

CHAPTER

51



MAINTENANCE MANUAL

TEMPORARY REVISION NR. DFW 51-4

INSERT FOLLOWING SUBCHAPTER 51-5-0, PAGE 226

REASON FOR CHANGE: TCA RVSM Implementation and Autopilot Replacement -
Phase II

INSTRUCTION: Insert updated page block.

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NOTE: The insertion of this TR has to be listed in the Record of Temporary Revisions at the beginning of Volume 1.

TCA: LX-N20199

RTCA: LX-N19997, LX-N20000

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SEE LAST PAGE OF LIST		711	MAY 15/66			51- 3- 0	
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		703	APR 15/70			8B	BLANK
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STRUCTURES - DESCRIPTION AND OPERATION

1. General

- A. The airplane structure in general is fabricated with materials which provide the strongest, yet lightest structure possible. The most prominent materials used, are 2024, 7075 and 7178 aluminum alloys, together with steel, titanium, and magnesium alloys where appropriately advantageous to strength, endurance, weight and heat protection. Protection against complete structural failure is a foremost consideration throughout the design to provide the structure with long service life. This is achieved in three different ways: first, by proper selection of material, especially in high load areas, to provide a consistent slow rate of crack propagation, and high residual strength; second, by providing multipath structure on the airplane such that the loss of any one segment would not endanger the airplane; and third, by providing readily accessible structure which can be inspected and maintained properly. For structural assembly details, see figure 1.

2. Fuselage

- A. The fuselage is composed of three primary sections: control cabin, Sta. 178 to Sta. 360, main cabin, Sta. 360 to Sta. 1440; and tail section, which contains the empennage, Sta. 1440 to Sta. 1676. The fuselage is of semi-monocoque construction utilizing circumferential frames and longitudinal hat section stiffeners. The entire shell is pressurized from Sta. 178 to Sta. 1440, except for the nose gear wheel well, center wing, and main landing gear wheel wells. The salient design features within the fuselage which contribute to the fail-safe concept, are circumferential tear stopper straps, shear ties from skin to frames, multiple load path structure and the division of critical members into several elements.

3. Wing

- A. The wing is a full-cantilever, semi-monocoque, cellular structure, tapering in both planform and depth. Its five main spanwise divisions include the wing center section, two inner wing sections, and two outer wing sections including wing tips. The wing box itself forms a series of integral fuel tanks, except in the center section where conventional bladder type fuel cells are used. The primary beam structure is a distributed flange, two spar tapered box beam divided into spanwise sections by inspar ribs. The wing skins are either constant thickness, roll tapered or machine sculptured sheets, stiffened by Z-section stringers. The secondary structure is cantilevered from the main beam and consists of the leading edge and trailing edge assemblies and support structure for the control surfaces, which consist of four double slotted type wing flaps and two fillet flaps, two inboard ailerons and eight spoilers. Bonded or honeycomb type structure is used extensively in the trailing edge and control surfaces for light weight and structural strength. The wing is structurally attached to the fuselage at Sta. 600K and Sta. 820 (BL 70.5) by means of two shear pins through

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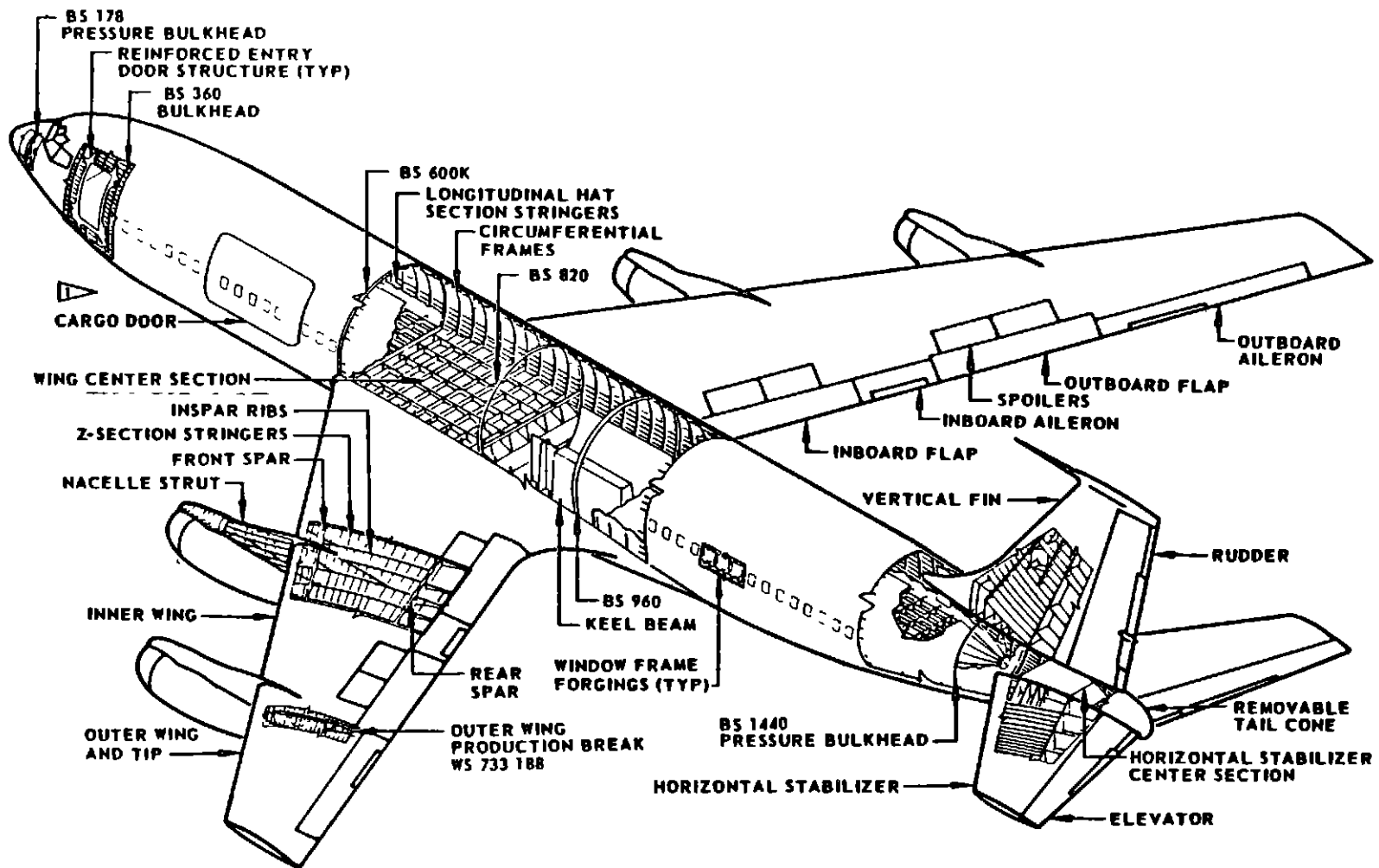
front and rear spar and fuselage fittings. See figure 2. A continuous tie in the form of a keel beam connects the wing center section on the lower surface to the fuselage.

4. Engine Nacelle Strut

- A. The engine loads are transmitted to the wing by three beams which form the main structural components of the engine nacelle strut. Access panels within the strut fairing provide access to wiring, plumbing and attachment fittings.

5. Empennage

- A. The empennage comprises a dorsal and a vertical fin, an adjustable horizontal stabilizer, rudder, elevators, trim tabs, and a ventral fin on airplanes OO-SJA thru OO-SJG.
- B. Left and right horizontal stabilizers are removable from the adjustable center section torque box located within the fuselage. This center section is movable, pivoting on two self-aligning bushing-type hinge joints attached to a heavy bulkhead in the fuselage. Each stabilizer consists of two spars with interconnecting ribs and skin forming a box beam structure. The leading edge, except for a short length near the fuselage and stabilizer tip, is removable.
- C. The elevators are metal bonded skin covered, monospar, and rib structures, containing balance panels, stabilizer actuated elevator tab and elevator control tab. Honeycomb type structure is used extensively in the tabs.
- D. The main structural member of the vertical fin is a box beam composed of front and rear spars, interconnecting ribs and skin. The leading edge is removable except for a short length above the dorsal fin. The fin and rudder may be folded to the right or may be removed.
- E. The rudder is a metal bonded, skin covered, monospar and rib structure containing balance panels and one control tab. Honeycomb type structure is used extensively in the tab.



△ CARGO AIRPLANES

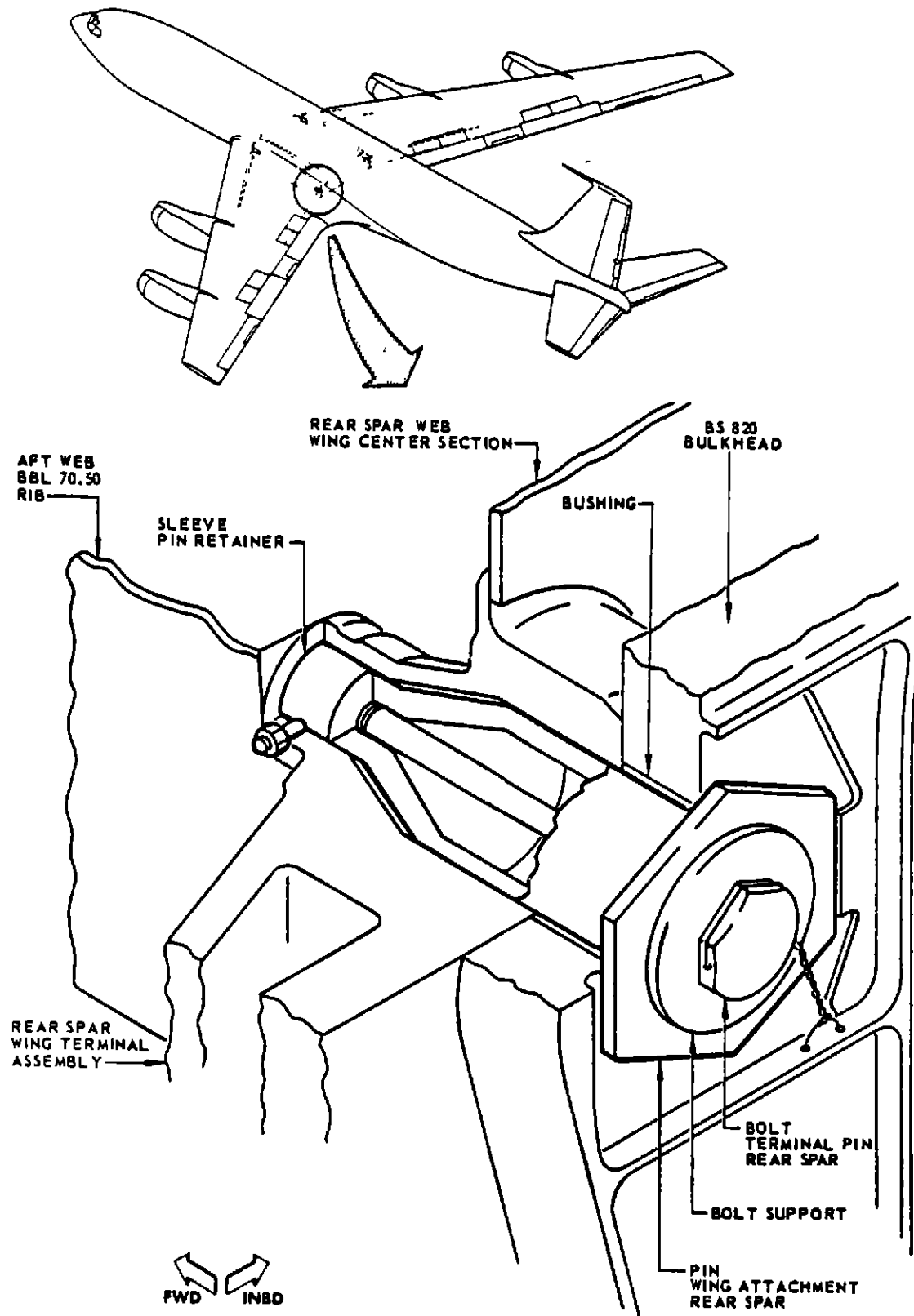
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Airplane Structure Assembly
Figure 1

51-1-0
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STRUCTURES
Structures - General
Description and Operation



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INTERIOR AND EXTERIOR FINISHES - DESCRIPTION AND OPERATION

1. General

- A The structure of the airplane is protected from corrosion by the application of various finishes. The finish applied depends upon the material and upon whether the surface is an interior or an exterior surface.
- B. The exterior surfaces of the airplane are defined, for the purposes of this subject, as follows:
 - (1) All aerodynamic surfaces, with all doors and hatches closed.
 - (2) All exposed areas of the control surfaces in their extended or deflected positions, together with their supports.
 - (3) All areas of the fixed leading edge exposed by the extension of the leading edge slats.
 - (4) The landing gear in the extended position.
- C. Interior aluminum structure is either anodized or alodized and is additionally treated with one coat of primer. Anodizing is a chromic acid electrolytic process and is a basic finish on aluminum parts. Alodizing is an alternative basic finish and consists of a chemical coating which may be applied by immersion or brushing. Exterior clad aluminum surfaces are generally alodized with clear Alodine. Exterior nonclad aluminum surfaces are generally anodized.
- D. Interior and exterior steel surfaces, other than stainless steel, are treated with a basic finish of electroplate, which may be cadmium, nickel, chromium or silver; the most extensively used is cadmium. Magnesium surfaces are basically finished either by anodizing or chemical treatment.



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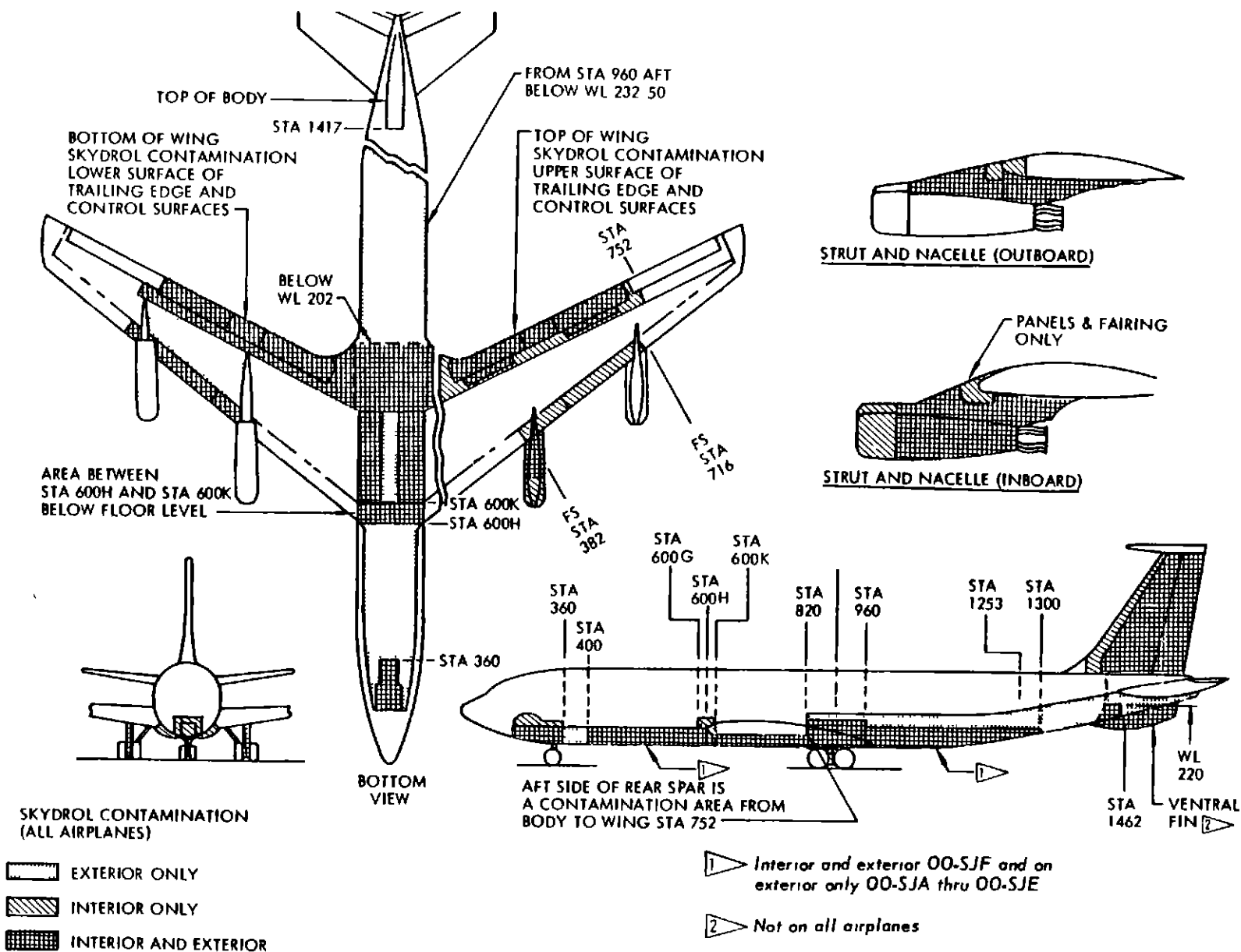
- E. The standard primer used, where applicable, throughout the airplane is BMS 10-11, Type 1. This is a chemical and solvent resistant, green colored, organic finish which may be applied by spray or brush.
- F. A coat of white enamel, BMS 10-11, Type 2, is applied over the primer in several areas. This provides additional protection from the effects of certain fluids which may collect in the lower structure. The white color also serves to provide better visibility for maintenance purposes.
- G. The integral wing tank lower surfaces (tank bottom and 2 inches up on the sidewalls), area around tank vents and tank faying surfaces, in addition to being anodized or alodized are overcoated with an application of urethane primer, BMS 10-20, or EC776SR (MIL-S-4383) which is not a faying surface primer. This special treatment protects the structure from the corrosive effects of the micro-organisms which exist in fuel. Refer to Chapter 28, Fuel Leak Detection and Fuel Leak Repair.

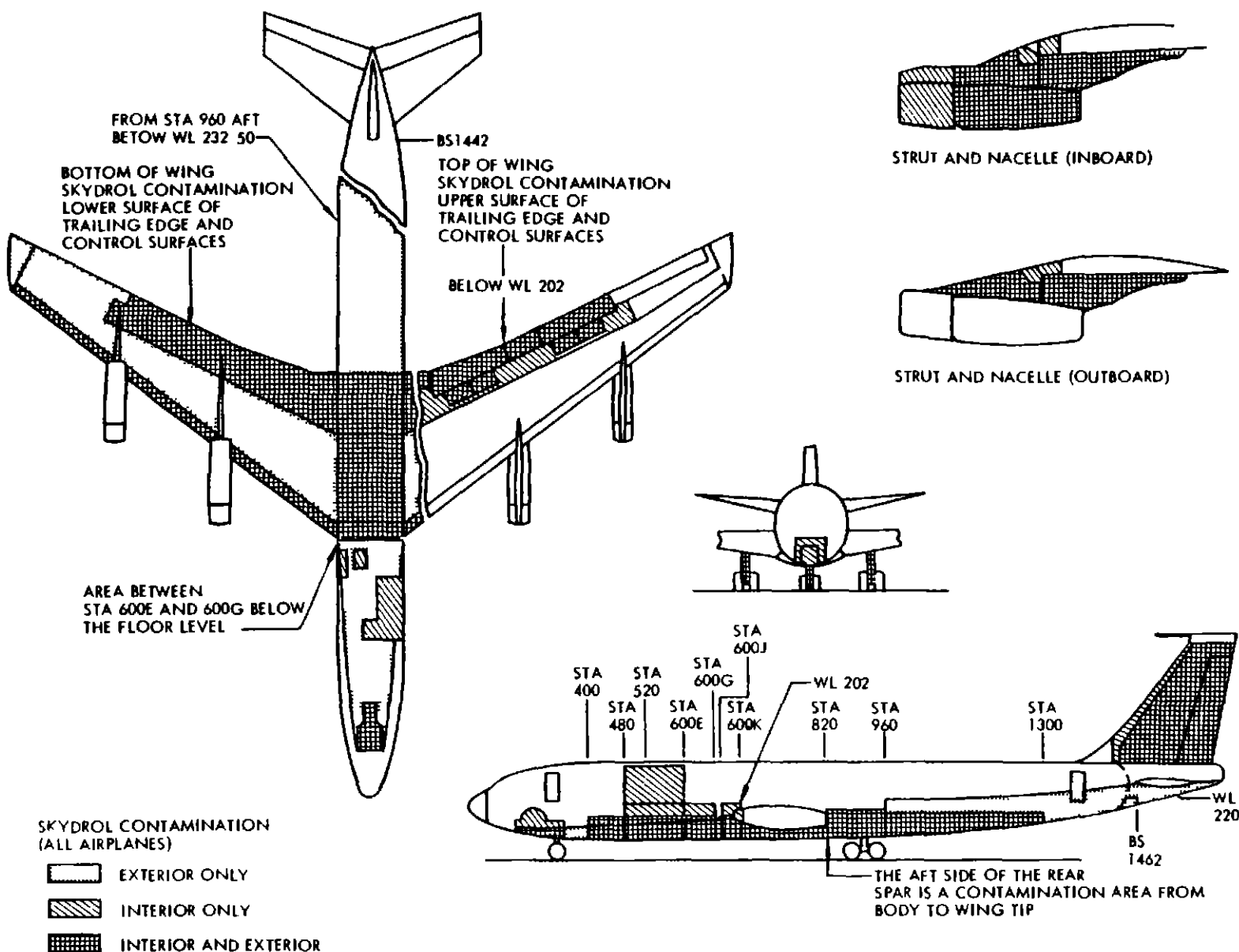
2. Skydrol 500 Contamination Areas

- A. Certain areas on the airplane are subject to contamination by Skydrol. Refer to figure 1 for the locations of the possible Skydrol contamination areas.

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Anticipated Skydrol Contamination Areas
Figure 1 (Sheet 1)







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TEMPORARY REVISION NR. DFW 51-02

INSERT FACING TO SUBCHAPTER 51-2-0, PAGE 701

REASON FOR CHANGE: Possible fuselage skin cracking resulting from scribe lines.

INSTRUCTION: Insert updated page.

NOTE: The insertion of this TR has to be listed in the Record of Temporary Revisions at the beginning of Volume 1.

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INTERIOR AND EXTERIOR FINISHES CLEANING AND PAINTING - GENERAL

1. General

- A. Protective and exterior decorative finishes maintenance practices are covered in the following sections.
- B. Certain processes, requiring the use of a powder in which some from of chromic acid is present, can constitute a fire hazard unless proper precautions are taken. Alodine powder is such a substance and it can ignite if it is allowed to make physical contact with organic solvents or combustible solid materials such as paper or rags. Other processes which, though not described in this manual, use similar hazardous powder, include chromic acid anodizing, chromium plating, Dow 17 magnesium coating and Iridite, which is an aluminum corrosion coating, MIL-C-5541, alternative to alodizing.
- C. Before paint is applied to any surface on the airplane the surface must be prepared to receive the paint. The surface must be dry and free of any dust or oily residue. Therefore, it is essential that the processes required for the preparation of metal surfaces be strictly adhered to if a durable paint application is to be made. The particular paint stripping compounds specified will provide maximum efficiency for ordinary field work and care must be taken when other strippers are used as they may be corrosive towards aluminum, magnesium, cadmium and steel. Where the surface conversion coating has been damaged or penetrated during corrosion removal, brush alodizing is to be applied to provide a receptive surface for painting and to protect the base metal. The Alodine 1200S coating may have a golden iridescent color which may vary with different alloys and processing conditions. The Alodine 1000 is a clear coating for use on clad aluminum alloy parts and is not recommended for use on magnesium or magnesium alloys. All magnesium is to be treated with Dow 19.

CAUTION SHARP KNIVES OR OTHER TOOLS THAT CAN DAMAGE THE SKIN PANEL ARE NOT ALLOWABLE TO REMOVE SEALANT, PAINT OR TRIM DECALS
EXTREME CAUTION HAS TO BE TAKEN TO AVOID DAMAGE TO SKIN PANELS SUCH AS SCRIBE LINES
SCRIBE LINES CAN WEAKEN THE STRUCTURE AND CREATE CRACKS

NOTE A scribe line is defined as a narrow, shallow line of damage (typically between 0.001 to 0.006 inch deep) usually associated with the removal of a fillet seal, or other trimming operations (such as decals). Scribe lines that create a potential safety concern are generally long continuous scratches or several scratches in a critical orientation at specific locations with relatively high stresses.

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INTERIOR AND EXTERIOR FINISHES CLEANING AND PAINTING - GENERAL

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- D. The following safety precautions shall be taken when applying solvents, cleaners, strippers, etchants or conversion coatings.
- (1) Avoid prolonged breathing of solvent vapors. Solvents must not be used in confined spaces without adequate ventilation or approved respiratory protection.
 - (2) Avoid prolonged or repeated contact of solvents, cleaners, etchants, or conversion coating materials with skin. Rubber or plastic gloves should be worn when using solvents or cleaners and shall be worn when using paint strippers, etchants or conversion coating materials. Goggles or plastic face shields, rubber raincoats and rain hats shall be worn when cleaning, stripping, etching or conversion coating overhead surfaces.
 - (3) Any paint stripper, etchant or conversion coating material on the skin should be washed off immediately with water.
 - (4) Materials splashed in the eyes must be flushed out promptly with water and the injured person sent for medical attention.

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EXTERIOR DECORATIVE FINISHES

1. General

A. Exterior decorative finishes, including markings and insignia, are shown on BAC drawings as follows:

PAA	- 65-2001
TWA	- 65-2003 (707-331/-331B)
AF	- 65-19046
SABENA	- 65-19047
BOAC	- 65-19050
DLH	- 65-19048
AIJ	- 65-19049
VARIG	- 65-19051
SAA	- 65-19053
EL AL	- 65-15511
USAF	- 65-21880
TWA	- 65-21887 (707-331C)
WAI	- 65-21885
NWA	- 65-15512
AA	- 65-2002
IIA	- 65-21888
QANTAS	- 65-39837
CAL	- 65-2006
TAP	- 65-47162
QA	- 65-51836
FTL	- 65-45914
BNF	- 65-52380
PIA	- 65-21881
AR	- 65-56840
AFA	- 65-58664

CORROSION REMOVAL AND CONTROL - CLEANING/PAINTING

1. General

- A. Any structural part which has been subject to corrosive action must be carefully examined to determine its structural integrity. Corroded parts should be removed and if salvageable reworked. The same type of protective finish which was previously on the part should be reapplied. If it is not possible to remove the structurally sound part, specific treatments according to the type of material and degree of corrosion are to be applied.

WARNING: MANY MATERIALS USED TO IMPLEMENT THIS PROCEDURE ARE TOXIC, FLAMMABLE OR IRRITATING. AVOID BREATHING SOLVENT MISTS. PROVIDE ADEQUATE VENTILATION. AVOID PROLONGED CONTACT OF MATERIALS WITH THE SKIN. DO NOT GET IN EYES. USE PROTECTIVE EQUIPMENT AS REQUIRED. KEEP SOLVENTS AWAY FROM ALL SOURCES OF IGNITION.

CAUTION: ACID BRIGHTENERS AND PHOSPHORIC ACID CORROSION REMOVERS SHOULD NOT BE ALLOWED TO COME IN CONTACT WITH TEFLON LINED SELF-LUBRICATED BEARINGS OR ELECTRICAL TERMINAL PLUGS. CHEMICALS IN THESE MATERIALS WILL ATTACK COMPONENTS.

- B. Corrosion removal and control procedures listed in this section are applicable to all areas except the wing upper inspar surface as defined in 51-2-12, Cleaning/painting. Procedures apply only to light corrosion. For severe corrosion removal, refer to Structural Repair Manual.
- C. In removing corrosion products it is of utmost importance for the removal to be complete. Failure to remove all residues permits corrosion action to start again after affected areas are refinished. For limits of corrosion removal, refer to Structural Repair Manual.
- D. Areas to be treated for corrosion must be free of oil, grease, dirt and paint.
- E. Acid brighteners for aluminum have significant activity in not only removing corrosion but also the metallic surface and should therefore be used infrequently and only as required. Phosphoric acid type corrosion removers, on the other hand, are milder and while not effective in removing heavy corrosion do not appreciably attack the metallic surface.

2. Equipment and Materials

- A. Cheesecloth or new rags
- B. Cleaning brushes - nylon and wire

C. Aluminum wool and steel wool.

D. Aluminum oxide paper -220 and 400 grit.

E. Polish - per QPL-6888, under MIL-P-6888 (REF 13-1-3).

F. Acid brighteners for aluminum (Ref 13-1-4).

NOTE: The following materials must be diluted with three parts water prior to use.

(1) Kelite L-20.

(2) Metal Glo N°2.

G. Phosphoric acid type corrosion removers for aluminum (Ref 13-1-4).

(1) Kelite "process K".

NOTE: Before use, dilute with 8 parts water.

(2) Oakite 36.

NOTE: Before use, dilute with 4 parts water.

(3) Turco "W.O. N° 1".

NOTE: Before use, dilute with 6 parts water.

H. Phosphoric acid type corrosion removers for steel (Ref 13-1-4).

NOTE: The following materials must be diluted with 3 parts water before use.

(1) GMC 801

(2) Kelite "Process K".

(3) Oakite 31.

(4) Turco "Prepaint".

I. Nitric acid, concentrated - Federal Specification O-A-88 (commercially available).

J. Alodine 30 and 1200S (Ref 13-1-4).

K. Dow 1 and 19 solutions (Ref 13-1-4).

L. Sodium dichromate or potassium dichromate

M. Chromic acid

N. Powdered calcium sulphate

3. Aluminum Corrosion Removal

A. General Exterior Skin Corrosion (brightening of aluminum)

- (1) Place the airplane in a suitable location, which will allow rapid and thorough rinsing of all surfaces.
- (2) Remove grease, oil and loose paint (Ref Chapter 12, Cleaning, and 51-2-21, Cleaning/painting).
- (3) Dilute acid aluminum brighteners per list in equipment and materials paragraph.
- (4) Apply liberally to small areas starting from lower surfaces and working upwards so that there will be no runs to cause streaks.

CAUTION: KEEP SOLUTION OFF NONCLAD ALUMINUM ALLOYS, STEELS HEAT TREATED OVER 180,000 PSI, MAGNESIUM, FABRIC AND PLASTIC. IT IS NOT NECESSARY TO MASK FABRIC OR PLASTIC SURFACES, BUT THE BRIGHTENING SOLUTION SHOULD BE WASHED OFF PROMPTLY AND NOT ALLOWED TO DRY.

- (5) Leave solution on surface for 5 to 30 minutes, depending on the temperature and amount of corrosion present.

CAUTION: DO NOT LEAVE ON LONGER THAN ~~NECESSARY~~ TO DISSOLVE CORROSION, AND IN NO CASE LONGER THAN 30 MINUTES.

NOTE: Avoid corrosion removal at temperatures above 100° F and below 45° F.

- (6) Agitate solution occasionally with a brush, preferably nylon.
- (7) Keep surface wet with solution.
- (8) Apply a light water spray during final brush agitation, unless there is no danger of solution drying and causing streaking.

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- (9) Follow with a very thorough high pressure water rinse.
- (10) Repeat steps (3) thru (9) on remaining portions of the airplane, working upwards so as to minimize streaking.

NOTE: Select small enough working areas so that the solution does not have chance to dry. Overlapping will not cause streaks unless solution dries.

- (11) Rinse treated area plus adjacent areas to assure complete and overlapping rinsing.

NOTE: Intensive housing is to be applied in wheel well areas, skin seams and other cavities where solution may have entered.

- (12) Brush alodize (Alodine 1200S) areas of clad and nonclad aluminum which are to be painted.
- (13) Brush alodize (Alodine 1000) areas of clad aluminum which are not to be painted.

NOTE: After corrosion removal, all nonclad areas must be refinished using Alodine 1200S plus either two coats BMS 10-11 primer or one coat primer followed by one coat BMS 10-11 enamel, or BMS 10-60 enamel, to match surrounding surface.

B. Light Skin Corrosion (aluminum)

NOTE: Optional to par. A.

- (1) Preferably remove corrosion mechanically with an approved aircraft polish.
- (2) After polishing, remove residues from surface, recesses and corrosion pits by means of solvent, or by use of a solvent alkaline or emulsion cleaner followed by a thorough water rinse (Ref Chapter 12, Cleaning and Washing).
- (3) Apply phosphoric acid corrosion remover, suitably diluted with water.
- (4) Rinse as in step A.(11).

4. Magnesium Corrosion Removal

- A. Remove most of the corrosion with aluminum wool and a stiff-fiber brush, or if necessary use aluminum oxide abrasive, 220 grit or finer. Do not use silicone carbide abrasive.
- B. Mask off other materials and parts, especially bearings and cast or pressed-in inserts, against contact with the treating solution or its fumes.
- C. Dissolve corrosion from pits with Dow 1 solution as follows:
 - (1) Brush on generous quantities of a freshly prepared Dow 1 solution containing 1-1/2 pounds of sodium dichromate and 1-1/2 pints of concentrated nitric acid per gallon.
 - (2) Wipe dry, rinse with clean water, and again wipe dry.
- D. Treat with Dow 19 solution as follows:
 - (1) Prepare solution in clean glass or plastic container by adding in order given: 1-1/3 ounces Chromic Acid (CrO_3), 1 ounce powdered Calcium Sulfate ($\text{CaSO}_4, 2\text{H}_2\text{O}$), and 1 gallon of water. Stir for at least 15 minutes then allow to settle. Prior to use, the clear solution is poured off and must be free of suspended material when applied.
 - (2) Apply solution by swabbing until the surface becomes dull golden to dark brown in color. Use caution in applying the solution as severe rubbing of the wet surface will damage the coating.
 - (3) Rinse with clean water.
 - (4) Dry with circulating air, 180° F max temp or by a mild blast of filtered compressed air.
- E. Apply following protective finish as soon as possible to avoid soiling scuffing or initiation of new corrosion:
 - (1) Apply two coats BMS 10-11, type 1, primer.
 - (2) Apply one coat BMS 10-11, type 2, enamel, or BMS 10-60 enamel, if part is located on airplane exterior.

5. Steel Corrosion Removal (Steel Parts Heat-Treated to 180 ksi or less)

NOTE: When heat-treat of a specific part is unknown or doubtful, treat as though over 180 ksi per par. 6 and do not treat with acidic materials.

- A. Remove loose rust with steel wool and wire brush.



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- B. Dissolve the remainder of the rust with Kelite Process K, Greater Mountain Chemical 801, Oakite 31 or Turco Prepaint, diluted one part to three parts of water.

CAUTION: CONFINE THE SOLUTION TO THE VICINITY OF THE RUSTED AREA AND ALLOW TO REMAIN SEVERAL MINUTES OR UNTIL A GRAY COATING IS OBSERVED.

C. Rinse with clean water.

D. Wipe with a damp cloth, and allow to dry. Force dry, if possible.

E. Apply protective finish without unnecessary delay as follows:

(1) Apply one coat of BMS 10-11, type 1 primer.

(2) Apply one coat of BMS 10-11, type 2 enamel, or BMS 10-60 enamel.

6. Steel Corrosion Removal (Mandatory for Parts Heat-Treated over 180 ksi, Optional for Parts Less than 180 ksi)

A. Remove corrosion by abrading with 220 or finer abrasive paper or dry abrasive blast.

B. Solvent clean.

C. Apply protective finish as follows.

NOTE: Metal is quite reactive after blasting. Primer coats must be applied within 1 hour after sanding or blasting.

(1) Apply one coat of BMS 10-11, type 1 primer.

(2) Apply one coat of BMS 10-11, type 2 enamel, or BMS 10-60 enamel.

7. Corrosion Removal from Corrosion Resisting Steels (all types), Nickel-Base Alloys, and Titanium.

A. Remove corrosion by abrading with stainless steel wool, stainless steel wire brush, fine abrasive paper or abrasive blasting.

NOTE: Abrade slightly beyond the point of removal of visible corrosion to ensure that no corrosion products remain.

B. Polish with 400 grit aluminum oxide paper to remove scratches.

C. Remove residues with solvent alkaline cleaner followed by water rinse and dry air blast.

D. Apply one coat of BMS 10-11, type 1, primer.

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SKIN AND FASTENER CORROSION CONTROL - CLEANING/PAINTING

1. General

- A. The following skin and fastener corrosion control procedures are applicable to the wing upper inspar surface, beavertail areas and wing center section lower skin, which forms upper surface of ram air inlet duct, as shown in Fig. 701. Refer to 51-2-11, Cleaning/Painting for general corrosion removal procedures.

WARNING: FINISHES, CLEANERS, THINNERS, AND SOLVENTS USED IN THIS SUBJECT CONTAIN TOXIC AND FLAMMABLE COMPONENTS. AVOID BREATHING VAPORS AND MIST. USE WITH ADEQUATE VENTILATION. PROVIDE APPROVED RESPIRATORY PROTECTION AS REQUIRED. DO NOT GET IN EYES. AVOID CONTACT WITH SKIN AND CLOTHING. USE PROTECTIVE EQUIPMENT AS REQUIRED. KEEP FLAMMABLE MATERIALS AWAY FROM SOURCES OF IGNITION.

NOTE: The corrosion preventive paint application procedures are applicable in general to airplane exterior, if required.

If Corogard is not available, use BMS 10-79 epoxy primer and BMS 10-60, Type II, polyurethane enamel as replacement (Ref 51-20-151, Cleaning/Painting). Remove Corogard and zinc chromate primer system to bare metal with MEK and paint stripper. Remove Corogard and epoxy primer system to epoxy primer with MEK. BMS 10-60, Type II, system does not adhere to Corogard, so overspraying should be kept to a minimum. Some differences in color and surface finish may be expected.

- B. Airplanes, as delivered, have one of two primer systems consisting of either MIL-C-8514 wash primer coated with MIL-P-8585 zinc chromate primer, or BMS 10-11, type 1 and BMS 10-20 (epoxy) primer.
- (1) MIL-C-8514 wash primer and MIL-P-8585 zinc chromate primer can be readily stripped to bare metal with chemical paint strippers per 51-2-21, Cleaning/Painting.
 - (2) BMS 10-11, type 1 and BMS 10-20 primers cannot be readily stripped with chemical strippers. However, it is not necessary to strip these epoxy base primers down to bare metal prior to application of finish coating.
- C. Refer to Structural Repair Manual for limits concerning corrosion removal.

2. Inspection/Check

- A. Check for steel fastener head rusting and for discoloration of adjacent anodized skin, indicating skin corrosion. If corrosion exists, accomplish repair per par. 3.

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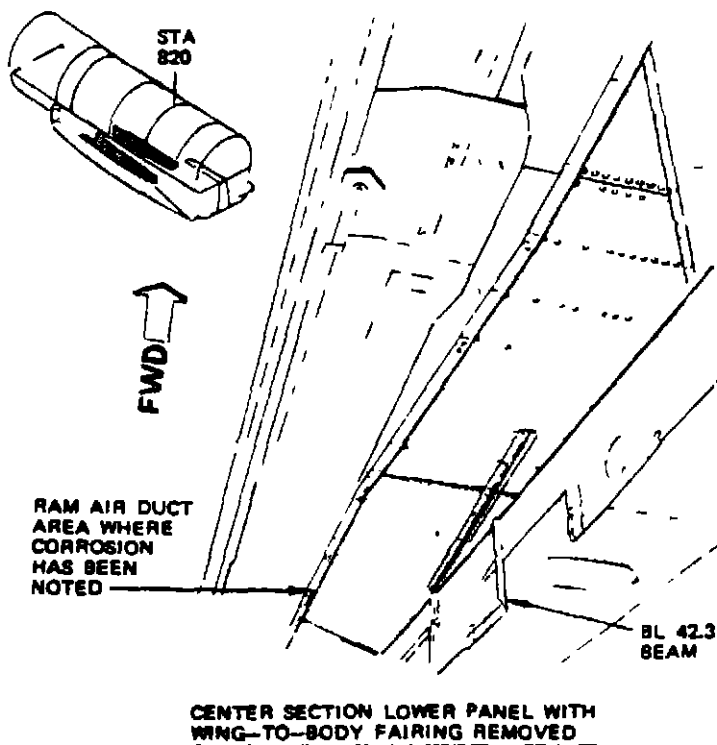
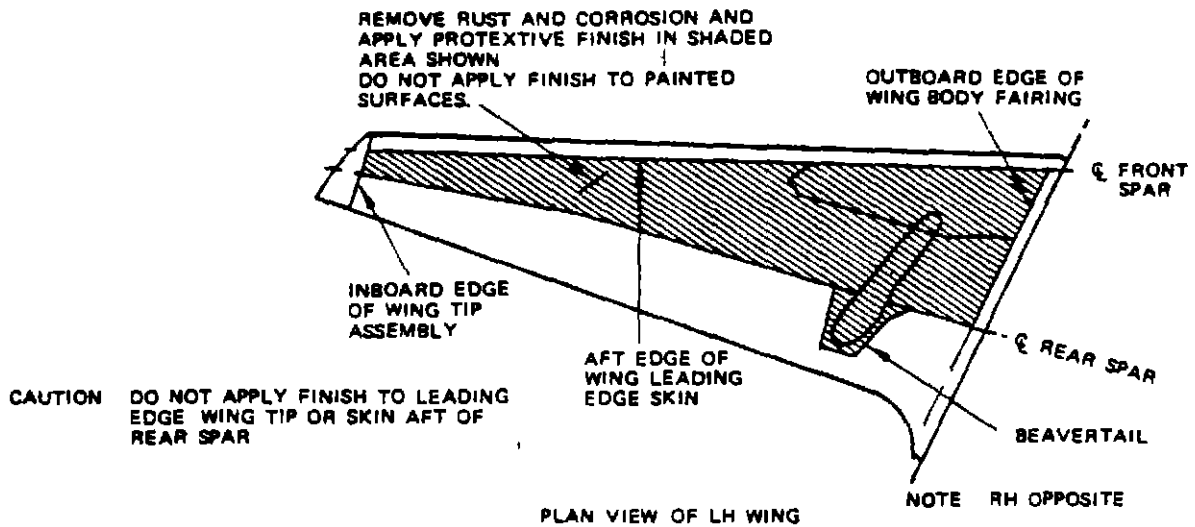
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3. Approved Repairs

A. Rust and Corrosion Removal

(1) Equipment and Materials

(a) Hardwood scraper



Skin and Fastener Corrosion Control Location

Figure 701
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- (b) Methyl Ethyl Ketone
- (c) Portable Blaster, "Educ-O-Matic ELOA", Clementina Ltd., San Francisco, California, or equivalent
- (d) Aluminum Oxide Grit, No 154 (600-4F mesh)
- (e) Aluminum Oxide Paper or Cloth, 240 grit
- (f) Magnifying Glass (5X to 10X magnification)

(2) Remove Rust and Corrosion

NOTE. If depth of corrosion exceeds 10% in skin less than 0.25 inch thick, or exceeds 0.025 inch in skin thicker than 0.25 inch, report location and extent of corrosion to The Boeing Company for evaluation of allowable rework.

- (a) Remove previously applied corrosion preventive paint in corroded area. See 51-2-21, Paint Stripping
- (b) Remove previously applied fastener sealant with hardwood scraper and methyl ethyl ketone.
- (c) Grit blast rusted fastener heads and limited surrounding skin area. If skin corrosion is noted, grit blast as required to remove corrosion. Avoid blasting of larger skin area than required to remove corrosion.

NOTE. Mask all openings to fuel tank to prevent entry of grit into tank. As an option, rust and corrosion may be removed with 240 grit aluminum oxide paper or cloth.

- (d) After removing rust and skin corrosion inspect countersunk area surrounding fastener heads for corrosion, using a 5X to 10X magnifying glass.

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- (e) If corrosion in the countersunk area is detected, remove the affected fasteners and remove the corrosion as follows:

- 1) Spotface the skin at the fastener location to maximum depth of 0.025 inch. The spotfaced diameter should be determined by the extent of the corrosion involved.
- 2) Countersink the fastener hole with a 100° countersink as required to suit the diameter of the fastener head and flushness requirements.

CAUTION: TO PREVENT SKIN SHIFTING REMOVE ONLY ONE ROW OF RIVETS AT A TIME IN A MULTIPLE ROW FASTENER CONFIGURATION AND REPLACE THE FASTENERS BEFORE REMOVING THE NEXT ROW. IN A SINGLE ROW CONFIGURATION, REMOVE AND REINSTALL ALTERNATE FASTENERS.

B. Cleaning Skin Prior to Alodine Treatment

(1) Equipment and Materials

- (a) Solvent Alkaline Cleaner (Wyandotte Aerowash A, Cee Bee Alumiloy P, GMC 528B)
- (b) Water (no more than 150 ppm totally dissolved solids)
- (c) BMS 3-2 Type I Solvent (TT-N-95 naphtha or 100°F flash Stoddard solvent)
- (d) Soft Bristled Brushes

(2) Clean Skin

- (a) An effective Alodine treatment can be achieved only on a properly cleaned surface. It is therefore mandatory to follow the cleaning procedures exactly.

1) Solution preparation

- a) Prepare the cleaning solution by using one part, by volume, solvent alkaline cleaner to two parts water and five to six parts BMS 3-2 Type I solvent.

(b) Environment

- 1) Park aircraft in shade and electrically ground. - See Chapter 13, Static Grounding



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(c) Application

- 1) Apply cleaner and allow to soak for a minimum of ten minutes. Reapply cleaner as necessary to prevent drying of the solution on the skins. After the soak period scrub vigorously with soft bristled brushes. Special attention shall be directed to scrubbing the countersink areas and around rivet heads. Rinse thoroughly with water. Use high pressure rinse if possible. Check for water breaks. If water breaks are observed repeat cleaning cycle.

NOTE. A water break free surface is defined as a surface which when wetted with rinse water (100°F maximum) either by immersion or spraying, will maintain a continuous film of water for a minimum of 30 seconds. Sharp breaks in the water film or evidence of residue registers failure of the test and an unclean surface.

C Brush Alodine Treatment

- (1) Alodine 1200 or 1200S (interchangeable) treatment shall be applied to all reworked steel fastener heads and the surrounding bare aluminum skin surfaces. See 51-2-31, Alodizing.

D. Fastener Sealant Application

(1) General

- (a) Sealant shall be used to build up reworked areas flush with aluminum skin and under heads of newly installed fasteners. An extremely clean Alodined surface is required for adhesion.

(2) Equipment and Materials

- (a) Methyl Ethyl Ketone or Trichloroethylene
- (b) Clean Cloths
- (c) BMS 11-7 Solvent
- (d) Sealant, PR 1422 Class A, Parts A and B
- (e) Sealant, PR 1422 Class B, Parts A and B
- (f) Sealant, PR 1432, Parts A and B
- (g) Extrusion Gun or Spatula
- (h) Fairing Tool, Plastic Scraper or Duckbill Nozzle

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- (i) Knife made from 2024 Sheet with a Bevelled Cutting Edge
- (j) Pressure Spray Equipment - Standard Type
- (k) Thinner, Toluene - TT-T-266a
- (l) Fine Sandpaper
- (m) Aluminum Oxide Grit Cloth
- (n) Gum Rubber Buffing Wheel
- (3) Apply Fastener Sealant
 - (a) Cleaning for sealant adhesion
 - 1) Fasteners
 - a) Remove lubricant from new fasteners prior to installation with methyl ethyl ketone or trichloroethylene.
 - 2) Countersinks and other reworked areas
 - a) Remove lubricant and other soil from countersinks and other reworked areas by wiping lightly with clean cloths dampened with HMS 11-7 solvent. Wipe surfaces dry with clean cloths before fastener and sealant installation.
 - (b) Sealant application
 - 1) Mixing
 - a) Thoroughly mix the sealants per the manufacturer's instructions. The mixing ratios by weight are as follows:
 - PR 1422 Class A - 1 part A (accelerator) to 10 parts B (base)
 - PR 1422 Class B - 1 part A (accelerator) to 7-1/2 parts B (base)
 - PR 1432 - 1 part A (accelerator) to 15 parts B (base)
- NOTE:** The PR 1422 Class A and Class B can be obtained with a working life of either 1/2 or 2 hours. The PR 1432 has a working life of 1 hour. Mix only the quantity which can be used within the application time of the sealant.



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2) Fastener application

- a) Apply a small bead of mixed PR 1422 Class B sealant to either the countersink area or underhead side of head of fastener and install the fastener immediately. Remove excess sealant with cloths dampened with methyl ethyl ketone.

3) Application to reworked areas

- a) Apply a brushcoat of mixed PR 1422 Class A sealant to the reworked area. Brush well into the crevice around the fasteners. A continuous coat is required on the reworked surface.
- b) Apply a mixed PR 1422 Class B sealant over Class A sealant with an extrusion gun or spatula. Fair out the sealant with a fairing tool, plastic scraper or duckbill nozzle so that the surface of the sealant is slightly below the surface of the adjacent wing skin. Use a spatula or fairing tool to work out air bubbles in the sealant.

NOTE: If difficulty is experienced in spreading and fairing out the B type sealant, the following alternate method may be used. Apply the PR 1422 Class B sealant thickly and well above the contour of the wing surface, allow to cure, then pare it off to wing surface with a knife made from 2024 sheet with a bevelled cutting edge.

- c) Apply mixed PR 1432 by spray until the reworked area is completely filled with the sealant extending over the edge of the reworked area and feathered

NOTE: The PR 1432 sealant can be sprayed with standard type pressure spray equipment. An external mix spray gun with an orifice diameter of at least 0.085 is recommended. An atomizing pressure of approximately 35 psig is required to provide proper breakup of the coating. The pressure in this range should be adjusted by the applicator in order to obtain the most favorable pressure. If difficulty is experienced in spraying the PR 1432 sealant, it may be thinned by adding 10% toluene by volume to base material. Mix and then add accelerator. Keep mix agitated and cut spray life down to 1/4 hour. Keep remaining 1 hour life mix in cold box at 50°F.

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4) Cure

a) Allow the sealant to cure as follows.

<u>Temperature</u>	<u>Relative Humidity</u>	<u>Time</u>
75°F	50%	72 Hours
120°F	50%	18 Hours

5) Sanding

The cured sealant can be faired out and irregularities smoothed by sanding lightly with a fine sandpaper, cloth (aluminum oxide grit) or with a gum rubber buffing wheel. Any Alodine coating that is damaged by sanding shall be repaired.

E. Corrosion Preventive Paint Application

(1) General

(a) The paint treatment consists of the application of wash primers, zinc chromate primer and aluminized coating EC-843 or EC-843S Corogard.

(2) Equipment and Materials

(a) Wash Primer, MIL-C-8514

(b) Zinc Chromate Primer, MIL-P-8585, color Y

(c) Aluminized Coating

- 1) EC-843 Corogard with EC-1101 aluminum powder (12.5 oz of powder per gallon of resin)
- 2) EC-843S Corogard with EC-1101 aluminum powder (9.0 oz of powder per gallon of resin)

(d) Thinners and Solvents

- 1) Ethyl alcohol, MIL-A-6091, or OE-760B, Grade III, or denatured alcohol
- 2) Butyl alcohol, TT-B-846



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- 3) Toluene, TT-T-548
 - 4) Methyl isobutyl ketone, TT-M-268
 - 5) BMS 3-2 solvent, optional, TT-N-95 naphtha
 - 6) Normal butyl acetate, TT-B-838
 - 7) Lacquer thinner, TT-T-266a
- (e) Clean, Lintless Cloth
 - (f) Stainless Steel Pressure Pot Liners and Mixing Equipment
 - (g) Varnish or Linseed Oil Type Tack Rags
 - (h) Abrasive Paper, 400 grit or finer and 280 grit or finer
 - (i) Metal Sieve, 60-80 mesh.
 - (j) Corogard Paint Application Equipment
 - 1) For EC-843, use a DeVilbiss MBC or JGA gun, EX needle and tip, 30 or 36 air cap, or Binks No. 18 gun, 66 x 66, SD nozzle assembly, or equivalent. Fluid pressure 10 to 20 psi and 60 to 70 psi atomization air.
 - 2) For EC-843S, use a DeVilbiss MBC or JGA gun, FX needle and tip, 704 or 765 air cap, or Binks No. 18 gun 63 x 63, FB nozzle assembly, or equivalent. Fluid pressure 10 to 15 psi and 50 to 55 psi atomization air.
- (3) Apply Corrosion Preventive Paint
 - (a) Surface preparation
 - 1) Immediately prior to application of wash primer, all loose dirt, dust, and lint shall be removed by wiping the surface to be painted with a clean, lintless cloth, wet with BMS 3-2 solvent or TT-N-95 naphtha and squeezed to remove the excess solvent. Change to a clean cloth as soon as soil appears on the cloth. Wipe dry with a clean, dry cloth before the solvent evaporates.

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(b) Mixing and application

1) Wash primer (MIL-C-8514)

NOTE: The wash primer is supplied in a two-component kit consisting of a resin base material (4 parts by volume) and an acid accelerator (1 part by volume).

- a) The wash primer base material and the acid accelerator shall be thoroughly and vigorously agitated just prior to mixing.
- b) Mix the wash primer by adding small amounts of acid accelerator to the base material with constant stirring. Do not add the base material to the accelerator. Immediately after mixing, the containers shall be time and date stamped. Allow the mixed wash primer to stand for 15 minutes before using.

NOTE: Mixed material has a usable pot life of four hours below 90°F and two hours above 90°F. Mixed material whose pot life has expired shall be scrapped.

- c) To prevent "cobwebbing" or "dry spray" thin the mixed wash primer with 50-50 mixture of MIL-A-6091 or OE-760B, Grade III ethyl alcohol or denatured alcohol and TT-B-846 butyl alcohol. The recommended volume of the ethyl alcohol/butyl alcohol mixture to add is approximately the same volume as the acid accelerator used.

NOTE: The spray equipment used for wash primer must be clean before use and should be flushed out with alcohol before and after use. Pressure pot liners and mixing equipment made of stainless steel will resist attack by the acid present in the wash primer.

- d) Spray apply the wash primer to a dry film thickness of 0.2 to 0.4 mils. A single wet spray pass should provide this thickness. Do not attempt to obtain full color hiding.

NOTE: Too thick a film shall be removed with alcohol immediately and replaced with a properly applied film.



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- e) Allow the wash primer to dry not less than 1.5 hours and not more than four hours before overcoating with zinc chromate primer.

NOTE: The wash primer coating shall not be topcoated until it is sufficiently hard to resist removal with the thumbnail. Under good painting conditions this should be after 1.5 hours drying. Primer films that are over four hours old shall be stripped using butyl alcohol or paint strippers. Reapply wash primer and allow to dry 1.5 to 4 hours before overcoating.

- f) Primer films that are soiled from dust, dirt, and paint overspray shall be carefully cleaned immediately prior to overcoating. Use normal varnish or linseed oil type tack rags or rags lightly wetted with butyl alcohol.

CAUTION BUTYL ALCOHOL WILL REMOVE THE PRIMER IF IMPROPERLY HANDLED.

- g) In addition to the above, the dry wash primer may be hand scuffed lightly with 400 grit or finer abrasive paper to obtain a smooth surface for overcoating. Use extreme care to prevent removal of the wash primer to the bare metal. If sanding is accomplished, clean surface as in step f) above to remove dust, dirt, etc.

2) Zinc chromate primer (MIL-P-8585)

- a) The zinc chromate primer shall be vigorously agitated prior to thinning and application.
- b) To obtain spray consistency, thin the zinc chromate primer with 2 to 2.5 parts, by volume, of TT-T-548 toluene to 1 part of primer. Always add the thinner to the paint slowly and with good agitation.
- c) Spray apply the zinc chromate primer to a dry film thickness of 0.2 to 0.4 mils.
- d) Allow the zinc chromate primer to dry not less than 1-1/2 hours and not more than 72 hours before overcoating with EC-843 or EC-843S Corogard.



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- e) The dry zinc chromate primer may be hand scuffed lightly with 400 grit or finer abrasive paper to obtain a smooth surface for overcoating.
 - f) Zinc chromate primer which is more than 72 hours old shall be removed and reapplied just prior to overcoating. Since stripping removes both wash primer and zinc chromate primer, reapplication of both is required.
 - g) Just prior to overcoating, lightly wipe the painted surfaces with a clean, lintless cloth wet with BMS 3-2 solvent or TT-N-95 naphtha and squeezed to remove the excess solvent.
- 3) Aluminized coating (EC-843 or EC-843S Corogard)
- NOTE: These materials are furnished in two component kits consisting of a resin component and an aluminum powder component (12.5 oz aluminum powder EC-1101 per gallon of resin EC-843 or 9.0 oz aluminum powder EC-1101 per gallon of resin EC-843S).
- a) Strain the resin component through a 60-80 mesh metal sieve into a pressure pot or mixer.
 - b) Place the aluminum powder in a separate container and prewet the powder by slowly adding sufficient methyl isobutyl ketone or resin component to form a uniform suspension.
 - c) Strain the aluminum powder suspension through the 60-80 mesh metal sieve into the pressure pot or mixer.
 - d) Agitate the mixture thoroughly by hand or a power mixer to a smooth even blend.



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- e) Thinning of EC-843 or EC-843S Corogard up to 20 percent with methyl isobutyl ketone may be made to facilitate application of a smooth uniform coating. If a slower drying thinner is required, thin up to 20 percent with a mixture of 3 parts normal butyl acetate and 1 part methyl isobutyl ketone (by volume).

NOTE: The EC-843 and EC-843S Corogard material will be slightly overpigmented to reduce effect of bronzing, therefore, some rub off of excess aluminum pigment may occur but is not detrimental to quality.

CAUTION MIX ONLY ENOUGH MATERIAL FOR IMMEDIATE USE. AFTER THE ADDITION OF ALUMINUM POWDER THE EVOLUTION OF GAS WILL PREVENT STORAGE IN A CLOSED CONTAINER. DO NOT ADD ADDITIONAL THINNER. DO NOT MIX FRESH MATERIAL WITH MATERIAL OVER 8 HOURS OLD. DISCARD ALL MATERIAL OVER 16 HOURS OLD

- f) Spray one wet cross coat of EC-843 or EC-843S Corogard.

NOTE: Frequently agitate paint in pot.

- g) Allow a minimum of 30 minutes between first and subsequent cross spray coats.

NOTE: On horizontal surfaces where there is no danger of runs or sags, this drying time between coats may be omitted

- h) Apply sufficient cross spray coats to obtain a total dry film thickness of 2 to 3 mils.

- i) Allow topcoat to air dry a minimum of 24 hours.

NOTE. Cure may be accelerated by heating the surface to $125^{\circ} \pm 5^{\circ}\text{F}$ for 2 hours.

(c) Repair and overcoat

- 1) Aged areas of EC-843 or EC-843S Corogard to be repaired or overcoated shall be thoroughly cleaned per paragraph B., and reactivated by sanding with 280 grit or finer abrasive paper and/or solvent activated by toluene (TT-T-548), methyl isobutyl ketone (TT-M-268) or lacquer thinner (TT-T-266a).
- 2) Repair and overcoat areas shall not exceed a total dry film thickness of 5.0 mils except in isolated overlap areas.

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PAINT STRIPPING

1. General

- A. Paint may be removed by the application of strippers or solvents. Paint applied to any metal surface may be removed by any of the specified strippers. Solvents may also be used if very small amounts of paints are to be removed. No paint stripper may be used, however, to remove paint from plastic laminates, fiberglass (bare or metalized), aerodynamic smoother or the edges of metal bonds, or rubber parts. Such materials as these may only be treated with prescribed solvents.
- B. Paint stripping of metal surfaces may be done by immersion or by application of a stripper by brush or spray. Because of its convenience in field work, the brush-on method is the one described in the following procedures.
- C. Surfaces to be stripped must be perfectly dry and the temperature should be between 50°F and 100°F. Stripping should not be done in hot sun or rain.
- D. If the surface to be stripped is excessively soiled it can be cleaned by application of the appropriate solvent alkaline or solvent emulsion cleaning agents or by solvent degreasing. Refer to Chapter 12, Cleaning and Washing.
- E. The stripper should be thoroughly mixed within its container before use, and it is advisable to keep the container covered when not in use, to avoid losses by evaporation.
- F. Critical areas subject to damage by strippers must be protected by proper masking, using polyethylene film and aluminum foil adhesive tape. Areas which must be protected from strippers include lubricated parts, rubber parts, laminated plastics, fiberglass (bare or metalized), aerodynamic smoother and metal bonded edges. Drain holes and vents should be similarly plugged. Strippers should never be used in integral fuel tanks.

CAUTION: PAINT STRIPPERS SHOULD NOT BE ALLOWED TO COME IN CONTACT WITH TEFLON LINED SELF-LUBRICATED BEARINGS, ELECTRICAL TERMINAL PLUGS, NYLON-COATED WIRES AND NYLON BUSHINGS. CHEMICALS IN THESE MATERIALS WILL ATTACK THE COMPONENTS.

2. Equipment and Materials

- A. Polyethylene film and aluminum foil adhesive tape, for masking.



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B. Paint strippers - all purpose and qualified for use on metal parts, including steel parts heat treated above 180,000 psi.

- (1) Turco 4669 (thick), Turco Products, Inc.
P. O. Box 1055, Wilmington, California
- (2) Nuvite 631-3A, Nuvite Chemical Compounds Corp.,
213 Freeman Street, Brooklyn 22, New York
- (3) Del Chem EZ Strip 19AC, Pennsalt Chemicals Corporation, Del Chem
Division, 2700 South Eastern Avenue, Los Angeles, 22, California

NOTE The above materials are preferred for removal of epoxy finishes. They are also usable on conventional finishes.

- (4) DuBois R2134, DuBois Chemicals, Inc.
Broadway at Seventh, Cincinnati 2, Ohio
- (5) DuBow 1800 Sure-Strip, DuBow Chemical Corp.
39 Hanse Avenue, Freeport, L. I., New York
- (6) Cee Bee A290, Cee Bee Chemical Company, Inc.
Downey, California
- (7) Ardrex 204, Brent Chemical Products, Ltd.
Brentford, Middlesex, England

C. Solvents

- (1) Ethylene Glycol Monobutyl Ether (Butyl Cellosolve),
TT-E-776, flash point 165°F
- (2) Ethyl Alcohol, U.S. Formula/denatured O-A-396, flash point 70°F
- (3) Methyl Isobutyl Ketone, TT-M-268, flash point 75°F
- (4) Xylene, TT-X-916, flash point 81°F
- (5) Toluene, TT-T-548 (JAN-T-171 Grade A optional) flash point 40°F



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- D. Miscellaneous tools including brush or nonatomizing spray, stiff bristled brush, clean cloths, squeegee or plastic scraper and proper protective clothing.

3. Application of Stripper

- A. Brush or spray liberal amounts of well-mixed stripper on painted surface. If using brush, apply in one direction only instead of brushing back and forth. If spraying, use nonatomizing spray.

NOTE· The surface should be kept moist with stripper and the area being stripped should not be larger than can be reasonably worked.

- B. Allow stripper to set undisturbed, but kept moist, until paint is completely loosened.

NOTE· This process may take between fifteen minutes and two hours, according to the type of paint being stripped. Usually the paint will wrinkle when loosened, but some paints do not wrinkle and should be tested for looseness by scraping very gently with a blunt wooden stick. Care should be taken to avoid damage to the skin while doing this.

- C. Remove old paint and examine surface.

NOTE· If stripping is incomplete, fresh stripper should be reapplied and the surface kept moist with stripper while stubborn areas are scrubbed with a stiff bristled brush. Stripper should only be applied to a surface that is free of water.

- D. Remove all excess stripper and loosened paint with squeegee or cloths.

- E. Apply pressure water rinse followed by solvent alkaline cleaning.

NOTE: Residual soils may be cleaned with butyl cellusolve solvent.

- F. Apply proper surface treatment in preparation for finish to be applied.



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4. General Stripping with Solvent

NOTE: If work is to be done indoors adequate ventilation must be provided.

- A. Apply to a small area with cloth soaked in solvent, and rub until paint is removed. Reapply additional solvent as required.
- B. Clean with solvent alkaline cleaner or butyl cellusolve.
- C. Apply proper surface treatment in preparation for finish to be applied.

5. Solvent Stripping Rain Erosion Coating from Fiberglass

- A. Moisten cloths in toluene and place over coating, allowing to stand until coating wrinkles. Apply more toluene to keep cloths moist if necessary.
- B. Peel coating off.

CAUTION DO NOT ALLOW TOLUENE TO CONTACT FIBERGLASS AREAS FOR LONGER THAN TWO HOURS.

- C. Lightly sand surface with abrasive paper (240 grit or finer) and solvent clean with xylene.



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PREPAINT CLEANING AND PRETREATMENT

1 General

- A. This section describes airplane surface preparation prior to application of exterior decorative finishes. The specific paint system section governs sequencing and selection of procedures in this section.
- B. For metal surfaces, the surface preparation procedures steps 3.F. through 3.K. shall not be interrupted for more than 24 hours. These prepared surfaces shall also be coated with primer within 8 hours of application of the Alodine.

2. Equipment and Materials

- A. Etchant, Turco 5414 or Tec 361
- B. Stripper, Turco 5351
- C. Magna 28-C-1 Static Conditioner
- D. Magna 6-W-5 Surfacers
- E. Power brush
- F. Wooden or plastic scrapers
- G. Cheesecloth
- H. Solvents and thinners, Toluene, Naphtha, Methyl ethyl ketone, TL-52
- I. Abrasive paper, 180-325 grit silicone carbide paper, Scotch-Brite pads, 400 grit or finer sandpaper, 240 grit or finer sandpaper
- J. Cleaning solutions, Kelite "Process K," Oakite #36, or Turco "W.O. No. 1"
- K. Masking tape

3. General Prepaint Cleaning and Pretreatment of Metal Surfaces (Including Aluminized Fiberglass)

- A. Mask or protectively cover all areas not to be contacted by solvents, cleaners and etchants.

CAUTION ETCHANTS (TURCO 5414 OR TEC 361) SHALL NOT CONTACT ANODIZED ALUMINUM WINDOW FORGINGS OR OTHER ANODIZED SURFACES NOT TO BE PAINTED PRIOR TO APPLYING ETCHANTS, OR ANY OTHER ACID-CONTAINING COMPOUNDS WHICH AFFECT ANODIZED ALUMINUM, MASK THE ANODIZED SURFACES IN SUCH A WAY THAT THE ETCHANT DOES NOT CONTACT THEM. IMMEDIATELY AFTER ETCHING AND RINSING, REMOVE THE MASKANT AND RINSE THE EXPOSED ANODIZED SURFACES WITH WATER



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- B. Remove per 51-2-21, Paint Stripping, residual coatings. Use Turco 5351 only

NOTE Do not allow paint strippers to contact aluminized fiberglass, acrylic windows, or sealant fillets.

- C. Remove stripper residue, loose dust and water soluble contaminants by flooding the surface with hot water (135 to 145°F)
- D. Clean all surfaces and remove all visible residue per paragraph 5
- E. On anodized aluminum and honeycomb surfaces scrub around fasteners, seams, and lap joints with a stiff bristled brush wet with toluene-MEK solvent blend (1 l by volume) Do not remove or damage sealant fillets in bonded lap joints.
- F. On stainless steel and titanium surfaces, thoroughly abrade with 180 to 325 grit silicon carbide abrasive paper, then accomplish step E.
- G. On all other metal, including aluminized fiberglass, thoroughly wet sand with very fine Scotch-Brite pads and a toluene-MEK solvent blend (1 l by volume), then accomplish step E.
- H. On all metal surfaces, solvent clean with the toluene-MEK solvent blend (1 l by volume) by scrubbing with cheesecloth then wiping dry before the solvent evaporates. Repeat as necessary to remove all sanding residues
- I. On anodized aluminum, proceed to step K.
- J. On all other metal surfaces, treat the surfaces with Turco 5414. Apply from the bottom to the top of the airplane. Allow to remain on surface 5 to 20 minutes. Option Treat surfaces with Tec 361, keep wetted for 5 to 6 minutes, apply from the bottom to the top of airplane
- K. Flood surfaces with hot water (135 to 145°F). Particular attention should be given to rinsing seams and joints. Rinse airplane from the bottom up.
- L. Allow the airplane surfaces including the seams and lap joints to dry thoroughly before applying primer.
- M. Reclean visibly contaminated areas per steps H, I and J as applicable.

NOTE. Areas contaminated only by lint, from wiping with dry cheesecloths, shall be very lightly wiped with an epoxy tack rag.

- N. Apply primers.



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4. General Prepaint Cleaning and Pretreatment of Unpainted Plastic Surfaces and Previously Painted Surfaces

- A. Shield areas where cleaning solvents may be harmful.
- B. On unpainted plastic surfaces, sand and treat pinholes per paragraph 7.
- C. On previously painted surfaces, sand and clean per paragraph 6.
- D. Accomplish steps M and N of paragraph 3.

5. Detailed Instructions for Prepaint Cleaning and Pretreatment of Metal Surfaces

- A. Clean the surface by using MEK and scrubbing with clean cheesecloth followed by wiping dry with clean cheesecloth before the solvent evaporates. Remove all visible residues including overspray, acrylic, parting agents, excess (excess being that material which exceeds the limits of the adhesive or sealant fillets in bonded lap joints) sealant, and adhesive flash. If necessary, use also wooden or plastic scrapers, sandpaper or Scotch-Brite pads.

NOTE Contaminants not removed by this method shall be stripped with Turco 5351. Remove stripper residue by spraying with hot water (135 to 145°F) and 10 to 20 gpm per hose.

- B Repeat the cleaning until no visible residue appears on cheesecloths used to wipe the solvent dry.

6. Detailed Instructions for Prepaint Cleaning and Pretreatment of Previously Painted Surfaces

- A. Epoxy paint surfaces less than 48 hours old.

- (1) Sand with 400 grit or finer abrasive paper as required to remove surface roughness, loose soils, etc. Just prior to overcoating wipe the surfaces with epoxy tack rags to remove dust, lint, etc.

- B. Epoxy paint surfaces over 48 hours old

- (1) Sand with 240 grit or finer abrasive paper. Scrub with clean cheesecloth wet with TL-52 thinner, then wipe dry with clean dry cheesecloth. Allow surface to dry thoroughly before overcoating.

NOTE Rough surfaces such as castings, forgings, etc., which cannot be sanded without exposing the bare metal shall be either tack ragged per step A.(1), or solvent clean per step B.(1), whichever is applicable. Sanding such surfaces should be avoided.

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C. Prestec surfaces less than 12 hours old.

- (1) No treatment necessary.

D. Prestec surfaces over 12 hours old

- (1) Treat per step B, except use naphtha in place of TL-52.

E. Conductive coated surfaces.

- (1) Solvent clean the surfaces by wiping with clean cheesecloth wet with naphtha, then wipe dry with a clean, dry cheesecloth. Repeat operation until cheesecloth shows no contamination. Do not sand surfaces.
- (2) If surfaces become soiled or contaminated prior to painting, reclean per step (1) above.

7 Detailed Instructions for Prepaint Cleaning and Pretreatment of Plastic Surfaces

A. Unpainted plastic surfaces with surface porosity (i.e., pinholes)

- (1) Remove greases, parting agents, and other contaminants from surface to be coated by scrubbing with a clean cheesecloth saturated with toluene or methyl ethyl ketone. Wipe the surface dry with clean cheesecloth.
- (2) Structural and Nonstructural Laminates
 - (a) Hand sand the surface with 240 grit or finer abrasive paper to remove the glossy finish of the laminate. In sanding, do not abrade the glass fiber reinforcement. Remove sanding dust by wiping the surface with a clean cheesecloth wet with TL-52 thinner. Before solvent evaporates, wipe surface dry with a clean, dry cheesecloth.
- (3) Optional - For Nonstructural Laminates Only
 - (a) Uniformly lightly abrade by wet or dry blasting the laminate surface. Do not allow blasting to abrade the glass fiber reinforcement. Remove blasting residue by wiping with a clean cheesecloth wet with TL-52 thinner. Before solvent evaporates, wipe surface dry with a clean, dry cheesecloth.



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(4) Treat the surface porosity by the following method.

(a) Magna Surface Conditioner System

- 1) This system consists of Magna 28-C-1 Static Conditioner which shall be used to treat pinholes and Magna 8-W-5 Surfacer which shall be used as required to treat larger surface defects than pinholes. In general, treatment is to allow paint to wet the surface and not to provide a surface flush with the surrounding area. Apply the Static Conditioner prior to application of the surfacer. Static Conditioner, surfacer and conductive coating or primer are intended to be applied in a sequence of continuous process steps.
- 2) Magna 28-C-1 Static Conditioner
 - a) Apply the Static Conditioner without thinning, using a clean cheesecloth and sufficient pressure to force the filler into the minute pinholes of the laminate. Use a circular, overlapping, wiping motion.
 - b) Allow the conditioner to dry for approximately 30 minutes at room temperature or higher (until it turns white) then wipe the excess material from the laminate surface using a clean, dry cheesecloth.
 - c) The laminate shall be coated with subsequent material as soon as practicable after dried excess Static Conditioner has been wiped off. If surface becomes soiled after Conditioner is applied, solvent clean using toluene or naphtha and reapply Static Conditioner.
- 3) Magna 8-W-5 Surfacer

CAUTION THIS MATERIAL IS NOT TO BE USED AS A FAIRING COMPOUND OR CONTOURING MATERIAL

- a) Prepare the surfacer by mixing 4 parts by volume of Magna 8-W-5 with 1 part by volume hardener 50-C-3 or 10-C-32. Blend thoroughly and allow to digest for 15 minutes prior to application, thin with 1 part by volume 66-C-28 Reducer. The pot life of the mixed material is 6 hours at 70°F. Do not use material over 6 hours old.



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- b) Apply Surfacer by brush, spray, cloth or squeegee, and allow to dry for 1 to 4 hours. Sand to desired smoothness using 150 grit or finer, abrasive paper.

NOTE After 5 hours cure the Surfacer is extremely hard and difficult to sand. Therefore, complete all necessary sanding prior to 5 hours cure.

- c) Remove sanding residue with clean cheesecloth wet with naphtha. Should any pinholes appear in the 8-W-5 Surfacer, treat with Magna 28-C-1 after the Surfacer has been sanded and solvent cleaned. Apply subsequent coating to filled Surfacer as soon as practicable.

B. Unpainted plastic surfaces without surface porosity.

(1) Clean and treat per step A.(1) prior to applying the organic finish.

8. Wing Skin Prepaint Cleaning

- A. Shield areas where cleaning or etching solutions may be harmful. Do not allow etchants to contact anodized wing surfaces.
- B. Clean using an alkaline cleaning solution. Apply the cleaner and allow to soak for approximately 5 minutes. Do not allow the cleaner to dry on the surface. Scrub and reapply if soil is not completely removed. Rinse thoroughly with clean (160°F maximum) water. Rinse with copious quantities of water using a flush or spray method. Rinse entire surface again working from one end or side to the other. Rinse a third time, as before, using flush or spray method. Check the entire rinsed surface for soil and cleaner removal.
- C. Solvent clean using MEK-Toluene (1:1 by volume). Wet surface with solvent and wipe or scrub all surfaces using a rag, soft brush, or sponge. Scrub around fasteners, seams and lap joints using solvent and a stiff bristle brush. Spray or flow solvent on to the surface. Wipe dry with clean cheesecloth or rags. Rinse surface using clean solvent and clean cloths. Wipe up excess solvent. Allow to drain dry.

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ALODIZING

1. General

- A. Alodine is a registered trade name of a proprietary process, marketed by Amchem Products, Inc., Ambler, Pa. It is approved under Specification MIL-C-5541, QPL-5541 for the production of chemical films on aluminum alloys. The film is softer than the anodic coating but is acceptable as a protective coating and a paint base. The solutions used for producing the chemical film are Alodine 1000 and Alodine 1200S.
- B. Alodine 1000 and Alodine 1200S are to be handled with the usual precautions for corrosive chemicals. Respirators and rubber or neoprene gloves are to be worn when handling the powder and applying the solution. Adequate protective measures are to be taken to assure reasonable splash protection and avoidance of contact with the solution. Any solution on the skin must be washed off immediately. Solution splashed in the eyes must be washed out with water followed by an eye wash of boric acid solution. Obtain medical aid immediately.
- C. Swabs, or paper used for applying or removing the solution should not be allowed to dry out. These constitute a fire hazard when dried. Immediately after use they should be thoroughly soaked in water before discarding.

2. Equipment and Materials

- A. Respirators
- B. Neoprene or rubber gloves
- C. Soft bristle brush (nylon)
- D. Clean rags with less than 0.75 per cent oil
- E. Cellulose sponge
- F. Stainless steel or acid resistant container (not lead or glass, preferably polyethylene)
- G. Alodine 1000 liquid (Amchem Products, Inc., Niles, California)
- H. Alodine 1200S powder (Amchem Products, Inc., Niles, California)



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3. Preparation and Storage of Alodine 1000 Solution

- A. To 6 volumes of water in a clean polyethylene container add 4 volumes of Alodine 1000 liquid concentrate and stir thoroughly. Transfer the Alodine 1000 solution to small clean polyethylene bottles. These small polyethylene bottles shall be date stamped with the date of mixing and the solution shall be discarded 14 calendar days after making if not used. Alodine 1000 solutions are sensitive to all types of contamination; consequently the mixing and storage containers must be thoroughly clean.

4. Apply Alodine 1000 Solution

- A. Apply Alodine 1000 solution using clean cheesecloth. The room temperature must be above 65°F. Wipe on additional Alodine as needed to keep surfaces wetted for 2 to 5 minutes. Rinse thoroughly. Air dry. Do not touch parts until dry as fresh Alodine films are easily damaged.

NOTE· Cloths used for applying or removing Alodine 1000 solutions should not be allowed to dry out since they are a fire hazard when dry. Immediately after using they shall be thoroughly rinsed in water, then immersed in water-filled steel drums for salvage or scrap.

5. Preparation and Storage of Alodine 1200S

- A. Prepare and dispense solutions only in container of stainless steel or acid resistant plastic or rubber (polyethylene preferred). Containers shall be covered if stored.
- B. Add 2 ounces of Alodine 1200S powder to water for each gallon of final solution. Stir well until the powder is dissolved. Disregard any small amount of settled-out insoluble material. Allow to stand at least 1 hour before use.

6. Apply Alodine 1200S Solution

- A. Apply Alodine 1200S with clean cloths and allow to remain on surface for between 2 and 3 minutes. The surface temperature should be 60°F or above in order for the Alodine to react properly. Rinse thoroughly. Air dry. Do not touch parts until dry as fresh Alodine films are easily damaged.

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CHEMICAL AND SOLVENT RESISTANT FINISH - CLEANING/PAINTING

1. General

- A. Conduct work in a well ventilated area.

WARNING: AVOID BREATHING VAPORS. WHEN FINISHES OR SOLVENTS ARE SPATTERED IN EYES FLUSH WITH WATER FOR 15 MINUTES AND REPORT TO MEDICAL SECTION IMMEDIATELY. WHEN SPATTERED ON THE SKIN, WASH WITH PLENTY OF WATER.

- B. An adequate ventilation system should be employed for all mixing and application of all finishes and for the solvent cleaning required prior to application of these finishes. If such facilities are not available, the use of full face air respirators approved by the U.S. Bureau of Mines or an equivalent approved source shall be used.
- C. All containers and mixing equipment must be clean and resistant to BMS 10-11 materials. Do not use wax lined containers. Dixie cup #2336 or any polyethylene lined cup is satisfactory for distribution of mixed material for touch-up painting.
- D. Clean equipment immediately after mixing. MIBK is recommended. Clean up any spillage immediately.
- E. The use of protective clothing shall be determined by the appropriate safety organization.

2. Equipment and Materials

- A. Chemical and Solvent Resistant Finish, BMS 10-11 (See figure 701.)
- (1) Type 1, Primer
 - (2) Type 2, Epoxy enamel
- B. Nonatomizing spray gun
- C. Compressed air supply with blower
- D. Strainer, 60-90 mesh



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- E. Spray paint equipment (See figure 702.)
- F. Natural bristle brush
- G. Alkaline Cleaner, GMC 528B
- H. Abrasive paper 320 grit or finer aluminum oxide
- I. Abrasive discs (grit very fine), Scotchbrite or Behr-Manning
- J. Solvent
 - (1) Methyl isobutyl ketone
 - (2) Methyl ethyl ketone
 - (3) Toluene
 - (4) BMS 3-2, type 1 or 2
 - (5) Naphtha
 - (6) TEC 902
 - (7) TL-58
 - (8) BMS 11-7

3. Prepare for Painting

A. Metal

- (1) With Pretreatment: Aluminum (alodined or anodized), metal sprayed aluminum (alodined), magnesium (Dow treated), titanium (treated with phosphate fluoride), carbon and low alloy steel (plated and phosphated)
 - (a) Inspect for visual evidence of soil.
 - (b) Proceed to paint parts not soiled or contaminated.
 - (c) Parts soiled or contaminated may be cleaned by any of the following methods.



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- 1) Solvent clean using specified solvents.
- 2) Alkaline clean. Soak period must not be longer than 20 minutes. Do not use on cadmium or cadmium-titanium plated parts.
- 3) Vapor degrease.
- (d) Proceed to paint parts.
- (2) Without Pretreatment
 - (a) Abrasive clean titanium, passivated stainless steel, carbon and low alloy steel, and copper.
 - (b) Solvent clean using specified solvents.
 - (c) Proceed to paint parts.
- B. Non-metals: Plastic, wood, adhesive, sealant
 - (1) Solvent clean with MEK-Toluene (1:1) or BMS 11-7.
 - (2) Proceed to paint parts.
- C. Previously Painted Surfaces
 - (1) Surfaces with zinc chromate primer
 - (a) Less than 48 hours old and hydraulic fluid BMS 3-11 resistance not required: solvent clean using naphtha, apply zinc chromate primer as necessary, proceed to paint parts.
 - (b) Greater than 48 hours old and hydraulic fluid BMS 3-11 resistance not required: reactivate by reactivation methods 1 or 2, apply zinc chromate primer as necessary, proceed to paint parts.
 - (c) For parts intended for use in hydraulic fluid BMS 3-11 areas. strip per 51-2-21, Paint Stripping, solvent clean with toluene apply zinc chromate primer as necessary, proceed to paint parts.
 - (2) Surfaces with BMS 10-11, type 1 and 2
 - (a) Less than 48 hours old: solvent clean with toluene or sand when necessary with 320 or finer grit paper, apply BMS 10-11, type 1 and 2, as necessary, proceed to paint parts.



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- (b) Greater than 48 hours old: reactivate by reactivation methods 1, 2 or 3, apply BMS 10-11, type 1 and 2, as necessary, proceed to paint parts.

(3) Adhesive Squeeze-out

- (a) Reactivate by reactivation method 3, or vapor degreasing, or sanding using 320 or finer abrasive and solvent cleaning with toluene, then apply applicable surface treatment and proceed to paint parts.

D. Reactivation

(1) Method 1

- (a) Manual solvent clean with toluene.
- (b) Abrasive clean with abrasive discs or 320 grit or finer aluminum oxide abrasive paper.
- (c) Manual solvent clean with MIBK.

(2) Method 2

- (a) Alkaline clean with GMC 528B diluted 1 part to 3 parts water using one of the following methods:
 - 1) Manual clean
 - 2) Pressure clean with nonatomizing spray gun. Minimum impingement time of 5 seconds with maximum stand time of 15 minutes.
- (b) Remove cleaner with clean water.
- (c) Wipe and blow surface dry with filtered compressed air.
- (d) Remove visible soil by solvent cleaning with specified solvents.

NOTE: Blue stains from leak detection paint need not be totally removed.

- (e) Within 48 hours of step (a) clean with Tec 902 using one of the following methods:



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- 1) Manual solvent clean with BMS 3-2.
 - 2) Pressure clean with nonatomizing spray gun. Minimum impingement time is 5 seconds with minimum stand time of 2 minutes.
- (f) Thoroughly rinse with water before Tec 902 evaporates.
- (g) Within 12 hours of cleaning with Tec 902 and within 6 hours before painting, solvent clean with TL-52, using one of the following methods:
- 1) Manual solvent clean with BMS 3-2.
 - 2) Pressure clean with nonatomizing spray gun. Minimum impingement time of 5 seconds.
- (h) Blow dry with filtered compressed air.
- (3) Method 3
- (a) Same as Method 2 except omit steps (a), (b), and (c).
- E. Mixing and Thinning of Primer (See figure 701.)
- (1) Continuous batch mixing of BMS 10-11 primer. The pot life of BMS 10-11 primer may be extended beyond 16 hours at temperatures below 80°F when the following requirements are met.
- (a) The minimum use of BMS 10-11 primer is 25% of the original batch each 8 hours.
 - (b) The minimum addition of freshly mixed BMS 10-11 primer is 25% of the original batch each 8 hours.
- NOTE: No stand period is required after each addition.
- (c) The viscosity shall be 31-40 seconds with a No. 1 Zahn cup. (Check at least every 8 hours or after every addition of primer.)
 - (d) Mark container with time of original mixing and the time of each addition of paint.



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- (e) Test panels painted with primer mixed according to this deviation shall meet all requirements for (1) film thickness, (2) appearance, and (3) resistance requirements.
- (f) Make three test panels, one at the start of the mixing time, one in the middle, and one at the end of the 8 hours.

(2) Choice of Primers

- (a) BMS 10-11, type 1, Green Primer

- 1) A general use primer. Use as required.

- (b) BMS 10-11, type 1, Yellow Primer

- 1) Use as required.

F. Mixing and Thinning of Enamel (See figure 701)

- (1) Thoroughly mix each component (catalyst, base and thinners) separately prior to combining. Strain any base material in which skinning is apparent through a 60 to 90 mesh strainer prior to combining. Stir in the catalyst into the base. Add thinner as required. Do not mix more material than can be used within allowable pot life. Adjust viscosity with thinner. Pot life: below 80°F 16 hours, 80-85°F 12 hours, above 85°F 8 hours.

4. Paint Airplane

- A. Spray or brush apply primer. Refer to figures 702 and 703 for spray equipment and film thickness.
- B. Spray apply enamel using the suitable combination of spray equipment, or brush apply enamel using a natural bristle brush. Refer to figures 702 and 703 for spray equipment and film thickness.



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5. Restore Airplane to Normal

- A. The drying times listed in parts I and II of figure 704 do not constitute full cure of the coatings. Full cure will vary depending on film thickness, temperature, humidity and in the case of enamel, color. Optimum cure based on 75 ($\pm$ 5) $^{\circ}$ F before exposing to weather or putting into service is 7 days regardless of whether the coatings have been forced dried at higher temperatures or not. When necessary, the minimum drying time prior to service use is 48 hours when cured under 75 $^{\circ}$ F and 24 additional hours at 75-160 $^{\circ}$ F.
- B. Parts I and II of figure 704 are based on the one coat film thickness according to figure 703 and should be increased proportionately for thicker films.
 - (1) Flash-off time before higher cure temperatures - 15 minutes at room temperature.
 - (2) Before applying sealants, dry primer tack-free. To determine tack-free, a slight downward pressure on the film with the finger shall not leave a mark.
- C. The drying times listed in part III of figure 704 are given to facilitate infrared curing and do not constitute full cure of the coating. A flash-off of 1 minute minimum at room temperature is required when infrared is used to accelerate drying.



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BMS AND TYPE	VENDOR'S DESIGNATION AND MATERIALS	MIXING RATIO BY VOLUME	RECOMMENDED SPRAY VISCOSITY AT 77 (± 2)°F
10-11 Type 1 (Green)	DeSoto Chemical Coatings 1910091 Primer Base ▶ 6108148A Primer Converter 6108189 Primer Thinner	1 part 1 part 1/2 part max.	31-40 Sec. No. 1 Zahn
	DeSoto Chemical Coatings 1904062C Primer Base 6108188 Primer Converter 6108189 Primer Thinner	4 parts 1 part 3 parts max.	31-40 Sec. No. 1 Zahn ▶ ▶
	DeSoto Chemical Coatings 515-706 Primer Base ▶ 910-012 Primer Converter 6108189 Primer Thinner	1 part 1 part 1/2 part max.	31-40 Sec. No. 1 Zahn
	Finch Paint & Chemical 463-4-4 Primer Base X-301 Primer Converter TL-52 Primer Thinner	3 parts 1 part 3 parts max. 1 part max. above 85°F	31-40 Sec. No. 1 Zahn or 31 Sec. Max. above 85°F No. 1 Zahn
	Finch Paint and Chemical 463-6-3 Primer Base ▶ X-306 Primer Converter TL-52 Primer Thinner	3 parts 1 part 4/5 part max. 2 parts max. above 85°F	31-40 Sec. No. 1 Zahn or 28-37 Sec. above 85°F No. 1 Zahn
	Finch Paint and Chemical 463-6-2 Primer Base X-305 Primer Converter TL-52 Primer Thinner	3 parts 1 part 4/5 part max. 1 part max. above 85°F	31-40 Sec. ▶ No. 1 Zahn or 28-37 Sec. above 85°F No. 1 Zahn



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BMS AND TYPE	VENDOR'S DESIGNATION AND MATERIALS	MIXING RATIO BY VOLUME	RECOMMENDED SPRAY VISCOSITY AT 77 (± 2)°F
(Yellow) 10-11 Type 1	DeSoto Chemical Coatings 513-705 Primer Base 910-012 Primer Converter 6108189 Primer Thinner	1 part 1 part 1/2 part max.	31-40 Sec. No. 1 Zahn
	DeSoto Chemical Coatings 1910102 Primer Base 6108148A Primer Converter 6108189 Primer Thinner	1 part 1 part 1/2 part max.	31-40 Sec. No. 1 Zahn
	Finch Paint and Chemical 463-6-5 Primer Base X-306 Primer Converter TL-52 Primer Thinner TL-82 Retarder	3 parts 1 part 4/5 part max.	31-40 Sec. No. 1 Zahn
	Andrew Brown - Gloss Colors A-423 Series Enamel Base T-261 Enamel Catalyst T-262A Enamel Thinner	4 parts 1 part 3 parts max.	17-19 Sec. No. 2 Zahn or 36-39 Sec. No. 1 Zahn
	Andrew Brown - Semigloss Colors A-423 Series Enamel Base T-380 Semigloss Enamel Catalyst T-262A Enamel Thinner	1 part 1 part 1 part max.	18-20 Sec. No. 2 Zahn or 36-39 Sec. No. 1 Zahn
	A-423 Series Semigloss Enamel Base T-261 Enamel Catalyst T-262A Enamel Thinner	4 parts 1 part 3 parts max.	18-20 Sec. No. 2 Zahn or 36-39 Sec. No. 1 Zahn
	Andrew Brown - Flat Colors A-423 Series Flat Enamel Base T-381 Flat Enamel Catalyst T-262A Enamel Thinner	1 part 1 part 1 part max.	22-23 Sec. No. 2 Zahn or 44-47 Sec. No. 1 Zahn
10-11 Type 2			



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BMS AND TYPE	VENDOR'S DESIGNATION AND MATERIALS	MIXING RATIO BY VOLUME	RECOMMENDED SPRAY VISCOSITY AT 77 (± 2)°F
	Finch Paint and Chemical Gloss Colors 443-3 Series Enamel Base X-304 Enamel Catalyst TL-29 Enamel Thinner	3 parts 1 part 2 parts max.	18-20 Sec. No. 2 Zahn or 36-39 Sec No. 1 Zahn
	Finch Paint and Chemical Semigloss Colors 453-3 Series Enamel Base X-304 Catalyst TL-29 Thinner	4 parts 1 part 3 parts max.	18-20 Sec. No. 2 Zahn or 36-39 Sec. No. 1 Zahn
	Finch Paint and Chemical Flat Colors 463-3 Series Enamel Base X-304 Catalyst TL-29 Thinner	4 parts 1 part 3 parts max.	18-20 Sec. No. 2 Zahn or 36-39 Sec No. 1 Zahn
	DeSoto Chemical Coatings Gloss Colors Enamel Base 011 311 Catalyst 020-013 Thinner	4 parts 1 part 3 parts max.	18-20 Sec. No. 2 Zahn or 36-39 Sec No. 1 Zahn

- 1 ▷ May be mixed as continuous batch
- 2 ▷ DeSoto 515-706 and 513-705 primer systems may be used in lieu of the 1910091 and 1910102 primer systems respectively.
- 3 ▷ Use for fill and drain application. For Finch 463-6-2, use 5 parts maximum of TL-58 primer thinner.
- 4 ▷ Use for dip application. Adjust viscosity to attain desired film thickness.

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SPRAY GUN		PRESSURE FEED		SUCTION FEED	
MFG.	MODEL	AIR CAP	FLUID TIP AND NEEDLE	AIR CAP	FLUID TIP AND NEEDLE
DeVilbiss	MBC	765 or 704	FX	30 or 36	EX or FF
DeVilbiss	JGA	765 or 704	FF	30 or 36	EX, FF or FX
DeVilbiss	CM	37	FF	37	E
Binks	7	33 PE	33	35 SC	35
Binks	7	33 PR	33	36 SC	36
Binks	7	33 PM	33	--	--
Binks	18	63 PB	63 Tip and 63A Needle	66 SC	66 Tip 65 Needle
Binks	18	66 PE	63 Tip and 63A Needle	66 SE	66 Tip 65 Needle
Binks	19	63 PB	63 Tip and 63A Needle	66 SE	66 Tip 15 Needle
Binks	19	66 PE	63 Tip and 63A Needle	66 SC	66 Tip 15 Needle
Binks	19	--	--	67 SA	67A Tip 18 Needle

Set pressure as follows:

Atomizing pressure 40-50 PSI at the filter with
up to 25 feet hose.

Fluid pressure 5-6 PSI for each 5 feet that
the gun is elevated above
pressure pot gage.

Adjust gun controls to produce a uniform wet film.

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SYSTEM

INCHES*

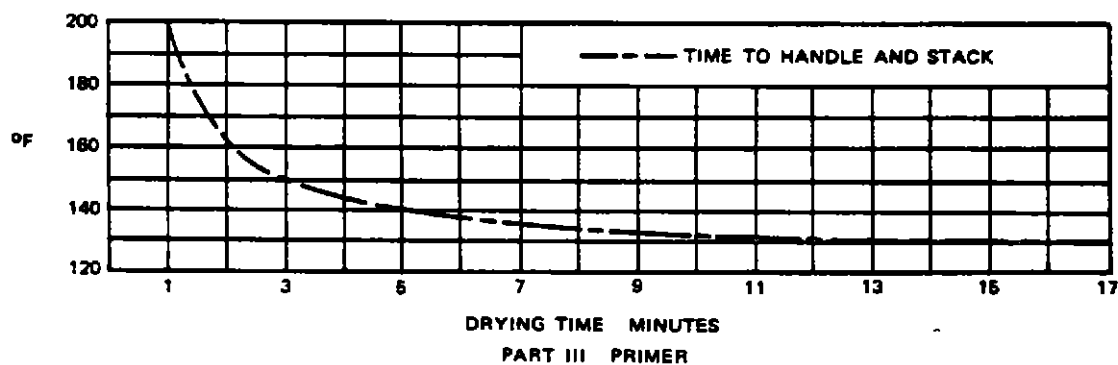
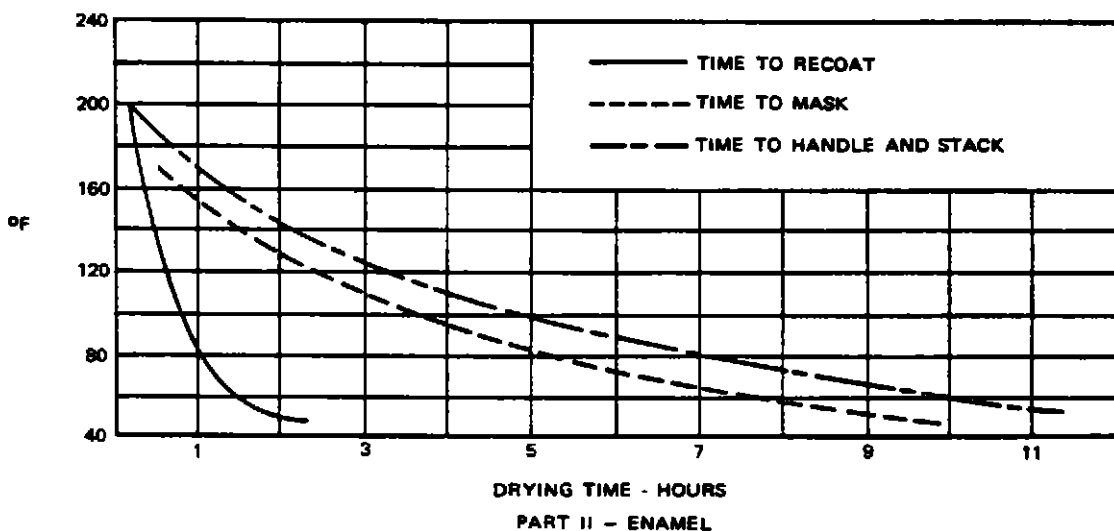
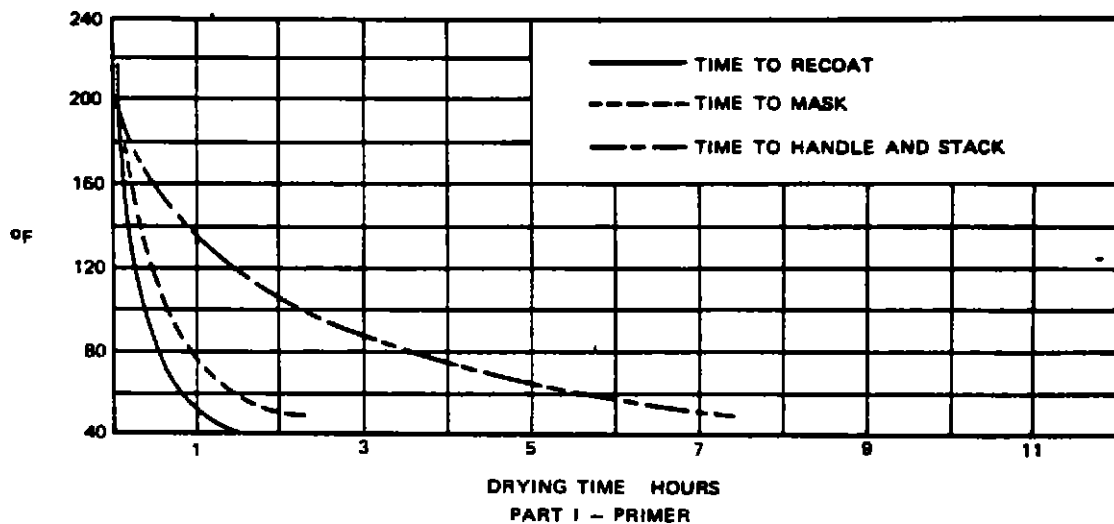
1st Coat	
BMS 10-11, Type 1 Primer	0.0008 ▶
2nd Coat	
BMS 10-11, Type 1 Primer	0.0008 ▶
One Coat BMS 10-11, Type 2	
Enamel over Type 1 Primer	
Green	0.0020 ▶▶
Yellow	0.0012 ▶▶
BMS 10-11, Type 2	
Enamel Touch-up	0.0030 ▶
BMS 10-35	
One Coat	0.0017 ▶

*.001 inches = 1.0 mil

- ▶ Primer films shall be continuous leaving no bare metal or conversion coating exposed. The maximum dry film thicknesses for each coat shall be 0.8 mils or a total of 1.6 mils maximum after the second coat except in the following case: Allowable primer thickness for each coat is 1.5 mils where buildup is unavoidable when coating deep recesses and complex assemblies.
- ▶ Thickness applies to enamel coat only - does not include primer.
- ▶ Maximum enamel thickness allowable is 2.6 mils for deep recesses and complex assemblies and 3.6 mils for body section interiors where buildup is unavoidable.

NOTE: In lieu of measurements made on the work itself, thickness measurements may be made on test panels painted at the same time as the work.

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Curing Times
Figure 704

51-2-51
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CLEAR SKYDROL RESISTANT OVERCOAT

1. Equipment and Materials

- A. BMS 3-2, Type 1, cleaning solvent, general purpose
- B. Manual alkaline cleaner. Refer to Cleaning and Washing - Maintenance Practices, Chapter 12
- C. Boiled cheesecloth - Rymplecloth, The Kendall Co., No. 301, or equivalent
- D. Grade A Coating
 - (1) Finch 683-3-2
 - (2) X-310 Catalyst
- E. Abrasive paper, 280 grit or finer

2. Surface Preparation

- A. Hand sand high gloss plastic surfaces and painted surfaces with abrasive paper to remove high gloss surface finish. Then clean per step D. Do not sand painted surfaces around decals when clear Skydrol-resistant coating is used as an edge sealer.
- B. When applying over sealant allow sealant to cure "tack free."
- C. Clean decals, placards, and stencils with manual alkaline cleaner using clean cheesecloth. Refer to Cleaning and Washing - Maintenance Practices, Chapter 12.
- D. Clean all other surfaces as follows:
 - (1) Scrub surface with clean cheesecloth moistened with solvent.
 - (2) Before solvent evaporates, wipe surface with clean, dry cheesecloth.
 - (3) Repeat steps (1) and (2) until no visible signs of soil are evident on a clean cloth

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3. Preparation of Coatings

A. Mixing of Materials

- (1) Mix the base component with the catalyst as follows

NOTE: Use clean containers for mixing. Do not use containers which are lined with organic coatings.

- (a) Use 1 part of X-310 with 2 parts 683-3-2 by volume, adding the catalyst to the base while stirring the base component.
- (b) Mix thoroughly to insure uniform distribution.
- (2) Immediately after mixing, affix a label to the container, stating the date and hour of mixing, and the date and hour of pot life expiration. See paragraph 3.B.

B Handling and Storage

- (1) Catalyzed coating material has a shop (usable) pot life of 4 hours at 70°F. Scrap any catalyzed coating material whose shop life has expired. Use of coating which has exceeded its shop pot life will seriously affect its performance in service, although this is not readily apparent at the time it is applied. Store the uncatalyzed coating at a temperature of between 40°F and 90°F. Shelf life of uncatalyzed coating is 12 months from date of manufacture.

4. Application of Coating

- A. Clean all surfaces in accordance with paragraph 2, prior to coating application.
- B. Apply coating on surface to be coated and overlap a minimum of 1/4 inch to insure a fluid-tight barrier. For edge sealing of decals apply coating to cover 1/4 inch of both the decal and the adjacent surface.

NOTE. Apply coating in a well-ventilated area maintained at 65°F or above and with a relative humidity of 85% or less. Brush or spray apply to a thickness of 1 to 2 mils (0.001 to 0.002 inch).

5. Cure of Coatings

- A. Cure for four hours at 65°F (minimum) prior to outdoor exposure.
- B. Complete cure requires 14 days at 65°F (minimum).

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CONDUCTIVE COATING SYSTEM FOR EXTERIOR REINFORCED PLASTIC SURFACES

1. General

CAUTION: CONDUCTIVE COATINGS HAVING METALLIC PIGMENTS, SUCH AS DESOTO NO. 3202009, MUST NOT BE USED ON ANTENNAS OR ANTENNA FAIRINGS.

A. This section describes application of DeSoto Chemical Coatings No. 3202009 conductive coating and enamel for exterior reinforced plastic surfaces except nose radome. Refer to Chapter 53, Nose Radome - Cleaning/Painting, for nose radome conductive coating procedures.

- (1) To provide adequate grounding to the airplane structure apply conductive coating prior to assembly to a minimum of 2 countersinks per panel for plastic-to-structure fasteners.
- (2) Apply pin hole filler to all plastic surfaces having pin holes. All reinforced laminates manufactured to Boeing specification normally require pin hole filling. An example of laminates not requiring pin hole filler is the MIL-P-15035, Type FBG phenolic laminate.
- (3) The pin hole filler shall be applied prior to application of the conductive coating except that countersink areas may be coated prior to filling.
- (4) The protective or decorative finish enamel shall be applied over the conductive coating in accordance with the drawing.
- (5) See figure 701 for description of spray guns, air pressures, material pressures, etc.
- (6) See figure 702 for size of air and fluid hoses to use.

2. Equipment and Materials

- A. DeSoto Chemical Co. Coating No. 3202009
- B. DeSoto Chemical Co. catalyst No. 6108101
- C. Abrasive paper, 280 grit or finer
- D. Boiled cheesecloth

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PAINT	PRESSURE OR SUCTION	MATERIAL PRESSURE IF USING PRESSURE EQUIPMENT	AIR FLOW	AIR LINE PRESSURE	SPRAY GUN DESCRIPTION USE GUN DESCRIBED OR EQUIVALENT					
					GUN	AIR CAP	NOZZLE	FLUID HEAD	FLUID TIP	FLUID NEEDLE
ALL FINISHES	PRESSURE	5 PSIG	6-8 CFM	60 PSIG MAXIMUM	DEVILBISS PMB 510-765-FX BINKS NO. 7	AV1239 #756	---	---	AV-601-FX	MBC-444-FX
	SUCTION	---	6-8 CFM	60 PSIG MAXIMUM	DEVILBISS MBC 510-30-EX DEVILBISS JGA 502-30-EX	MB4039 #30 MB4039 #30	---	---	AV-601-EX AV-601-EX	496-EX JGA 402-EX

Spray Gun Descriptions and Pressure Requirements
Figure 701

THE FOLLOWING ID AIR AND FLUID HOSE SIZE REQUIREMENTS ARE MANDATORY MINIMUMS

AIR HOSE

- 1 0 TO 25 FEET HOSES SHALL BE 5/16 INCH ID MINIMUM
- 2 25 TO 50 FEET HOSES SHALL BE 3/8 INCH ID MINIMUM
- 3 50 TO 75 FEET HOSES SHALL BE 7/16 INCH ID MINIMUM
- 4 75 TO 100 FEET HOSES SHALL BE 1/2 INCH ID MINIMUM
- 5 OVER 100 FEET NOT PERMITTED

OPTIONAL. THE 25 FEET OF HOSE NEXT TO THE SPRAY GUN CAN BE 3/8 INCH ID MINIMUM

FLUID HOSE

- 1 0 TO 50 FEET HOSES SHALL BE 3/8 INCH ID MINIMUM
- 2 50 TO 100 FEET HOSES SHALL BE 1/2 INCH ID MINIMUM
- 3 OVER 100 FEET NOT PERMITTED

OPTIONAL. THE 25 FEET OF HOSE NEXT TO THE SPRAY GUN CAN BE 3/8 INCH ID MINIMUM

Air and Fluid Hose Size Requirements Length vs Size
Figure 702

- E. Naphtha
- F. Paint spray gun
- G. DC Ohmmeter (minimum range of 1 to 20 megohms)

3. Conductive Coating System Procedure

A. Laminate Surfaces With Pin Holes

- (1) After bonding, solvent clean and fill pin holes per paragraph 4.
- (2) Apply DeSoto Chemical Co. coating No. 3202009 per paragraph 5.
- (3) Measure electrical resistance of coating per step 5.F.
- (4) Solvent clean per step 5.G.
- (5) Apply enamel (gray) per step 5.H.

B. Laminate Surfaces Without Pinholes

- (1) After bonding, sand and solvent clean per paragraph 4.
- (2) Apply DeSoto Chemical Co. coating No. 3202009 per paragraph 5.
- (3) Measure electrical resistance of coating per step 5.F.
- (4) Solvent clean per step 5.G.
- (5) Apply enamel (gray) per step 5.H.

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4. Surface Preparation for Conductive Coating System

A. Refer to 51-2-22, Prepaint Cleaning and Pretreatment, for directions.

5. Preparation and Application of Conductive Coating System

NOTE The conductive coating is supplied in two component kits consisting of 3202009 base material and 6108101 catalyst in equal parts by volume.

A. Agitate each component thoroughly prior to mixing.

B. Mix the conductive coating by adding one part by volume catalyst to one part by volume base material while stirring the base material.

NOTE Mixed material has a usable pot life from time of mixing of 16 hours at 70°F and 8 hours at 100°F. Material whose pot life has expired must be scrapped. Immediately after mixing, the containers shall be affixed with a label stating the date and hour of mixing and the date and hour the pot life expires.

C. Allow the mixed material to stand for at least one hour after mixing and agitate the mixture thoroughly just before using.

D. Mask off all areas not to be coated with the DeSoto Chemical Coatings Conductive Coating.

E. Apply the DeSoto Chemical Coating Conductive Coating by spray to a dry film thickness of 0.5 ± 0.1 mil.

F. Measure conductive coating resistance as follows

NOTE Allow the coating to dry at least four hours before resistance measurements are taken or before overcoating with enamel. Allow the coating applied to countersunk areas to dry at least 20 minutes before installation of fasteners.

- (1) Determine the electrical resistance of the coating using a DC ohmmeter having a minimum range of 1 to 20 megohms. The resistance of the coating shall not exceed 10 megohms when the ohmmeter probes contact the coating at a distance of 12 inches from probe to probe. Resistance measurements shall be made at least once per 4 square feet of area, and in addition a minimum of 2 measurements per panel shall be made. If the resistance exceeds 10 megohms, the area shall be sanded with 280 grit or finer abrasive paper, solvent cleaned per paragraph 4. and the DeSoto Chemical Coatings Company Conductive Coating reapplied per paragraph 5.

NOTE. Do not allow waxed papers to contact the conductive coating during transportation, storage, etc.



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- G. Just prior to overcoating the conductive coating with enamel, solvent clean the surface to be painted by wiping with a clean cheesecloth moistened with naphtha. Wipe dry with another dry, clean cheesecloth before the solvent evaporates.
- H. Apply epoxy enamel or alkyd enamel.
- 6. Rework and Repair of Conductive Coating System (Including Lube-Lok 4253 and DeSoto No. 3202009 Conductive Coatings)
 - A. Sand surfaces where the conductive coating has been removed with 280 or finer grit abrasive paper.
 - B. Solvent clean the area to be repaired per paragraph 4 and apply DeSoto Conductive Coating No. 3202009 per paragraph 5. Feather edge all spot painting.
 - C. Repair the decorative finish.



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ABRASION RESISTANT TEFLON FINISH - APPLICATION

1. General

- A. This section describes the surface preparation required and application of a sprayable and brushable, abrasion, chemical and solvent resistant finish to chafing surfaces
- B. Apply the abrasion resistant Teflon coating over BMS 10-11 Type 1 primers or BMS 5-89 unless otherwise indicated. Thickness is to be as specified. When no thickness is specified apply 5 to 10 mils (0.005 to 0.010 inches) dry film. Total dry film thickness of 20 mils (0.020 inch) maximum may be authorized by specification or for replacement of solid (e.g., phenolic) rub strips.
- C. The sprayable material systems are to be used for spray application.
- D. Use the brushable materials for those areas where spraying is not practical, and where dry to handle times of from 1 to 2 hours are required. Spray application is permitted where a 45-minute pot life can be tolerated.
- E. Clean and proper equipment shall be used.
- F. The spray applied coatings shall be uniform, free of skins, lumps, gelled or coarse particles. Brush marks, sags, and runs on brush-applied surfaces are acceptable.
- G. All spray painting of airplanes should be limited to areas having good general ventilation. All painting of small parts should be confined to a paint spray booth having adequate exhaust ventilation. Respirators should be worn when proper exhaust ventilation is not available.

WARNING. TEFLON FINISH CONTAINS TOXIC AND FLAMMABLE COMPONENTS. AVOID BREATHING VAPORS. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. ALWAYS WASH HANDS BEFORE EATING OR SMOKING.

- H. Material shall be properly mixed.
- I. Material whose pot life has been exceeded shall be scrapped and not used.
- J. Material whose shelf life (1 year) has expired shall be rejected. Shelf life of the Teflon coating is 1 year from date of manufacture



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2. Equipment and Materials

- A. Laminar X-500 teflon coating kit, Color W or G. Magna Coatings and Chemical Corp.; Los Angeles, California. Kit consists of:

(1) Color W (White)

	SPRAY	BRUSH
Resin component	7-W-27	7-W-27FC
Hardener	10-C-81	10-C-81

(2) Color G (Gray)

	SPRAY	BRUSH
Resin component	7-X-74	7-X-74FC
Hardener	10-C-81	10-C-81

- B. Reducer (For W and G) 66-C-28 and 66-C-20 Magna Coatings and Chemical Corp.; Los Angeles, California.
- C. Toluene, TT-T-548 (JAN-T-171, Grade A, optional)
- D. Methyl Isobutyl Ketone, TT-M-268
- E. Cleaning Solvent, General Purpose BMS 3-2, optional. Aliphatic Naphtha, TT-N-95
- F. Cheese cloth, or equivalent, with less than 0.75 per cent oil
- G. TT-M-261 Methyl Ethyl Ketone
- H. Scotch Brite Sheet, Finishing Type A (containing aluminum oxide abrasive) Minnesota Mining and Manufacturing Company, Optional. Bear Tex Aluminum Oxide Abrasive Disks, Behr-Manning Company, Troy, New York
- I. Tec 361, Tec Chemical Company
- J. Alodine 1000, Amchem Products, Inc. Ambler, Pennsylvania
- K. Stiff bristle brush
- L. Wooden or plastic scrapers, or sandpaper
- M. Silicon carbide abrasive paper, 180 to 325 grit



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3. Surface Preparation

A. Unpainted Metal Surfaces

- (1) Solvent clean the surface by scrubbing with clean cheesecloth wetted with methyl ethyl ketone followed by wiping dry with clean cheesecloth before the solvent evaporates. Remove all visible residues including overspray, excess sealant, and adhesive flash. Scrub around fasteners, seams and lap joints with a stiff bristled brush wet with the solvent. If necessary, also use wooden or plastic scrapers, sandpaper, or Scotch-Brite pads.

NOTE Contaminates not removed by this method shall be stripped with a brush-on stripper per 51-2-21, Paint Stripping. Remove stripper residue by repeating the above solvent cleaning step.

- (2) Thoroughly wet-sand all metal surfaces except honeycomb assemblies and anodized aluminum with very fine Scotch-Brite pads and a toluene - MEK solvent blend (1:1 by volume). Stainless steel and titanium shall be thoroughly abraded with 180-325 grit silicon carbide abrasive paper.
- (3) Solvent clean all surfaces with the solvent blend of step (2) above by scrubbing with cheesecloth then wiping dry before the solvent evaporates. Repeat as necessary to remove all sanding residues.
- (4) Etch all unpainted metal areas except anodize aluminum that are to be painted by applying Tec 361 etchant. Scrub all surfaces with cheesecloth. Keep surfaces wetted for five to six minutes, then wipe dry with clean cheesecloth. Time is measured from the initial applications. Immediately flood the etched surfaces with water while scrubbing with clean cheesecloth. Particular attention should be given to rinsing and drying seams and joints. Wipe dry using clean cheesecloth.
- (5) Apply Alodine 1000 per 51-2-31, Alodizing.
- (6) Remove excess liquids from seams and lap joints using a vacuum tool or other device and dry with clean cheesecloth.
- (7) Allow the surfaces including the seams and lap joints to dry thoroughly prior to applying primer.

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B. Previously Painted Surfaces

- (1) Clean and reactivate per 51-2-51, Chemical and Solvent Resistant Finish (use Method 1 for epoxy primer films force dried).

C. Plastic Laminate Surfaces

- (1) Prepare surfaces per 51-2-22, Prepaint Cleaning and Pretreatment.

4. Mixing and Application of BMS 10-11 Primer

- A. Mix and apply one coat of BMS 10-11, Type 1 primer according to 51-2-51, Chemical and Solvent Resistant Finish.

5. Mixing and Application of Abrasion-Resistant Teflon Finish (Spray Application)

- A. The abrasion-resistant teflon coating is supplied in two component kits of resin component 7-W-27 for color W and 7-X-74 for color G, and hardener 10-C-81. If thinning is desired, use thinner-reducer 66-C-28.
- B. Mask off those areas adjacent to the areas which are to be coated with abrasion resistant Teflon coating.
- C. Mixing of the resin-pigment component should be by stirring only (Shaking is not effective.)
- D. Mix the coating as follows.

Spray Application

(Parts by weight)

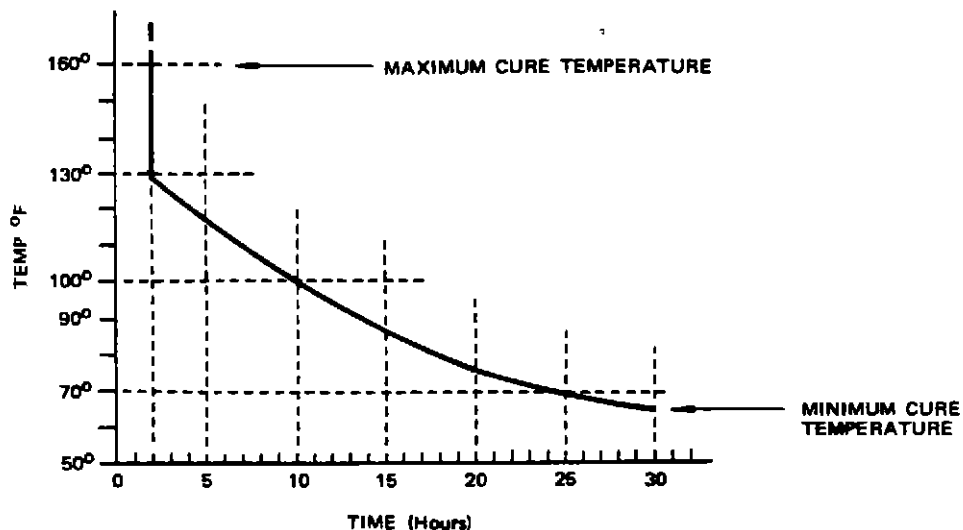
Resin Component 7-W-27 or 7-X-74	3
Hardener 10-C-81	1

- E. Mix these two components together by stirring only; do not shake. If thinning is required, up to one part by volume 66-C-28 may be added. If thinner is added, thoroughly mix the thinner into the 3:1 mixture by stirring only; do not shake. Allow the mixed material to stand at least 5 minutes before use.

NOTE Shaking will entrap air bubbles in the mixture producing an uneven coating.

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- F. At a temperature of 70°F the mixed material has a usable pot life of about 1-1/2 hours. The pot life of a mixed material decreases approximately half for every 20° rise in temperature. Material whose pot life has expired shall be scrapped. Do not mix more materials than will be used during the time listed above. Clean equipment prior to expiration of pot life
- G. Spray apply enough coats of Teflon coating to achieve the required dry film thickness. Where extremely difficult or impossible to spray, use brush application. If no thickness is specified, apply 5 to 10 mils (0.005 to 0.010 inch). Apply four to five wet cross passes per coat. Allow solvent to flash off 5 to 10 minutes between coats
- H. Prior to handling, allow the coating to dry tack free (at least 2 hours at 70 (± 5)°F). Allow a minimum cure of 12 hours at ambient conditions prior to outdoor exposure.
- I. Prior to assembly or in-service use, allow the last coat to air dry one hour followed by curing under the time-temperature conditions given in figure 701.





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- J. Feather all sharp paint edges by tapering with a hardwood stick, light sanding with 180 grit or finer, or spraying with paint thinned as required. Exercise caution when feathering to prevent damage to aluminum skins.

6. Mixing and Application of Abrasion Resistant Teflon Finish (Brush Application)

- A. The abrasion-resistant brushable Teflon coating is supplied in two component kits of resin component 7-W-27 FC (white) or 7-X-74 FC (gray) with hardener component 10-C-81. The solvent reducer is 66-C-20.

- B. Mix the coating as follows

<u>Brush Application</u>	<u>Parts by Volume</u>
Resin Component 7-W-27 FC (white) or Resin Component 7-X-74 FC (gray)	3
Hardener Component	1

- C. If additional thinning is desired, thin mixed material to a maximum of 20% by volume with solvent-reducer 66-C-20.
- D. Mix the components together thoroughly by stirring only; do not shake.
- E. Use 5 to 10 minutes after mixing; usable pot life is 45 minutes at 70°F.
- F. Apply by brushing in one direction to cover the required area to a thickness of 6 to 8 mils (0.006 to 0.008 inch) dry film thickness. Allow 30 minutes between brush coats; allow 5 minutes between spray coats.
- G. Prior to service allow the last topcoat to air dry 8 hours at 70°F.

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VELVET COATING FOR NONGLARE AREAS

1. Equipment and Materials

- A. 3M Velvet Coating, #101 Series
- B. Masking Tape, 3M #214
- C. Solvent
 - (1) Naphtha
 - (2) Xylene

2. Surface Preparation for Velvet Coating

- A See 51-2-22, Prepaint Cleaning and Pretreatment.

3. Velvet Coating Application

- A. Mix the 3M Velvet Coating thoroughly prior to use.
- B. Thin the 3M Velvet Coating if necessary to proper spray viscosity of 21-26 seconds (No 2 Zahn) using up to 10 percent naphtha or xylene.
- C. Spray apply one even coat, to 1.5 mil (0.0015 inch) minimum thickness by overlapping passes while previous spray pass is still wet. Do not apply more than one coat.
- D. The 3M Velvet Coating may be taped and masked after approximately 12 hours. Determine tape time by spraying test panels at the same time the airplane is painted, and taping on panel using 3M #214 tape.

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DECORATIVE PROTECTIVE POLYURETHANE PAINT SYSTEM - CLEANING/PAINTING

1. General

- A. This section describes the surface preparation, mixing, application and cure of the decorative protective polyurethane paint system. This system consists of Finch BMS 10-11, type 1, yellow primer, and BMS 10-60 polyurethane enamel.
- B. Rigid observation of the requirements of this section is necessary to ensure that the paint systems will adhere.
- C. Within 48 hours of application, the BMS 10-11 yellow primer shall be topcoated.
- D. Particular care shall be taken to avoid contamination of applied BMS 10-11 yellow primer and polyurethane enamel as a result of overspray, etc.
- E. Spray equipment used for application of these materials shall be thoroughly flushed with methyl ethyl ketone (MEK) or methyl isobutyl ketone (MIBK) and dried before and after use.
- F. Materials that have exceeded their storage life or pot life shall not be used.
- G. Mask or protectively cover surfaces not to be painted, as required.

2. Equipment and Materials

- A. Epoxy primer, Finch BMS 10-11, type 1, yellow
- B. Enamel, Finch BMS 10-60
- C. Thinners, TL-52 and TL-59
- D. Cheesecloth
- E. Strainer
- F. Spray equipment
- G. Tack rags
- H. Abrasive paper, 320 grit or finer, 400 grit or finer, and Scotchbrite
- I. Masking tape



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3. Surface Preparation

A. Prepare surfaces per 51-2-22, Prepaint Cleaning and Pretreatment

4. Epoxy Primer (Finch BMS 10-11, Type 1, Yellow)

A. Mixing

- (1) The 463-6-5 primer is supplied in two-component kits consisting of three parts 463-6-5 base material and one part X-306 converter. Thinner TL-52 is supplied separately.
- (2) Agitate each component thoroughly prior to mixing to ensure homogeneity. Use clean containers, that are not lined with organic coatings, for mixing.
- (3) Mix the primer by adding 1 part by volume of X-306 converter to 3 parts by volume of the 463-6-5 base material. Strain the primer through cheesecloth or equivalent strainer. Add 10% by volume thinner TL-52 to minimize dry spray and produce viscosity suitable for spraying. Agitate the mixed primer thoroughly and allow the mixed primer to stand 1/2 hour before using.
- (4) Immediately after mixing, the containers shall be affixed with a label stating the date and hour of mixing, and the date and hour the pot life expires. Mixed primer has a usable pot life from time of mixing of 8 hours at 75°F, 4 hours at 90°F and 3 hours at 100°F. Mixed primer whose pot life has expired shall not be used.

B. Application

- (1) Just prior to application of the BMS 10-11, type 1 yellow primer lightly wipe the surfaces to be painted using Tack Rag to remove dust, lint, overspray, etc.
- (2) Spray apply the primer to the entire area to be painted as indicated by the drawing.
- (3) Spray apply the primer in a wet, continuous film to a sufficient thickness to give complete metal coverage. Maximum dry film thickness is 0.7 mil for 1 coat and 1.5 mils for 2 coats. Primer films which exceed a dry film thickness of 0.7 mil for 1 coat or 1.5 mils for 2 coats shall be allowed to dry then sanded with 320 grit or finer abrasive paper to remove the excess primer.

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C. Cure

- (1) Allow the primer to dry a minimum of 1 hour at 75°F or higher or 2 hours at temperatures from 65° to 75°F, before overcoating.
- (2) BMS 10-11 yellow primer may be taped and masked after drying 45 minutes at 75°F or higher. The dry-to-tape time is dependant on temperature and humidity and is given here as a guide only. This time may be shortened or lengthened as need be providing the tape after removal has had no visible effects on the primer film.
- (3) If overspray or other surface roughness is apparent, hand scuff the dry primer film with 400 or finer grit abrasive paper.

5. Finch BMS 10-60 Enamel

A. Mixing

- (1) Finch 643-3 enamel and Finch 683-3 clear are supplied as kits consisting of 3 parts by volume of base and 1 part by volume of X-310 catalyst. Finch 663-3 enamel and 653-3 enamel are supplied in kits consisting of 4 parts by volume of base and 1 part by volume of X310 catalyst. Thinner TL-59 is furnished separately.
- (2) Agitate each component thoroughly and strain through cheesecloth just prior to mixing. Use clean containers without organic liners for mixing and application.

NOTE: Alkyd or other contamination cannot be tolerated by this paint. Fisheyes will result.

- (3) Mix the enamel by adding the catalyst to the base material while stirring. Then agitate thoroughly to ensure uniform mixing. Thin the resultant mixture, if necessary, to the desired spray consistency with TL-59 thinner. (Maximum of 25% of the original mixed paint volume.)

NOTE: Add thinner slowly with agitation. Recommended spray viscosity is 20 seconds with Zahn No. 2 Cup.

- (4) Immediately after mixing, label container with date and hour of mixing, and date and hour the pot life expires. Pot life at 70°F is 4 hours for the white enamel. Other colors may have a shorter pot life. Do not use material whose pot life has expired.
- (5) Agitate the mixed material for 15 minutes before applying.

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B. Application

- (1) If the BMS 10-11, type 1 primer has cured more than 48 hours before overcoating sand with 400 grit or finer abrasive paper and scrub with clean cheesecloth wet with TL-52 thinner. Allow the surface to dry before overcoating.
- (2) Immediately before applying polyurethane enamels, Scotch-Brite the primer surfaces if necessary and wipe with Tack Rag to remove lint, dust, overspray, etc.
- (3) Apply a heavy wet coat of enamel and allow to become tacky (at least 15 minutes) then follow with an additional wet coat to obtain uniform flow out. Use low air pressure (approximately 45 psi air fluid) and as few gun passes as practical to apply the required thickness.

NOTE: Do not apply other paints in close proximity to the airplane between the completion of the cleaning cycle step and dry-to-touch time of the polyurethane. Do not apply coats too wet, or sags, runs and curtains may develop.

- (4) Dry film thickness shall be sufficient to give complete dry hiding (2.0 to 2.4 mils) for decorative color enamels. If these enamel colors are applied over white, total thickness of the enamel should not exceed 4.8 mils. The dry film thickness of protective color enamels (such as 7025 gray) shall be 1.4 to 1.8 mils. Minimize overspray.

C. Cure

- (1) Dry to tape time (90°F) 4 hours. This drying time is dependent on temperature and humidity and is given here as a guide only. The time may be varied providing the tape after removal has had no visible effects on the enamel film. The exact time can best be determined on practice panels under shop conditions identical to those under which the airplane is painted.
- (2) Allow 8 hours or more at 75°F or higher before exposing the top coats to rain or outdoor temperatures below 75°F.

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ABRASION RESISTANT MOLYBDENUM DISULFIDE FINISH

1 General

- A. This section describes the preparation and application of a brushable or sprayable and Skydrol 500 resistant finish to chafing surfaces.
- B. Film thickness of the abrasion resistant finish is designated as follows:
 - (1) Class A - 3 to 7 mils (0.003 inch to 0.007 inch)
 - (2) Class B - 10 to 20 mils (0.010 inch to 0.020 inch)
- C. The following requirements must be observed:
 - (1) Material shall be properly mixed.
 - (2) Material whose pot life has been exceeded shall be scrapped and not used.
 - (3) The BMS 10-11, Type 1, primers shall be properly cured before topcoating with Tereco 155.
 - (4) Clean and proper equipment shall be used.
 - (5) Use high quality bristle brushes with firmly attached bristles for brush application.
 - (6) The coating materials shall be uniform, free of skins, lumps, gelled or coarse particles.
 - (7) Avoid contact with skin because Tereco 155 contains toxic ingredients.

2. Equipment and Materials

- A. Tereco 155, consisting of base material (part A) and accelerator (part B), Technical Research Co., Seattle.
- B. Solvents and Thinners
 - (1) Toluene, TT-T-548 or JAN-T-171, Grade A
 - (2) Xylene, TT-X-916, Grade A

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- (3) Methyl isobutyl ketone, TT-M-268
- (4) BMS 3-2 general purpose cleaning solvent, or Aliphatic naphtha, TT-N-95
- (5) Cheesecloth, new, meeting the following requirements.
 - (a) Grease or oil content based on a carbon tetrachloride (Trichlorethylene Optional) extraction - 0.75% maximum.
 - (b) Acetone soluble content - 1.0% maximum.
 - (c) Water soluble content - 1.0% maximum.

NOTE: (a), (b) and (c) to be calculated to a dry weight basis.

C. Sandpaper, 320 grit or finer, and 280 grit or finer

3. Surface Preparation

A. Aluminium Surfaces

- (1) Prior to application of Tereco 155 all aluminum surfaces shall have a conversion coating (chromic acid anodizing or alodizing) and a prime coat of either BMS 10-11, Type 1, epoxy primer or MIL-P-8585 zinc chromate primer.
- (2) Allow above primers to dry a minimum of 1 hour at room temperature or 15 minutes at $150^{\circ} \pm 15^{\circ}\text{F}$ prior to overcoating with the abrasion resistant finish.

B. Previously Painted Surfaces

- (1) BMS 10-11 epoxy films shall be cleaned and activated as follows prior to topcoating:
 - (a) Epoxy films not over 48 hours old. Wipe with a clean cheesecloth moistened with toluene. Wipe dry before solvent evaporates.
 - (b) Epoxy films over 48 hours old: Wipe using toluene or MIBK followed by light sanding with 320 grit or finer abrasive paper. Remove all sanding residue by wiping with methyl isobutyl ketone wetted cheesecloth.



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- (2) Zinc chromate primer films shall be cleaned and activated as follows prior to topcoating:
- (a) Zinc chromate primer less than 72 hours old: Wipe with a clean cheesecloth moistened with BMS3-2 or TT-N-95 solvent.
 - (b) Zinc chromate primer over 72 hours old: Reactivate by light hand sanding with 320 or finer dry abrasive paper and wipe clean with toluene (TT-T-548 or JAN-T-171 Grade A) moistened cheesecloth.

C. Steel Surfaces

- (1) Prepare surface and apply one coat of BMS 10-11, Type 1 primer.

4 Mixing and Application of Abrasion Resistant Finish

NOTE The abrasion resistant coating is supplied in two-component kits consisting of Tereco 155, base material (part A) and Tereco 155, accelerator (part B).

WARNING AVOID CONTACT WITH SKIN BECAUSE TEREKO 155 CONTAINS TOXIC INGREDIENTS.

A. Stir each component thoroughly prior to mixing.

B Mix the coating as follows:

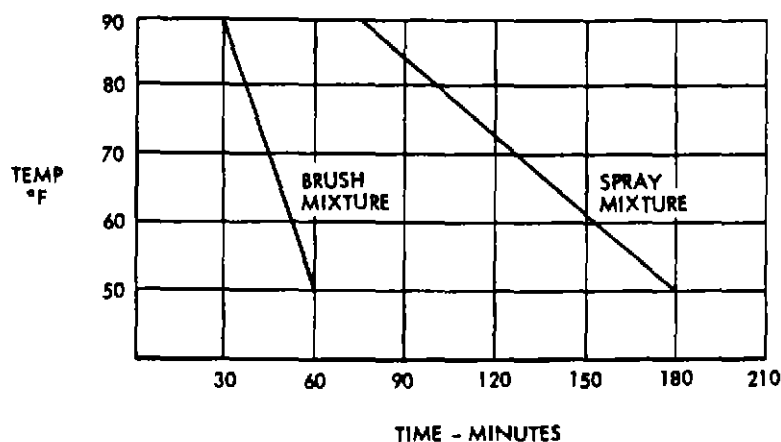
	<u>Brush Application</u>	<u>Spray Application</u>
Part B/Part A (parts by weight)	25/100	25/100
	Thin with 9 parts by weight of Toluene or Xylene per 125 parts of coating mixture.	Thin with 20-30 parts by weight of Toluene or Xylene per 125 parts of coating mixture.

- C. Thinner should be added to part B prior to mixing parts A and B. Allow the mixed material to stand at least 5 minutes before using.



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- D. Pot life of Tereco 155 is shown in figure 701. Material whose pot life has expired shall be scrapped. Do not mix more materials than will be used during time-temperature conditions noted in figure 701.
- E. Mask off the areas adjacent to the area being coated.
- F. Apply one or more coats of Tereco 155 to a continuous film with a dry film thickness as follows, regardless of application method. Allow excess solvent to flash off between coats. Dry film thickness shall be as follows.
- (1) Class A - 3 to 7 mils (.003" to .007")
 - (2) Class B - 10-20 mils (.010" to .020")
- G. Prior to handling, allow the coating to dry tack free (at least 8 hours at $70^{\circ} \pm 5^{\circ}\text{F}$). Prior to outdoor exposure, allow the coating to cure at least 12 hours.





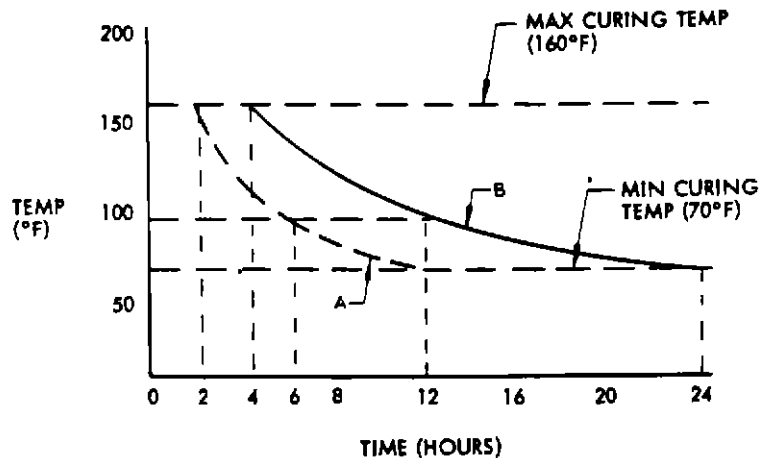
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- H Prior to assembly, allow coating to cure under the time-temperature conditions shown on curve A in figure 702.
- I. Prior to functional movement of parts allow coating to cure under the time-temperature conditions shown on B curve in figure 702.
- J. Feather all sharp paint edges with a hardwood stick or other suitable tool. Exercise caution to prevent damage to aluminum skins when using sharp feathering tools.

NOTE: The shelf life if Tereco 155 is six (6) months from date of manufacture.

5. Rework and Repair

- A Clean the areas to be reworked per paragraph 3 and apply Tereco 155. Feather edge all spot painting.
- B. Sand surfaces where the abrasive resistant coating has worn out with 280 or finer grit abrasive paper. Clean the area using a clean cheesecloth wetted with toluene and apply Tereco 155 coating. If BMS 10-11, Type 1 primer or MIL-P-8585 zinc chromate primer becomes scratched in the sanding operation rework per 3.A.(1)(omitting conversion treatment) and 3.A.(2); if aluminum becomes scratched rework per paragraphs 3 and 4





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NONSKID SURFACE - CLEANING/PAINTING

1. Nonskid Surface Painting

A. Equipment and Materials

- (1) Goodyear Griptred A868-White, Type I, Smooth (Optional. MIL-W-5044, Type I, Color Fed Std 495, 37875 White)
- (2) Goodyear Griptred A419A-Black, Type I, Smooth (Optional: MIL-W-5044, Type I, Color Fed Std 495, 37038 Black)
- (3) Goodyear Griptred A859-Light Dull Gray, Type I, Smooth (Optional MILW-W-5044, Type I, Color Fed Sta 495, 36440 Light Dull Gray)
- (4) Goodyear Griptred A-441-A-Dark Dull Gray, Type I, Smooth (Optional MIL-W-5044, Type I, Color Fed Std 415, 36231 Dark Dull Gray)
- (5) Primer
- (6) Solvents, Aliphatic Naphtha, TT-N-95, Type II, Methyl Isobutyl Ketone (MIBK), TT-M269 (Flash Pt 81°F), and Toluene
- (7) Abrasives, disks, or 320 grit or finer aluminum oxide abrasive paper
- (8) Binks No. 62 Spray Gun with #68 Nozzle Assembly (#68 Air Cap, 368 Needle and 68 Fluid Tip), or equivalent
- (9) Pressure tank, capable of withstanding 100 psi pressure and equipped with a stirring mechanism for agitation
- (10) Fluid hose, of sufficient diameter to furnish material to gun at proper pressure
- (11) Brush, with suitable bristle material
- (12) Masking tape

B. Prepare for Painting

WARNING: CONDUCT WORK IN WELL VENTILATED AREA DUE TO THE TOXIC EFFECTS OF SOLVENTS USED IN THE FINISHES. AVOID OPEN FLAMES AROUND THE COATING MATERIALS.

NOTE: Nonskid coating must be applied over primed or primed and topcoated surfaces per drawing specification.



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- (1) Surface Preparation of Previously Painted Surfaces. (Avoid exposing bare metal. In the event of exposure, prime and touch up per drawing specification.)

- (a) Less than 48 hours old

- 1) Solvent clean using Toluene or sand, when necessary, with 320 or finer grit paper.

- (b) Greater than 48 hours old

- 1) Manually solvent clean with Toluene.
 - 2) Abrasive clean with abrasive discs or 320 grit or finer aluminum oxide abrasive paper.
 - 3) Manually solvent clean with MIBK.

- (c) Mask areas not to be coated.

C. Paint Nonskid Surface

- (1) Use the coating material as supplied by the manufacturer. If thinning is required use aliphatic naphtha.
- (2) Apply one or more spray or brush coats to give a dry film thickness of 0.005 to 0.007 inch (6 to 8 ounces per square yard) Film thickness is defined as being the distance from the substrate to the outermost particle.

D. Restore Airplane to Normal

- (1) Each application of walkway material shall be allowed to dry thoroughly with a minimum drying time of 1/2 hour.
- (2) The finished walkway shall be allowed to air dry until set to touch before handling. Full hardness is obtained after 2 hours at 70°F or greater.

NOTE: Any masking tape adjacent to a painted edge shall be pulled before the coating is thoroughly dry to avoid removal of the coating due to the heavy film thicknesses involved.



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DECORATIVE PAINT SYSTEM - CLEANING/PAINTING

1. General
 - A. This subject contains procedures for all approved BMS 10-72 decorative paint system. Refer to par. 3 for a listing.
 - B. Procedures are also given for paint systems not described by BMS 10-72. Refer to par. 4.
2. Equipment and Materials
 - A. Finishes (Ref 13-1-4)
 - (1) Primer - BMS 10-11, type 1 (yellow and green)
 - (2) Primer - BMS 10-79
 - (3) Exterior Decorative Paint System - BMS 10-72
 - (4) Exterior Decorative Enamel - BMS 10-60, type II
 - B. Spray equipment
 - C. Abrasives (Ref 13-1-5)
 - (1) Scotchbrite pads
 - (2) Abrasive paper, 400 grit or finer, and 280 grit or finer
 - D. Tack rags
 - E. Cheesecloth
 - F. Solvents - MEK, MIBK, Toluene, TL-52 (Ref 13-1-3)
 - G. Masking tape (Ref 13-1-5)
 - H. Stripper - Turco 5351 (Ref 13-1-3)
3. BMS 10-72 Decorative Paint Systems

WARNING: FINISHES, CLEANERS, STRIPPERS AND SOLVENTS USED IN THIS SUBJECT CONTAIN TOXIC AND FLAMMABLE COMPONENTS. AVOID BREATHING VAPORS AND MIST. USE WITH ADEQUATE VENTILATION. PROVIDE APPROVED RESPIRATORY PROTECTION AS REQUIRED. DO NOT GET IN EYES. AVOID CONTACT WITH SKIN AND CLOTHING. USE PROTECTIVE EQUIPMENT AS REQUIRED. KEEP FLAMMABLE MATERIALS AWAY FROM SOURCES OF IGNITION.

- A. BMS 10-72, Type 1, (Bastic Finch Wash Primer, Intermediate Primer and Enamel)
 - (1) Prepaint clean and pretreat surface (Method 1)(Ref 51-2-22) Cleaning/Painting)
 - (2) Apply decal markings as necessary.
 - (3) Apply wash primer 364-1 per par. 5 and 6.
 - (4) Apply intermediate primer 463-6-5 per par. 5 and 6.
 - (5) Apply enamel topcoat 643-3 and 663-3 per par. 7 and 8. For 683-3 mettalic enamel colors, refer to par. 9.
- B. BMS 10-72, Type I (U.S. Paint Wash Primer, Intermediate Primer and Enamel)
 - (1) Prepaint clean and pretreat surface (Method 1)(Ref 51-2-22) Cleaning/Painting).
 - (2) Apply decal markings as necessary.
 - (3) Apply wash primer C22Y-7245 per par. 5 and 6.

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- (5) Apply intermediate primer AA92-I-6 per par. 5 and 6.
- (6) Apply enamel topcoat AA92 per par. 7 and 8. For metallic enamel colors, refer to par. 9.
- C. BMS 10-72, Type I (U.S. Paint Wash Primer, U.S. Paint Intermediate Primer and Finch Enamel)
 - (1) Prepaint clean and pretreat surface (Method I)(Ref 51-2-22) Cleaning/Painting).
 - (2) Apply decal markings as necessary.
 - (3) Apply wash primer C22Y-7245 per par. 5 and 6.
 - (4) Apply intermediate primer AA92-I-6 per par. 5 and 6.
 - (5) Apply enamel topcoat 643-3 and 663-3 per par. 7 and 8. For 683-3 metallic enamel colors, refer to par. 9.
- D. BMS 10-72, Type I (Sterling Wash Primer, Intermediate Primer and Enamel)
 - (1) Prepaint clean and pretreat surface (Method I) (Ref 51-2-22) Cleaning/Painting).
 - (2) Apply decal markings as necessary.
 - (3) Apply wash primer M3225 per par. 5 and 6.
 - (4) Apply intermediate primer U-1000 per par. 5 and 6.
 - (5) Apply enamel topcoat U-10XX-3 per par. 7 and 8. For metallic enamel colors, refer to par. 9.
- E. BMS 10-72, Type II (Alodine 1000 or 1200, BMS 10-11 Primer and Finch Enamel)
 - (1) Prepaint clean and pretreat surface (Method II)(Ref 51-2-22) Cleaning/Painting).
 - (2) Apply decal markings as necessary.
 - (3) Apply BMS 10-11 primer, Finch 463-6-5, per par. 5 and 6.
 - (4) Apply enamel topcoat 643-3 and 663-3 per par. 7 and 8. For 683-3 metallic enamel colors, refer to par. 9.
- F. BMS 10-72, Type III (Alodine 1000 or 1200, BMS 10-79, Type II Primer and Finch Enamel)
 - (1) Prepaint clean and pretreat surface (Method II)(Ref 51-2-22) Cleaning/Painting).
 - (2) Apply decal markings as necessary.
 - (3) Apply BMS 10-79, Type II primer, DeSoto 513-329 per par. 5 and 6.
 - (4) Apply enamel topcoat 643-3 and 663-3 per par. 7 and 8. For 683-3 metallic enamel colors, refer to par. 9.
- G. BMS 10-72, Type III (Alodine 1000 or 1200, BMS 10-79, Type II Primer and U.S. Paint Enamel)
 - (1) Prepaint clean and pretreat surface (Method II)(Ref 51-2-22) Cleaning/Painting).
 - (2) Apply decal markings as necessary.
 - (3) Apply BMS 10-79, Type II primer, DeSoto 513-329, per par. 5 and 6.
 - (4) Apply enamel topcoat AA92 per par. 7 and 8. For metallic enamel colors, refer to par. 9.

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- H. BMS 10-72, Type III (Alodine 1000 or 1200, BMS 10-79, Type II Primer and Sterling Enamel)
- (1) Prepaint clean and pretreat surface (Method II)(Ref 51-2-22) Cleaning/Painting).
 - (2) Apply decal markings as necessary.
 - (3) Apply BMS 10-79, Type II primer, DeSoto 513-329, per par. 5 and 6.
 - (4) Apply enamel topcoat U-10XX per par. 7 and 8. For mettalic enamel colors, refer to par. 9.
4. Decorative Paint System (Not Described by BMS 10-72)
- A. BMS 10-60, Type II (Alodine 1000 or 1200, BMS 10-79, Type II Primer and DeSoto Enamel)
- (1) Prepaint clean and pretreat surface (Method II)(Ref 51-2-22) Cleaning/Painting).
 - (2) Apply decal markings as necessary.
 - (3) Apply BMS 10-79, Type II primer, DeSoto 513-329, per par. 5 and 6.
 - (4) Apply enamel topcoat 822-T-203 per par. 7 and 8. For metallic enamel colors, refer to par. 9.
5. Primer Mixing
- A. The primer consists of a two-component kit containing resin base and curing agent. Thinner is supplied separately when required.
 - B. Agitate the primer base material and curing agent thoroughly just prior to mixing. Agitate sufficiently to incorporate all solids that may have settled out during storage.
 - C. Catalyze the primer by adding the proper amount of curing agent to resin base according to Fig. 701. Stir the base continuously while adding the curing agent. Immediately after catalyzing, thin the primer with the proper amount of reducer required for spray viscosity accoraing to Fig. 701.
 - D. Label the container with the date and hour of mixing and the date and hour the pot life expires.
 - E. Spray equipment used for wash primer must be clean. Flush out with alcohol before and after using.
- CAUTION: PRESSURE POT LINERS AND EQUIPMENT OF STAINLESS STEEL WILL RESIST ATTACK BY THE ACID IN THE WASH PRIMER DO NOT USE ALUMINUM LINERS
- F. Spray equipment used for application of other primers shall be thoroughly flushed with methyl ethyl ketone (MEK) or methyl isobutyl ketone (MIBK) and dried before and after use.
6. Primer Application
- A. Do not apply wash primer over previously painted surfaces.
 - B. Wash primer films that are too thick or that have cured over 4 hours shall be stripped according to 51-2-21 Paint Stripping, and reapplied.

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PRIMERS							
Material Designation per BMS 10-72	Mixing Ratio Parts by Volume	Induction Period	Pot Life	Mils Dry Film	Dry Time to Recoat	Dry Time to Tape *[2]	Spray Viscosity #2 Zahn
BOSTIK-FINCH wash primer Base: 364-2-1 Catalyst: CA-122 Thinner: T-31	1 1 1 max	15 min	4 hrs below 90°F	0.2 to 0.4	45 min to 4 hrs	N/A	15 to 18 sec
U.S. Paint wash primer Base: C22Y-7245 Catalyst: 66-C-72755 Thinner: None req'd	1 1 -	15 min	4 hrs below 90°F	0.2 to 0.4	45 min to 4 hrs	N/A	15 to 18 sec
Sterling wash primer Base: M3225 Catalyst: M3226 Thinner: U-1014 or Reducer: U-1275	1 1 1/2 max	15 min	4 hrs below 90°F	0.2 to 0.4	45 min to 4 hrs	N/A	15 to 18 sec
BOSTIK-FINCH BMS 10-11 epoxy primer (Intermediate) Base: 463-6-5 Catalyst: X-306 Thinner: TL-52	3 1 4/5 max	30 min	8 hrs	0.5 to 0.8	2 to 96 hrs *[1]	45 min at 75°F	18 to 20 sec

Primers
Figure 701 (Sheet 1)

PRIMERS							
Material Designation per BMS 10-72	Mixing Ratio Parts by Volume	Induction Period	Pot Life	Mils Dry Film	Dry Time to Recoat	Dry Time to Tape *[2]	Spray Viscosity #2 Zahn
U.S. Paint urethane primer (Intermediate) Base: AA92-I-6 Catalyst: AA92-C-33 Thinner: T-888	2 1 as req'd	30 min.	8 hrs	0.5 to 0.8	2 to 96 hrs *[1]	2.75 hrs at 90°F	18 to 20 sec
Sterling urethane primer (Intermediate) Base: U-1000 Catalyst: U-1000 Thinner: U-1014 or Reducer: U-1275	2 1 25%	30 min.	8 hrs	0.5 to 0.8	2 to 48 hrs *[1]	2.75 hrs at 90°F	18 to 20 sec
DeSoto BMS 10-79 epoxy primer TYPE I Base: 513-731 Catalyst: 910-709 Thinner: None req'd	1 1 -	30 min.	8 hrs	0.5 to 1.0	1 to 48 hrs *[1]	1 hr at 75°F	18 to 20 sec
TYPE II Base: 513X329 Catalyst: 910X456 Thinner: None Req'd	1 1 -	30 min.	8 hrs	0.4 to 1.0	1 to 24 hrs *[1]	2 hrs at 75°F	18 to 20 sec

- *[1] Where these maximum dry times are exceeded, reactivation by sanding and solvent cleaning is required according to 51-2-22 Prepaint Cleaning and Pretreatment (Previously Painted Surfaces).
*[2] Dry to tape time values are approximate. Tape after removal shall have had no visible effects on the primer film.

Primers
Figure 701 (Sheet 2)

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ENAMELS, TOPCOAT						
Material Designation per BMS 10-72	Mixing Ratio Parts by Volume	Induction Period	Pot Life	Mils Dry Film	Dry Time to Tape *[1]	Spray Viscosity #2 Zahn
Enamel, Gloss						
BOSTIK-FINCH						
Base: 643-3 Catalyst: X-310A Thinner: TL-59	3 1 as req'd	30 min	3 to 4 hrs	1.8 to 4.8	4 hrs at 90°F	17 to 23 sec
U.S. Paint						
Base: AA92-XX Catalyst: AA92-C-49 Thinner: T-816	1 1 1/4 max	30 min	3 to 4 hrs	1.8 to 4.8	4 hrs at 90°F	17 to 23 sec
Sterling						
Base: U-10XX-3 Catalyst: U-1001-3 Thinner: U-1014 or Reducer: U-1275	1 1 25%	none req'd	3 to 4 hrs	1.8 to 4.8	4 hrs at 90°F	18 to 20 sec
DeSoto						
Base: 822-T-203 or 800 Series Catalyst: 910X331A Thinner: None	2 1 0	none	3 to 4 hrs	1.8 to 4.8	4 hrs at 90°F	17 to 18 sec

Enamel Topcoats
Figure 702 (Sheet 1)

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ENAMELS, TOPCOAT						
Material Designation per BMS 10-72	Mixing Ratio Parts by Volume	Induction Period	Pot Life	Mils Dry Film	Dry Time to Tape * [1]	Spray Viscosity #2 Zahn
<u>Enamel, Flat</u> BOSTIK-FINCH Base: 663-3 flat Catalyst: X310A Thinner: TL-59	4 1 as req'd	30 min	3 to 4 hrs	1.8 to 4.8	4 hrs at 90°F	17 to 23 sec
U.S. Paint Base: AA92-XX Catalyst: AA92-C-49 Thinner: T-816 or T-295	2 1 1 max	30 min	3 to 4 hrs	1.8 to 4.8	4 hrs at 90°F	17 to 23 sec
Sterling Base: U-10XX-3 Catalyst: U-1146 Thinner: U-1014 or Reducer: U-1275	2 1 as req'd	30 min	3 to 4 hrs	1.8 to 4.8	4 hrs at 90°F	17 to 23 sec
<u>BMS 10-60 Type II Enamel</u> Gloss, semi-gloss, flat, clear and metallic						
DeSoto Base: 822-T-203 or 800 Series Catalyst: 910-152 Thinner: 020X310	2 1 1 max	none	3 to 4 hrs	1.8 to 4.8	4 hrs at 90°F	17 to 18 sec

BOSTIK-FINCH

4
1
as req'd

30 min

3 to 4 hrs

1.8 to 4.8

4 hrs at
90°F

**17 to 23
sec**

Base: AA92-XX
Catalyst: AA92-C-49
Thinner: T-816
or T-295

2
1
1 max

30 min

3 to 4 hrs

1.8 to 4.8

4 hrs at
90°F

**17 to 23
sec**

Base: U-10XX-3
Catalyst: U-1146
Thinner: U-1014 or
Reducer: U-1275

2
1
as req'd

30 min

3 to 4 hrs

1.8 to 4.8

4 hrs at
90°F

**17 to 23
sec**

Gloss, semi-gloss, flat,
clear and metallic

Base: 822-T-203
or 800 Series
Catalyst: 910-152
Thinner: 020X310

2
1
1 max

none

3 to 4 hrs

1.8 to 4.8

4 hrs at
90°F

**17 to 18
sec**

ENAMELS, TOPCOAT						
Material Designation per BMS 10-72	Mixing Ratio Parts by Volume	Induction Period	Pot Life	Mils Dry Film	Dry Time to Tape *[1]	Spray Viscosity #2 Zahn
<u>Enamel, Metallic</u> BOSTIK-FINCH Base: 683-3 clear + gold Catalyst: X-310A Thinner: TL-59 <u>Clear Overcoat</u> Base: 683-3 Catalyst: X-310A Thinner: TL-59 U.S. Paint Base: AA92-C-45 clear + gold Catalyst: AA92-C-31 Thinner: T-816	3 1 as req'd 3 1 as req'd 1 1 as req'd	5 min 30 min 5 min	1 hr 3 to 4 hrs 1 hr	Metallic & Clear 1.8 to 4.8 Metallic & Clear 1.8 to 4.8 Metallic & Clear 1.8 to 4.8	2 hrs at 70 to 100°F before clear topcoat 4 hrs at 90°F 2 hrs at 70 to 100°F before clear topcoat	15 to 20 sec 15 to 20 sec 15 to 20 sec

Enamel Topcoats
 Figure 702 (Sheet 3)

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ENAMELS, TOPCOAT						
Material Designation per BMS 10-72	Mixing Ratio Parts by Volume	Induction Period	Pot Life	Mils Dry Film	Dry Time to Tape *[1]	Spray Viscosity #2 Zahn
<u>Clear Overcoat</u> Base: AA92-C-45 Catalyst: AA92-C-31 Thinner: T-816	1 1 as req'd	30 min	3 to 4 hrs	Metallic & Clear 1.8 to 4.8	4 hrs at 90°F	15 to 20 sec
<u>Sterling</u> Base: U-10XX-3 clear + gold Catalyst: U-1001-3 Thinner: U-1014 or Reducer: U-1275	1 1 as req'd	5 min	1 hr	Metallic & Clear 1.8 to 4.8	2 hrs at 70 to 100°F before clear topcoat	15 to 20 sec
<u>Clear Overcoat</u> Base: U-10XX-3 Catalyst: U-1001-3 Thinner: U-1014 or Reducer: U-1275	1 1 as req'd	30 min	3 to 4 hrs	Metallic & Clear 1.8 to 4.8	4 hrs at 90°F	15 to 20 sec

*[1] Dry to tape time values are approximate. Tape after removal shall have had no visible effects on the primer film.

Enamel Topcoats
Figure 702 (Sheet 4)

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- C. The primer dry-to-tape time is dependent on temperature and humidity and is given in Fig. 701 as a guide only. This time may be shortened or lengthened as need be, providing the tape after removal has had no visible effects on the primer film.
- D. If overspray or other surface roughness of the primer film is apparent, lightly hand-sand the dry primer with 400 or finer grit abrasive paper or Scotchbrite pads. Use extreme care to prevent removal of the primer to substrate. If this occurs, repair per par. 9.
- E. Primer films that are soiled from dust, dirt and/or paint overspray, or that have been sanded shall be carefully cleaned immediately prior to overcoating by wiping with a tack rag.

7. Enamel Mixing

- A. Enamel consists of a two-component kit containing resin base and catalyst. Thinner is supplied separately.
- B. Agitate the enamel base material thoroughly just prior to mixing. Agitate sufficiently to incorporate all solids that may have settled out during storage.
- C. Catalyze the enamel by adding the proper amount of catalyst to resin base according to Fig. 702. Stir the base continuously while adding the curing agent. Immediately after catalyzing, thin the enamel with the proper amount of reducer required for spray application (Fig. 702).

NOTE: Failure to thin Sterling enamel immediately may result in a shorter pot life.

- D. Label container with date and hour of mixing and date and hour the pot life expires.

8. Enamel Application

A. General

- (1) Where enamel colors are applied over white the total enamel thickness is not to exceed 4.8 mils (0.0048 inch)
- (2) The dry-to-tape time at 90°F is approximately 4 hours. This drying time is dependent on temperature and humidity and is given here as a guide only. The time may be varied providing the tape after removal has had no visible effects on the enamel film. The exact time can best be determined on practice panels under shop conditions identical to those under which the airplane is painted.
- (3) Cure 8 hours minimum before exposing the paint to rain or outdoor temperatures below 70°F.

CAUTION: PAINT DOES NOT DEVELOPE MAXIMUM RESISTANCE TO HYDRAULIC FLUID FOR APPROXIMATELY 7 DAYS AT 70°F OR ABOVE.

- (4) Cure paint used for touchup on fasteners, rivet heads, scratches, etc (not to exceed 36 square inches) for a minimum of 8 hours at temperatures above 70°F
- B. The recommended procedure for application of enamel is to apply two to three coats with 15 to 20 minutes dry time between coats.

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MAINTENANCE MANUAL

9. Metallic Enamel

A. General

- (1) This paragraph describes surface preparation, mixing, application, and cure of the decorative metallic paint system. This system consists of an exterior metallic color coat plus an exterior clear overcoat.

NOTE: The application instructions for the clear overcoat apply for its use over all colors.

- (a) Apply the total BMS 10-72 system specified on the drawing.

NOTE: Enamel barrier coat is not required for use on fiberglass nor under aluminum pigmented metallic paints.

- (b) Mask as required to isolate the area to be overcoated with metallic paint.

- (c) Apply BMS 10-72 metallic enamel according to par. 8.C.

B. Metallic Enamel Mixing

- (1) The exterior metallic color coat consists of a three-component kit containing component A, clear resin base, component B, catalyst and component C, metallic powder, component D, thinner is supplied separately.
- (2) Mix the materials in clean containers without organic liners.
- (3) Add approximately 1/3 by volume of component A, resin base, to component C, powder, and stir into a smooth paste. Mix thoroughly. Add the remainder of the resin base, while stirring. Slowly add the catalyst to the powder-resin mixture while stirring. Shake for 3 to 5 minutes, then let stand for 5 minutes without agitation. Label the container with the time of mixing and time the pot life expires (4 hours for aluminum powder pigmented systems and 1 hour for gold powder pigmented systems). Do not use material whose pot life has expired.
- (4) Hand-stir for 3 to 5 minutes and strain through cheesecloth or an equivalent strainer. Just prior to application, thin as required for spray consistency with component D thinner.
- (5) Mix clear enamel overcoat according to enamel mixing instructions of par. 6 and Fig. 702.
- (6) Clean spray gun equipment with methyl ethyl ketone (MEK) or toluene.

C. Metallic Enamel Application

- (1) Apply one light coat and allow to dry until it begins to lose tackiness, then apply a wet cross coat to obtain uniform flowout without producing runs or sags.
- (2) Cure 8 hours at 70°F or higher before exposure to rain or outdoor temperatures below 75°F.

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10. In Process Correction

- A. Surfaces with Minor Damage (Not to Bare Metal)**
 - (1) Sand smooth with 280 grit or finer wet or dry abrasive paper.
 - (2) Remove sanding dust with a clean cheesecloth saturated with TL-52 solvent; wipe dry with clean cheesecloth.
 - (3) Reprime if necessary masking surrounding areas. Feather the edges of the dry primer with Scotchbrite pads to make a smooth finish.
 - (4) Remove masking and repaint enamel. Spray overlap to make a continuous unblemished surface.
- B. Areas with Extensive Damage (Bare Metal Exposed)**
 - (1) Strip paint film from the damaged area per 51-2-21, Paint Stripping (use Turco 5351 only) or sand to a smooth surface taking care not to sand to bare metal. Feather the edges of the adjacent area with 280 grit or finer abrasive paper wet with water.

CAUTION: DO NOT ALLOW PAINT STRIPPER TO CONTACT FIBERGLASS OR SEAMS OF ADHESIVE BONDED PARTS.

- (2) Remove sanding dust with clean cheesecloth saturated with TL-52 solvent. Wipe dry with clean cheesecloth.
 - (3) Reapply appropriate primer systems and topcoats as required. Feather all edges to make a continuous smooth finish.
- C. Areas with Defective Paint Films (Sags, Runs, Drips or Orange Peel)**
 - (1) Sand area to the degree necessary to correct defects using 280 or finer wet or dry abrasive paper. Feather the edges into surrounding area.
 - (2) Wipe sanding residue from area with cheesecloth dampened with TL-52 solvent.
 - (3) Touch up with appropriate enamel.

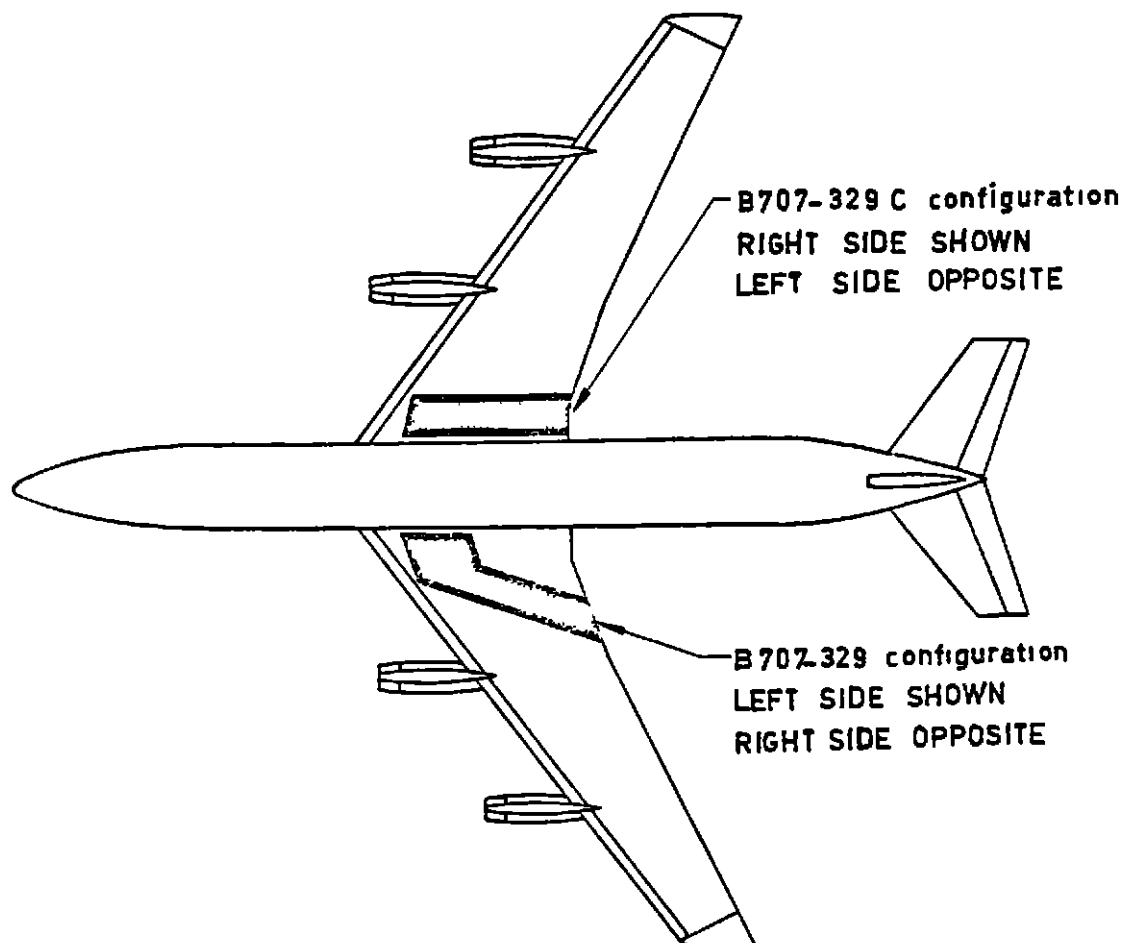
11. Paint Exterior Decorative Finishes

- A. Do not paint pressure relief valve or outflow valve. Paint may prevent pressure relief valve or outflow valve from proper operation. No paint should be applied for a one inch wide circular band around or on the pressure relief valve doors or outflow valve.**

T.R 51-37

MM B737

OVERWING SLIP RESISTANT ESCAPE ROUTE



REFER TO

SB 2754/B.707 for areas configuration

SAB 707 579 for procedure and specifications

SAC DET 7 MARS 1970

51-2-181

Page 1

SEALING - DESCRIPTION AND OPERATION

1. General

- A. Sealing compounds are used to seal small openings such as joggles, holes, slots, and closure joints. They are applied to structure in those areas where a barrier to the flow of gases, vapors or fluids is required. The extent of sealing and type of sealant required varies depending on location, therefore there have been established four levels of sealing. These levels are absolute, extensive, intermediate, and limited. The sealing requirements for the fuselage are shown in figure 1, for nacelles and struts in figure 2, and for wing in figure 3.

2. Definitions of Levels of Sealing

A. Absolute Sealing

- (1) All openings of any nature are positively sealed.

B. Extensive Sealing

- (1) All holes, slots, joggles, and enclosure joints are sealed as follows.
- (a) Standard flush rivets in countersunk holes - require edges of attached parts to be sealed. Upset head is not sealed. Sealing is not required if these rivets are driven high and shaved.
 - (b) Screws and bolts, which do not require torque value, are dipped prior to installation.
 - (c) Bolts, which require tightening to a specified torque value, have bolt head or nuts and threads sealed after installation. Edges of attached parts are sealed also. High shear rivets are sealed in a similar manner if it is determined through functional testing that excessive leakage occurs through the hi-shear rivets.
 - (d) Blind and repair rivets are dipped prior to installation.
 - (e) Standard protruding head rivets, flush rivets in dimpled holes and lock bolts are not sealed.
 - (f) Dome type nut plates are sealed all around flange.

C. Intermediate Sealing

- (1) All holes, slots, joggles and enclosure joints are sealed.

D. Limited Sealing

- (1) All holes, slots, and joggles are sealed.

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MAINTENANCE MANUAL

REQUIREMENTS

STA 130 TO STA 360 (SECTION 41)

EXTENSIVE PRESSURE SEAL - Required from sta 178 to sta 360 - seal planes other than normal body contour are as follows:

- ① Aft side of pressure bulkhead sta 178
- ② Fwd side of doppler cavity sta 211.80 below wl 173.10 and pressure deck sta 211.80 to sta 259.50 at wl 173.10
- ③ Aft side of doppler cavity at sta 259.5 below wl 173.10 except that portion enclosing nose wheel well
- ④ All sides of structure enclosing nose wheel well except fwd side of sta 259.50 and area of battery compartment
- ⑤ Fwd side of bhd sta 312 below wl 149.15 and outboard of bl 22
- ⑥ Upper surface of walkway at wl 149.15 from sta 312 to sta 360
- ⑦ Aft side of bhd sta 360 enclosing nose wheel well and below wl 149.15
- ⑧ External surfaces of battery compartment

INTERMEDIATE WEATHER SEAL

- ⑧ Nose area fwd of pressure bhd sta 178
- ⑨ Around all window openings

LIMITED WEATHER SEAL

- ⑩ External skin under walkway sta 312 to sta 360
- ⑪ Nose wheel doors
- ⑫ Nose wheel well door frame

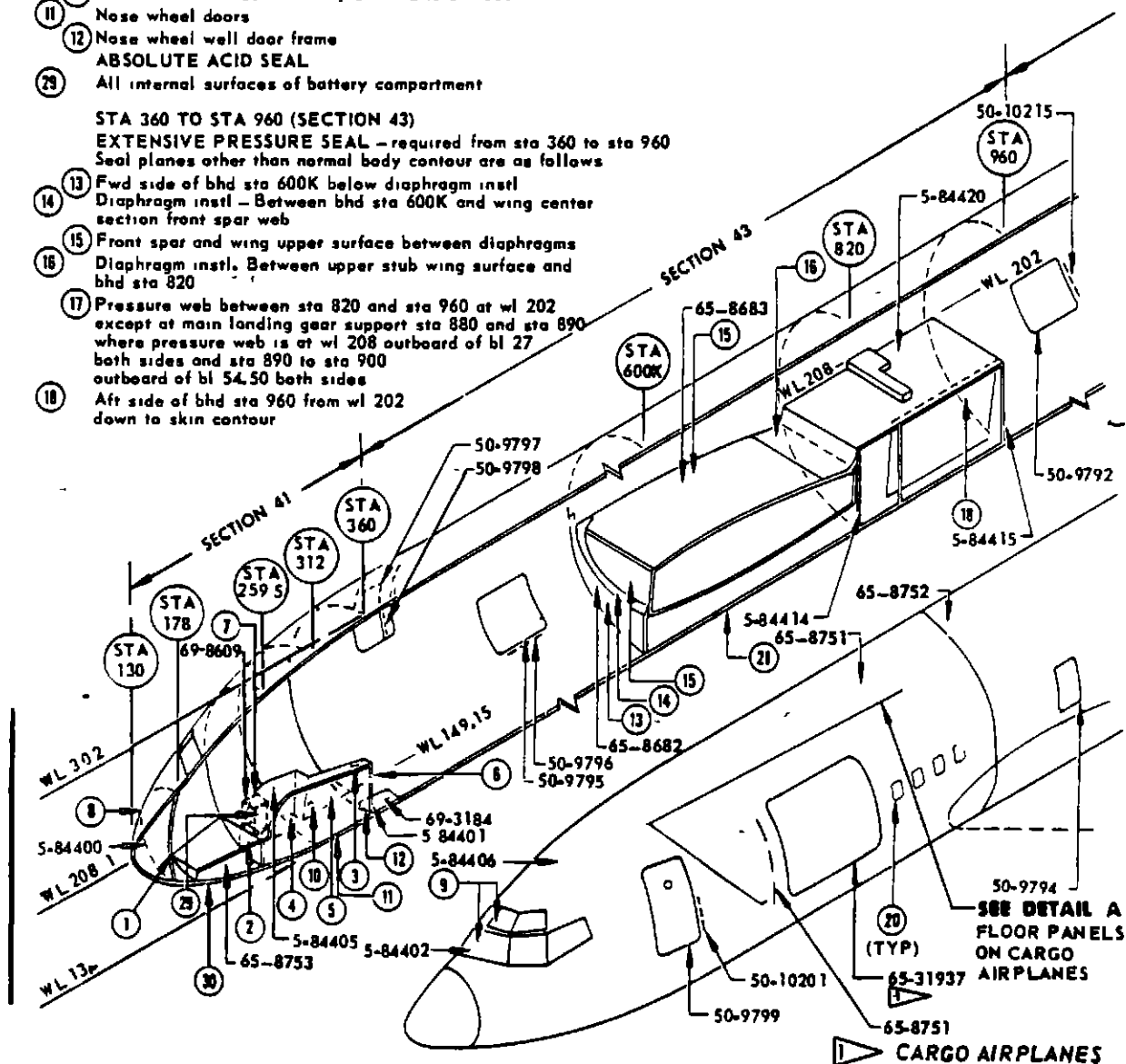
ABSOLUTE ACID SEAL

- ⑬ All internal surfaces of battery compartment

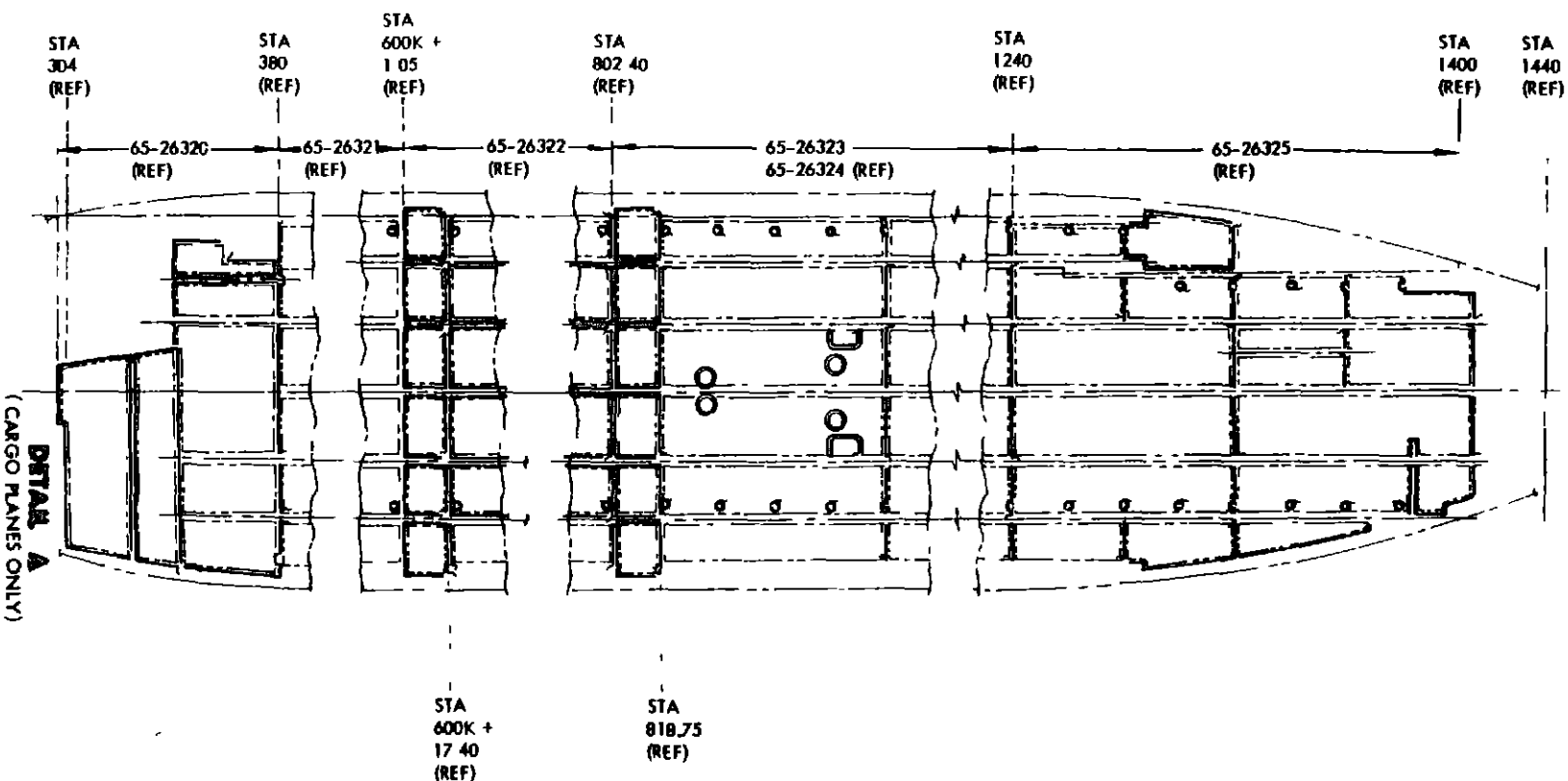
STA 360 TO STA 960 (SECTION 43)

EXTENSIVE PRESSURE SEAL - required from sta 360 to sta 960
Seal planes other than normal body contour are as follows:

- ⑬ Fwd side of bhd sta 600K below diaphragm instl
- ⑭ Diaphragm instl - Between bhd sta 600K and wing center section front spar web
- ⑮ Front spar and wing upper surface between diaphragms
- ⑯ Diaphragm instl. Between upper stub wing surface and bhd sta 820
- ⑰ Pressure web between sta 820 and sta 960 at wl 202 except at main landing gear support sta 880 and sta 890 where pressure web is at wl 208 outboard of bl 27 both sides and sta 890 to sta 900 outboard of bl 54.50 both sides
- ⑱ Aft side of bhd sta 960 from wl 202 down to skin contour



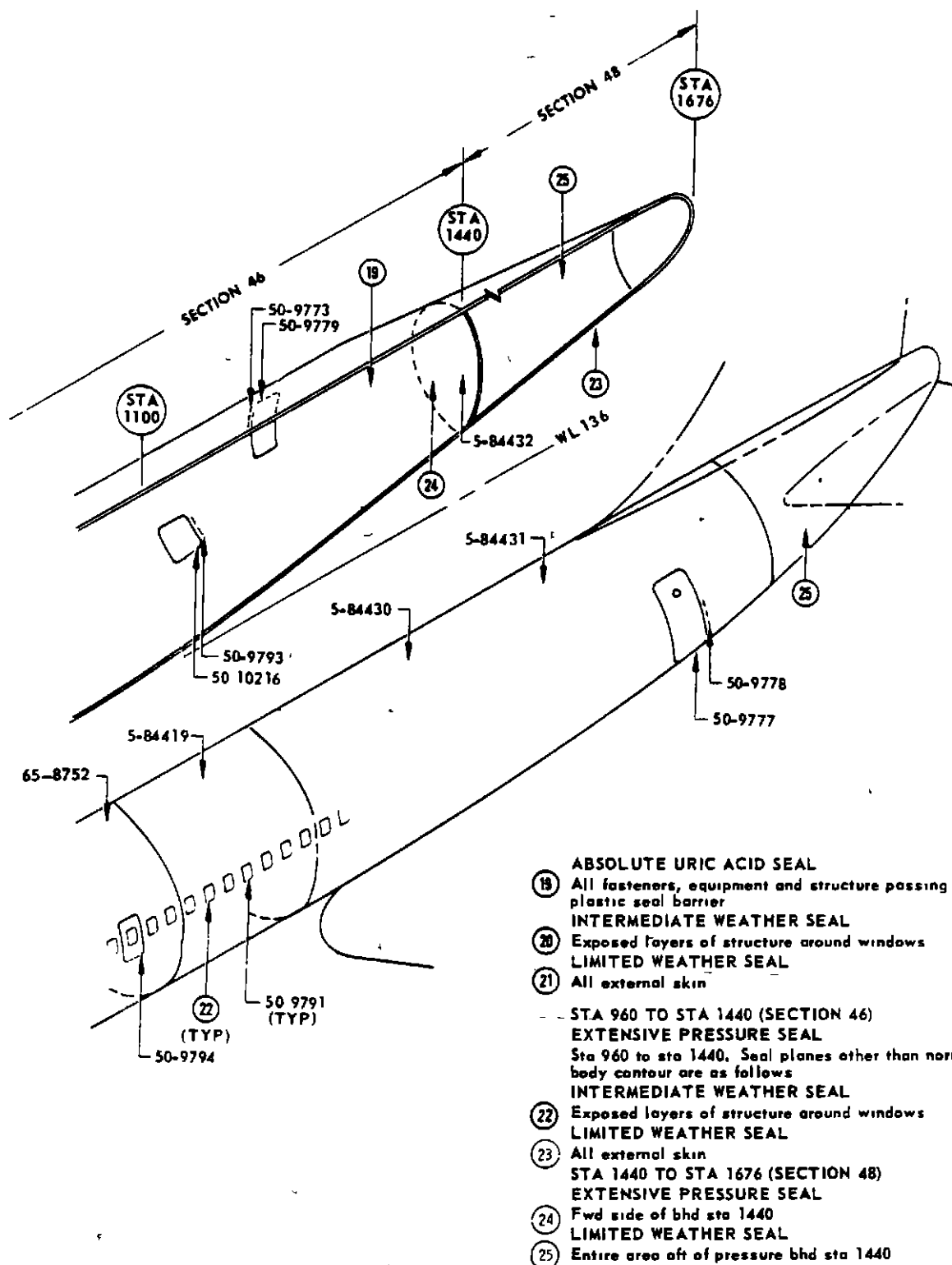
Fuselage - Sealing Index and Requirements
Figure 1 (Sheet 1)



NOTE HEAVY DARK LINE INDICATES NYLON CORD
 NYLON CORDS ARE ALSO USED FOR TIE-DOWN
 FITTINGS EXCEPT THOSE ON PANEL BREAKS, FOR
 CIRCULAR ACCESS DOORS AND FOR MAIN LAND-
 ING GEAR INSPECTION DOORS ON FLOOR
 PANELS AND TIE-DOWN FITTINGS USE NYLON
 CORD PER MIL-T-7807 TYPE I CLASS II ON CIR-
 CULAR ACCESS DOORS AND MAIN LANDING
 GEAR INSPECTION DOORS USE NYLON CORD PER
 MIL-T-5040A TYPE 1A SEE BOEING DRAWING
 65-32195

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 Jun 15/63

Fuselage - Sealing Index and Requirements
 Figure 1 (Sheet 2 of 4)



- 19 ABSOLUTE URIC ACID SEAL
All fasteners, equipment and structure passing thru plastic seal barrier
- 20 INTERMEDIATE WEATHER SEAL
Exposed layers of structure around windows
- 21 LIMITED WEATHER SEAL
All external skin
- STA 960 TO STA 1440 (SECTION 46)
EXTENSIVE PRESSURE SEAL
Sta 960 to sta 1440. Seal planes other than normal body contour are as follows
- 22 INTERMEDIATE WEATHER SEAL
Exposed layers of structure around windows
- 23 LIMITED WEATHER SEAL
All external skin
- STA 1440 TO STA 1676 (SECTION 48)
EXTENSIVE PRESSURE SEAL
- 24 Fwd side of bhd sta 1440
LIMITED WEATHER SEAL
- 25 Entire area aft of pressure bhd sta 1440



MAINTENANCE MANUAL

BAC DWG NO

NOMENCLATURE

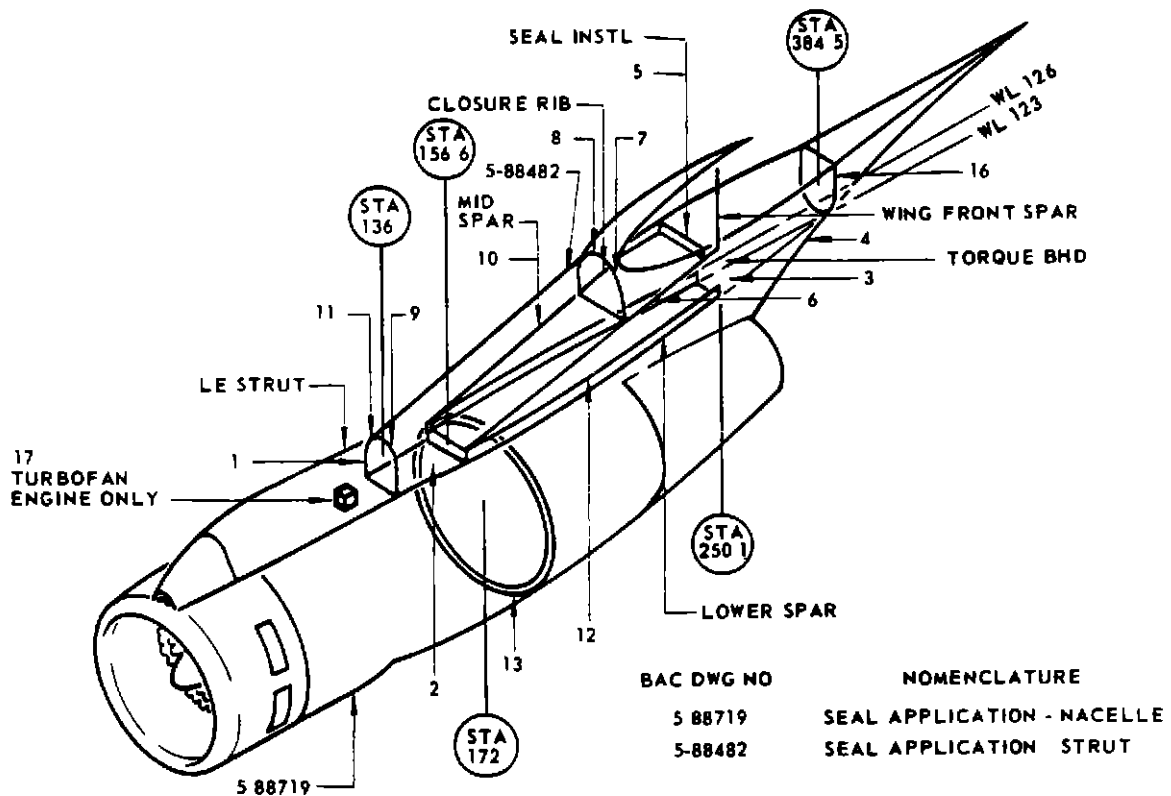
50-9794	SEAL APPLICATION - ESCAPE HATCH
50-9795	SEAL APPLICATION - FWD CARGO DOOR
50-9796	SEAL APPLICATION - FWD CARGO DOOR FRAMES AND SILLS
50-9797	SEAL APPLICATION - FWD GALLEY DOOR
50-9798	SEAL APPLICATION - FWD GALLEY DOOR FRAMES AND SILLS
5-84415	SEAL APPLICATION - BHD STA 960
5-84414	SEAL APPLICATION - BHD STA 820
65-8682	SEAL APPLICATION - BHD STA 600K
65-8683	SEAL APPLICATION - PRESSURE WEB INSTL - STA 600K TO STA 820
5-84420	SEAL APPLICATION - PRESSURE WEB INSTL - STA 820 TO STA 960
5-84419	SEAL APPLICATION - SKIN PANEL INSTL - STA 820 TO STA 960
65-8752	SEAL APPLICATION - SKIN PANEL INSTL - STA 600K TO STA 820
65-8751	SEAL APPLICATION - SKIN PANEL INSTL - STA 360 TO STA 600K
50-9791	SEAL APPLICATION - WINDOW FRAME PASSENGER
5-84406	SEAL APPLICATION - SKIN INSTL - STA 130 TO STA 360
5-84405	SEAL APPLICATION - NOSE WHEEL WELL AREA
50-9799	SEAL APPLICATION - FWD ENTRY DOOR
50-10201	SEAL APPLICATION - FWD ENTRY DOOR - FRAMES AND SILLS
5-84402	SEAL APPLICATION - COCKPIT ENCLOSURE
5-84401	SEAL APPLICATION - BHD 360 TO PROD BREAK
5-84400	SEAL APPLICATION - PRESSURE BHD STA 178
69-3184	SEAL APPLICATION - DOOR ACCESS ELECTRONIC
5-84430	SEAL APPLICATION - SKIN INSTL - STA 960 TO STA 1240
5-84431	SEAL APPLICATION - SKIN INSTL - STA 1240 TO STA 1440
50-10215	SEAL APPLICATION - CENTER CARGO DOOR FRAMES AND SILLS
50-9792	SEAL APPLICATION - CENTER CARGO DOOR
50-9773	SEAL APPLICATION - AFT GALLEY DOOR, FRAMES AND SILLS
50-9779	SEAL APPLICATION - AFT GALLEY DOOR
50-9778	SEAL APPLICATION - AFT ENTRY DOOR, FRAMES AND SILLS
50-9777	SEAL APPLICATION - AFT ENTRY DOOR
50-9793	SEAL APPLICATION - AFT CARGO DOOR, FRAMES AND SILLS
50-10216	SEAL APPLICATION - AFT CARGO DOOR
5-84432	SEAL APPLICATION - PRESSURE BHD STA 1440
65-8753	SEAL APPLICATION - DOPPLER CAVITY - STA 211.8 TO STA 259.5
69-8609	SEAL APPLICATION - BATTERY COMPARTMENT - NOSE WHEEL WELL
65-31937	SEAL APPLICATION - MAIN CARGO DOOR 1
50-11368	FLOOR PANEL INSTALLATION - SECTION 41
65-2428	FLOOR PANEL INSTALLATION - SECTION 43
65-2429	FLOOR PANEL INSTALLATION - SECTION 46

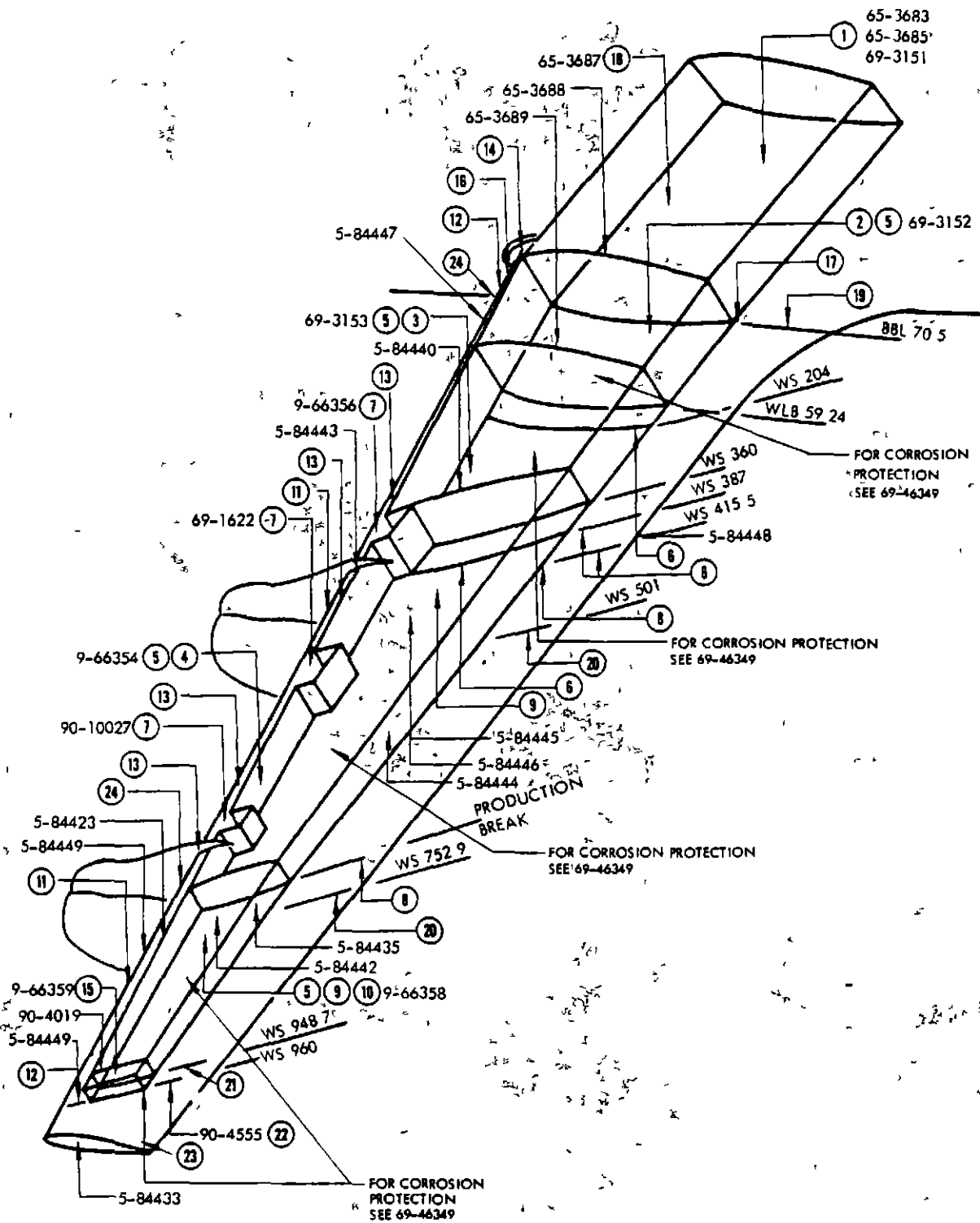
1 Cargo Airplanes

2 All except Cargo Airplanes
See page 2A for Cargo
Airplanes

MAINTENANCE MANUAL

- 1 ABSOLUTE FUEL SEAL - Sta 136 lhd between wl 126 and lower spar
- 2 ABSOLUTE FUEL SEAL - Lower spar, mid spar and side structure between sta 136 and sta 156 60 up to wl 126
- 3 ABSOLUTE FUEL SEAL - Slip joint seal between wl 123 and wl 126
- 4 ABSOLUTE FUEL SEAL - TE fairing from torque bhd to TE
- 5 ABSOLUTE FUEL SEAL - Seal instl from mid spar to join seal on wing front spar 5 86580 (Ref)
- 6 ABSOLUTE FUEL SEAL - Mid spar and sides above mid-spar to top of mid spar chords from seal instl to join closure rib
- 7 ABSOLUTE FUEL SEAL - Closure rib up to 3 inches above mid-spar
- 8 INTERMEDIATE FUEL SEAL - Closure rib structure between strut LE and absolute seal
- 9 INTERMEDIATE FUEL SEAL - Sta 136 bhd from strut LE to wl 126
- 10 INTERMEDIATE FUEL SEAL - Mid-spar between closure rib and sta 156 60 - seal to join absolute seal 2 and 6
- 11 LIMITED FIRE SEAL - Sta 136 bhd between strut LE and lower spar
- 12 LIMITED FIRE SEAL - Lower spar between torque bhd and sta 136 bhd
- 13 LIMITED FIRE SEAL - Fire ring sta 172
- 16 ABSOLUTE FUEL SEAL - Up former 3 0 from lower seam (inboard strut only)
- 17 LIMITED PRESSURE SEAL - Fan reverser follow up mechanism box





Wing Sealing Index and Requirement
Figure 3 (Sheet 1)



MAINTENANCE MANUAL

REQUIREMENTS

- ① WING CENTER SECTION - (EMERGENCY SEALS)
ABSOLUTE FUEL SEAL ENTIRE BOTTOM SURFACE AND 1 5 INCHES UP ON FRONT SPAR, REAR SPAR, ALL SPAN WISE BEAMS, AND INBD SIDE OF TANK END AT BBL 70.5 DO NOT PLUG DRAIN OR LIMBER HOLES
INTERMEDIATE FUEL SEAL ALL INTERNAL BOUNDARIES OF TANK ABOVE ABSOLUTE SEAL (NOTE IT IS NOT NECESSARY TO SEAL AREAS WHERE AN ADEQUATE SEAL IS PROVIDED ON OPPOSITE SIDE BY PRESSURE OR INTEGRAL TANK SEALS)
- ② BBL 70.5 TO WBL 59.24 (INTEGRAL TANK)
ABSOLUTE FUEL SEAL REQUIRED ON ALL INTERNAL BOUNDARIES OF THIS TANK
- ③ MAIN TANK NO. 2 (INTEGRAL TANK)
ABSOLUTE FUEL SEAL REQUIRED ON ALL INTERNAL BOUNDARIES OF THIS TANK
- ④ MAIN TANK NO. 1 (INTEGRAL TANK)
ABSOLUTE FUEL SEAL REQUIRED ON ALL INTERNAL BOUNDARIES OF THIS TANK
- ⑤ ALL INTEGRAL TANKS (EMERGENCY SEALS)
PROVIDE A LEAKAGE ISOLATION SEAL AT APPROXIMATELY 50 INCH INTERVALS ALONG ALL SEAMS TO PREVENT EXCESSIVE TRAVEL FROM SOURCE OF LEAKAGE
- ⑥ RIB WS 204.0, WS 226.286, WS 387 AND WS 415.5
LIMITED FUEL SEAL DAMS ALONG LOWER EDGE OF RIB UP TO TOP OF DAMS
- ⑦ DRY BAYS WS 360 TO WS 387 AND WS 501 TO WS 529 AND WS 672 TO FSS 666.140 (EMERGENCY SEALS)
ABSOLUTE FUEL SEAL AFT FACE OF FRONT SPAR FULL HEIGHT (EXCEPT DO NOT SEAL BULKHEAD FITTINGS THRU SPAR)
- ⑧ WING TRAILING EDGE TO STRUT BARRIER (EMERGENCY SEAL)
ABSOLUTE SEAL FULL HEIGHT OF BARRIER FROM STRUT TRAILING EDGE SKIN CONTOUR TO WING LOWER SURFACE (EXCEPT DO NOT SEAL BULKHEAD FITTINGS)
- ⑨ STRUCTURAL VENTS (INTEGRAL TANK AREA)
ABSOLUTE FUEL SEAL REQUIRED TO ISOLATE VENTS FROM ALL SURROUNDING AREAS
- ⑩ NO. 1 RESERVE TANK (INTEGRAL TANK)
ABSOLUTE FUEL SEAL REQUIRED ON ALL INTERNAL BOUNDARIES OF THIS TANK
- ⑪ INBOARD AND OUTBOARD LEADING EDGE ANTI-ICING SYSTEMS
INTERMEDIATE ANTI-ICING SEAL PLENUM CHAMBER PORTIONS OF THE ANTI-ICING SYSTEM FROM FSS 422.63 TO FSS 666.14 AND ALL OUTER LEADING EDGE SKIN PLACES
- ⑫ LEADING EDGE RIBS FSS 16.75 AND WS 960 (EMERGENCY SEALS)
ABSOLUTE FUEL SEAL RIBS UP TO THE FOLLOWING HEIGHTS
FSS 16.75, 7 INCHES BELOW WCP
WS 960, TO HEIGHT OF WCP
INTERMEDIATE FUEL SEAL ABOVE ABSOLUTE SEAL (EXCEPT DO NOT SEAL CABLES PASSING THRU FAIRLEADS)

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- ⑬ LEADING EDGE RIBS IN NACELLE AREAS (EMERGENCY SEALS)
ABSOLUTE FUEL SEAL RIBS UP TO THE FOLLOWING HEIGHTS
FSS 382 66, 2 0 INCHES BELOW WCP
FSS 422 63, 1 5 INCHES BELOW WCP
FSS 666 14, 0 5 INCH BELOW WCP
FSS 716 72, 0 5 INCH BELOW WCP
LIMITED FIRE SEAL ENTIRE HEIGHT OF RIBS (EXCEPT DO NOT SEAL CABLES PASSING THRU FAIRLEADS)
- ⑭ RIB FORMER AT BBL 63 2 (EMERGENCY SEAL)
ABSOLUTE FUEL SEAL RIB FORMER UP TO WL 154.65
- ⑮ WING TIP SURGE TANK (INTEGRAL TANK)
ABSOLUTE FUEL SEAL REQUIRED ON ALL INTERNAL BOUNDARIES OF THIS TANK
- ⑯ FRONT SIDE OF FRONT SPAR INBOARD OF FFS 16 75 (EMERGENCY SEAL)
ABSOLUTE FUEL SEAL FRONT SPAR ON FORWARD SIDE IN AREA SHOWN SEALS SHALL BE CONTINUOUS WITH THOSE ON LE RIB 16 75 AND THE WING CENTER SECTION FRONT SPAR AND SHALL EXTEND DOWN TO THE FUSELAGE FAIRING TO MEET THE SEALS ON THE RIB FORMER DESCRIBED IN ⑭ AND ⑰
- ⑰ BARRIER BETWEEN REAR SPAR AND BODY BULKHEAD STA 820 (EMERGENCY SEAL)
INTERMEDIATE FUEL SEAL THE BARRIER TO PREVENT VAPOR ENTRY INTO FUSELAGE THESE SEALS SHALL JOIN SEALS DESCRIBED IN ⑱
- ⑱ WING - FUSELAGE FAIRING (EMERGENCY SEAL)
ABSOLUTE FUEL SEAL BBL 63 2 BEAM, UP TO ONE INCH TO PREVENT FUEL FLOW INTO FUSELAGE INTERMEDIATE FUEL SEAL ABOVE ABSOLUTE SEAL AT AFT END THE SEALS SHALL JOIN SEALS DESCRIBED IN ⑰ AT FORWARD END THE SEALS SHALL JOIN SEALS DESCRIBED IN ⑯
- ⑲ TRAILING EDGE PANEL BBL 70 5 (EMERGENCY SEAL)
ABSOLUTE FUEL SEAL CHANNEL AT BBL 70 5 (65-3674 REF) FROM REAR SPAR AFT TO FUSELAGE STA 884 AND THE OUTBOARD 6 INCHES ON BEAM AT STA 844 TO PREVENT DRAINAGE INTO WHEEL WELL
- ⑳ TRAILING EDGE DAMS WS 204, 289 03, 354 7, 501 AND 752 9 (EMERGENCY SEALS)
ABSOLUTE FUEL SEAL STRUCTURE TO A HEIGHT OF APPROXIMATELY 2 INCHES (WHEN POSSIBLE) TO PROVIDE DAM FOR LIQUIDS FLOWING INBOARD
- ㉑ TRAILING EDGE RIB WS 948 AND TORQUE BOX BULKHEAD (EMERGENCY SEAL)
ABSOLUTE FUEL SEAL RIB AND BULKHEAD TO HEIGHT OF APPROXIMATELY 1 INCH
- ㉒ TRAILING EDGE RIB WS 960 01 (EMERGENCY SEAL)
ABSOLUTE FUEL SEAL UP TO A HEIGHT OF ONE INCH BELOW WCP AND AFT OF THE REAR SPAR INTERMEDIATE FUEL SEAL ABOVE ABSOLUTE SEAL
- ㉓ WING TIP (EMERGENCY SFAL)
INTERMEDIATE FUEL SEAL LOWER SURFACE SKIN AND VENT OUTLET
- ㉔ LANDING LIGHT (EMERGENCY SEAL)
ABSOLUTE FUEL SEAL FULL HEIGHT OF CAVITY

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BAC DRWG NO

NOMENCLATURE

69-1622	SEAL APPLICATION - DRY BAY - STA 501 TO STA 529 50
5-84445	SEAL APPLICATION - LOWER PANEL INBD WING
5-84446	SEAL APPLICATION - UPPER PANEL INBD WING
5-84447	SEAL APPLICATION - LEADING EDGE INBD WING
5-84448	SEAL APPLICATION - TRAILING EDGE INBD WING
65-3683	SEAL APPLICATION - LOWER PANEL WING CENTER SECTION
65-3685	SEAL APPLICATION - FRONT AND REAR SPAR WING CENTER SECTION
65-3687	SEAL APPLICATION - WING BODY FAIRING - LOWER
65-3688	SEAL APPLICATION - TANK END RIB - BBL 70 5
65-3689	SEAL APPLICATION - TANK END RIB - WBL 59 24
5-84440	SEAL APPLICATION - TANK END RIB - WS 360
5-84443	SEAL APPLICATION - FRONT SPAR INBD WING
5-84444	SEAL APPLICATION - REAR SPAR INBD WING
5-84449	SEAL APPLICATION - LEADING EDGE OUTBD WING
90-4019	SEAL APPLICATION - TANK END RIB WS 948
90-4555	SEAL APPLICATION - TRAILING EDGE AREA WS 960
5-84423	SEAL APPLICATION - FRONT SPAR OUTBD WING
5-84435	SEAL APPLICATION - REAR SPAR OUTBD WING
5-84442	SEAL APPLICATION - UPPER PANEL OUTBD WING
5-84433	SEAL APPLICATION - TIP WING
69-3151	SEAL APPLICATION - WING CENTER SECTION
69-3152	SEAL APPLICATION - INTEGRAL TANK BBL 70 5 TO WBL 59 24
9-66354	SEAL APPLICATION - INTEGRAL TANK WS 360 TO PRODUCTION BREAK
69-3153	SEAL APPLICATION - INTEGRAL TANK WBL 59 24 TO WS 360
9-66356	SEAL APPLICATION - DRY BAY STA 360 TO STA 387
9-66358	SEAL APPLICATION - NO 1 RESERVE TANK
9-66359	SEAL APPLICATION - VENT SURGE TANK
90-10027	SEAL APPLICATION - FUEL SHUT-OFF VALVE CAVITY WS 672 TO FSS 666 140
69-46349	CORROSION PROTECTION APPLICATION WING

NOTES

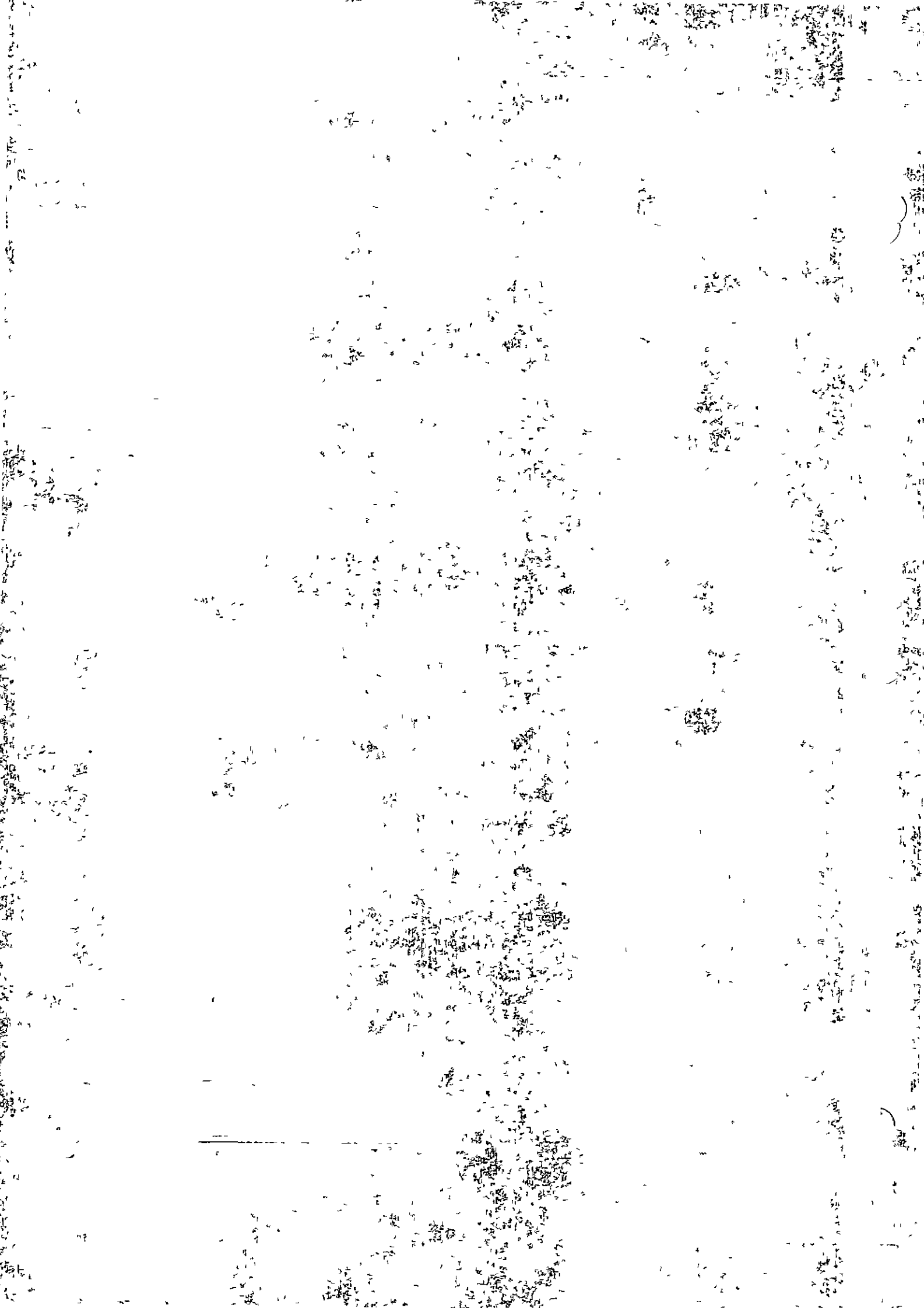
DO NOT PLUG DRAIN OR LIMBER HOLES FOR WING DRAINAGE DIAGRAM SEE 65-1021 FOR LEAKAGE DAM INSTALLATION SEE 50-10636 ALL NUTPLATES IN THE INTEGRAL FUEL TANKS MUST BE SEALED

IF A STRUCTURAL SATISFACTORY ALUMINUM RIVET LEAKS, IT IS PERMISSABLE TO FILLET SEAL ITS BUCKED END (RATHER THAN RESTRIKING OR REPLACING IT)

THE FILLET SEAL ON THE MANUFACTURED HEAD OF ALL BAC 50-47 ALUMINUM RIVETS MAY BE OMITTED IF THESE RIVETS ARE MECHANICALLY SEALED UNDER THE MFG HEAD PER D6-8777 AND IF THE PARTICULAR SEAL PLANE FULFILLS ALL FUNCTIONAL TEST REQUIREMENTS

FUNCTIONAL TEST PER APPLICABLE SECTIONS OF D-17339 05 REWORK AREAS WHERE LEAK DETECTION PAINT HAS BEEN APPLIED OVER BMS 10-11 PRIMER (1) TREAT ANY RESIDUAL LEAK DETECTION STAINS BY LIGHTLY SWABBING WITH CEE-BEE A-24 SOLVENT (THIS CHANGES THE COLOR OF THE STAIN FROM BLUE TO YELLOW BUT DOES NOT REMOVE STAIN) (2) APPLY FOG COAT BMS 10-11 TYPE 1 PER BAC 5736 OVER YELLOW STAIN AREAS

- 1 APPLY ALL SEALS IN INTEGRAL TANK AREAS PER BAC 5504
- 2 APPLY SEALS IN OTHER AREAS PER BAC 5000
- 3 FOR CORROSION PROTECTION SEE 69-46349



3 Definitions of Types of Sealing

A Hole and Slot Filling

- (1) Tool and coordination holes are closed with soft rivets except when one side is not accessible and in that case they are sealed.
- (2) Sealant is also used for plugging joints, gaps, joggles, and holes, providing their size does not exceed specification limits.
- (3) All sealing is done on the on-pressure or fuel side. The reason for this is to use pressure to help hold the sealant in place.

B Fillet Sealing

- (1) Fillet sealing is the application of a bead of sealant to cover seams or joints.

C. Injection Sealing

- (1) Injection sealing is the filling of holes or channels by forcing sealant through the void or cavity.

D. Faying Surface Sealing

- (1) Faying surface sealing is the sealing of two flat surfaces fastened together, one on top of the other before the parts are assembled. It is especially used to seal areas that will be hard or impossible to seal after assembly.

E. Fastener Sealing

- (1) Fasteners are sealed during assembly by being installed through a faying surface seal within the work life of the sealant. Fasteners installed through seal planes where no faying surface sealant is used are sealed during or after assembly.

F. Electrical Wire Sealing

- (1) Electrical wiring requires specified sealants for sealing wiring bundles and fittings. Unless otherwise specified, each bundle is separated and each wire is coated separately over the length that is to pass through the fairlead or coupling before the bundle is pulled through the fitting. The whole unit, fairlead and coupling as well as the wire bundle, is sealed all around.

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4 Sealants

A. Material - BMS 5-12; Pressure and Moisture Sealant

Class B Injection, EP-711 (equal parts material)

- (1) The basic ingredient in this product is a synthetic rubber of the polysulfide type. It cures by the addition of a separate curing agent. The material is prepared by mixing the base compound with the appropriate accelerator, and in proportions as directed by the manufacturer. The two components should be mixed until the mixture is of uniform color. Apply the mixed material with a gun or spatula. These materials cure to a nonporous rubber sealant and may be removed by first cutting away as much as possible with a hardwood cutting tool. Remove the remainder with methyl ethyl ketone.

B. Aerodynamic Smoother

- (1) Material BMS 5-13 (Presstite 108, EC1328, Pro-Seal 715, or Pro-Seal 895)
 - (a) Used to fill gaps, slots, and depressions in the exterior of the airplane, also used for exterior weather seals in skin joints. The material is prepared by stirring the accelerator into a thick paste, before mixing with the base material. Thoroughly mix the base material with the correct amount of accelerator until the mixture is of uniform color. Exercise care in mixing to minimize entrapment of air in the compound. Mix only enough compound to satisfy the immediate requirements. Apply the mixed smoother with a flow gun, paper cone or spatula. The mixed compound will produce a silvery grey rubbery sealant which has a thiokol odor. For removing cured sealant, cut away excess material with a cutting tool made of hardwood. Remove the remainder with methyl ethyl ketone.
- (2) Material BMS 5-79, Class B
 - (a) Manufacturing has a choice of materials with different application times and shall select the proper compound for the job. The material has different application times and each is so designated with a dash number. For example: BMS 5-79, Class B-2, designates a sealant with a 2-hour application time at 77 (± 2)°F and 50 (± 5)% relative humidity. Lower humidities will proportionately retard the cure. The material is available with 1/2-hour, 2-hour, 4-hour and 8-hour application time. The mixed sealant is satisfactory for use as long as it can be easily extruded from a flow gun or worked with a spatula.



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- (b) The applied sealant will cure to a Rex Model A durometer hardness of 30 at 77 (± 2)°F and 50 (± 5)% relative humidity, in approximately the time specified below:

Class B-1/2	24 Hours
Class B-2	48 Hours
Class B-4	90 Hours
Class B-8	7 Days

- (c) The base compound of two-part materials shall be mixed thoroughly with the vendor's recommended amount of matched activator (marked with the batch number of base compound with which it is to be used) so that the mixture is of uniform color. Care shall be exercised during mixing to maintain entrapment of air.
- (d) Volatile materials shall be kept in safety cans or other air-tight containers. All containers shall be tightly closed when not in use.
- (e) BMS 5-79, Class B materials shall not be applied over MIL-P-8585 primer or BMS 10-11, type 1 primer until primer has dried to a hard and tough film (at least 6 hours at room temperature)
- (f) The usability range of each activated compound may be extended beyond the normal application time by refrigerated storage immediately after mixing. After thawing, the sealant must not again be refrigerated. All material stored under refrigeration shall be packed in sealed tubes.

C Material BMS 5-16; Two Part Hole Filling Compound

Pro-Seal 567, PR205, EC1370, or Presstite 1094

- (1) This compound consists of a liquid thiokol polymer containing a micaceous filler. It cures by the addition of a separate curing agent. This material is used to fill gaps or holes and will make an effective seal without an overcoating material at temperatures from -65 to +200°F. The material is prepared by mixing the base compound with the appropriate accelerator in proportions as directed by the manufacturers. Mix the two components until the mixture is of a uniform color, mixing only sufficient to satisfy immediate requirement as the work life of this material is only approximately 2 hours at 75°F and 50% relative humidity. Apply the compound with a flow gun or spatula, packing firmly into the space to be filled. Large slots and holes may be backed with masking tape to prevent excessive extrusion of sealant. The cure may be accelerated by the application of warm air, 120°F maximum. The mixed material will produce a dark brown rubbery sealant which will make an effective seal without an overcoating material. To remove cured sealant cut away with a tool made of hardwood and remove the remainder with methyl ethyl ketone

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D. Material BMS 5-18; High Temperature Sealant

Type I - Duct sealant, filleting only, effective from -65 to 350°F
PR1600 or Pro-Seal 303-7

Type II - Filleting and faying surfaces, effective from -65 to 450°F.
Presstite 193.1, Pro-Seal 714, or PR810

- (1) These materials are used for sealing duct seams and joints in the anti-ice system. Except for Pro-Seal 714, the materials are used as packaged. The Pro-Seal 714 material shall be prepared by mixing the base compound with the appropriate accelerator in proportions as directed by the manufacturer. Mix the two components until the mixture is of uniform color. As long as solvent is present in the mixture, no curing or gelling will occur for at least 1 week at 75°F, so the mixed material may be stored in an airtight container for this period. BMS 5-18 sealants shall not be thinned with solvents. Application is by flow gun or spatula, the normal curing time being approximately 72 hours at 75°F but this time may be accelerated by the application of circulating warm air, 140°F maximum. BMS 5-18, type 2 sealant may be protected by spraying with a light coat of zinc chromate primer MIL-P-6889 1 hour after application of sealant. This sealant is a black, rubbery type material which will shrink considerably in the process of curing. To remove, cut out the sealant with a tool made of hardwood and remove remainder with methyl ethyl ketone.

E. Material BMS 5-19; Pressure and Moisture Sealant

Class A - For brush application use PR9021 or Pro-Seal 719

Class B - Injection filleting and faying surface sealant PR9021,
Pro-Seal 719, Churchill 3C-401 or EC1239

- (1) The basic ingredients in these products are synthetic rubbers of the polysulfide type. They cure by the addition of a separate curing agent to the base compound. The base compounds are white, the accelerators dark brown. Used in absolute seal areas of the center wing cavity and as an alternative to BMS 5-12 in pressure sealing the airplane body. Temperature range -65 to +180°F. The sealant is prepared by mixing the base compound with the appropriate accelerator in proportions as recommended by the manufacturer until a uniform color is obtained. Exercise care in mixing to minimize entrapment of air in compound. These sealants are available in different work lives to meet the need of the specific job. Type A is used as a brushable sealant for precoating on all types of seals except faying surface seals. To remove, cut away as much as possible with a tool made of hardwood and remove remainder with methyl ethyl ketone.



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F. Firewall Sealant

(1) Material BMS 5-22 (Pro-Seal 700)

- (a) These materials will remain elastic at operating temperatures from 0 to 400°F and can withstand flash temperatures of 2000°F. Pro-Seal 700 is supplied as two components which are to be mixed as recommended by the manufacturer. It is a black two-part synthetic rubber and when mixed has the consistency of a buttery paste. The dry material cures in approximately 60 to 72 hours at a temperature of 75°F. Apply the mixed sealant with a spatula or similar tool. To remove Pro-Seal 700, grind or chip away.

(2) Material BMS 5-63, BMS 3-11 Hydraulic Fluid Resistant

- (a) BMS 5-63 sealant is a two-part material.
- (b) Surfaces to be sealed must be primed with BMS 5-63 primer prior to sealant application. Allow a minimum of 30 minutes for the primer to dry prior to sealing. Silicone primed surfaces which have been contaminated with dirt, grease, etc., shall be recleaned and reprimed.
- (c) Sealant may be applied with a Semco sealing gun or by spatula. Smoothing and fairing shall be done with a spatula or similar tool. Since BMS 5-63 is a silicone compound, tools which have contacted the sealant must no longer be used with nonsilicone compounds (residual silicone cannot be completely cleaned and may cause adhesion problems).
- (d) At 77 (± 2)°F and 50 (± 5)% relative humidity, BMS 5-63 has an application time (pot life) of at least 6 hours. Higher temperatures will decrease this time greatly.
- (e) At 77 (± 2)°F and 50 (± 5)% relative humidity, BMS 5-63 requires a maximum of 48 hours for curing. Lower temperatures will greatly increase the time required for curing.
- (f) Curing of BMS 5-63 may be accelerated by applying heat. At 120°F approximately 3 hours are required for curing.
- (g) Each production batch of sealant and primer shall be retested not later than 6 months after receipt of the material and within each subsequent 3 month period. BMS 5-63 primer has a storage life of approximately 6 months, and primer containers should be kept tightly closed when primer is not being used.



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- (h) The usability range of the mixed sealant may be extended beyond the normal application time by storage below 0°F immediately after mixing. After thawing the sealant must not again be refrigerated. All refrigerated materials shall be packaged in Semco sealant gun tubes or aluminum toothpaste type tubes. The sealant tubes shall be mechanically refrigerated or shall be placed in separate gas-tight containers before being placed in dry ice. Storage of sealant tubes directly in dry ice is not allowed because carbon dioxide penetrates into the silicone sealant and forms bubbles.

G. Material EC801 with EC807 Activator

- (1) For sealing areas in the vicinity of the batteries and relief stations where there is a danger of spillage. This sealant is a thiokol base material which cures by the addition of a separate curing agent and when mixed produces a shiny, nonporous, black rubbery, highly adhesive sealant. The sealant is prepared by mixing the base compound and activator in proportions as directed by the manufacturer. To remove, cut away as much as possible with a tool made of hardwood and remove remainder with methyl ethyl ketone.

H. Material MIL-S-4383

Topcoating EC776SR

- (1) A fuel and corrosion resistant coating for integral fuel tank sealing. These are thin red topcoatings with excellent adhesion to most surfaces and are Buna-N base materials. EC776R is a brushable version and has a ketone solvent. EC1527 is a sprayable version having a ketone and acetate solvent. At 75°F the material takes approximately 24 hours to cure but the curing time may be speeded up by circulating warm air, 120°F maximum. Remove with methyl ethyl ketone.

I. Material Vinyl Parting Compound

- (1) Consists of one part by weight of MIL-I-7444 vinyl tubing dissolved in four part cyclohexenone. This material is used as a parting agent when low adhesion to one member or surface is required. Application is by brush or spray and the curing time is approximately 10 minutes. Remove with cloth saturated in cyclohexenone. Delco X-769 may be used in place of the MIL-I-7444 vinyl tubing dissolved in cyclohexenone.

SEALING - MAINTENANCE PRACTICES

1 General

- A. Sealing compounds have been used to seal sections of the airplane against leakage of fuel, pressurized air, hot air from anti-icing ducts, battery acids etc., and during the course of structural or component inspection are to be examined for deterioration of compound and non-adherent characteristics. Any air leakage throughout the pressurized fuselage can normally be detected, when carrying out a fuselage pressure check, by aural means. Fluid leakage can be detected by the obvious presence of fluid, or fluid stains on the dry side of the structural members. For detailed information on fuel leak detection and repair procedure, refer to Fuel, Chapter 28

2 Equipment and Materials

A Equipment

NOTE It is of primary importance that all equipment used for the application of sealing compound be kept clean at all times. It is particularly necessary to see that this equipment is cleaned up thoroughly after completing each job. Two part sealing compounds, those which have been mixed with an activator, will harden and make cleaning of equipment extremely difficult if they are not removed before they cure.

- (1) Cotton coveralls (no pockets, nor metal buttons etc.).
- (2) Thermal socks.
- (3) Pencil brushes No. 3
- (4) Varnish brushes, 1 inch and 2 inch.
- (5) Neoprene rubber gloves.
- (6) Unsterilized gauze sponges, (all material shall contain less than 0.75% oil - by carbon tetrachloride extraction).
- (7) Pipe cleaners
- (8) Medicine dropper.
- (9) Polyethylene wash bottles.
- (10) Inspection Mirrors - large.
- (11) Flashlight - explosion proof.
- (12) Fillet fairing tools - ST 982, A, B, and C.



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- (13) Sealant removal tools - made from hardwood 3/16" thick and 8" long in 1/4", 1/2" and 3/4" widths.
- (14) Semco sealing gun, (6" length cartridge). Semco Research Inc. Inglewood, California.
- (15) Semco polyethylene nozzles - No. 254, No. 420, No. 600E, No. 620, No. 640, and No. 643.
- (16) Semco polyethylene cartridges - No. 250C6.
- (17) Semco polyethylene plungers - No. 240P.

B. Materials

- (1) Methyl ethyl ketone
- (2) Methyl isobutyl ketone.
- (3) HMS 11-7 Cleaning Solvent Pre-Sealing
 - (a) TL-4119 (W.P. Fuller, Seattle, Washington).
 - (b) PFL-307-56 (Sherwood and Co. Inc., Wichita, Kansas).
 - (c) T2279A (Enmar Inc., Wichita, Kansas).
- (4) Tape - Permacel Tape No. 70 or No. 85, or American Tuck Tape No. 210.
- (5) Ammonium hydroxide (Commercial grade).

3. Prepare for Sealing

- A. Determine whether any structural repair is necessary and if so, refer to Structural Repair Manual.
- B. Examine sealing in area of leakage and determine the seal level, and seal plane in adjacent structure.

NOTE: The seal plane is defined as being the boundary plane through any assembly of structural items which presents a continuous barrier to the flow of fluids or gases.

- C. Identify the type of sealant used in area of defect.
- D. Determine the type of seal; fillet, faying surface etc.; which will be required to carry out repair.

NOTE: Do not interchange sealing compounds. The material originally used has been found to be the most efficient for sealing the area.



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TEMPORARY REVISION NR. DFW 51-03

INSERT FACING TO SUBCHAPTER 51-3-0, PAGE 203

REASON FOR CHANGE: Possible fuselage skin cracking resulting from scribe lines.

INSTRUCTION: Insert updated page.

NOTE: The insertion of this TR has to be listed in the Record of Temporary Revisions at the beginning of Volume 1.

TCA: LX-N20199

RTCA: LX-N19997, LX-N20000

51-3-0

TR-Nr. 51-03

Page 1 of 3

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- E. Completely remove or notch sealant in the affected area to produce a solid residual material.

CAUTION CUTTING TOOLS SHALL BE OF HARDWOOD MATERIAL
SHARP KNIVES OR OTHER TOOLS THAT CAN DAMAGE THE SKIN
PANEL ARE NOT ALLOWABLE TO REMOVE SEALANT, PAINT OR TRIM
DECALS
EXTREME CAUTION HAS TO BE TAKEN TO AVOID DAMAGE TO SKIN
PANELS SUCH AS SCRIBE LINES
SCRIBE LINES CAN WEAKEN THE STRUCTURE AND CREATE
CRACKS

NOTE: A scribe line is defined as a narrow, shallow line of damage (typically between 0.001 to 0.006 inch deep) usually associated with the removal of a fillet seal, or other trimming operations (such as decals). Scribe lines that create a potential safety concern are generally long continuous scratches or several scratches in a critical orientation at specific locations with relatively high stresses.

- F. Examine rework area for clean cuts and adequate notching and for access. Loose chunks or flaps of sealant on cut areas shall be removed.

- G. Remove grease, oil dirt, and chips, immediately prior to sealant application, from all surfaces to which sealing compound is to be applied. BMS 11-7 solvent shall be used for all general cleaning.

NOTE. The importance of proper cleaning before application of a sealing compound cannot be too highly emphasized. Sealing compound will not stick to a dirty greasy surface. The entire purpose of applying the sealing compound is defeated if it falls off after application.

- H. Clean only with unused, expendable gauze sponges, or equivalent absorbent materials, using clean solvent from dispensers.

- J. Wipe off all solvent while wet with a clean cloth.

NOTE The use of excess solvent shall be avoided.

- K. Repeat steps H. and J. until no visible soil remains on the wiping cloth.

NOTE. It is permissible if some primer is removed during cleaning. The exposed metal surface need not be further treated providing the cleaning is accomplished per paragraph H, J., and K. If primer is completely removed, reprime the surface after completion off all sealing

- L. Clean an area wider than the width of the finally applied sealant.

- M. Remove all solvent from assembled faying surfaces by blast of oil-free and water-free air.

- N. Make a final cleaning with a cloth just damp with solvent and wipe dry.

NOTE. The use of grease or wax base markings shall not be allowed in areas to be sealed. Any such markings inadvertently occurring shall be removed prior to sealing by special cleaning with BMS 11-7 solvent. Successive applications of solvent and wiping shall be made until no visible trace of the marking remains on the final wiping cloth.

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- E. Completely remove or notch sealant in the affected area to produce a solid residual material.

CAUTION: CUTTING TOOLS SHALL BE OF HARDWOOD MATERIAL. METAL CUTTING TOOLS ARE NOT ALLOWED.

- F. Examine rework area for clean cuts and adequate notching and for access. Loose chunks or flaps of sealant on cut areas shall be removed.
- G. Remove grease, oil, dirt, and chips, immediately prior to sealant application, from all surfaces to which sealing compound is to be applied. BMS 11-7 solvent shall be used for all general cleaning

NOTE: The importance of proper cleaning before application of a sealing compound cannot be too highly emphasized. Sealing compound will not stick to a dirty greasy surface. The entire purpose of applying the sealing compound is defeated if it falls off after application.

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- L. Clean an area wider than the width of the finally applied sealant

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NOTE: The use of grease or wax base markings shall not be allowed in areas to be sealed. Any such markings inadvertently occurring shall be removed prior to sealing by special cleaning with BMS 11-7 solvent. Successive applications of solvent and wiping shall be made until no visible trace of the marking remains on the final wiping cloth.

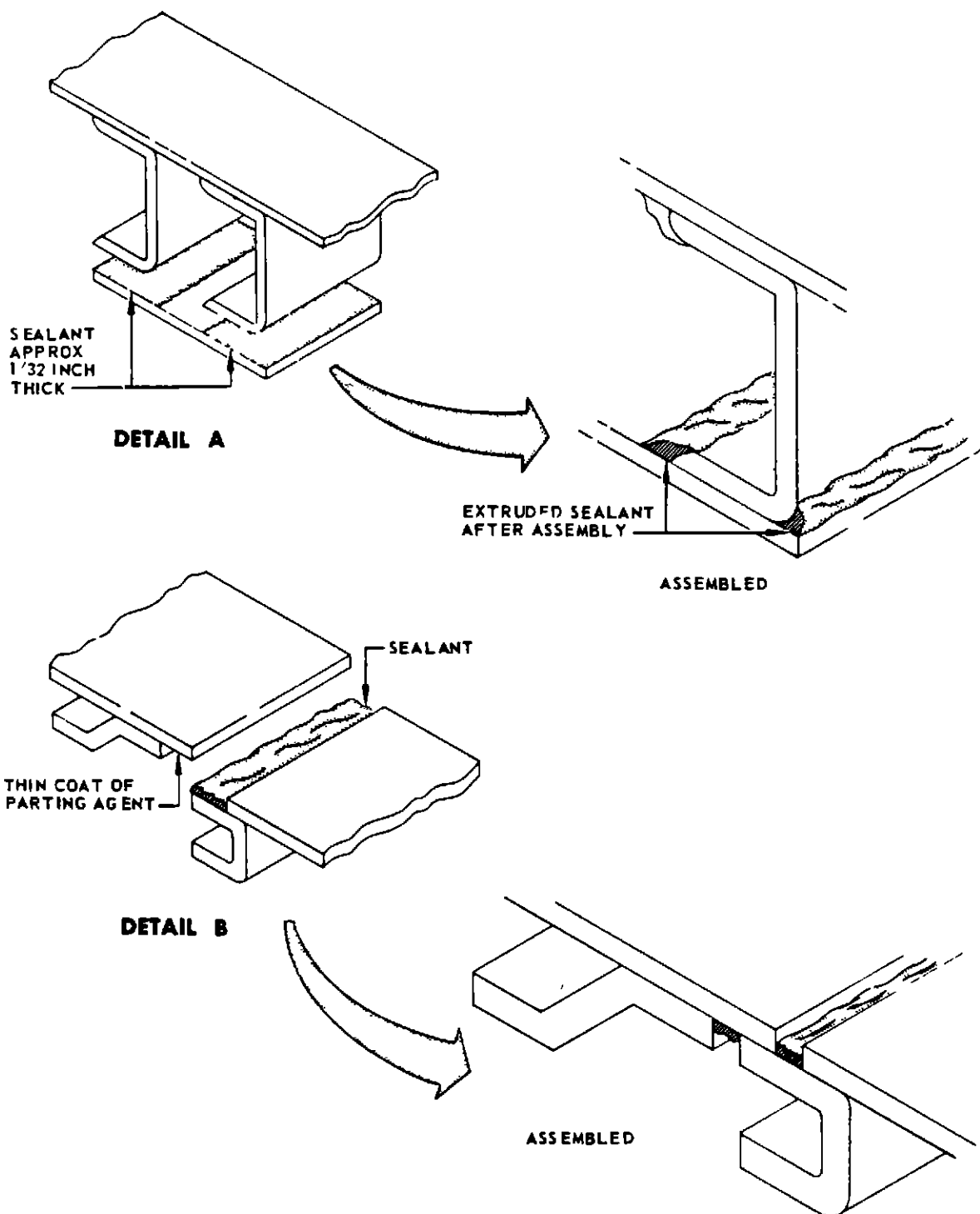
P Apply sealing compound. Refer to appropriate paragraphs for procedures as listed below

(1) Faying surface seals	-	Paragraph 4
(2) Injection seals	-	Paragraph 5
(3) Hole and slot seals	-	Paragraph 6
(4) Fillet seals	-	Paragraph 7
(5) Fastener sealing	-	Paragraph 8
(6) Aerodynamic smoother	-	Paragraph 9
(7) Installation and sealing of electrical seal fittings	-	Paragraph 10
(8) Fuel sealing	-	Paragraph 11
(9) Integral water tank sealing	-	Paragraph 12
(10) Acid sealing	-	Paragraph 13
(11) Protection of sealing materials	-	Paragraph 14
(12) Accelerated curing	-	Paragraph 15

4. Apply Faying Surface Seal

A. Apply Permanent Seal

- (1) Apply sealant to one surface with a flow gun or spatula and spread out over the entire faying surface until a uniform thickness of approximately 1/32 inch is obtained
- (2) Place the component parts together and install the required fasteners
 - (a) If fasteners are to be sealed, their installation shall be completed during the work life of the sealant.
 - (b) If permanent fasteners cannot be installed prior to the end of the work life of the sealants, use temporary fasteners to hold the parts together until sealant has cured.
 - (c) Permanent fasteners shall then be installed with fresh sealant, either on the fastener or in the hole.
- (3) Fair out extruded sealant to leave a smooth fillet along the joint. (See detail A, figure 201.)



B. Apply Removable Seal

- (1) Apply parting agent, Delco X-769, or one part by weight of MIL-I-7444, vinyl tubing dissolved in four parts cyclohexanone, to one of the faying surfaces.
- (2) Apply sealant to opposite faying surface. See paragraph A (1).
- (3) Assemble parts when parting agent is dry to touch See paragraph A.(2) and A.(3).
- (4) If one faying surface is acrylic, apply parting agent to non-acrylic surface. (See detail B, figure 201.)

CAUTION: PARTING AGENT REACTS WITH ACRYLIC AND MUST NOT BE APPLIED TO CONTACT ANY ACRYLIC SURFACE.

5. Apply Injection Seal

- A. Completely fill, with sealant, holes and joggles that require continuity of seal or block-off seals.
- B. Inject sealant into one end of the cavity or injection hole if provided, with a Semco type flow gun, or equivalent, until sealant emerges from all other openings. (See details A and B, figure 202.)

CAUTION: TO PREVENT THE INCLUSION OF AIR IN THE SEALANT, NEVER COMPLETELY EMPTY A FLOW GUN. NEVER SEAL FROM BOTH ENDS OF CAVITY AS THIS TENDS TO CREATE AIR POCKETS AND POSSIBLE LEAKS WITHIN THE SEAL.

NOTE: When an opening is to be closed only for support of sealant, it is not necessary to inject the entire depth of the opening

- C. When a seal is made at the bottom of a slot, apply the sealant so as to fill and have continuous contact with the bottom and sides of the slot. (See detail C, figure 202.)

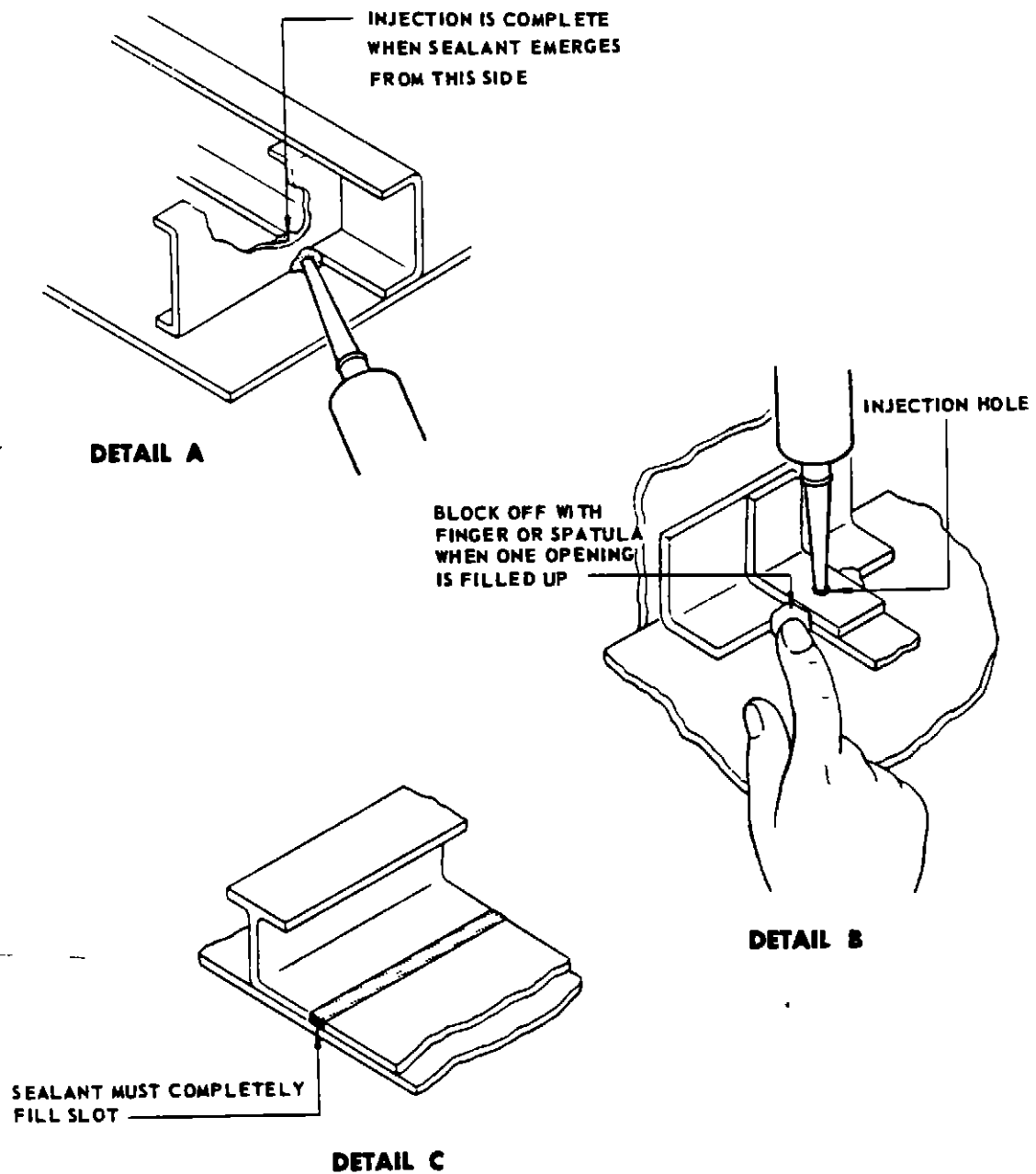
6. Apply Hole and Slot Seal

- A. Seal all tool and coordination holes that are not plugged with soft rivets because of inaccessibility.
- B. Overcoat rivets in absolute sealed areas with the appropriate sealant.
- C. Apply hole filling compound to the pressure side of the hole. (See details figure 203.)
- D. Back large slots and holes with masking tape.
- E. Remove the tape after the sealant is formed.
- F. Apply compound to the pressure side of the hole with spatula or suitable tool.

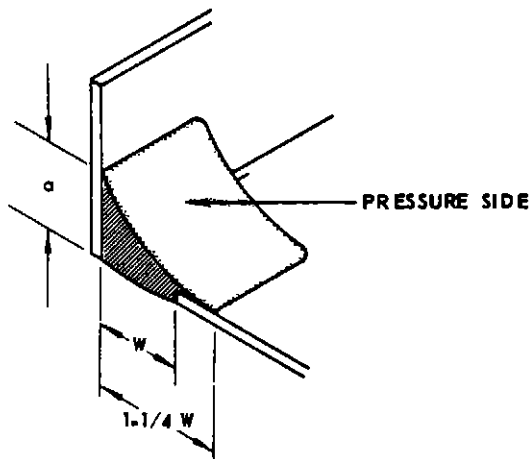
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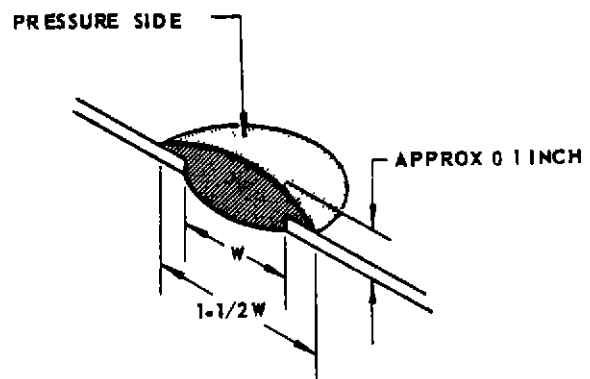
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MAX "w" IS 0.25 INCH FOR DUCT AND PRESSURE SEALING
 MAX "w" IS 0.50 INCH FOR WEATHER AND FUEL SEALING
 "a" = 0.25" MINIMUM AND NOT LESS THAN "w"



- G Pack compound firmly into space being filled.
- H Smooth the applied compound and feather into all contacting surfaces

7. Apply Fillet Seal

- A. Apply sealant with a Semco type flow gun or equivalent.
- B. Point nozzle tip into the seam and maintain the line of travel.
- C. Force a bead of sealant ahead of the nozzle tip. (See detail A, figure 204.)
- D. Press sealant firmly into place with a fairing tool to obtain a shaped and smooth fillet. (See detail B, figure 204.)
- E. Apply second application of sealant to produce a full bodied fillet. (See detail C, figure 204.) Second application of sealant is required only for integral fuel tank sealing.

NOTE. The nozzle tip may be cut and shaped to give a full bodied seal contour. For typical finished fillet dimensions see detail D, figure 204.

- F Obtain final configuration by forming the fillet with a fairing tool.
- G. Press tool against the sealant and move parallel to the bead.

NOTE. Care must be exercised so that folds, flaps and entrapped air are not created during working. Any evident air bubbles must be worked out. At the completion of working, which must occur before end of work life, the bead should have the shape of a faired fillet of approximately the proper size and be quite smooth

8. Apply Fastener Seal

NOTE. Fasteners installed through a faying surface seal within the work life of the sealant need no further sealing

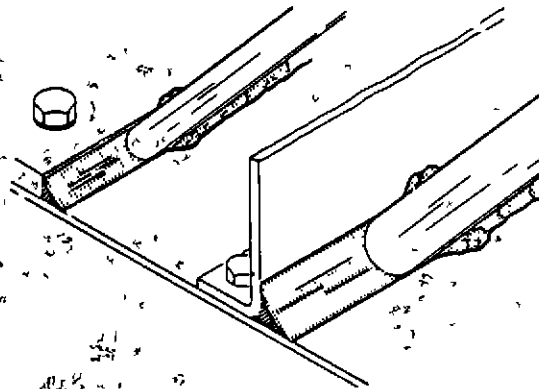
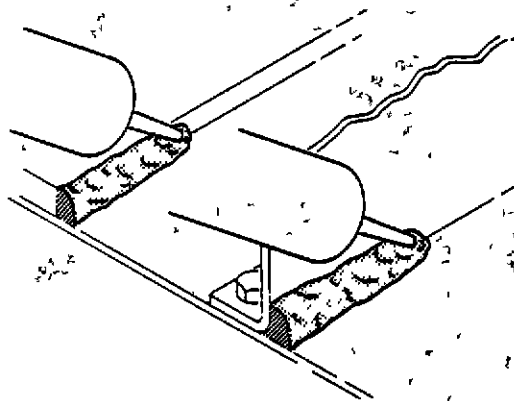
- A Seal all fasteners installed through a faying surface seal after the sealant work life has been exceeded, and fasteners installed through a seal plane where no faying surface sealant is used, by one of the following methods:
 - (1) Applying sealant to the fastener or hole at installation. Extruded sealant shall be continuously evident to indicate adequate sealing. (See detail A, figure 205.)
 - (2) Spraying or brushing the fastener with sealant after installation. (See detail B, figure 205.)
 - (3) Filletting around fastener after installation. (See detail C, figure 205.)

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STRUCTURES
Sealing
Maintenance Practices

APPLY SEALANT WITH FLOW GUN

PRESS SEALANT INTO PLACE
WITH AN UNLUBRICATED FAIRING TOOL

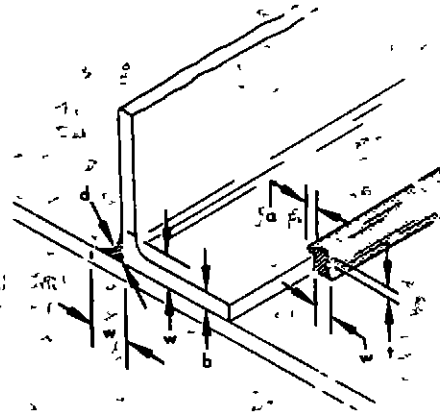
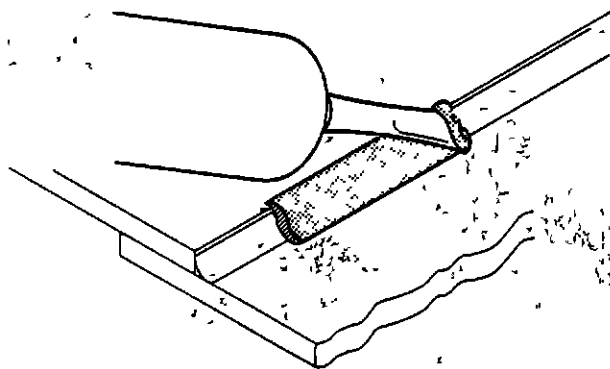


DETAIL A APPLICATION OF FILLET SEAL

DETAIL B FORMING OF FILLET SEAL

APPLY FULL BODIED SEAL

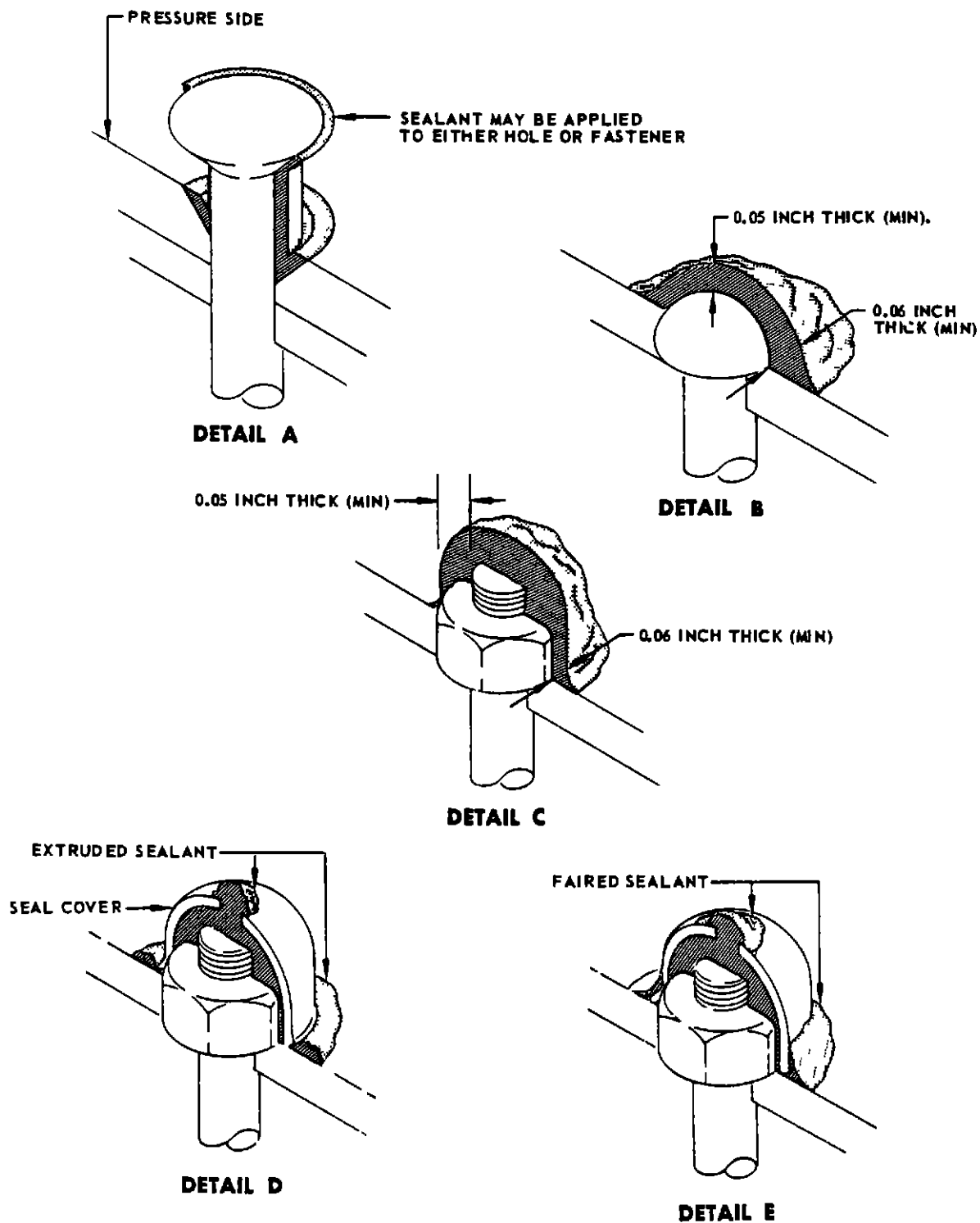
$d = .08$ INCH MINIMUM, $w = .12$ TO $.25$ INCH
 $t = .02$ TO $.10$ INCH EXCEPT $t = 0$ WHEN $b = 0$
 $t = .02$ TO $.10$ INCH EXCEPT $t = 0$ WHEN
 $b = .15$ INCH OR MORE.
 $a = .04$ TO $.15$ INCH EXCEPT $a = 0$ WHEN
 $b = .15$ INCH OR MORE.



DETAIL C APPLICATION OF FILLET
FULL BODIED SEAL

DETAIL D FILLET SEAL FINISHED DIMENSIONS

Application of Fillet Seal
Figure 204



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B. Sealing of fasteners with metal seal covers.

- (1) Fill cover 1/2 to 2/3 full of sealant and press cover down over fastener until flange contacts structure.
- (2) Remove excess sealant from top of seal cover.
- (3) Fair out sealant around base of cover. (See detail D and E, figure 205.)

NOTE: Sealant must be extruded continuously around the bottom of the seal cap. Avoid an excess of material around the cap.

9. Apply Aerodynamic Smoother

- A. Remove all defective compound from the repair area and taper the remaining compound in order to produce a scarf joint. (See detail A, figure 206.)
- B. Clean thoroughly surface and recess to which compound is to be applied. Cleaning must be accomplished in accordance with paragraph 3.
- C. Cover the skin adjacent to the recess with masking tape. (See detail A, figure 206.)
- D. Apply the compound with a flow gun, or a spatula.

NOTE: Make certain no air is trapped in the recess during the filling procedure. Overfill the recess to allow for smoothing and leveling. Because of compound shrinkage, spot faced recess may require two fillings approximately eight hours apart to bring them level.

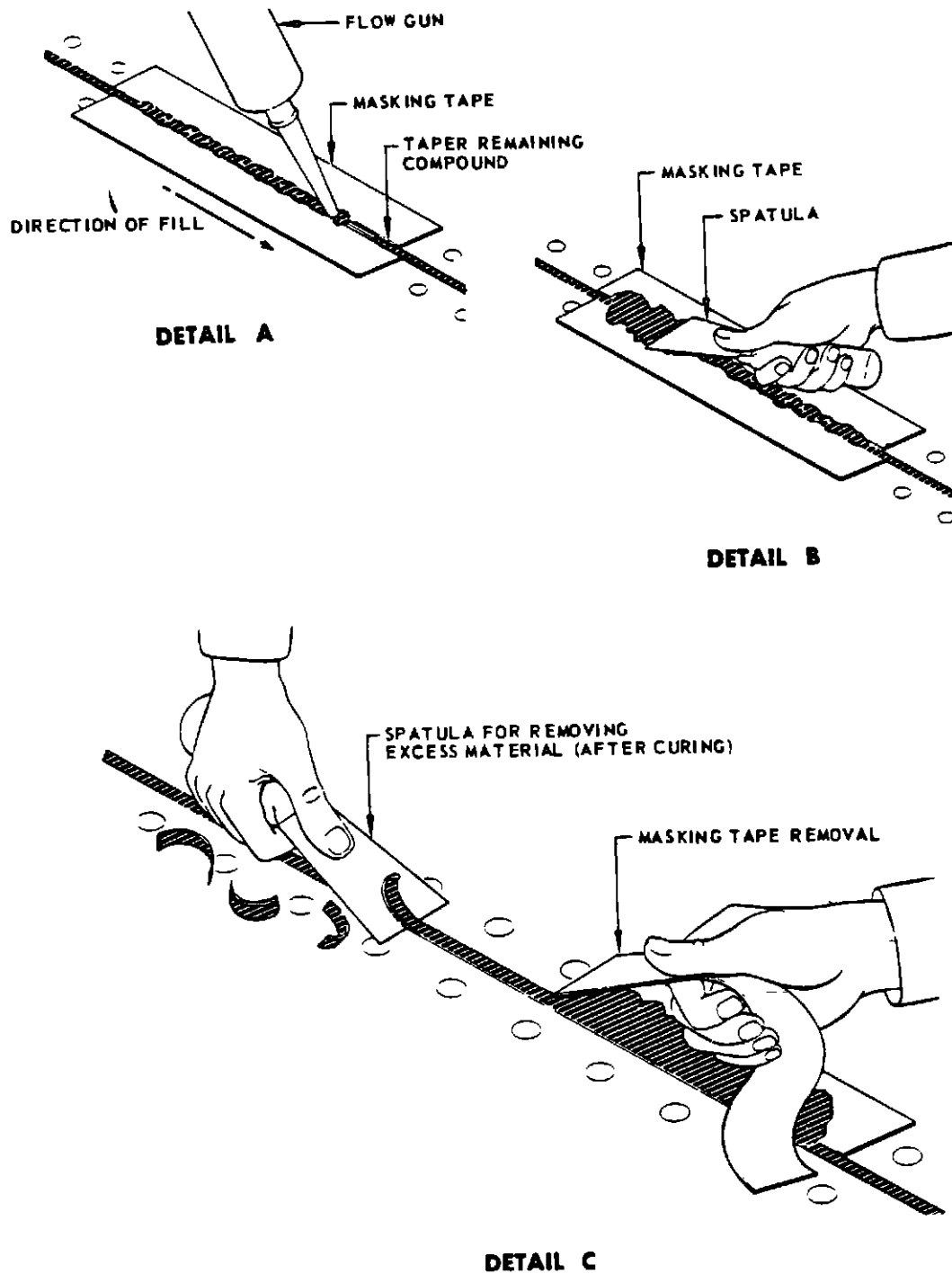
- E. Using a spatula, smooth the compound level with the masking tape. (See detail B, figure 206.)
- F. Remove the tape immediately after smoothing or leave in place for the curing period.
- G. Smooth down the edges of the compound which tend to lift the tape, and remove excess compound with a spatula or similar tool. (See detail C, figure 206.)

NOTE: Smoothing, fairing and sealing materials shall not be applied over zinc chromate primer until primer has become hard and tough.

10. Apply Electrical Fitting Seal

A. Multiple Cutout

- (1) Absolute or Extensive Sealing Areas.
 - (a) Clean the area where seal fittings will seal. See paragraph 3.
 - (b) Pass wire bundle through the cutout provided.





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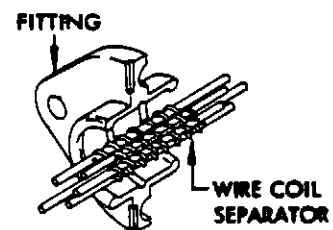
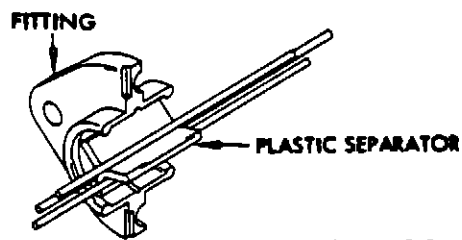
(c) Encircle each individual wire in the bundle with coiled spacers.

- 1) Coil spacers two to four turns on each wire.
- 2) Position spacers on the wires so as to be completely enveloped by the seal assembly when it is secured in the cutout. (See detail A, figure 207.)

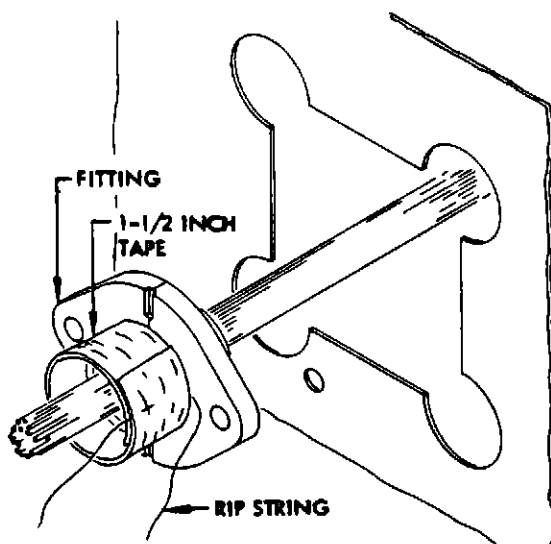
NOTE: Three wires or less can be separated by solid plastic wire separators. Four or more wires must be separated by wire coil separators.

- (d) Place seal fitting halves around wires in the bundle with flanges on the on-pressure side.
- (e) Position fitting so that wire separators are entirely within fitting.
- (f) Place a strong piece of string about 8 inches long against the seal assembly parallel with the wires.
- (g) Wrap fitting halves with three turns of 1-1/2 inch wide masking tape (Permacel Tape No. 70 or No. 85, American Tuck Tape No. 210, or equivalent). (See detail B, figure 207.)
- (h) Crimp the 1-1/2 inch wide masking tape around the seal assembly ends so as to center the wire bundle.
- (j) Wrap crimped end with three turns of 3/4 inch masking tape. (See detail C, figure 207.)
- (k) Position seal plate and filler on off-pressure side and secure seal assembly in place. (See detail D, figure 207.)
- (l) Puncture the paper masking tape over the most convenient injection hole in the seal fitting.
- (m) Inject sealant, BMS 5-37, Class B, using a sealant gun at a pressure of approximately 200 psi until sealant without visible evidence of entrapped air emerges from both notches in the outer periphery of the seal assembly mounting flanges.
- (n) Apply fillets of BMS 5-37, Class B, sealant along joints of the filler and seal over the fasteners in the center of the filler.
- (p) Remove tape after sealant has cured (16 to 24 hours) by pulling rip string and unwinding.
- (q) Where a cover plate is used to cover an unused opening, apply a faying surface seal between plate and structure. (See detail E, figure 207.)

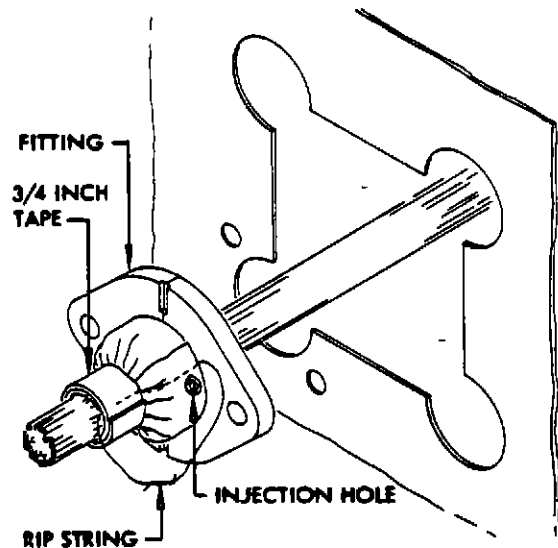
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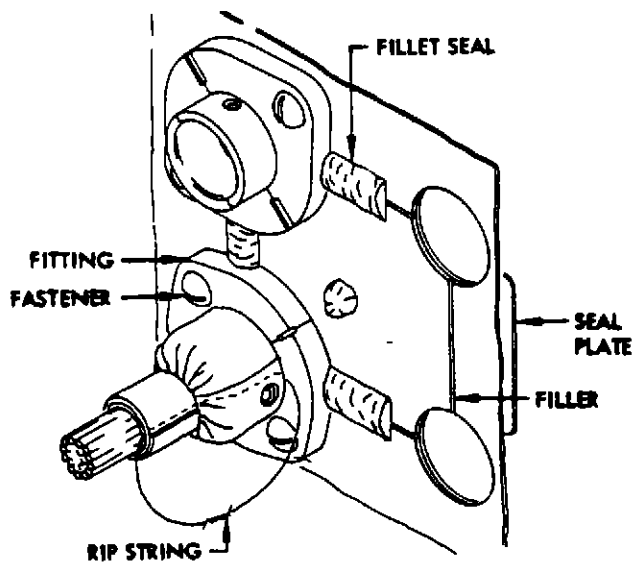
INSTALLATION OF SEPARATORS
 DETAIL A



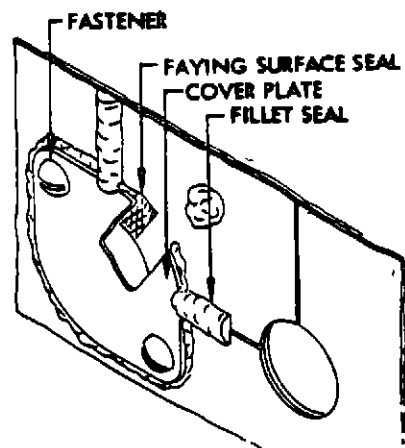
ASSEMBLY OF BULKHEAD FITTING
 DETAIL B



TAPING OF BULKHEAD FITTING
 DETAIL C



INSTALLATION OF BULKHEAD FITTING
 DETAIL D



INSTALLATION OF COVER PLATE
 DETAIL E



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(2) Intermediate Sealing Area

NOTE: In fuel vapor barrier areas the same procedure of installation as outlined in paragraph 10.A.(1) is followed except the coil spacers are not used

B. Single Cutout

(1) Absolute or Extensive Sealing Area

NOTE: Procedure is identical as outlined for multiple cutout except no seal plate or filler is involved.

(2) Intermediate Sealing Area

NOTE: Procedure is identical as outlined for multiple cutout, except no seal plate or filler is involved

11 Apply Fuel Seal

- A. For complete information on integral fuel tank sealing, refer to Fuel, Chapter 28.

12. Apply Integral Water Tank Seal

- A. Integral water tank sealing is accomplished using BMS 5-19 and BMS 5-16 sealant. For additional information on these sealants, refer to Sealing - Description and Operation - paragraph 4.A and 4.C. For more complete information on integral water tank sealing, refer to Water Injection - Chapter 82.

13. Apply Acid Seal

- A. Areas in the vicinity of the batteries, where there is danger of spillage, must be sealed with acid resistant sealant. EC801 sealant with EC807 activator is recommended for this seal. This sealant requires an overcoating of acid resistant lacquer, refer to Sealing - Description and Operation - paragraph 4.H. Any area damaged by acid must be reworked as described in paragraphs 1, and 3 thru 9. Where alkaline batteries are used, areas damaged by alkaline spillage must be reworked as described in paragraphs 2, and 3 thru 9

- (1) Clean the entire area with a 5% to 10% solution of ammonium hydroxide (commercial grade); for acid spillage only.
 - (a) Spray ammonium hydroxide solution not only into the seams so as to force the acid from between the faying surfaces, but also over any of the remaining acid contacting area.
 - (b) Where possible brush vigorously all areas to be neutralized after each spray application of neutralizing solution.



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- (2) Clean the entire area with a 5% to 10% solution of citric acid; for alkaline spillage only.
 - (a) Spray citric acid solution not only into the seams so as to force the alkaline from between the faying surfaces, but also over any of the remaining alkaline contacting area.
 - (b) Where possible brush vigorously all areas to be neutralized after each spray application of neutralizing solution.
- (3) Allow solution to remain for 5 minutes and then hose off with water making certain that all seams are adequately rinsed and that all salts are removed.
- (4) Wipe area with dry clean cloth or with clean dry air.
- (5) Check area with moist PH indicating paper. The paper shall show a PH range between 6 to 8.
- (6) Remove lacquer from damaged area with paint stripper, Delchem "E-Z Strip 19A Type 1" recommended, or equivalent.
- (7) Remove sealant over damaged area wherever the paint stripper has been allowed to penetrate.
- (8) Taper the remaining fillet seals in order to produce a scarf joint on application of new sealant.
- (9) Clean surfaces to which compound is to be applied in accordance with paragraph 3.
- (10) Apply new paint finish and seal as required.

14. Protection of Sealing Materials

- A. Sealing materials shall be kept free of contamination by grease, oil, dirt, metal chips, etc.
- B. Operations subsequent to sealing may be performed immediately after sealing if care is taken to prevent the sealing from being dislodged, contaminated or damaged. Masking with some removable material may be used to provide protection after sealant is tack-free.
- C. A light coat of zinc chromate primer (MIL-P-8585) or EMS 10-11, Type I, primer may be sprayed over tack-free EMS 5-19 Class A sealants for protection. EMS 5-12 Class B, EMS 5-19 Class B, EMS 5-16, EMS 5-37 Class B, and EC801 may be sprayed immediately after application. The primer must be removed if more sealant is to be applied.

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15. Accelerating Curing

A. The rate of cure of two-part sealants is accelerated by raising the temperature and/or humidity by one of the following methods:

- (1) Circulating warm air over the sealants. The heated air in contact with the sealant shall not exceed 120°F. Since relative humidities below 40% will retard sealant curing, the air may be humidified by the addition of water containing less than 100 parts per million total solids and less than 10 parts per million chlorides.
- (2) Prewarming the structure.

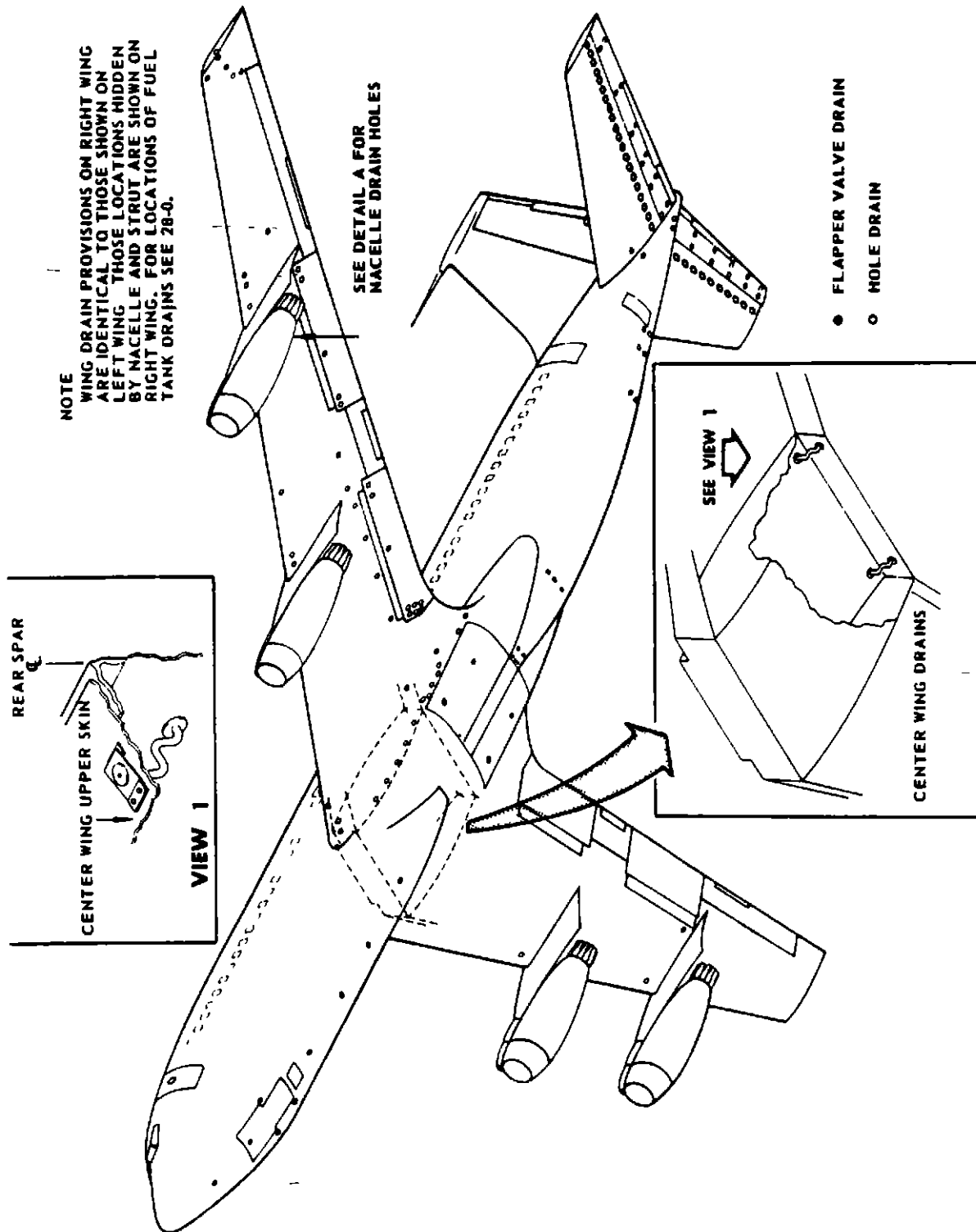


AIRFRAME DRAINAGE - DESCRIPTION AND OPERATION

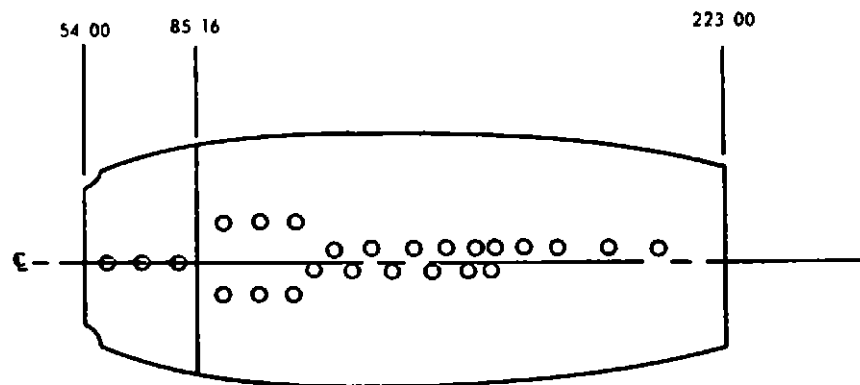
1. General

- A. Drain holes are located throughout the aircraft at points where fluids such as fuel, oil, water or acid may collect. In some cases, tubes, channels or dams are also provided to direct the flow of the fluids towards these holes. Within the fuselage a number of rubber flapper valves automatically close off the drain ports when the airplane is pressurized. Drain provisions should be examined frequently and kept free of obstructions because any excessive accumulation of fluids could become a possible fire or corrosion hazard and/or ultimately cause the malfunction of adjacent components. For drain provision locations see Figure 1

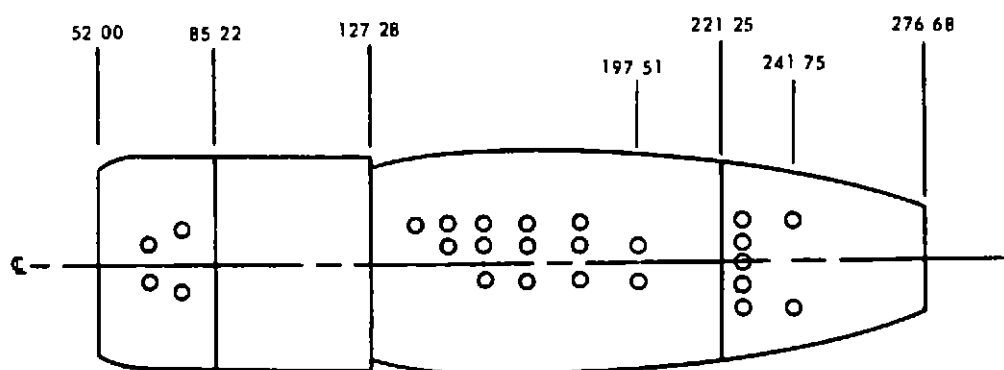
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TURBOJET



TURBOFAN
NACELLE DRAIN HOLES
DETAIL A



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CONDITIONAL INSPECTIONS - MAINTENANCE PRACTICES

1. General

A. This list contains recommended inspections which require accomplishment due to specific circumstances or upon occurrence of specific conditions.

2. Ice or Snow Conditions

A. Whenever Icing or Snow Conditions Exist, Prior to Flight

(1) Examine for the following:

- (a) Fuselage, wings, control surface, balance panel areas and hinge points for ice and snow.
- (b) Engine inlet cowl for ice and snow, inlet doors and first stage compressor for freedom of movement.

3. Extreme Dust Conditions

A. When Extreme Dust Conditions Exist Prior to Flight

(1) Examine for the following:

- (a) Stabilizer trim and flap screw and mechanism for cleanliness.
- (b) Static vents and pitot tube for cleanliness.
- (c) Engine inlet for dust accumulation and PT₂ probe for cleanliness.

4. Exceeding Design Speed, Severe Turbulence or Buffeting Conditions

A. General

(1) The structural examination in this subject is applicable after a severe turbulence or buffeting condition or stalls (beyond initial buffet or stick shaker) or exceeding design speed.

(2) Severe Turbulence

- (a) The following general information applies to a severe turbulence condition.
- (b) The following flight vertical load acceleration limits are specified in the FAA Flight Manual, Section I:
 - 1) Flaps up. 2.5g to -1.0g
 - 2) Flaps down. 2.0g to 0.0g
- (c) The judgement of the pilot shall determine the requirement for structural examination.

(3) Buffeting

- (a) If an unusual maneuver or abnormal or excessive buffeting or vibration is experienced in flight, a structural examination is required.



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- (b) After stalls (beyond initial buffet or stick shaker) examine the following:

- 1) Accessible interior structure in fuselage, aft of rear pressure bulkhead, for distortion, cracks, flaking paint and pulled or missing fasteners. Check the following. Fuselage bulkheads and fin and stabilizer attachment fittings at body stations 1440, 1505.87 and 1592, horizontal stabilizer center section hinge fittings, horizontal stabilizer front and rear spar terminal fittings, and stabilizer jackscrew mechanism mount fittings and support structure. Check jackscrew and hinges for evidence of binding.
- 2) Horizontal stabilizer exterior surfaces for evidence of buckling, checking particularly at skin splices for cracking, yielding and pulled or missing fasteners.

NOTE: If any exterior damage is observed, the spars and all accessible internal primary structure in the affected area must be examined for distortion or buckling, cracks, flaking paint and pulled or missing fasteners.

- 3) Elevator and tab external surfaces for cracks, pulled or missing fasteners, and hinge bearings and actuator bearings for evidence of binding.

NOTE: If any external damage is observed, the elevator spar web should be examined for distortion, flaking paint, cracks and pulled or missing fasteners.

- 4) Fin and rudder in same manner as horizontal stabilizer and elevator in 2) and 3).
- 5) Flight controls for freedom of movement

NOTE: If any unusual handling conditions are observed, check all flight controls for force requirements and cable tensions. (Refer to applicable sections of Chapter 27, "FLIGHT CONTROLS.")

(4) Exceeding Design Speed

- (a) The maximum design speed of the airplane for normal flight operation is the Maximum Operating Speed as defined in Section 1, LIMITATIONS of the airplane Flight Manual. An aural warning horn activates at this speed condition. If the airplane exceeds the Maximum Operating Speed by 20 knots or more a structural examination is required.



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B. Examine Airplane Structure

(1) General

- (a) The first indications of excessive flight loads due to lateral accelerations will appear in the areas of the engine strut side panels. If these areas do not show any signs of deformation, further examination is unnecessary. If these areas do show signs of deformation, further examination must be performed. The effects of severe lateral accelerations without a flight recorder indication of excessive vertical acceleration are limited to the fin, rudder, aft body and engine strut areas which must be examined according to steps (2), (3), (7), (8), (9), (10), (11), (12) and (13).
 - (b) The first indications of excessive flight loads due to vertical accelerations will appear in the area of the wing-body fairing forward of the wing front spar. If this area does not show any signs of deformation, further examination is unnecessary. If this area does show signs of deformation, further examination must be performed according to steps (2) thru (13).
- (2) Fuselage exterior surface for distortion, flaking paint, cracks and pulled or missing rivets. Particular attention should be paid to the keel beam lower chords and webs between body stations 600K and 960, the area above the wing aft of station 800, the lower body between stations 960 and 1140, and the whole area between stations 1140 and 1505.87.

NOTE: If any exterior damage is observed on these or any parts of the fuselage the interior structure in the affected area must be examined.

- (3) Accessible interior structure in fuselage, aft of rear pressure bulkhead, for distortion, cracks, flaking paint and pulled or missing fasteners. Check the following: Fuselage bulkheads and fin and stabilizer attachment fittings at body stations 1440, 1505.87 and 1592, horizontal stabilizer center section hinge fittings, horizontal stabilizer front and rear spar terminal fittings, and stabilizer jackscrew mechanism mount fittings and support structure. Check jackscrew and hinges for evidence of binding.
- (4) Exterior surfaces around top and bottom of wing root area, including wing to body fairing, for distortion, cracks and pulled or missing fasteners.

NOTE: If any exterior damage is observed, the body to wing attachment fittings at body stations 600K and 820 and the upper wing skin splice at BL 70.5 must be examined for distortion, flaking paint, cracks and pulled or missing fasteners.



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- (5) Wing exterior surfaces, checking particularly at skin splices for misalignment and pulled or missing rivets, and along trailing edge upper surface for skin buckles.

NOTE If any exterior damage is observed, all accessible internal primary structure in the affected area must be examined for distortion, buckling, cracks, flaking paint and pulled or missing fasteners.

- (6) Wing control surfaces for cracks, pulled or missing rivets and for evidence of binding.
(7) Horizontal stabilizer exterior surfaces for evidence of buckling, checking particularly at skin splices for cracking, yielding and pulled or missing fasteners.

NOTE. If any exterior damage is observed, the spars and all accessible internal primary structure in the affected area must be examined for distortion or buckling, cracks, flaking paint and pulled or missing fasteners.

- (8) Elevator and tab external surfaces for cracks, pulled or missing fasteners, and hinge bearings and actuator bearings for evidence of binding.

NOTE: If any external damage is observed, the elevator spar web should be examined for distortion, flaking paint, cracks and pulled or missing fasteners.

- (9) Fin and rudder in same manner as horizontal stabilizer and elevator in (7) and (8).
(10) Flight controls for freedom of movement

NOTE. If any unusual handling conditions are observed, check all flight controls for force requirements and cable tensions. (Refer to applicable sections of Chapter 27, "FLIGHT CONTROLS.")

- (11) Nacelle strut skin panels, gap covers, and lower surface of engine cowlings for buckling, cracks, pulled or missing fasteners, or any unusual external condition.

NOTE. If any such conditions are observed, proceed with further examination of nacelle and strut, as described in par. 9.

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- (12) Wing, nacelles, struts, fuselage external surfaces, and all landing gear wheel wells, for evidence of fuel or any other fluid leakage.
 - (13) Whenever the flight load accelerations shown in par. 4.A.(1) are believed to have been exceeded, and the foregoing examinations reveal evidence of extensive damage, the airplane must be checked for alignment (Ref Structural Repair Manual, 51-6-1, Alignment Check Procedure).
5. Excessive Stick Force Condition
- A. Whenever Stick Force in Excess of 100 Pounds is Required to Maintain Level Flight Due to Lack of Stabilizer Trim
 - (1) Examine for the following.
 - (a) Fuselage bulkhead at station 1505.87 for distortion, flaking paint, cracks and pulled or missing fasteners.
 - (b) Stabilizer jackscrew for evidence of binding.
 - (c) Stabilizer jackscrew mechanism mount fittings and support structure for distortion, flaking paint, cracks, and pulled or missing fasteners.
 - (d) Stabilizer front spar terminal fittings for distortion, flaking paint, cracks, and pulled or missing fasteners.
6. Excessive Rudder Trim
- A. Whenever large amounts of rudder trim are required, refer to 27-13-0 or 27-15-0 for corrective action.
 - (1) If, after the above check, the condition persists, examine for the following:
 - (a) Vertical fin and fuselage for alignment.
 - (b) Rudder hinge fittings for distortion, flaking paint, cracks, and pulled or missing fasteners.
 - (c) Vertical fin front and rear spar terminal fittings for distortion, flaking paint, cracks, and pulled or missing fasteners.
7. Exceeding Flap Down Speeds
- A. Any Time the Flaps Down Placard Speeds Have Been Exceeded
 - (1) Examine for the following:
 - (a) Wing flap external skin (including foreflap) for distortion and pulled or missing fasteners.
 - (b) Flap tracks for cracks or distortion, track attachment points for cracks, distortion, and hole elongation.
 - (c) Flap track support fittings, and wing inspar surfaces in close proximity to flap support fittings for cracks, distortion, hole elongation, and pulled or missing fasteners.
 - (d) Flap carriages for cracks; bearings and mounting bolts for binding, cracks, distortion, and hole elongation.
 - (e) Cove lip doors for distortion, cracks, and pulled or missing rivets; end fittings and ribs, bearings, stops and hinges for distortion, cracks, pulled or missing bolts and hole elongation, latches for security.
8. Hard Landing, Overweight Landing, or High Drag/Side Load Landing
- A. General
 - (1) Hard Landing
 - Whenever the airplane makes a landing within maximum design landing weight (MLW) limits at what is believed to be an excessive rate of sink, the landing will be considered as a hard landing, and the examination described below is required.

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- (2) High Drag/Side Load Landing
Whenever the airplane skids or overruns from the prepared surface onto an unprepared surface, lands short of the prepared surface, makes a landing which involves the blowing of two or more tires, or skids on the runway to the extent that damage of the aircraft is suspected, the landing will be considered a high drag/side load landing and the examination described below is required.
- (3) Overweight Landing
When the airplane makes a landing at weights above the maximum design landing weight (MLW), the landing will be considered as overweight landing, and the examination described below is required.
- (4) The Examination
The examination is divided into Phase I and II. Phase I(1) examination is applicable when comments indicate that the landing was abnormal or the landing sink rate was medium to high.
Phase I(2) examination is applicable when comments indicate that the overweight landing sink rate was low to moderate.
If examination per Phase I reveals no damage, no further examination is necessary.
If Phase I reveals any evidence of damage or distress, Phase II must be accomplished.
If examination per Phase I(2) reveals damage, examine the remaining items in Phase I(1) and then proceed to Phase II.

B. Phase I Examination

- (1) Examine airplane structure (for hard landing, high drag/side load landing condition, or overweight landing at medium to high sink rate)
 - (a) Inboard nacelle strut side skin panels for buckling, cracks and pulled or missing fasteners. Wing leading edge - nacelle gap covers for gap displacement, fastener hole elongation or tear-out, skin cracks, pulled or missing fasteners. Upper and lower fuselage skin panels forward and aft of wing for buckles, wrinkles or tears.
 - (b) Flap actuator access panel (3402 or 402) for buckling adjacent to forward inboard corner of inboard spoiler. If buckling is found, examine upper flange of wing trailing edge rib at wing station 299 for buckling adjacent to forward inboard corner of inboard spoiler.
 - (c) Inboard trailing edge flap area for foreign object damage.
 - (d) Main gear wheels for cracks.
 - (e) Main gear piston attach nut for evidence of fluid leakage.
 - (f) Main gear leveling and centering cylinders; attach bolts for evidence of shearing.
 - (g) Main gear oleo strut doors and linkage for distortion, cracks, or other evidence of distress.
 - (h) Main landing gear forward trunnion collar and attach bolts for evidence of hole elongation or bolt distortion (such as collar displacement).
 - (i) Nose wheel well for buckling, flaking paint, cracks and pulled or missing fasteners in the web of nose wheel well particularly in the vicinity of the trunnion support fittings.



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- (j) Nose gear wheels for cracks.
- (k) Nose gear outer cylinder; evidence of contact between the lower end of the outer cylinder and the radius between the inner cylinder and the axle forging is positive proof of damage to the piston tube.
- (2) Examine airplane structure (for overweight landing condition at low to moderate sink rate)
 - (a) Check tires and wheels for damage.
 - (b) Check main gear shock strut upper and lower ends for evidence of fluid leakage.

NOTE. A small amount of fluid on the inner cylinder is normal.

- (c) Check main gear truck beams for evidence of distortion.
- (d) Check nose gear shock strut upper and lower ends for evidence of fluid leakage.

NOTE: A small amount of fluid on the inner cylinder is normal.

- (e) Check nose gear tires and wheels for damage.

C. Phase II Examination

- (1) Examine airplane structure.
 - (a) Check for evidence of interference, misalignment, or distortion.
 - 1) Jack the airplane at wing and fuselage jack points (Ref Chapter 7, Jacking.)
 - 2) Retract and then extend main and nose landing gears (Ref Chapter 32, Landing Gear and Door Control System - Maintenance Practices).
 - (b) Visually examine main landing gear wheels for cracks without wheel removal, unless tires are blown. If wheel removal is necessary due to blown tires examine wheel spokes of wheel halves for cracks. Check brake assemblies for damage.
 - (c) Lower fuselage structure for skin buckling, flaking paint, cracks and pulled or missing fasteners.
 - (d) Wing to fuselage fittings at station 820 and 620 for distortion, flaking paint, cracks, and pulled or missing fasteners.
 - (e) Bulkhead at body stations 312 and 360, chords and web immediately outboard of the nose wheel well for buckling, flaking paint, cracks, and pulled or missing fasteners.
- NOTE: This examination can be done without structure removal, through the lightening holes in the lower aft nose wheel well.
- (f) Wing, nacelle struts, and fuselage external surface, nose and main landing gear wheel well cavities, for evidence of fuel and other fluid leaks in region of landing gears.
 - (g) Main landing gear outer cylinder lugs for cracks and visible surface distortion.



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- (h) Main gear truck beam especially in the area of the torque links and inner cylinder forks for cracks or dents.
- (i) Main landing gear snubbers and leveling cylinders for serviceable condition, attach bolts for evidence of shearing and fittings for cracks or distortion.
- (j) Main gear drag and side strut linkage for distortion or cracks.
- (k) Remove and examine the main landing gear upper drag strut to trunnion bolt for evidence of distortion.
- (l) Main landing gear trunnion support fittings for cracks; external lower chord of WBL 59.24 rib for cracks in region of rear spar. Forward trunnion, collar and bolt for evidence of hole elongation or bolt distortion (such as collar displacement).
- (m) Aft trunnion bearing area in region of aft trunnion support fitting for cracks.

CAUTION: IF THE AIRCRAFT HAS SUSTAINED STRUCTURAL DAMAGE TO ANY PRIMARY STRUCTURE AS A RESULT OF A HARD LANDING OR HIGH DRAG/SIDE LOAD LANDING; I.E., CRACKS OR BUCKLES IN PYLON, A TWICE MONTHLY VISUAL EXAMINATION OF THE TRUNNION AT THE AFT TRUNNION BEARING AREA MUST BE MADE OR THE TRUNNION REPLACED. THE REMOVED TRUNNION MUST REMAIN OUT OF SERVICE FOR SIX MONTHS AT WHICH TIME IT SHOULD BE MAGNETIC PARTICLE INSPECTED. IF NO FLAWS ARE DETECTED AT THAT TIME, THE TRUNNION MAY BE RETURNED TO SERVICE. IF THE TRUNNION IS NOT REPLACED, THE AFT TRUNNION BEARING AREA MUST BE INSPECTED BY THE MAGNETIC PARTICLE METHOD AFTER SIX MONTHS OR AT FIRST GEAR OVERHAUL FOLLOWING THE SIX MONTH INTERVAL. HOWEVER, THE TWICE MONTHLY VISUAL EXAMINATION MUST BE MAINTAINED UNTIL THE ABOVE MAGNETIC PARTICLE INSPECTION HAS BEEN ACCOMPLISHED.

- (n) Main landing gear shock strut for fluid level. If fluid level is 10 pints low or more, remove inner cylinder and inspect for distortion and cracks. Inspect the piston in place for obvious cracks. Refer to Chapter 32 of the Overhaul Manual for relevant steps pertaining to removal of main gear inner cylinder.
- (o) Nose landing gear wheel well for buckling, flaking paint, cracks and pulled or missing fasteners in the web of the nose wheel well particularly in the vicinity of the trunnion support fittings.
- (p) Nose gear outer cylinder lugs for cracks or distortion, outer cylinder steeple lugs and trunnion fitting, drag brace link assemblies and knee joint side plates for distortion, cracks, flaking paint and pulled, loose or missing fasteners.
- (q) Nose landing gear inner cylinder piston rod for cracks and distortion around lower fluid path holes (Ref Chapter 32, Nose Landing Gear - Maintenance Practices).

NOTE. The urgency of accomplishing the piston rod examination depends on the results of examination per (p) in accordance with par. 1) and 2) below.



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- 1) If examination per (p) shows visible damage, or if shock strut servicing abnormalities (such as loss of fluid or difficulty in maintaining normal pressure) are encountered, or if the hard-landing is combined with high impact on the nose gear, the piston rod examination should be made prior to the next flight of the airplane.

NOTE: Evidence of contact between the lower end of the outer cylinder and the radius between the inner cylinder and the axle forging is positive proof of damage to the piston tube. Absence of such evidence, however, is no assurance that the piston tube is undamaged.

- 2) If examination per (p) shows no visible damage, and no shock strut servicing abnormalities are encountered, the piston rod examination should be made at the first convenient opportunity following the report of a hard landing.

- (r) Check rigging of nose landing gear steering mechanism. See Chapter 32, Nose Wheel Steering System - Maintenance Practices.
- (s) Flight controls for freedom of movement, and specified cable tension.
- (t) Conduct dragged engine nacelle/engine seizure/engine and strut damage examination per par. 9.

9. Dragged Engine Nacelle/Engine Seizure/Engine and Strut Damage

- A. Whenever an engine nacelle is believed to have scraped the ground or engine seizure experienced, examine nacelle strut skin panels and gap covers, and lower surface of engine cowlings, for buckling, cracks, pulled or missing fasteners, and any unusual external conditions. If any such conditions are observed, proceed as follows:
 - (1) Remove all access panels from sides and top of strut, wing leading edge nacelle gap covers, the strut midfairing and the entire strut trailing edge fairing. Open engine cowlings.
 - (2) Remove the nacelle strut front spar bolt for detailed examination. Examine the midspar and diagonal brace hollow bolts, checking the inside surface for distortion, flaking paint, etc. Remove these bolts for more detailed examination if necessary.
 - (3) Examine all engine to strut attachment points and their surrounding fittings, and all other primary structure, for distortion, cracks, flaking paint, pulled, loose or missing fasteners.
 - (4) Examine wing front spar webs between nacelle struts for buckles.
 - (a) If buckles are found, provide description of damage as to degree and location and contact Boeing for repair instructions.
 - (b) Examine engine inlets for damage and evidence of foreign objects.
 - (c) If engine seizure or internal engine damage is suspected, examine engine (Ref PWA Maintenance Manual, Chapter 72) and remove engine if necessary.

10. Deleted

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11. Fuel Dump Chute Extension or Retraction with Flaps Down Condition
 - A. The fuel dump chute actuator has a small bearing on the end beneath the motor that will not take the compression load imposed on it by extending or retracting the fuel dump chute with the flaps down. The balls in the bearing brinnell the race. This may cause the unit to jam the next operation. It is required that this bearing be changed before the airplane is flown again. See Chapter 28, Fuel Dump Chute Actuator, for removal and installation of the actuator.
12. Cabin Overpressurization
 - A. If cabin overpressurization occurs, (20 psia for oxygen system components and 18 psia for air data units) the following must be accomplished:
 - (1) Replace oxygen system continuous flow control units and oxygen diluter demand regulators.
 - (2) Check all spare air data units in airplane and air data units with disconnected pitot static lines for damage.
 - B. Upon completion of replacement and check, systems and components subject to damage due to overpressurization require reactivation or reinstallation and functional testing in compliance with applicable maintenance manual sections.
13. Mercury Spillage Condition
 - A. General
 - (1) It is assumed that any significant quantity of mercury on board an airplane is properly contained, packaged and labeled for loading in a cargo compartment.
 - (2) The spillage of mercury or a mercury compound, within an airplane, requires immediate action for its isolation and recovery to prevent possible corrosion damage to and possible embrittlement of aluminum alloy structural components.
 - (3) Mercury, by the amalgamation process, can penetrate any break in the finish, paint or sealing coating of a metal structural element. An oxide coating on a dry metallic surface will tend to inhibit an immediate action while a bright, polished, shining or scratched surface will hasten the process. Moisture will also promote the amalgamation process. Soils, greases or other inert contaminants present on the metal surfaces will prevent the start of the action. The corrosion and embrittlement which results from an initial penetration can be extremely rapid in structural members under load. Once it has begun, there is no known method of stopping it. Complete destruction of the load carrying capacity of the metal may be the result.
 - (4) Damage due to mercury of an aluminum alloy structural item appears externally as a grayish, powdery dust or fuzzy coating. Such external evidence may be an indication of damage by embrittlement. Refer to the Structural Repair Manual, Chapter 51, Mercury Spillage Corrective Action.
 - (5) When using X-ray equipment to detect mercury, droplets of mercury will show on a negative as small white spots. Corrosion and embrittlement will show as tree-like forms completely penetrating a structural component.



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(6) Personnel precautions

(a) Mercury spreads very easily from one surface to another. It adheres to hands, shoes, clothes, tools, hoses, etc.; therefore, the following precautions must be observed:

- 1) Allow no through traffic from the contaminated section to any "clean" section.
- 2) Avoid contact with surfaces suspected of being contaminated. If necessary, use wood or fiber sheets to support body while working in the area. Do not attempt to pick up free mercury or amalgamated mercury by hand.
- 3) Clean tools with soap and hot water or by a steam bath. Discard drill bits after use on mercury contaminated structure.
- 4) Wear wing socks in the contaminated area to prevent scratching the exposed surfaces. Throw away socks after use. Clean shoes with vacuum cleaner and wash them with hot water and soap. Thoroughly wash clothes worn during cleanup as soon as possible.
- 5) Always wash thoroughly after contacting mercury. Keep hands away from mouth. Do not eat, smoke or even blow nose without first washing your hands carefully.
- 6) Appreciable amounts of mercury will vaporize at normal temperatures to the extent that a stagnant air mass will become dangerous to personal health.

WARNING: ALWAYS PROVIDE AMPLE VENTILATION WHILE CLEANING MERCURY CONTAMINATED AREAS.

(7) Precautions for cleaning up mercury spilled on floor.

- (a) When mercury is found on the floor, do not remove access plates/inspection plates, screws, rivets, etc., from floor. Any hole which is left open in the contaminated area of the floor may allow mercury to spread to the structure underneath the floor.
- (b) Do not use cleaning materials such as solvents, solids or polishes on the contaminated areas. These materials may promote the corrosion.
- (c) If hands become contaminated while working with cleanup equipment, do not touch any exposed metal in the surrounding area as you may contaminate it.
- (d) If corrosion is evident and cleanup cannot be completed immediately, coat contaminated area with corrosion preventative oil (CP oil) or with engine oil. This helps to slow down the rate of corrosion and also helps to prevent spreading of the contamination.

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B. Equipment and Materials

- (1) Corrosion preventative oil, or engine oil
- (2) Cardboard
- (3) Paper troughs
- (4) Scotch tape
- (5) Zinc oxide tape
- (6) Medicine dropper
- (7) Mercury vacuum pump, Lab Safety Supply Co., P. O. Box 1368, Janesville, Wisconsin 53545
- (8) 10X hand lens
- (9) Sensing device (mercury sniffer)
 - (a) Beckman Instruments, Inc., Fullerton, California
 - (b) Sunshine Scientific Instrument Company, 1810-12 Grant Street, Philadelphia, Pennsylvania
- (10) Portable X-ray equipment

C. Mercury Spillage Corrective Measures

- (1) Passenger Compartment or Main Cargo Deck
 - (a) Log the incident with respect to the following:
 - 1) Amount of spillage
 - a) Small - Broken thermometers, etc.
 - b) Larger - Such as might be expected by damage to a technical instrument using mercury, etc.
 - 2) Date and time of spillage
 - 3) Exact location of spillage
 - (b) General cleanup and inspection (using equipment available) must be made immediately after spillage occurs or immediately after spillage is detected.

WARNING: AFTER CLEANUP AND INSPECTION, NO KNOWN FREE MERCURY IS PERMISSIBLE WITHIN AIRPLANE, USE MERCURY SNIFFERS AND X-RAY EQUIPMENT, IF AVAILABLE, TO DETECT FREE MERCURY.

- 1) Pick up all visible spillage (broken thermometer, etc.) by use of cardboard or paper troughs, scotch tape, zinc oxide tape. A medicine dropper is useful for larger globules of visible mercury. If none of these methods are practical, isolate the spillage by covering it with fastened-down cloth (towels, plastic sheets, etc.) until vacuum methods, etc., become available.
- 2) Vacuum thoroughly the carpet area (or the cargo deck) where the spillage occurred.
 - a) For a spillage, use a mercury vacuum pump.

NOTE: Vaporized mercury may contaminate commercial vacuum cleaner. A contaminated vacuum cleaner should be cleaned after use.



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- 3) Make a visual inspection of seat track rails (and crease beam components) if spillage occurs near them. Use the equivalent of a 10X hand lens for determination of corrosion damage. Any evidence of mercury corrosion or embrittlement requires repair.

NOTE. A sensing device (mercury sniffer) is recommended to detect hidden deposits of mercury when a spillage is classified as "larger." If available, use X-ray equipment to assist in detecting mercury.

- 4) Make a close inspection of all exposed brass metal, such as turnbuckles, or cables. A silver color on nonplated brass is indication of mercury reactions.
- (c) Strict cleanup and inspection (using Mercury vacuum pump, mercury sniffers, X-ray equipment, etc.), and possible repairs, must be made during first airplane service at a main base.

WARNING: AFTER CLEANUP AND INSPECTION, AND POSSIBLE REPAIR, NO FREE MERCURY IS PERMISSIBLE WITHIN AIRPLANE. USE MERCURY SNIFFERS AND X-RAY EQUIPMENT TO DETECT FREE MERCURY.

- (d) Reinspect area of spillage and areas below spillage at first overhaul.
- (2) Lower Cargo Compartments
 - (a) Log the incident with respect to the following.
 - 1) Amount of spillage
 - a) Small - Broken thermometers, etc.
 - b) Larger - Such as might be expected by damage to a technical instrument using mercury, etc.
 - 2) Date and time of spillage
 - 3) Exact location of spillage
 - (b) General cleanup and inspection (using equipment available) must be made immediately after spillage occurs or immediately after spillage is detected.

WARNING: AFTER CLEANUP AND INSPECTION, NO KNOWN FREE MERCURY IS PERMISSIBLE WITHIN AIRPLANE. USE MERCURY SNIFFERS AND X-RAY EQUIPMENT, IF AVAILABLE, TO DETECT FREE MERCURY.

- 1) Pick up all visible spillage by use of cardboard or paper troughs, scotch tape, zinc oxide tape. A medicine dropper is useful for larger globules of visible mercury. If none of these methods are practical, isolate the spillage by covering it with fastened down cloth (towels, plastic sheets, etc.) until vacuum methods, etc., become available.



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- 2) Vacuum visible regions of a cargo compartment immediately. Vacuum thoroughly the aluminum alloy deck floor where the spillage has occurred. Vacuum also any portion of a bulkhead as required. The use of a Mercury vacuum pump is recommended.
 - 3) Make a visual inspection immediately of visible structural components affected (cargo track rails, deck floor, bulkheads, etc.). Use the equivalent of a 10X power hand lens for determination of corrosion damage to readily accessible metal structural components. Any evidence of mercury corrosion or embrittlement requires repair.
 - 4) Make a close inspection of all exposed brass metal, such as turnbuckles, or cables. A silver color on nonplated brass is an indication of mercury reactions.
 - 5) If available, use a portable X-ray machine inside the cargo compartments and along the outside lower surface of the fuselage to check suspected corrosion areas of the skin, stringers and frames which are hidden below the floor.
- (c) Strict cleanup and inspection (using Mercury vacuum pump, mercury sniffers, X-ray equipment, etc.), and possible repair, must be made during first airplane service at a main base.

WARNING: AFTER STRICT CLEANUP AND INSPECTION, AND POSSIBLE REPAIR, NO MERCURY IS PERMISSIBLE WITHIN AIRPLANE. USE MERCURY SNIFFERS AND X-RAY EQUIPMENT TO DETECT FREE MERCURY.

- (d) Reinspect area of spillage and areas below spillage at first overhaul.

14. Lightning Strike Condition

A. General

- (1) The airplane design incorporates all necessary and known lightning strike protection measures. The basic protection being the nearly all metal exterior structure. The metal surface acts as a shield protecting the interior from direct strikes and preventing coupling of electromagnetic energy into the airplane wiring. In the event the airplane has sustained a lightning strike, a general inspection is made of the airplane to determine the areas of the strike and discharge, then a thorough check is made to those specific areas to determine the extent of the damage that has occurred.
- (2) A lightning strike usually causes burning which may be localized or scattered over a large area. Results of lightning strikes may also be indicated by burnt or discolored skin or rivets. Evidence of lightning strike usually appears more prevalent in the fuselage nose section or other leading edges, on trailing edges under the lower aft fuselage area, antennas and on fin, horizontal stabilizer and wing trailing edges.

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- (3) Cases have occurred in which aircraft components have become strongly magnetized due to the aircraft having been struck by lightning. It is possible that during the lightning discharge, heavy electric currents flow in the metal airframe structure. The magnetic field produced by such electric current is the cause of magnetization, this being an undesirable factor in the vicinity of the magnetic compass.
- (4) The external surface areas most likely to receive the initial component of a lightning strike are the nose radome, nacelles, wingtips, stabilizer tips, elevators, vertical fin tip, ends of the leading edge flaps, trailing edge flap track fairings, external lights, and of body extensions, such as landing gear, tail skid, waste water masts and pitot probes. Surfaces for which there is a probability of strikes being swept rearward from a point of direct strike contact are the fuselage and the wing surfaces aft of the ends of the leading edge flaps.
- (5) Possible internal effect to the airplane due to lightning strike could be to the electrical power systems and external light wiring. While the electrical system is designed to withstand lightning strikes without damage, a strike of exceptionally high intensity may damage the generators, power feeders, and distribution systems.

B. Lightning Strike External Examination

- (1) **Examine Airplane External Surface**
 - (a) Examine direct strike surface areas for any indication of damage.
 - (b) Examine strike swept surface areas for any indication of damage. Special attention should be given to areas of transition from one surface termination to another.
 - (c) If an external light shows damage from a strike, examine internal wiring of light fixture and of wiring back to circuit breaker.
 - (d) Check operation of navigation lamps (including rotary lights) and landing lights.
 - (e) Check standby magnetic compass for accuracy.
 - (f) If demagnetization is required in any area, refer to 34-13-71, Demagnetization of Airplane Structure.
 - (g) Check rudder, elevator, and aileron hinges and bearings for evidence of damage. If damage is found, perform detailed examination of bondings, trim tabs and tab controls, balance panels, snubbers, etc.
 - (h) If wingtip shows indications of lightning strike, perform detail inspection of fuel vent surge tanks.
- (2) **Examine HF Lightning Arresters**
 - (a) Examine lightning arrester spark gap. HF lightning arresters area located on vertical fin tip and wing tip, if installed.



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- (3) Examine Static Dischargers
 - (a) Visually check that all dischargers are secure on mounting retainers and are not broken or missing.
 - (b) Check dischargers for damage as evidenced by burned and roughened discharger coating and pitted metal discharger retainers.
 - (c) Check dischargers for broken, bent or blunted tungsten pins. Bent pins must be straightened.
 - (d) Check for excessive erosion of coating on dischargers or peeling of tip cap. Leading edge erosion of the dischargers should not extend back more than one third the width of the discharger.
 - (e) If damaged discharger is found in steps (a) thru (d), check resistance (Ref 23-12-0 I/C).
 - (4) Examine Loran lightning arrester on aft section of fin tip. Replace arrester if it shows evidence of spark gap damage (Ref 34-22-31 MP).
 - C. Lightning Strike Internal Examination
 - (1) If the lightning strike has caused only loss of power from a generator, the equipment on the main ac distribution buses will be operative when power is supplied from the other generators. Examine the following for evidence of physical damage or overheating:
 - (a) Generator and generator control wiring. If damaged, replace generator (Ref 24-3-12). Repair or replace wiring as required.
 - (b) Constant speed drive and control wiring. If damaged, replace constant speed drive (Ref 24-12-11). Repair or replace as required.
 - (c) In electrical equipment rack (E1), wiring, main power circuit breakers, and load controller. If damaged, repair wiring and replace units as required:
- NOTE:** For main power circuit breaker, refer to 24-4-61.
- For load controller, refer to 24-3-51 (if applicable).
- (d) Generator control panels in electrical equipment rack and control wiring to generator and constant speed drive. If damaged, replace generator control panels. Repair or replace damaged wiring as required.
 - (e) Perform operational test of generator system (Ref 24-1-0). If malfunction occurs, trouble shoot system (Ref 24-1-0).



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- (2) If the lightning strike has caused loss of power from a generator and additional damage to the electrical distribution system, equipment on one or more main ac buses will be inoperative. Check for damage to the equipment listed in par. C.(1) and examine the following for evidence of physical damage or overheating:
 - (a) The bus tie breaker of the malfunctioning bus (E1). If damaged, replace bus tie breaker (Ref 24-4-61).
 - (b) Check bus wiring and circuit breakers in affected bus and repair as required.
 - (c) Check that all loads on repaired bus are operable. Refer to 24-1-0 for bus loading.
- D. Inspection and Operational Check of Radio Systems
 - (1) General
 - (a) A thorough inspection of the radio and navigation systems must be accomplished whenever an airplane has sustained a lightning strike or severe static discharge. The extent of the inspection/operation checks are based upon flight crew information regarding conditions existing during and after an incident.
 - (2) Inspection
 - (a) HF System
 - 1) Probes for damage
 - 2) Tuners for damage and arcing
 - 3) Arrestors for damage and arcing
 - (b) VHF-VOR-DME-ATC-MARKER Systems
 - 1) Antennas for damage
 - 2) Coaxial cables and connectors for damage
 - (c) Radar System
 - 1) Radome for damage
 - 2) Check radome bonding straps for security and contact to airframe.
 - 3) If radome is damaged, check antenna and waveguide for damage.
 - (3) Operational Check
 - (a) General
 - 1) An operational check of all radio and navigation systems shall be made.
 - 2) If a malfunction is detected by operational check or reported by flight crew, accomplish detailed operational check per applicable section of maintenance manual.
 - (b) Check operation of the following systems:
 - 1) HF System
 - a) Check operation of systems on several frequencies.
 - b) Note that the VSWR is within tolerance and that loading is normal.
 - c) Check receiver operation by monitoring several active frequencies.
 - d) Make a ground check of each system, preferably with a station at least 100 miles distant. Assure positive contact.



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- 2) VHF System
 - a) Check loading of transmitters on several frequencies. Note that all transmitter meter readings are normal.
 - b) Check receiver operation by monitoring an active frequency.
 - c) Make a ground check of each system with the local tower facility. Assure positive contact.
- 3) VOR/ILS
 - a) Check system operation on local VOR and/or localizer facility. If VOR/ILS ramp test set is available, check operation of VOR, localizer and glide slope.
- 4) ADF
 - a) Check operation of receivers on Ant, Loop and ADF functions.
 - b) Check that each system will take a bearing preferably on stations of at least 100 miles.
- 5) Radar
 - a) Check operation of system noting that all receiver/transmitter meter readings are normal. Check targets on 20-, 50- and 150-mile ranges.
- 6) Radio Altimeter
 - a) Check operation of low range altimeter system
- 7) DME
 - a) Check operation of system on local station or ramp tester.
- 8) ATC
 - a) Check transponder operation with ramp tester if available.
- 9) Marker
 - a) Check operation with marker test set if available.

15. Bird Strike Condition

A. General

- (1) Examine the entire aircraft exterior especially wing leading edges, flaps and slats, engine inlets, and nacelles for impact damage when a bird strike is reported or suspected due to extreme possibility of multiple bird strikes. Aircraft configuration should be the same as when bird strike occurred, i.e., position of flaps, landing gear, etc. If flap position is unknown, examine trailing edge flaps and leading edge flaps and slats in fully extended position. Damage areas should be marked for thorough examination and/or action when the exterior examination of the total aircraft is complete. Refer to the Structural Repair Manual for repair of any impact damage.



B. Bird Strike Conditional Inspection

- (1) Examine wing, nacelle strut, and horizontal and vertical stabilizer leading edge fairing for displacement, distortion, fastener hole elongation or tear-out, flaking paint, skin cracks, and pulled or missing fasteners.
- (2) Examine pylon panels, doors, and structure for buckling, cracks, and pulled or missing fasteners.
- (3) Examine wing leading and trailing edge structure, panels, and doors for displacement, distortion, flaking paint, cracks, and pulled or missing fasteners. Examine both side of honeycomb panels for cracks, delamination, soft spots, and core damage.
- (4) Examine leading edge and trailing edge flap mechanism and trailing edge track fairing for distortion, cracks, misalignment, or other evidence of distress.
- (5) Check control surfaces for binding, excess free play, misalignment, distortion or displacement of skins, and pulled or missing fasteners.
- (6) Examine nose and main gear doors and linkage for distortion, cracks, and other evidence of distress.
- (7) Check pilot's windows for delamination, spalling, or cracks and adjacent structure for distortion, cracks, and pulled or missing fasteners.
- (8) Examine forward body nose section and radome for cracks, distortion, delamination, misalignment, displacement of skins, and pulled or missing fasteners.
- (9) Examine inside and outside of radome for honeycomb core damage and soft spots.
- (10) Examine nose cowl and engine for foreign object damage.
 - (1) Check CSD oil cooler and PS3 filter for foreign matter.
 - (2) Perform engine run to check normal operation.

16. Landing Gear Down Overspeed Condition

- A. Examine all nose and main gear doors including hinges, linkage and linkage support structure, and fairing panels for distortion, cracks, misalignment, displacement, fastener hole elongation or tear-out, pulled or missing fasteners, and any other evidence of distress.
- B. Examine systems installations in wheel wells for any evidence of distress.

17. Leading Edge Devices Retraction System (Reverser Actuated) Inoperative (Airplanes with Thrust Reverser Actuated Leading Edge Flaps)

- A. General
 - (1) Any time reverse thrust is used with the leading edge devices deployed, an inspection of the leading edge area must be conducted.
 - (2) Inspection will be a visual inspection of the leading edge devices and fixed structure normally protected by the retracted leading edge devices.
 - (3) Refer to specific structure of system chapter as required for isolation of cause of any malfunction or repair of damage found.



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- B. Leading Edge Flaps Extended during T/R Operation - Conditional Inspection
 - (1) Examine leading edge flaps for evidence of distortion, heat damage or thrown particle damage.
 - (2) Examine actuating mechanism for evidence of damage, contamination or degradation of lubricants by foreign material or exhaust gases.
 - (3) Examine all fiberglass panels and fixed leading edge support structure for evidence of delamination, distortion or damage.
 - (4) Observe retraction of leading edge devices for evidence of faulty operation.
- 18. Nacelle/Strut Pressure Relief Doors Open Condition
 - A. General
 - (1) The pressure relief doors are designed to protect the nacelle/strut structure from over-pressurization due to excessive leakage from or rupture of pneumatic ducts. However, it is possible for the doors to open as a result of hard landings, severe turbulence, engine vibration, or any other condition that could create temporary or permanent distortion. If the doors are found open conduct the following inspections.
 - B. Examine Nacelle/Strut Structure
 - (1) Nacelle/strut inner and outer surfaces for distortion, cracks and pulled or missing rivets. Particular attention should be given to discolored surfaces or flaking paint which could be evidence of high temperature air impingement.
 - C. Examine Pneumatic Ducting
 - (1) Hard ducting and flexible sensing line for cracks and tears, clamps, nuts, etc. for tightness.
- 19. Hot Air Duct Rupture Condition
 - A. Examine any airplane structure which has been exposed to excessive heat to determine whether such overheating has weakened structure (Ref Nondestructive Test Manual).
- 20. Cabin Depressurization Condition
 - A. General
 - (1) The examination is applicable after a cabin depressurization caused by unscheduled opening of pressurization outflow valves.
 - B. Cabin Depressurization Conditional Inspection
 - (1) Check for displaced blowout panels and visible lining and insulation damage (Ref Chap. 21).
 - (2) Check area around pressurization outflow and relief valves for damage and examine valves (Ref Chap. 21).

21. Exceeding Maximum Nose Gear Turning Angle Condition

A. General

- (1) The airplane is limited to 58° maximum nose gear towing angle above 140,000 pounds gross weight for 720 aircraft, 160,000 pounds gross weight for 707-100 series and 180,000 pounds gross weight for 707-300 series. If this limitation is exceeded, the following conditional inspection should be made

B. Exceeding Maximum Nose Gear Towing Angle Conditional Inspection

- (1) Examine the airplane as follows:
- (a) Flap actuator access panel (3402 or 402) for buckling adjacent to forward inboard corner of inboard spoiler. If buckling is found, examine upper flange of wing trailing edge rib at wing station 299 for buckling adjacent to forward inboard corner of inboard spoiler.
 - (b) Main gear oleo strut doors and linkage for distortion, cracks, or other evidence of distress.
 - (c) Main landing gear forward trunnion collar and attach bolts for evidence of hole elongation or bolt distortion (such as collar displacement).
 - (d) Nose wheel well for buckling, flaking paint, cracks and pulled or missing fasteners in the web of nose wheel well particularly in the vicinity of the trunnion support fittings.
 - (e) Lower fuselage structure for skin buckling, flaking paint, cracks and pulled or missing fasteners.
 - (f) Bulkhead at body stations 312 and 360, chords and web immediately outboard of the nose wheel well for buckling, flaking paint, cracks, and pulled or missing fasteners.

NOTE: This examination can be done without structure removal, through the lightening holes in the lower aft nose wheel well.

- (g) Wing, nacelle struts, and fuselage external surface, nose and main landing gear wheel well cavities, for evidence of fuel and other fluid leaks in region of landing gears.
- (h) Main gear truck beam especially in the area of the torque links and inner cylinder forks for cracks or dents.
- (i) Main landing gear snubbers and leveling cylinders for serviceable condition; attach bolts for evidence of shearing and fittings for cracks or distortion.
- (j) Main gear drag and side strut linkage for distortion or cracks.

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22. Tire Tread Loss or Tire Burst Condition

A. General

- Following any incident involving the loss of tread from, or the bursting of, a nose or main gear tire, the areas detailed below should be inspected for impact damage and/or obstruction from tire fragments lodged in the structure and components. Impact damage is usually evidenced by rubber and bitumen markings deposited on the impacted surface.

B. Tire Tread Loss or Tire Burst Conditional Inspection

- (1) Examine wing upper inboard fixed trailing edge panel for damage, areas of delamination or local separation (detected by coin tapping method) and soft spots from core crushing (detected by pushing on surface).
- (2) Examine inboard trailing edge flaps and fillet flaps for damage, areas of delamination or local separation and soft spots from core crushing. Examine for tire fragments lodged in linkages, inboard flap carriages and fillet flap linkages.
- (3) Examine trailing edge flap jackscrews, actuating linkages and rods for damage and obstruction from tire fragments.
- (4) Examine antenna and lower fuselage wing-to-body fairing panels for damage, areas of delamination or local separation and soft spots from core crushing.
- (5) Examine wheel well areas for damage and obstruction from tire fragments. Pay particular attention to hydraulic plumbing and flap drive torque tubes for distortion due to impact damage from tire pieces.
- (6) Examine landing gear assemblies, associated components and hydraulic plumbing for evidence of impact or flailing damage and hydraulic fluid leakage.
- (7) Examine wheel well doors and actuating rods for damage and obstruction from tire fragments.
- (8) Examine remaining tires on the affected gear for evidence of slashing and wire penetration of the tread and sidewalls.

24. Volcanic Ash Condition

A. General

- (1) Flight crew reports of electrostatic discharge across the windshields and a bright glow in the engine inlets along with subsequent engine shutdown in some cases and obscured visibility through the windshields and windows are indications of volcanic ash encounter.
- (2) Volcanic ash is highly abrasive material generally considered to be non-corrosive over the short term. The abrasive nature of the ash can, however, affect finishes resulting in a corrosive situation. Removal of volcanic ash and repair of finishes should be accomplished at the earliest opportunity.
- (3) The texture of volcanic ash resembles talcum powder. The majority of the particles are under 5 microns with trace amounts over 50 microns. Because of the abrasive nature of volcanic ash, care should be taken not to rub the surface when washing the airplane.
- (4) The ash will cling to exposed lubricated surfaces and may penetrate many conventional seals, enter the engine gas path and air conditioning system, and may enter other orifices on the airplane. It is assumed that volcanic ash will not enter sealed bearings such as wheel bearings. Monitoring of rotating or sliding parts for evidence of ash related damage not found initially should be considered as a follow-on program depending on the severity of the ash fallout.
- (5) The conditional inspection should be accomplished if one or more of the following occur:
 - (1) An airplane is flown through a cloud of volcanic ash.
 - (2) An airplane is engulfed in volcanic ash fallout during ground operations (towing, taxiing, parking, etc.).
 - (3) An airplane encounters existing volcanic ash fallout during landing or takeoff.
- (6) Volcanic ash can cause personnel discomfort during the time of exposure. Precautions should be taken when working in a volcanic ash environment to prevent volcanic ash entering the eyes and respiratory system.

WARNING: VOLCANIC ASH CAN CAUSE EYE IRRITATION AND MAY BE HAZARDOUS TO THE RESPIRATORY SYSTEM. PERSONNEL ENCOUNTERING VOLCANIC ASH CONDITIONS SHOULD WEAR PROTECTIVE CLOTHING, EYE GOGGLES, AND A RESPIRATOR MASK SUFFICIENT TO FILTER VOLCANIC ASH PARTICLES.



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B. Volcanic Ash Conditional Inspection

- (1) When volcanic ash is encountered, examine the following:
 - (a) Examine frontal surfaces of fuselage, wing, engine nacelles, vertical stabilizer, and horizontal stabilizer for abrasion.
 - 1) Examine wing leading edges for dents and allowable skin thickness per structural Repair Manual.
 - (b) Examine windshields and windows for abrasion damage which obscures vision.
 - (c) Examine engines for damage (Ref P&WA Chapter 72 I/C).
 - (d) Examine pitot tubes, static ports and PT2 probes for volcanic ash accumulation and plugged condition.
 - (e) Examine air conditioning system as follows:
 - 1) Remove water separators (Ref 21-2-51) and examine for evidence of volcanic ash.

NOTE: If no evidence of volcanic ash is found in water separators, examination of air conditioning system is complete and remainder of par. (e) may be omitted.

- 2) Remove air cycle pack heat exchangers (Ref 21-2-11 and 21-2-31 or 21-12-11 and 21-12-32) and examine for evidence of volcanic ash.
- 3) Remove air cycle machines (Ref 21-2-21) and examine for evidence of volcanic ash.
- 4) Remove pack flow control valves (Ref 21-2-161) and examine for evidence of volcanic ash.
- 5) On 707-300 airplanes, remove zone temperature control valves (Ref 21-12-141) and examine for evidence of volcanic ash.
- 6) Remove turbofans (Ref 21-2-191) and examine for evidence of volcanic ash.
- 7) Examine outflow valves for evidence of volcanic ash.
- (f) Examine pneumatic system as follows:
 - 1) Remove turbocompressors (Ref 36-1-2) and examine for evidence of volcanic ash.
 - 2) Remove pneumatic air shutoff valves (Ref 36-2-12) and examine for evidence of volcanic ash.
 - 3) Remove swing check valves (Ref 36-2-12) and examine for evidence of volcanic ash.
 - 4) Remove wing isolation valves (Ref 36-2-12) and examine for evidence of volcanic ash.
 - 5) Examine ground air connectors for evidence of volcanic ash.
 - 6) Remove pressure regulator (Ref 36-1-32) and examine for evidence of volcanic ash.
 - 7) Check operation of duct pressure transmitters (Ref 36-2-41).



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- (g) Examine exterior light lens for abrasion.
- (h) Examine fuel system as follows:
 - 1) Obtain fuel sample from each fuel tank sump (Ref 12-1-41) and examine samples for evidence of volcanic ash.
 - 2) Obtain fuel sample from each surge tank sump (if fuel is present in surge tanks) (Ref 12-1-41) and examine samples for evidence of volcanic ash.
 - 3) Examine interior of each surge tank (Ref 28-6-11) for evidence of volcanic ash.
- (i) Examine oxygen system (if cabin and cockpit contamination is reported) as follows:
 - 1) Remove diluter demand regulators (Ref 35-1-0) and examine for evidence of volcanic ash.
 - 2) Remove flow regulators (Ref 35-2-11), pressure surge valve (Ref 35-2-0), automatic trigger valve (Ref 35-2-21), bypass valve (Ref 35-2-31), and flow control units (Ref 35-4-11) and examine for evidence of volcanic ash.
 - 3) Examine portable oxygen cylinders and masks for evidence of volcanic ash.
 - 4) Examine passenger and crew oxygen masks for evidence of volcanic ash.
- (j) Examine auxiliary power unit (APU) as follows:
 - 1) Examine inlet and exhaust ducts for evidence of volcanic ash ingestion.

NOTE: If no evidence of volcanic ash is found in APU inlet and exhaust ducts, examination of APU is complete and remainder of par. (j) may be omitted.

- 2) Remove oil, air and fuel filters (Ref 49-7-41, SRV; 49-4-11, SRV; 49-3-91, SRV) and examine for evidence of volcanic ash.
 - 3) Disconnect compressor discharge pressure and bleed air lines (Ref 49-4-81, C/P, 49-4-2, R/I) and examine for evidence of volcanic ash.
 - 4) Remove electrical and pneumatic control valves (Ref 49-8-51, R/I) and examine for evidence of volcanic ash.
- (k) On 707-300C airplanes, examine potable water system as follows:
 - 1) Remove bleed air, compressor intake, and compressor outlet air filters (Ref 38-11-41) and examine for evidence of volcanic ash.

NOTE: If no evidence of volcanic ash is found in air filters, examination of potable water system is complete and remainder of par. (k) may be omitted.



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- 2) Remove compressor (Ref 38-11-41) and examine for evidence of volcanic ash.
- 3) Obtain water sample from water tanks (Ref 38-11-82) and examine for evidence of volcanic ash.
- 4) Remove pressurization check valves (Ref 38-11-41) and examine for evidence of volcanic ash.
- 5) Remove water quantity transmitters (Ref 38-11-31) and examine for evidence of volcanic ash.
- (l) Examine smoke detectors for evidence of volcanic ash.
- (m) Examine engine and APU fire extinguisher bottle nozzles for evidence of volcanic ash.
- (n) Examine constant speed drive and oil cooler for evidence of volcanic ash.
- (o) Examine landing gear as follows:
 - 1) Examine exposed inner cylinders of main and nose landing gear shocks struts for evidence of volcanic ash.
 - 2) Examine all hydraulic actuator exposed piston rods for evidence of volcanic ash.
 - 3) Examine all landing gear component attachment points for evidence of volcanic ash.
 - 4) Examine landing gear door hinges, lock mechanisms, ground door release cables and pulleys, and ground door release handle bearings for evidence of volcanic ash.
 - 5) Examine main and nose gear emergency extension system crank and cable drum for evidence of volcanic ash.
 - 6) Examine all cables and pulleys for evidence of volcanic ash.
 - 7) Examine landing gear brakes for evidence of volcanic ash.
 - 8) Examine landing gear selector valve and brake metering valves for evidence of volcanic ash.
- (p) Examine hydraulic system as follows.
 - 1) Obtain sample of hydraulic fluid (Ref 29-0, MP) and examine for evidence of volcanic ash.
 - 2) Remove air filter (Ref 29-3-11), air pressure regulator (Ref 29-3-11), relief valve (Ref 29-7-1 and 29-7-11), interconnect valve (Ref 29-9-11), and bypass valve (Ref 29-9-21) and examine for evidence of volcanic ash.
- (q) Examine flight controls as follows:
 - 1) Examine aileron, elevator, rudder, leading edge flap, leading edge slat, and spoiler actuator exposed piston rods for evidence of volcanic ash.
 - 2) Examine control cables in unpressurized areas for evidence of volcanic ash.
 - 3) Examine stabilizer jackscrew for evidence of volcanic ash.
 - 4) Examine all flight control surface hinges for evidence of volcanic ash.
 - 5) Examine trailing edge flap track and flap mechanisms for evidence of volcanic ash.
 - 6) Examine trailing edge flap track fairings and linkages for evidence of volcanic ash.
 - 7) Examine leading edge flaps, leading edge slats, and mechanisms for evidence of volcanic ash.
 - 8) Examine aileron, elevator, and rudder balance panels for evidence of volcanic ash.
 - 9) Examine engine control linkages and mechanisms for evidence of volcanic ash.

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- (r) Examine wing and engine nacelle thermal anti-icing systems as follows:
- 1) Remove wing anti-ice valves (Ref 30-12-11) and examine for evidence of volcanic ash.
 - 2) Remove engine and nacelle anti-ice control valves (Ref 75-6-21 and 75-6-41) and examine for evidence of volcanic ash.
- (s) Examine airplane interior (if cabin and cockpit contamination is reported) as follows:
- 1) Examine upper and main deck compartments, closets, seats, powered crew seats, floor coverings, lavatories, lavatory components, galleys, and galley components for evidence of volcanic ash.
 - 2) Examine refrigeration/chiller units (if installed) for evidence of volcanic ash.
 - 3) Examine baggage/cargo systems and electrical/electronic compartments for evidence of volcanic ash.
 - 4) On executive airplanes, examine powered window blinds for evidence of volcanic ash.
 - 5) Examine control cables and mechanisms for evidence of volcanic ash.



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REDUCED VERTICAL SEPARATION MINIMUM (RVSM) - INSPECTION/CHECK

1. General

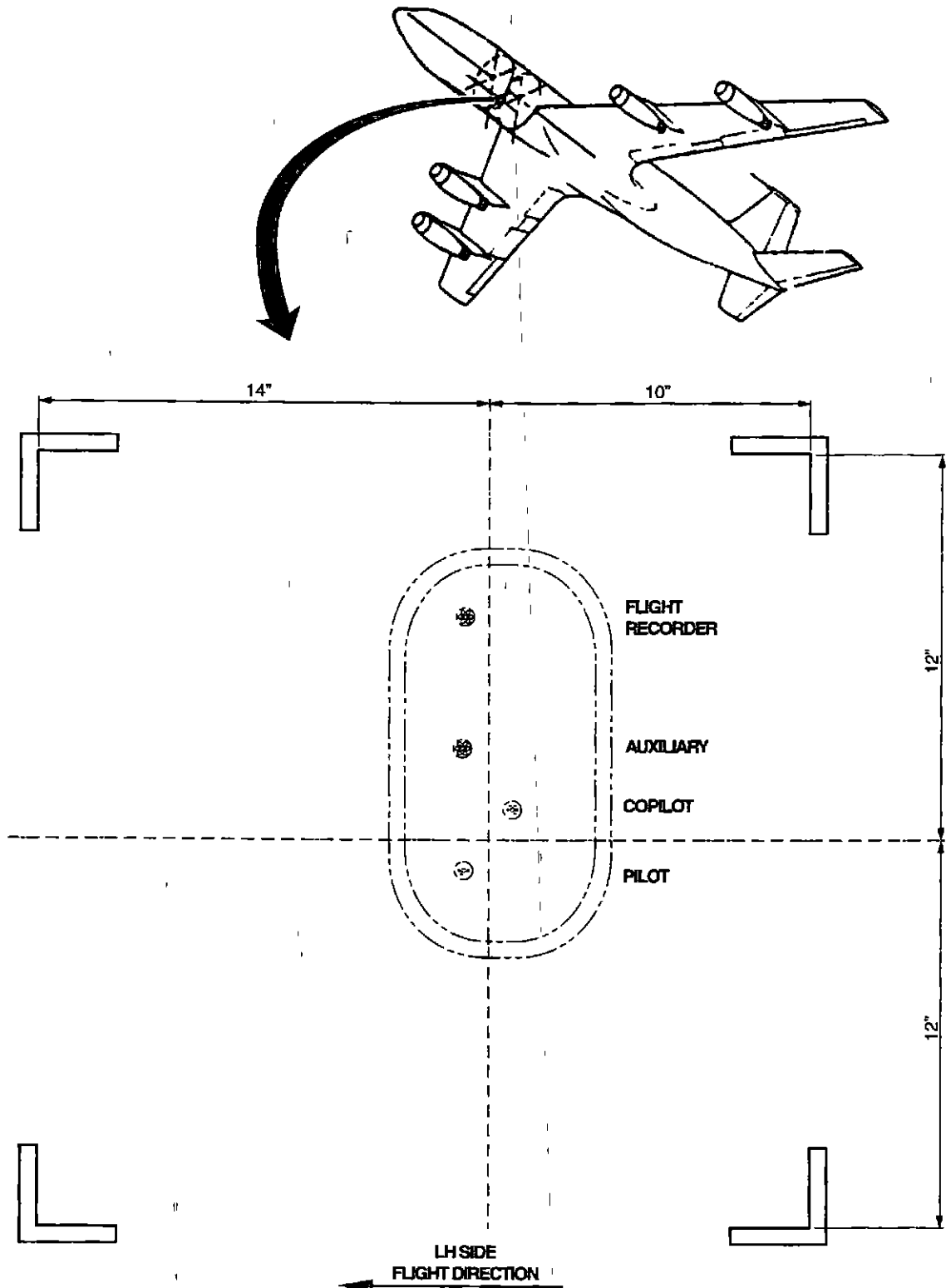
- A. Reduced Vertical Separation Minimum will permit the aircraft to be separated from each other by 1000 ft vertically from FL290 to FL410, instead of the current 2000 ft RVSM will make more available route assignments and give benefits to operators through better route assignments and reduced schedule delays.
- B. To maintain the RVSM capability the area around the static pressure ports on both sides of the aircraft have to be inspected during routine maintenance.

NOTE: Any airflow change in this area may have substantial influence to the accuracy of the RVSM related systems. Any discrepancy may exclude the aircraft from operation in RVSM airspace.

2. Preflight Inspection RVSM Critical Area (See Fig. 1)

- A. Check area around static ports for condition:
 - (1) Check surface for creases, dents, or bulges in the skin.
 - (2) Check for non-flush or missing fasteners.
 - (3) Check for deformed/elongated or obstructed static orifices.
 - (4) Check for non-flush application of aerodynamic sealant.
 - (5) Check for excessive paint.

NOTE: If any damage or irregularity is found refer to SRM 53-2-1.



RVSM Critical Area (LH Side Shown)
Fig. 1



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TEMPORARY REVISION NR. DFW 51-1

INSERT AFTER SUBCHAPTER 51-05-00

REASON FOR CHANGE: New description PAINTING.

INSTRUCTION: Insert new subchapter 51-90-00 and following.

INTRODUCTION

1. General

- A. Airframe refinishing consists of cleaning, surface preparation, chemical treatment, and application of paint or other protective coating on surfaces for protection against corrosion and erosion. Maintaining protective finishes without discontinuities in the organic coating is essential to corrosion and erosion prevention. Softened or badly chipped coating should be removed and the surface refinished. Good protective finishes are normally maintained by re-work of corroded areas and touch up of paint and other protective coating. However, refinishing of the entire airframe may be required at periodic intervals. Procedures for touch up of protective coatings and refinish of the entire airframe are provided in the following chapters.
- B. The safety precautions are given in Chapter 51-90-10.
- C. The different types of surface protection of the exterior surface and components are given in Chapter 51-90-20.
- D. The Surface Treatment, refer to Chapter 51-91-00, is related to:
 - (1) Protective Treatment of Metal Parts, Chapter 51-91-10
 - (2) Protective Treatment of Glass Fabric Parts, Chapter 51-91-20.
- E. The Painting/Coating Application, refer to Chapter 51-92-00, is related to:
 - (1) Exterior Finish System Component Application
 - (a) Astrocoat Primer (Product No. 8200), Chapter 51-92-10

NOTE: The insertion of this TR has to be listed in the Record of TCA Temporary Revisions at the beginning of Volume 1.



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- (b) Astrocoat White Polyurethane Erosion-Resistant Coating (Product No. 8001), Chapter 51-92-11
 - (c) Astrocoat White (Nonyellowing Topcoat) (Product No. 8004), Chapter 51-92-12
 - (d) Caapcoat Primer (Product No. 9947), Chapter 51-92-13
 - (e) Caapcoat White Polyurethane Erosion-Resistant Coating (Product No. CW-4), Chapter 51-92-14
 - (f) Aluminized Lacquer (TT-L-32), Chapter 51-92-15
 - (g) Epoxy-Polyamide Enamel (MIL-C-22750), Chapter 51-92-16
 - (h) Abrasion-Resistant Teflon Coating (23-T3-10 or 23-T3-105) and Abrasion-Resistant Teflon Coating Application Fillet Flap Flaperette, Chapter 51-92-17
 - (i) Polyurethane Abrasion-Resistant Coating (Aerodur ARC) Application, Chapter 51-92-18.
- (2) Storage and Mixing Table and Special Consumable Material, Chapter 51-92-20.
- F. The Paint Removal and the Paint Repair Procedure, refer to Chapter 51-93-00 is related to:
- (1) Paint Coating Stripping/Removal, Chapter 51-93-10
 - (2) Final Cleaning and Inspection, Chapter 51-93-11
 - (3) Paint Touch Up, Chapter 51-93-20
 - (4) Aircraft Strip, Surface Preparation and Painting, Chapter 51-93-30.



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SAFETY PRECAUTION

Some materials used in airframe refinishing are toxic and flammable. Some metals and finishes require special treatment. Care should be exercised by complying with the following personnel and general precautions.

1. Personnel Precautions

The following personnel precautions shall be complied with, as applicable, when performing airframe refinishing procedures:

- WARNING ACCELERATORS AND ACCELERATOR THINNERS ARE HIGHLY TOXIC AND MUST BE WASHED FROM SKIN IMMEDIATELY
- WARNING WORK AREA SHALL BE CLEAN, WELL VENTILATED, AND FREE FROM OPEN FLAMES
- WARNING PROTECTIVE CLOTHING AND EQUIPMENT SUCH AS RUBBER GLOVES, APRONS, BOOTS, AIR SUPPLY OR FILTER RESPIRATORS, APPROPRIATE EYE SHIELDS AND GOGGLES SHALL BE USED AS NECESSARY TO PROVIDE ADEQUATE PROTECTION
- WARNING STORE PROTECTIVE CLOTHING AND RESPIRATORY DEVICES IN METAL LOCKERS OUTSIDE OF PAINT AREA
- WARNING WASH THOROUGHLY AFTER PAINTING AND BEFORE EATING, DO NOT CARRY FOOD INTO SPRAYING AREA
- WARNING CLEAN WATER FOR EMERGENCY USE SHALL BE AVAILABLE IN IMMEDIATE WORK AREA BEFORE STARTING WORK
- WARNING MATERIALS SPLASHED IN EYES SHALL BE PROMPTLY FLUSHED OUT WITH WATER AND THE INJURED PERSON SENT TO THE MEDICAL OFFICER FOR FURTHER TREATMENT
- WARNING CLEANING SOLVENTS ARE TOXIC, VOLATILE, AND FLAMMABLE AVOID EXCESSIVE BREATHING OF VAPORS AND PROLONGED OR REPEATED SKIN CONTACT USE IN WELL-VENTILATED AREAS AWAY FROM IGNITION SOURCES, OPEN FLAMES OR HEATED OBJECTS SUCH AS SOLDERING IRONS

2. General Precautions

The general precautions should be observed when performing airframe refinishing procedures:

- CAUTION ELECTRICALLY GROUND AIRPLANE PER AMM CHAPTER 07 (D6-6003) BEFORE START OF REFINISHING OPERATION
- CAUTION USE ONLY AUTHORIZED MATERIALS AND EQUIPMENT
- CAUTION MAINTAIN AND OPERATE PAINTING EQUIPMENT PER CHAPTER 51 (D6-6003)
- CAUTION DO NOT ALLOW CLEANING SOLVENTS TO CONTACT RAIN-EROSION-RESISTANT COATINGS
- CAUTION DISCARD RAGS USED IN METAL SURFACE TREATMENT BY PLACING IN SAFETY CONTAINERS THE RAGS ARE FIRE HAZARDS WHEN DRY



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EXTERIOR AIRPLANE SURFACES AND FINISH SYSTEMS

1. Exterior Surface Definition

Exterior surfaces of the airplane, as referenced in this manual, are all aerodynamic surfaces, including doors, hatches and covers; landing gear and wheel wells. Also included are all exposed areas of wing and flight control surfaces, supports and cove areas including those interior surfaces which may be wetted with water or other corrosive fluids. A description of the airplane exterior finish systems is provided in Figure 1 of this Chapter.

2. Components not Requiring Paint

Components not to be painted are the following: rubber, mohair seals, stainless steel, rub strips, anodized handles or door handle pans, silicon rubber sealant, lubrication fittings and interior surfaces of housings which are completely immersed in oil or grease.

3. All Exterior Magnesium Parts are listed in Table 1 of this Chapter.

4. The High Strength, Heat Treated Steel Parts are listed in Table 2 of this Chapter.

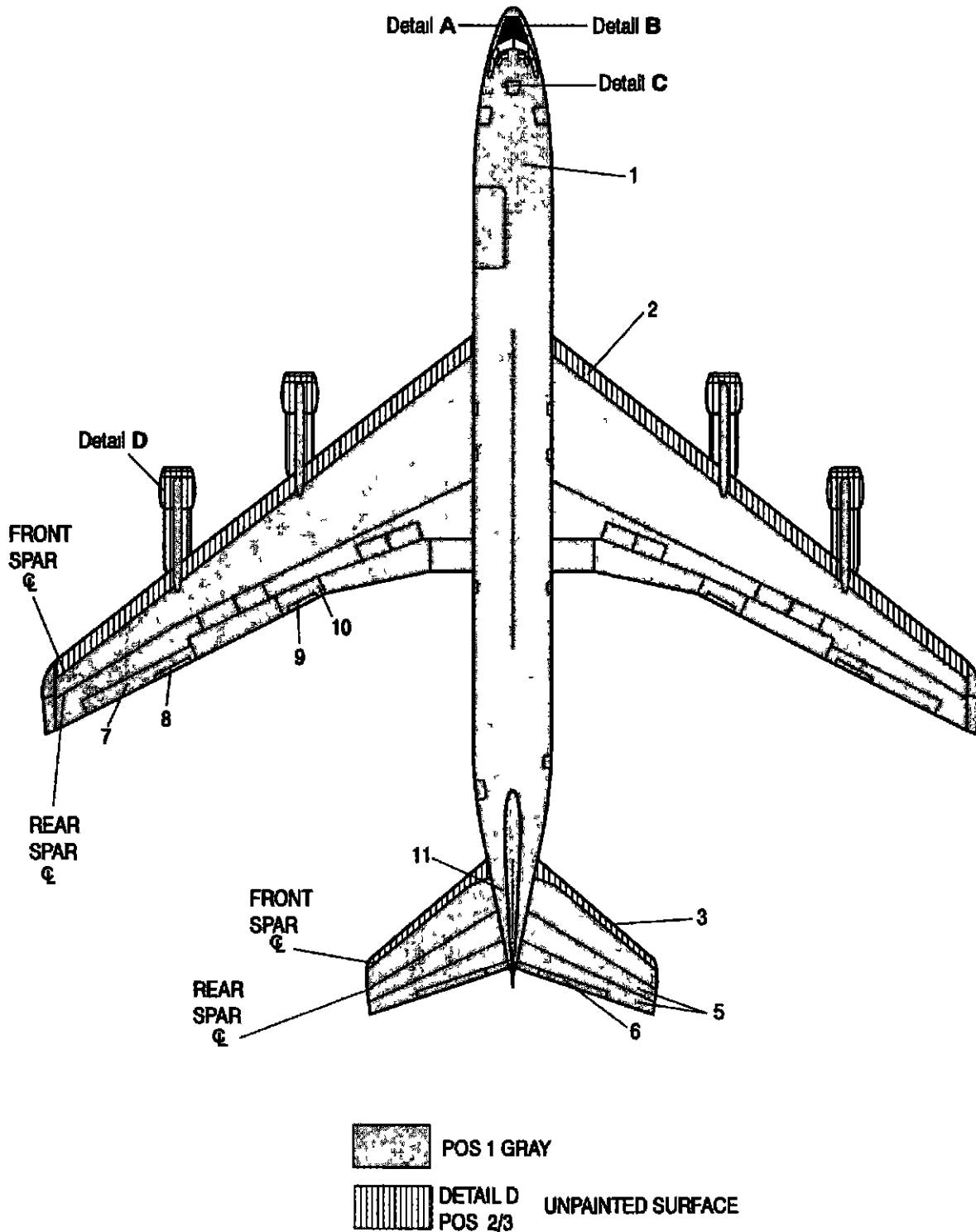


Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 1 of 20)

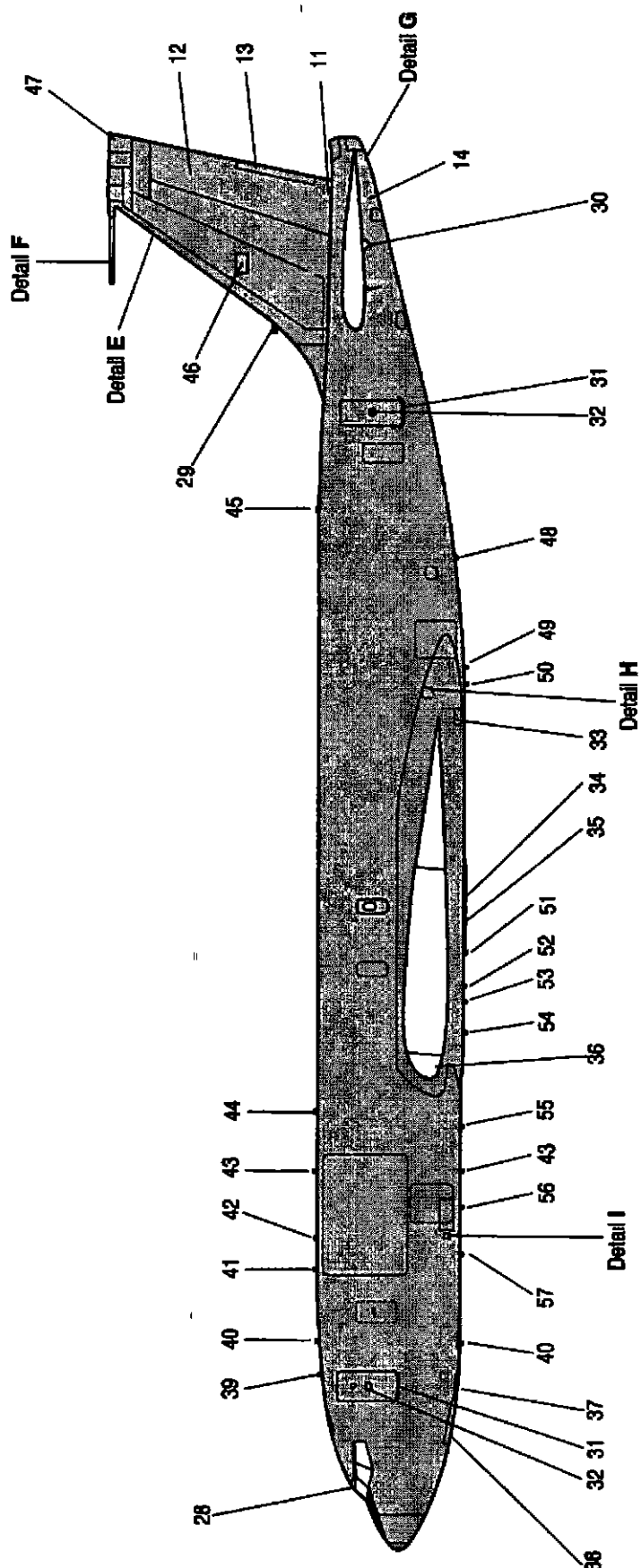


Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 2 of 20)

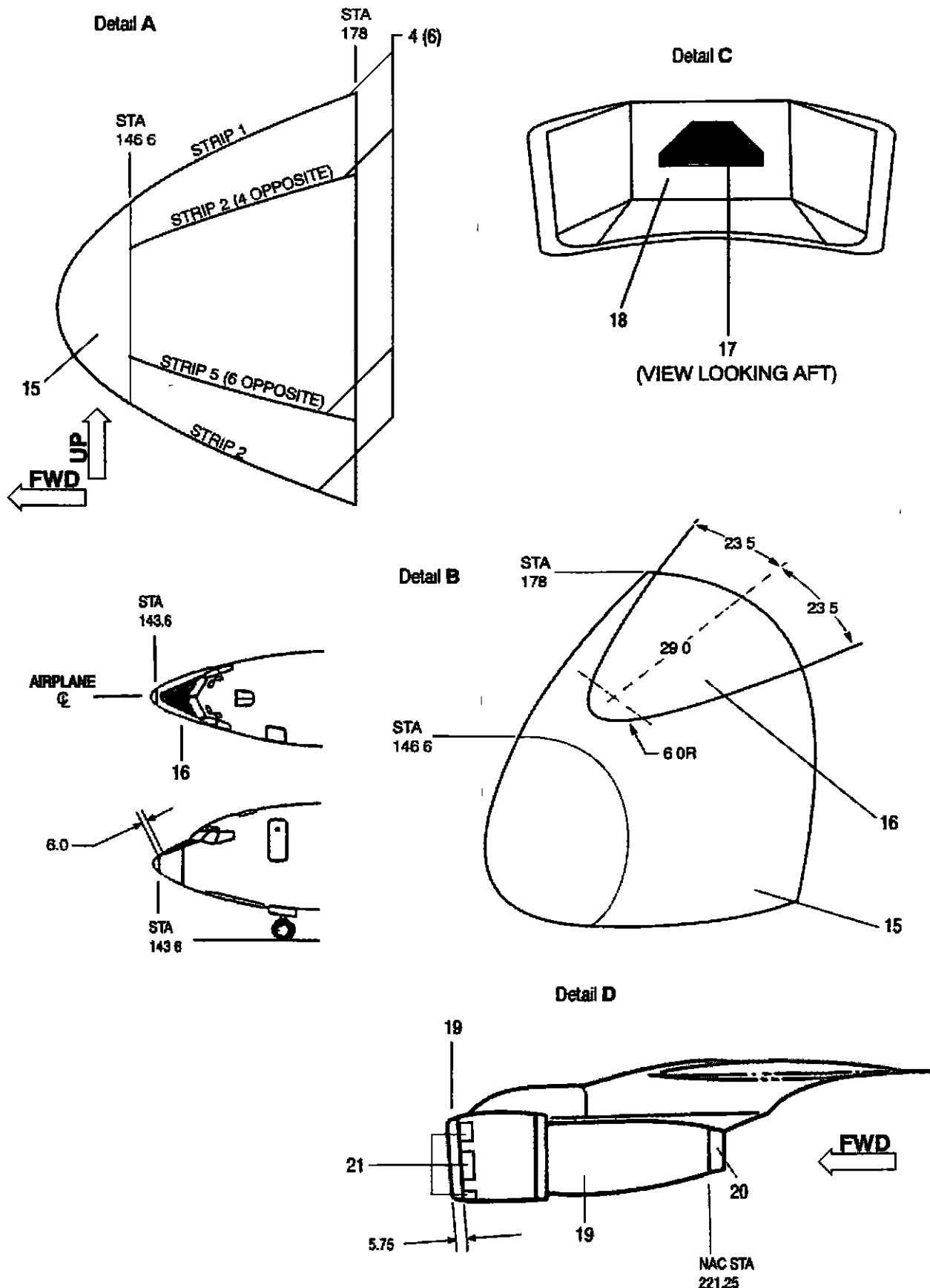


Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 3 of 20)

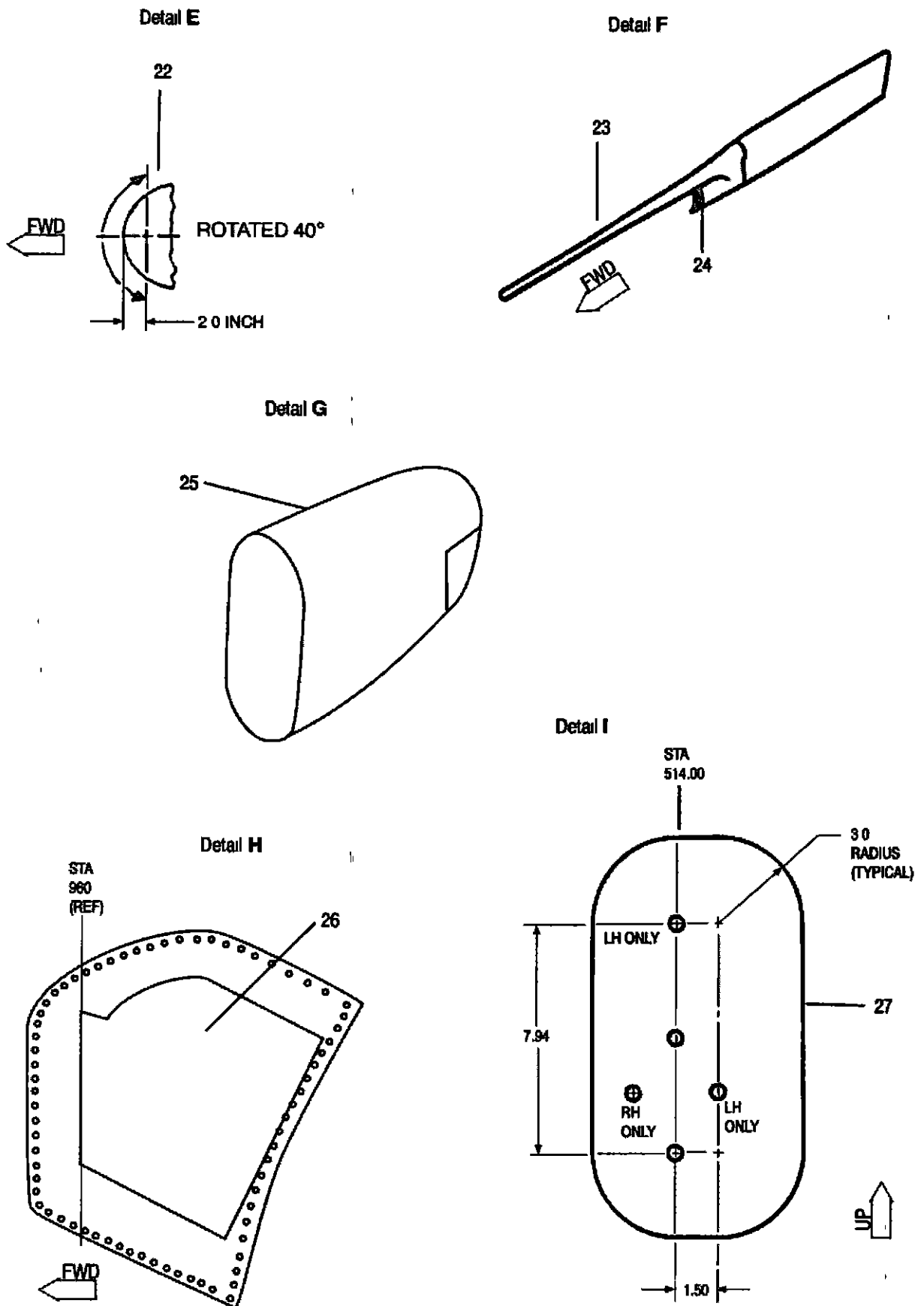


Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 4 of 20)

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Index No.	Surface or Part	Pretreatment	Primer	Topcoat
1	Exterior surfaces (except as noted below)	Aluminum: Etch Primer PR30B (Chapter 51-93-30)	Epoxide Primer PR143 (chapter 51-93-30)	Flexible Polurethane Topcoat. Gray Color No. 16515 per Fed-Std-595, two coats. Total dry film thickness 2.5(±0.5) mils (Chapter 51-92-19)
1	Alternate	BMS 10-72 Type 5 Pretreatment (Etch) Wash Primer	BMS 10-72 Type 5 Hydraulic Fluid Resistant Primer	MIL-C-83286 Polyurethane Finish Gray Color No. 16515 per Fed-Std-595
1	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating or MIL-A-8625 Type I Anodized AMM Chapter 51 (D6-6003)	BMS 10-79 Epoxy Primer, one coat	BMS 10-60 Type II / MIL-C-83286 Polyurethane Enamel Gray - Boeing Std. Color No. 707 or No. 16515 per Fed-Std-595, two coats
1		Magnesium: MIL-M-45202 Type I Class C Anodized or MIL-M-3171 Type III Chemical Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Gray Color No. 16515 per Fed-Std-595, two coats. Total dry film thickness 2.5(±0.5) mils
1	Alternate	MIL-M-3171 Chemical Conversion Coating	BMS 10-11 Epoxy Primer, two coats	BMS 10-60 Type II Polyurethane Enamel. Gray - Boeing Std. Color No. 707, two coats
2	Wing Leading Edge	MIL-A-8625 Type I Chromic Acid Anodized F-2.26	None	None
2	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating or Chromic Acid Anodized AMM Chapter 51 (D6-6003)	None	None

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 5 of 20)

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Index No.	Surface or Part	Pretreatment	Primer	Topcoat
3	Horizontal Stabiliser Leading Edge	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating. Clear AMM Chapter 51 (D6-6003). (SRF-2.130)	None	None
3	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating. Clear	None	None
4	Rudder to Fuselage Fairing	None	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Gray Color No. 16515 per Fed-Std-595, two coats. Total dry film thickness 2.5(±0.5) mils
4	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	BMS 10-11 Type I Epoxy Primer, one coat	BMS 10-60 Type II Polyurethane Enamel. Gray - Boeing Std. Color No. 707, two coats
5, 6, 7, 8, 9, 10 Prior to Installation.	Elev. Ass., Elev.Trim Tab, Outb. Aileron, Trim Tab, Inb. Aileron, Trim Tab (all L/H and R/H)	Aluminum: Etch Primer PR30B (Chapter 51-93-30)	Epoxide Primer PR143 (Chapter 51-93-30)	Flexible Polyurethane Topcoat. Gray Color No. 16515 per Fed-Std-595, two coats. Total dry film thickness 2.5(±0.5) mils (Chapter 51-92-19)

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 6 of 20)

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Index No.	Surface or Part	Pretreatment	Primer	Topcoat
5, 6, 7, 8, 9, 10	Alternate	BMS 10-72 Type 5 Pretreatment (Etch) Wash Primer	BMS 10-72 Type 5 Hydraulic Fluid Resistant Primer.	MIL-C-83286 Polyurethane Finish Gray Color No. 16515 per Fed-Std-595
5, 6, 7, 8, 9, 10	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating or MIL-A-8625 Type I Anodized AMM Chapter 51 (D6-6003)	BMS 10-79 Epoxy Primer, one coat	BMS 10-60 Type II / MIL-C-83286 Polyurethane Enamel Gray - Boeing Std. Color No. 707 or No. 16515 per Fed-Std-595, two coats
5, 6, 7, 8, 9, 10		Magnesium: MIL-M-45202 Type I Class C Anodized or MIL-M-3171 Type III Chemical Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Gray Color No. 16515 per Fed-Std-595, two coats. Total dry film thickness 2.5(±0.5) mils
5, 6, 7, 8, 9, 10	Alternate	MIL-M-3171 Chemical Conversion Coating	BMS 10-11 Epoxy Primer, two coats	BMS 10-60 Type II Polyurethane Enamel. Gray - Boeing Std. Color No. 707, two coats
11	Diverter Strips (6) (Weather Radar Radome)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	MIL-P-23377 Epoxy Primer, one coat	MIL-C-85285 Type I Polyurethane Gray Color No. 16515 or Black Color No. 37038 (top strip) per Fed-Std-595, one coat
11	Alternate	Same as Primary System	BMS 10-79 Epoxy Primer, one coat	BMS 10-60 Type II Polyurethane Gray Boeing Std. Color No. 707 or Black Color No. 37038 (top strip) per Fed-Std-595, one coat

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 7 of 20)

MAINTENANCE MANUAL

Index No.	Surface or Part	Pretreatment	Primer	Topcoat
12, 13	Rudder Assy, Rudder Trim Tab. Prior to Installation	Aluminum. Etch Primer PR30B (Chapter 51-93-30)	Epoxide Primer PR143 (Chapter 51-93-30)	Flexible Polyurethane Topcoat. Gray Color No. 16515 per Fed-Std-595, two coats. Total dry film thickness 2.5(±0.5) mils (Chapter 51-92-19)
12, 13	Alternate	BMS 10-72 Type 5 Pretreatment (Etch) Wash Primer	BMS 10-72 Type 5 Hydraulic Fluid Resistant Primer	MIL-C-83286 Polyurethane Finish Gray Color No. 16515 per Fed-Std-595
12, 13	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating or MIL-A-8625 Type I Anodized AMM Chapter 51 (D6-6003)	BMS 10-79 Epoxy Primer, one coat	BMS 10-60 Type II / MIL-C-83286 Polyurethane Enamel Gray - Boeing Std. Color No. 707 or No. 16515 per Fed-Std-595, two coats
12, 13		Magnesium: MIL-M-45202 Type I Class C Anodized or MIL-M-3171 Type III Chemical Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Gray Color No. 16515 per Fed-Std-595, two coats. Total dry film thickness 2.5(±0.5) mils
12, 13	Alternate	MIL-M-3171 Chemical Conversion Coating	BMS 10-11 Epoxy Primer, two coats	BMS 10-60 Type II Polyurethane Enamel. Gray - Boeing Std. Color No. 707, two coats
14	STA 1592 to STA 1616	Aluminum: MIL-A-8625 Type I Anodized or MIL-C-5541 Chemical Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel Gray Color No. 16515 per Fed-Std-595, two coats. Total dry film thickness 2.5(±0.5) mils
14	Alternate	Same as Primary System. or BMS 10-72 Type 5 Wash Primer	BMS 10-79 Epoxy Primer, one coat or BMS 10-72 Type 5 Hydraulic Fluid Resistant Primer	BMS 10-60 Type II Polyurethane Enamel. Gray - Boeing Std. Color No. 707, two coats Total dry film thickness 2.5(±0.5) mils

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 8 of 20)

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Index No.	Surface or Part	Pretreatment	Primer	Topcoat
15	Weather Radar Radome	Magna 28-C-1 Static Conditioner plus Magna 8-W-5, Chapter 51-91-20	Caapcoat No. 9947, Chapter 51-92-13	Caapcoat C-W4 11.0(±2) mils. Chapter 51-92-14 plus MIL-C-83286 Polyurethane Enamel Gray Color No. 16515 per Fed-Std-595, one coat. AFT Std. 143.6 only, as shown in detail A.
15	Alternate	Same as Primary System	Product No. 8200 Astrocoat Primer 1.0(±0.5) mil total dry film thickness, Chapter 51-92-10	Product No 8001 Erosion Resistant Astrocoat, single coat thickness, 1.0(+0.0,-0.5) mils, total dry film thickness, 6.0(±1.0) mils, Chapter 51-92-11 plus Product No. 8004 Erosion Resistant Astrocoat, single coat thickness, 1.0(+0.0,-0.5) mils. total dry film thickness 5.0(±1.0) mils,. Chapter 51-92-12 plus BMS 10-60 Type II Polyurethane Enamel Gray - Boeing Std. Color No. 707, one coat AFT of STA 143.6 only as shown in detail A

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 9 of 20)

MAINTENANCE MANUAL

Index No.	Surface or Part	Pretreatment	Primer	Topcoat
16	Antiglare Area (weather radome)	(See index 15 top-coat.)	MIL-C-23377 Epoxy Primer, one coat See detail B	MIL-C-83286 Polyurethane Enamel Black Color No. 37038 per Fed-Std-595. See detail B. Total dry film thickness 2.5(±0.5) mils
16	Alternate	(See index 15 top-coat)	BMS 10-79 Epoxy Primer, one coat AMM Chapter 51 (D6-6003). See detail B	BMS 10-60 Type II Polyurethane Enamel. Black Color No. 37038 per Fed-Std-595. See detail B. Total dry film thickness 2.5(±0.5) mils
17	Air re-fueling door (if installed)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. two coats. Total dry film thickness 2.5(±0.5) mils
17	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	BMS 10-79 Epoxy Primer, one coat	BMS 10-60 Type II Polyurethane Enamel. Gray - Boeing Std. Color No. 707, two coats
18	Air re-fueling cover (if installed)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. two coats. Total dry film thickness 2.5(±0.5) mils
18	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	BMS 10-79 Epoxy Primer, one coat	BMS 10-60 Type II Polyurethane Enamel. Gray - Boeing Std. Color No. 707, two coats
19	Cowling (Leading Edge) and Nacelle to NAC STA 221.25 (see detail D)	MIL-A-8625 Type I Chromic Acid Anodized	None (see detail D)	None (see detail D)
19	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating. Clear AMM Chapt. 51 (D6-6003)	None (see detail D)	None (see detail D)

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 10 of 20)

MAINTENANCE MANUAL

Index No.	Surface or Part	Pretreatment	Primer	Topcoat
20	Nacelle Group	None AFT of NAC STA 221.25 (see detail D)	None AFT of NAC STA 221.25 (see detail D)	None AFT of NAC STA 221.25 (see detail D)
20	Alternate	None AFT of NAC STA 221.25 (see detail D)	None AFT of NAC STA 221.25 (see detail D)	None AFT of NAC STA 221.25 (see detail D)
21	Nose Cowl TC Airinlet and Nose Cowl Doors	MIL-M-45202 Type I Class C Anodized or MIL-M-3171 Type III Chemical Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Gray Color No. 16515 per Fed-Std-595, two coats. Total dry film thickness 2.5(±0.5) mils
21	Alternate	MIL-M-3171 Chemical Conversion Coating	BMS 10-79 Epoxy Primer, two coats	BMS 10-60 Type II Polyurethane Enamel. Gray - Boeing Std. Color No. 707, two coats
22	Vertical Fin Leading Edge	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating. Clear AMM Chapter 51 (D6-6003) Apply forward edge as defined in detail E	None	None
22	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating. Clear	None	None
23	HF COMM No. 1 + TRANS No. 2	MIL-A-8625 Type I Chromic Acid Anodized (F-2.80)	None	None
23	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating AMM Chapter 51 (D6-6003)	None	None

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 11 of 20)

MAINTENANCE MANUAL

Index No.	Surface or Part	Pretreatment	Primer	Topcoat
24	Vertical Fin Tip Leading Edge	(Provided as a part of topcoat kit.)	(Provided as a part of topcoat kit.)	MIL-C-83231A, Class A, Type I. Composition L:
24	Alternate	Same as Primary System	(Provided as a part of topcoat kit.)	Same as Primary System
25	Tailcone (STA 1616 and AFT)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	MIL-P-23377 Epoxy Primer.	MIL-C-83286 Polyurethane Enamel. Gray Color No. 16473 per Fed-Std-595, two coats. Total dry film thickness 2.5(±0.5) mils
25	Alternate	Same as Primary System	BMS 10-79 Epoxy Primer, one coat	Same as Primary System
26	APU Exhaust Door, detail B	None	None	None
26	Alternate	None	None	None
27	Static Port Area detail I	None	None in area shown in detail I.	None in area shown in detail I
27	Alternate	None	None in area shown in detail I.	None in area shown in detail I
28	Windshield (frame)	MIL-C-5541 / MIL-C-81706 CL 1A Chromate Conversion Coating	MIL-P-23377 Epoxy Primer, one coat	MIL-L-81352 Gray Color No. 26373 per Fed-Std-595, one coat
28	Alternate	Same as Primary System	Same as Primary System	Same as Primary System
29	Q-Bellow	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	None	None
29	Alternate	Same as Primary System	Same as Primary System	Same as Primary System

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 12 of 20)

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Index No.	Surface or Part	Pretreatment	Primer	Topcoat
30	Steelslide	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	None	None
30	Alternate	Same as Primary System	Same as Primary System	Same as Primary System
31	Steelslide at thresholds	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	None	None
31	Alternate	Same as Primary System	Same as Primary System	Same as Primary System
32	Steelslide at door handle	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	None	None
32	Alternate	Same as Primary System	Same as Primary System	Same as Primary System
33	Teflon Coating (prevent gravel pitting)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	MIL-P-23377 Epoxy Primer, one coat	Polyurethane Abrasion Resistant Coating. Gray, two coats, Chapter 51-92-18
33	Alternate	BMS 10-72 Type 5 Pretreatment (Etch) Wash Primer	BMS 10-72 Type 5 Hydraulic Fluid Resistant Primer.	Same as Primary System
34	Landing Gear Wheels	MIL-C-5541 Class 1A / MIL-C-81706 Chromate Conversion Coating	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Gray Color No. 16515 per Fed-Std-595, two coats or Silver Color No. 17178, two coats
34	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	BMS 10-79 Epoxy Primer, one coat	BMS 10-60 Type II Polyurethane Enamel. Gray - Boeing Std. Color No. 707, two coats
35	Steelslide	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	None	None
35	Alternate	Same as Primary System	Same as Primary System	Same as Primary System

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 13 of 20)

MAINTENANCE MANUAL

Index No.	Surface or Part	Pretreatment	Primer	Topcoat
36	Wing Spar Cavities (typical front and rear)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. White Color No. 17925 per Fed-Std-595, two coats. Total dry film thickness 2.5(±0.5) mils
36	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	BMS 10-79 Epoxy Primer, one coat	BMS 10-60 Type II Polyurethane Enamel. White Boeing Std. Color No. 702, two coats
37	Landing Gear (Typical main and nose). Prior to installation.	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Gray Color No. 16515 per Fed-Std-595, two coats total dry film thickness 2.5(±0.5) mils
37	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	BMS 10-79 Epoxy Primer, one coat	BMS 10-60 Type II Polyurethane Enamel. Gray - Boeing Std. Color No. 707, two coats
38	Wheel wells (Nose gear, main gear and inner surface of landing gear doors)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83285 Type I Polyurethane Enamel. White Color No. 17925 per Fed-Std-595, two coats total dry film thickness 2.5(±0.5) mils
38	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	BMS 10-79 Epoxy Primer, one coat	BMS 10-60 Type II Polyurethane Enamel. White Boeing Std. Color No. 702, two coats
39	GPS Antenna (STA 338)	None	None	None
39	Alternate	None	None	None

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 14 of 20)

MAINTENANCE MANUAL

Index No.	Surface or Part	Pretreatment	Primer	Topcoat
40	TCAS Antennas (Upper STA 380 and Lower STA 380)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating. AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Color No. 12197 per Fed-Std-595, one coat
40	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	513-009 DeSoto Primer Surfacer 910-077 Curing 620-044 Reducer	643-3-73 Bostick X310A Catalyst Color - International Orange
41	VHF/AM TRANS/ RECV Antenna (STA 470)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating, mounting surface, base and tip - AMM Chapter 51 (D6-6003) (Aluminum surfaces only) MIL-A-8625 Type II Anodized Clear Leading Edge	MIL-P-23377 Epoxy Primer, one coat, base, tip and fiberglass trailing edge	MIL-C-83286 Polyurethane Enamel. Gray Color No. 16515 per Fed-Std-595, one coat base, tip and fiberglass trailing edge
41	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	Same as Primary System	Same as Primary System
42	TACAN No. 1 Antenna (STA 510)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Color No. 12197 per Fed-Std-595, one coat.
42	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	513-009 DeSoto Primer Surfacer 910-077 Curing 620-044 Reducer or 620-004 Reducer	643-3-73 Bostick X310A Catalyst Color - International Orange

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 15 of 20)

MAINTENANCE MANUAL

Index No.	Surface or Part	Pretreatment	Primer	Topcoat
43	IFF/AIMS Antennas (Upper STA 580 and Lower STA 580)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Color No. 12197 per Fed-Std-595, one coat
43	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	513-009 DeSoto Primer Surfacer 910-077 Curing 620-044 Reducer	643-3-73 Bostick X310A Catalyst Color - International Orange
44	TACAN No. 2 Antenna (STA 600F + 10)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Color No. 12197 per Fed-Std-595, one coat
44	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	513-009 DeSoto Primer Surfacer 910-077 Curing 620-044 Reducer	643-3-73 Bostick X310A Catalyst Color - International Orange
45	Crash Position Indicator Beacon (Right-hand side) (STA 1230)	None MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel Gray Color No. 16473, one coat
45	Alternate	None	None	Self-priming paint Presto Chemical Co. Beacon top surface and base faying surface with fin gray Color No. 16473

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 16 of 20)

MAINTENANCE MANUAL

Index No.	Surface or Part	Pretreatment	Primer	Topcoat
46	VOR/VHF NAV Localizer Antenna Door (Left-hand shown - right-hand opposite)	None (No finish required on antenna surface see DWG 5-88152 / FSCM81205 finish installation)	MIL-P-23377 Type I Epoxy Primer	MIL-C-83286 Polyurethane Enamel Color No. 16515 per Fed-Std-595, one coat.
46	Alternate	None	BMS 10-11 Epoxy Primer, one coat	BMS 10-60 Type II Polyurethane Enamel Gray Boeing Std. Color No. 707, one coat
47	HF Receive Antenna (Fin Cap)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel, Gray Color No. 16515 per Fed-Std-595, two coats total dry film thickness 2.5(±0.5) mils
47	Alternate	Same as Primary System	BMS 10-79 Epoxy Primer, one coat	BMS 10-60 Type II Polyurethane Enamel. Gray - Boeing Std. Color No. 707
48	UHF Receive Antenna (STA 1170)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Gray Color No. 16515 per Fed-Std-595, one coat
48	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	Same as Primary System	Same as Primary System

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 17 of 20)

MAINTENANCE MANUAL

Index No.	Surface or Part	Pretreatment	Primer	Topcoat
49	Low Range Radio Al-timeter (Receive, STA 1030)	None	MIL-P-23377 Epoxy Primer, one coat	MIL-C-22750 Epoxy Enamel. Color No. 37038 per Fed-Std-595, one coat. Total dry film thickness 2.5(±0.5) mils. Chapter 51-92-16.
49	Alternate	None	No. 32 Ditzler	MIL-C-22750 Epoxy Enamel. Gray Lus-terless No. 364040 Randolph
50	Low Range Radio Al-timeter (Trans-mit, STA 1011)	None	MIL-P-23377 Epoxy Primer, one coat	MIL-C-22750 Epoxy Enamel. Color No. 37038 per Fed-Std-595, one coat total dry film thickness 2.5(±0.5) mils. Chapter 51-92-16
50	Alternate	None	No. 32 Ditzler	MIL-C-22750 Epoxy Enamel. Gray Lus-terless No. 364040 Randolph
51	ADF Sense Antenna (STA 720-820)	None SRF-6.21 overall SRF-12.63 door ex-terior see DWG D6-5000/ FSCM 81205	MIL-P-23377 Epoxy Primer, one coat	MIL-C-85285 Poly-urethane. Gray Color No. 36440 per Fed-Std-595, one coat. Chapter 51-92-16
51	Alternate	None	BMS 10-11 Type I Epoxy Primer, one coat	BMS 10-11 Type II Polyurethane Enamel. Gray Boe-ing Std. Color No. 707, one coat
52	TACAN No. 2 Antenna (STA 670)	MIL-C-5541 / MIL-C-81706 Chro-mate Conversion Coating. AMM Chap-ter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Poly-urethane Enamel. Color No. 12197 per Fed-Std-595, one coat
52	Alternate	MIL-C-5541 / MIL-C-81706 Chro-mate Conversion Coating	513-009 DeSoto Primer Surfacer 910-077 Curing 620-044 Reducer	643-3-73 Bostick X310A Catalyst Color - Interna-tional Orange

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 18 of 20)

MAINTENANCE MANUAL

Index No.	Surface or Part	Pretreatment	Primer	Topcoat
53	Marker Beacon (STA 650)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Gray Color No. 16515 per Fed-Std-595, one coat. CAUTION: ONLY SMALL PAINT TOUCHUP APPLICATIONS ON THE FIBERGLASS SURFACE IS PERMISSABLE. APPLICATION OF PAINT TO A MAJOR PORTION OF THE ANTENNA WILL EFFECT ELECTRICAL PERFORMANCE
53	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	513-009 Desoto Primer Surfacer 910-077 Curing 620-004 Reducer	643-5-1 Bostick X310A Catalyst Color - White
54	TACAN No. 1 Antenna (STA 600L + 10)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Color No. 12197 per Fed-Std-595, one coat
54	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating	513-009 DeSoto Primer Surfacer 910-077 Curing 620-044 Reducer	643-3-73 Bostick X310A Catalyst Color - International Orange
55	ADF Loop Antenna (STA 600E + 10)	None IAW DWG 10-604E9/FSCM 81205	MIL-P-23377 Epoxy Primer, one coat	MIL-C-22750 Epoxy Enamel. Gray Color No. 16515 per Fed-Std-595, one coat. Chapter 51-92-16
55	Alternate	None	None	4 Parts Y-102GSA White Catalytic Coating. 1 Part A-188 Catalytic Coating Thinner, 1 Part Y-100 Curing Agent (Lenmar Lacquer)

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 19 of 20)

MAINTENANCE MANUAL

Index No.	Surface or Part	Pretreatment	Primer	Topcoat
56	X-Band Rendez-vous Radar Beacon (STA 550)	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating AMM Chapter 51 (D6-6003)	MIL-P-23377 Epoxy Primer, one coat	MIL-C-83286 Polyurethane Enamel. Gray Color No. 16515 per Fed-Std-595, one coat
56	Alternate	MIL-C-5541 / MIL-C-81706 Chromate Conversion Coating Brush AMM Chapter 51 (D6-6003)	Same as Primary System	Same as Primary System
57	VHF/AM TRANS/RCV (STA 670)	None	Exterior Surface except Leading Edge: MIL-P-23377 Epoxy Primer, one coat. Leading Edge Only: MIL-C-27315 Rain Erosion Coating, one coat.	Exterior Surface except Leading Edge: MIL-C-83286 Polyurethane Enamel. Gray Color No. 16515 per Fed-Std-595, one coat.
57	Alternate	None	Primer: Same as Primary System Rain Erosion Coating: Same as Primary System	Same as Primary System

Figure 1 Finish Systems for Exterior Airplane Surfaces (Sheet 20 of 20)

MAINTENANCE MANUAL

Table 1 Exterior Magnesium Parts (Sheet 1 of 1)

POS	AREA / ITEM	PART NO.	REFERENCE FOR LOCATION
1	Flaperette	65-19178	AMM Chapter 27 (D6-6003), Fig.1
2	Inboard Spoiler T/E Filler	9-63878	AMM Chapter 27 (D6-6003), Fig.1
3	Shim Inboard Spoiler	5-84477	AMM Chapter 27 (D6-6003), Fig.1
4	Inboard Flap Trailing Edge Filler	65-19159	AMM Chapter 27 (D6-6003), Fig.1
5	Shim Inboard Spoiler Cam	9-64044	AMM Chapter 27 (D6-6003), Fig.1
6	Aileron T/E End Filler	5-86071, 5-86072	AMM Chapter 27 (D6-6003), Fig.1
7	Outboard Aileron Support Hinges	5-95846, 50-08315, 5-96181	AMM Chapter 27 (D6-6003), Fig.1
8	Outboard Flap Trailing Edge Filler	65-07360	AMM Chapter 27 (D6-6003), Fig.1
9	Outboard Spoiler Cam	9-64045	AMM Chapter 27 (D6-6003), Fig.1
10	Outboard Spoiler T/E Filler	9-63879	AMM Chapter 27 (D6-6003), Fig.1
11	Landing Gear Doors, Inboard Wing Door, Lg. Oleo Wing Door	65-1057, 65-1058, 65-1059, 65-1060	AMM Chapter 52 (D6-6003)
12	Lower Fixed Wing Trailing Edge Panel	65-05474	AMM Chapter 52 (D6-6003)
13	Actuator Support Trailing Edge	69-05474	AMM Chapter 52 (D6-6003)
14	T/E Upper Panel Filler	65-06351	AMM Chapter 52 (D6-6003)
15	Upper Panel Filler	2-07801	AMM Chapter 52 (D6-6003)
16	T/E Panel Filler	9-64373	AMM Chapter 52 (D6-6003)
17	Boost Pump Access Door	9-56930	AMM Chapter 52 (D6-6003)
18	Dry Bay Access Door	65-56930	AMM Chapter 52 (D6-6003)
19	Leading Edge Torque Tube Flap	65-32240, 65-32241, 65-32243	AMM Chapter 27 (D6-6003), Fig.1
20	Leading Edge Inboard Slat	65-18961, 65-18962, 65-18963, 65-18427, 65-18424	AMM Chapter 27 (D6-6003), Fig.1
21	Door Upper Gate	65-01647, 65-01980, 50-11384	AMM Chapter 52-1-0 (D6-6003), Fig.1
22	Door Lower Gate	65-01648, 69-02069, 50-11385	AMM Chapter 52-1-0 (D6-6003), Fig.1
23	Steering Control Crank	5-97035	AMM Chapter 32-8-1 (D6-6003), Fig.403
24	Steering Control Valve Bracket	5-97094	AMM Chapter 32-8-1 (D6-6003), Fig.403

MAINTENANCE MANUAL

Table 2 High Strength, Heat Treated Steel Parts (Sheet 1 of 2)

POS	AREA/ITEM	PART NO.	POSITION
1	Nose Landing Gear Trunnion	66-03853	AMM Chapter 32-4-0 (D6-6003), Fig.4
2	Nose Landing Gear Rear Steering Collar	65-26742	AMM Chapter 32-4-0 (D6-6003), Fig.4
3	Nose Landing Gear Axle	65-27333	AMM Chapter 32-4-0 (D6-6003)
4	Nose Landing Gear Inner Cylinder	65-27331	AMM Chapter 32-4-0 (D6-6003), Fig.4
5	Nose Landing Gear Front Steering Collar	65-26741	AMM Chapter 32-4-0 (D6-6003), Fig.3
6	Nose Landing Gear Drag Brace Lower Link	65-03693	AMM Chapter 32-4-0 (D6-6003), Fig.4
7	Nose Landing Gear Drag Brace Upper Link	65-03693	AMM Chapter 32-4-0 (D6-6003), Fig.3
8	Main Landing Gear Universal Bolt	69-23630	AMM Chapter 32-2-0 (D6-6003), Fig.2
9	Main Landing Gear Lower Side Strut Universal	69-26548	AMM Chapter 32-2-0 (D6-6003), Fig.2
10	Main Landing Gear Upper Side Strut Universal	65-29538	AMM Chapter 32-2-0 (D6-6003), Fig.2
11	Main Landing Gear Upper Side Strut	65-03792	AMM Chapter 32-2-0 (D6-6003), Fig.2
12	Main Landing Gear Truck Pivot Bolt	69-40062	AMM Chapter 32-2-0 (D6-6003), Fig.2
13	Main Landing Gear Truck Beam and Axles	65-65031	AMM Chapter 32-2-0 (D6-6003), Fig.2
14	Main Landing Gear Brake Support Collar	65-65036	AMM Chapter 32-2-0 (D6-6003), Fig.2
15	Main Landing Gear Axle Equaliser Brake Bolt	66-29043	AMM Chapter 32-2-0 (D6-6003), Fig.2
16	Main Landing Gear Axle Equaliser Brake Bolt	66-29044	AMM Chapter 32-2-0 (D6-6003), Fig.2
17	Main Landing Gear Drag Strut to Cylinder Bolt	66-03943	AMM Chapter 32-2-0 (D6-6003), Fig.2
18	Main Landing Gear Drag Strut	65-05746	AMM Chapter 32-2-0 (D6-6003), Fig.2
19	Main Landing Gear Drag Strut to Trunnion Bolt	66-03918	AMM Chapter 32-2-0 (D6-6003), Fig.2
20	Main Landing Gear Upper / Lower Torsion Link Attaching Bolt	69-40065	AMM Chapter 32-2-91 (D6-6003), Fig.2



MAINTENANCE MANUAL

Table 2 High Strength, Heat Treated Steel Parts (Sheet 2 of 2)

POS	AREA/ITEM	PART NO.	POSITION
21	Main Landing Gear Torsion Link Apex Bolts	66-13401	AMM Chapter 32-2-91 (D6-6003), Fig.2
22	Main Landing Gear Upper / Lower Torsion Link	65-22116	AMM Chapter 32-2-91 (D6-6003), Fig.2
23	Main Landing Gear Trunnion Collar Bolt	66-03932	AMM Chapter 32-2-91 (D6-6003), Fig.2
24	Main Landing Gear Trunnion Collar	90-08670	AMM Chapter 32-2-91 (D6-6003), Fig.2
25	Main Landing Gear Trunnion	65-22123	AMM Chapter 32-2-91 (D6-6003), Fig.2



MAINTENANCE MANUAL

SURFACE TREATMENT

This section gives information about the application of protective treatments to different materials.

The initial surface protection, including the paint coating schemes and the information for the repair processes are listed in Figure 1.

- A. The application procedures for surface treatment of metal parts are given in Chapter 51-91-10.
- B. The application procedures for protective treatment of glass fabric parts are given in Chapter 51-91-20.





MAINTENANCE MANUAL

APPLICATION OF PROTECTIVE TREATMENT OF METAL PARTS

NOTE: Use of MIL-C-5541 / MIL-C-81706 containing potassium ferricyanide is prohibited.

1. Aluminum Surfaces

Aluminum surfaces shall receive one coat of MIL-C-5541 / MIL-C-81706 chromate conversion coating per AMM Chapter 51 (D6-6003). This metal pretreatment shall be followed with one coat of wash primer within 48 hours. If part was previously painted, refer to Figure 1 for topcoat identification.

2. Magnesium Surfaces

Magnesium surfaces shall receive one coat of MIL-M-3171, Type VI chromic acid treatment (brush on) per AMM Chapter 51 (D6-6003). This metal pretreatment shall be followed with two coats of primer per Chapter 51-92-00 within 48 hours. Conversion coating must be dry prior to primer application. All magnesium parts require two topcoats of primer. Refer to Figure 1 for topcoat identification. See Table 1 for a list of exterior magnesium parts.

3. High Strength Heat-Treated Steel

High strength heat-treated steel shall receive one coat of primer per Chapter 51-92-00 and AMM Chapter 51 (D6-6003), immediately following corrosion removal. If part was previously painted, refer to Figure 1 for topcoat identification.

4. Stainless Steel (CRES)

Prior to finishing stainless steel surfaces, scuff sand the surface with 180 grit or finer abrasive to roughen the surface. Solvent wipe scuff sanded surfaces with Naphtha (or P-D-680, Type XIII) Ethyl Alcohol (50/50) mixture. Apply one coat of TT-P-2760 Koroflex Primer or MIL-P-23377 Epoxy Primer (optional) per Chapter 51-92-00. Apply MIL-C-85285, Type I, Polyurethane topcoat per Chapter 51-92-00.

5. Aluminum Surfaces Containing Cadmium Plated Steel and/or Titanium Fastener

Thoroughly clean the surfaces using MIL-C-87937B, Type I or III. Raise surfaces thoroughly. Use very fine abrasive pads, MIL-A-9962. Apply wash primer on the surfaces in accordance with Chapter 51-93-30, paragraph 6..

6. Cadmium-Plated Surfaces

If cadmium plating has to be removed from surfaces during corrosion rework, completely strip the plating and zinc-nickel plate parts IAW AMS 2417E. If part was previously primed and/or topcoated, reapply IAW AMM Chapter 51 (D6-6003). If parts have to be locally remanufactured because the original parts are worn or severely corroded, zinc-nickel plate new parts IAW AMS 2417E. Prime and topcoat as required AMM Chapter 51 (D6-6003) and Chapter 51-92-00.

TR-Nr. DFW 51-1

TCA: LX-N20199

RTCA: LX-N19997, LX-N20000

51-91-10

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APPLICATION OF PROTECTIVE TREATMENT OF GLASS FABRIC PARTS

1. Glass Fabric Surface Static Conditioner and Surfacer

Where required by specific painting procedure, the glass fabric surface static conditioner and surfacer will be applied as follows:

- A. Inspect surfaces to assure that all old coatings have been removed.
- B. Hand sand surfaces with 180 grit or finer P-P-105 aluminum oxide abrasive paper to remove residue and gloss.

WARNING CLEANING SOLVENTS ARE TOXIC, VOLATILE, AND FLAMMABLE. AVOID EXCESSIVE BREATHING OF VAPORS AND PROLONGED OR REPEATED SKIN CONTACT. USE IN WELL VENTILATED AREAS AWAY FROM IGNITION SOURCES, OPEN FLAMES OR HEATED OBJECTS SUCH AS SOLDERING IRONS.

CAUTION DO NOT EXPOSE GLASS FIBERS OF THE LAMINATE WHEN SANDING.

- C. Clean surfaces with TT-T-548 toluene or TT-X916 xylene. Wipe surfaces dry immediately with clean CCC-C-440 cheesecloth as not to allow solvent to evaporate dry on surface.
- D. Apply surface conditioner, Magna 28-C-1 static conditioner, at package consistency using hand pressure and clean CCC-C-440 cheesecloth to force the material into pin holes.

NOTE: Magna 28-C-1 is intended only to fill minute surface defects such as pin holes. A continuous layer of the conditioner is detrimental to subsequent paint adhesion. Do not use the conditioner as a smoothing material.

- E. Allow conditioner to dry until the material becomes white (approximately 30 minutes at 70 to 90 °F).
- F. Wipe off excess material with clean CCC-C-440 cheesecloth. Scotch-brite finishing sheet may be used, followed by a clean cheesecloth.

CAUTION DO NOT USE SOLVENTS SINCE THEY WILL REMOVE THE CONDITIONER.

CAUTION POT LIFE OF MIXED MAGNA 8-W-5 SURFACER IS 6 HOURS AT 75 °F. MIX ONLY ENOUGH MATERIAL AS NEEDED AND CAN BE USED WITHIN 6 HOURS.

NOTE: Apply surfacer per the subsequent steps within 24 hours after conditioner. The surfacer, Magna 8-W-5, is intended to fill large surface pits and other minor depressions which cannot be filled with Magna 28-C-1 conditioner.

- G. Prepare surface by mixing 4 parts by volume of Magna 8-W-5 surfacer with one part by volume of hardener, Magna 50-C-3 or Magna 50-C-32. Add thinner, Magna 66-C-28, 3 parts by volume for spray or brush.

TR-Nr. DFW 51-1

TCA: LX-N20199

RTCA: LX-N19997, LX-N20000

51-91-20

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application, or one part by volume for wipe-on. Allow the mixed material to stand at least 15 minutes before application.

- H. Apply by either wipe-on, spray or brush. For wipe-on, apply in a circular motion to 2 square feet maximum at a time. Apply just enough material to fill holes and voids.
- I. If curing at elevated temperature is intended, allow the applied surfacer to flash off for 15 minutes before raising temperature.
- J. Cure surfacer as follows:

TEMP (°F)	TIME (MINUTES)
180	15
140	10
120	45
100	70
90	90
80	120

- K. After cure, allow to cool down to 100 °F or less before preparing for painting.

CAUTION ALIPHATIC NAPHTHA IS TOXIC, VOLATILE, AND FLAMMABLE. AVOID EXCESSIVE BREATHING OF VAPORS AND PROLONGED OR REPEATED SKIN CONTACT. USE IN WELL VENTILATED AREAS AWAY FROM IGNITION SOURCES, OPEN FLAMES OR HEATED OBJECTS SUCH AS SOLDERING IRONS.

- L. Using 180 grit or finer P-P-105 aluminum oxide abrasive paper, sand excess material to maintain original panel contour and obtain desired smoothness. Remove sanding residue with cheesecloth wet with TT-N-95 aliphatic naphtha, or water.
- M. Proceed with required painting.



MAINTENANCE MANUAL

PAINTING / COATING APPLICATION

1. Application of a protective coating (paint system) to surfaces, following surface treatment is necessary to complete refinish requirement. The primary airplane finish systems for touch up or total repaint of exterior surfaces are given in Figure 1. An alternate (original) finish system is also identified for use when primary system components are not available. Exterior finishes, markings or paint shall not be altered. If finishes, markings or paint removed for repair refinishing, reapplication must conform to specified colors, thickness and locations in order to preclude increasing vulnerability to thermal radiation.

2. Exterior Finish System Component Application

Exterior finish system component application procedures are contained in Chapters 51-92-10 to 51-92-19. These procedures in conjunction with the application procedures contained in general finishing technical orders provide complete finishing instructions for the TCA/R-TCA.

- A. The application of Astrocoat Primer (Product No. 8200) is given in chapter 51-92-10
- B. The application of Astrocoat Polyurethane Erosion-Resistant Coating (Product No. 8001) is given in chapter 51-92-11.
- C. The application of Astrocoat White (Nonyellowing) Topcoat (Product No. 8004) is given in chapter 51-92-12.
- D. The application of Caapcoat Primer (Product No. 9947) is given in chapter 51-92-13.
- E. The application of Caapcoat White Polyurethane Erosion-Resistant Coating (Product No. CW-4) is given in chapter 51-92-14.
- F. The application of Aluminized Lacquer (TT-L-32) is given in chapter 51-92-15.
- G. The application of Epoxy-Polyamide Enamel (MIL-C-22750) is given in chapter 51-92-16.
- H. The application of Abrasion-Resistant Teflon Coating (23-T3-105) and Abrasion-Resistant Teflon Coating Application Fillet Flap Flaperette are given in chapter 51-92-17.
- I. Flexible Polyurethane Topcoat (CA8000) application at chapter 92-20-19.
- J. For finish requirements of the landing gear and wheels see Figure 1



MAINTENANCE MANUAL

3. Paint Color Numbering

The Boeing paint system contains some three and four digit color numbers. These color numbers identify standard paint colors controlled by the contractor. When five digit color numbers are listed, the color is per Federal Standard 595.

4. Components not Requiring Paint

Components not to be painted are the following: rubber, mohair seals, stainless steel rub strips, anodized handles or door handle pans, silicon rubber sealant, lubrication fittings and interior surfaces of housings which are completely immersed in oil or grease.

5. Markings

The location and identification of airplane markings and insignias are contained in Chapter 11-20-00.

6. Rain-Erosion-Resistant Coatings

These rain-erosion-resistant coating systems, are used on the airplane when required by Figure 1. These systems are polyurethane coating systems. Two systems are electricity nonconductive and one is an antistatic system used where necessary to discharge or dissipate static electricity. The rain-erosion-resistant coatings are used to protect leading edges of glass reinforced laminated surfaces from the erosive action of rain and hail during flight. See paragraph 7 for temperature requirements during application of erosion-resistant and antistatic coatings.

7. Temperature and Humidity Requirements

CAUTION DUE TO THE STRICT TEMPERATURE (AND HUMIDITY) REQUIREMENTS FOR ASTROCOAT, RAIN-EROSION-RESISTANT COATINGS SHALL BE APPLIED WITHIN A CLOSED HANGAR

The application of erosion-resistant and antistatic coatings requires a clean environment and the following:

NOTE: Caapcoat System does not require humidity control. Neither does MIL-C-83231, Class A, Type I, Comp. I.

Temperature: 60 to 100 °F

Humidity: 50 percent or more (Astrocoat only).



MAINTENANCE MANUAL

ASTROCOAT PRIMER (PRODUCT NO. 8200) APPLICATION

WARNING ASTROCOAT PRIMER PRODUCT NO. 8200 IS TOXIC, VOLATILE, AND FLAMMABLE. AVOID EXCESSIVE BREATHING OF VAPORS AND PROLONGED OR REPEATED SKIN CONTACT. USE IN WELL VENTILATED AREAS AWAY FROM IGNITION SOURCES, OPEN FLAMES OR HEATED OBJECTS SUCH AS SOLDERING IRONS.

CAUTION POT LIFE OF THE MIXED PRIMER IS 8 HOURS MAXIMUM.

1. Control environment during application and curing per Chapter 51-92-00.
2. Mix Astrocoat Primer per Table 1, Chapter 51-92-20.

NOTE: Mixed primer may be thinned with not more than an equal volume of thinner as necessary to obtain selected viscosity.

3. Thin mixed primer, if required, with astrocoat thinner product No. 8300 (item 9, Table 2) to obtain viscosity suitable for spraying.
4. Strain mixed primer with a 60 mesh, or finer, metal strainer.
5. Spray or brush mixed primer to cover the radome fiberglass and resin.

NOTE: Primer shall be allowed to air dry 30 minutes minimum and 2 hours maximum prior to recoating with primer.

6. After 30 minutes to two hours remove shroud cover. Inspect surface for complete coverage, and rough areas due to particle entrapment.

CAUTION LIMIT DEPTH OF SANDING TO EXCESS PRIMER, DO NOT EXPOSE FIBERGLASS RESIN SURFACE.

NOTE: Roughness typical of the peelply surface shall not be cause for sanding.

NOTE: Repair surfaces showing rough area or incomplete coverage shall be sanded and additional primer applied as necessary to maintain thickness. Sanding and primer application shall be accomplished within 30 minutes to 2 hours after first application.

7. Sand smooth excess primer and any rough area, with 150 grit or finer P-P-105 aluminum oxide abrasive paper and remove sanding dust with vacuum.
8. Spray an additional coat of primer as required to replace that removed by sanding. Replace the shroud cover.
9. Allow total thickness of primer to air cure 2 hours minimum to 20 hours maximum prior to application of polyurethane coating.



MAINTENANCE MANUAL

ASTROCOAT POLYURETHANE EROSION-RESISTANT COATING (PRODUCT NO. 8001) APPLICATION

WARNING PRODUCTS ARE TOXIC, VOLATILE AND FLAMMABLE AVOID EXCESSIVE BREATHING OF VAPORS AND PROLONGED OR REPEATED SKIN CONTACT USE IN WELL-VENTILATED AREAS AWAY FROM IGNITION SOURCES, OPEN FLAMES OR HEATED OBJECTS SUCH AS SOLDERING IRONS USE OF AIR-SUPPLIED RESPIRATOR IS REQUIRED WHEN USING POLYURETHANE COATINGS

1. Control environment during application and curing per paragraph Chapter 51-92-00.
2. Mix Astrocoat polyurethane erosion-resistant coating per Table 1, Chapter 51-92-20.

NOTE: For applications above 80 °F the catalyst may be reduced by 10 milliliter per quart for each 10 °F increment of temperature increase (see Table 1)

3. Add 40 milliliters of catalyst product No. 8100 (item 11, Table 2) and mix thoroughly.
4. Check viscosity of the catalyst material; viscosity shall be Zahn No. 2 cup, 27 to 29 seconds (refer to AMM Chapter 51 (D6-6003)). If viscosity is too high, add astrocoat thinner product No. 8300 (item 9, Table 2) until above viscosity is obtained.

CAUTION COATING SHALL NOT BE APPLIED AT TEMPERATURES BELOW 60 °F OR ABOVE 100 °F

CAUTION COATING SHALL NOT BE APPLIED AT A RELATIVE HUMIDITY BELOW 50 PERCENT, BUT MAY BE APPLIED AT ANY RELATIVE HUMIDITY ABOVE 50 PERCENT

CAUTION POT LIFE OF CATALYZED COATING MATERIAL IS 3 HOURS MAXIMUM AT 60 °F POT LIFE IS REDUCED TO APPROXIMATELY 1 HOUR AT 90 °F

CAUTION MATERIAL WHICH SHOWS EVIDENCE OF GEL FORMATION OR PRESENCE OF SEEDS SHALL BE DISCARDED AS SOON AS SUCH CONDITION IS OBSERVED

5. Strain mixed coating material with a 60 mesh, or finer metal strainer.

NOTE: Catalyzed material does not require stand time prior to use.

NOTE: Single coat thickness for weather radar radome is 1.0 (+0.0, -0.5) mil.

6. Spray mixed coating on prepared surface to obtain required single coat thickness.

NOTE: The air, temperature and humidity have to be controlled during the application and curing of the paint.

CAUTION TIME BETWEEN COATS IS CRITICAL BEFORE RECOATING, THE PREVIOUS COAT MUST HAVE OBTAINED INITIAL CURE OR EXTENSIVE BUBBLING WILL OCCUR, BUT MUST NOT HAVE BECOME TACK FREE OR POOR ADHESION WILL RESULT THE NORMAL RECOAT TIME CAN BE EXPECTED TO FALL BETWEEN 30 MINUTES AND 120 MINUTES HIGH TEMPERATURE AND HIGH HUMIDITIES WILL REDUCE THE TIME, LOW TEMPERATURE AND LOW HUMIDITIES WILL INCREASE THE TIME



MAINTENANCE MANUAL

7. Additional coating may be applied as soon as finger pressure results in no permanent imprint in the coating and no coating transfers to the finger. During between-coat-cure inspect for bubbles, runs, lint, particles, and small voids. If such defects are observed, correct as follows:

- A. When bubbling is encountered, decrease coat quantity and allow longer between-coat cure. Very minor, random bubbles in one coat shall not be cause for rejection of the coating provided the two succeeding coats completely cover and seal bubbles. The coating shall be rejected if an accumulation of bubbles.
- B. Repair runs by brushing, or finger-painting to obtain a smooth coating.
- C. Remove particles with scalpel, provided this can be done without damage to the coating.

NOTE: Repair of lint or voids are best accomplished after the first and second coats. As additional coats are applied, the repair becomes increasingly difficult and the probability of a coating defect will increase.

- D. Lint may be worked into the coating by lightly passing over the protruding lint with a clean spatula.
- E. Small voids may be filled and smoothed by lightly passing over the void with a clean spatula so as to work adjacent coating into the void.

NOTE: Subsequent coats must be applied continuously until total thickness is obtained.

8. Repeat steps 5. and 6. until total dry film thickness is obtained.



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ASTROCOAT WHITE (NONYELLOWING) TOPCOAT (PRODUCT NO. 8004) APPLICATION

1. Control environment during application and curing Chapter 51-92-00.
2. Mix Astrocoat White (Nonyellowing) Topcoat per Table 1, Chapter 51-92-20.

WARNING PRODUCTS ARE TOXIC, VOLATILE AND FLAMMABLE AVOID EXCESSIVE BREATHING OF VAPORS AND PROLONGED OR REPEATED SKIN CONTACT USE IN WELL-VENTILATED AREAS AWAY FROM IGNITION SOURCES, OPEN FLAMES OR HEATED OBJECTS SUCH AS SOLDERING IRONS USE OF AIR-SUPPLIED RESPIRATOR IS REQUIRED WHEN USING POLYURETHANE COATINGS

CAUTION COATING SHALL NOT BE APPLIED AT TEMPERATURES BELOW 60 °F OR ABOVE 100 °F

CAUTION COATING SHALL NOT BE APPLIED AT A RELATIVE HUMIDITY BELOW 50 PERCENT, BUT MAY BE APPLIED AT ANY RELATIVE HUMIDITY ABOVE 50 PERCENT

CAUTION POLYURETHANE ASTROCOAT MATERIALS CURE BY REACTION WITH MOISTURE MINIMIZE THE TIME MATERIALS ARE EXPOSED TO OPEN AIR

CAUTION POT LIFE OF CATALYZED BASE MATERIAL IS 3 HOURS MAXIMUM AT 60 °F POT LIFE IS REDUCED TO APPROXIMATELY 1 HOUR AT 90 °F

CAUTION MATERIAL WHICH SHOWS EVIDENCE OF GEL FORMATION OR PRESENCE OF SEEDS SHALL BE DISCARDED AS SOON AS GEL FORMATION IS OBSERVED

NOTE: For application above 80 °F the catalyst may be reduced by 10 milliliter per quart for each 10 °F increment of temperature increase.

3. Add 40 milliliters of catalyst product No. 8100 (item 11, Table 2) per quart of product No. 8004 (item 12, Table 2) base material, and mix thoroughly.
4. Thin mixture with astrocoat thinner product No. 8300 (item 9, Table 2) as required to obtain a viscosity Zahn No. 2 cup, 27 to 29 seconds refer to AMM Chapter 51 (D6-6003).
5. Strain mixed coating material with a 60 mesh, or finer, metal strainer.

NOTE: Catalyzed material does not require stand time prior to use

NOTE: Single coat thickness for weather radar radome is 1.0 (+0.0,-0.5) mil.

6. Spray mixed coating on prepared surface determined to beat correct recoat time, to obtain required single coat thickness.

CAUTION TIME BETWEEN COATS IS CRITICAL BEFORE RECOATING, THE PREVIOUS COAT MUST HAVE OBTAINED INITIAL CURE OR EXTENSIVE BUBBLING WILL OCCUR, BUT MUST NOT HAVE BECOME TACK FREE OR POOR ADHESION WILL RESULT THE NORMAL RECOAT TIME CAN BE EXPECTED TO FALL BETWEEN 30 MINUTES AND 120 MINUTES HIGH TEMPERATURES AND HIGH HUMIDITIES (WITHIN THE GIVEN LIMITS) WILL REDUCE THE TIME, LOW TEMPERATURES AND LOW HUMIDITIES (WITHIN THE GIVEN LIMITS) WILL INCREASE THE TIME

MAINTENANCE MANUAL

7. Determine time to recoat by applying light finger pressure to the coating. Additional coating may be applied as soon as finger pressure results in no permanent imprint in the coating, and no coating transfers to the finger. During between-coat-cure inspect for bubbles, runs, lint, particles and small voids. If such defects are observed, correct as follows:
 - A. When bubbling is encountered, decrease per coat quantity and/or allow longer between-coat cure. Very minor, random bubbles in one coat shall not be cause for rejection of the coating provided the two succeeding coats completely cover and seal bubbles. The coating shall be rejected if an accumulation of bubbles resembling porosity occurs.
 - B. Repair runs by brushing, or finger-painting to obtain a smooth coating.
 - C. Remove particles with scalpel, provided this can be done without damage to the coating.

NOTE: Repair of lint or voids are best accomplished after the first and second coats. As additional coats are applied, the repair becomes increasingly difficult and the probability of a coating defect will increase.

 - D. Lint may be worked into the coating by lightly passing over the protruding lint with a clean spatula.
 - E. Small voids may be filled and smoothed by lightly passing over the void with a clean spatula so as to work adjacent coating into the void.
8. Repeat steps 6. and 7. until total dry film thickness is obtained.
9. Allow coating to cure 12 hours minimum at conditions of 50 % relative humidity and 60 °F minimum. Following conditioned cure allow coating to air dry a minimum of 36 hours at 60 °F minimum.
10. Polish coating lightly, with CCC-C-440 cheesecloth filled with technical grade MIL-T-50036 talc.
11. Remove excess talc by wiping with a water damp cheesecloth, followed by light polishing with clean, dry cheesecloth.



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CAAPCOAT PRIMER (PRODUCT NO. 9947) APPLICATION

WARNING CAAPCOAT PRIMER PRODUCT NO 9947 IS TOXIC, VOLATILE, AND FLAMMABLE AVOID EXCESSIVE BREATHING OF VAPORS AND PROLONGED OR REPEATED SKIN CONTACT USE IN WELL VENTILATED AREAS AWAY FROM IGNITION SOURCES, OPEN FLAMES OR HEATED OBJECTS SUCH AS SOLDERING IRONS

CAUTION POT LIFE OF MIXED PRIMER IS 8 HOURS MAXIMUM

CAUTION DISCARD MATERIAL SHOWING GEL FORMATION OR PRESENCE OF SEEDS

1. Control environment during application and curing Chapter 51-92-00.
2. Verify repair area has been cleaned per Chapter 51-93-11.
3. Mix Caapcoat Primer per Table 1, Chapter 51-92-20.

NOTE: Mixed primer may be thinned with not more than an equal volume of thinner as necessary to obtain selected viscosity.

4. Thin mixed primer, if required, with Caapcoat thinner (Item 13F, Table 2) to obtain viscosity of 26-29 seconds in a Zahn No. 2 cup.
5. Strain mixed primer with a 100 mesh, or finer, metal strainer.
6. Remove shroud cover if the shroud assembly is used, and mask to prevent spraying primer on white base coat and top coat.

NOTE: Total dry film thickness does not apply to antenna pedestal radome exposed edge seal. Primer in this area sufficient to cover the EC-776SR coating is adequate.

7. Spray or brush mixed primer to cover the radome fiberglass and resin with one continuous coat. Replace the shroud cover if the shroud assembly is used.

NOTE: Stir mixed primer frequently during application Primer shall be allowed to air dry 30 minutes minimum and 24 hours maximum prior to coating with Caapcoat white polyurethane coating.

8. After 30 minutes to two hours remove shroud cover. Inspect surface for rough areas due to large particle entrapment.

CAUTION LIMIT DEPTH OF SANDING TO REMOVAL OF ROUGHNESS DUE TO LARGE PARTICLE

NOTE: Roughness typical of the peelply surface shall not be cause for sanding.

9. Sand smooth any rough area, with 150 grit or finer P-P-105 aluminum oxide abrasive paper and remove sanding dust with vacuum.
10. Allow total thickness of primer to air cure 30 minutes minimum to 24 hours maximum prior to application of polyurethane coating.



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CAAPCOAT WHITE POLYURETHANE EROSION-RESISTANT COATING (PRODUCT NO. CW-4)

APPLICATION

WARNING CAAPCOAT WHITE POLYURETHANE EROSION-RESISTANT COATING PRODUCT NO. CW-4 IS TOXIC, VOLATILE, AND FLAMMABLE. AVOID EXCESSIVE BREATHING OF VAPORS AND PROLONGED OR REPEATED SKIN CONTACT. USE IN WELL VENTILATED AREAS AWAY FROM IGNITION SOURCES, OPEN FLAMES OR HEATED OBJECTS SUCH AS SOLDERING IRONS.

1. Control temperature environment during application and curing per Chapter 51-92-00.
2. Mix Caapcoat white polyurethane erosion-resistant coating in accordance with Table 1, Chapter 51-92-20.
3. Dilute the activated vehicle to spray viscosity using the Caapcoat thinner provided.
4. The viscosity shall be Zahn No. 2 cup, 22 to 28 seconds (refer to AMM Chapter 51 (D6-6003)). If viscosity is too high, add more thinner until above viscosity is obtained.

CAUTION COATING SHALL NOT BE APPLIED AT TEMPERATURES BELOW 60 °F OR ABOVE 100 °F.

CAUTION POT LIFE OF CATALYZED COATING MATERIAL IS 4 HOURS MAXIMUM AT 70 °F. POT LIFE IS REDUCED TO APPROXIMATELY 2 HOURS AT 90 °F.

CAUTION MATERIAL WHICH SHOWS EVIDENCE OF GEL FORMATION OR PRESENCE OF SEEDS SHALL BE DISCARDED AS SOON AS SUCH CONDITION IS OBSERVED.

5. Strain mixed coating material with a 100 mesh, or finer, metal strainer.

NOTE: Activated material does not require stand time prior to use.

6. Weather radar radome brush or spray multiple coats of 1.0 (+1.0/-0.5) mil thickness to achieve the total thickness requirement of 11 (+2) mils thickness. See Figure 1.

NOTE: To achieve the 1.0 (+1.0/-0.5) mil thickness, apply coating in four passes to produce a fine, thin layer.

7. Inspect for bubbles, runs, lint, particles, and small voids. If such defects are observed, correct as follows:

CAUTION THE NORMAL RECOAT TIME CAN BE EXPECTED TO FALL BETWEEN 15 TO 30 MINUTES. HIGH TEMPERATURES WILL REDUCE THE TIME, LOW TEMPERATURES WILL INCREASE THE TIME. NO MORE THAN 3 HOURS SHOULD ELAPSE BETWEEN SUCCESSIVE COATS AT TEMPERATURES BELOW 90 °F. AT TEMPERATURES 90 TO 100 °F, 2 HOURS MAXIMUM BETWEEN THE COATS.

A. Fill bubbles using a small paint brush wet with CW-4.

B. Repair runs by brushing, or finger-painting to obtain a smooth coating.

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- C. Remove particles with scalpel, provided this can be done without damage to the coating.

NOTE: Repair of lint or voids are best accomplished after the first and second coats. As additional coats are applied, the repair becomes increasingly difficult and the probability of a coating defect will increase.

- D. Lint may be worked into the coating by lightly passing over the protruding lint with a clean spatula.

- E. Small voids may be filled and smoothed by lightly passing over the void with a clean spatula so as to work adjacent coating into the void.

NOTE: Subsequent coats must be applied continuously until total thickness is obtained.

8. Remove the cover at one or two attach points at a time to determine time to recoat by applying light finger pressure to the coating. Additional coating may be applied as soon as finger pressure results in no permanent imprint in the coating, and no coating transfers to the finger.

9. Repeat steps 5. and 6. until total dry film thickness is obtained.

10. Cure time for completed base coat is temperature and humidity sensitive. Cure base coat (Product No. CW-4) per Table 3.

NOTE: If humidity is below 30% at 60 °F heat may be used provided surface temperature does not exceed 90 °F.

11. Verify that the dry film thickness meets the requirements of 6. as required.

12. Verify time, temperature, and humidity requirements of coating application have been met.

Table 3 Cure Time of Caapcoat White Polyurethane Erosion-Resistant Coating
(Product No CW-4)

AMBIENT TEMPERATURE	MINIMUM RELATIVE HUMIDITY	CURE TIME (HOURS)
90 °F	10%	1 1/2 - 2
70 °F	20%	2 - 3
60 °F	50% and above	4 - 5
60 °F	30% to 50%	6 - 7



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ALUMINIZED LACQUER (TT-L-32) APPLICATION

WARNING PERSONNEL PERFORMING THIS PROCEDURE SHALL OBSERVE THE SAFETY PRECAUTIONS GIVEN IN CHAPTER 51-90-00

1. Clean and prepare receiving surface, as applicable.
2. Apply two coats of MIL-P-23377 epoxy primer per AMM Chapter 51 (D6-6003).

NOTE: When aluminized lacquer is not available, prepare an equivalent material by adding 20 ounces of TT-P-320, Type II, Class B aluminum paste to 1/4 gallon of TT-T-801 turpentine, and mix thoroughly. Add mixture to one gallon of TT-V-119 varnish.

3. Apply required thickness to surface and allow to dry to tack-free condition before part is returned to service.
4. Remove masking and protective covering.





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EPOXY-POLYAMIDE ENAMEL (MIL-C-22750) APPLICATION

NOTE: The enamel is a two-component coating. Component I is a pigmented epoxy resin. Component II is a polyamide converter.

1. Observe Safety Precautions per Chapter 51-90-10.

CAUTION DO NOT MIX COMPONENT I FROM ONE KIT WITH COMPONENT II OF ANOTHER EPOXY-POLYAMIDE ENAMEL FROM ONE MANUFACTURER SHOULD NOT BE MIXED WITH THAT FROM ANOTHER MANUFACTURER

CAUTION POT LIFE OF EPOXY POLYAMIDE ENAMEL IS 8 HOURS CONVERT ONLY THAT AMOUNT WHICH CAN BE USED DURING POT LIFE PERIOD

2. Mix enamel per Table 1, Chapter 51-92-20.
3. Stir thinned enamel thoroughly and allow to stand undisturbed for 30 minutes at 60 to 95 °F before application.
4. Verify primer has cured to tack-free condition before applying enamel.

NOTE: Mist coat may be eliminated when cratering occurs from dust or overspray.

NOTE: If required, TT-B-846 butyl acetate thinner may be added to a maximum of 5 percent of the activator-thinner volume, to reduce occurrence of orange peel.

NOTE: Epoxy polyamide requires approximately 24 hours to dry thoroughly, and approximately 8 days at 80 °F air drying for final cure.

5. Using spray equipment, apply one mist coat followed by coating to required thickness; mist coat shall air dry 30 minutes before final coat application.



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ABRASION-RESISTANT TEFLON COATING (23-T3-105) APPLICATION

WARNING USE TOLUENE TT-T-548 SPARINGLY AND WITH ADEQUATE VENTILATION. USE ONLY IN AREAS FREE OF POSSIBLE IGNITION SOURCES. AVOID PROLONGED BREATHING OF VAPORS AND REPEATED CONTACT WITH SKIN.

WARNING PERSONNEL PERFORMING THIS OPERATION SHALL OBSERVE THE SAFETY PRECAUTIONS PER CHAPTER 51-90-10.

NOTE: This coating is applied to applicable surfaces after pretreatment or priming with epoxy primer following repair, or after reactivation of old epoxy primer.

NOTE: Teflon coating locations are shown in Figure 3 in this Chapter.

NOTE: The base material color selected is to be determined by the area of application per Figure 1. Base material 23-T3-105 (item 15, Table 2) is gray.

1. Mask off adjacent surfaces.
2. Clean area being repaired by wiping with clean cheesecloth moistened in toluene TT-T-548. Wipe dry with clean cheesecloth before solvent evaporates.
3. Sand surfaces, where abrasion-resistant coating has been abraded or worn thin, using abrasive paper 280 grit, or finer.
4. Clean area with clean cheesecloth moistened in toluene TT-T-548. Wipe dry with clean cheesecloth before solvent evaporates.
5. Apply one coat of primer MIL-P-23377.

WARNING RESIN BASE 23-T3-105, HARDENER 10-C-81 AND THINNER 66-C-28 ARE TOXIC. AVOID BREATHING VAPORS AND CONTACT WITH EYES AND SKIN. WASH HANDS THOROUGHLY AFTER HANDLING.

6. Mix by stirring 3 parts by volume of resin base 23-T3-105 (gray) with one part by volume of hardener 10-C-81. Stir until uniform in color and texture. If thinning is required, up to one part by volume, thinner 66-C-28 may be added. Mixed material shall be uniform, free of skins, lumps and gelled or coarse particles. Allow mixed material to stand at least 5 minutes before using.

NOTE: At temperature of 70 °F the mixed material has a usable pot life of 2 hours. Pot life of mixed material decreases approximately one-half for every 10 °F rise in temperature. Material shall be discarded when pot life has expired. Do not mix more material than can be used during time listed above. Containers and equipment should be cleaned prior to expiration of pot life of mixed material.

7. Spray or brush apply coating to obtain a dry film thickness of 5 to 10 mils. Apply sufficient number of coats to obtain the specified dry film thickness. Approximately 3 mils (dry film thickness) are applied with each coat.



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8. Apply four or five wet cross passes per coat, keeping each coat as thin as possible to prevent runs and air bubbles. Each coat shall be uniform, free of skins, lumps, gelled or coarse particles and free of air bubbles. Feather sharp edges.

NOTE: Allow solvent to flash off 5 to 10 minutes between coats.

9. Prior to handling allow coating to cure for 6 hours at 70 °F to 90 °F.
10. Before outdoor exposure allow coating to cure for 12 hours at 70 °F to 90 °F.
11. Before returning to service allow coating to cure under time-temperature conditions indicated in Figure 2 in this Chapter.
12. Remove masking and protective covering.



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REFINISH ABRASION-RESISTANT TEFLON COATING APPLICATION FILLET FLAP FLAPERETTE

1. Remove paint and dirt from the surface of the flaperette by abrasive blasting.

WARNING USE TOLUENE TT-T-548 SPARINGLY AND WITH ADEQUATE VENTILATION USE ONLY IN AREAS FREE OF POSSIBLE IGNITION SOURCES AVOID PROLONGED BREATHING OF VAPORS AND REPEATED CONTACT WITH SKIN

WARNING PERSONNEL PERFORMING THIS OPERATION SHALL OBSERVE THE SAFETY PRECAUTIONS PER CHAPTER 51-90-10

NOTE: This coating is applied to applicable surfaces after pretreatment or priming with epoxy primer following repair, or after reactivation of old epoxy primer.

2. Clean the surface of all dust and grease by wiping with clean cheesecloth moistened in toluene TT-T-548. (Enzyme Cleaner No. 109 MIL-C-83873 may be used if Bioenvironmental prohibited the use of TT-T-548). Wipe dry with clean cheesecloth before solvent evaporates.
3. Dilute LIXTON TS 803 M with water (1 part LIXTON to 4 parts water) and hand brush solution on entire surface to be treated.
4. Flush the TS 803 M solution from the surface with clean water. Ensure that the surface is clean. If not, repeat step 3.
5. Dilute LIXTON TS 563 with water (1 part LIXTON to 4 parts water) and apply on entire surface by hand using medium grade Scotchbrite abrasive pad. Allow to work on surface for approximately 15 minutes until the surface turns black.
6. Rinse surface with water and ensure that all corrosion and TS 563 solution has been completely removed. If any corrosion remains, repeat paragraph 5. page 47.
7. When surface is dry, refinish with MIL-P-23377 epoxy primer and MIL-C-83286 polyurethane topcoat per Figure 1.
8. Apply a coat of gray (23-T3-105) Teflon coating.
9. Treat interior of flaperette with Dinotrol AV 30.

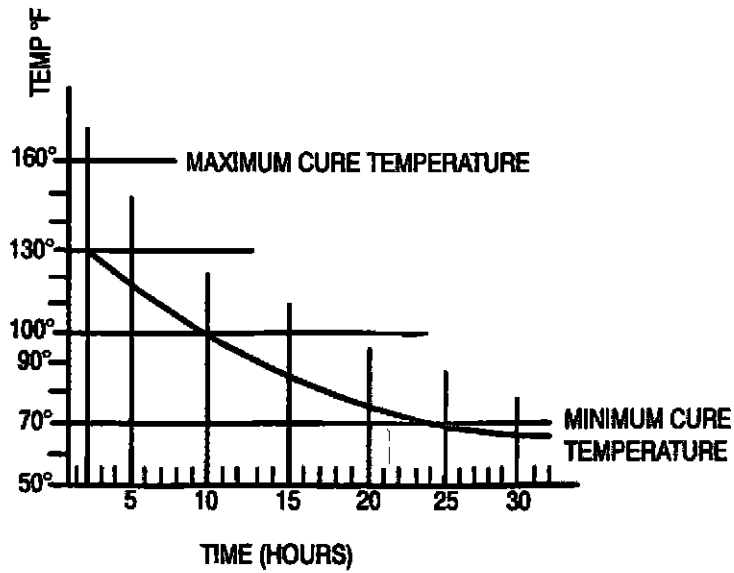


Figure 2 Coating Time - Temperature Cure Chart

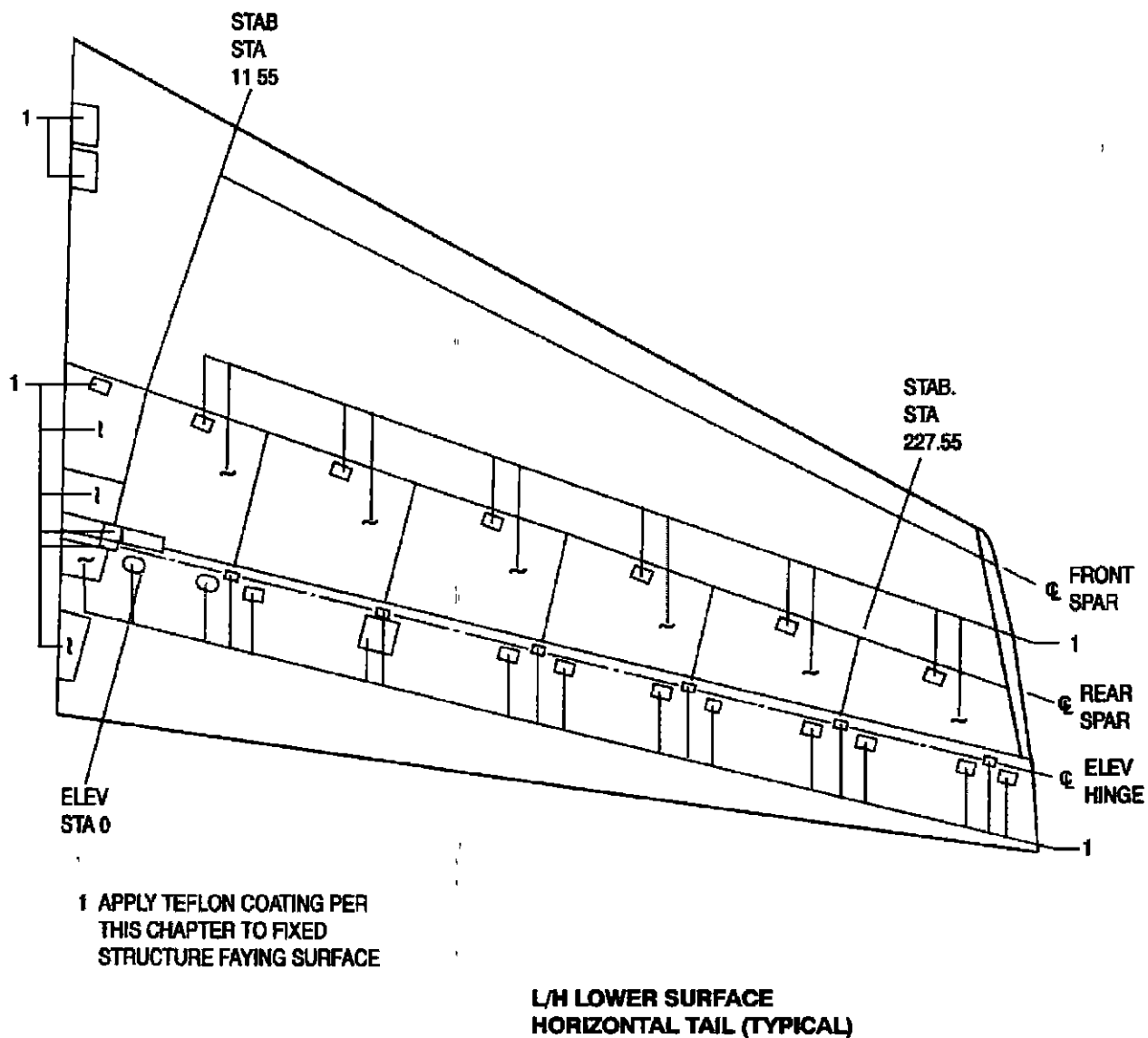
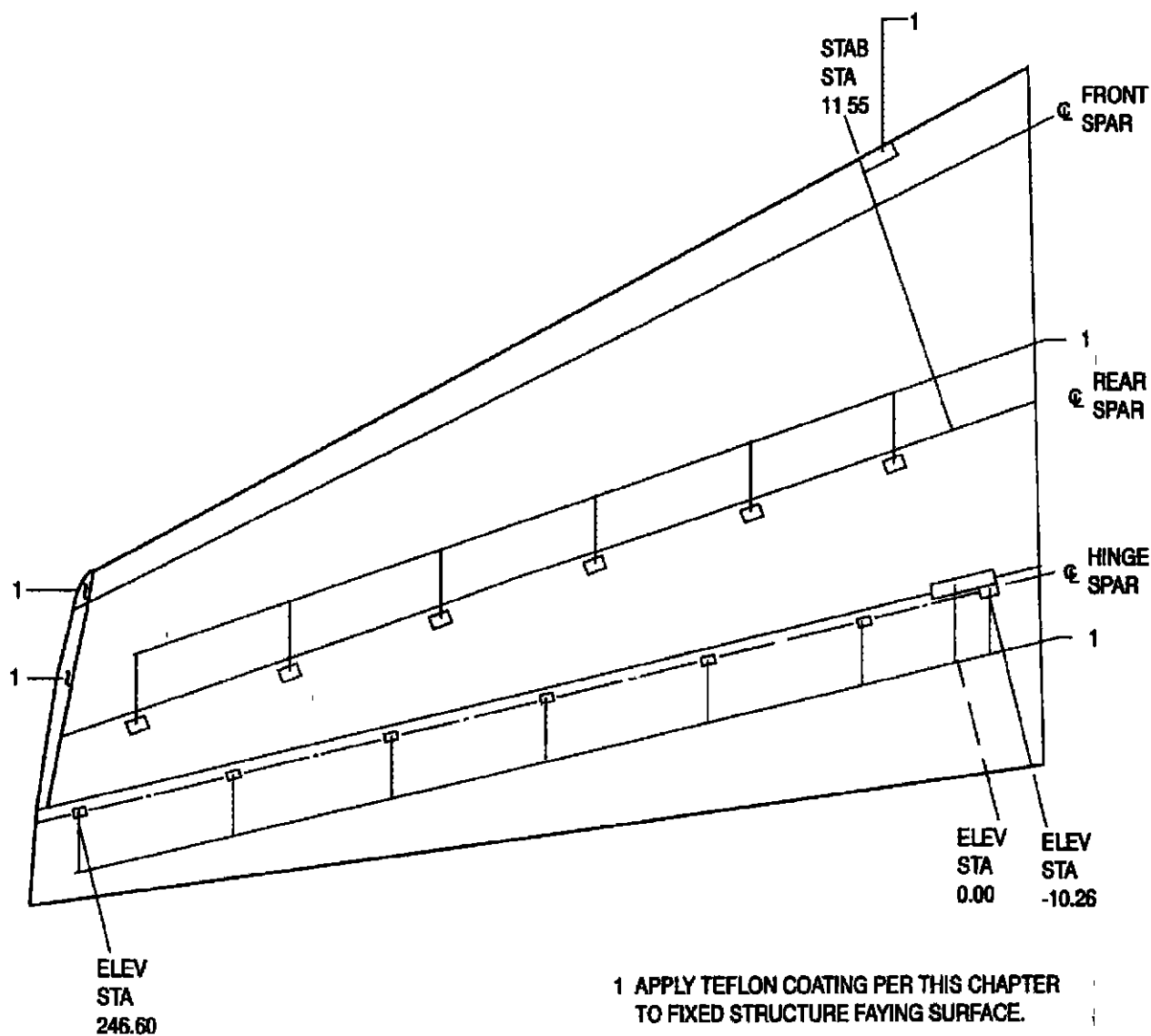
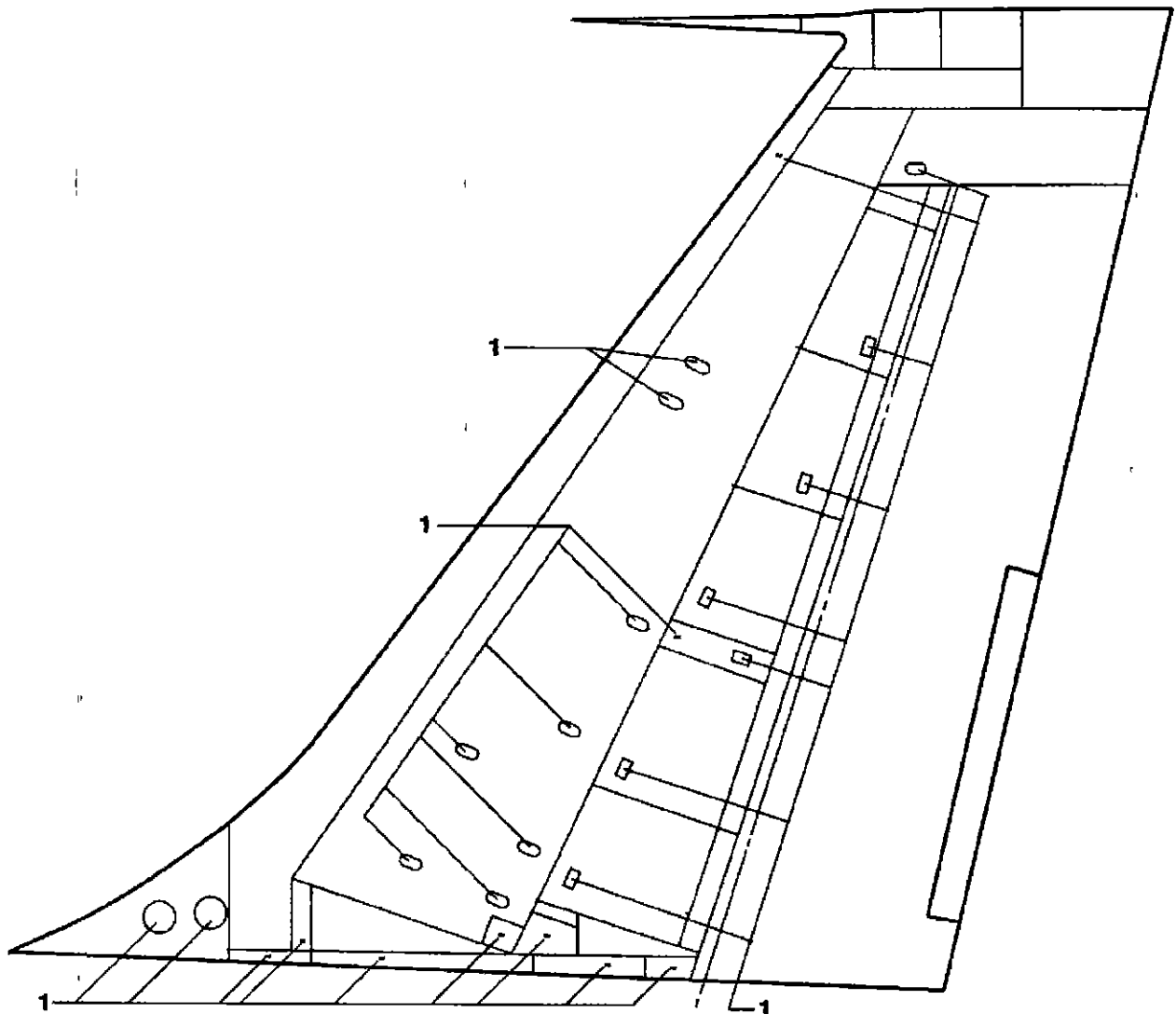


Figure 3 Abrasion-Resistant Teflon Coating Locations (Sheet 1 of 8)



**L/H UPPER SURFACE
HORIZONTAL TAIL (TYPICAL)**

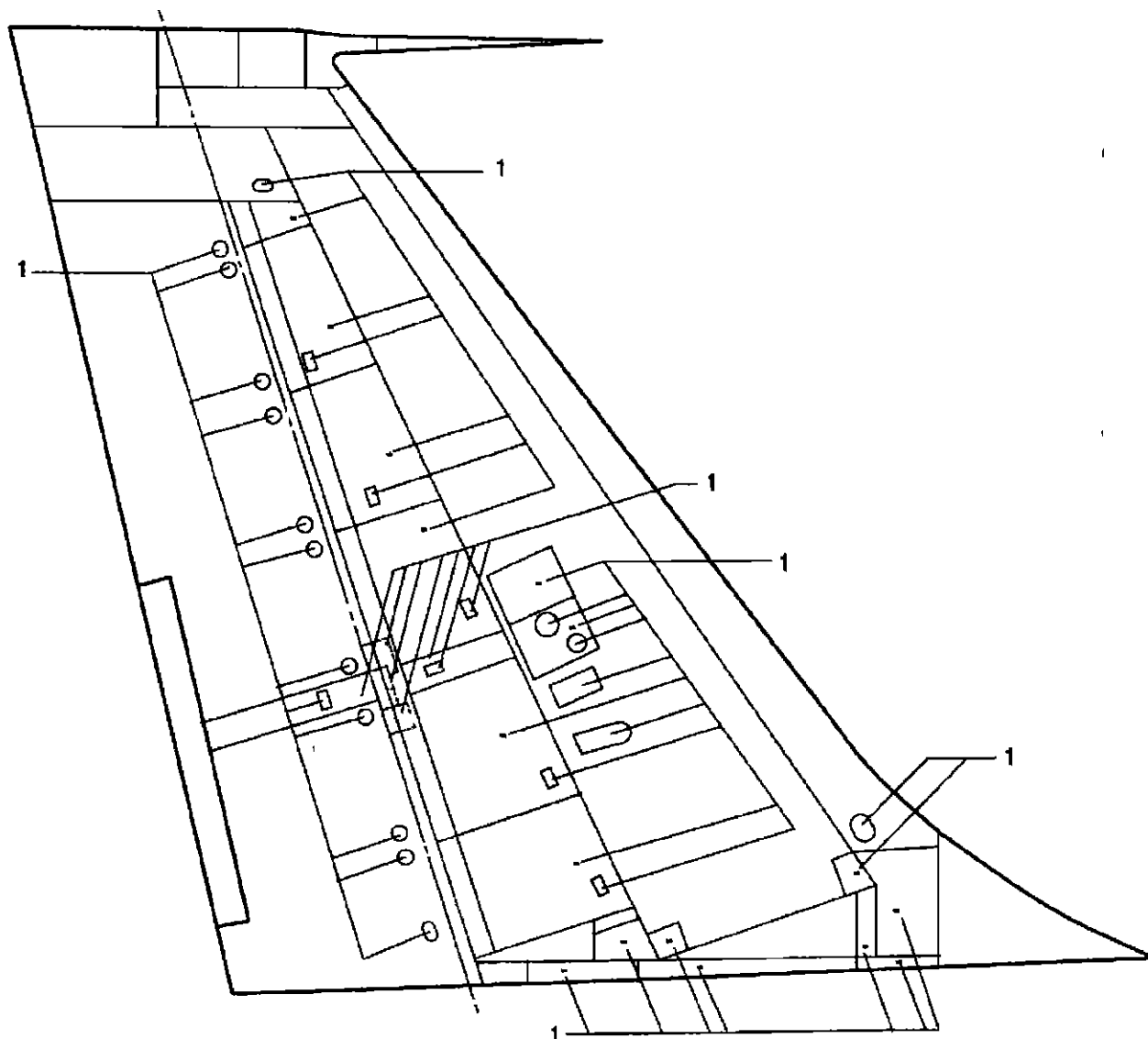
Figure 3 Abrasion-Resistant Teflon Coating Locations (Sheet 2 of 8)



1 APPLY TEFLON COATING PER
THIS CHAPTER TO FIXED
STRUCTURE FAYING SURFACE

**L/H SIDE
FIN, FIN TIP, RUDDER**

Figure 3 Abrasion-Resistant Teflon Coating Locations (Sheet 3 of 8)



1 APPLY TEFLON COATING PER
THIS CHAPTER TO FIXED
STRUCTURE FAYING SURFACE

R/H SIDE
FIN, FIN TIP, RUDDER

Figure 3 Abrasion-Resistant Teflon Coating Locations (Sheet 4 of 8)

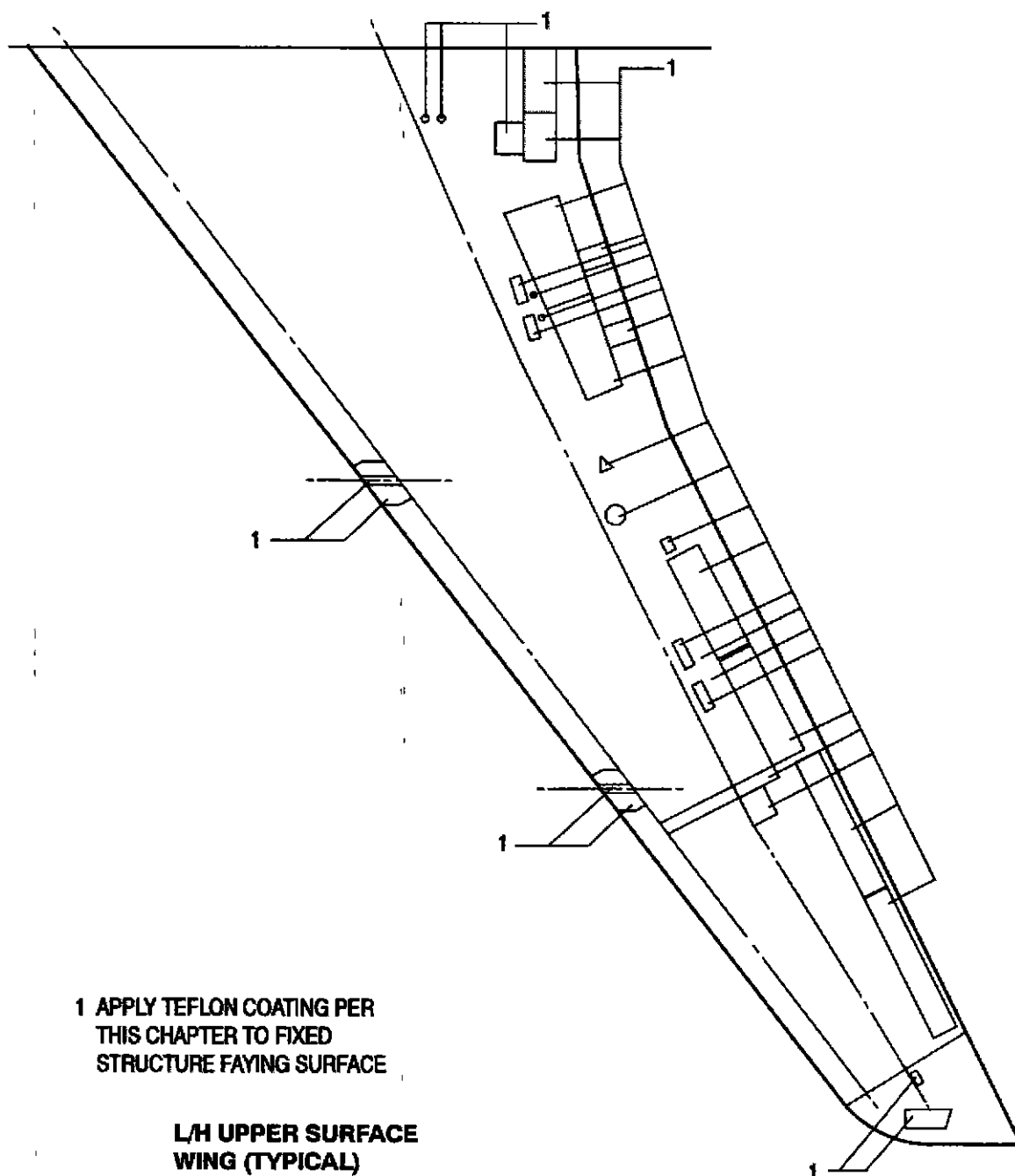


Figure 3 Abrasion-Resistant Teflon Coating Locations (Sheet 5 of 8)

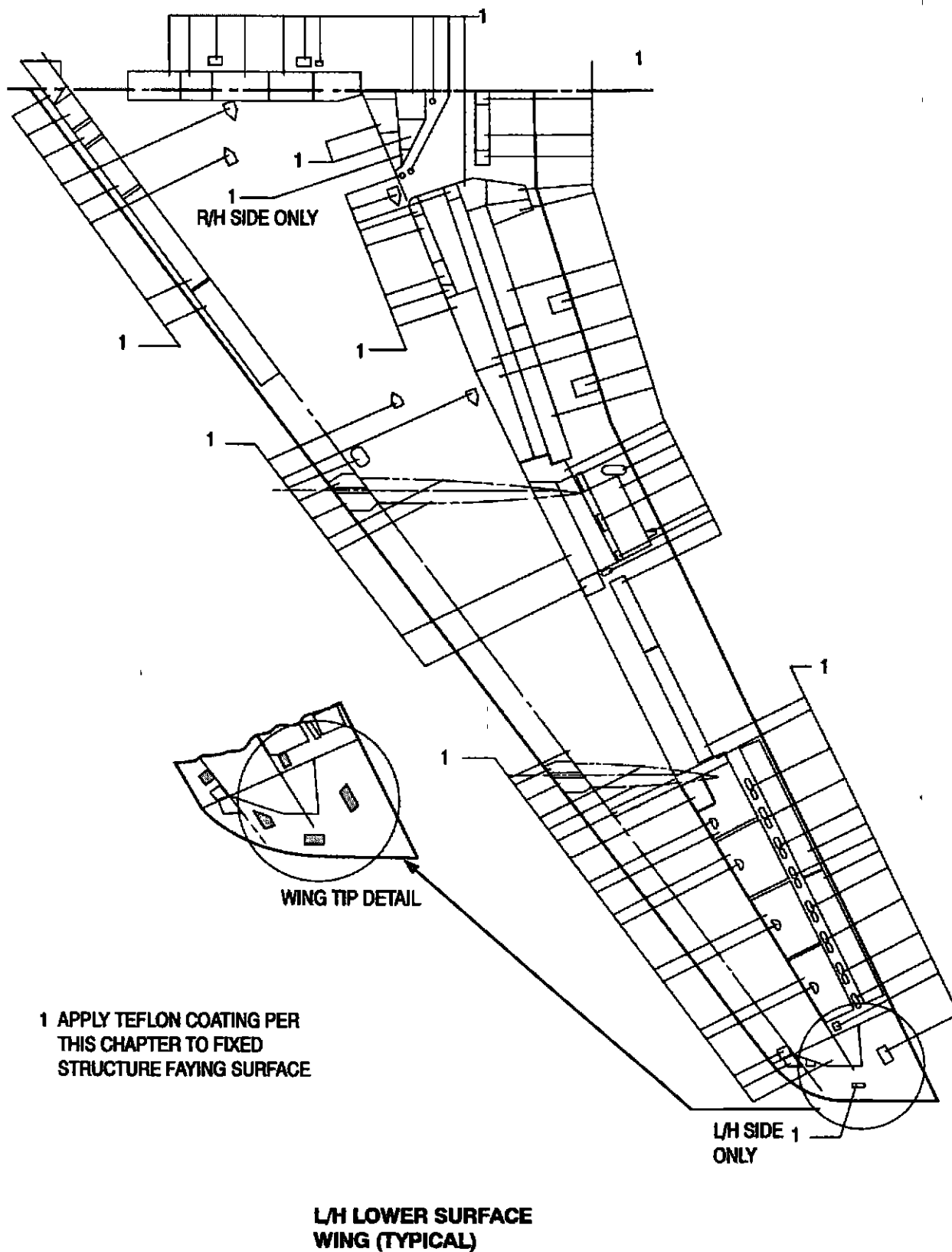
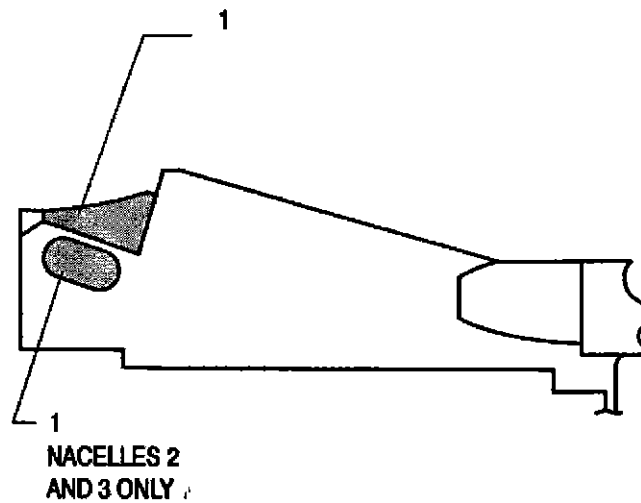
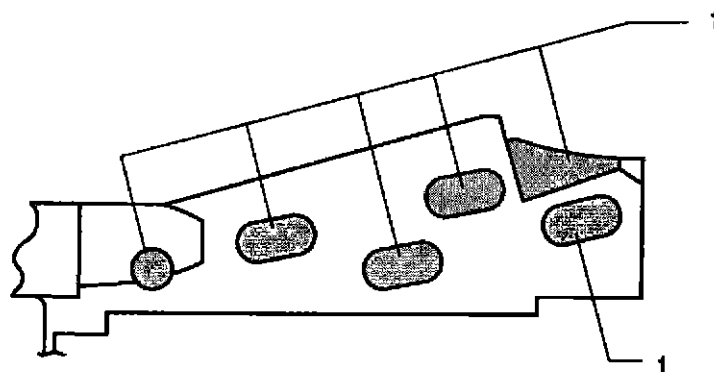


Figure 3 Abrasion-Resistant Teflon Coating Locations (Sheet 6 of 8)



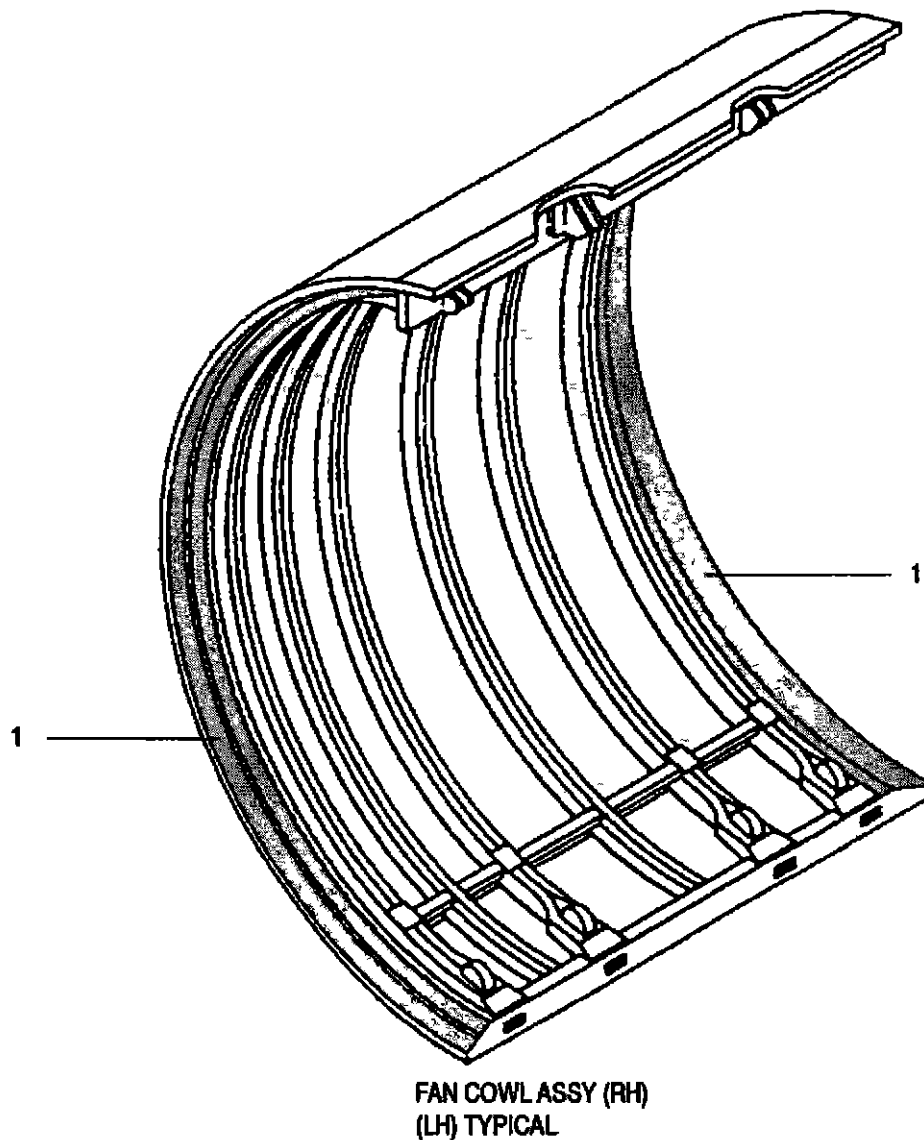
R/H SIDE VIEW



L/H SIDE VIEW

1 APPLY TEFLON COATING PER THIS CHAPTER
TO FIXED STRUCTURE FAYING SURFACE

Figure 3 Abrasion-Resistant Teflon Coating Locations (Sheet 7 of 8)



- 1 APPLY TEFLON COATING (GRAY) PER THIS CHAPTER
TO L/H AND R/H INTERIOR SURFACES AS SHOWN
ALSO APPLY TO FIXED STRUCTURE FAYING SURFACES
OF ACCESS PANELS

Figure 3 Abrasion-Resistant Teflon Coating Locations (Sheet 8 of 8)



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POLYURETHANE ABRASION-RESISTANT COATING (AERODUR ARC) APPLICATION

1. Location of Aerodur ARC (refer to Figure 1 of this Chapter)
 - AFT of nose landing gear, approx from STA 360 along the panel lap joints and AFT corner of NLG well until to the next panel joint backwards
 - Fuselage lower skin AFT of STA 830 to STA 990 (skin joint) up to skin panel joint including complete MLG doors (coating will be in line with wing trailing edge).
 - Fillet Flaps lower surface, including cover lip doors.
 - Inboard flaps lower surface for approx. 75 inches from inboard edge
 - Wing trailing edge lower surface, for span wise width to match with the inboard flap coated area, including shock strut doors
 - MLG shock strut lower door, upper and lower surface (lower strut door is affected at the inflight inside surface).

WARNING PERSONNEL PERFORMING THIS OPERATION SHALL OBSERVE THE SAFETY PRECAUTIONS PER CHAPTER 51-90-10

NOTE: Observe the recoatability limits of the relevant primer.

2. Remove oil, grease and other contaminants prior to application of Aerodur ARC at these areas.
3. Control environment during application and curing.
 - Temperature from 59 °F to 95 °F
 - Relative humidity from 35% to 75%
4. Recondition aged primers/topcoats with Scotch Brite Type A until a uniform matt surface
5. Remove dust with cheesecloth prior to application of Aerodur ARC.

WARNING AERODUR ARC IS HIGHLY FLAMMABLE KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING DO NOT BREATHE SPRAY IN CASE OF INSUFFICIENT VENTILATION, WEAR SUITABLE RESPIRATORY EQUIPMENT

WARNING HARDENER S 66/22 R IS FLAMMABLE KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING DO NOT BREATHE SPRAY CONTAINS ISOCYANATES - SEE INFORMATION SUPPLIED BY THE MANUFACTURER

WARNING THINNER C 25/90 S IS HIGHLY FLAMMABLE IRRITATING TO EYES AND RESPIRATORY SYSTEM KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES DO NOT BREATHE SPRAY IN CASE OF INSUFFICIENT VENTILATION, WEAR SUITABLE RESPIRATORY EQUIPMENT WEAR EYE/FACE PROTECTION



MAINTENANCE MANUAL

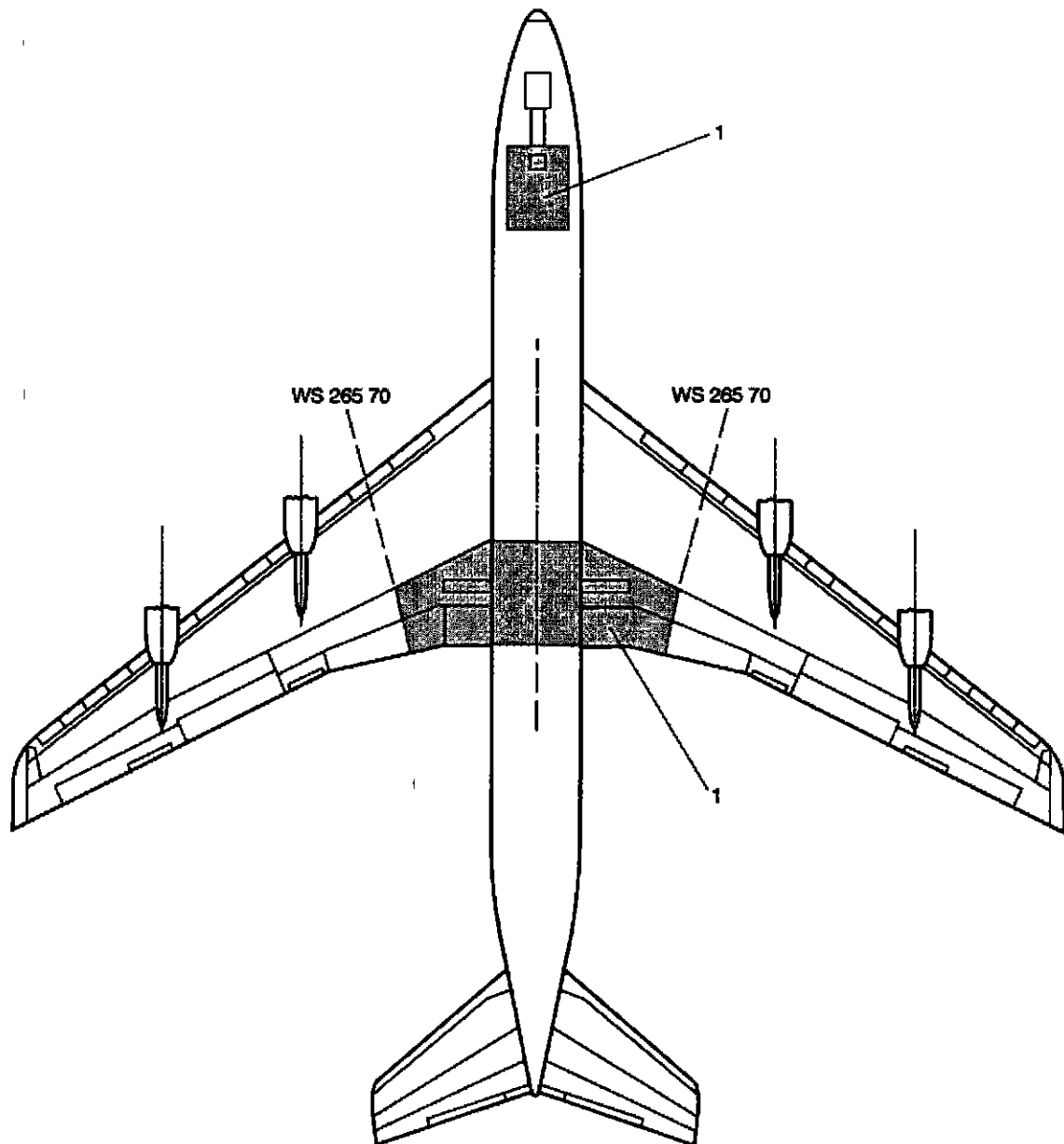
6. Mix Aerodur Arc according Table 1
7. Apply coating to obtain a dry film thickness of 5 to 6 mils.
8. Apply two cross-coats, with 60-120 minutes flash-off between coats.

NOTE: Allow solvent to flash off 60 to 120 minutes between coats.

9. Curing times:

- Dust free after 2 hours at 68(+3) °F
- Dry hard after 6 hours at 68(+3) °F
- Forced drying after 30 minutes flash-off followed by one hour at 176 °F or two hours at 140 °F.

10. Remove masking and protective covering.



1 APPLY TEFLON COATING TO FIXED
STRUCTURE FAYING SURFACE.
FOR DETAILS SEE SHEET 2 OF 4,
3 OF 4 AND 4 OF 4

A/C LOWER SURFACE

Figure 1 Polyurethane Abrasion-Resistant-Coatings Location (Sheet 1 of 4)

MAINTENANCE MANUAL

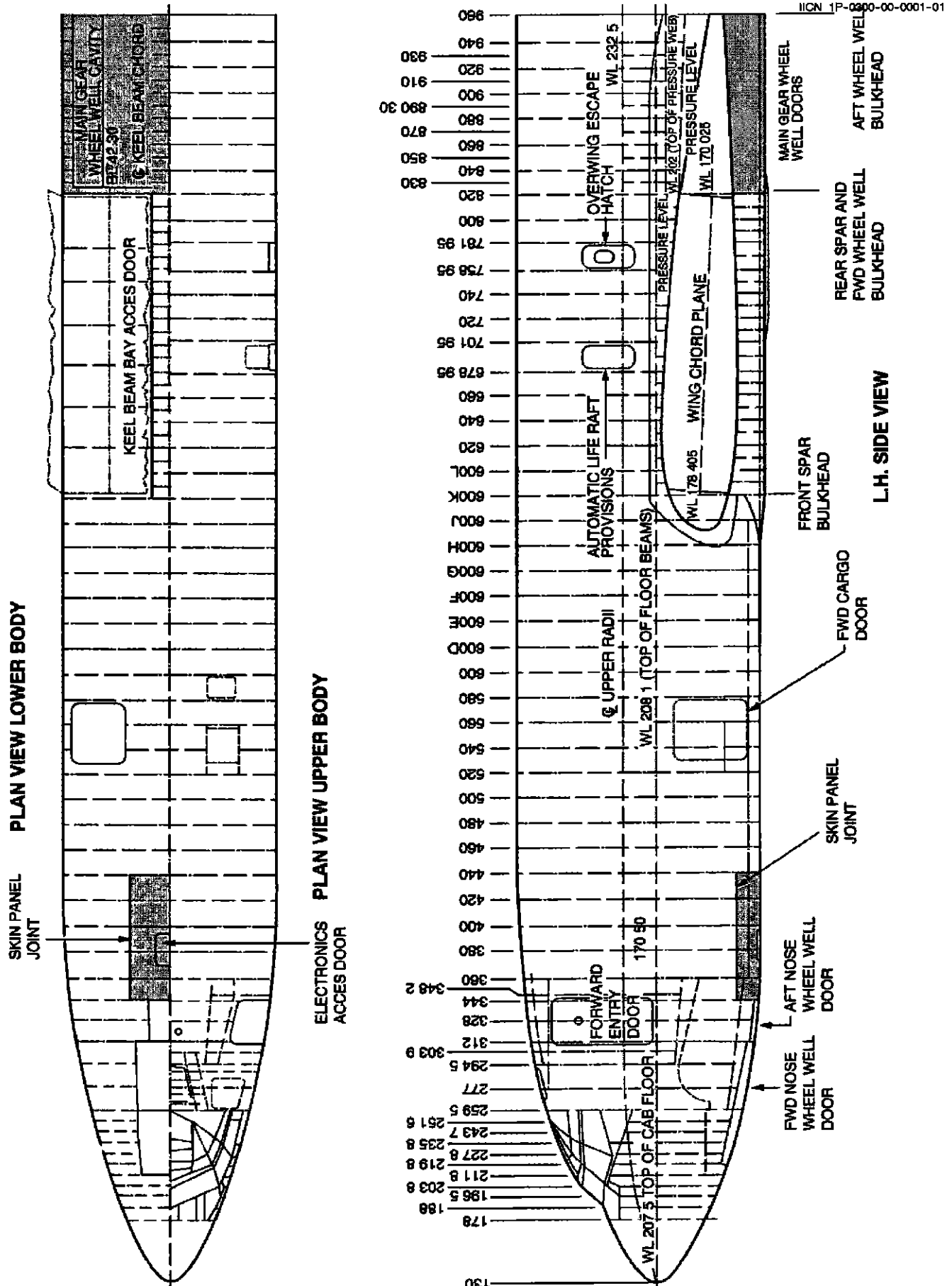


Figure 1 Polyurethane Abrasion-Resistant-Coatings Location (Sheet 2 of 4)

TR-Nr. DFW 51-1

TCA: LX-N20199

RTCA: LX-N19997, LX-N20000

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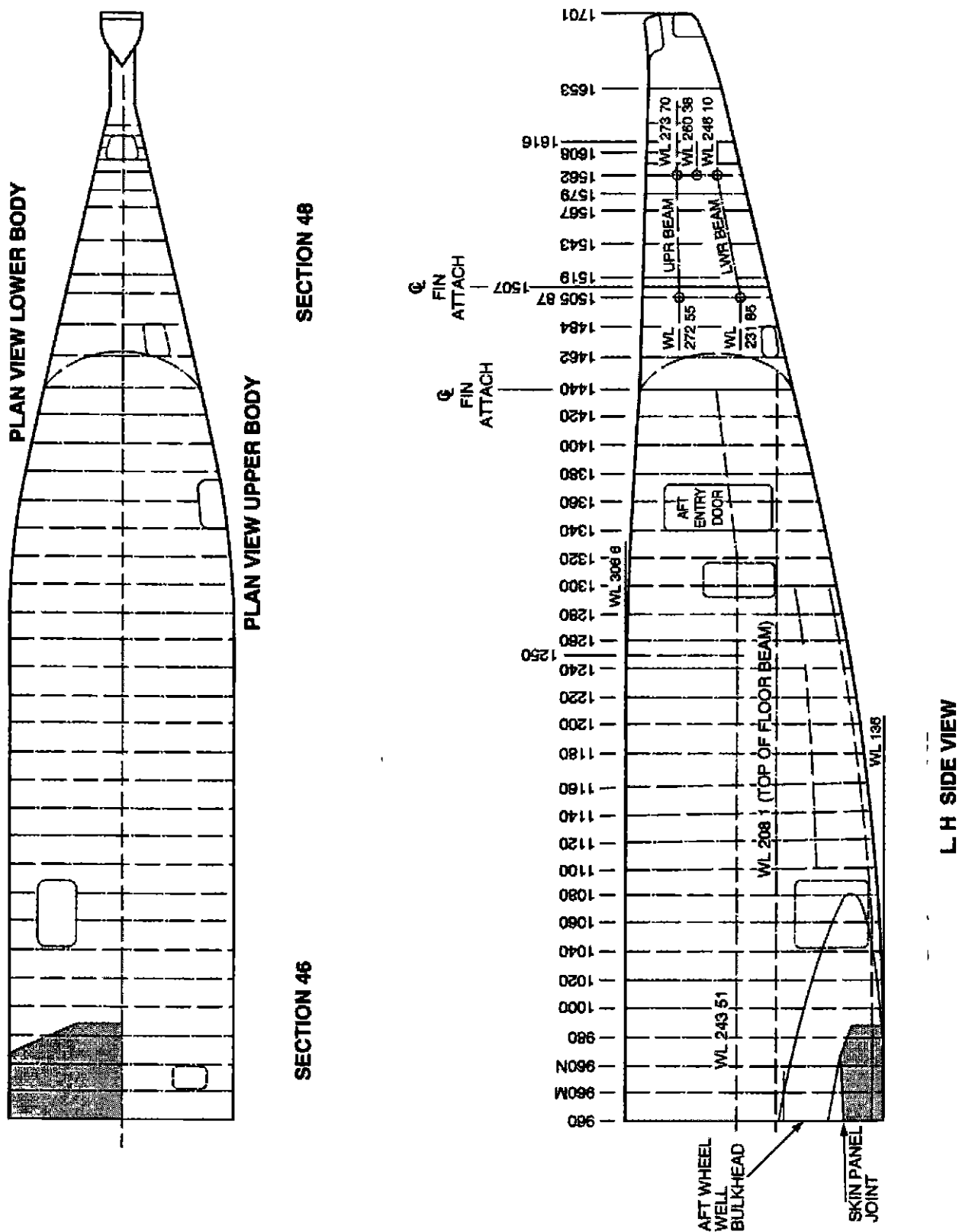


Figure 1 Polyurethane Abrasion-Resistant-Coatings Location (Sheet 3 of 4)

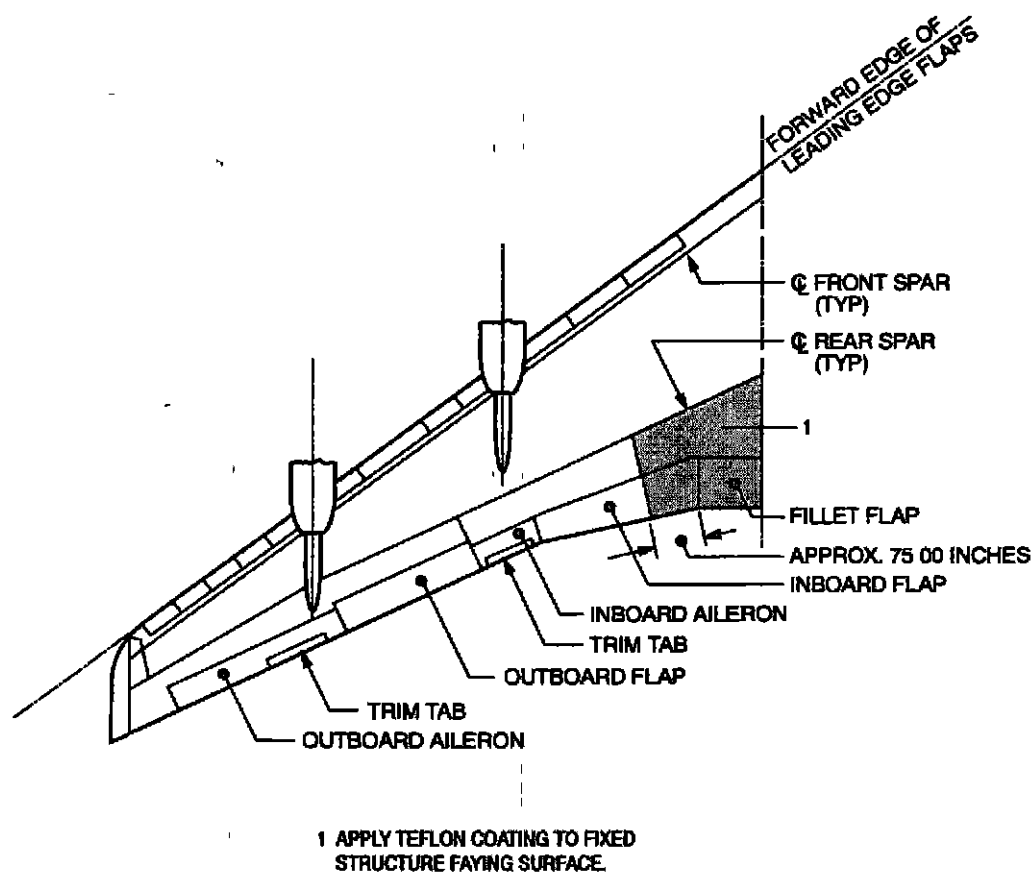


Figure 1 Polyurethane Abrasion-Resistant-Coatings Location (Sheet 4 of 4)



MAINTENANCE MANUAL

FLEXIBLE POLYURETHANE TOPCOAT (CA8000) APPLICATION

1. Location of Flexible Polyurethane Topcoat (refer to Figure 1 of Chapter 51-90-20)

WARNING PERSONNEL PERFORMING THIS OPERATION SHALL OBSERVE THE SAFETY PRECAUTIONS PER CHAPTER 51-90-10

NOTE: Observe the recoatability limits of the relevant primer.

2. Remove oil, grease and other contaminants prior to application of topcoat at these areas.
3. Control environment during application and curing.
 - Temperature from 59 °F to 86 °F
 - Relative humidity from 30% to 75%
4. Recondition aged primers according manufacturer's instruction.
5. Remove dust with cheesecloth prior to application of Flexible Polyurethane Topcoat.
6. Mix Flexible Polyurethane Topcoat according manufacturer's instruction or Table 1 of Chapter 51-92-20

NOTE: Do not use material which has been mixed 2 hours or over, without re-checking the viscosity and adjusting to within limits if necessary.

7. Strain the mixed coating through fine mesh nylon cloth to remove any particles that may have been introduced into the coating during mixing and measuring. In-line filter on spray equipment will also reduce the possibility of foreign particles. Stir or agitate the mixed material just before and during use.
8. Apply one light wet even coat.

NOTE: Depending on the temperature, leave to dry 45 minutes to 1 hour.

NOTE: A guide as to when the first coat is ready to accept a further coat, is to place the front of the fore-finger lightly on the surface and when this can be removed without a trace of wet paint on the finger, it is ready for the next coat.

9. If a two coat application, apply a double or a box coat.
10. For a third coat, follow procedure of step 9.
11. Curing times at:
 - temperature of 73 °F



MAINTENANCE MANUAL

- humidity of 55 % (± 5 %).

A. Overcoat time

- min 1 hour
- max 48 hours.

B. the Topcoat is chemical resistant after 7 days.

12. Remove masking and protective covering.



MAINTENANCE MANUAL

Table 1 Storage and Mixing Table (Sheet 1 of 7)

PRODUCT:	Astrocoat Primer (Product No. 8200)
STORAGE:	Unopened storage life is 12 months. Store at 40 °F to 90 °F indoors. Store only in filled and sealed containers. Partially filled containers shall be repackaged in smaller filled containers.
MIXING:	Add while stirring equal amounts, by volume, of primer accelerator product No. 8201 (item 8, Table 2) and primer base product No. 8200 (item 7, Table 2). <u>NOTE:</u> Astrocoat primer product No. 8200 shall be stirred to homogeneous consistency prior to removal from container for use. <u>NOTE:</u> Primer accelerator product No. 8201 shall be clear and free of sediment prior to use. Allow mixture to stand 15 minutes. <u>CAUTION</u> POT LIFE OF MIXED PRIMER IS 8 HOURS MAXIMUM
APPLICATION:	Chapter 51-92-10
PRODUCT:	Astrocoat White Polyurethane Erosion - Resistant Coating (Product No. 8001)
STORAGE:	Store at 40 °F to 90 °F indoors. Store only in filled and sealed containers. Partially filled containers shall be repackaged in smaller filled containers. <u>CAUTION</u> POLYURETHANE ASTROCOAT MATERIALS CURE BY REACTION WITH MOISTURE MINIMIZE CONTAINER OPENINGS AND MINIMIZE THE TIME A CONTAINER IS OPENED
MIXING:	Add 40 milliliters of catalyst product No. 8100 (item 11, Table 2) per quart of coating product No. 8001 (item 10, Table 2) and mix thoroughly. <u>CAUTION</u> POT LIFE OF CATALYZED COATING MATERIAL IS 3 HOURS MAXIMUM AT 60 °F POT LIFE IS REDUCED TO APPROXIMATELY 1 HOUR AT 90 °F
APPLICATION:	Chapter 51-92-11



MAINTENANCE MANUAL

Table 1 Storage and Mixing Table (Sheet 2 of 7)

PRODUCT:	Astrocoat White (Nonyellowing) Topcoat (Product No. 8004)
STORAGE:	Store at 40 °F to 90 °F indoors. Store only in filled and sealed containers. Partially filled containers shall be repackaged in smaller filled containers. CAUTION POLYURETHANE ASTROCOAT MATERIALS CURE BY REACTION WITH MOISTURE MINIMIZE CONTAINER OPENINGS AND MINIMIZE THE TIME A CONTAINER IS OPENED
MIXING:	Add 40 milliliters of product No. 8100 (item 11, Table 2) catalyst per quart of product No. 8004 (item 12, Table 2) base material, and mix thoroughly. NOTE: For application above 80 °F the catalyst may be reduced by 10 milliliters per quart for each 10 °F increment of temperature increase. CAUTION POT LIFE OF CATALYZED COATING MATERIAL IS 3 HOURS MAXIMUM AT 60 °F POT LIFE IS REDUCED TO APPROXIMATELY 1 HOUR AT 90 °F DISCARD MATERIAL SHOWING GEL FORMATION OR PRESENCE OF SEEDS
APPLICATION:	Chapter 51-92-12
PRODUCT:	Caapcoat Primer (Product No. 9947)
STORAGE:	Unopened storage life is 12 month. Store at 40 °F to 100 °F indoors. Store only in filled and sealed containers. Partially filled containers shall be repackaged in smaller filled containers.
MIXING:	Thoroughly agitate primer base by shaking the unopened container for a minimum of 5 minutes. Add while stirring equal amounts, by volume, of primer accelerator (item 13B, Table 2) and primer base (item 13A, Table 2). Continue stirring for one minute. Mixed primer shall be covered and allowed to stand 15 minutes prior to thinning. NOTE: Primer accelerator shall be clear and free of sediment prior to use. CAUTION POT LIFE OF MIXED PRIMER IS 8 HOURS MAXIMUM, DISCARD MATERIAL SHOWING GEL FORMATION OR PRESENCE OF SEEDS
APPLICATION:	Chapter 51-92-13

MAINTENANCE MANUAL

Table 1 Storage and Mixing Table (Sheet 3 of 7)

PRODUCT:	Caapcoat White Polyurethane Erosion - Resistant Coating (Product No. CW-4)
STORAGE:	Unopened storage life is 12 month. Store at 40 °F to 100 °F indoors. Store only in filled and sealed containers. Partially filled containers shall be repackaged in smaller filled containers. The remaining storage life shall be halved.
MIXING:	Shake unopened can of CW-4 for ten minutes minimum. Add 6 fluid ounces of curing agent container (item 13D, Table 2), to gallon of coating product No. CW-4 (item 13C, Table 2) and mix thoroughly. Add 8 fluid ounces of CW-4 accelerator and mix thoroughly for 30 seconds. CAUTION POT LIFE OF CATALYZED COATING MATERIAL IS 4 HOURS MAXIMUM AT 70 °F POT LIFE IS REDUCED TO APPROXIMATELY 2 HOURS AT 90 °F DISCARD MATERIAL SHOWING GEL FORMATION OR PRESENCE OF SEEDS NOTE: Accelerator may be volatilized, if the application temperature is between 90 ° and 100 °F.
APPLICATION:	Chapter 51-92-14
PRODUCT:	Epoxy - Polyamide Enamel (MIL-C-22750)
STORAGE:	Unopened storage life is 12 month. Store at 40 °F to 100 °F indoors. Store only in filled and sealed containers.
MIXING:	Slowly add two parts by volume, component II to two parts by volume of component I, while stirring. Agitate converted enamel mixture thoroughly, add MIL-T-19588 thinner to obtain viscosity between 17 to 20 seconds of a No. 3 Ford Cup at a temperature of 77 °F. CAUTION POT LIFE OF EPOXY POLYAMIDE ENAMEL IS 8 HOURS CONVERT ONLY THAT AMOUNT WHICH CAN BE USED DURING POT LIFE PERIOD NOTE: Mixing container may be cleaned with MIL-T-19588 thinner.
APPLICATION:	Chapter 51-92-16



MAINTENANCE MANUAL

Table 1 Storage and Mixing Table (Sheet 4 of 7)

PRODUCT:	Abrasion - Resistant Teflon Coating
STORAGE:	Unopened storage life is 12 month. Store at 40 °F to 100 °F indoors. Store only in filled and sealed containers.
MIXING:	Slowly add one part 10-C-81 (item 16, Table 2) hardener to three parts by volume base material while agitating the base material. NOTE: The base material 23-T3-10 (item 14, Table 2) color is white and base 23-T3-105 (item 15, Table 2) is gray. NOTE: Catalyzed base material has a 2-hour pot life at 70 °F: 1-hour pot life at 80 °F and a 1/2-hour pot life at 90 °F. Mixed material shall be uniform: free of skins, lumps and gelled or coarse particles.
APPLICATION:	Chapter 51-92-17
PRODUCT:	BMS 10-72 Type 5 Pretreatment (Etch) Washprimer (Metaflex FCR Primer)
STORAGE:	Unopened storage life is 12 month. Store at 41 °F to 77 °F indoors. Store only in filled and sealed containers.
MIXING:	Mix 100 parts by volume of Metaflex FCR primer (item 28, Table 2) with 200 parts by volume of Metaflex FCR hardener (item 29, Table 2). Reduce to spraying viscosity with maximum 25 parts of volume of thinner C25/90 S (item 30, Table 2), thinner 98056 or thinner 96184. NOTE: Stir or shake Metaflex FCR primer till all pigment has been uniformly dispersed before adding the hardener and thinner. NOTE: Stir the catalyzed mixture thoroughly. NOTE: If necessary, add thinner (maximum 25 parts of volume) and stir again till a homogeneous mixture CAUTION POT LIFE OF MIXED MATERIAL IS 6 HOURS AT 68(±3) °F
APPLICATION:	Figure 1, Chapter 51-93-30

MAINTENANCE MANUAL

Table 1 Storage and Mixing Table (Sheet 5 of 7)

PRODUCT:	BMS 10-72 Type 5, Hydraulic Fluid Resistant Primer (Aerodur Primer S 15/90 Type 2)
STORAGE:	Unopened storage life is 24 month. Store at 41 °F to 77 °F indoors. Store only in filled and sealed containers.
MIXING:	Mix 100 parts by volume of Aerodur primer (item 31, Table 2), with 50 parts by volume of hardener S 66/14 (item 32, Table 2), and 100 parts by volume of thinner C25/90 S (item 30, Table 2). <u>NOTE:</u> Stir or shake Aerodur primer S 15/90 Type 2 until all pigment has been uniformly dispersed before adding the hardener and thinner. <u>NOTE:</u> Stir the catalyzed mixture thoroughly. <u>NOTE:</u> Add thinner and stir again until there is a homogeneous mixture. <u>CAUTION</u> POT LIFE OF MIXED MATERIAL IS 4 HOURS AT 68(±3) °F
APPLICATION:	Figure 1, Chapter 51-93-30
PRODUCT:	MIL-C-83286 Polyurethane Finish Hydraulic Fluid Resistant Finish (Aerodur HF A 130)
STORAGE:	Unopened storage life is 24 month. Store at 41 °F to 77 °F indoors. Store only in filled and sealed containers.
MIXING:	Mix 100 parts by volume of Aerodur HF A 130 (item 33, Table 2) with 100 parts by volume of hardener S 66/22 R (item 34, Table 2). Reduce to spraying viscosity with maximum 75 parts of volume of thinner C25/90 S (item 30, Table 2). <u>NOTE:</u> Stir or shake Aerodur HF A 130 until all pigment has been uniformly dispersed before adding the hardener and thinner. <u>NOTE:</u> Stir the catalyzed mixture thoroughly. <u>NOTE:</u> Add thinner and stir again till a homogeneous mixture <u>CAUTION</u> POT LIFE OF MIXED MATERIAL IS 6 HOURS AT 68(±3) °F
APPLICATION:	Figure 1

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Table 1 Storage and Mixing Table (Sheet 6 of 7)

PRODUCT:	Polyurethane Abrasion-Resistant Coating (Aerodur ARC)
STORAGE:	Unopened storage life is 12 month. Store at 41 °F to 77 °F indoors. Store only in filled and sealed containers.
MIXING:	Mix 100 parts by volume of Aerodur ARC (item 52, Table 2) with 100 parts by volume of hardener S 66/22 R (item 34, Table 2). Reduce to spraying viscosity with 0-25 parts of volume of thinner C25/90 S (item 30, Table 2). Spraying viscosity is 25-35 seconds ISO-cup 4 or 30-40 seconds BSB-cup 3 or 55-80 seconds AFNOR-cup 2.5. <u>NOTE:</u> Stir or shake Aerodur ARC until all pigment has been uniformly dispersed before adding the hardener and thinner. <u>NOTE:</u> Stir the catalyzed mixture thoroughly. <u>NOTE:</u> Add thinner and stir again till a homogeneous mixture <u>CAUTION</u> POT LIFE OF MIXED MATERIAL IS 4 HOURS AT 68(±3) °F
APPLICATION:	Chapter 51-92-18
PRODUCT:	Epoxide Primer PR143
STORAGE:	<u>CAUTION</u> IN COMPLIANCE WITH HIGHLY FLAMMABLE LIQUIDS 1972 AND PETROLEUM REGULATIONS Original unopened containers life is 18 months from date of manufacture. Store at 32 °F to 86 °F indoors.
MIXING:	Mix two parts by volume of Epoxide Primer PR143 (item 55, Table 2) with one part by volume of Activator No.143 (item 56, Table 2). Stir and mix throughly till uniform, then adjust to viscosity with Thinners T17/T187 (item 57, Table 2). Spraying viscosity for Air Atomised Spray is 26-30 seconds, for Airless Spray / Electrostatic Spray are 28-32 seconds Flow Cup BS B3 by temperature between 65 °F and 77 °F. <u>NOTE:</u> Allow materials to reach shop temperature before use. Stir and shake the pigmented base until all the pigment is uniformly dispersed before adding the activator. <u>NOTE:</u> Viscosity may be varied to suit local conditions. Allow the thinned mix to stand for approx 15 minutes before use. <u>CAUTION</u> MATERIAL SHOULD NOT BE USED IF LEF FOR MORE THAN 8 HOURS AFTER MIXING
APPLICATION:	Figure 1, Chapter 51-93-30

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Table 1 Storage and Mixing Table (Sheet 7 of 7)

PRODUCT:	Wash Primer PR30B
STORAGE:	Original unopened containers life is 20 months from date of manufacture. Store at 41 °F to 95 °F indoors. Partly used containers must be re-sealed immediately after use. NOTE: Once opened, catalyst thinners TH34B must be used within two months.
MIXING:	CAUTION MIXING SHOULD ONLY BE CARRIED OUT IN A OPEN VENTILATED, OR PURPOSE DESIGNED MIXING ROOM CAUTION ENSURE ALL MIXING AND MEASURING CONTAINER ARE CLEAN AND FREE FROM ANY CONTAMINATION NOTE: Ensure materials are at shop temperature 73 (+3) °F before use. NOTE: Stir and shake the pigmented components, until all pigment is uniformly dispersed. Mix one part by volume of Catalyst Thinner TH34B (item 59, Table 2) with one part by volume of Wash Primer PR30B (item 58, Table 2). Stir and mix thoroughly. NOTE: For application with Airless / Air Assisted type spray equipment and at temperatures above 73 °F and or relative humidity above 60 % the addition of 5-10 % by volume of Thinner T105 (item 26, Table 2) is recommended. CAUTION POT LIFE OF MIXED MATERIAL IS 4 HOURS FROM 59 °F TO 95 °F
APPLICATION:	Figure 1, Chapter 51-93-30
PRODUCT:	Flexible Polyurethane Topcoat CA8000
STORAGE:	CAUTION IN COMPLIANCE WITH HIGHLY FLAMMABLE LIQUIDS 1972 AND PETROLEUM REGULATIONS Original unopened containers life from date of manufacture - 24 month for topcoat CA8000 - 12 month for activator CA8000B - unlimited for thinners CA8000C1 / CA8000C2. Store at 32 °F to 86 °F indoors. Partly used containers must be re-sealed immediately after use. NOTE: Once opened, Activator CA8000B should be used immediately to avoid deterioration, or released and used within 2 month.



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MIXING:	CAUTION MIXING SHOULD ONLY BE CARRIED OUT IN A OPEN VENILATED, OR PURPOSE DESIGNED MIXING ROOM CAUTION ENSURE ALL MIXING AND MEASURING CONTAINER ARE CLEAN AND FREE FROM ANY CONTAMINATION NOTE: Ensure materials are at shop temperature 73 (+3) °F before use. NOTE: Stir and shake the pigmented components, until all pigment is uniformly dispersed. Mix one part by volume of Activator CA8000B (item 62, Table 2) with two parts by volume of Finish CA8000 (item 61, Table 2). Stir and mix thoroughly. Adjust to spraying viscosity with Thinner CA8000C2 (item 64, Table 2) for spraying small areas; and with Thinner CA8000C1 (item 63, Table 2) for spraying and rolling of large areas. Spraying viscosity for Air Atomised Spray / Airless Spray / Electrostatic Spray is 24-26 seconds with a BSB3 cup. CAUTION POT LIFE OF MIXED MATERIAL IS 8 HOURS AT 73 °F AND 4 HOURS AT 95 °F ABOVE TIMES ARE FOR MATERIAL THINNED TO RECOMMENDED SPRAY VISCOSITY
	APPLICATION: Figure 1, Chapter 51-92-19

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Table 2 Special Consumable Material (Sheet 1 of 5)

POS	AREA / ITEM	NOMENCLATURE	Application
1	Turco No. 5351 Turco Products Inc. Division of Purex Corp. Ltd. Wilmington, Calif.	Paint Remover	Chapter 51-93-10
2	Magna 28-C-1 The Dexter Corp. Hayward, Calif.	Static Conditioner	Chapter 51-91-20
3	Magna 8-W-5 The Dexter Corp. Hayward, Calif.	Surfacer	Chapter 51-91-20
4	Magna 50-C-3 The Dexter Corp. Hayward, Calif.	Hardener	Chapter 51-91-20
5	Magna 50-C-32 The Dexter Corp. Hayward, Calif.	Hardener	Chapter 51-91-20
6	Magna 66-C-28 The Dexter Corp. Hayward, Calif.	Thinner	Chapter 51-91-20
7	Product No. 8200 Olin Corporation Stamford, Conn. OR Sterling Lacquer Mfg. Co. 3150 Brannon Ave, St. Louis, M063139	Astrocoat Primer	Chapter 51-92-10
8	Product No. 8201 Olin Corporation Stamford, Conn. OR Sterling Lacquer Mfg. Co. 3150 Brannon Ave, St. Louis, M063139	Primer Accelerator	Chapter 51-92-10
9	Product No. 8300 Olin Corporation Stamford, Conn. OR Sterling Lacquer Mfg. Co. 3150 Brannon Ave, St. Louis, M063139	Astrocoat Thinner	Chapter 51-92-11
10	Product No. 8001 Olin Corporation Stamford, Conn. OR Sterling Lacquer Mfg. Co. 3150 Brannon Ave, St. Louis, M063139	Astrocoat White Polyurethane Erosion Resistant Coating	Chapter 51-92-11
11	Product No. 8100 Olin Corporation Stamford, Conn. OR Sterling Lacquer Mfg. Co. 3150 Brannon Ave, St. Louis, M063139	Astrocoat Catalyst	Chapter 51-92-11
12	Product No. 8004 Olin Corporation Stamford, Conn. OR Sterling Lacquer Mfg. Co. 3150 Brannon Ave, St. Louis, M063139	Astrocoat White (Nonyellowing) Top- coat	Chapter 51-92-12

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Table 2 Special Consumable Material (Sheet 2 of 5)

POS	AREA / ITEM	NOMENCLATURE	Application
13	CAAP Co Inc. P.O. Box 2066. Huntington, Connecticut, D204-12918-1-W	Caapcoat CW-4 White Polyurethane Rain Erosion Coating Kit:	
	Coating Kit consists of:		
13A	1 Pint Product No. 9947A	Wash Primer	Chapter 51-92-13
13B	1 Pint Product No. 9947B	Wash Primer	Chapter 51-92-13
13C	1 Gallon Caapcoat Product NO. CW-4	White Polyurethane Rain-Erosion	Chapter 51-92-14
13D	6 oz.	Curing Agent	Chapter 51-92-14
13E	8 oz.	Accelerator	
13F	1/2 Gallon	Polyurethane Thinner	Chapter 51-92-13, Chapter 51-92-14
14	23-T3-10 Midland Division The Dexter Corp. Hayward, Calif.	Abrasion-Resistant Teflon Coating (White)	Chapter 51-92-17
15	23-T3-105 Midland Division The Dexter Corp. Hayward, Calif.	Abrasion-Resistant Teflon Coating (Gray)	Chapter 51-92-17
16	10-C-81 Midland Division The Dexter Corp. Hayward, Calif.	Hardener	Chapter 51-92-17
17	66-C-28 Midland Division The Dexter Corp. Hayward, Calif.	Thinner	Chapter 51-92-17
18	BMS 10-60 Type II Color No. 7067 The Boeing Company Seattle, Wash.	Polyurethane Enamel	Figure 1
19	BMS 10-60 Type II Color No. 707 The Boeing Company Seattle, Wash.	Polyurethane Enamel	Figure 1
20	S408 Stone Incorporated Quarryville, PA 17566	Parting Agent (Dry Film Mold Release)	Chapter 51-93-20
21	MIL-C-83231-Class A, Type I, Comp L	Rain-Erosion Resistant Coating Kit.	
22	MIL-C-83286	Polyurethane Enamel	Figure 1
23	MIL-C-5541/Class 1A	Chromate Conversion Coating	Figure 1

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Table 2 Special Consumable Material (Sheet 3 of 5)

POS	AREA / ITEM	NOMENCLATURE	Application
24	MIL-C-81706	Chromate Conversion Coating	Figure 1
25	MIL-P-23377	Epoxy Primer	Figure 1
26	MIL-C-8625 Type I	Chromic Acid Anodize	Figure 1
27	DeSoto 110 Vanilla Solvent Cleaner, P/N 020K019, Courtaulds Aerospace. Sealant, Adhesives and Coatings Division 1608 Fourth Street Berkley, CA 94710	Cleaning Compound	Figure 1
28	BMS 10-72 Type 5 Metaflex FCR Primer Code 10-01 Akzo Nobel Aerospace Coatings Inc. East Water Street, Waukegan, Illinois, 60085 USA	Pretreatment (Etch) Washprimer	Figure 1 Chapter 51-93-30
29	Metaflex FCR Hardener Akzo Nobel Aerospace Coatings Inc. East Water Street, Waukegan, Illinois, 60085 USA	Hardener	Figure 1
30	Thinner C 25/90 S Akzo Nobel Aerospace Coatings Inc. East Water Street, Waukegan, Illinois, 60085 USA	Thinner	Figure 1 Chapter 51-20-18
31	BMS 10-72 Type 5 Aerodur Primer S 15/90 Type 2 Code 20-02 Akzo Nobel Aerospace Coatings Inc. East Water Street, Waukegan, Illinois, 60085 USA	Hydraulic Fluid Resistant Primer	Figure 1 Chapter 51-93-30
32	Hardener S 66/14 Akzo Nobel Aerospace Coatings Inc. East Water Street, Waukegan, Illinois, 60085 USA	Hardener	Figure 1
33	MIL-C-83286 Polyurethane Finish Aerodur HF A 130 Code 30-08 Akzo Nobel Aerospace Coatings Inc. East Water Street, Waukegan, Illinois, 60085 USA	Hydraulic Fluid Resistant Finish	Figure 1
34	Hardener S 66/22 R Akzo Nobel Aerospace Coatings Inc. East Water Street, Waukegan, Illinois, 60085 USA	Hardener	Figure 1 Chapter 51-92-18



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Table 2 Special Consumable Material (Sheet 4 of 5)

POS	AREA / ITEM	NOMENCLATURE	Application
35	MIL-C 38334	Corrosion Remover	Chapter 51-93-30
36	MIL-M-3171	Chromic Acid Conversion	Chapter 51-93-30
37	3M Super Fine Scotchbrite Surface Conditioning Discs PN. 04127	Scotchbrite	Chapter 51-93-30
38	3M ROLOC Super Fine Scotchbrite Surface Conditioning Discs PN. 05522 with 3M ROLOC Disc Holder PN. 45095 or 45094	Scotchbrite with Holder	Chapter 51-93-30
39	Comparator Hydrion Paper, 0-13 Range: NSN 6630-P3-109-D05 or 6630-P3-109-D15	Comparator Hydrion Paper	Chapter 51-93-30
40	Edge Sealer 3M4150	Sealer	Chapter 51-93-30
41	Marker NSN 7420-00-138-7981	Marker	Chapter 51-93-30
42	Chromated Deoxidizer (Desmut-ter) NSN 6850-01-193-9837	Desmutter	Chapter 51-93-30
43	Adhesive Tape 3M Company No. 250 adhesion tape	Adhesive Tape	Chapter 51-93-30
44	CCC-C-440	cheesecloth	Chapter 51-93-20
45	TT-N-95, Type II	aliphatic naphtha	Chapter 51-93-20
46	MIL-T-21595	masking tape	Chapter 51-93-20
47	MIL-A-9962	abrasive pads	Chapter 51-93-30
48	TT-T-548	toluene	Chapter 51-93-30
49	MIL-C-83873	Enzyme Cleaner No. 109	Chapter 51-93-30
50	TT-L-32	Aluminized Lacquer	Chapter 51-92-15
51	MIL-C-22750	Epoxy-Polyamide Enamel	Chapter 51-92-16
52	Aerodur ARC Code 30-05 Akzo Nobel Dexter Aerospace Coatings GmbH Postfach 1104 D-22801 Norderstedt	Polyurethane Abrasion Resistant Finish	Chapter 51-92-18
53	Paint Remover 82522 Akzo Nobel Dexter Aerospace Coatings GmbH Postfach 1104 D-22801 Norderstedt	Paint Remover	Chapter 51-93-10
54	Thinner S 44/16 Akzo Nobel Dexter Aerospace Coatings GmbH Postfach 1104 D-22801 Norderstedt	Thinner	Chapter 51-93-10

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Table 2 Special Consumable Material (Sheet 5 of 5)

POS	AREA / ITEM	NOMENCLATURE	Application
55	Epoxide Primer PR143 Courtaulds Aerospace Sealant and Coatings Darlington Road, Shildon Co Durham DL4 2QP	Epoxide Primer	Figure 1 Chapter 51-93-30
56	Activator No.143 Courtaulds Aerospace Sealant and Coatings Darlington Road, Shildon Co Durham DL4 2QP	Activator	Figure 1
57	Thinner T17 / Thinner T187 Courtaulds Aerospace Sealant and Coatings Darlington Road, Shildon Co Durham DL4 2QP	Thinner	Figure 1
58	Etch Primer PR30B Courtaulds Aerospace Sealant and Coatings Darlington Road, Shildon Co Durham DL4 2QP	Etch Primer	Figure 1 Chapter 51-93-30
59	Catalyst Thinner TH34B Courtaulds Aerospace Sealant and Coatings Darlington Road, Shildon Co Durham DL4 2QP	Catalyst Thinner	Figure 1
60	Thinner T105 Courtaulds Aerospace Sealant and Coatings Darlington Road, Shildon Co Durham DL4 2QP	Thinner	Figure 1
61	Flexible Polyurethane Topcoat CA8000 Courtaulds Aerospace Sealant and Coatings Darlington Road, Shildon Co Durham DL4 2QP	Flexible Polyurethane Topcoat	Figure 1 Chapter 51-93-30
62	Activator CA8000B Courtaulds Aerospace Sealant and Coatings Darlington Road, Shildon Co Durham DL4 2QP	Activator	Figure 1
63	Thinner CA8000C1 Courtaulds Aerospace Sealant and Coatings Darlington Road, Shildon Co Durham DL4 2QP	Thinner	Figure 1
64	Thinner CA8000C2 Courtaulds Aerospace Sealant and Coatings Darlington Road, Shildon Co Durham DL4 2QP	Thinner	Figure 1 Chapter 51-92-19



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PAINT REPAIR

1. General

A. This Chapter gives an overview about paint removal and the paint repair procedure.

- (1) The Chapter 51-93-10 describes paint coating stripping/removal.
- (2) The Chapter 51-93-11 describes the final cleaning and inspection.
- (3) The Chapter 51-93-20 describes the paint touch up.
- (4) The Chapter 51-93-30 describes aircraft strip, surface preparation and painting.

2. Surface Preparation

Surfaces shall be prepared for chemical treatment following cleaning. Surface preparation consists of removal (stripping) of paint, cleaning surfaces, and inspection for evidence of corrosion as required. Procedures for preparation of metal surfaces for painting are provided in Chapter 51-91-10 and Figure 1, Chapter 51-90-20. Preparation of glass fabric surfaces is contained in Chapter 51-91-20.



MAINTENANCE MANUAL

PAINT COATING STRIPPING / REMOVAL

1. General

For preparation of stripping see Chapter 51-93-30.

2. Paint Removal (Stripping)

Remove old paint from parts or metal surfaces as follows:

- A. Chemically strip paint from parts or exterior aircraft surfaces, except composite parts, with the chemical strippers listed below that are authorized for epoxy/polyurethane primer and polyurethane top-coats, as follows:

- (1) Eldorado PR3170/PR5000 (Two Parts Stripper)
Eldorado Chemical Company Inc.
P.O. Box 34837
San Antonio, TX 78265

WARNING CHEMICAL PAINT REMOVERS ARE TOXIC TO SKIN, EYES, AND RESPIRATORS TRACT CONTACT BIOENVIRONMENTAL ENGINEERING FOR THE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT (PPE)

CAUTION PROTECT GLASS FABRIC SURFACES, MAGNESIUM, AND HIGH-STRENGTH HEAT-TREATED STEEL PARTS FROM CONTACT WITH CHEMICAL REMOVER BY MASKING PRIOR TO EXTERIOR AIRCRAFT SURFACES STRIPPING OPERATION

CAUTION USE ONLY AUTHORIZED PAINT REMOVERS FOR REMOVAL OF PAINT FROM HIGH-STRENGTH HEAT-TREATED STEEL PARTS. SUBSTITUTE PAINT REMOVERS MAY CAUSE HYDROGEN EMBRITTLEMENT OF STEEL

CAUTION PARTS SHOULD BE REMOVED FROM THE AIRCRAFT BEFORE PAINT STRIPPING. IF NOT PRACTICAL TO DO SO, USE EVERY CAUTION NECESSARY TO PROTECT AREAS SURROUNDINGS THE REPAIR AREA

CAUTION IF TWO PARTS STRIPPER IS PREMIXED, MAKE SURE THE PREMIXED BINS HAVE A PRESSURE RELIEF VALVE

CAUTION RINSE SOLID PAINT RESIDUE WITH WATER BEFORE DRUMMING WASTE

- (a) Apply a light to medium thick, uniform coat of chemical paint remover to the coated surface. Preferably, application of chemical removers should begin at the highest point of a vertical or sloping surface.
- (b) Allow to dwell for approximately 8 hours or until activity has started to diminish.
- (c) At 4-hour point, re-wet any areas that look dry.
- (d) Remove all loose paint and stripper of the surface using squeegees or stiff bristled brushes.

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NOTE: Do not let solid paint residues accumulate on the upper wings and horizontal stabilizers when stripping exterior aircraft surface.

- (e) Immediately re-apply chemical paint remover to areas with paint remaining, repeat steps (a) to (4).
 - (f) Rinse the treated surfaces with hot water 120 °F (minimum). Start at the lowest point and work upward.
 - (g) Ensure all stripper has been rinsed from surface prior to next step by performing surface pH test on bare metal surfaces using comparator hyrion, 0-13 range (Item 39, Table 2), test paper. When the pH of the surface is equal to the PH of the rinse water, the surface passes the test.
- (2) Paint Remover 82522 and Thinner S 44/16
Akzo Nobel Dexter Aerospace Coatings GmbH
Postfach 1104
D-22801 Norderstedt

The Paint Remover 82522 is an uninflammable, alkaline, non-penolic paint stripper. It is designed for removal of two component paint systems applied on washprimers of alkyd or acrylic systems. Also non corrosive for aluminum (clad or bare), magnesium, steels, cadmium plated steels and titanium as specified in MIL-R-81294 class II.

WARNING PAINT REMOVER POSSIBLE RISK OF IRREVERIBLE EFFECTS HARMFUL BY INHALATION AND IF SWALLOWED IRRITATING TO EYES AND SKIN MAY VAUSE SENSITIZATION BY SKIN CONTACT KEEP OUT OF REACH OF CHILDREN IN CASE WITH CONTACT WITH EYES, RINSE IMMEDIATELY WITH A PLENTY OF WATER AND SEEK MEDICAL ADVISE DO NOT BREATHE VAPOUR IN CASE OF INSUFFICIENT VENTILATION, WEAR SUITABLE RESPIRATORY EQUIPMENT

WARNING THINNER HARMFUL POSSIBLE OF IRREVERIBLE EFFECTS THROUGH INHALATION AND IN CONTACT WITH SKIN KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES DO NOT BREATHE VAPOUR/SPRY WEAR SUITABLE GLOVES CONTAINS DICHLOROMETHANE BUTANOLS

CAUTION DO NOT USE PAINT REMOVER 82522 TOGETHER WITH ACIDIC PAINT REMOVERS

CAUTION DO NOT USE PAINT REMOVERS IN BRIGHT SUNSHINE

- (a) Apply a heavy layer of Paint Remover by brush, airless sprayer or flow coating
- (b) Do not brush any longer than necessary to avoid excessive solvent evaporation



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NOTE: Allow sufficient dwell time for effective stripping of the paint system

NOTE: For effective stripping action observe a higher temperature than 59 °F for paint remover as well as for substrate. To avoid too fast solvent evaporation observe a maximum temperature limit of 95 °F.

- (c) Remove the mass with suitable scrapers or a jet of pressurized water
- (d) Remove residues with e.g. Thinner S 44/16 or any other appropriate industrial cleaning method

NOTE: Surface must pass this test before proceeding.

- B. Mechanically strip paint from Magnesium parts in accordance with applicable procedures contained in AMM Chapter 51 (D6-6003), by using plastic media blasting.
3. After removing paint, clean and inspect surfaces or parts for corrosion, Chapter 51-93-11.



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FINAL CLEANING AND INSPECTION

1. After stripping paint, clean and inspect parts or surfaces for corrosion as follows:
 - A. Clean parts and surfaces in accordance with appropriate method contained in AMM Chapter 51 (D6-6003) for removal of residue resulting from paint stripping operation. Small areas may be cleaned according to step C.
 - B. After cleaning surfaces, open access doors in difficult-to-drain areas and remove cleaning solutions from interior of airplane. Wipe surfaces dry with clean CCC-C-440 cheesecloth.

WARNING CLEANING SOLVENTS ARE TOXIC, VOLATILE, AND FLAMMABLE. AVOID EXCESSIVE BREATHING OF VAPORS AND PROLONGED OR REPEATED SKIN CONTACT. USE IN WELL-VENTILATED AREAS AWAY FROM IGNITION SOURCES, OPEN FLAMES OR HEATED OBJECTS SUCH AS SOLDERING IRONS.

- C. Small areas stripped of paint may be cleaned by wiping surfaces with a clean cheesecloth wet with TT-T-266 lacquer thinner or other suitable method according to AMM Chapter 51 (D6-6003). Wipe surface clean with clean, dry cheesecloth before solution evaporates.
 - D. Inspect cleaned surfaces for evidence of corrosion. Remove corrosion and treat corroded surface in accordance with AMM Chapter 51 (D6-6003) as applicable.
 - E. Replace any loosened seam or joint sealants. Refer to airframe sealing (AMM Chapter 51 (D6-6003)) and aerodynamic smoothness (SRM TCA D6-2962) for sealant application and smoothness requirements respectively.
 - F. Perform surface cleanliness test per paragraph 2.
2. Surface Cleanliness Test

To determine that surfaces being refinished meet cleanliness requirements, representative areas of the surfaces shall have the surface conditions tested per AMM Chapter 51 (D6-6003). Surfaces that meet the requirements of this test shall be treated per Chapter 51-91-00.



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PAINT TOUCH UP

1. General

All scratches or damage to paint topcoat on equipment should be repaired. An acceptable method for paint touch up is given in the following paragraphs.

2. Finish Requirement

Primer and topcoat, identified as the primary finish system, in Figure 1, shall be used for touch up. Apply required finish system component per the referenced Chapter or general technical order.

3. Surface Preparation

Proper preparation and cleanliness of the base surface are essential to good paint adhesion. Prepare surface as follows:

CAUTION THIS PROCEDURE IS NOT APPLICABLE TO HIGH-STRENGTH HEAT-TREATED STEEL COMPONENTS LISTED IN TABLE 2 FOR SURFACE PREPARATION OF THESE COMPONENTS

A. Observe safety precautions of Chapter 51-90-10.

WARNING ALIPHATIC NAPHTHA IS TOXIC, VOLATILE, AND FLAMMABLE. AVOID EXCESSIVE BREATHING OF VAPORS AND PROLONGED OR REPEATED SKIN CONTACT. USE IN WELL VENTILATED AREAS AWAY FROM IGNITION SOURCES, OPEN FLAMES OR HEATED OBJECTS SUCH AS SOLDERING IRONS.

NOTE: Fluid seepage shall be prevented from spreading over touch up area.

B. Wipe touch up area clean using clean CCC-C-440 cheesecloth (Item 44, Table 2) dampened with TT-N-95, Type II, aliphatic naphtha (Item 45, Table 2).

C. Wipe surface dry with clean, dry cheesecloth.

D. Remove old finish from surface of area to be painted using 240 grit, wet or dry sandpaper.

E. Feather edges of old finish around area to be painted.

CAUTION SURFACES THAT HAVE BARE METAL EXPOSED SHALL BE TESTED FOR CLEANLINESS

F. If applicable, perform surface conditions test per AMM Chapter 51 (D6-6003), and if required, upon satisfactory completion, apply surface pretreatment for primary finish system identified in Figure 1.



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4 Replacement of White Polyurethane Erosion-Resistant Coating

NOTE: The following procedures are for replacement of Astrocoat White. For replacement using Caapcoat White.

- A. Outline coating replacement area, using MIL-T-21595 masking tape (Item 46, Table 2), or equivalent.

CAUTION AVOID DAMAGE TO FIBERGLASS SUBSTRATE WHEN REMOVING COATING WITH SCRAPER

CAUTION AREAS OF SKIN SPLICES ARE HIGHLY SUSCEPTIBLE TO DAMAGE WHEN SCRAPING

- B. Remove white coating/primer, using procedure for removal of polyurethane coating, specification MIL-C-83231 and MIL-C-83445.

CAUTION AVOID SANDING FIBERGLASS SUBSTRATE DO NOT EXPOSE GLASS FIBERS

- C. Using 280 grit abrasive, sand surface smooth and feather edge of surrounding coating. Feather sand coating for 750 to 1000 mils beyond area of removed coating.

- D. Wipe area using CCC-C-440 cheesecloth (Item 44, Table 2) moistened with Astrocoat thinner (product No. 8300) (Item 9, Table 2) until clean.

- E. Mask around the coating replacement area, using MIL-T-21595 masking tape.

- F. Apply astrocoat primer (product No. 8200) (Item 7, Table 2), Chapter 51-92-10.

- G. Apply a single coat of Astrocoat white polyurethane erosion-resistant coating (product No. 8001) (Item 10, Table 2) per Chapter 51-92-11.

- H. Allow white coating to dry for approximately 10 minutes and remove the top mask

- I. Allow coating to dry for 10 minutes and remove the mask.



MAINTENANCE MANUAL

AIRCRAFT STRIP, SURFACE PREPARATION AND PAINTING

1. General

A. Explanation of Terms

- (1) **Aircraft Exterior.** All surfaces of the aircraft that are exposed to natural elements during ground and airborne movement in any configuration of landing gear and flight controls. These areas include landing gear wells and areas of wings and stabilizers exposed by removal of flight controls, and those mechanical components which exist and function outside the cavities of the wings and stabilizers.
- (2) **Corrosion Appearance**
 - (a) Light corrosion is characterised by discoloration or pitting to a depth of approximately 1 mil maximum.
 - (b) Moderate corrosion appears similar to light corrosion except there may be some blisters or evidence of scaling and flaking. Pitting depth may be as deep as 10 mils.
 - (c) Severe corrosion appearance may be similar to moderate corrosion with severe blistering, exfoliation, and scaling or flaking. Pitting depth will be deeper than 10 mils.
- (3) **Non-Conformance.** A departure from the requirements specified in the contract, any specification, drawing, technical order, or other approved product description.

B. Procedures

- (1) **Quality.** Proper completion of the following steps is essential to prevent damage to the aircraft and to minimise defects. Attention to these steps is critical.
 - (a) Masking called for prior to paint stripping.
 - (b) Masking called for prior to application of finishing system.
 - (c) Protection of aluminum surfaces from magnesium treatment chemicals and vice versa.
 - (d) Accurate location of all alignment point markings as shown in Chapter 11-20-10.
 - (e) Complete attention to procedures in Chapter 51-90-10 and AMM Chapter 51 (D6-6003) regarding removal and application of organic finishing systems.
 - (f) Complete attention to corrosion identification and rework procedures.



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(2) General Work Requirements

- (a) Work requirements shall only be to the extent necessary to accomplish the specific tasks identified in this Chapter.
- (b) Inspections and repair shall be accomplished in accordance with applicable AMMs.
- (c) All panels, access doors, covers, etc., removed for inspection and repair shall be reinstalled in serviceable condition. This shall include application/reapplication of corrosion inhibiting compounds (CICs), as appropriate (also referred to as corrosion preventive/preventative compounds (CPC)).
- (d) Removal of all light corrosion shall be considered part of following work requirements.

(3) Materials

- (a) The Table 2 in Chapter 51-92-20 contains the major material needed to accomplish specific work requirements. It is not all inclusive, and additional material may be required by the individual sections of the AMMs to accomplish various tasks.

2. Aircraft Input

A. Fuel System (if not already performed)

- (1) Defuel and drain all fuel tanks in accordance with AMM Chapter 28 (D6-6003).
- (2) Purge or inert fuel tanks to a fire-safe condition in accordance with AMM Chapter 28 (D6-6003).

B. Towing and Parking. The aircraft shall be towed and parked in accordance with AMM Chapter 07 (D6-6003). Static ground cables and ground safety locks and pins shall be installed in accordance with AMM Chapter 51 (D6-6003). The aircraft shall be towed onto sheets of masking material which shall be wrapped up and around the landing gear to protect it during finish stripping.

C. Removals

- (1) Remove flight controls in accordance with AMM Chapter 27 (D6-6003), Rudder, Ailerons, Elevators, Flaps, and Slats.
- (2) Remove main landing gear (MLG) wheel well and shock struts doors and nose landing gear (NLG) wheel well doors in accordance with AMM Chapter 32 (D6-6003).
- (3) Remove engine nose domes in accordance with AMM Chapter 71 (D6-6003).



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3. Aircraft Cleaning

A. Prepare aircraft surfaces for paint removal as follows:

- (1) Masking. Ensure that all areas of the aircraft, including all removed components, which require protection, are masked and protected from water entry in accordance with AMM Chapter 51 (D6-6003).
- (2) Cleaning.
 - (a) Clean the aircraft and removed components in accordance with AMM Chapter 51 (D6-6003).
 - (b) The lubrication procedure and corrosion inhibiting compound (CIC) application required after washing shall be postponed until aircraft refinish is complete.

4. Paint Removal

A. General

- (1) Paint may be removed by the application of strippers. Paint applied to any metal surface may be removed by any of the specified strippers. No paint stripper may be used, however, to remove paint from plastic laminates, fiberglass (bare or metalized), aerodynamic smoother or the edges of metal bonds, or rubber parts.
- (2) It is recommended to adequately wash heavily contaminated areas by means of e. g. streamcleaning prior to the application of strippers.
- (3) Critical areas subject to damage by strippers must be protected by proper masking, using polyethylene film and aluminum foil adhesive tape. Areas which must be protected from strippers include lubricated parts, rubber parts, laminated plastics, fiberglass (bare or metalized), aerodynamic smoother and metal bonded edges. Drain holes and vents should be similarly plugged.

CAUTION PAINT STRIPPERS SHOULD NOT BE ALLOWED TO COME IN CONTACT WITH TEFLON LINED SELF-LUBRICATED BEARINGS, ELECTRICAL TERMINAL PLUGS, NYLON-COATED WIRES, NYLON BUSHINGS AND FIBERGLASS REPAIRS. CHEMICALS IN THESE MATERIALS WILL ATTACK THE COMPONENTS

B. Preparation for stripping (masking)

- (1) Mask all items in accordance with AMM Chapter 51 (D6-6003).
- (2) Mask all areas in accordance with AMM Chapter 51 (D6-6003).
- (3) Mask all drain holes listed in AMM Chapter 51 (D6-6003).



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- (4) Mask any internal areas exposed by flight control removal to prevent stripper entry.
 - (5) Protect the following items listed in Chapter 51-90-20 Figure 1 from stripper:
 - (a) Landing gear and tires (37)
 - (b) Wheel well areas (38,34)
 - (c) Wing cavities (36), and stabilizer cavities
 - (d) APU exhaust door (26)
 - (e) All anodised leading edge panels (2,3 and 19)
 - (f) Nacelle group aft of station 221.25 (20)
 - (6) Stainless steel entry door sills and all bare areas around static ports shall be masked and left untreated out the repaint process.
 - (7) The two engine fire bottle discharge disks (red) and the two discharge indications (yellow disks) located on the inboard side of the inboard engine struts shall be masked and left untreated out the repaint process.
 - (8) Mask the following magnesium parts for protection from stripper Chapter 51-90-20, Table 1:
 - (a) Spoiler trailing edge filler (Item 2 and 10)
 - (b) Inboard/outboard flap trailing edge filler (Item 4 and 8)
 - (c) Inboard aileron trailing edge end filler (Item 6)
 - (d) Wing trailing edge upper panel fillers (Item 14 and 15)
 - (9) Mask the weather radar radome (15) identified in Chapter 51-90-20, Figure 1.
 - (10) Mask former fibreglass repair on the aircraft.
- NOTE:** A preliminary inspection to identify critical fibreglass areas has to be performed.
- (11) Mask all the fiberglass areas identified in Chapter 51-90-20, Figure 1:
 - (a) VOR localizer antenna door (46)
 - (b) Vertical fin tip leading edge (24)
 - (c) Crash position indicator beacon (45)
 - (d) Rudder to fuselage fairing (4)
 - (e) Wing trailing edge panel over flap jackscrew stop nut.



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- (12) Mask all the antennas identified in Chapter 51-90-20, Figure 1.
 - (13) Mask all edges, repairs, damaged or loosened fasteners, and other areas of the flight controls, including control tabs, and landing gear doors, which are susceptible to stripper entry or stripper damage.
 - (14) Ballast Weight: Some aircraft may have a ballast weight hanging by a cable from the nose jack pad. This weight, as well as the jack pad and cable, must be completely masked to protect them from stripper and alodine (as applicable) solutions.
- C. Paint Removal (airframe, removed flight controls and landing gear doors).
- (1) Remove old paint/primer from exterior surfaces in accordance with Chapter 51-93-10.
 - (2) **Do not** remove paint on the trailing edge magnesium fillers (see para. 4.A.(8) with chemical strippers. Remove paint and primer mechanically in accordance with AMM Chapter 51 (D6-6003). Use only approved materials and tools.
 - (3) For areas of primer which are not removed by repeated applications of stripper, mechanically remove the primer in accordance with this Chapter. Use 240 grit or finer wet or dry Emery paper, or 3M Scotchbrite pads No. 7447 (P/N 04029) with extreme caution being taken to minimise damage to clad and anodised aluminum panels, as well as any magnesium parts stripped. Remove primer from entire aircraft, but primary emphasis is on the upper/lower wingskins and the upper/lower horizontal stabilizers.

CAUTION USE OF POWER TOOLS IS ONLY AUTHORISED PROVIDED EXTREME CAUTION IS TAKEN TO REMOVE ONLY REMAINING PRIMER AND TO MINIMISE DAMAGE TO AIRCRAFT SURFACES

- (4) For those areas with primer remaining on the aircraft surface after chemical stripping and hand abrading, use of power tools and fine Scotchbrite pad (preferred) or 240 grit (minimum) abrasive pad is authorised to remove remaining primer.
- (5) Rinse stripper from aircraft surfaces with hot water (120 °F minimum).
- (6) Remove masking used during chemical stripping process and inspect all cavities for evidence of stripper entry. If any doubt exists, open/remove access doors and panels and inspect areas for condition. If stripper has entered any cavity, clean stripper and repair any structural (or other) damage caused by the stripper entry, including finishing, in accordance with AMM Chapter 51 (D6-6003).
- (7) Perform alkaline wash in accordance with AMM Chapter 51 (D6-6003), using MIL-C-87936, Type 1 detergent. Ensure residual stripper is removed from the aircraft surface and from fastener countersink areas. Pay particular attention to cleaning those areas which may have primer remaining on the aircraft surface.

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5. Surface Preparation prior to Coating Application

A. Nose Jack Point. Locally strip the nose jack point area in accordance with AMM Chapter 51 (D6-6003) on those aircraft which had the balance weight installed during the stripping phase.

B. Scuff Sanding

(1) Fiberglass Areas, Engine Nose Domes and Engine Inlets

(a) In accordance with AMM Chapter 51 (D6-6003), scuff sand the engine nose domes, the engine inlets, fiberglass patches and the following fiberglass areas identified in Chapter 51-90-20, Figure 1. Prevent debris from entering engine while scuff sanding the engine inlets.

- 1 VOR localizer antenna door (46)
- 2 Vertical fin tip leading edge (24)
- 3 Crash position indicator beacon (45)
- 4 Rudder to fuselage fairing (4)
- 5 Wing trailing edge panel over flap jackscrew stop nut.

(2) Weather Radar Radome. Completely remove topcoat CAAPCOAT (Product No. C-W4 and MIL-C-83286) to the primer CAAPCOAT (Product No. 9924) layer. Lightly scuff sand the primer with 240 grit or finer wet or dry abrasive paper or very fine Scotchbrite pads. Ensure that primer coating is not completely removed, as to not damage the pre-treatment coating underneath the primer (reference Chapter 51-90-20, Figure 1, Item 15).

(3) Airframe. Lightly scuff sand the airframe areas which still have primer remaining, if any, using 240 grit or finer wet or dry Emery paper or Scotchbrite pads (Product No. 7447). Mechanical sanding is authorised to remove existing primer, if necessary, using guidelines established in accordance with paragraph 4.C., of this Chapter.



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C. Airframe, Removed Flight Controls, and Landing Gear Wheel Well Doors

- (1) Masking. Ensure all masking is accomplished in accordance with paragraph 4.A of this Chapter, with the exception of exterior masking on entry doors, access doors, and the following areas identified in Chapter 51-90-20, Figure 1:

- (a) Weather radar radome (15)
- (b) VOR localizer antenna door (46)
- (c) Vertical fin tip leading edge (24)
- (d) Crash position indicator beacon (45)
- (e) Rudder to fuselage fairing (4)
- (f) Wing trailing edge panel over flap jackscrew stop nut.

- (2) Airframe Cleaning

- (a) Using MIL-C-87936, Type I, alkaline cleaner, thoroughly clean all exterior surfaces in accordance with AMM Chapter 51 (D6-6003). Ensure alkaline cleaner is completely rinsed off. Look for areas that flash dry or develop a water break test; this may indicate that residue is still present. Use hot alkaline cleaner and hot rinse water (120 °F minimum).

CAUTION DO NOT CLEAN BARE MAGNESIUM SURFACES WITH WATER, OR SOAP AND WATER MIXTURE

- (b) Perform water break test in accordance with AMM Chapter 51 (D6-6003) in order to assure surface cleanliness before proceeding.
- (c) Perform pH test on all bare metal surfaces using comparator hydrion, 0 - 13 range, test paper. First, test and record the pH of the rinse water. Then, test and record the pH of the wet aircraft surfaces. If the pH of the surface is equal to the pH of the rinse water, the surface passes the test. If the pH is not the same, rinse the aircraft surface again.

NOTE: Aircraft surface must pass this test before proceeding.

- (3) Corrosion Removal

- (a) Remove corrosion on magnesium surfaces with grit sandpaper (No. 240) or finer, unless otherwise directed by this Manual. Sandpaper may be used on a buffing machine provided operators take care to sand uniformly.

- Do not clean bare magnesium with water. Clean magnesium with MEK.



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- Do not perform water break tests on magnesium surfaces.
- Do not remove corrosion from magnesium using instructions in AMM Chapter 51 (D6-6003), but rather mechanical method described above.
- Do not use magnesium pickling solution.

WARNING MAGNESIUM CAN IGNITE WHEN EXPOSED TO HEAT
EXCESSIVE SANDING CAN HEAT MAGNESIUM SURFACES
PERIODIC BREAKS WILL ENSURE THE SURFACE
TEMPERATURE REMAINS LOW

- Perform periodic breaks when sanding magnesium surfaces.

NOTE: Do not apply MIL-C-38334 to the anodised leading edges.

- (b) Apply MIL-C-38334 to aluminum surfaces in accordance with AMM Chapter 51 (D6-6003). Use very fine abrasive pads, MIL-A-9962 (Item 47, Table 2), and agitate aircraft surfaces vigorously while applying MIL-C-38334 (Item 35, Table 2).
- (c) Perform water break test on aluminum surfaces in accordance with AMM Chapter 51 (D6-6003), using deionized water that is 100 °F or less.

NOTE: Aircraft surface must pass this test before proceeding.

- (d) The Surface treatment must be applied immediately after chemical corrosion removal to be effective.
 - (e) Rinse corrosion removal compounds from aircraft surfaces using rinse water that is less than 100 °F. Look for surfaces that indicate a water break or flash dry during rinses. If this occurs, agitate the surface and rinse again to ensure a clean surface. Continue this process until the drying time is longer and comparable to surrounding surfaces.
- (4) Surface Treatment (Conversion Coating)
- (a) During the following steps, look for areas that flash dry or develop a water break during rinse. This will indicate that the conversion coating did not take in these areas. Soak (No. 320) a grit Scotchbrite pad (Item 37, Table 2, Chapter 51-92-20) in the conversion coating and agitate those areas. Then rinse again. Continue this process until the drying time is longer and comparable to surrounding surfaces.



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- (b) Protect aluminum surfaces from the MIL-M-3171 solution. Apply MIL-M-3171, Type VI (Item 36, Table 3, Chapter 51-92-20), to all bare magnesium areas with a clean rag from bottom of a part to the top, in accordance with AMM Chapter 51 (D6-6003). Magnesium conversion coating solution shall have a pH of 1.1 - 1.6. During application of MIL-M-3171 chromic acid treatment to magnesium surfaces, dwell time shall be less than one minute. Mix water temperature for the chromic acid treatment (MIL-M-3171) should be between 70 °F and 90 °F.
- (c) Rinse magnesium surfaces with tap water (100 °F maximum) to remove the conversion coating. Rinse should begin as soon as the magnesium begins to change color. Ensure rinse water does not contact adjacent, bare magnesium parts. If surface turns dark brown or black, repeat procedures starting with alkaline cleaning, paragraph 5.C.(2) of this Chapter.
- (5) Cavity Inspection. Inspect all areas previously masked to prevent intrusion of chemicals used for surface preparation. Ensure chemicals have not entered any cavities. If there is evidence of chemical entry, clean the chemical from the cavity and repair any damaged parts or structure caused by the chemical entry, including finish.

NOTE: Ensure conversion coating dries a minimum of two hours prior to applying primer.

6. Application of Primer

A. General Requirements

- (1) Application of the primer must conform to the specified locations given in Chapter 51-90-20, Figure 1.
- (2) Adhere to all procedures for the application of protective coatings (using test panels, film thickness gages, etc.) identified in AMM Chapter 51 (D6-6003).

B. Masking

- (1) Ensure the following areas are masked:
 - (a) All windows and lights
 - (b) All fuel caps located on top of wings
 - (c) All static ports, including bare areas around static ports
 - (d) Entry door sills
 - (e) All drain holes
 - (f) The two engine fire bottle discharge disks (red) and the two discharge indications (yellow disks) located on the inboard side of the inboard engine struts.



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(2) Ensure the following areas identified in Chapter 51-90-20, Figure 1, are masked:

- (a) Landing gear and tires (37 and 34)
- (b) Wheel wells (38)
- (c) Wing cavities (36)
- (d) APU exhaust door (26)
- (e) All antennas (23, 39 thru 43)
- (f) All leading edge anodised panels (2, 3 and 19)
- (g) Vertical fin tip leading edge (24)
- (h) Nacelle group aft of station 221.25 (20)
- (i) Weather radar radome (15).

C. Application of Wash Primer

Wash primers are an alternative to chemical pre-treatment chromate filming process for exterior of aircraft.

NOTE: Wash primer should not be applied over chemically pre-treated surfaces, i.e. Alodine and is not suitable for use over sealed anodising as this will impair adhesion properties and result an adhesion failure.

(1) Wash Primer BMS 10-72, Type 5 (Chapter 51-92-20, Table 2, Item 28).

- (a) Ensure that wash primer is prepared for use in accordance with manufacturer's instructions. Use within 15-30 minutes after mixing primer/hardener/thinner. Apply wash primer to a dry film thickness of 0.3 - 0.4 mils, in accordance with manufacturers instructions, to locations specified Chapter 51-90-20, Figure 1, and applicable Boeing drawings.
- (b) Apply a three and one-half (3 1/2) inch wash primer strip to the upper aft portion of the wing leading edge skin panel along the entire length of the both wings at the front spar containing steel fasteners.
- (c) Allow wash primer to cure (dry) a minimum of 2 hours, and a maximum of 8 hours prior to applying primer BMS 10-72, Type 5.

(2) Wash Primer PR30B (Chapter 51-92-20, Table 2, Item 58)

- (a) Ensure that etch primer is prepared for use in accordance with manufacturer's instructions or Chapter 51-92-20,

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Table 1. Allow the mixed material to stand 30 to 45 minutes before use.

- (b) Apply one wet even coat of etch primer to give a dry film thickness of 4-8 microns, in accordance with manufacturers instructions, to locations specified Chapter 51-90-20, Figure 1, and applicable Boeing drawings.

NOTE: The applied coating should represent a chemical pre-treatment with an iridescent yellow to golden colour. Dark brown to black applications should be avoided as this would indicate overapplication and excessive film build.

- (c) Allow etch primer to cure (dry) a minimum of 1 hour at 23 °C, prior to applying Epoxide Primer PR143.

D. Application of Primer

(1) Primer BMS 10-72, Type 5 (Chapter 51-92-20, Table 2, Item 31)

- (a) Ensure primer is prepared for use in accordance with manufacturer's instructions. Use within 15 - 30 minutes after mixing primer/hardener/thinner. Apply primer to a dry film thickness of 0.5 - 0.8 mils (12 - 20 microns), in accordance with manufacturers instructions, to locations specified in Chapter 51-90-20, Figure 1, and applicable Boeing drawings. If a second coat is required to obtain stated dry film thickness, recoat after a minimum of 2 hours drying time, not to exceed 72 hours.
- (b) Apply a three and one-half (3 1/2) inch primer strip to the upper aft portion of the wing leading edge skin panel along the entire length of the both wings at the front spar containing steel fasteners, over area previously coated with wash primer.
- (c) Allow final coating of primer to cure (dry) a minimum of 4 hours prior to application of topcoat, not to exceed 72 hours. Exception to minimum cure time is in area of application at upper wing skin leading edges, where sprayable sealant will be applied in accordance with paragraph 6.E.

(2) Epoxide Primer PR143 (Chapter 51-92-20, Table 2, Item 55)

- (a) Ensure primer is prepared for use in accordance with manufacturer's instructions or Chapter 51-92-20, Table 1. Allow the mixed material to stand for 15 minutes before use.
- (b) Apply one wet even double track / box coat of epoxide primer to give a dry film thickness of 15 - 20 microns, in accordance with manufacturers instructions, to locations specified Chapter 51-90-20, Figure 1, and applicable Boeing drawings.



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NOTE: Avoid over application. Heavy coats of primer can result in orange peel, intercoat adhesion failure and usually necessitates sanding prior to the application of the finishing coats. Also adds weight to the aircraft.

- (c) Allow epoxide primer to cure (dry) a minimum of 4 hour and maximum 48 hours prior to applying flexible polyurethane topcoat. After 48 hours prepare the epoxide primer according manufacturer's instructions before applying of the topcoat.
- (3) Weather Radar Radome. Wipe the scuff sanded radome with MEK dampened clean cloths until there is no visible pickup of particles or discoloration of cloth. Wipe dry with clean, dry wipers. Apply mist coat of CAAPCOAT (Product No. 9924) primer over entire radome.

E. Inspection of Primer Application

- (1) A complete inspection of the primer application shall be accomplished after the time specified for drying in accordance with manufacturers instruction.
- (2) Dry film thickness gages shall be used to ensure the coating is at the proper thickness in accordance with Chapter 51-90-20, Figure 1.
- (3) A visual inspection of the primer shall be accomplished at a distance of 3 to 5 feet from the aircraft surface for the following defects:
 - (a) Blisters: None are acceptable.
 - (b) Fish Eyes: None are acceptable.
 - (c) Runs: None are acceptable.
 - (d) Sags: No more than 2 minor per 50 square feet of surface (minor run does not exceed two inches in length). No sags with discoloration of primer are acceptable.
 - (e) Pin Holes: No pin holes that penetrate thru the primer coat are acceptable.
 - (f) Orange Peel: Slight to medium orange peel is acceptable provided defect does not exceed two square feet in one area and no more than 1 to 1/2 percent of the entire surface.
 - (g) Roughness, Dirt or Dust Inclusions: This type of defect shall be held to the very minimum; however, it is realised that a complete absence of dirt and dust is next to impossible.
 - (h) Upper Wing Skin Fasteners: "Half moons" around upper wing skin fasteners are not acceptable. Ensure that coating system completely penetrates and fills areas surrounding countersink fastener and upper skin panel. Only slight circular indentations should be present, indicating fastener head underneath.



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F. Upper Wing Skin Leading Edge Sprayable Sealant Application

- (1) Location of the 6 inch wide strip of sprayable sealant (MIL-S-81733, Type III-1) is as follows: Locate the centerline of the strip at the aft edge of the wing leading edge skin panels. The strip will extend 3 inches forward on the leading edge skin panel and 3 inches aft on the inspar wingskin surface, and will extend from the wing root to the wing tip.

NOTE: In this area, allow primer (BMS 10-72, Type 5) to cure for 12 hours prior to applying sealant.

- (2) Apply MIL-S-81733 Type II-1/2 in seams and fastener areas in accordance with AMM Chapter 51 (D6-6003), and allow to cure for 12 hours.
- (3) Mask inspar skin for the 6 inch wide strip of sprayable sealant defined above. Lightly scuff sand primer in the 6 inch area with Scotchbrite pad or 240 grit sandpaper. Wipe with alcohol and tack.
- (4) Prepare and mix MIL-S-81733 Type III-1 sealant in accordance with AMM Chapter 51 (D6-6003). Apply MIL-S-81733 Type III-1, to 6 inch area in accordance with AMM Chapter 51 (D6-6003).
- (5) Demask area immediately after spraying to allow sealant edges to feather slightly.
- (6) Allow spray sealant to cure in accordance with manufacturer's instructions, and apply mist coat of primer. Once mist coat of primer on sealant has cured for a minimum 2 hours, apply topcoat to area in accordance with paragraph 7. requirements.

G. Refinish Abrasion-Resistant Teflon Coating Application Fillet Flap Flaperette.

- (1) Remove paint and dirt from the surface of the flaperette by abrasive blasting per AMM Chapter 51 (D6-6003).

WARNING USE TOLUENE TT-T-548 SPARINGLY AND WITH ADEQUATE VENTILATION. USE ONLY IN AREAS FREE OF POSSIBLE IGNITION SOURCES. AVOID PROLONGED BREATHING OF VAPORS AND REPEATED CONTACT WITH SKIN. PERSONNEL PERFORMING THIS OPERATION SHALL OBSERVE THE SAFETY PRECAUTIONS PER CHAPTER 51-90-10.

NOTE: This coating is applied to applicable surfaces after pre-treatment or priming with epoxy primer following repair, or after reactivation of old epoxy primer.

- (2) Clean the surface of all dust and grease by wiping with clean cheesecloth moistened in toluene TT-T-548 (Item 48, Table 2). (Enzyme Cleaner (Product No. 109) MIL-C-83873 (Item 49, Table 2) may be used if Bioenvironmental prohibited the use of TT-T-548). Wipe dry with clean cheesecloth (Item 44, Table 2) before solvent evaporates.



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- (3) Dilute LIXTON TS 803 M with water (1 part LIXTON to 4 parts water) and hand brush solution on entire surface to be treated.
- (4) Flush the TS 803 M solution from the surface with clean water. Ensure that the surface is clean. If not, repeat paragraph 6.G. of this Chapter.
- (5) Dilute LIXTON TS 563 with water (1 part LIXTON to 3 parts water) and apply on entire surface by hand using medium grade Scotch-brite abrasive pad. Allow to work on surface for approximately 15 minutes until the surface turns black. Rinse surface with water and ensure that all corrosion and TS 563 solution has been completely removed. If any corrosion remains, repeat paragraph 6.G. of this Chapter.
- (6) When surface is dry, refinish with primer and polyurethane topcoat per Chapter 51-90-20.
- (7) Apply a coat of teflon coating (Item 14, Table 2) per Chapter 51-92-17 procedures.

Treat interior of flaperette with dinotrol AV 30, section X III, AMM Chapter 51 (D6-6003).

7. Application of Topcoat

A. General Requirements

- (1) Topcoat must be applied within 8 hours of application of primer, but after sufficient time for primer to cure in accordance with manufacture guidelines. Exception is in area of spray sealant application, in accordance with paragraph 6.F. of this Chapter.

NOTE: In areas which are prone to stress and/or damage (e.g. fastener movements and leading edges) and are not restricted by specification film weight requirements, the application of a further coats with 2 hours minimum airdry between should be applied to give a dry film thickness of approx 125 microns.

- (2) Application of topcoat must confirm to the colors, locations, specifications, and thicknesses specified in Chapter 51-90-20, Figure 1, Primary Finish System and applicable Boeing drawings.

B. Application of Topcoat

- (1) Airframe (including removed flight controls, landing gear doors, engine nose dome and engine inlets).
 - (a) Adhere to all procedures for the application of protective coatings (using test panels, film thickness gages, etc.) identified in AMM Chapter 51 (D6-6003).
 - (b) Prepare topcoat for application in accordance with manufacturer's instructions or Chapter 51-92-20.

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- (c) Apply topcoat to airframe surfaces in accordance with Chapter 51-90-20, Figure 1. Extend topcoat application on upper wing skin leading edge to match underlying 3 1/2 inch primer application, applied per paragraph 6.C.
- (d) Engine nose domes and engine inlets shall have a minimum of 2.5 mils (63.5 microns) of topcoat applied. High erosion areas around cockpit windows, leading edge of engine struts and aft of radome strut leading edges shall have a minimum thickness of 3.0 - 5.0 mils (76 - 127 microns).
- (e) Total dry film thickness of the wash primer, primer and topcoat shall be 2.5 - 3.5 mils.

(2) Weather Radar Radome

- (a) Aft of Station 143.6: Immediately prior to coating application, wipe the area with CAAPCOAT thinner or methyl-iso-butyl ketone (MIBK) dampened cheesecloth. Apply CW-4 topcoat, and one coat of Polyurethane Enamel, Color Number 16515 (gray), in accordance with Chapter 51-90-20, Figure 1, Item 15.
- (b) Forward of Station 143.6: Immediately prior to coating application, wipe the area with CAAPCOAT thinner or methyl iso-butyl ketone (MIBK) dampened cheesecloth. Apply C-W4 coating in accordance with Chapter 51-90-20, Figure 1, Item 15.

(3) Vertical Fin Tip Leading edge (Chapter 51-90-20, Figure 1, Item 24). Apply rain erosion resistant coating.

C. Edge Sealer Application. On critical areas which are prone to peeling, i.e., wing leading edge, vertical fin leading edge, antenna pedestal strut leading edge, stabilizer leading edge, apply 3M 4150 (Item 40, Table 2) (or equivalent) edge sealer. Apply sufficient sealer to affect a maximum of one inch width band centered on paint edge. Edge sealer may also be used to cover the joint between paint and silicon aerosmoothen sealant, all around flight deck fixed windows.

D. Inspection of Topcoat Application

- (1) A complete inspection of the topcoat application shall be accomplished after the time specified for drying in accordance with manufacturers instruction.
- (2) Dry film thickness gages shall be used to ensure the coating is at the proper thickness in accordance with Chapter 51-90-20, Figure 1.
- (3) A visual inspection of the primer and topcoat system shall be accomplished at a distance of 3 to 5 feet from the aircraft surface for the following defects in accordance with AMM Chapter 51 (D6-6003) guidelines.



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- (a) Blisters: None are acceptable.
- (b) Fish Eyes: Allowable on underside of aircraft only.
- (c) Runs: None are acceptable.
- (d) Sags: Light sags no more than 2 minor per 50 square feet of surface (2 inches in length). No sags with discoloration of paint are acceptable.
- (e) Pin Holes: No pin holes that penetrate thru the top coat are acceptable.
- (f) Orange Peel: Slight to medium orange peel is acceptable provided the finish meets the gloss and thickness requirements and does not exceed two square feet in one area, and no more than 1-1/2 percent of entire surface.
- (g) Overspray: Overspray shall be held to a minimum and these areas shall meet the gloss and thickness requirements. Overspray of a different color is not acceptable.
- (h) Sandpaper Finish: None is acceptable for gloss finish aircraft.
- (i) Roughness, Dirt or Dust Inclusions: This type of defect shall be held to the very minimum; however, it is realised that a completely absence of dirt and dust is next to impossible.
- (j) Adhesion: Wet tape tests shall be performed in representative areas on the surface of the aircraft in accordance with AMM Chapter 51 (D6-6003).
- (k) Upper Wing Skin Fasteners: "Half moons" around upper wing skin fasteners are not acceptable. Ensure that coating system completely penetrates and fills areas surrounding countersink fastener and upper skin panel. Only slight circular indentations should be present, indicating fastener head underneath.
- (l) The minimum gloss requirement for polyurethane finish is 85, tested in accordance with AMM Chapter 51 (D6-6003).



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8. Seperate Treatment Requirements

A. Flight Control Cutouts (including hinge point areas).

- (1) Before cleaning flight control cutouts, all high strength, heat treated steel components shall be identified. Refer to Chapter 51-90-20, Table 3 for a list of these components. The specific AMM requirements for these components shall be followed.
- (2) Clean flight control cutouts (ailerons, elevators, rudder, trailing edge flaps) in accordance with AMM Chapter 51 (D6-6003).
- (3) Mask all areas which may be damaged by entry of paint dust. Mask all components/parts (including cables, tubing, wiring, etc.) not to be painted, to prevent overspray.
- (4) Hand abrade flight control cutouts to remove all loose and deteriorated topcoat and spot paint in accordance with AMM Chapter 51 (D6-6003), using wash primer/primer and polyurethane enamel, color in accordance with Chapter 51-90-20, Figure 1.
- (5) Replace missing/damaged decals and markings, as required, in accordance with Chapter 11-20-10.

9. Post Finish Requirements

A. Flight Controls. Engine Nose Domes. Landing Gear Doors. After painting, flight control surfaces shall be balanced in accordance with AMM Chapter 51 (D6-6003). After balancing, the control surfaces shall be installed, rigged, and functionally checked in accordance with AMM Chapter 27 (D6-6003). Reinstall engine nose domes after repaint in accordance with AMM Chapter 27 (D6-6003). Reinstall main and nose gear wheel well door and main gear strut doors after repaint in accordance with AMM Chapter 32 (D6-6003).

B. Markings and Stencils

- (1) Reapply aircraft markings and stencils in accordance with 11-20-10.
- (2) Precise location of the alignment points during repaint is required. Incorrect location could lead to structural damage during future maintenance actions.
- (3) Existing panel numbers shall not be removed from leading edge anodised panels.



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C. Aircraft Lubrication/CIC Application

- (1) Reapply corrosion inhibiting compound in accordance with AMM Chapter 51 (D6-6003). Ensure that all areas noted in AMM Chapter 51 (D6-6003), have CIC applied. Specifically:
 - (a) Wing leading edge slat/flap cavities
 - (b) Wing trailing edge flap wells
 - (c) Wing leading edge slat support fittings
 - (d) Surrounding structure of fillet flap transmission assembly
 - (e) Nose and main landing gear structure
 - (f) Nose and main landing gear wheel wells
 - (g) Main landing gear magnesium door panels (outboard follow up doors). Prior to applying CIC, ensure that all deteriorated finishes are restored in accordance with AMM Chapter 51 (D6-6003).
- (2) Lubricate the aircraft in accordance with AMM Chapter 07 (D6-6003), Section 4.

D. Aircraft Weight and Balance. After paint, weigh the aircraft in accordance with T.O. NITCA-5.

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INTERCONTINENTAL
STRUCTURAL REPAIR
ALUMINUM HONEYCOMB REPAIRS

TEMPORARY REVISION 51-49

FILING INSTRUCTIONS

For the printed manual, file this temporary revision adjacent to the page(s) affected.

For the microfilm supplement, file this temporary revision in sequence by ATA number. Mark the microfilm cartridge to indicate that it has been changed by temporary revision(s).

Revision reason: Added new metal bond technology.

This temporary revision furnishes an advance copy of the following page(s) which supersede any previously issued page(s). The information thereon is to be used until this temporary revision is either incorporated or rescinded.

<u>Chapter-Section-Subject</u>	<u>Page No.</u>	<u>Date</u>
51-9-1	1 thru 13	DELETED
51-9-2	1 thru 7	DELETED
51-9-3	1 thru 94	Jun 30/06
51-9-4	1 thru 3	Jun 30/06
51-9-5	1 thru 6	Jun 30/06
51-9-6	1 thru 10	Jun 30/06
51-9-7	1 thru 20	Jun 30/06
51-10-1	1 thru 44	DELETED



INTERCONTINENTAL
STRUCTURAL REPAIR

REPAIR GENERAL - ALUMINUM HONEYCOMB REPAIRS - 250°F (121°C) CURE

1 Applicability

NOTE The repairs in this subject will not have an effect on a Structurally Significant Item (SSI). Thus, no change to the Supplemental Structural Inspection Document (SSID) inspection program is necessary.

- A This subject gives instructions for 250°F (121°C) cure repairs to bonded aluminum alloy skin and honeycomb core sandwich structure.
- B This subject applies to the repair of Boeing airplane structure that was manufactured at 250°F (121°C) or 350°F (177°C).
- C Only use this procedure if an SRM repair section or an approved repair plan refers to this subject.
- D Do not use this procedure for a rebuild or remanufacture of Boeing airplane structure (or for a repair that is larger than the limits given in Fig. 1).

2 General

- A Refer to the SRM component repair section for

- * The identification of the materials and the references to the engineering drawings
- * The allowable damage data
- * The references to this subject
- * The types of repairs that are permitted and/or the repair size limits (When applicable)
- * Other data that is not given in this subject

- B In this subject are the instructions for:

- * Damage removal
- * Surface preparation procedures for aluminum alloys
- * Application of adhesive primers
- * Application of film and paste adhesives
- * Aluminum honeycomb core splicing
- * Vacuum bag procedures
- * Cure procedures
- * Bond inspection procedures
- * Repair procedures

3 References

SRM 51-1-1	Sheet Metal Materials
SRM 51-13-1	Inspection and Removal of Damage
SRM 51-15-0	Control Surface Balancing
SRM 51-8-0	Protective Treatment of Metallic and Composite Materials



**INTERCONTINENTAL
STRUCTURAL REPAIR**

BAC 5514	Common Bonding Requirements for Structural Adhesives
BAC 5514-589	Application of Corrosion Inhibiting Adhesive Primer
BAC 5555	Phosphoric Acid Anodizing of Aluminum for Structural Bonding
BSS 7217	Air Cleanliness, Shop Compressed Air
D6-49327	Certification of Autoclaves for Metal Bonding and Curing of Composite Structure
D6-56273	Qualification of Heat Blankets for Hot Bonding
NDT Part 1, 51-01-01	Inspection of Repairs to Composite Structure
NDT Part 1, 51-04-00	Ultrasonic
NDT Part 1, 51-05-01	Tap Test Inspection of Honeycomb Sandwich Structure
SOPM 20-30-03	General Cleaning Procedures
SOPM 20-30-97	Solvents for Final Cleaning Before Structural Bonding (Series 97)

4 Definitions

A Boegel (AC130)

- (1) A type of complex inorganic polymer from the sol-gel family of chemical compounds

B Damage

- (1) Change to the surface of a part that is caused by deterioration, corrosion, disbands, erosion, dents, gouges, cracks, scratches, punctures and holes

C Disbond

- (1) The failure of a bond adhesive that causes separation between a skin and core or doubler

D Durability

- (1) A low crack growth rate, a strong bond, and good corrosion protection

E Engineering Review

- (1) Approval by an engineer with the experience, qualifications and authority to make decisions on structural repairs. The engineer will make sure that the repair design has the necessary airworthiness requirements (the repaired part has the necessary strength, durability, damage tolerance (if necessary), and will function on the airplane correctly)
- (2) Boeing can also give an engineering review, if necessary.

F One-Stage Cure

- (1) The core and skins are bonded together at the same time (One application of heat)

G Rebuild/Remanufacture



INTERCONTINENTAL STRUCTURAL REPAIR

- (1) The damage is too large to use repair procedures and materials (manufacturing procedures are necessary) Permission from Boeing and your local regulatory agency can be necessary because of intellectual property, certification, quality control, and safety rules

NOTE With permission, you can use the Boeing engineer drawings, material specification, and process specifications

H Two-Stage Cure

- (1) When the repair parts are bonded in two cure steps (Two separate applications of heat)
- (a) The first stage The core is bonded into the repair and then cured with one side of the core open (Before the last skin is put on and then cured)
- (b) The second stage. The last skin (one or more doublers) is put on and then cured

I More sources of definitions

- (1) SRM 51-13-1

5 Repair Summary

A Refer to Table 1 for an index of the paragraphs and figures

REFERENCE	TITLE
Paragraph 6	Find the Limits of the Damage
Paragraph 7	Remove the Damage
Paragraph 8	Make the repair parts
Paragraph 9	Installation of the Honeycomb Repair Core
Paragraph 10	Inspect the fit of the repair parts
Paragraph 11	Use of the Surface Preparation Procedures
Paragraph 12	The Phosphoric Acid Containment System (PACS) Procedure
Paragraph 13	The Phosphoric Acid Non-Tank Anodizing (PANTA) Procedure
Paragraph 14	The Boegel (AC-130) Prebond Treatment Procedure
Paragraph 15	Application of BMS 5-89 Adhesive Primer to the Bond Surface
Paragraph 16	Hydrofluoric (HF) - Alodine Procedure
Paragraph 17	Application of BAC 5710, Type 60 Adhesive Primer
Paragraph 18	Application of BMS 5-101 Film Adhesive
Paragraph 19	Application of BMS 5-92 or BMS 5-141 Paste Adhesive
Paragraph 20	Cure the bond
Paragraph 21	Do an examination of the bonded repair
Paragraph 22	Clean, seal, and finish

Repair General Index
Table 1 (Sheet 1)

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**INTERCONTINENTAL
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REFERENCE	TITLE
Fig 1	Repair Options
Fig 2	Flow Chart of the Repair Steps
Fig 3	Damage Removal
Fig 4	Phosphoric Acid Containment System (PACS)
Fig 5	Phosphoric Acid Non-Tank Anodize (PANTA) Layup
Fig 6	Polarized Light Test - Verification of Anodic Oxide Film
Fig 7	Repair Doubler Specifications for Flush Repairs
Fig 8	Repair Doubler Specifications for External Patch Repairs
Fig 9	Installation of the Repair Core
Fig 10	Cure Time for BMS 5-92, Two-part Paste Adhesive
Fig. 11	Cure Time for BMS 5-141 Paste Adhesive
Fig 12	Installation of the Repair Doubler
Fig 13	Thermocouple Locations
Fig 14	Layup of Vacuum Bagging Materials

**Repair General Index
Table 1 (Sheet 2)**

- B** The illustrations and instructions in this repair show different examples of repairs and types of damage. You can do repairs that put together one or more of these examples. Use the correct repair procedures for each type of example. For example, if a circular shaped repair is shown, you can use a non-circular shape as an alternative.
- C** This subject contains four surface preparation procedures.
- (1) The Phosphoric Acid Containment System (PACS) procedure
 - (2) The Phosphoric Acid Non-Tank Anodize (PANTA) procedure
 - (3) The Boegel (AC-130) Prebond Treatment procedure
 - (4) The Hydrofluoric (HF) - Alodine procedure
- D** There are two adhesive primer application procedures
- (1) BMS 5-89 Type I or Type II application procedure
 - (2) BAC 5710, Type 60 application procedure
- E** There are four metal-to-metal bond adhesives used in this subject
- (1) BMS 5-101, Type II film adhesive, cured at 225° to 260°F (107° to 127°C)
 - (2) BMS 5-92, Type I paste adhesive, cured at 70° to 260°F (21° to 127°C)
 - (3) BMS 5-92, Type V paste adhesive, cured at 70° to 180°F (21° to 82°C)

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**INTERCONTINENTAL
STRUCTURAL REPAIR**

(4) BMS 5-141 paste adhesive, cured at 70° to 200°F (21° to 93°C)

F To make a satisfactory repair, you must do what follows:

- (1) Use the correct materials
- (2) Remove all the water and other contamination from the part
- (3) Do the bond procedures in a clean, dry location.
- (4) Make the bond surfaces clean
- (5) Do a satisfactory surface preparation
- (6) Make sure that all of the parts have the correct shape and dimensions
- (7) Make sure that the repair parts have the correct flatness or curvature The parts must install correctly when you apply light finger pressure
- (8) Make sure that the adhesive bondline thickness is correct.
- (9) Remove some of the air and gases from the honeycomb core before you start a cure cycle (Vacuum bagged repair procedure)
- (10) Use sufficient pressure, time, and temperature to cure the repair

G Identify the material containers with a label that contains the data that follows:

- * BMS Specification
- * Type
- * Class
- * Supplier Name
- * Batch Number
- * Date of preparation

H Make sure that you do the bond procedures in a clean, dry location (a location that does not have contamination from exhaust fumes, rain, or other unwanted materials) Make sure that shop compressed air does not have water, oil, or other contamination Use Boeing Specification Support Standard BSS 7217 "Air Cleanliness, Shop Compressed Air" (or the equivalent specification) to see if the shop compressed air is satisfactory.

NOTE You can make a tent to seal the area from contamination

I A phosphoric acid tank anodize procedure is a permitted alternative to the PAA non-tank procedures given in this section Make sure that your tank facilities, chemicals, and procedures are satisfactory Refer to Boeing Process Specification BAC 5555, "Phosphoric Acid Anodizing of Aluminum for Structural Bonding" (or the equivalent specification).



**INTERCONTINENTAL
STRUCTURAL REPAIR**

- J If you use a heat blanket, make sure that it is qualified and will operate correctly D6-56273, "Qualification of Heat Blankets for Hot Bonding", is a procedure that Boeing uses. You can refer to this procedure or use an equivalent procedure to qualify your heat blanket.
- K If you use an autoclave, make sure that your autoclave facilities and procedures are satisfactory. Refer to Boeing Process Specification 5514, "Common Bonding Requirements for Structural Adhesives" and D6-49327, "Certification of Autoclaves for Metal Bonding and Curing Composite Structure" (or the equivalent specifications).
- L If you use an oven, make sure that it has equipment that can circulate the heated air, supply a vacuum and control the temperature.

WARNING USE MECHANICAL AIRFLOW AND BREATHING PROTECTION WHEN YOU WORK IN A CLOSED SPACE OR AREA. MAKE SURE THAT THE FRESH AIR SUPPLY IS NOT BLOCKED. IF YOU GET FLUIDS IN YOUR EYES, FLUSH WITH WATER IMMEDIATELY AND GET MEDICAL AID.

- M Read the manufacturer's safety data sheet (MSDS) for each of the materials you use in this procedure. Wear protective clothing and equipment if it is specified in the MSDS.
- N Keep all resin and adhesive materials in the storage condition specified in the manufacturer's instructions or the Boeing specifications (as applicable). Do not keep the materials out of storage for longer than necessary.
- O Read each CAUTION in this procedure. They will help to prevent damage to the repair and prevent more damage to the airplane part.
- P Read each WARNING in this procedure. They will help to prevent injury to you and others.
- Q Refer to Fig 1, Repair Options to help you make a decision on the correct repair procedure.
- R Refer to Fig 2, Flow Chart of the Repair Steps before you start the repair procedure.
- S Refer to Table 2 and make a repair selection.

SRM Section	Title
51-9-4	Repair of a Disbond at an Edge of Aluminum Honeycomb Structure
51-9-5	Repairs to Small Damage
51-9-6	Septumized Core Repairs
51-9-7	Repairs to Large Damage

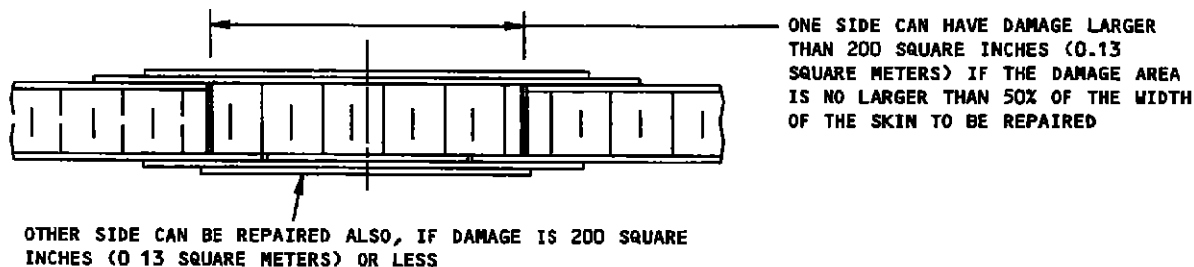
Repair Examples
Table 2



**INTERCONTINENTAL
STRUCTURAL REPAIR**

SURFACE PREPARATION	REPAIR TYPE	PASTE ADHESIVES	FILM ADHESIVES	
			VACUUM BAG CURE A	AUTOCLAVE CURE B
		MAXIMUM DAMAGE SIZE C		
HF ALODINE	INTERIM D	2.0 INCHES (50 mm) LENGTH OR DIAMETER	2.0 INCHES (50 mm) LENGTH OR DIAMETER	2.0 INCHES (50 mm) LENGTH OR DIAMETER
BOEGEL (AC-130)	INTERIM D	2.0 INCHES (50 mm) LENGTH OR DIAMETER	NOT APPLICABLE	NOT APPLICABLE
	PERMANENT	E	64 SQUARE INCHES (400 SQUARE CM) F	200 SQUARE INCHES (0.13 SQUARE METERS)
TANK PAA, PACS, PANTA	INTERIM D	2.0 INCHES (50 mm) LENGTH OR DIAMETER	NOT APPLICABLE	NOT APPLICABLE
	PERMANENT	E	64 SQUARE INCHES (400 SQUARE CM) F	200 SQUARE INCHES (0.13 SQUARE METERS) SEE DETAIL A G H

TABLE A



PERMITTED DAMAGE SIZES THAT CAN BE REPAIRED IN AN AUTOCLAVE
(APPLICABLE TO SURFACES PREPARED WITH TANK PAA (BAC5555),
PACS OR PANTA) **G H**

DETAIL 1

Repair Options
Figure 1 (Sheet 1)

BOEING
707**INTERCONTINENTAL
STRUCTURAL REPAIR****NOTES:**

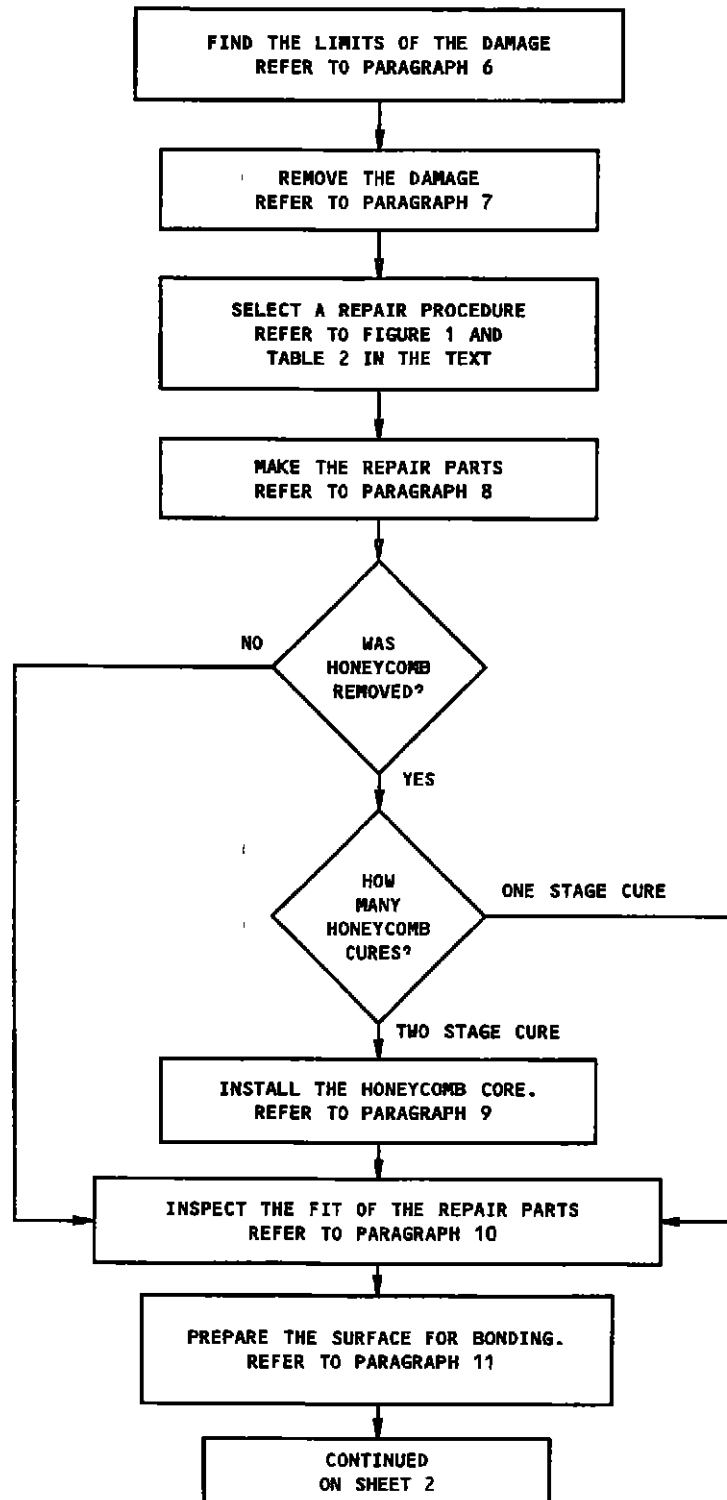
- A** OVEN, HEAT BLANKET, HEAT LAMPS OR FORCED HOT AIR ARE PERMITTED. MAKE SURE THAT THE CORRECT CURE TEMPERATURE CAN BE CONTROLLED DURING THE CYCLE. REFER TO PARAGRAPH 20.
- B** AUTOCLAVE MUST BE PRESSURIZED AS SPECIFIED IN PARAGRAPH 20
- C** AFTER YOU FIND AND REMOVE THE DAMAGE AS SPECIFIED IN PARAGRAPH 7
IF YOU DO A FLUSH REPAIR: THE CUTOUT ON THE SIDE THAT WILL HAVE THE EXTERNAL DOUBLER MUST BE LESS THAN OR EQUAL TO THE SIZES IN THIS TABLE.
- D** INTERIM REPAIRS MUST BE INSPECTED EACH 24 MONTHS OR LESS, OR EACH 3500 FLIGHT CYCLES OR LESS (NO LATER THAN THE INTERVAL THAT OCCURS FIRST)
- E** THE MAXIMUM PERMITTED DAMAGE LENGTH (OR DIAMETER) IS 1.0 INCH (25 mm) OR THE ALLOWABLE DAMAGE LIMIT (THE SMALLER OF THE TWO). ONLY BMS 5-92, TYPE V OR BMS 5-141 ARE PERMITTED IN PERMANENT REPAIRS.
- F** YOU CAN INCREASE THE MAXIMUM SIZE TO 200 SQUARE INCHES (0.13 SQUARE METERS) IF YOU DO THE STEPS THAT FOLLOW:
- DO A TWO STAGE CURE REPAIR PROCEDURE (WHEN HONEYCOMB CORE IS DAMAGED)
 - USE BMS 5-121 POSITIONING FABRIC WITH THE FILM ADHESIVE
- G** TO REPAIR DAMAGE THAT IS LARGER THAN 200 SQUARE INCHES (0.13 SQUARE METERS) YOU MUST:
- GET AN ENGINEERING REVIEW
 - SEE DETAIL A FOR REPAIR SIZES.
- H** TO REBUILD/REMANUFACTURE PARTS THAT HAVE DAMAGE TO MORE THAN 200 SQUARE INCHES (0.13 SQUARE METERS) OR MORE THAN 50% OF THE AREA OF THE SKIN TO BE REPAIRED, YOU MUST:
- GET AN ENGINEERING REVIEW
 - USE APPROVED ENGINEERING DRAWINGS FOR THE COMPONENT TO BE REPAIRED
 - USE APPROVED MATERIALS AND MANUFACTURING PROCESSES SPECIFIED IN THE COMPONENT ENGINEERING DRAWINGS
 - RESTORE THE PART TO THE INITIAL DESIGN CONFIGURATION

Repair Options
Figure 1 (Sheet 2)

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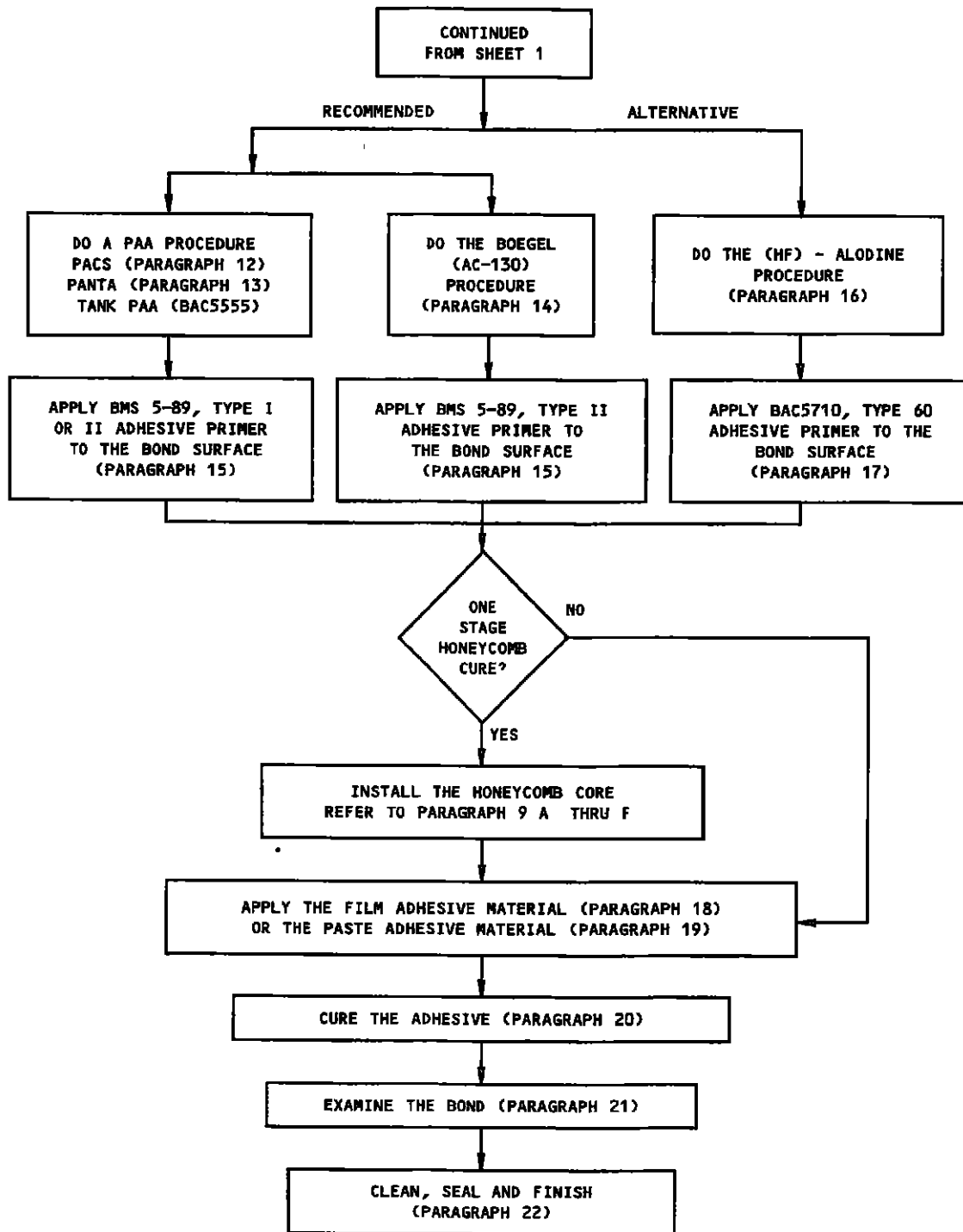
**INTERCONTINENTAL
STRUCTURAL REPAIR**



Flow Chart of the Repair Steps
Figure 2 (Sheet 1)



**INTERCONTINENTAL
STRUCTURAL REPAIR**



Flow Chart of the Repair Steps
Figure 2 (Sheet 2)

**6 Find the Limits of the Damage****A. Examine the damage in the repair area**

WARNING DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN DO NOT BREATHE THE FUMES FROM SOLVENTS SOLVENTS ARE DANGEROUS MATERIALS SOLVENTS CAN BE FLAMMABLE OR CAUSE DAMAGE TO THE ENVIRONMENT REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS) AND THE LOCAL SAFETY PRECAUTIONS

- (1) Clean the damaged area with a soft cloth moist with cleaning solvent Refer to SOPM 20-30-03 for the applicable cleaning solvent and general cleaning procedures

CAUTION USE NON-DESTRUCTIVE PROCEDURES TO MAKE SURE THAT THERE IS NO WATER TRAPPED IN THE PART BEFORE YOU APPLY HEAT TO CURE THE ADHESIVES DAMAGE TO THE PART WILL OCCUR IF THE WATER IS NOT REMOVED

- (2) Do a visual and NDI examination of the damaged area to find disbonds and other types of damage to the structure

NOTE Refer to NDT Part 1, 51-04-00 for instrumented NDI procedures, or NDT Part 1, 51-05-01 for tap test procedures

B Examine the initial BMS 5-89 adhesive primer (if applicable)

- (1) It is not necessary to remove the initial BMS 5-89 adhesive primer from the bond surface if the primer has the conditions that follow

(a) There is no contamination from paints, oils, chemicals, or other unwanted materials

(b) Metal-to-metal bonding - there are no scratches or missing primer that

- 1) Show more than 0.1 square inch (65 square mm) of bare metal
- 2) Are more than 0.5 inch (13 mm) in length
- 3) Are less than 0.5 inch (13 mm) from an edge
- 4) Are less than 3.0 inches (75 mm) (edge-to-edge) apart

(c) Core-to-skin bonding - there are no scratches or missing primer that

- 1) Show more than 2.0 square inches (13 square cm) of bare metal at each location
- 2) Show more than a cumulative total area of bare metal of 4.0 square inches (26 square cm)



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- 3) Are less than 6 0 inches (150 mm) (edge-to-edge) apart.

NOTE A group of bare metal areas in a 2 0 square inch (13 square cm) area can be specified as one bare metal area. A group must then be 6 0 inches (150 mm) (edge-to-edge) from a different bare area or group.

- (2) In these small areas where there is bare metal or missing primer, do the steps that follow:

- (a) Clean the bare metal. Refer to SOPM 20-30-03 for the applicable solvents.
- (b) Apply adhesive primer to the bare metal as given in par 15 or par 17.

- (3) If more adhesive primer is damaged or removed than is permitted, then do one of the surface preparations specified in par 11.

7 Remove the Damage

NOTE Use a table or special tool to keep the part in the correct shape if you remove large areas of damage.

- A. Remove the damaged skin from the repair area.

NOTE As an alternative, you can do a surface preparation and apply the adhesive primer on the surface before you remove the damage. Make sure that you prepare an area that is larger than the necessary minimum bond area. This will give you a sufficient bond area if the removed damage is larger than the NDI indication.

WARNING DO NOT USE EQUIPMENT THAT CAN CAUSE AN ARC OR A SPARK IN AN AREA WHERE THE IGNITION OF FUMES IS POSSIBLE. IF YOU DO, AN EXPLOSION CAN BE THE RESULT.

- (1) If the aluminum skin is damaged or has disbanded areas, do the procedure that follows:

- (a) Cut and remove the damaged skin in the disbanded areas.
- (b) Separate the bonded structures (if applicable and necessary). Refer to Fig 3 for the steps that follow:
 - 1) Make the wedge(s).
 - 2) Use polyester tape to attach an approximately 0 02-0 06 inch (0 5-1 5 mm) thick metal or plastic sheet adjacent to the bonded area.

WARNING USE DRY ICE OR COMPRESSED CARBON DIOXIDE GAS ONLY IN AN AREA WHERE THERE IS A SATISFACTORY FLOW OF AIR. HIGH LEVELS OF CARBON DIOXIDE CAN CAUSE INJURY. WEAR PROTECTIVE GLOVES. IF DRY ICE TOUCHES YOUR SKIN OR EYES, GET MEDICAL AID IMMEDIATELY.

- 3) Push the wedge(s) between the bonded structures. Lightly tap the wedge(s) if necessary.



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- a) If problems occur, you can apply heat, dry ice (solid carbon dioxide), compressed carbon dioxide gas, or liquid nitrogen to the bond area. This will make the adhesive resin brittle and easier to separate.

NOTE For best results, keep the temperature at less than 260°F (127°C) if you use heat to remove skin.

- (c) Do a check to see if the bond is weak along the perimeter of the area to be repaired.

NOTE Instrumented Non-destructive Inspection (NDI) procedures will not always find a bond that is weak but not broken.

- 1) Pull carefully on the edge of the skin to see if the bond will break.
 - 2) If the bond is easily broken, then continue to remove the skin until the bonds are not easily broken.
- (2) Remove all the nicks, scratches, gouges, burrs, sharp edges, corrosion and other unwanted material to a smooth surface. If you remove more than 10% of a sheet thickness, do one of the steps that follow:
- (a) If the depth of the removed damage is less than 80% of the sheet thickness, refer to 51-9-5.
 - (b) If the depth of the removed damage is more than 80% of the sheet thickness, cut out the damage. Refer to 51-9-7.

NOTE A facesheet (skin) can have more than one sheet bonded together. Be careful not to cause damage to the sheet(s) below the damaged sheet(s).

- (3) Examine the damaged area for signs of water, oil, fuel, dirt or other contamination in the honeycomb. Remove all fluids, dirt and other contamination.
- (a) Use a vacuum or oil-free compressed air to remove water.
 - (b) Dry the honeycomb core. You can heat the core or use hot air at the wet area for 1 hour (minimum) at 150°F (77°C). Make sure that the temperature does not increase more than 5°F (3°C) a minute. Dry again if necessary.

WARNING DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE OR CAUSE DAMAGE TO THE ENVIRONMENT. REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS) AND THE LOCAL SAFETY PRECAUTIONS.

- (c) If a honeycomb core has oil in it, then spray on MEK, MIBK, MPK, or acetone solvent to remove the contamination. Be careful to prevent damage to the adhesive on the opposite skin. Immediately remove the solvent from the core. Let the core become completely dry.



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STRUCTURAL REPAIR**

- (4) If you are repairing a crack you can do a stop-drill procedure or cut out the damage with a 0.25 inch (6 mm) minimum diameter router bit. Refer to 51-13-1, and 51-9-5 for the stop drill procedure.
- (5) For small damage that has a 1.0 inch (25 mm) diameter or less, cut out the damage to a circular shape. Then put BMS 5-28 Type 6 or 7 potting compound or BMS 5-101 Type III liquid pourcoat adhesive in the hole. Refer to Table 3 and 51-9-5.

B If the aluminum honeycomb core is damaged, do one of the procedures that follow:

NOTE If the opposite skin is not damaged, be careful to not cut into the opposite aluminum skin. Also, do not cause the bond area to get hot when you use the router.

(1) Full depth core damage:

- (a) Remove all of the damaged core.
- (b) Lightly abrade the adhesive surface at the bottom of the hole (where the core was).

NOTE It is not necessary to remove all of the adhesive from the opposite facesheet unless it is in an unsatisfactory condition. The adhesive is unsatisfactory if it has damage from water or other fluids, or if bare metal shows.

- (c) Use a vacuum cleaning device to remove dust and particles of the core from the adhesive surface.

(2) For core damage of partial depth, use a septum. See 51-9-6 for repairs that use a septum.

- C** Make all the corners of large cutouts in skins and honeycomb sandwich facesheets a minimum of 1.0 inch (25 mm) radius.
- D** If you removed skin from above an open core (no core replacement), use a vacuum to remove dust and particles from the open core.
- E** Refer to the component engineering drawings or use NDI procedures to find the locations of internal doublers and other repairs. Refer to 51-9-7 for the doubler thicknesses and overlaps to use when cutouts are near a panel edgeband.

8 Make the repair parts

WARNING USE ONLY EXPLOSION-PROOF EQUIPMENT WHEN YOU DO THESE TYPES OF REPAIRS. IF YOU DO NOT, PERSONAL INJURY AND DAMAGE TO ADJACENT EQUIPMENT CAN BE THE RESULT. WHEN YOU WORK WITH FLAMABLE MATERIALS, HEAT, FIRE OR SPARKS CAN CAUSE AN EXPLOSION.

- A** Make the repair doublers and fillers from material that is the same or an equivalent alloy material and heat treatment as the initial skin. Refer to 51-1-1, for the approved substitution materials.



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STRUCTURAL REPAIR**

- (1) Do not make doublers and fillers from 7000 series aluminum that are clad on both sides. You can use clad 7000 series aluminum repair parts that are non-clad on one or both sides.

NOTE This procedure will only let you bond on a non-clad side of a 7000 series aluminum part. Do not use 7000 series aluminum fillers and internal doublers if a side is clad.

- (2) As an alternative to the surface preparation and primer application steps in par 11 through par 17, you can make your repair doublers and fillers from pre-primed aluminum (aluminum that has the correct surface preparation and adhesive primer on it).
- (3) For flush repairs, refer to Fig 7 for the thickness and dimensions of the repair parts.
- (4) For external doubler (non-flush) repairs, refer to Fig 8 for the thickness and dimensions of the repair parts. Make a chamfer around the edges of external repair doublers that are 0.032 or thicker gage. Refer to Fig 12.
- (5) Remove all the nicks, scratches, gouges, burrs, sharp edges, and other unwanted material from the repair doublers and fillers.

B If a core repair plug is necessary, do the steps that follow:

- (1) Use the same Boeing Material Specification (BMS) material or equivalent BMS-type and alloy as the initial core material.

NOTE You can increase the durability of the repair if you purchase and use core that is phosphoric acid anodized (BMS 4-4 Class NPA, for example).

- (a) You can use the same grade or a one grade higher density core than the initial core material.
 - (b) If necessary, you can make a full depth core from two pieces that are less than full depth. Refer to 51-9-6 for a repair that uses a septum to make a full depth core from two pieces.
 - (c) If necessary, you can make a partial depth core if you use a septum. Refer to 51-9-6 for a repair that uses a septum to make a partial depth core.
- (2) Make the repair core so that it has the same shape and ribbon direction as the initial core. Make the core so that it will fill the hole. Refer to Fig 9.
 - (3) Put the repair core into the hole.
 - (4) Measure the gap between the outer edges of the initial core and the repair core. Make sure that the gap is less than 0.1 inch (2.5 mm). If the gap is too large, then make another repair core that has the correct fit.
 - (5) If necessary, cut or abrade the top of the core plug until the core height is -0.00 to +0.005 inch (-0.00 to +0.13 mm) above.
 - (a) The surface of the adjacent core (when the skin has been removed from above an area of core that will not be replaced), or

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- (b) The undamaged skin (when the edge the undamaged core is adjacent to the edge of the undamaged skin)

NOTE The repair core will compress and move down during the cure

- (6) Carefully remove the repair core plug from the hole
- (7) Remove all the burrs and other unwanted material from the repair core
- (8) Use a vacuum cleaning device to remove all the dust and particles from the repair core

WARNING. DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN DO NOT BREATHE THE FUMES FROM SOLVENTS SOLVENTS ARE DANGEROUS MATERIALS SOLVENTS CAN BE FLAMMABLE OR CAUSE DAMAGE TO THE ENVIRONMENT REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS) AND THE LOCAL SAFETY PRECAUTIONS

- C Clean the repair doublers and fillers that do not have primer applied to the surface
- D Clean the aluminum honeycomb repair core, if used. Make sure that all unwanted materials are removed Do a vapor de-grease as given in SOPM 20-30-03 or flush the honeycomb core with Series 97 solvent as given in SOPM 20-30-97

NOTE To flush the core with solvent, put the core fully into the solvent and leave it for a minimum of 30 seconds Remove it and let it dry fully The time to dry fully is approximately 1 hour.

- E Prepare the core mating surfaces

- (1) Abrade the adhesive layer at the bottom of the hole in the initial core to make the surface rough Use Scotch Brite, Type A, No 180 or finer pads (or the equivalent)

NOTE If the adhesive is damaged, then look to see if the adhesive primer is also damaged Refer to par 6 B

- (2) Clean the mating surfaces of the initial core, repair core, and the facesheet at the bottom of the hole with a cleaning solvent Refer to SOPM 20-30-03 for the applicable solvents
- (3) Continue to clean the surfaces until a new moist cloth is clean after it is used Remove the solvent before it can dry
- (4) Do an inspection of the cleaned repair area The area must show no signs of a glossy surface

9 Installation of the Honeycomb Repair Core

- A If you do the one-stage cure repair, then do a surface preparation as specified in par 11 Then come back to this step and do the honeycomb installation procedure

NOTE The steps that follow are applicable for the one-stage and the two-stage cure procedures.



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- B** If you cut out damage through the top and bottom facesheets, then put the repair doubler(s) and filler(s) on one of the facesheets before you install the core Refer to Fig 7 and Fig 8

NOTE If you are doing a core repair that is less than full depth, or if you make a thick core from two thin cores, then use a septum Refer to 51-9-6 for septumized core repairs

- C** To bond the repair core mating surfaces, you can use foaming adhesive, two-part paste adhesive, or potting compound Refer to Table 3 for data on the adhesive materials

NOTE Before you open the film adhesive or a foaming adhesive container, let the adhesive stay at a temperature of 60°F to 80°F (16°C to 26°C) You can use the adhesive after there is no condensation

RESIN TYPE (RESIN USE)	POT LIFE	CURE TIME	CURE TEMPERATURE
BMS 5-28, Type 6 or 7 (Potting Compound)	1 hour	1 5 hours	250° to 260° F (121° to 127° C)
BMS 5-90, Type III, Class 250 (Foaming Adhesive)	Not Applicable	1 5 hours	225° to 260° F (107° to 127° C)
BMS 5-92, Type I, or V (Two-part Paste Adhesive)	Refer to Fig 210	Refer to Fig 10	Refer to Fig 10
BMS 5-101, Type III (Liquid Pour Coat Adhesive)	Not Applicable	1 5 hours	225° to 260° F (107° to 127° C)
BMS 5-141 (Two-Part Paste Adhesive)	1 hour (Minimum)	Refer to Fig 11	Refer to Fig 11

Cure Instructions for the Adhesives and Potting Compounds to Make a Core Repair
Table 3

- D** To bond the core to the facesheet or repair doubler, you can use a film adhesive or a two-part paste adhesive Refer to par 18 or par 19 for data on the adhesive materials

E Core Installation Options

- (1) The procedure in par 9 F (1) shows how to install the repair core with film adhesive, and BMS 5-90, Type III, Class 1, Grade 50 or 100 foaming adhesive
- (2) The procedure in par 9 F (2) shows how to install the repair core with BMS 5-101, Type II, film adhesive, and BMS 5-28 Type 6 of 7 potting compound
- (3) The procedure in par 9 F (3) shows how to install the repair core with BMS 5-92 or BMS 5-141 two-part paste adhesive
- (4) The procedure in par 9 F (4) shows how to seal a square edge with BMS 5-101, Type III liquid pourcoat adhesive

F Core installation procedures



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- (1) Foaming adhesive core splice procedure Do the steps that follow to install a repair core with film adhesive, and with BMS 5-90, Type III, Class 1, Grade 50 foaming adhesive

- (a) Prepare the facesheet before you bond the core

- 1) Use one of the film adhesive types that follow

- * three plies of BMS 5-101, Type II, Grade 5, or
- * two plies of BMS 5-101, Type II, Grade 10, or
- * one ply of BMS 5-101, Type II, Grade 15

- 2) Cut the film adhesive to the same dimensions as the bottom surface of the repair core

- 3) Put the ply (or plies) of film adhesive at the bottom of the hole in the initial core

- a) Remove the separator sheet from each film adhesive ply.
- b) If one-side tacky (OST) adhesive is used, (adhesive that has the mat carrier cloth on one of the outer surfaces), put the non-tacky (cloth) side against the bottom of the repair core

- 4) Push the adhesive smoothly and tightly in place Do not trap air between the adhesive plies and the skin or repair doubler at the bottom of the hole.

- (b) Cut a piece of BMS 5-90, Type III or IV Class 1, Grade 50 or Grade 100 foaming adhesive

NOTE BMS 5-90 Type IV extrudable adhesive is an alternative that can be used in a pressurized autoclave

- 1) Cut the adhesive to a sufficient length to wind fully around the inner cell wall splice surfaces (of the hole in the initial core)

NOTE. Cut the BMS 5-90, Type III, foaming adhesive to make each end attach in a butt-joint You are also permitted to have a maximum 1/8 inch (3 mm) overlap

- 2) If the adhesive has a separator sheet on each side, then remove one of them now Keep the tacky side against the cell walls in the hole

- 3) Wind the foaming adhesive around the inside of the hole in the initial core Make sure that the adhesive touches all of the core splice surfaces

- 4) Remove the separator sheet from the open side of the adhesive

NOTE The adhesive must fill a minimum of 3/4 of the clearance between the initial core and the repair core. If necessary, you can apply more than one layer of the BMS 5-90 adhesive material to the repair core



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- (c) Align the ribbon direction of the repair core in the same direction as the core to be repaired Put the repair core inside the hole

NOTE The maximum error permitted is ± 5 degrees in the vertical direction and the ribbon direction See Fig 9

- 1) Make sure that the repair core plug is pushed into the adhesive at the bottom of the hole
- (2) Potting compound core splice procedure Do the steps that follow to install a repair core with the adhesive film and BMS 5-28, Type 6 or 7 potting compound

- (a) Prepare the facesheet for bonding the core

- 1) Use one of the film adhesive types that follow

- * three plies of BMS 5-101, Type II, Grade 5, or
- * two plies of BMS 5-101, Type II, Grade 10, or
- * one ply of BMS 5-101, Type II, Grade 15

- 2) Cut the film adhesive to the same dimension as the bottom surface of the repair core.

- 3) Put the ply (or plies) of film adhesive at the bottom of the hole in the initial core

- a) Remove the separator sheet from each film adhesive ply
- b) If one-side tacky (OST) adhesive is used, (adhesive that has the mat carrier cloth on one of the outer surfaces), put the non-tacky (cloth) side against the bottom of the repair core

- (b) Apply a sufficient quantity of BMS 5-28, Type 6 or 7 potting compound to the mating sides of the initial and repair cores. The potting compound must fill all of the area between the repair core and the core to be repaired

- (c) Align the ribbon direction of the repair core in the same direction as the core to be repaired Put the repair core inside the hole

NOTE The maximum error permitted is ± 5 degrees in the vertical direction and the ribbon direction See Fig 9

- 1) Make sure that the repair core has a tight interference in the core hole

- 2) Make sure that the repair core plug is pushed into the adhesive at the bottom of the hole

- (3) Paste adhesive core splice and core to skin bond procedure. Do the steps that follow to install a repair core with BMS 5-92, Type I or V, or BMS 5-141 two-part paste adhesive

- (a) The edges of the repair core must be a minimum of 2.0 inches (50 mm) from attached fittings The repair core must also be a minimum of 2.0 inches (50 mm) from the outer edges of the initial core

**INTERCONTINENTAL
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- (b) Prepare the facesheet for bonding the core. Apply a 0.04 to 0.08 inch (1.0 to 2.0 mm) thick layer of adhesive to the first surface that the core will be bonded to.

NOTE Example: at the bottom of the hole in the initial core. As an alternative, you can wet two plies of BMS 9-3, Type H-2 or H-3 dry glass fabric with the paste adhesive and put them in the bottom of the hole.

- (c) Apply a sufficient quantity of adhesive to the mating sides of the initial and repair cores. The adhesive thickness must fill all of the area between the repair core and the core to be repaired.

- (d) Align the ribbon direction of the repair core in the same direction as the core to be repaired. Put the repair core into the core hole.

NOTE The maximum error permitted is ± 5 degrees in the vertical direction and the ribbon direction. See Fig. 9.

- 1) Make sure that the repair core has a tight interference in the core hole.
- 2) Make sure that the repair core plug is pushed into the adhesive at the bottom of the hole.

(4) Seal procedure for a square edge panel assembly

NOTE 51-9-7, Fig. 2 shows examples of square edges of honeycomb core that are sealed.

- (a) If PAA core is used, you can put BMS 5-95 sealant on the open edges after the repair to the honeycomb panel is completed.
- (b) On bare aluminum core, apply BMS 5-101, Type III, liquid pourcoat adhesive to seal the square edge. Do what follows:

- 1) Clean the repair core again.
- 2) Measure 3 to 6 core cells in from the perimeter edge of the repair core. Apply the BMS 5-101, Type III liquid pourcoat adhesive on the applicable cells of the repair core. You can dip the core cells into the adhesive or pour the adhesive on to the core cells.

NOTE If you use the pour procedure, apply the adhesive to one side of the repair core first. Turn the core over and apply other side. Make sure that the adhesive fully covers the cell walls.

- 3) Put the repair core on clean, absorbent, oil-free paper.

NOTE After the adhesive is applied, you have less than 3 minutes to drain the extra liquid adhesive from the cells.

- a) If there is too much liquid adhesive in the core cells, let the extra adhesive drain away.





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- b) After the extra liquid adhesive has drained away, put the repair core on another clean oil-free paper to help the extra liquid adhesive continue to drain
- 4) Let the repair core air-dry at ambient temperature on a clean oil-free paper for 30 to 40 minutes
- 5) After the air dry time, oven dry the BMS 5-101, Type III at 180°F to 190°F (82°C to 88°C) for 30 to 35 minutes before you install the repair core

NOTE Protect the core from contamination

G Two-stage honeycomb core cure repair procedure Refer to Fig 9 for the steps that follow

NOTE If you do a one-stage honeycomb core cure repair procedure, then the steps that follow are not necessary

(1) Bagging procedure

- (a) Put thermocouples at the edges and bottom of the core.
- (b) Find a heat blanket that is larger, than the replacement core
 - 1) The heat blanket must be sufficient to extend 2 0 inches (50 mm) or more, from the edges of the replacement core
 - 2) Use the dimensions of the blanket to find the correct dimensions of the layup and vacuum bag materials
- (c) Cut a layer of perforated FEP release film to the same dimensions as the heat blanket Put the release film on the open replacement core Make sure that the edges of the release film are an equal distance from the edges of the replacement core
- (d) Cut a layer of dry peel ply or fiberglass bleeder material that is 2 0 inches (50 mm) larger, all around, than the dimensions of the heat blanket Put the peel ply (or bleeder) on the perforated FEP Make sure that the edges of the peel ply (bleeder) extend 2 0 inches (50 mm) from the edges of the FEP
- (e) Cut a layer of solid FEP release film, to the same dimension as the heat blanket. Put the release film on the peel ply (bleeder) Make sure that the edges of the release film are an equal distance from the edges of the dry peel ply (bleeder)
- (f) Cut a layer of dry peel ply material that is 2 0 inches (50 mm) larger, all around, than the dimensions of the heat blanket. Put the peel ply on the solid FEP Make sure that the edges of the peel ply extend 2 0 inches (50 mm) from the edges of the FEP
- (g) Put the heat blanket on the peel ply Make sure that the edges of the heat blanket are an equal distance from the edges of the peel ply
- (h) You can put a thermocouple on the heat blanket (optional) If the heat blanket gets too hot, you can turn off the power before you damage the skin panel



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- (i) If the heat blanket extends more than 30 inches (75 mm) from the edge of the cutout, you can do this recommended procedure

NOTE If a heat blanket gets too hot, it can cause damage to the repair and to the adhesive in the undamaged skin. To help prevent damage (if the heat blanket gets too hot), do not let the heat blanket touch more skin than is necessary. Insulation between the heat blanket and the skin is recommended.

- 1) Put the edge of the insulation 20 to 30 inches (50 to 75 mm) from the edge of the cutout in the top facesheet
- 2) Let the insulation material extend to the end of the heat blanket (at a minimum)
- (j) Put four to six layers of glass fabric (or two layers of 0.04 inch (1.0 mm) breather fabric, or one layer of 0.1 inch (2.5 mm) breather fabric) above the heat blanket as a breather. Make sure that the breather is sufficient to extend from the edges of the heat blanket
- (k) Put a vacuum base above the fiberglass breather cloth for each vacuum port and vacuum gage port
- (l) Put on the vacuum bag sealant
- (m) Make a hole in the outer vacuum bag at the vacuum base location for each vacuum port and vacuum gage port
- (n) Put the vacuum bag film on the repair area
- (o) Connect the vacuum port and vacuum gage ports to their vacuum bases
- (p) If necessary, put insulation material on the outer surface of the vacuum bag
- (2) Cure the repair
 - (a) Refer to Table 3 for the cure instructions
 - (b) When the cure time is completed, decrease the temperature at a rate of 5°F (3°C) a minute
- (3) When the temperature is less than 125°F (52°C), release the vacuum pressure and remove the vacuum bag equipment.
- (4) Remove the thermocouple wires from the repair area

NOTE Part of the thermocouple wires can stay in the cured adhesive if you cannot remove them. Cut the thermocouple wires so that the ends of the wires are below the surface of the core
- (5) Abrade the top of the core until it is flush with the top of the adjacent core or skin (that which applies). Refer to Fig 9

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- (6) Use a vacuum cleaning device to remove dust and particles from the open core and the repair area
- (7) Do a visual inspection of the core splice. If you see areas that are not bonded, then fill the voids with a core splice adhesive or potting compound. Measure the length of the filled areas.
 - (a) If the total cumulative length of the filled areas is more than 20 inches (50 mm), then cure the core splice material and do par. 9 G.(5) through par. 9 G. (7) again
 - (b) If the total cumulative length of the filled areas is 20 inches (50 mm) or less, then do all of the applicable steps that remain in this procedure

10 Inspect the fit of the repair parts

- A See if light finger pressure can make all the areas of the repair part touch the surface to be bonded
- B Examine and measure the bondline for all repair doublers that have an area of 64 square inches (410 square cm) or more
 - (1) The verfilm test is a satisfactory procedure to make sure that you have the permitted bondline thickness. Other procedures are permitted if you can make sure that the bondline thickness is satisfactory
 - (2) Make sure that you have a bondline thickness of between 0.002 and 0.020 inch (0.05 to 0.50 mm)
- C If you do a verfilm test, do the steps that follow
 - (1) Put a ply of 0.001 or 0.002 inch (0.025 or 0.050 mm) non-perforated FEP release film above the repair area

NOTE If there is open honeycomb core, use 0.004-0.007 inch (0.10 to 0.18 mm) thick PVC film. You can use a different material if

- * It does not cause contamination of the core, and
- * It will let the honeycomb pattern (from the honeycomb core) show on the adhesive

- (2) Put on to the release film the same adhesive type that you use to do the repair

NOTE If a paste adhesive is used, make sure that you apply the adhesive at a constant thickness. If a film adhesive is used, make sure that you use the same number of plies and the same grade that you use in the repair

- (3) Put a ply of nonperforated FEP release film or PVC film above the adhesive
- (4) Put the repair doublers and fillers on the release film the same as you do for the repair



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- (5) Apply a vacuum bag and cure the adhesive as specified in par 18. You are permitted to cure the adhesive for half of the time specified for the repair.
- (6) After the verfilm check is completed, disassemble the parts and do a visual inspection of the cured adhesive.
 - (a) The adhesive must be between 0.002 inches (0.05 mm) and 0.020 inch (0.50 mm) thick.
 - (b) Make sure that the parts did not move during the cure.
 - (c) Make the sure that there are no voids that are larger than 0.10 inch (2.5 mm) in diameter.
 - (d) If there is open honeycomb core, make sure that you can clearly see the honeycomb pattern on the adhesive for all of the open core. Make sure that the core is not crushed.
- (7) If the test is satisfactory, then discard the cured adhesive and the used release film materials. If the test is not satisfactory, then do one or more of the steps that follow.
 - (a) Repeat the verfilm test with an additional ply of Grade 5 or 10 film adhesive. If the test is satisfactory, make sure that you use the same number of plies of adhesive and the same grades when you do the repair.
 - (b) Repeat the verfilm test with weight or pressure added. If the test is satisfactory, make sure that you use the same weight or pressure when you do the repair.
 - (c) Check the shape and fit-up of the repair parts. Adjust if necessary, and then repeat the verfilm test.
 - (d) Ask Boeing for help if necessary.

D Apply the adhesive as given in par 18 or par 19.

11 Use of the Surface Preparation Procedures

CAUTION: DO NOT BOND A CLAD SURFACE OF A CLAD 7000 SERIES ALUMINUM PART. THE RESULT CAN BE CORROSION AT THE BOND INTERFACE OF THE REPAIR.

- A Do a surface preparation procedure only on aluminum surfaces that are not primed. Remove all unwanted primer and other material before you continue with the procedure.
- B Refer to Fig 1 for the permitted repair size limit for each surface preparation procedure.

NOTE These procedures prepare the aluminum surfaces for metal-to-metal bonding and bonding metal face sheets to aluminum honeycomb core.

- C Phosphoric Acid Anodized (PAA) aluminum gives the best surface preparation for bonding. You can get PAA repair parts from the list that follows.
 - (1) Purchase parts that come with the PAA surface and the adhesive primer on them.



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- (2) Do a tank PAA procedure as specified in Boeing Process Specification BAC 5555 "Phosphoric Acid Anodizing of Aluminum for Structural Bonding".
- (3) Do the PACS or PANTA surface preparation procedure
- D The PACS and PANTA procedures are PAA alternatives to tank PAA procedures to prepare an aluminum surface for bonding
- E As an alternative to the PANTA or PACS procedures, you can use the Boegel (AC-130) procedure
- F The HF - Alodine procedure can only be used for small, interim repairs

12 The Phosphoric Acid Containment System (PACS) Procedure

NOTE The Phosphoric Acid Containment System (PACS) procedure is covered by U S patent numbers 4,882,016 and 4,988,414 and other patent applications assigned to The Boeing Company. Repair stations that have Boeing licenses and operators of Boeing aircraft are permitted to use this procedure. For data regarding licensing for non-Boeing applications, call the Chief Patent Counsel, The Boeing Company.

- A The necessary PACS materials are
 - (1) Phosphoric Acid, 75-80% (by weight), as given in Federal Specification A-A-55820
 - (2) Copper Wire
 - (3) Corrosion Resistant Steel (300 Series CRES) Wire Mesh
 - (4) DC Power Supply
 - (5) Vacuum Sealing Compound
 - (6) Nylon Vacuum Bag Film
 - (7) Solvent and Acid Resistant Tape
 - (8) 3M Scotch Brte Pads, Type A, Very Fine
 - (9) Fiberglass Breather Cloth
 - (10) Nylon Breather Material (11) Aluminum Foil Tape
 - (12) Solid FEP
 - (13) Blue Litmus Paper
 - (14) Acetone or Methyl Propyl Ketone (MPK) Solvent
 - (15) BMS 5-89 Adhesive Primer



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- (16) Plastic Film (Mylar, acetate, polyester or equivalent plastic material)

WARNING KEEP ACIDS AWAY FROM HEAT, FIRE, AND SPARKS. ACID FUMES ARE FLAMMABLE AND TOXIC. INJURY TO PERSONNEL CAN BE THE RESULT. DO NOT PERMIT ACIDS TO MIX WITH OTHER MATERIALS. MAKE SURE THAT THE AIR SUPPLY TO THE AREA IS NOT BLOCKED.

USE RUBBER GLOVES, PROTECTIVE CLOTHING AND EYE PROTECTION WHEN YOU WORK WITH PHOSPHORIC ACID. THE ACID CAN BURN YOUR EYES AND SKIN AND CAUSE INJURY. IF THE ACID TOUCHES THESE AREAS, FLUSH WITH A LARGE QUANTITY OF WATER AND GET MEDICAL AID IMMEDIATELY.

B Make the phosphoric acid solution

- (1) Calculate how much solution is necessary

NOTE In this step, you have a minimum of two times as much solution than is needed for the anodize process. This is because it is necessary to have sufficient solution on the area to be anodized.

- * During the time needed to get the specified voltage, and
- * To make sure that the solution flows for a minimum of 20 minutes

- (a) Make sure that a minimum of 1.0 gallon (4.0 liters) of phosphoric acid solution for each 100 square inches (645 square cm) of treatment area is prepared and connected.
- (b) As an alternative, you can circulate the acid and use it two times on the bond surface. Start with a minimum of 1/2 gallon (2.0 liters) of solution for each 100 square inches (645 square cm) of treatment area.

WARNING ALWAYS ADD ACID TO WATER WHEN YOU MIX THEM. IF YOU ADD WATER TO ACID, THE ACID WILL BECOME VERY HOT AND WILL NOT BE STABLE. THIS CAN CAUSE INJURY TO PERSONS.

- (2) To make the phosphoric acid solution, add $14 \pm 1/3$ fluid ounces (410 $\pm$ 10 ml) of 75-80% phosphoric acid to each 135 $\pm$ 2 fluid ounces (4.0 liters $\pm$ 60 ml) of distilled water.

C Clean and abrade the repair surfaces

WARNING DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE OR CAUSE DAMAGE TO THE ENVIRONMENT. REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS) AND THE LOCAL SAFETY PRECAUTIONS.

- (1) Do a solvent wipe with MPK or acetone as given in SOPM 20-30-03.
- (2) Abrade the surfaces with Scotch Brite, Type A, very fine pads or a high grade alumina sand paper (180-grit or finer). The metal surface will look clean when you finish this step of the process.

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- (3) Remove the unwanted abrasive particles from the surface. Use clean, dry air or nitrogen
- (4) Do a solvent wipe with MPK or acetone as given in SOPM 20-30-03
- (5) Isolate the mechanical fasteners and all the areas that are not damaged. Use aluminum foil tape or a combination of aluminum foil tape and polyethylene film (or the equivalent)
- (6) Put on a mask to seal all areas where the damage goes through a skin. To make the mask, put aluminum foil tape, solid FEP or other satisfactory material on top of the honeycomb

NOTE If you do a one-stage repair, you can temporarily fill the hole before you put on the mask. Example: you can put the honeycomb repair core in the hole (without the core splice adhesive) or you can put in a solid plug

- (7) Flush with clean water. You can also wipe with a clean, wet, lint-free cloth until no residue shows on the cloth

D Do a visual inspection for a water-break-free surface

- (1) Flush the surface with clean (mineral-free or de-ionized) water. Do this for 30 seconds or until the surface has a continuous water film on all of the repair area

NOTE The preferred water temperature is between 50° and 100 °F (10° and 38 °C)

- (2) After the flush procedure is completed, the water film on the bond surface must stay continuous for a minimum of 30 seconds

NOTE The water surface tension at the edges of an aluminum skin can cause the water film to pull away from the edge a small distance. This condition is permitted unless it is caused by surface contamination or incorrect abrading

- (3) If the film does not stay continuous for a minimum of 30 seconds, do par 12 C and par 12 D again

E Put a layer of plastic film (Mylar, acetate, polyester or an equivalent material) on the bench tops and other work areas. This will help to prevent the contamination of the repair parts

F Assemble the PACS immediately after you clean the repair surface. Refer to Fig 4

CAUTION DO NOT USE A STAINLESS STEEL SCREEN IF IT SHOWS CORROSION OR OTHER DETERIORATION. IF YOU DO, IT IS POSSIBLE THAT THERE WILL NOT BE THE NECESSARY AMOUNT OF CURRENT FLOW THROUGH THE SCREEN

- (1) Cut a piece of the stainless steel screen to the shape and dimensions of the surface area to be anodized. Use 300 series alloy CRES with a wire gauge that is a minimum of American Wire Gauge (AWG) #20 (0.03 inch (0.8 mm) diameter) and a maximum of #14 (0.06 inch (1.5 mm) diameter).

NOTE AWG #18 (0.04 inch (1.0 mm) diameter) is the usual type of stainless steel screen used

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- (2) Make a record of the dimensions of the area to be anodized and do a calculation of the area. This data will be used later to make a calculation of the volume of acid divided by the area that was anodized.
- (3) Attach conductive negative (-) cathode wire(s) to the stainless steel screen. Make sure that there is a minimum of one wire for each 30 square inches (200 square cm) of the repair area. Use a sufficient length of wire to prevent tension in the wire between the power supply and the PACS assembly. Put the same space between each of the wires.

NOTE The negative (-) cathode wire must have a good electrical conductivity with the stainless steel screen. Make sure that the wires and clamps are sufficiently large to transmit the necessary electrical current.

- (4) Cut three or four ply layers of non-woven mat breather material. Each layer must be a minimum of 1 0 inch (25 mm) larger than the stainless steel screen (to make sure that the screen will not touch the surface of the part).
- (5) Put two layers of the breather material on the area to be anodized. Align each layer with each other. Make sure that the breather material extends 0 5 inch (13 mm) from each edge of the area to be anodized.

NOTE On repair areas that are vertical or not easy to get to, use tape to attach each breather cloth layer.

CAUTION MAKE SURE THAT THE STAINLESS STEEL SCREEN AND CATHODE WIRE DOES NOT TOUCH THE ALUMINUM REPAIR SURFACE. THE RESULT CAN BE DAMAGE TO THE PARTS.

- (6) Put the screen on the breather material. Make sure that the edges of the screen are 0 5 inch (13 mm) from the edges of the breather material.
- (7) Put one or two layers of breather material on the screen. (Two layers above the screen are recommended for areas larger than 64 square inches (410 square cm). Have the edges align with the edges of the breather material below.
- (8) Put acid inlet tube(s) between the breather cloth layers at one edge. Do not put the inlet tube on the stainless steel screen. If you use two or more inlet tubes, put the tubes sufficiently far apart to make the surface fully wet.

NOTE Use two or more acid solution inlet tubes for repair sizes that are larger than 64 square inches (410 square cm). This is necessary to keep the bond surface fully wet during the anodize procedure.

- (9) Put the vacuum outlet tube(s) between the breather cloths at the opposite edge. Do not put the outlet tube on the stainless steel screen.

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STRUCTURAL REPAIR**

- (10) Apply vacuum sealing compound on the aluminum part 1 0 inch (25 mm) or less from the edges of the breather cloth
 - (11) Cut a piece of vacuum bag film that is approximately 5 0 inches (130 mm) larger than the breather cloths. Put it fully around the repair area
 - (12) Remove all the wrinkles in the vacuum bag
 - (13) Seal the cathode wire(s) and the inlet tube(s).
 - (14) Connect the outlet tube between the vacuum probe and the catch basin
 - (15) Attach the three-way valve to the inlet tube(s).
 - (a) Turn the valve to the closed position (no flow of water or acid solution)
 - (b) Connect one valve line to a container with the phosphoric acid solution that you made in par 12 B
 - (c) Connect a second valve line to the water supply.
 - (16) If the surface to be anodized is vertical or face down, then Boeing recommends that you use two vacuum bags (an inner bag and an outer bag) The outer vacuum bag will contain the acid if there is leakage from the inner vacuum bag If the surface is face up (as shown in Fig 4) then the outer vacuum bag is not necessary
 - (a) If the outer vacuum bag is necessary, go to par 12 F.(17)
 - (b) If the outer vacuum bag will not be used, then do the steps that follow
 - 1) Start a vacuum in the vacuum bag and seal all the leaks
- NOTE** The vacuum is through the drain line from the catch basin to the outlet tube
- 2) Go to par 12 F (18)
 - (17) When you use two vacuum bags, do the steps that follow:
 - (a) Put a minimum of four continuous plies of fiberglass breather cloth around the inner vacuum bag
 - (b) Put a vacuum base above the fiberglass breather cloth.
 - (c) Cut a second piece of vacuum bag film for the outer vacuum bag Make sure that it is larger than the inner bag and fiberglass breather cloth
 - (d) Put the outer vacuum bag above the fiberglass breather cloth and the inner bag layup Seal it to the metal surface Make sure that the outer bag is sealed Remove all the wrinkles

NOTE Make sure that the cathode wire, inlet tube(s), and outlet tube(s) go below the outer bag Seal it at the edge of the bag



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- (e) Make a hole in the outer vacuum bag at the vacuum base location for the vacuum port
- (f) Connect the vacuum port and vacuum gage port to the vacuum base
- (g) Start a vacuum in the inner bag and seal all the leaks

NOTE The vacuum is through the drain line from the catch basin to the outlet tube

- (h) Start a vacuum in the outer bag and seal all the leaks

NOTE The vacuum in the outer bag will hold the inner bag and the parts in their positions

- (18) Connect the wires to a DC power supply

NOTE Use a battery or a DC power supply as the power source for the anodizing procedure. The power source must have a capacity of 10 volts, minimum. The power source must also have a capacity of 8 amps/square foot (86 amps/square meter), minimum

- (a) Connect the negative (-) cathode wire that is attached to the stainless steel screen, to the negative lead on the power source
- (b) Connect the positive (+) anode wire to the aluminum part surface to be anodized, and to the positive (+) lead on the power source

G Do the PACS anodize procedure.

- (1) Before you let the acid solution flow

- (a) Make a record of the initial quantity (in fluid ounces or liters, as applicable) of the acid in the container

NOTE This record will be necessary for the calculation in par 12 G (9)(a)

- (b) If you recycle the acid solution, you must have a procedure to measure or calculate the total quantity of solution that flowed on the bond surface

- (2) Make sure that the temperature of the acid and aluminum part stays between 70° and 85° F (21° and 29° C) during the anodizing procedure
- (3) Open the three-way valve to let the phosphoric acid solution flow from its container to the inner vacuum bag.
 - (a) Let a sufficient quantity of acid to flow in until the non-woven mat breather material becomes soaked. Make sure that you keep a sufficient and continuous acid solution flow rate



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- (b) Use a minimum of 0.03 fluid ounce (1.0 ml) a minute for each square inch (1.5 ml a minute for each 10 square cm) to be anodized. This quantity is necessary to keep the surface fully wet.
- (4) Do the steps that follow (as soon as possible) in the sequence that follows
- (a) Set the voltage and current positions to zero on the electrical power supply
 - (b) Start the electrical power supply
 - (c) Increase the current adjustment to the full open position
 - (d) Slowly increase the voltage (approximately 5 volts for each minute) until it is between 9.5 to 10 volts (DC)
 - (e) Do a check of the amperage after it gets to the correct voltage

NOTE A fast increase in the current (more than 20% of the stable value) could be a sign that the surface is burning. Add more acid solution. If this is an unsatisfactory solution, an electrical short could be the cause. Stop the procedure and look for the problem.

- 1) In one minute or less, the current will become stable
 - 2) The current density at 9.5 to 10 volts (DC) must be in a range that is between 0.014 and 0.048 amperes/square inches (0.0022 and 0.0074 amperes/square cm)
- (f) Apply the 9.5 to 10 volts (DC) for 18 to 22 minutes

CAUTION DO NOT LET THE ASSEMBLY BECOME DRY. THE RESULT CAN BE A BURNED SURFACE OR A SURFACE TREATMENT THAT IS UNSATISFACTORY. ADD MORE ACID AS NECESSARY TO KEEP THE SURFACE FULLY WET.

- (5) Make sure that there is a steady flow of acid over all of the surface of the part during the anodizing procedure. Signs that the acid flow rate is not sufficient or signs of local dry areas are

- * An increase in current after it has stabilized, or
- * A significant increase in temperature, or
- * A lightening of the color of the breather cloth

NOTE The breather cloth will change to a darker color when it becomes soaked with the phosphoric acid.

- (6) Stop the electrical power after the specified anodizing time
- (7) Quickly, make a record of the quantity of phosphoric acid that stays in the container

NOTE This record will be necessary for the calculation in par 12 G (9)(a)

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- (8) Immediately, turn the three-way valve to let the rinse water flow from the container to the inner bag
- (a) Flush with a quantity of water equal to 0.03 fluid ounces (1.0 ml) a minute for each square inch (1.5 ml a minute for each 10 square cm) that was anodized
- (b) The rinse water must flush freely against all of the anodized surface
- (9) Flush the bag with rinse water for a minimum of 5 minutes. Do the steps that follow, while the rinse water flushes the anodized surface
- (a) Calculate the quantity of phosphoric acid that was used.
- (b) Subtract the quantity of phosphoric acid (the record you made in par 12 G (9)(a)) from the initial quantity (the record you made in par 12 G (1)).
- (c) Divide the volume of phosphoric acid that was used, by the area that was anodized (Use the data from the record you made in par 12 F (2))
- (d) If the calculated quantity of phosphoric acid used is less than 1/3 fluid ounce (10 ml) for each square inch (15 ml for each 10 square cm) of area that was anodized, then do par 12 G (1) through par 12 G (7) again
- (e) Stop the flow of rinse water if the calculated quantity of phosphoric acid used is sufficient

H Quickly, disassemble the PACS layup

- (1) Stop the vacuum and disconnect all of the tubing
- (2) Remove the outer vacuum bag and the fiberglass breather cloth. Be careful to not let contamination or other unwanted material get on the anodized surface

NOTE Do not touch the anodized surface with your bare skin or with gloves that have contamination on them. Do not let the adhesive tape touch the anodized surface.

- (3) Remove the inner vacuum bag, the breather cloths, and the stainless steel screen layup
- (4) Discard the tape, the inner bag, the breather cloth, and the stainless steel screen in an approved container. Make sure to discard these materials by a procedure that is permitted by local health, safety, and environmental authorities

I Flush the anodized surface with clean (mineral-free or de-ionized) water for 5 minutes. This will remove all possible phosphoric acid solution.

NOTE Do not wipe or rub the repair surfaces

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- J** Let the anodized surface fully dry at room temperature. As an alternative, you can dry the parts with forced, clean, dry, filtered air that is a maximum of 160°F (71°C) until the surface is fully dry.

NOTE You must apply the adhesive primer in less than 24 hours after the surface is anodized. Prevent the contamination of the anodized surface by moisture, dust, oil fumes, engine exhaust, or other unwanted material. Do not touch the dried anodized surfaces. Do not apply tape to the anodized surfaces.

- K** Examine the anodized surface. You can use a Phosphoric Acid Anodize Detector (dichroscope) or do the polarized filter color inspection test that follows.

NOTE You can purchase a Phosphoric Acid Anodize Detector (part number WCI-AD55) from West Coast Industries, Inc., 14900 Whitman Ave N, Seattle, WA 98133.

(1) Polarized filter color inspection test

- (a)** Use a fluorescent light source on the anodized area.
- (b)** Put a polarizing filter between yourself and the treated surface and look at the reflected light (from the surface) at an angle of 5 degrees or less. It can be helpful to put the light source at a glancing angle. Refer to Fig. 6.
- (c)** While you look at the surface through the polarizing filter, turn the filter 90 degrees. A correctly anodized surface gives a constant change in color (on all areas of the anodized surface) when you look through the filter. The colors seen most frequently are purple, yellow, and green.

NOTE It is not easy to see the colors on a rough or contoured surface. To find out if a surface is anodized correctly, change the view angle of the polarizing filter to see if the anodic coating is satisfactory.

(2) The anodize procedure is not successful if you find one or more of the conditions that follow:

- (a)** There are sudden changes in color as a result of stains, contamination, fingerprints, or other parts that touched the surface.
- (b)** There are electrical burns or pits.
- (c)** There are areas of the surface to be bonded that are not anodized.

(3) The surface is fully anodized if you see a constant change in color (with the polarizing filter) on all the areas of the anodized surface.

(4) If the color inspection test on a rough or contoured surface is not successful, you can do alternative tests to make sure you have a good anodized surface. Do one or more of the tests that follow:

- (a)** Use an ohmmeter to do a resistance test of the anodized surface. Make sure that the ohmmeter probes are clean.
 - 1)** Carefully, put the ohmmeter probes on the anodized surface. Make sure that you do not damage the anodized surface with the ohmmeter probes.



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- 2) Carefully touch the surface with the sides of the probes first, then lay them down. If the surface has a resistance of more than 20,000 ohms (20 kohms) the test is successful

- (b) Do an infrared filter test to measure the weight of the anodize coating. Use an infrared filter device that is tuned to measure phosphoric acid anodize oxides. If the infrared filter test shows an anodized coating that is more than 20mg/square foot (215mg/square Meter), the test is successful

NOTE A source for the infrared filter is as follows: Personal Instruments, LLC 18 Commerce Road Newton, CT 06470 (203) 426-0152

- (c) The surface is fully anodized if you see a constant change in color (with the polarizing filter) on 90 percent or more of the anodized surface and one or more of the alternative tests are satisfactory

- (5) If the anodize procedure is not successful, you must do all of the steps in par. 12 again (You must remove the unsatisfactory anodic oxide by abrasion as given in par. 12 C)

- L If you put a mask on open honeycomb core during par. 12 C (6)/REPAIR GENERAL, then remove it now. Make sure that you do not touch or contaminate the surfaces that have been anodized. Do not let moisture get into the core cells

- (1) Do a visual check for moisture in the cells. If you see moisture, use blue litmus paper to make sure that there is no acid contamination

- (a) If the litmus paper changes to a red color, there is acid contamination in the core cells. Flush the core with water. Use more blue litmus paper and do a check for acid again

- (b) If the litmus paper stays blue, there is no acid in the core. Remove the moisture, then continue with the procedure

- (2) Make sure that the core is fully dry before you apply the adhesive primer

- M Keep the bond surface(s) clean if you cannot apply the adhesive primer immediately

- (1) Do not touch the surface(s) with your bare skin, waxed paper, or material that has a release agent or other contamination

- (2) If protection of the surface(s) is necessary, then put vacuum bag film or unwaxed paper (without ink or other contamination on it) on the bond surface(s)

- N Apply the BMS 5-89 adhesive primer in less than 24 hours after the anodize procedure is completed. Refer to par. 15.

13 The Phosphoric Acid Non-Tank Anodizing (PANTA) Procedure

- A The materials that you need are



INTERCONTINENTAL
STRUCTURAL REPAIR

- (1) Phosphoric Acid, 75-80% (by weight), as given in Federal Specification A-A-55820 or (optional) pre-mixed phosphoric acid gel
- (2) (Optional) Floculated Silica (Cab-o-Sil, Grade M-5, or PTG)
- (3) Copper Wire
- (4) Corrosion Resistant Steel (300 Series CRES) Wire Mesh
- (5) Gauze or Cheesecloth (Cotton, Clean and lint-free)
- (6) DC Power Supply
- (7) Solvent and Acid Resistant Tape
- (8) 3M Scotch Brite Pads, Type A, Very Fine
- (9) Aluminum Foil Tape
- (10) Solid FEP
- (11) Blue Litmus Paper
- (12) Acetone or Methyl Propyl Ketone (MPK) Solvent
- (13) BMS 5-89 Adhesive Primer
- (14) Plastic Film (Mylar, acetate, polyester or equivalent plastic material)

WARNING KEEP ACIDS AWAY FROM HEAT, FIRE, AND SPARKS ACID FUMES ARE FLAMMABLE AND TOXIC INJURY TO PERSONNEL CAN BE THE RESULT DO NOT PERMIT ACIDS TO MIX WITH OTHER MATERIALS MAKE SURE THAT THE AIR SUPPLY TO THE AREA IS NOT BLOCKED

USE RUBBER GLOVES, PROTECTIVE CLOTHING AND EYE PROTECTION WHEN YOU WORK WITH PHOSPHORIC ACID THE ACID CAN BURN YOUR EYES AND SKIN AND CAUSE INJURY IF THE ACID TOUCHES THESE AREAS, FLUSH WITH A LARGE QUANTITY OF WATER AND GET MEDICAL AID IMMEDIATELY.

B Make the phosphoric acid solution (or gel)

WARNING ALWAYS ADD ACID TO WATER WHEN YOU MIX THEM IF YOU ADD WATER TO ACID, THE ACID WILL BECOME VERY HOT AND WILL NOT BE STABLE THIS CAN CAUSE INJURY TO PERSONS

- (1) To make the phosphoric acid solution, add $14 \pm 1/3$ fluid ounces (410 ± 10 ml) of 75-80% phosphoric acid to each 135 ± 2 fluid ounces (4.0 liters ± 60 ml) of distilled water

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (2) As an option, you can make the phosphoric acid solution thicker. Mix flocculated silica (Cab-OSil, Grade M-5 or PTG) with the phosphoric acid until the acid solution and silica become a gel.

NOTE You can also get the phosphoric acid gel mixture from a vendor (supplier).

C Clean and abrade the repair surfaces.

WARNING DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE OR CAUSE DAMAGE TO THE ENVIRONMENT. REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS) AND THE LOCAL SAFETY PRECAUTIONS.

- (1) Do a solvent wipe with MPK or acetone as given in SOPM 20-30-03.
- (2) Abrade the surfaces with Scotch Brite, Type A, very fine pads or a high grade alumina sand paper (180-grit or finer). The metal surface should look clean when you finish this step of the process.
- (3) Remove the unwanted abrasive particles from the surface. Use clean dry air or nitrogen.
- (4) Do a solvent wipe with MPK or acetone as given in SOPM 20-30-03.
- (5) Isolate the mechanical fasteners and all the areas that are not damaged. Use aluminum foil tape or a combination of aluminum foil tape and polyethylene film (or the equivalent). This will prevent acid contamination.
- (6) Put on a mask to seal all areas where the damage goes through a skin. To make the mask, put aluminum foil tape, solid FEP or other satisfactory material on top of the honeycomb.

NOTE If you do a one-stage repair, make sure that the hole is filled before you put on the mask. Example: you can put the honeycomb repair core in the hole (without the core splice adhesive) or you can put in a solid plug.

- (7) Flush with clean water and/or wipe with a clean, wet, lint-free cloth until no visible residue appears on the cloth.

D Do a visual inspection for a water-break-free surface.

- (1) Flush the surface with clean (mineral-free or de-ionized) water. Do this for 30 seconds or until the surface has a continuous water film on all of the repair area.

NOTE The preferred water temperature is between 50° and 100°F (10° and 38°C).

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (2) After the flush procedure is completed, the water film on the bond surface must stay continuous for a minimum of 30 seconds

NOTE The water surface tension at the edges of an aluminum skin can cause the water film to pull away from the edge a small distance. This condition is permitted unless it is caused by visible surface contamination or incorrect abrading.

- (3) If the film does not remain continuous for a minimum of 30 seconds, do par 13 C and 13 D again

E Put a layer of plastic film (Mylar, acetate, polyester or an equivalent material) on the bench tops and other work areas. This will help to prevent the contamination of the repair parts.

F Assemble the PANTA system immediately after you clean the repair surfaces. Refer to Fig 5 when you do the steps that follow.

- (1) Make a dam to prevent the acid solution (or gel) and rinse water from going into the adjacent structure. To make the dam, build up aluminum foil, acid resistant tape, solid FEP, or other acceptable material around the surface to be treated.

CAUTION DO NOT USE A STAINLESS STEEL SCREEN IF IT SHOWS CORROSION OR OTHER DETERIORATION. IF YOU DO, IT IS POSSIBLE THAT THERE WILL NOT BE THE NECESSARY AMOUNT OF CURRENT FLOW THROUGH THE SCREEN.

- (2) Cut a piece of the stainless steel screen to the shape and dimensions of the surface area to be treated. Use a 300 series alloy CRES with a wire gauge that is a minimum of American Wire Gauge (AWG) #20 (0.03 inch (0.8 mm) diameter) and a maximum of #14 (0.06 inch (1.5 mm) diameter).

NOTE AWG #18 (0.04 inch (1.0 mm) diameter) is the usual type of stainless steel screen used.

- (3) Set up an acid drain and rinse water recovery basin to hold the waste acid and rinse water after the anodize procedure is completed.

- (4) Apply the acid and layup materials.

NOTE You have 30 minutes maximum after you apply the phosphoric acid to start the anodize procedure.

- (a) Make sure the temperature of the aluminum part and the acid solution (or gel) during the anodizing procedure is between 70° and 85° F (21° and 29° C).
- (b) Keep the surface wet with acid solution (or gel) at all times. If the surface starts to dry, add more acid solution (or gel).

**INTERCONTINENTAL
STRUCTURAL REPAIR**

WARNING KEEP ACIDS AWAY FROM HEAT, FIRE, AND SPARKS ACID FUMES ARE FLAMMABLE AND TOXIC INJURY TO PERSONNEL CAN BE THE RESULT DO NOT PERMIT ACIDS TO MIX WITH OTHER MATERIALS. MAKE SURE THAT THE AIR SUPPLY TO THE AREA IS NOT BLOCKED

USE RUBBER GLOVES, PROTECTIVE CLOTHING AND EYE PROTECTION WHEN YOU WORK WITH PHOSPHORIC ACID THE ACID CAN BURN YOUR EYES AND SKIN AND CAUSE INJURY IF THE ACID TOUCHES THESE AREAS, FLUSH WITH A LARGE QUANTITY OF WATER AND GET MEDICAL AID IMMEDIATELY

- (c) Apply a smooth layer of phosphoric acid solution (or gel) to the aluminum surfaces.
- (d) Cut a layer of gauze (or the equivalent absorbent, porous material) that is larger than the area to be anodized
 - 1) Put the gauze on the acid layer Extend the gauze 0.5 inch (13 mm) minimum, from the edges of the area to be anodized Do this until two or three layers of the gauze are assembled
 - 2) Keep the thickness to a minimum to prevent gasses from being trapped (but make sure that there is enough so that the screen will not touch the surface to be anodized)
 - 3) Remove the wrinkles If necessary you can use a paint brush or a plastic sweeper to make sure the acid fully soaks the gauze

NOTE You can pre-soak the gauze The gauze can be pre-soaked by squeezing the acid gel solution through the gauze by hand Use rubber gloves for protection

CAUTION MAKE SURE THAT THE STAINLESS STEEL SCREEN AND CATHODE WIRE DOES NOT TOUCH THE ALUMINUM REPAIR SURFACE THE RESULT CAN BE DAMAGE TO THE PARTS

- (e) Put the stainless steel screen on the layers of gauze and acid

CAUTION MAKE SURE THAT THE SURFACE OF THE REPAIR AREA IS OPEN TO THE AIR TO PERMIT THE RELEASE OF UNWANTED GASES IF YOU DO NOT, THE REPAIR WILL BE UNSATISFACTORY

- (f) Add a layer of phosphoric acid solution (or gel) to the stainless steel screen to make sure that the solution fully covers the screen
- (5) Make the electrical connections

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (a) Attach a conductive negative (-) cathode wire to the stainless steel screen. Make sure that there is a minimum of one wire for each 30 square inches (200 square cm) of the repair area. The length of the wire must be sufficient so that there is no tension between the power supply and the PANTA assembly. The wires must be evenly spaced apart.

NOTE The negative (-) cathode wire must have a good electrical conductivity with the stainless steel screen. Make sure that the wires and clamps are large enough to carry the necessary electrical current.

- (b) Connect the negative (-) cathode wire that is attached to the stainless steel screen to the negative lead on the power source. Connect the positive (+) anode wire to the aluminum part surface to be anodized, and to the positive (+) lead on the power source.

NOTE Use a battery or a DC power supply as the power source for the anodizing procedure. The power source must have a capacity of 10 volts, minimum. The power source must also have a capacity of 8 amps/square foot (86 amp/square meter), minimum.

CAUTION DO NOT LET THE ASSEMBLY BECOME DRY. THE RESULT CAN BE A BURNED SURFACE OR A SURFACE TREATMENT THAT IS UNSATISFACTORY. ADD MORE ACID AS NECESSARY TO KEEP THE SURFACE FULLY WET.

G Do the PANTA procedure

- (1) Do the steps that follow in the sequence that follows

NOTE You have less than 30 minutes to start the electricity after you apply the acid.

- (a) Set the voltage and current positions to zero on the electrical power supply.
- (b) Start the electrical power supply.
- (c) Increase the current adjustment to the full open position.
- (d) Slowly increase the voltage (approximately 5 volts for each minute) until it is between 9.5 to 10 volts (DC).
- (e) Do a check of the amperage after it gets to the correct voltage.

NOTE A fast increase in the current (more than 20% of the stable value) could be a sign that the surface is burning. Add more acid solution (or gel). If this is an unsatisfactory solution, an electrical short could be the cause. Stop the procedure and look for the problem.

- 1) In one minute or less, the current will become stable.
- 2) The current density at 9.5 to 10 volts (DC) must be in a range that is between 0.014 and 0.048 amperes/square inches (0.0022 and 0.0074 amperes/square cm).

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (f) Apply the 9.5 to 10 volts (DC) for 10 to 12 minutes

CAUTION DO NOT LET THE ASSEMBLY BECOME DRY. THE RESULT CAN BE A BURNED SURFACE OR A SURFACE TREATMENT THAT IS UNSATISFACTORY. ADD MORE ACID AS NECESSARY TO KEEP THE SURFACE FULLY WET.

- (2) Stop the electrical power after the specified time
- (3) Immediately, remove the screen and the gauze breather cloth. Discard these materials. Use a method to discard these materials that is permitted by your local safety, health, and environmental authorities.
- (4) Immediately, flush the phosphoric acid from the anodized surfaces with clean water. The time interval between power shut-off and the start of the flush must not be more than 2.5 minutes. Flush with clean (mineral free or de-ionized) water for a minimum of 5 minutes.

NOTE Do not rub or wipe the repair surface.

- H Let the anodized surface fully dry at room temperature. As an alternative, you can dry the parts with forced, clean, dry, filtered air that is a maximum of 160°F (71°C) until the surface is fully dry.

NOTE You must apply the adhesive primer in less than 24 hours after the surface is anodized. Prevent the contamination of the anodized surface by moisture, dust, oil fumes, engine exhaust or other unwanted material. Do not touch the dried anodized surfaces. Do not apply tape to the anodized surfaces.

- I Examine the anodized surface. You can use a Phosphoric Acid Anodize Detector (dichroscope) or do the polarized filter color inspection test that follows.

NOTE You can purchase a Phosphoric Acid Anodize Detector (part number WCI-AD55) from West Coast Industries, Inc., 14900 Whitman Ave N, Seattle, WA 98133.

- (1) Polarized filter color inspection test
- (a) Use a fluorescent light source on the anodized area.
- (b) Put a polarizing filter between yourself and the treated surface and look at the reflected light (from the surface) at an angle of 5 degrees or less. It can be helpful to put the light source at a glancing angle. Refer to Fig. 6.
- (c) While you look at the surface through the polarizing filter, turn the filter 90 degrees. A correctly anodized surface gives a constant change in color (on all areas of the anodized surface) when you look through the filter. The colors seen most frequently are purple, yellow, and green.

NOTE It is not easy to see the colors on a rough or contoured surface. To find out if a surface is anodized correctly, change the view angle of the polarizing filter to see if the anodic coating is satisfactory.

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (2) The anodize procedure is not successful if you find one or more of the conditions that follow
- (a) There are sudden changes in color as a result of stains, contamination, fingerprints, or other parts that touched the surface
 - (b) There are electrical burns or pits
 - (c) There are areas of the surface to be bonded that are not anodized
- (3) The surface is fully anodized if you see a constant change in color (with the polarizing filter) on all the areas of the anodized surface.
- (4) If the color inspection test on a rough or contoured surface is not successful, you can do alternative tests to make sure you have a good anodized surface. Do one or more of the tests that follow
- (a) Use an ohmmeter to do a resistance test of the anodized surface. Make sure that the ohmmeter probes are clean
 - 1) Carefully, put the ohmmeter probes on the anodized surface. Make sure that you do not damage the anodized surface with the ohmmeter probes
 - 2) Carefully touch the surface with the sides of the probes first, then lay them down. If the surface has a resistance of more than 20,000 ohms (20 kohms) the test is successful
 - (b) Do an infrared filter test to measure the weight of the anodize coating. Use an infrared filter device that is tuned to measure phosphoric acid anodize oxides. If the infrared filter test shows an anodized coating that is more than 20mg/square foot (215mg/square Meter), the test is successful
- NOTE** A source for the infrared filter is as follows: Personal Instruments, LLC 18 Commerce Road Newton, CT 06470 (203) 426-0152
- (c) The surface is fully anodized if you see a constant change in color (with the polarizing filter) on 90 percent or more of the anodized surface and one or more of the alternative tests are satisfactory
- (5) If the anodize procedure is not successful, you must do all of the steps in par 13 again (You must remove the unsatisfactory anodic oxide by abrasion as given in par 13 C.)
- J If you put a mask on open honeycomb core during par 13 C (6), then remove it now. Make sure that you do not touch or contaminate the surfaces that have been anodized. Do not let moisture get into the core cells
- (1) Do a visual check for moisture in the cells. If you see moisture, use blue litmus paper to make sure that there is no acid contamination
 - (a) If the litmus paper changes to a red color, there is acid contamination in the core cells. Flush the core with water. Use more blue litmus paper and do a check for acid again
 - (b) If the litmus paper stays blue, there is no acid in the core. Remove the moisture, then continue with the procedure



**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (2) Make sure that the core is fully dry before you apply the adhesive primer
- K** Keep the bond surface(s) clean if you cannot apply the adhesive primer immediately
- (1) Do not touch the surface(s) with your bare skin, waxed paper, or material that has a release agent or other contamination
- (2) If protection of the surface(s) is necessary, then put vacuum bag film or unwaxed paper (without ink or other contamination on it) on the bond surface(s)
- L** Apply BMS 5-89 adhesive primer in less than 24 hours after the anodize procedure is completed Refer to par 15
- 14. The Boegel (AC-130) Prebond Treatment Procedure**
- NOTE.** The Boegel (AC-130) Prebond Treatment materials must be purchased from an approved Boeing licensed supplier
- A** The materials that you need are
- (1) AC-130 Sol-Gel Kit (Source: Advanced Chemistry and Technology, 7341 Anaconda Avenue, Garden Grove, CA 92841, 800-732-4470)
- (2) Cheesecloth, gauze or clean cotton rags, or BMS 15-5, Class A wipers
- (3) Acetone or Methyl Propyl Ketone (MPK) Solvent
- (4) BMS 5-89 Type II (BR 6747-1 only) Adhesive Primer
- (5) Merit Shur Stik ALO Resin Bond, #180-grit Abrasive Papers (Source: Merit Abrasives, Customer Service, 2770 W Washington St., Stephenville, TX 76401-3798, Tel: 800 421-1936, Fax: 800 472-3094, website: www.meritabr.com) Refer to Table 4 for product identification

ALO Resin Bond 180 Grit Sanding Discs				
Disc Diameter	Quick-Change PowerLock Discs			Shur Stik Adhesive Backed Discs
1/2 inch (13 mm)	N/A	N/A	N/A	71108
3/4 inch (19 mm)	61010	65109	64325	71122
1 inch (25 mm)	61023	65124	66252	71137
1 1/2 inches (38 mm)	61036	65139	66251	71152
2 inches (50 mm)	61050	65154	64916	71167
3 inches (75 mm)	61064	65169	66187	71182
4 inches (100 mm)	61078	65184	64843	71197
5 inches (125 mm)	N/A	N/A	N/A	72024
6 inches (150 mm)	N/A	N/A	N/A	72053

Merit Sandpaper Ordering Information
Table 4



INTERCONTINENTAL
STRUCTURAL REPAIR

- B Prepare the repair area for the Boegel (AC-130) Prebond Treatment procedure

WARNING DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN DO NOT BREATHE THE FUMES FROM SOLVENTS SOLVENTS ARE DANGEROUS MATERIALS SOLVENTS CAN BE FLAMMABLE OR CAUSE DAMAGE TO THE ENVIRONMENT REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS) AND THE LOCAL SAFETY PRECAUTIONS

- (1) Do a solvent wipe with MPK or acetone as given in SOPM 20-30-03.
- (2) Abrade the surfaces with Scotch Brite, Type A, very fine pads or a high grade alumina sand paper (180-grit or finer) The metal surface will look clean when you finish this step of the process
- (3) Remove the unwanted abrasive particles from the surface Use clean dry air or nitrogen
- (4) Do a solvent wipe with MPK or acetone as given in SOPM 20-30-03

- C Mix the components of kit as given in the manufacturer's instructions Use a kit size that is the best for the area to be treated Example approximately 50 ml of the Boegel (AC-130) solution is satisfactory to treat 200 square inches (1300 square cm) of bond zone Scale it up if necessary

- (1) 30 minutes after you mix the components, you can apply Boegel (AC130) to the surface to be treated

NOTE 30 minutes is the minimum time necessary for the components to react

- (2) Use the mixture after the abrade steps that follow, but not after 10 hours

CAUTION USE THE SANDPAPER THAT IS SPECIFIED IN THIS PROCEDURE SOME TYPES OF SANDPAPER CAN CAUSE A WEAK BOND

- D Fully abrade the repair area again.

- (1) Use a random orbital sander or die grinder
 - (a) Make sure that the sander or grinder will not get oil contamination on the sandpaper or the bond surface
 - (b) Only use a sander or grinder that has a vented or filtered exhaust for the dust particles
- (2) Use Ment ALO Resin Bond, 180-Grit, alumina sandpaper (Ment Abrasives, 201 W. Manville Street, P O Box 5477, Compton, CA 90224-5477)
- (3) Abrade for a minimum of 1 minute for each 40 square inches (260 square cm) in area.
 - (a) Move the sander/grinder in one direction on the panel surface

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (b) Change the sandpaper after each 30 seconds that you abrade. Change the direction of movement by 90 degrees each time that the sandpaper is changed.

NOTE This procedure is necessary to remove the metal oxide layer on the aluminum and make the surface reactive for the Boegel (AC-130)

- (c) Make sure that all of the repair area is fully abraded, including the edges
- (d) After all of the surface has been abraded, change the sandpaper and fully abrade the surface again. Move the sander in a random direction on all of the panel surface

NOTE You can abrade a maximum of 200 square inches (1300 square cm) on the last sheet of sandpaper. Do not abrade the surface for more than 30 seconds

- (4) Example: If you treat a section that is 80 square inches (520 square cm) do the steps that follow:
- (a) Abrade the surface in one direction for a minimum of 30 seconds
- (b) Change the sandpaper, and then abrade in a 90 degree direction for a minimum of 30 seconds. Then change the sandpaper again. Repeat this for a total treatment time of 2 minutes, minimum (with 4 sheets of sandpaper).
- (c) Then, change the sandpaper and abrade all of the surface for 30 seconds more
- (5) Do a visual inspection. The surface should have a fully abraded appearance. If not, do the abrade steps again
- (6) Remove the loose grit residue with clean, dry compressed nitrogen or air. Keep the surface clean until you apply the Boegel (AC-130) Solution
- (7) Apply the Boegel (AC-130) solution in less than 30 minutes after you complete the abrade steps

NOTE. After 30 minutes the surface will begin to oxidize. Then you will need to do the abrade steps again to remove the oxide layer

WARNING DO NOT PERMIT THE BOEGEL (AC-130) SOLUTION TO TOUCH YOUR FACE OR EYES. USE APPROVED PROTECTION PROCEDURES. IF THE SOLUTION TOUCHES THESE AREAS, IRRITATION TO THE EYES AND SKIN CAN OCCUR

E Apply the Boegel (AC-130) solution

- (1) Put on a mask to seal all areas where the damage goes through a skin. To make the mask, put aluminum foil tape, solid FEP or other satisfactory material on top of the honeycomb

NOTE If you do a one-stage repair, make sure that the hole is filled before you put on the mask. Example: you can put the honeycomb repair core in the hole (without the core splice adhesive) or you can put in a solid plug

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (2) Isolate the mechanical fasteners and all the other areas that are not damaged Use aluminum foil tape or a combination of aluminum foil tape and polyethylene film (or the equivalent) This will prevent contamination
- (3) Make sure that the temperature of the Boegel and aluminum part stays between 50° and 100° F (10° and 38° C) during the procedure
- (4) Apply the solution to the bond surface to be treated with a clean, natural (non-metallic) bristle brush or with a sprayer
- (5) Apply a sufficient quantity of solution to cause the solution to drain from the bond surface Keep the bond surface fully and continuously wet with the solution for 2 minutes, minimum
- (6) When the 2 minutes is completed, the wetted surface must look like a water-break-free surface

NOTE The solution surface tension at the edges of an aluminum skin can cause the solution film to pull away from the edge a small distance This condition is permitted unless it is caused by surface contamination or incorrect abrading

- (a) The solution film on the bond surface must stay continuous for a minimum of 30 seconds.
 - (b) If the solution film does not stay continuous for a minimum of 30 seconds, there is surface contamination Do the cleaning, abrasion and application steps again.
- (7) If the break-free surface test is satisfactory, then drain off the remaining solution
 - (8) If you see drops of solution in crevices, pockets, or other contained areas, then they must be removed
 - (a) Lightly blow off the drops of solution with filtered dry air, or
 - (b) Carefully remove the drops with clean cheesecloth or other absorbent material that is moist with Boegel (AC-130)

NOTE. Do not rub or wipe the surface. Do not touch the surface with your bare skin or with gloves that have contamination on them

- F Let the treated surfaces dry at room temperature for 60 minutes, minimum. You can use an oven, heat lamp, or forced air that is oil-free and is no hotter than 160° F (71° C) to dry the parts
- G Examine all of the treated surface The surface must look dry and not have dust, fingerprints or other contamination Use filtered forced air to remove dust If there is contamination that cannot be removed with forced air, then clean, abrade, and do the Boegel steps again

NOTE It is possible that you see stains on the prepared surface after the surface is dry These stains are permitted

- H If you put a mask on open honeycomb core during par 14 E (1), then remove it now Make sure that you do not touch the surface to be bonded Do not let moisture get into the core cells Make sure that the core is fully dry before you apply the adhesive primer



INTERCONTINENTAL
STRUCTURAL REPAIR

- I Keep the bond surface(s) clean if you cannot apply the adhesive primer immediately
- (1) Do not touch the surface(s) with your bare skin, waxed paper, or material that has a release agent or other contamination
 - (2) If protection of the surface(s) is necessary, then put vacuum bag film or unwaxed paper (without ink or other contamination on it) on the bond surface(s)
- J Apply BMS 5-89, Type II (BR 6747-1 only) adhesive primer not later than 24 hours after you apply the Boegel (AC-130) solution Refer to par 15 Clean the bond surface and do the Boegel (AC-130) procedure again if the bond surface has contamination

15 Application of BMS 5-89 Adhesive Primer to the Bond Surface

- A Remove the primer from storage Do not open the container until it is between 65° and 90° F (18° and 32° C)

NOTE. Refer to Boeing Process Specification BAC 5514-589 "Application of Corrosion Inhibiting Adhesive Primer" for the storage and shelf life specifications Do not use a primer that shows signs of deterioration Do a check for signs of lumps or gelatin

WARNING DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN DO NOT BREATHE THE FUMES FROM SOLVENTS SOLVENTS ARE DANGEROUS MATERIALS SOLVENTS CAN BE FLAMMABLE OR CAUSE DAMAGE TO THE ENVIRONMENT REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS) AND THE LOCAL SAFETY PRECAUTIONS

DO NOT USE SOLVENT BASED PRIMERS IN AREAS WITH EQUIPMENT THAT PRODUCE HEAT OR A SPARK IF YOU DO, AN EXPLOSION CAN OCCUR AND CAUSE INJURY

CAUTION PREVENT CONTAMINATION OF THE PARTS AFTER YOU DO A SURFACE PREPARATION WEAR CLEAN GLOVES, OR USE HOOKS TO MOVE THE PARTS DO NOT APPLY THE PRIMER IF THE TEMPERATURE IS LESS THAN 50° F (10° C) OR MORE THAN 85 PERCENT OF THE RELATIVE HUMIDITY. IF YOU DO NOT OBEY, THE RESULT CAN BE AN UNSATISFACTORY BOND

- B Mix the BMS 5-89 adhesive primer Use the manufacturer's instructions, or Boeing Process Specification BAC 5514-589 "Application of Corrosion Inhibiting Adhesive Primer"

- C Apply the BMS 5-89 adhesive primer

NOTE BMS 5-89 must be baked after it is applied Because you cannot measure the thickness until after you bake, you need sufficient training or experience to know what a good thickness looks like (You can also use a visual reference standard, or you can do an experiment on an aluminum part that will not be used for the repair) It is permitted for you to apply BMS 5-89 primer on painted surfaces adjacent to the bare aluminum surface It is not necessary to measure the thickness of the primer that is applied to the painted surfaces adjacent to the bare aluminum It is not necessary to measure the thickness of the primer on the edges of the repair parts or the edges of the removed damage area. You have a maximum of 120 hours to start the baking procedure



INTERCONTINENTAL
STRUCTURAL REPAIR

- (1) Apply the primer to a thickness that will be between 0.00015 and 0.00040 inch (0.004 and 0.010 mm) after baking.

NOTE: It can be necessary to apply the primer two or more times to get it to the specified thickness. Continuously shake the container (that has the primer) each 3 to 5 seconds until the procedure is completed.

- (2) Apply the primer to the edges of the repair parts and the edges at the removed damage area.

CAUTION: DO NOT USE FORCED AIR ON THE WET SURFACE. DEFECTS AND DAMAGE TO THE PRIMER CAN OCCUR. PROTECT THE PRIMER FROM DUST OR OTHER CONTAMINATION. IF YOU DO NOT, THE STRENGTH OF THE REPAIR CAN BE REDUCED.

- D Let the primer dry. If more than one side will have primer, make sure that the first side is dry before you apply primer to the second side.

NOTE: Do not use Type I or III primer if you did the Boegel (AC-130) surface preparation.

- (1) BMS 5-89, Type I solvent based primer can be dried for 30 minutes at room temperature. As an alternative, you can dry the primer with a heat lamp that is no hotter than 200° F (93° C) until the primer is hard (tack-free).
- (2) BMS 5-89, Type II or III water based primer can be dried at room temperature, or with a heat lamp until all of the water that you see is gone (the primer does not look wet).
- (3) After BMS 5-89, Type III primer has dried, let it stay for 15 more minutes (minimum) before you start to bake.

- E Bake the primer at 240° ±20° F (116° ±12° C) for 30 to 120 minutes. Use an oven, heat lamp, or hot air.

NOTE: As an alternative, you can do a two stage cure. First, bake the primer at 175° F (80° C) for 2 hours minimum. Then do the layup. The cure will be complete when the adhesive is cured.

- F Measure the primer thickness. You can use an eddy current procedure, a visual standard, or a procedure that gives the equivalent satisfactory results.

- (1) If the primer is not at the specified thickness, then you must remove the primer.

- (a) Do one of the surface preparations in par. 11 and put adhesive primer on the bond surface again.

- (b) Bake the primer and measure the thickness again.

- (2) If the thickness is satisfactory, apply the adhesive as given in par. 18 or par. 19.



INTERCONTINENTAL
STRUCTURAL REPAIR

16 Hydrofluoric (HF) - Alodine Procedure

NOTE This surface preparation procedure has size limits Refer to Fig 1

A The materials that you need are

- (1) Hydrofluoric Acid (HF)
- (2) 3M Scotch-Brite, Type A, very fine pads or a high grade alumina sandpaper (180-grit or finer)
- (3) Aluminum Foil Tape
- (4) Solid FEP
- (5) Cheesecloth, gauze or clean cotton rags, or BMS 5-15 Class A wipers
- (6) Blue litmus paper
- (7) Alodine 1200
- (8) Acetone or Methyl Propyl Ketone (MPK) Solvent
- (9) BAC 5710 Type 60 Adhesive Primer

B Clean and abrade the repair surfaces.

WARNING DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN DO NOT BREATHE THE FUMES FROM SOLVENTS SOLVENTS ARE DANGEROUS MATERIALS SOLVENTS CAN BE FLAMMABLE OR CAUSE DAMAGE TO THE ENVIRONMENT REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS) AND THE LOCAL SAFETY PRECAUTIONS.

- (1) Do a solvent wipe with MPK or acetone as given in SOPM 20-30-03
- (2) Abrade the surfaces with Scotch Brite, Type A, very fine pads or a high grade alumina sand paper (180-grit or finer) The metal surface should look clean when you finish this step of the process
- (3) Remove the unwanted abrasive particles from the surface Use clean dry air or nitrogen
- (4) Do a solvent wipe with MPK or acetone as given in SOPM 20-30-03

CAUTION DO NOT PERMIT THE ACID SOLUTION TO TOUCH OTHER SURFACES ADJACENT TO THE REPAIR BOND AREAS IF IT DOES, THE RESULT CAN BE DAMAGE TO THE PAINT AND ADHESIVE SYSTEMS

- (5) Isolate the mechanical fasteners and all the areas that are not damaged, with aluminum foil tape or a combination of aluminum foil tape and polyethylene film (or the equivalent). This will prevent acid contamination



**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (6) Put on a mask to seal all areas where the damage goes through a skin. To make the mask, put aluminum foil tape, solid FEP or other satisfactory material on top of the honeycomb.

NOTE If you do a one-stage repair, make sure that the hole is filled before you put on the mask. Example: you can put the honeycomb repair core in the hole (without the core splice adhesive) or you can put in a solid plug.

- (7) Flush with clean water and/or wipe with a clean, lint-free cloth until no visible residue appears on the cloth.

C Do a visual inspection for a water-break-free surface

- (1) Flush the surface with clean (mineral-free or de-ionized) water. Do this for 30 seconds or until the surface has a continuous water film on all of the repair area.

NOTE The preferred water temperature is between 50° and 100° F (10° and 38° C).

- (2) After the flush procedure is completed, the water film on the bond surface must stay continuous for a minimum of 30 seconds.

NOTE The water surface tension at the edges of an aluminum skin can cause the water film to pull away from the edge a small distance. This condition is permitted unless it is caused by visible surface contamination or incorrect abrading.

- (3) If the film does not remain continuous for a minimum of 30 seconds, do par 16 B and par 16 C.

WARNING DO NOT BREATHE THE FUMES WHEN YOU DO WORK WITH HYDROFLUORIC ACID SOLUTIONS. USE MECHANICAL AIRFLOW AND RESPIRATORY PROTECTION. DO NOT LET THE SOLUTIONS TOUCH YOUR EYES OR SKIN. WEAR GLOVES AND PROTECTIVE CLOTHING. IF YOU DO NOT OBEY, YOU CAN CAUSE SKIN IRRITATION OR INJURY. IF THE SOLUTION TOUCHES YOUR EYES, CLEAN WITH A LARGE QUANTITY OF WATER AND GET MEDICAL AID IMMEDIATELY.

- D** Prepare the Alodine 1200 solution as given in 51-8-0. Let it stay mixed for one hour before you use it.

NOTE A dirty solution is not satisfactory for use. Prepare the solution in small quantities. Discard the solution if you do not use it before 24 hours or if the solution is dirty. If you use non-distilled water, then add nitric acid to control the pH of the solution. For the Alodine 1200 product, the pH must be between 1.5 and 2.0. Use pHydron papers to check the pH of the solution.



INTERCONTINENTAL
STRUCTURAL REPAIR

E Do the HF acid etch procedure

- (1) Make sure that the temperature of the HF acid and the aluminum part stays between 50° and 100° F (10° and 38° C) during the etch procedure
- (2) Make a clean cloth moist, but do not soak it, with a 2 percent solution of HF acid. Rub the bond mating surface area with the moist cloth. Let the solution stay on the surface for 15 to 30 seconds
- (3) Quickly rub mating surfaces of the bond area with the moist cloth
- (4) Let the HF solution stay on the surface for approximately 15 to 30 seconds
- (5) Quickly remove the solution with a cloth moist with clean water

NOTE Do not permit the cloth to touch the etched surface for more than 2 minutes. Do not permit the cloth to touch surfaces that were not etched with the HF solution and then to touch the etched surfaces. This will cause contamination of the etched surfaces.

F Apply the Alodine solution to the etched area as given in 51-8-0

NOTE Do not permit the etched surfaces to dry before you apply the chemical conversion coating.

- (1) Make sure that the temperature of the Alodine and the aluminum part stays between 50° and 100° F (10° and 38° C) during the procedure
- (2) Apply the Alodine solution to the etched area in less than 60 seconds after the HF acid etch procedure is completed
 - (a) Apply the Alodine solution with a fiber or nylon brush, or clean, dry cheesecloth

NOTE Make sure that you apply a sufficient quantity of chemical conversion coating to give a smooth layer.

- (b) Make sure that the etched area stays moist with Alodine solution for 3 to 4 minutes

CAUTION USE CARE WHEN YOU RINSE THE COATED SURFACE. IF YOU DO NOT, THE RESULT CAN BE AN UNSATISFACTORY CHEMICAL CONVERSION COATING. THE NEW COATING IS FRAGILE AND CAN BE EASILY DAMAGED.

- (3) Rinse the area with a moist, but not soaked, cheesecloth. Make sure that the cheesecloth and water are clean.

NOTE Lightly touch the surface for 1 to 2 minutes. Then, do it again with another clean moist cheesecloth to remove more of the solution from the surface. Do not wipe the surface.

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (4) Do a check of the repair area to see if acid remains on the surface
- (a) Look at the repair surface and all of the crevices in the repair area
 - (b) If you see moisture, use blue litmus paper to make sure that there is no acid on the surface or in the crevices

NOTE If the litmus paper remains blue then remove the moisture and continue with the procedure. If the litmus paper changes to a red color, then acid remains on the surface. You must do par 16 F (3) and par 16 F (4) again until the litmus paper remains blue.

CAUTION USE CARE WHEN YOU DRY THE COATED SURFACE. DO NOT WIPE OR RUB THE SURFACE. THE NEW COATING IS FRAGILE AND CAN BE EASILY DAMAGED.

- (5) Carefully dry the surface with clean dry cheesecloth to remove the rinse water. If necessary, do this again to remove the water from the surface.

WARNING DO NOT PERMIT THE CHEMICAL CONVERSION COATING TO DRY ON THE BRUSHES OR CHEESE CLOTH. MAKE SURE THAT YOU WASH ALL OF THE COATING FROM THE FROM THESE MATERIALS BEFORE IT IS DRY. WRING OUT THE MATERIALS AND PUT THEM INTO A FIRE-PROOF CONTAINER. IF YOU DO NOT, THE RESULT CAN BE A CHEMICAL FIRE CAUSED BY SPONTANEOUS COMBUSTION.

- (6) Do not put materials that have Alodine on them in the same container with materials that have solvent on them.
- (a) Wash all of the Alodine from the materials used for the application, before the materials are discarded.
 - (b) Discard the materials in an approved container. Use a procedure to discard these materials that is permitted by your local safety, health, and environmental authorities.
- (7) Permit the surfaces to fully air-dry. You are permitted to use filtered hot air up to a maximum of 130° F (54° C). A minimum 15 minutes is recommended.

NOTE. You must apply the final finish or start the adhesive procedures as soon as possible after the chemical conversion coating is dry. Wear clean gloves to keep contamination from the part.

G Do a visual check of the repair surface for a powdery coating. All Alodine coatings must be free of powder.

- (1) If you find a powdery coating on the surface, then you must do par 16 F (3) through par 16 F (7) and par 16 G again until the surface is free of powder.
- (2) If the surface is free of powder, then continue with the procedure.

H If you put a mask on open honeycomb core during par 16 B (6), then remove it now. Make sure that you do not touch the surface to be anodized. Do not let moisture get into the core cells.

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (1) Do a visual check for moisture in the cells. If you see moisture, use blue litmus paper to make sure that there is no acid contamination.
 - (a) If the litmus paper changes to a red color, there is acid contamination in the core cells. Flush the core with water. Use more blue litmus paper and do a check for acid again.
 - (b) If the litmus paper stays blue, there is no acid in the core. Remove the moisture, then continue with the procedure.

(2) Make sure that the core is fully dry before you apply the adhesive primer.

I Keep the bond surface(s) clean if you cannot apply the adhesive primer immediately

- (1) Do not touch the surface(s) with your bare skin, waxed paper, or material that has a release agent or other contamination
- (2) If protection of the surface(s) is necessary, then put vacuum bag film or unwaxed paper (without ink or other contamination on it) on the bond surface(s)

J Apply the BAC 5710, Type 60 adhesive primer not later than 24 hours after you apply the Alodine. Refer to par 17. Clean the bond surface and do the HF Alodine procedure again if the bond surface has contamination.

17 Application of BAC 5710, Type 60 Adhesive Primer

WARNING DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS. SOLVENTS CAN BE FLAMMABLE OR CAUSE DAMAGE TO THE ENVIRONMENT. REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS) AND THE LOCAL SAFETY PRECAUTIONS.

WARNING DO NOT USE SOLVENT BASED PRIMERS IN AREAS WITH EQUIPMENT THAT PRODUCE HEAT OR A SPARK. IF YOU DO, AN EXPLOSION CAN OCCUR AND CAUSE INJURY.

A Mix the Courtaulds Aerospace 515X346 primer with 910X520 catalyst and the 020-702 thinner. Refer to Table 5 for the mixture ratio of the primer components.

B Prepare the mixture as given in the manufacturer's instructions.

- (1) Permit the mixture to stay at room temperature for 30 minutes before you apply it to the surface.
- (2) Apply the primer before 60 minutes after you apply the chemical conversion coating to the repair area.

NOTE Do not apply the primer if its pot-life has expired (8 hours at 77°F (25°C)).



INTERCONTINENTAL
STRUCTURAL REPAIR

COMPONENTS	MIX RATIO BY VOLUME
515X346 Base	4 parts
910X520 Catalyst	1 part
020-702 Thinner	4 parts

Necessary Mix Ratio for the BAC 5710, Type 60 Primer Components
Table 5:

CAUTION PREVENT CONTAMINATION OF THE PARTS AFTER YOU DO A SURFACE PREPARATION. WEAR CLEAN GLOVES, OR USE HOOKS TO MOVE THE PARTS. DO NOT APPLY THE PRIMER IF THE TEMPERATURE IS LESS THAN 50° F (10° C) OR MORE THAN 85 PERCENT OF THE RELATIVE HUMIDITY. IF YOU DO NOT OBEY, THE RESULT CAN BE AN UNSATISFACTORY BOND.

- C Apply a layer of primer to the surface to give a 0.0002 to 0.0008 inch (0.005 to 0.020 mm) dry film thickness.
- D Measure the primer thickness with an eddy current procedure, or a procedure that uses a visual standard, or with a procedure that gives the equivalent satisfactory results.

NOTE: If the primer is more than the specified thickness, then you must remove the primer, do the HF chemical conversion procedure, and apply the primer again. Do not continue unless you have the correct primer thickness. If a second layer of the primer is necessary, permit the first layer to air dry for 1 hour before you apply the second layer.

- E Permit the primer to air dry at a temperature between 70°F and 90°F (21°C and 32°C) for 60 to 90 minutes before you apply the adhesive.
- (1) Keep the primed mating surfaces free from contamination and sunlight.
- (2) Do not store the primed mating surfaces for more than 7 days before you make the bond.
- (3) Do not wipe the primed mating surfaces with solvent before you make the bond.
- F Apply the adhesive as given in par 18 or par 19 L. as applicable. Refer to Fig 1 for repair size limitations.

18 Application of BMS 5-101 Film Adhesive

- A Make a clear plastic template that shows the size and shape of the largest external doubler and the damage cutout. Use the template to make ink marks on the primed surface where the largest external doubler must be put.

NOTE: Use a water-resistant, alcohol based ink pen that will not contaminate or damage the primer or the adhesive. You can use a Sharpie2 SAN30000, SAN35000, or SAN37000 Series fine point pen (or an equivalent pen). Sharpie2 pens are a trademark of the Sanford Corporation.

**INTERCONTINENTAL
STRUCTURAL REPAIR**

WARNING DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN DO NOT BREATHE THE FUMES FROM SOLVENTS SOLVENTS ARE DANGEROUS MATERIALS SOLVENTS CAN BE FLAMMABLE OR CAUSE DAMAGE TO THE ENVIRONMENT REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS) AND THE LOCAL SAFETY PRECAUTIONS

- B** Make sure that you do these application steps in a clean area Use a tabletop or other non-airplane component work surface when you cut adhesive film
- (1) Clean all the work surfaces, templates, and tools with solvent Remove all contamination. Refer to SOPM 20-30-03
 - (2) If necessary, you can put clean vacuum bag film on the work surface to keep contamination off the adhesive
- C** Cut a layer of BMS 5-121 positioning fabric to a larger diameter than the largest repair doubler Cut the fabric so that the edge of the fabric is 0.5 inch (13 mm) minimum, from the edges of the largest repair doubler

NOTE BMS 5-121 positioning fabric is not necessary when you use a pressurized autoclave Positioning fabric is necessary when you use a vacuum bag procedure on a honeycomb panel with more than 64 square inches (400 square cm) of open core If two sides of a honeycomb panel are repaired with external doublers, it is not necessary to use positioning fabric on more than one side. If you do a flush repair, put the positioning fabric on the side that has the external doubler As an option, you can use positioning fabric on repairs that are 64 square inches (400 square cm) or less

- D** Cut the film adhesive Refer to Fig 12 for the steps that follow
- (1) Use only certified film adhesives from the Boeing Material Specification Qualified Products List (QPL)

NOTE. A manufacturer can make an adhesive film material that can be qualified to BMS 5-129 and/or to BMS 5-101 and be listed in each Qualified Products List (QPL) Do not use a BMS 5-129 material for a metal bond repair unless the material has been tested and certified to the BMS 5-101 specification also

- (2) Keep the bag that contains the roll of film adhesive at room temperature until there is no condensation on the bag

NOTE Do not touch the adhesive with your bare skin Wear gloves to protect the adhesive from contamination

- (3) Put the film adhesive on a clean work surface Make sure that the film adhesive side that is against the work surface has a separator sheet

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (a) If you use OST with BMS 5-121 positioning fabric, make sure that the mat side is up, tacky side down, against the work surface. If you use OST without the positioning fabric, make sure that the tacky side is up, mat side down, against the work surface.

NOTE OST film adhesive has a mat carrier cloth on one of the outer surfaces, thus producing one side that is more tacky than the other side. Non-OST mat or knit film adhesive has a carrier cloth in the middle of the adhesive, thus both sides are equally tacky. Both OST and Non-OST can be used with BMS 5-121 positioning fabric.

- (b) If you are using BMS 5-101 Grade 5 film adhesive, then put two plies on the work surface. Make sure that you remove the separator sheet (or sheets) between the plies.
- (c) If you are using BMS 5-101 Grade 10 or 15 film adhesive, then put one ply on the work surface.

NOTE Do not use Grade 15 film adhesive to bond parts that have a gage thickness of 0.020 inch or less.

- (4) Put the repair part with the surface to be bonded against the adhesive. If there is a separator sheet on top of the adhesive, make sure that it is removed.
- (5) Cut the film adhesive all around the repair part with a sharp knife. Let the film adhesive extend 0.01 to 0.1 inch (0.3 to 2.5 mm) from the edge of the repair part.
- (6) If you are using BMS 5-101 Type II, Grade 5 or 10 film adhesive, and the repair has an open core, then cut a piece of adhesive to the same dimensions as the open core. (Do not do this step if you are using a Grade 15 film adhesive.)

NOTE If a piece of OST film adhesive is not a symmetrical shape, then make sure that you cut it so that the mat side will be up when you put it on the honeycomb core.

- E** Put the BMS 5-121 positioning fabric (when specified) on to the area to be repaired. Make sure that the edges of the fabric go past the marks that were made in par. 18 A a minimum of 0.5 inches (13 mm).

NOTE If you can not see the marks through the fabric, then use the template again to make marks that will show the position of the largest external doubler.

- F** Put each of the repair parts (one at a time and in the correct sequence) on to the surface to be repaired. Refer to Fig. 12 and the applicable repair procedure in Table 2.

- (1) Remove the separator sheet from each repair part before it is installed.
- (2) Apply equal and light finger pressure to each repair part as it is installed.
- (3) Apply small pieces of high-temperature polyester tape (or equivalent) to the edges of the repair part(s) to hold the part(s) on to the part to be repaired.



G Do the instructions that follow to assemble the vacuum bag Refer to Fig 14

- (1) Put a breather strip all around and against the edges of the largest external repair doubler

NOTE Put the breather strips on the BMS 5-121 positioning fabric (when the fabric is specified)

- (2) Put thermocouples at the edges and top of the repair doubler(s) as given in Fig 13

NOTE Use thermocouples and a measurement system that can measure temperature to a minimum accuracy of $\pm 5^{\circ}\text{F}$ ($\pm 3^{\circ}\text{C}$)

- (3) Connect the thermocouples to the applicable temperature recorder devices

- (4) Get a heat blanket that is a minimum 2 inches (50 mm) larger all around than the largest repair doubler

- (5) Use the heat blanket dimensions to find the correct dimensions of the layup and bagging materials

(a) Cut two layers of dry peel ply that are 2 inches (50 mm) larger all around than the dimensions of the heat blanket Put one of the dry peel plies on the repair part(s) Make sure that the edges of the peel ply extend an equal distance from the edges of the largest repair doubler

(b) Cut a layer of solid or perforated FEP parting film to the same dimensions as the heat blanket Put the parting film on to the dry peel ply Make sure that the edges of the parting film are an equal distance from the edges of the peel ply

(c) Put the second dry peel ply on to the first peel ply and the parting film Make sure that the edges of the second peel ply are against the edges of the first peel ply

- (6) Protect the component to be repaired from too much heat

(a) If there are attached fittings on the part to be repaired, then put insulation material between the attached fittings and the heat blanket

(b) If the heat blanket extends more than 30 inches (75 mm) from the edge of the damage cutout, you can do this recommended procedure

NOTE If a heat blanket gets too hot, it can cause damage to the repair and to the adhesive in the undamaged skin To help prevent damage (if the heat blanket gets too hot), do not let the heat blanket touch more skin than is necessary Insulation between the heat blanket and the skin is recommended

1) Put one edge of each insulation material on the skin, 20 to 30 inches (50 to 75 mm) from the edge of the damage cutout

2) Put the opposite edge of each insulation material where the edges of the heat blanket will be

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (7) Put the heat blanket on to the top peel ply. Make sure that edges of the heat blanket are an equal distance from the edges of the peel ply (and the insulation, if applicable).
- (8) Put four to six layers of glass fabric (or two layers of 0.04 inch (1.0 mm) breather fabric, or one layer of 0.1 inch (2.5 mm) breather fabric) above the heat blanket as a breather. Make sure that the breather is 2 inches (50 mm) larger all around than the heat blanket.
- (9) Put a vacuum base above the fiberglass breather cloth for each vacuum port and vacuum gage port.
- (10) Put on the vacuum bag sealant.
 - (a) You can put the vacuum bag sealant all around the area to be repaired, or
 - (b) If you use an envelope bag procedure, then seal the open part of the bag with the sealant.
- (11) Make a hole in the outer vacuum bag at the vacuum base location for each vacuum port and vacuum gage port.
- (12) Put the vacuum bag film on the repair area.
- (13) Connect the vacuum port and vacuum gage ports to their vacuum bases.

NOTE A procedure to remove the vacuum source will be necessary, that will not decrease the vacuum in the bag. If necessary, put a valve on the vacuum line between the vacuum bag and the vacuum source.

- (14) If necessary, put insulation material on the outer surface of the vacuum bag.

19 Application of BMS 5-92 or BMS 5-141 Paste Adhesive

NOTE Only small repair sizes can use these adhesives. Refer to Fig. 1 for permitted repair sizes.

- A. Make a clear plastic template that shows the size and shape of the largest external doubler and the damage cutout. Use the template to make ink marks on the primed surface where the largest external doubler must be put.

NOTE Use a water-resistant, alcohol based ink pen that will not contaminate or damage the primer or the adhesive. You can use a Sharpie² SAN30000, SAN35000, or SAN37000 Series fine point pen (or an equivalent pen). Sharpie² pens are a trademark of the Sanford Corporation.

**INTERCONTINENTAL
STRUCTURAL REPAIR**

WARNING DO NOT GET SOLVENTS IN YOUR MOUTH, YOUR EYES, OR ON YOUR SKIN DO NOT BREATHE THE FUMES FROM SOLVENTS. SOLVENTS ARE DANGEROUS MATERIALS SOLVENTS CAN BE FLAMMABLE OR CAUSE DAMAGE TO THE ENVIRONMENT REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS) AND THE LOCAL SAFETY PRECAUTIONS

CAUTION MAKE SURE THAT YOU DO THIS PROCEDURE IN A CLEAN AREA DO NOT LET CONTAMINATION OF THE REPAIR PARTS OCCUR IF YOU DO NOT OBEY, YOU CAN CAUSE AN UNSATISFACTORY REPAIR

B Clean the work area, templates, and tools with solvent before you start to apply the adhesive Refer to SOPM 20-30-03 for the applicable solvents and procedures

CAUTION DO NOT MIX MORE THAN 450 GRAMS OF BMS 5-141 AT ONE TIME IF YOU DO, AN EXOTHERMIC REACTION (A BUILD-UP OF HEAT) CAN OCCUR THE RESULT CAN BE DAMAGE TO THE ADHESIVE.

C Use one of the adhesives that follow

(1) BMS 5-92

(a) Type V, Class 1 or Class 2 (preferred)

(b) Type I, Class 4 (alternative)

(2) BMS 5-141

D Refer to the manufacturer's instructions to mix paste adhesives Tap the container or use a satisfactory procedure to remove air bubbles from the mixture

NOTE As an aid to make sure that you get the necessary thickness on the bond surface, you can add up to 1 percent by weight of 0 005 inch (0 13 mm) diameter glass beads Mix the glass beads with the Part B hardener before you add the Part A base

E Apply a thin, smooth layer of paste adhesive to all of the mating surfaces.

NOTE Do not touch the adhesive with your bare skin Wear gloves to protect the adhesive from contamination

(1) Make sure that the mating surfaces have adhesive primer on them before you apply the paste adhesive

(2) After you mix the adhesive, apply the mixture to the repair parts as soon you can, but not after the pot-life has expired Make sure that the mating surfaces have sufficient adhesive so that it will squeeze out from the edges of the repair part(s) when you mate them

(3) After you apply the adhesive, you have a maximum of 5 minutes to mate the repair parts(s) (After 5 minutes, the adhesive will get a thin, cured skin layer on it, that will make it difficult to get a good bond)

F Install the repair parts

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (1) Put the repair parts into their correct positions

NOTE Use a satisfactory procedure to remove air bubbles from that can be below each repair part. For example, you can put one edge of the repair part on the component. Then slowly put the repair part on the adhesive.

- (2) Apply a equal and continuous pressure of 1 psi (7 kPa) minimum, to the surface of the repair parts. Let the adhesive squeeze out all around the edges.

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- G Clean all of the unwanted adhesive from the repair parts with solvent before you continue with the cure. Refer to SOPM 20-30-03 for the applicable solvents and procedures. Remove all of the contamination.

NOTE Do not permit the solvent to get in the bond line.

20 Cure the bond

- A Vacuum bag procedure for film adhesives (See par 20 C for autoclave cure)

- (1) Remove some of the air out of the honeycomb core before you start the cure.
- (a) Use an initial vacuum of 3 to 5 inches (7.6 to 12.7 cm) of mercury (Hg) for 15 minutes.
- (b) Apply a vacuum to a minimum of 22 inches (56 cm) of mercury (Hg) for 1 minute.
- (2) Do an inspection of the vacuum bag. Look for leaks in the vacuum bag.

NOTE A vacuum bag that has a leak can cause porosity in the adhesive and a weak bond.

- (a) Remove the vacuum source.

NOTE Do not disconnect the vacuum line(s). This can cause a loss of vacuum in the bag.

- (b) Monitor the vacuum gage. After 5 minutes, the total difference in the vacuum must be less than 5 inches of (12.7 cm) of mercury (Hg).

WARNING USE ONLY EXPLOSION-PROOF EQUIPMENT WHEN YOU DO THESE TYPES OF REPAIRS. IF YOU DO NOT, PERSONAL INJURY AND DAMAGE TO ADJACENT EQUIPMENT CAN BE THE RESULT. WHEN YOU WORK WITH FLAMABLE MATERIALS, HEAT, FIRE OR SPARKS CAN CAUSE AN EXPLOSION.

- (3) Cure the bond as given in Table 6.



**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (a) You can use hot air, heat lamps, or a radiant heater with the heat blankets, if necessary
- (b) Start to measure the cure time after the thermocouples show the bond to be at the specified cure temperature

ADHESIVE SPECIFICATION	CURE TEMPERATURE	CURE TIME (MINIMUM)	RATE OF TEMPERATURE INCREASE PER MINUTE
BMS 5-92, Type I or V Adhesive Resin	Refer to Fig 210	Refer to Fig 210	Not Applicable
BMS 5-101 Adhesive Film	225°F to 260°F (107°C to 127°C)	90 minutes	3 ± 2° F (2 ± 1° C)
BMS 5-141 Adhesive Paste	Refer to Fig 211	Refer to Fig 211	Not Applicable

**Adhesive Cure Data
Table 6**

- (4) Apply and keep a vacuum at a minimum of 20 inches (50 cm) of mercury (Hg) during the cure cycle
- (5) If it is necessary to add more pressure, put shot-bags, clamps or other mechanical pressure on to the repair area

NOTE If the repair is on a honeycomb panel, this pressure can prevent a disbond, (during the cure cycle) between the undamaged skin and core

- (a) The pressure must be applied equally to all the areas. The total pressure on a honeycomb panel must not be more than 25 psi (170 kPa)
- (b) Use cast ceramic, plaster, or plastic tools when you apply pressure to the outer skin on a contoured or rounded panel
- (6) When the cure time is completed, decrease the temperature at a rate of 5°F (3°C) a minute
- (7) Let the repaired part decrease in temperature to 150°F (66°C) or less before you release the pressure

NOTE If a temperature indication goes below the specified cure temperature, then extend the cure time before you decrease the temperature. Continue at the specified cure temperature for a minimum time equal to the time that the indication was below the specified cure temperature

B Paste adhesives

- (1) Continue to apply 1 psi (7 kPa) minimum pressure

**INTERCONTINENTAL
STRUCTURAL REPAIR**

- (2) You can decrease the cure times for paste adhesives if you increase the cure temperature of the repair. Refer to Fig 10 and Fig 11 for the time-temperature cure charts. You can use an oven, hot air, heat lamps, or a radiant heater to increase the cure temperature.

NOTE To keep the strength in the aluminum material, do not use a cure temperature that is more than 260° F (127° C)

C If you use an autoclave

- (1) Make sure that you use an applicable tool to hold all of the parts in their positions during the repair procedure.

NOTE In most (but not all) conditions, the tool must be the same contour as the part to be cured.

- (2) Increase the pressure and temperature in the autoclave as specified in Boeing Process Specification BAC 5514 "Common Bonding Requirements for Structural Adhesives" (or equivalent procedure)
- (3) Cure the bond as given in Table 6
- (4) After the cure is completed, decrease the pressure and temperature as specified in Boeing Process Specification BAC 5514 "Common Bonding Requirements for Structural Adhesives" (or equivalent procedure)

21 Do an examination of the bonded repair

- A** Use a synthetic fiber material (Scotchbrite pads, for example) to remove all fabric, plastic film, and thermocouple materials that are bonded to the outside of the repair. Make sure that you do not scratch the aluminum or remove clad material.

B Do a visual inspection of the repair doubler(s)

- (1) Look for a continuous bead of cured adhesive around the edges of each repair doubler. Look for disbonds, gaps, or a failure of the bond line. No disbonds, gaps or failures at the bond line (that you can see) are permitted. If some of the bead is missing or not fully cured, the repair is unsatisfactory.

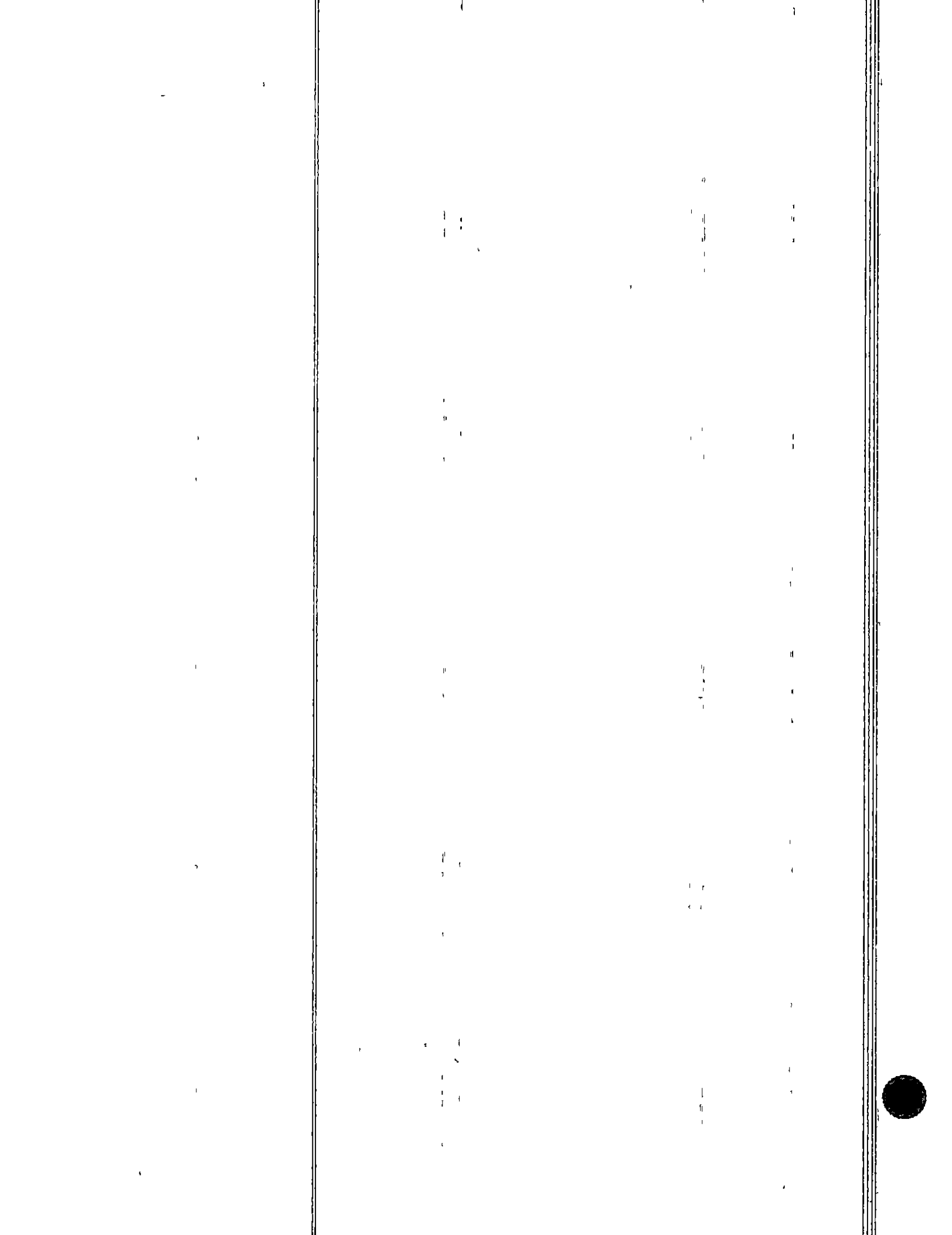
NOTE A bead that is not fully cured will be soft and tacky.

- (2) Look to see if a repair doubler moved during the cure. Movement of 0.06 inches (1.5 mm) or less is permitted.

C A post repair Non-Destructive Inspection (NDI) of the repair area is recommended.

- (1) If a heat blanket was used, then do an NDI of the area that was below the heat blanket. If you use NDI procedures, refer to NDT Part 1, 51-01-01 and NDT Part 1, 51-04-00. Other NDI procedures, if they are satisfactory, are also permitted.

NOTE You can use a tap test procedure as an alternative inspection procedure for a skin thickness that is 0.040 inch (1.0 mm) or less. Use the tap test as given in NDT Part 1, 51-05-01.





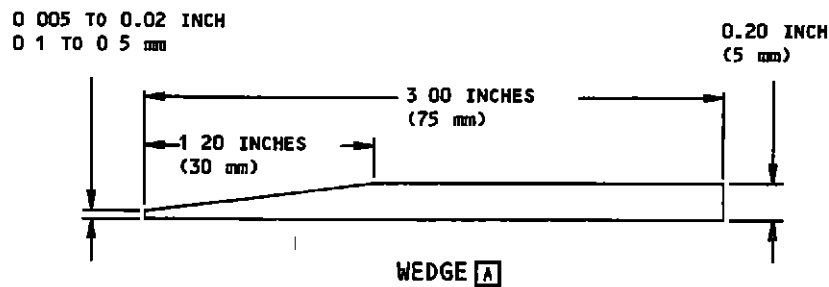
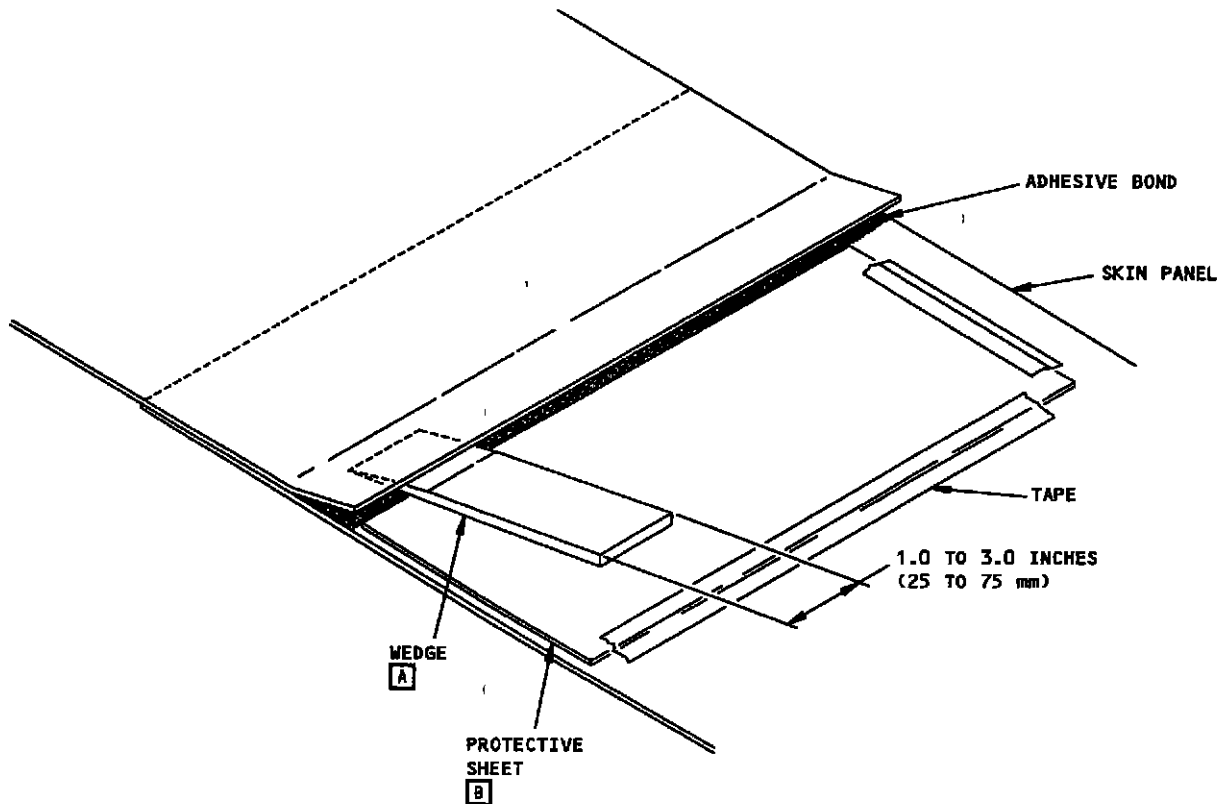
INTERCONTINENTAL
STRUCTURAL REPAIR

- (2) Continue to use NDI to examine the area 8 inches (20 cm) from where the edges of the heat blanket were
 - (3) If you find an NDI indication that shows a possible disbond, you can do additional tests and analysis to verify that it is a disbond. If tests and analysis verify that the repair has a disbond, then the repair is unsatisfactory
 - D Remove all repair parts that have an unsatisfactory bond or cut out and repair the area that is disbanded. Do all of the necessary repair steps to make the repair satisfactory
- 22 Clean, seal and finish
- A If the repair is satisfactory, then clean the surfaces that are to be sealed and finished. Refer to 51-8-0
 - B Seal all of the gaps and edges of the doubler(s)
 - C Apply a protective finish to the bare surfaces as given in 51-8-0
 - D If a control surface was repaired, then a rebalance can be necessary. Refer to 51-15-0

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**INTERCONTINENTAL
STRUCTURAL REPAIR**



**SEPARATION OF THE BONDED PARTS WITH WEDGES
DETAIL 1**

NOTES

- A** WOOD OR PLASTIC ARE EXAMPLE MATERIALS
- B** METAL OR PLASTIC ARE EXAMPLE MATERIALS

**Damage Removal Procedures
Figure 3 (Sheet 1)**

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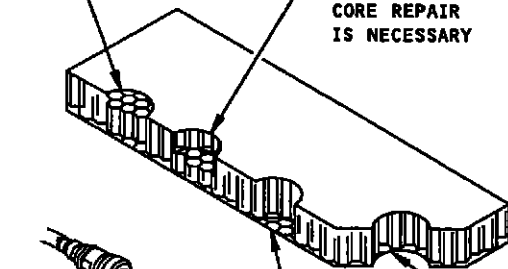
**51-9-3
Page 63**



**INTERCONTINENTAL
STRUCTURAL REPAIR**

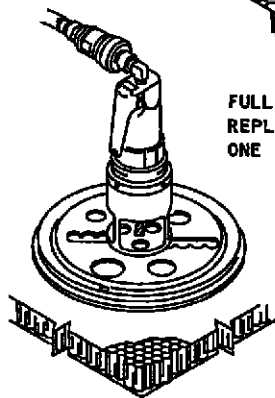
CORE UNDAMAGED.
REPAIR TO
FACESHEET ONLY

PARTIAL CORE
REPLACEMENT.
SEPTUMIZED
CORE REPAIR
IS NECESSARY

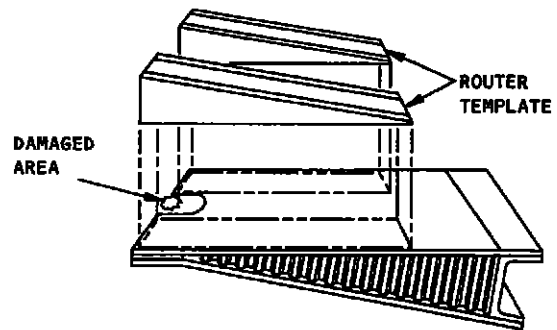
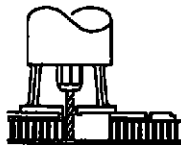


FULL CORE
REPLACEMENT,
ONE SIDED REPAIR

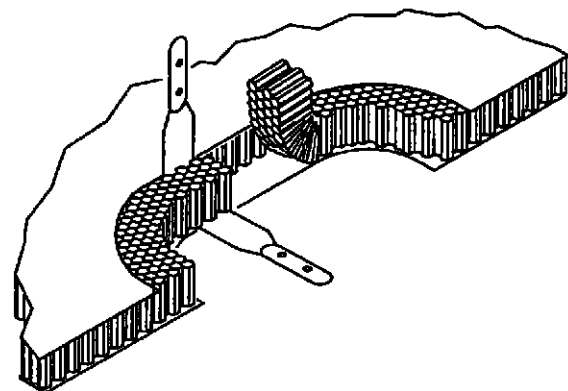
FULL CORE
REPLACEMENT, TWO
SIDED REPAIR



**HONEYCOMB CORE REMOVAL
DETAIL II**



**REMOVING HONEYCOMB CORE
FROM A TAPERED CONTROL SURFACE
DETAIL III**



**REMOVAL OF CORE WITH CORE KNIFE
DETAIL IV**

INSTRUCTIONS

- 1 REMOVE THE FACE SHEET AND/OR CORE WITH A POWER ROUTER, USING A ROUTER TEMPLATE TO PROTECT THE UNDAMAGED PART OF THE FACE SHEET. REFER TO SRM 51-13-1 FOR INSTRUCTIONS ON THE USE OF A ROUTER AND TEMPLATE

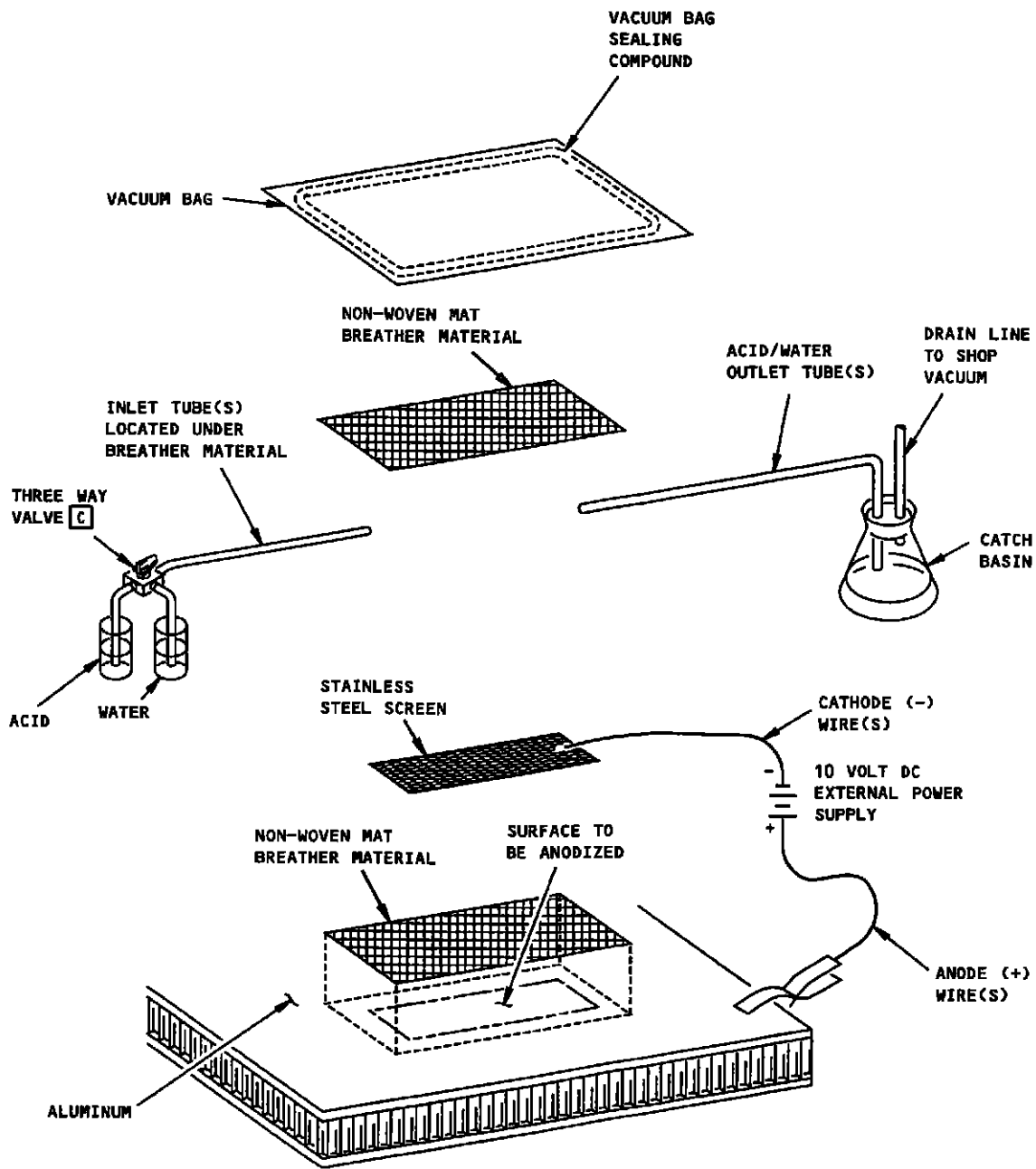
NOTE THE ROUTER CAN BE ADJUSTED TO REMOVE ONE OF THE FACE SHEETS ONLY, A FACE SHEET AND PART OF THE CORE, A FACE SHEET AND ALL OF THE CORE, OR BOTH THE FACE SHEETS AND CORE SEE DETAIL II
- 2 IF YOU ARE ROUTING A TAPERED PART, YOU CAN USE WEDGE SHAPED ROUTER TEMPLATES. THIS WILL PERMIT THE ROUTER TO CUT THE CORE MATERIAL PARALLEL WITH THE LOWER SURFACE. SEE DETAIL III
- 3 IT IS PERMITTED TO REMOVE HONEYCOMB CORE WITH A CORE KNIFE. SEE DETAIL IV.

**Damage Removal Procedures
Figure 3 (Sheet 2)**





**INTERCONTINENTAL
STRUCTURAL REPAIR**



ONE VACUUM BAG SYSTEM [A]

DETAIL I

**Phosphoric Acid Containment System (PACS)
Figure 4 (Sheet 1)**

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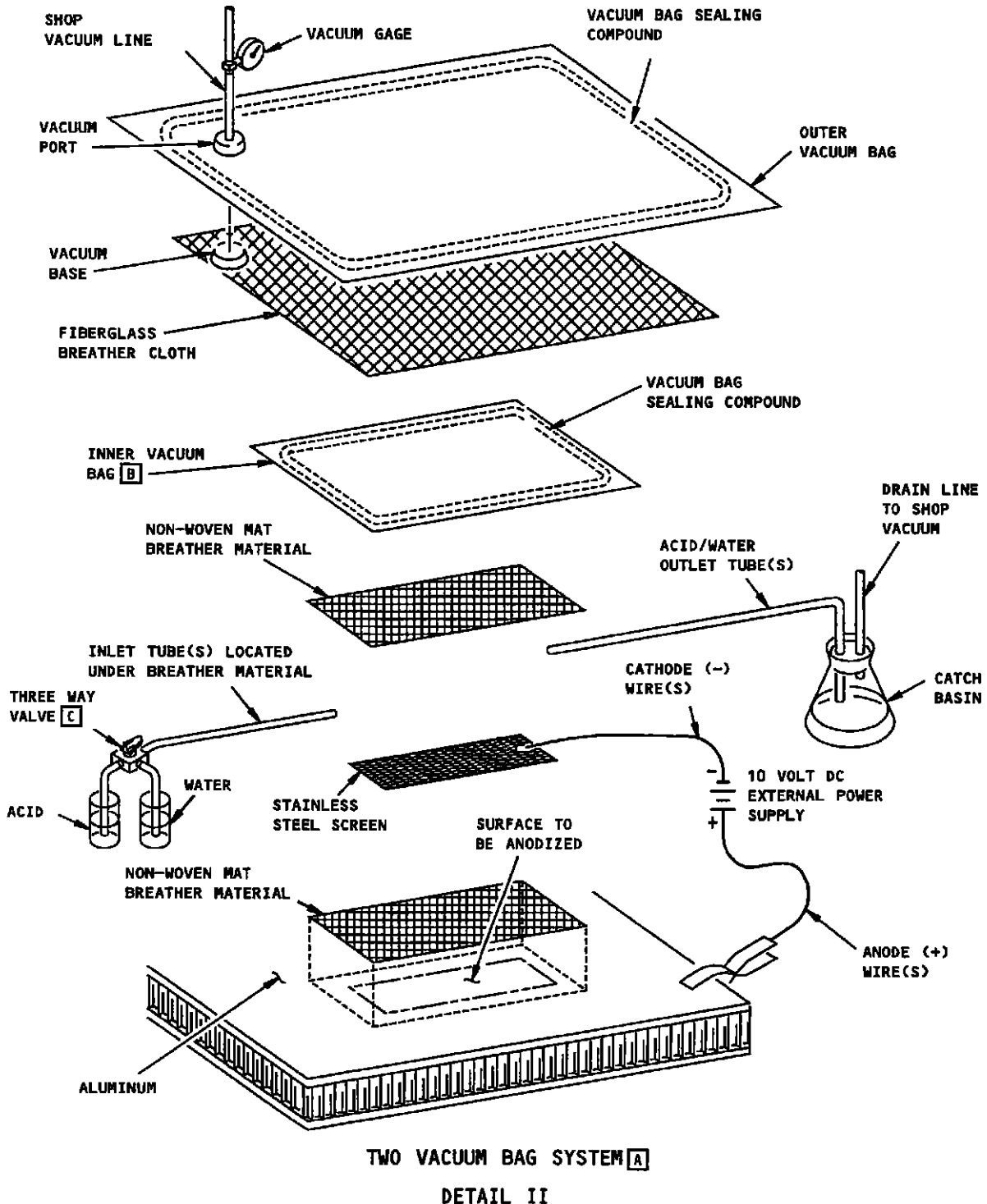
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**INTERCONTINENTAL
STRUCTURAL REPAIR**



Phosphoric Acid Containment System (PACS)
Figure 4 (Sheet 2)

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**INTERCONTINENTAL
STRUCTURAL REPAIR**

NOTES

- [A]** WHEN THE SURFACE TO BE ANODIZED IS FACE UP (AS SHOWN IN THIS FIGURE), THE SECOND, OUTER VACUUM BAG IS OPTIONAL. IF THE SURFACE TO BE ANODIZED IS FACE DOWN OR IF THE SURFACE IS VERTICAL, THEN BOEING RECOMMENDS THAT YOU USE AN OUTER VACUUM BAG. THE OUTER VACUUM BAG WILL CONTAIN THE ACID IF THERE IS LEAKAGE FROM THE INNER VACUUM BAG. SEE DETAIL I FOR THE ONE VACUUM BAG SYSTEM, SEE DETAIL II FOR THE TWO VACUUM BAG SYSTEM.
- [B]** AFTER YOU ARE FINISHED WITH THE PACS PROCEDURE, DO A CHECK FOR ACID LEAKAGE BEFORE YOU REMOVE THE INNER VACUUM BAG. IF THERE WAS ACID LEAKAGE, RINSE AND REMOVE ALL OF THE ACID AND OTHER CONTAMINATION FROM THE ALUMINUM FIRST. THEN REMOVE THE INNER VACUUM BAG.
- [C]** THE THREE-WAY VALVE OPERATION MUST PERMIT THE CONDITIONS THAT FOLLOW
- NO FLOW (OFF)
 - FLOW OF ACID ONLY
 - FLOW OF RINSE WATER ONLY

Phosphoric Acid Containment System (PACS)
Figure 4 (Sheet 3)

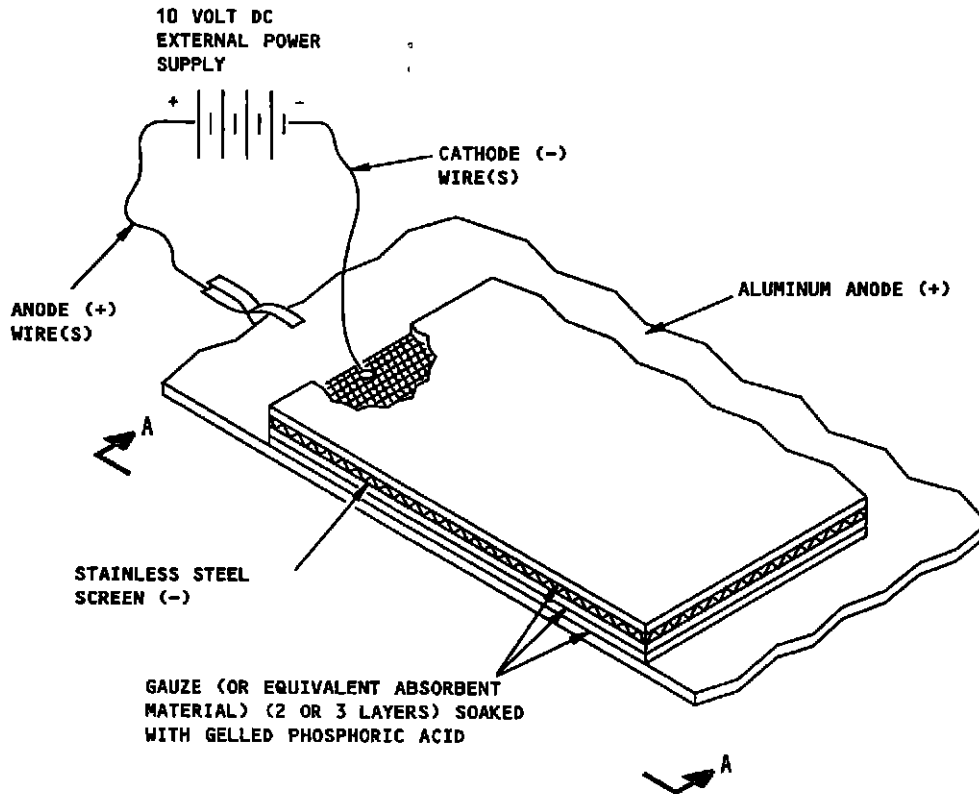
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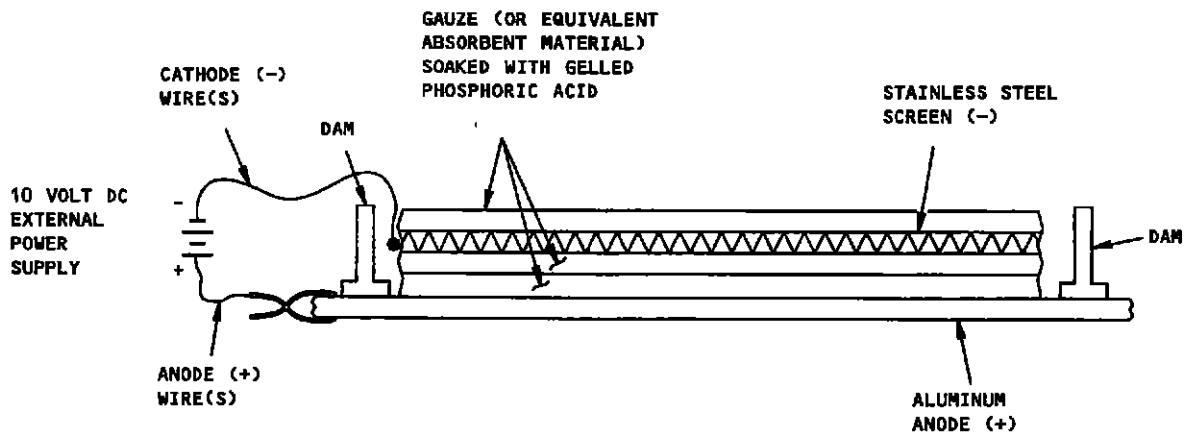
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**INTERCONTINENTAL
STRUCTURAL REPAIR**



**TYPICAL PANTA LAYUP (DAM NOT SHOWN)
DETAIL I**

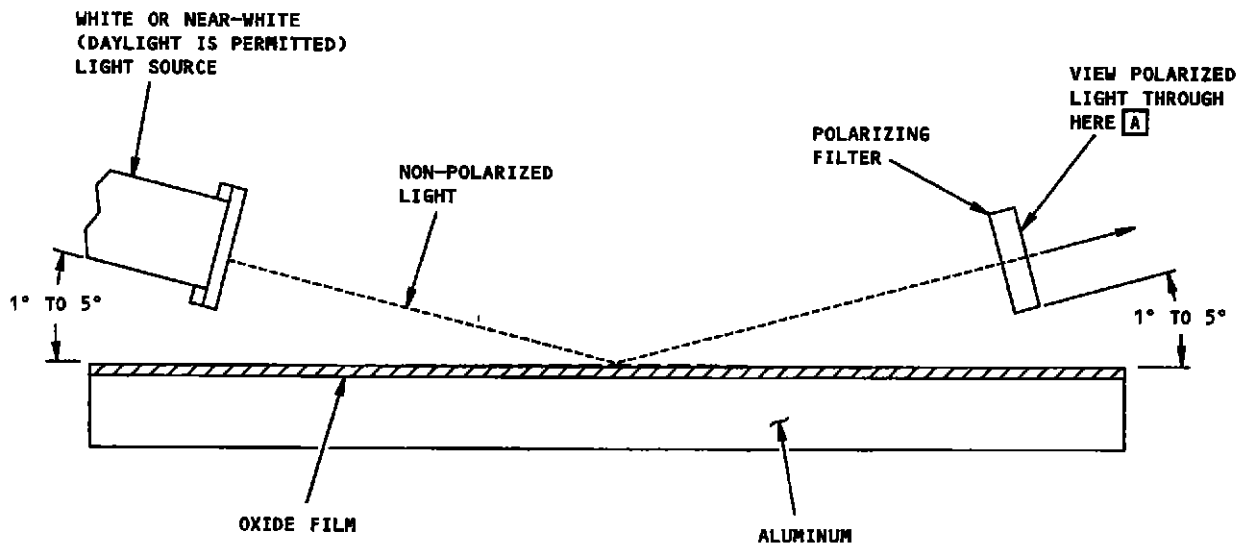


SECTION A-A

**Phosphoric Acid Non-Tank Anodize (PANTA) Layup
Figure 5**



INTERCONTINENTAL
STRUCTURAL REPAIR



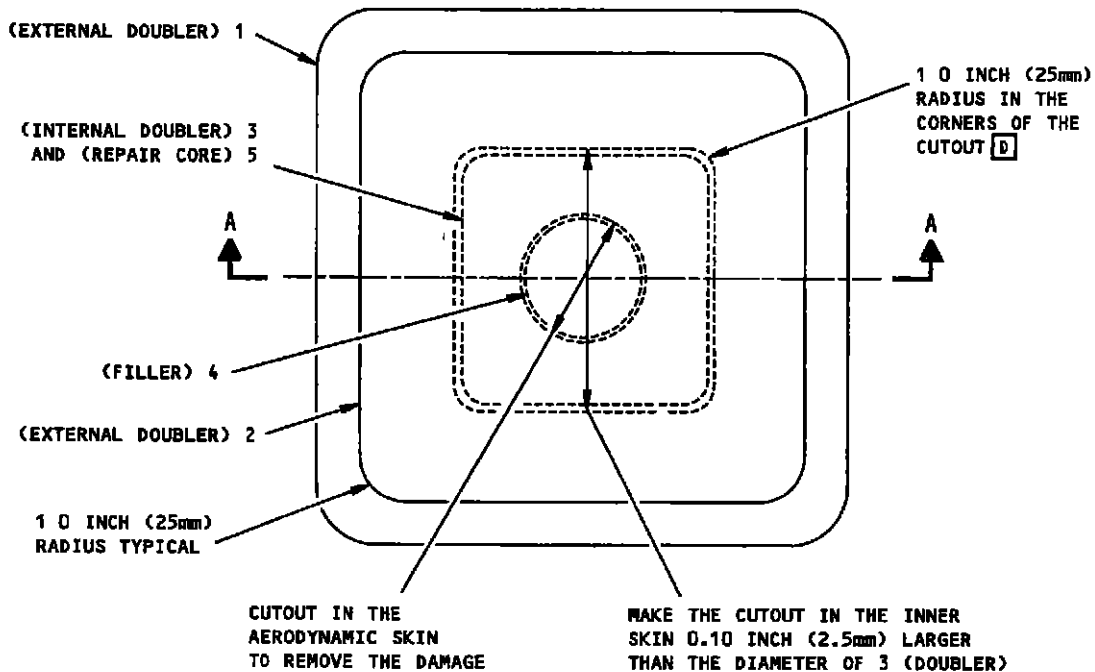
NOTES

- A** VIEW THE LIGHT AS YOU ROTATE (TURN) THE FILTER 90° TO INSPECT FOR A COLOR CHANGE

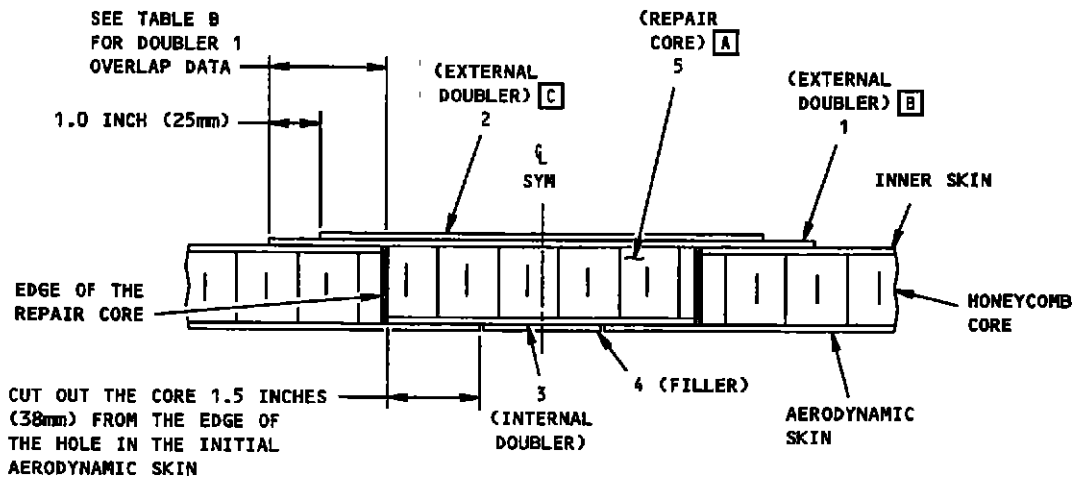
Polarized Light Test - Verification of Anodic Oxide Film
Figure 6



**INTERCONTINENTAL
STRUCTURAL REPAIR**



DETAIL I

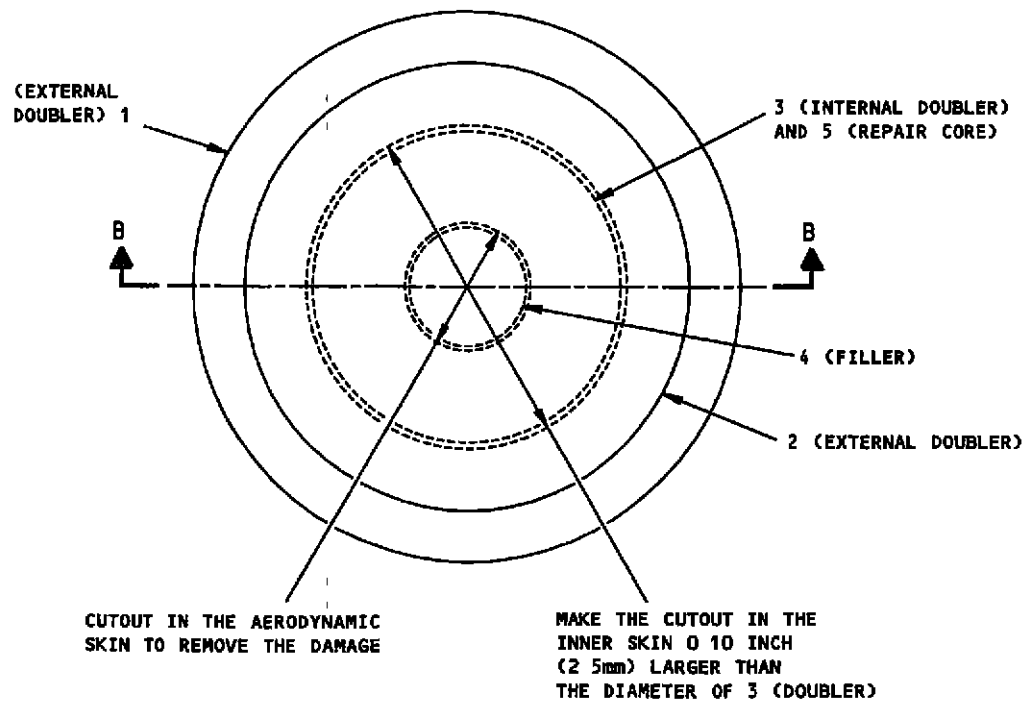


SECTION A-A

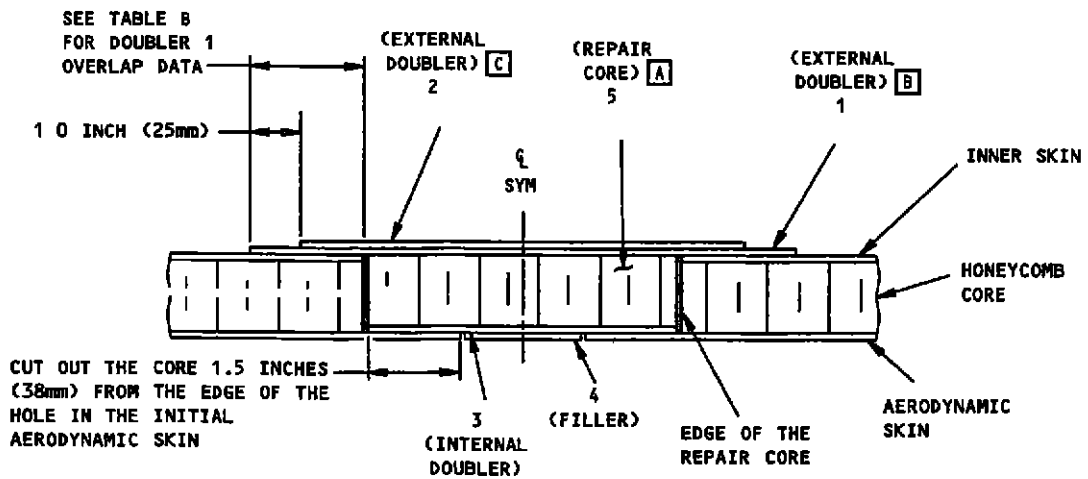
**Repair Doubler Specifications for Flush Repairs
Figure 7 (Sheet 1)**



**INTERCONTINENTAL
STRUCTURAL REPAIR**



DETAIL II



SECTION B-B

**Repair Doubler Specifications for Flush Repairs
Figure 7 (Sheet 2)**



INTERCONTINENTAL STRUCTURAL REPAIR

REPAIR PART THICKNESS (INCHES) FOR BONDED REPAIRS				
INITIAL SKIN GAGE RANGE	PART 1 EXTERNAL DOUBLER	PART 2 EXTERNAL DOUBLER	PART 3 INTERNAL DOUBLER	PART 4 FILLER
0 012 TO 0 020	SAME AS THE INITIAL SKIN 0 025 B 0 032 B E 0 016 0 020 0 025 0 025 0 032 E 0.032 E 0.032 E 0.040 E	NOT NECESSARY B B 0 025 0 025 0 025 0.032 E 0.032 E 0.040 E 0 040 E	SAME AS THE AERODYNAMIC SKIN	SAME AS THE AERODYNAMIC SKIN
0 021 TO 0 025				
0 026 TO 0.032				
0 033 TO 0.041				
0 042 TO 0 045				
0.046 TO 0 050				
0.051 TO 0.057				
0.058 TO 0 064				
0.065 TO 0 072				
0.073 TO 0.080				

TABLE I

INITIAL SKIN THICKNESS	THE MINIMUM OVERLAP DIMENSION OF DOUBLER 1
0.00 TO 0 032	1.5 INCHES (38 mm)
> 0 032	2.5 INCHES (63 mm)

TABLE II

REPAIR PART THICKNESS (INCHES) FOR HIGH CURVATURE REPAIRS		
INITIAL SKIN	PART 1 EXTERNAL DOUBLER	PART 2 EXTERNAL DOUBLER
0.021 TO 0 028	0 012	0 016
0.029 TO 0 032	0.012	0 020

TABLE III

Repair Doubler Specifications for Flush Repairs
Figure 7 (Sheet 3)

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707**INTERCONTINENTAL
STRUCTURAL REPAIR****NOTES**

- USE THIS FIGURE TO DETERMINE THE DOUBLER DIMENSIONS ONLY
 - THE MATERIAL FOR THE REPAIR PARTS MUST BE EQUIVALENT TO THE SAME BOEING MATERIAL SPECIFICATION (BMS) AND HEAT TREAT AS THE SKIN TO BE REPAIRED.
 - BONDING SURFACES OF 2000 SERIES ALUMINUM DOUBLERS CAN BE CLAD OR NON-CLAD (BARE). BONDING SURFACES OF 7000 SERIES ALUMINUM DOUBLERS MUST BE NON-CLAD (BARE)
- [A]** MAKE THE PART 5 REPAIR CORE LEVEL WITH THE OUTER SURFACE OF THE SKIN TO BE REPAIRED (UNLESS SPECIFIED DIFFERENTLY IN A SPECIFIC REPAIR)
- [B]** FOR THE INITIAL SKIN THICKNESSES THAT ARE 0 021 TO 0 032 GAGE, THE PART 2 (EXTERNAL DOUBLER) IS NOT NECESSARY IF THE SKIN IS FLAT, OR IF THE PART 1 DOUBLER CAN TOUCH ALL OF THE BOND SURFACE WITH ONLY LIGHT FINGER PRESSURE.
- IF THE SKIN SURFACE HAS A HIGH CURVATURE, YOU CAN DO ONE OF THE STEPS THAT FOLLOW
- MAKE THE PART 1 DOUBLER TO THE SAME CURVATURE AS THE SKIN SURFACE, SO THAT LIGHT FINGER PRESSURE MAKES THE DOUBLER TOUCH ALL OF THE SKIN SURFACE, OR
 - MAKE THE PART 1 DOUBLER FROM 0 012 GAGE, AND MAKE THE PART 2 DOUBLER FROM THE THICKNESS SPECIFIED IN TABLE III
- [C]** WHEN YOU USE THE PART 2 (EXTERNAL DOUBLER), MAKE THE PART 2 (EXTERNAL DOUBLER) 1.0 INCH (25 mm) SMALLER ALL AROUND THAN THE PART 1 (EXTERNAL DOUBLER).
- [D]** IF YOU ARE REPAIRING A CRACK, GOUGE, OR SMALL HOLE, YOU CAN USE A MINIMUM RADIUS THAT IS 0 25 INCH (6 mm)
- [E]** CHAMFER ALL EDGES OF THE DOUBLER AS SHOWN IN FIGURE 12 FOR DOUBLERS 0 032 GAGE AND THICKER

Repair Doubler Specifications for Flush Repairs
Figure 7 (Sheet 4)

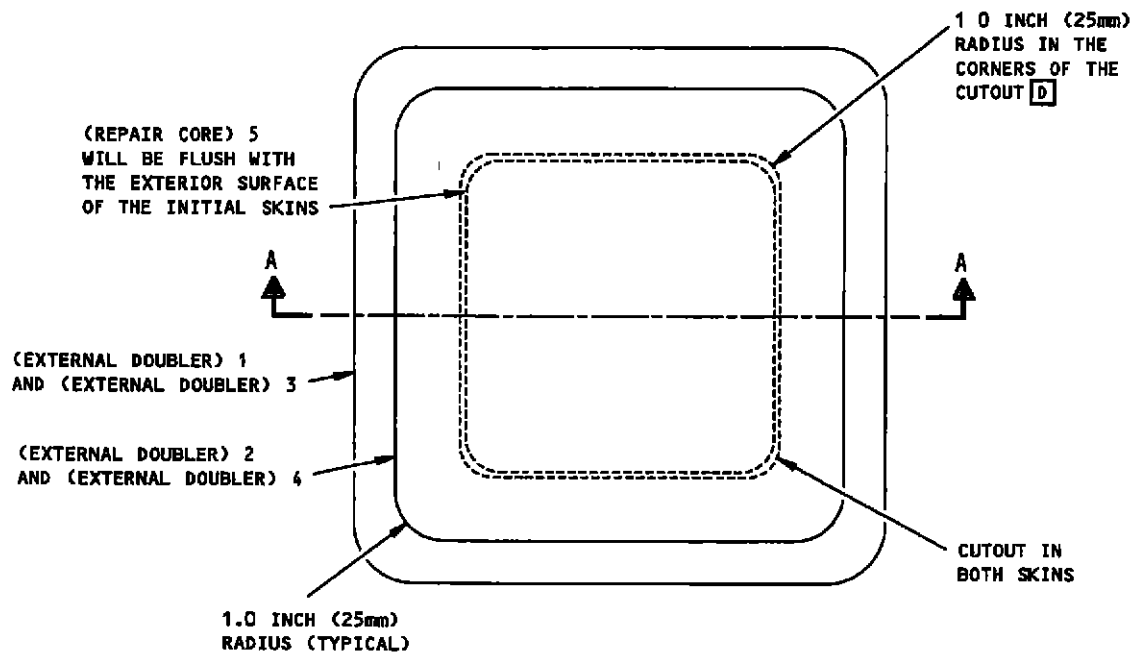
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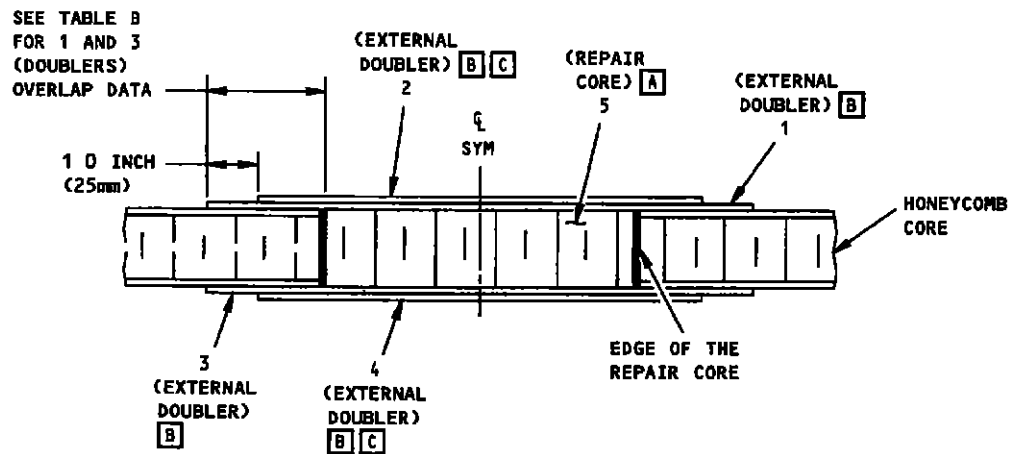
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**INTERCONTINENTAL
STRUCTURAL REPAIR**



DETAIL I



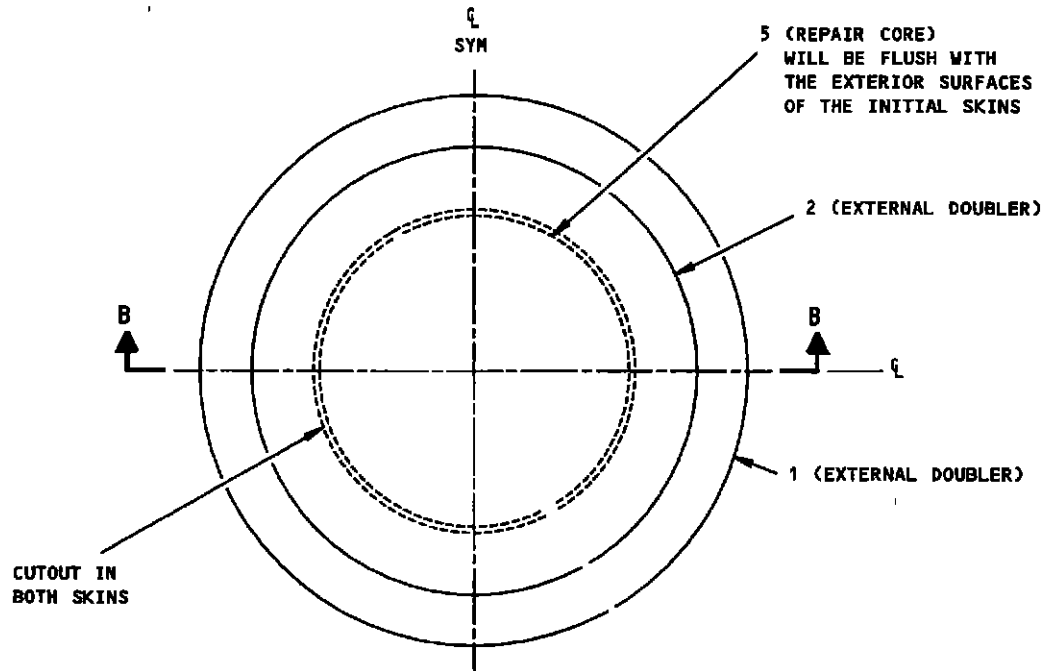
**TWO-SIDED REPAIR SHOWN
SEE DETAIL II FOR ONE SIDED REPAIR
SECTION A-A**

**Repair Doubler Specifications for External Patch Repairs
Figure 8 (Sheet 1)**

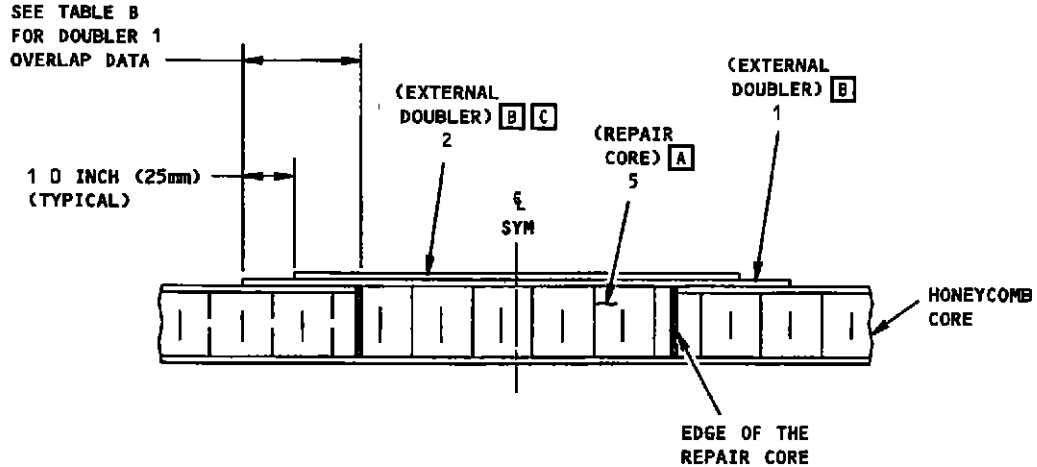
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**INTERCONTINENTAL
STRUCTURAL REPAIR**



DETAIL II



**ONE-SIDED REPAIR SHOWN
SEE DETAIL I FOR TWO-SIDED REPAIR
SECTION B-B**

**Repair Doubler Specifications for External Patch Repairs
Figure 8 (Sheet 2)**

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**INTERCONTINENTAL
STRUCTURAL REPAIR**

REPAIR PART THICKNESS (INCHES) FOR BONDED REPAIRS		
INITIAL SKIN GAGE RANGE	PART 1 AND 3 DOUBLER	PART 2 AND 4 DOUBLER
0 012 TO 0 020	SAME AS THE INITIAL SKIN	NOT NECESSARY
0 021 TO 0 025	0.025 B	B
0.026 TO 0 032	0.032 B E	B
0.033 TO 0 041	0.016	0 025
0.042 TO 0 045	0.020	0.025
0.046 TO 0 050	0 025	0 025
0.051 TO 0 057	0 025	0.032 E
0 058 TO 0 064	0 032 E	0 032 E
0 065 TO 0 072	0.032 E	0 040 E
0 073 TO 0.080	0.040 E	0 040 E

TABLE I

INITIAL SKIN THICKNESS	THE MINIMUM OVERLAP DIMENSION OF DOUBLERS 1 AND 3
0 00 TO 0 032	1 5 INCHES (38mm)
> 0 032	2 5 INCHES (63mm)

TABLE II

REPAIR PART THICKNESS (INCHES) FOR HIGH CURVATURE REPAIRS		
INITIAL SKIN	PART 1 AND 3 DOUBLER	PART 2 AND 4 DOUBLER
0 021 TO 0 028	0.012	0 016
0 029 TO 0 032	0.012	0 020

TABLE III

Repair Doubler Specifications for External Patch Repairs
Figure 8 (Sheet 3)

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**INTERCONTINENTAL
STRUCTURAL REPAIR**

NOTES

- USE THIS FIGURE TO DETERMINE THE DOUBLER DIMENSIONS ONLY.
 - THE MATERIAL FOR THE REPAIR PARTS MUST BE EQUIVALENT TO THE SAME BOEING MATERIAL SPECIFICATION (BMS) AND HEAT TREAT AS THE SKIN TO BE REPAIRED.
 - BONDING SURFACES OF 2000 SERIES ALUMINUM DOUBLERS CAN BE CLAD OR NON-CLAD (BARE). BONDING SURFACES OF 7000 SERIES ALUMINUM DOUBLERS MUST BE NON-CLAD (BARE).
- [A]** MAKE THE PART 5 REPAIR CORE TO BE LEVEL WITH THE OUTER SURFACE OF THE SKIN TO BE REPAIRED (UNLESS SPECIFIED DIFFERENTLY IN A SPECIFIC REPAIR)
- [B]** FOR THE INITIAL SKIN THICKNESSES THAT ARE BETWEEN 0.021 AND 0.032 GAGE, THE PARTS 2 AND 4 DOUBLERS ARE NOT NECESSARY IF THE INITIAL SKIN IS FLAT OR IF THE PARTS 1 AND 3 DOUBLERS CAN TOUCH ALL OF THE BOND SURFACE WITH ONLY LIGHT FINGER PRESSURE.
- IF THE SKIN SURFACE HAS A HIGH CURVATURE, YOU CAN DO ONE OF THE STEPS THAT FOLLOW
- MAKE THE PARTS 1 AND 3 DOUBLERS TO THE SAME CURVATURE AS THE SKIN SURFACE, SO THAT LIGHT FINGER PRESSURE MAKES THE DOUBLERS TOUCH ALL OF THE SKIN SURFACE, OR
 - MAKE THE PARTS 1 AND 3 DOUBLERS FROM 0.012 GAGE, AND MAKE THE PARTS 2 AND 4 DOUBLERS FROM THE THICKNESS SPECIFIED IN TABLE III
- [C]** WHEN YOU USE THE PART 2 AND 4 DOUBLERS, MAKE THE PARTS 2 AND 4 DOUBLERS 1.0 INCH (25 mm) SMALLER ALL AROUND THAN THE PARTS 1 AND 3 DOUBLERS.
- [D]** IF YOU ARE REPAIRING A CRACK, GOUGE, OR SMALL HOLE, YOU CAN USE A MINIMUM RADIUS THAT IS 0.25 INCH (6 mm)
- [E]** CHAMFER ALL EDGES OF THE DOUBLER AS SHOWN IN FIGURE 12 FOR DOUBLERS 0.032 GAGE AND THICKER

Repair Doubler Specifications for External Patch Repairs
Figure 8 (Sheet 4)

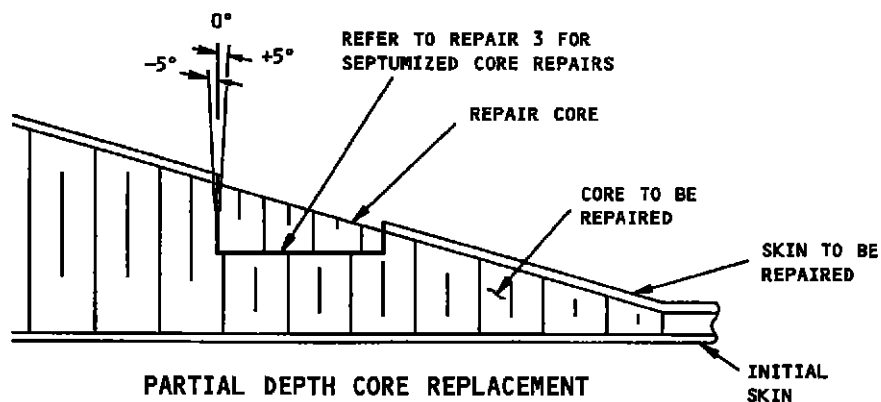
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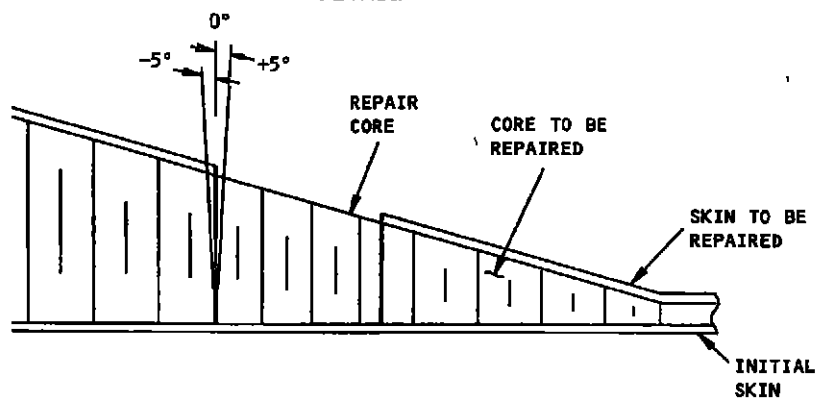


**INTERCONTINENTAL
STRUCTURAL REPAIR**



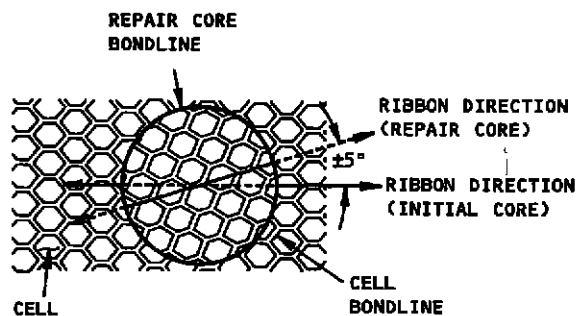
**PARTIAL DEPTH CORE REPLACEMENT
(TYPICAL) A**

DETAIL I

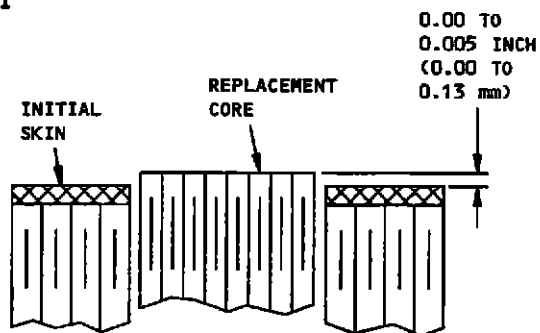


**FULL DEPTH CORE REPLACEMENT
(TYPICAL) A**

DETAIL II



**CORE ALIGNMENT
DETAIL III**

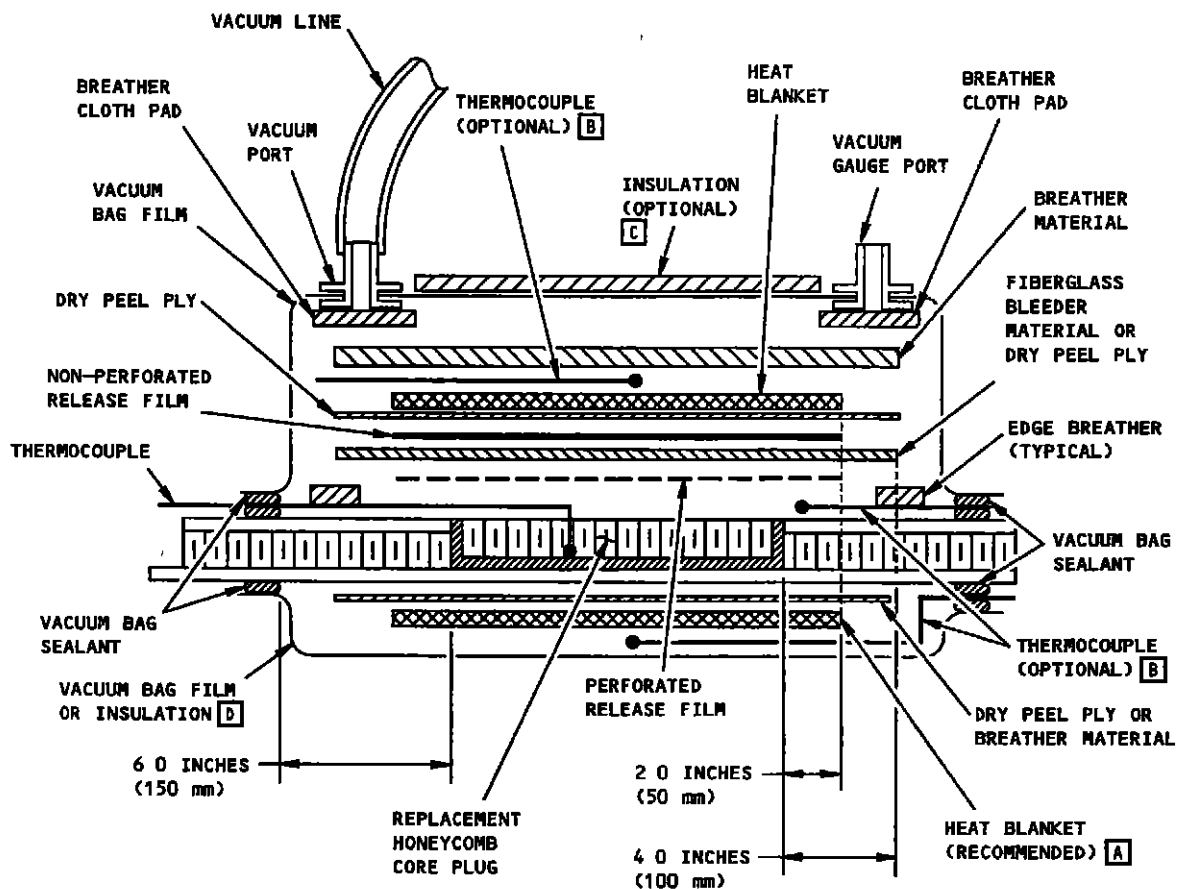


**INITIAL CORE HEIGHT
(BEFORE CURE)
DETAIL IV**

**Installation of the Repair Core
Figure 9 (Sheet 1)**



INTERCONTINENTAL STRUCTURAL REPAIR



VACUUM BAG PROCEDURE FOR REPLACEMENT CORE
WHEN THE TWO STAGE CURE PROCEDURE IS USED

DETAIL V

NOTES

- [A] MAXIMUM ERROR OF THE CELL WALLS AFTER INSTALLATION OF THE REPAIR CORE.
- [B] YOU CAN USE THESE THERMOCOUPLES TO MAKE SURE THAT IF THE HEAT BLANKET GETS TOO HOT, YOU CAN TURN OFF THE POWER SUPPLY BEFORE YOU DAMAGE THE SKIN PANEL.
- [C] 4-8 PLYS OF BREATHING MATERIAL IS AN EXAMPLE. YOU CAN USE OTHER INSULATION MATERIALS ALSO THIS WILL KEEP THE HEAT IN THE REPAIR AREA
- [D] IF YOU USE A HEAT BLANKET ON THE UNDAMAGED SIDE, MAKE SURE THAT THE HEAT BLANKET CAN BE HELD AGAINST THE PART. A VACUUM BAG CAN BE USED TO HOLD THE HEAT BLANKET, OR YOU CAN PUT THE PART ON A TOOL SURFACE (WITH INSULATION BETWEEN THE HEAT BLANKET AND THE TOOL SURFACE

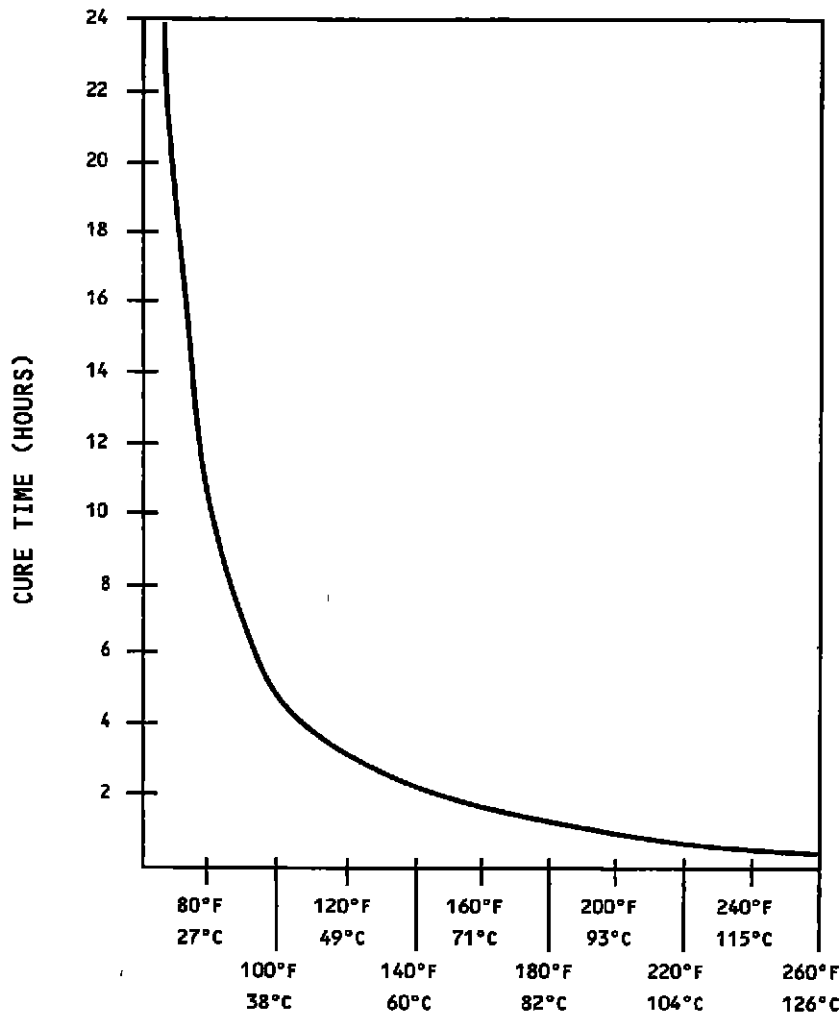
Installation of the Repair Core
Figure 9 (Sheet 2)



INTERCONTINENTAL
STRUCTURAL REPAIR

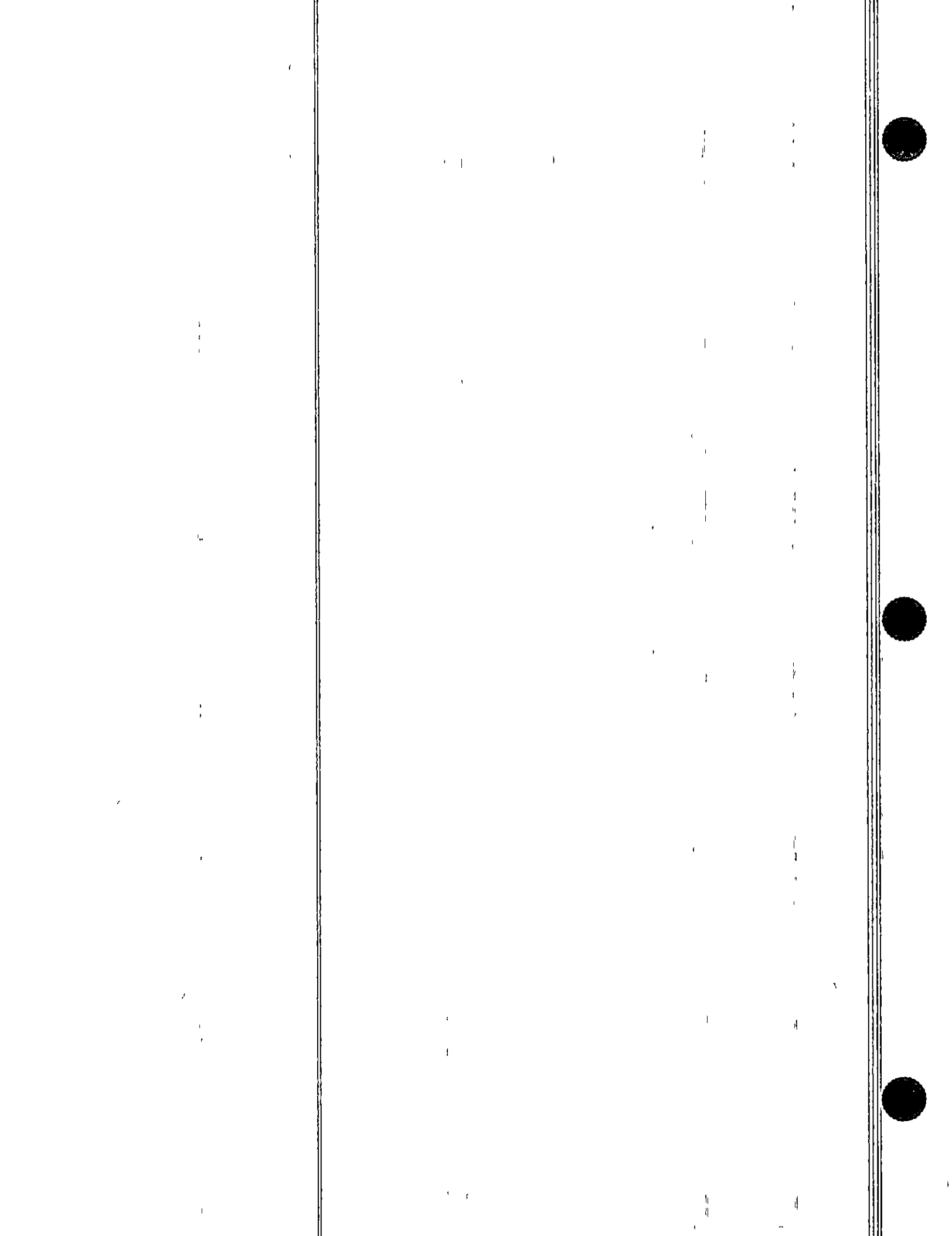
CLASS	POT LIFE AT LESS THAN 80°F (27°C)	PARTS BY WEIGHT PART A (BASE)		PARTS BY WEIGHT PART B (HARDENER)
		TYPE I	TYPE V	TYPE I AND V
1	20 MINUTES MAXIMUM	140	49	100
2	60 MINUTES MAXIMUM	140	49	100
3	90 MINUTES MAXIMUM	140	---	100
4	120 MINUTES MAXIMUM	140	---	100

BMS 5-92 TWO-PART PASTE ADHESIVE MIXTURE DATA
TABLE I



BMS 5-92, TYPE I CURE TEMPERATURE
CHART I

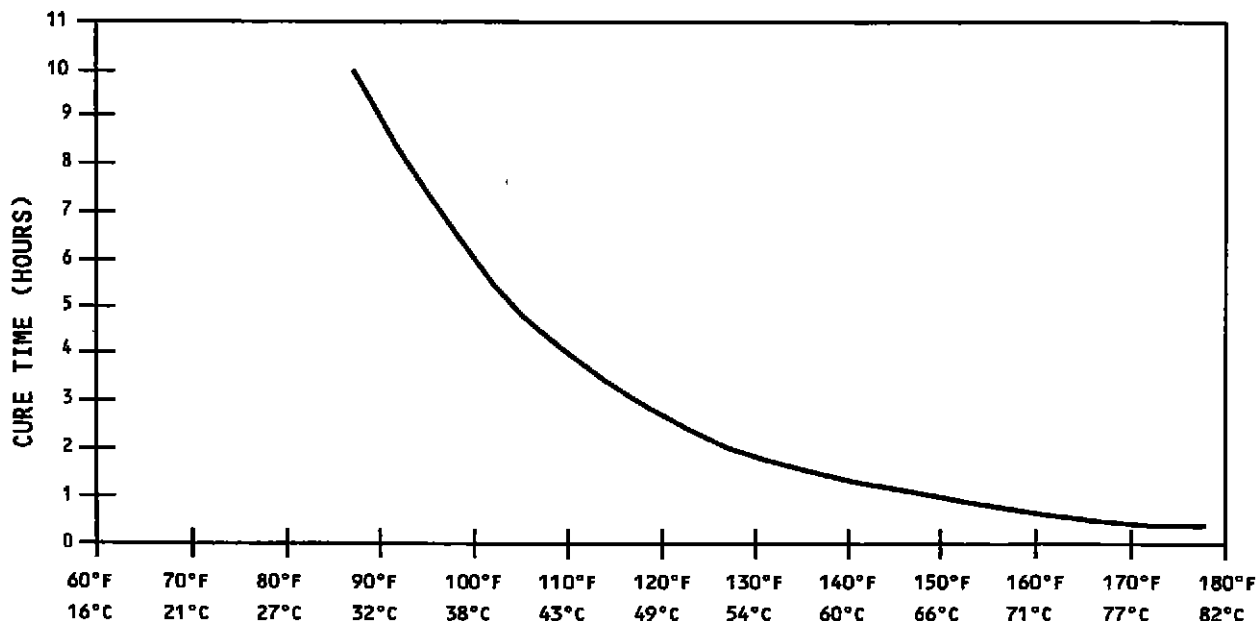
Cure Time for BMS 5-92, Two-part Paste Adhesive
Figure 10 (Sheet 1)



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**INTERCONTINENTAL
STRUCTURAL REPAIR**



**BMS 5-92, TYPE V, CLASS 2 CURE TEMPERATURE
CHART II**

NOTES

- IF A TYPE IS NOT SPECIFIED IT IS PREFERRED THAT YOU USE TYPE V
- CURE UNDER PRESSURE AS FOLLOWS:
 - (1) BMS5-92, TYPE V, CLASS 1 ADHESIVE:
3 HOURS MINIMUM AT 70 TO 100°F (21 TO 38°C), OR
2 HOURS MINIMUM AT 120 TO 130°F (49 TO 54°C).
 - (2) BMS5-92, TYPE V, CLASS 2 ADHESIVE:
7 HOURS MINIMUM AT 70 TO 100°F (21 TO 38°C) OR SEE CHART II

Cure Time for BMS 5-92, Two-part Paste Adhesive
Figure 10 (Sheet 2)

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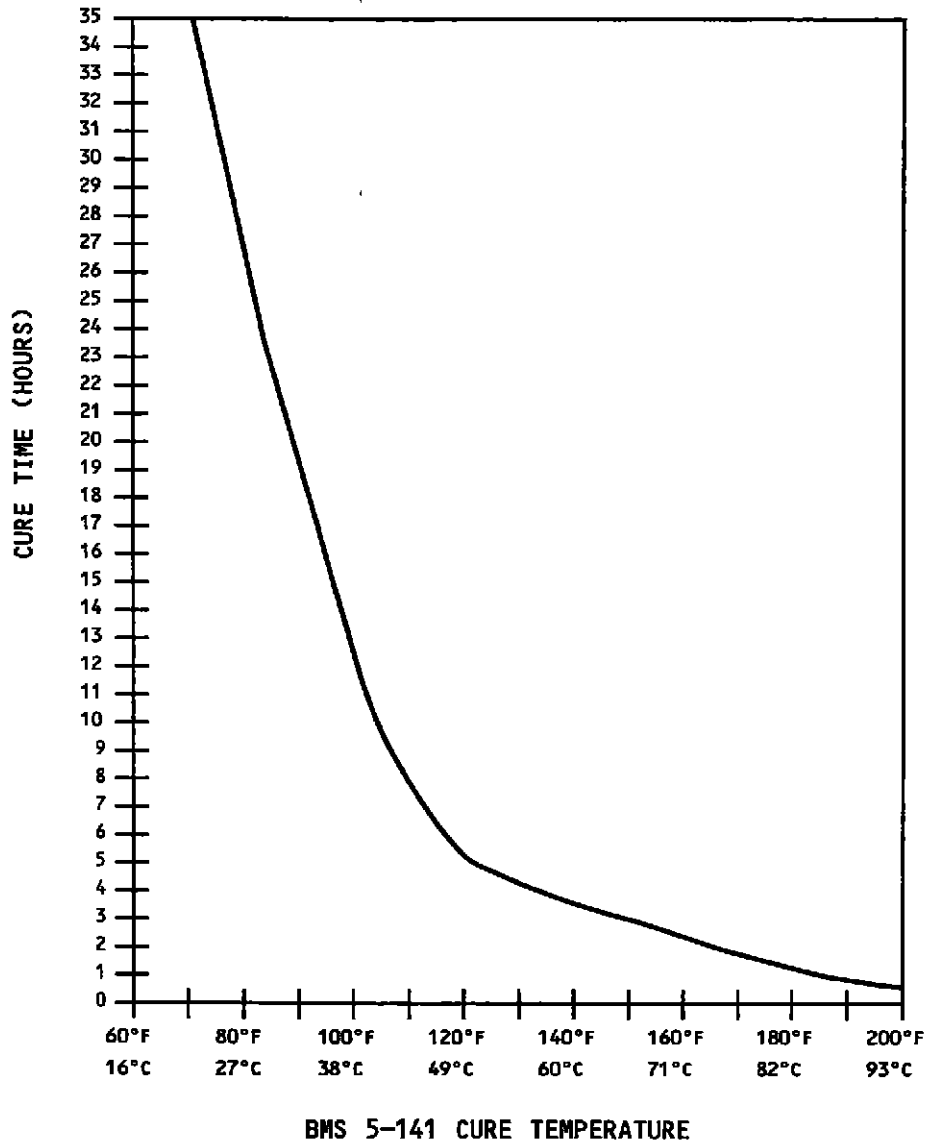
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**INTERCONTINENTAL
STRUCTURAL REPAIR**

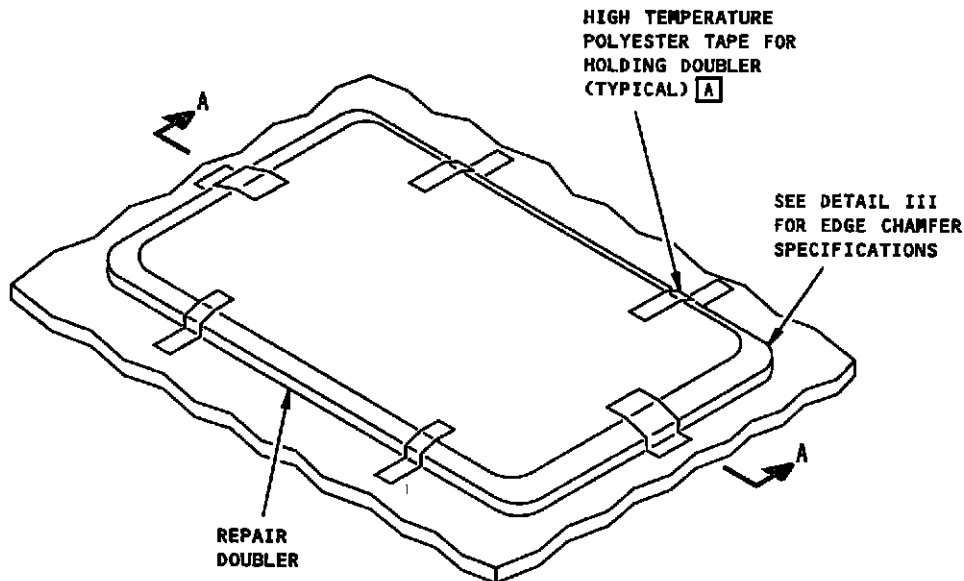


Cure Time for BMS 5-141 Paste Adhesive
Figure 11

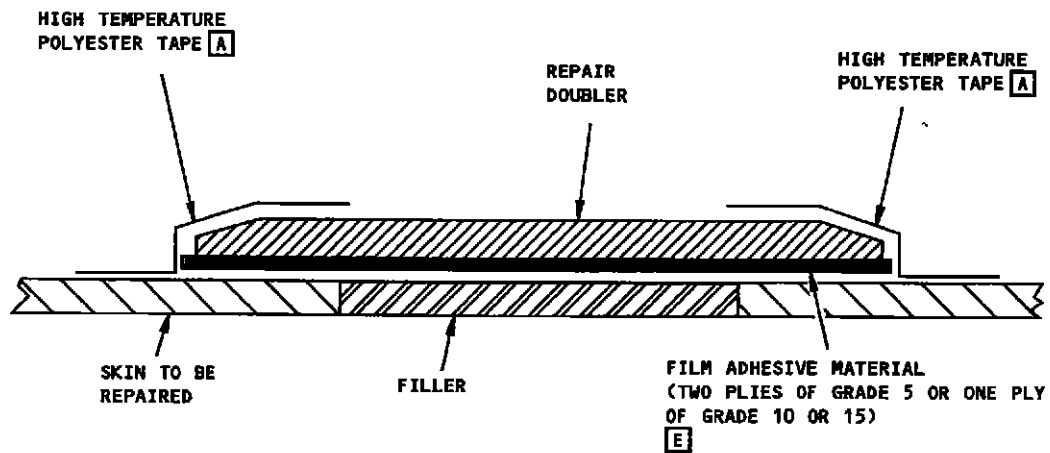
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**INTERCONTINENTAL
STRUCTURAL REPAIR**



**METAL TO METAL
(NO HONEYCOMB)
DETAIL I**



SECTION A-A

**Installation of the Repair Doubler
Figure 12 (Sheet 1)**

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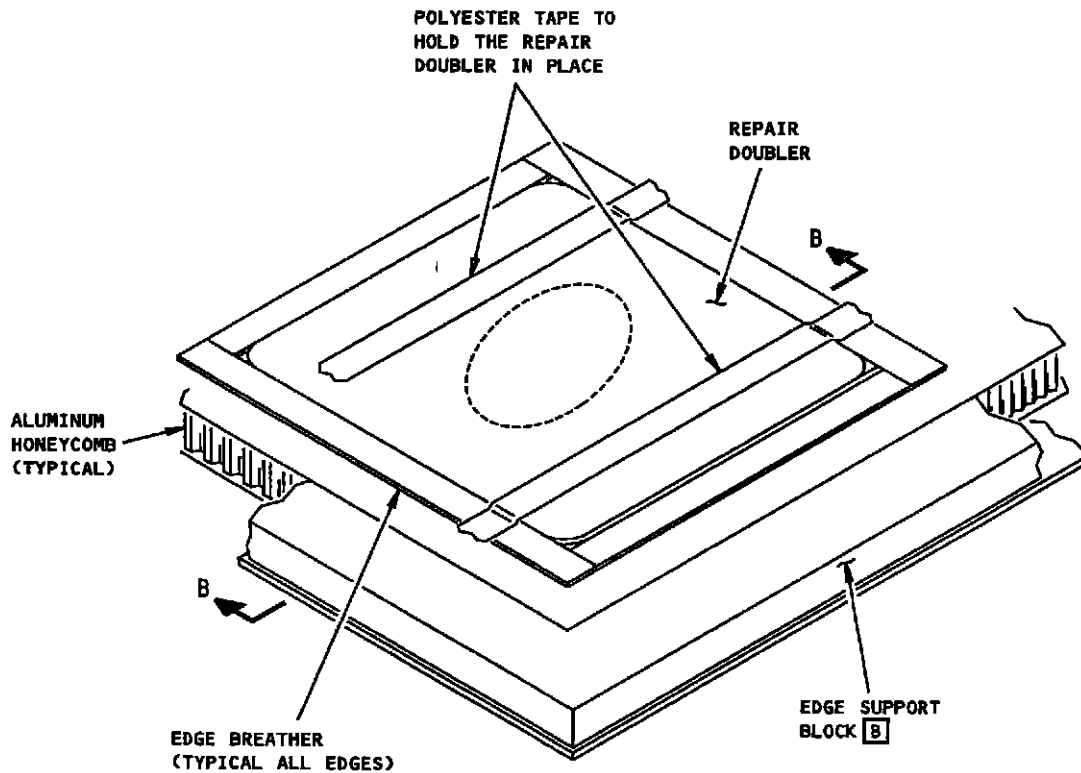
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**INTERCONTINENTAL
STRUCTURAL REPAIR**



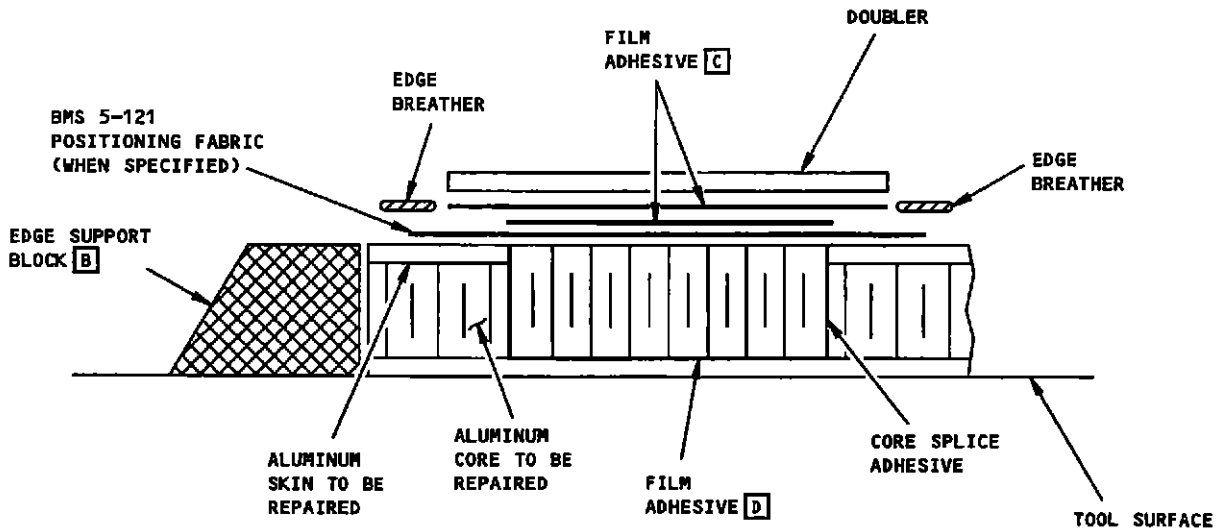
DETAIL II

**Installation of the Repair Doubler
Figure 12 (Sheet 2)**

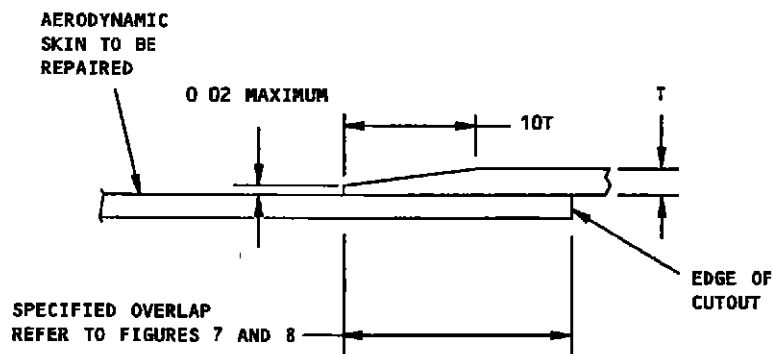
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**INTERCONTINENTAL
STRUCTURAL REPAIR**



SECTION B-B



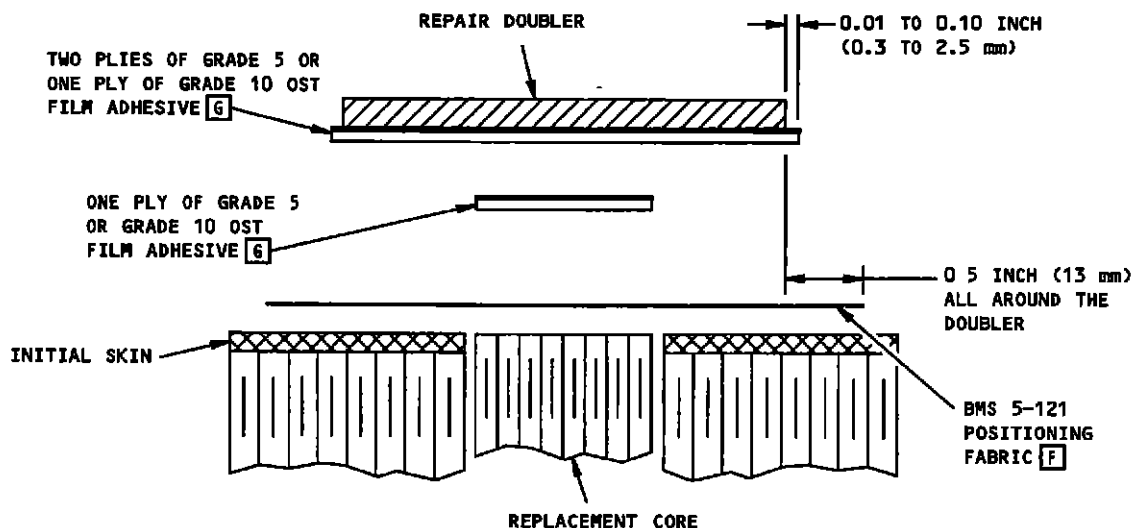
**TYPICAL CHAMFERED EXTERNAL PATCH
(GAGE THICKNESS 0.032 AND MORE)
DETAIL III**

**Installation of the Repair Doubler
Figure 12 (Sheet 3)**

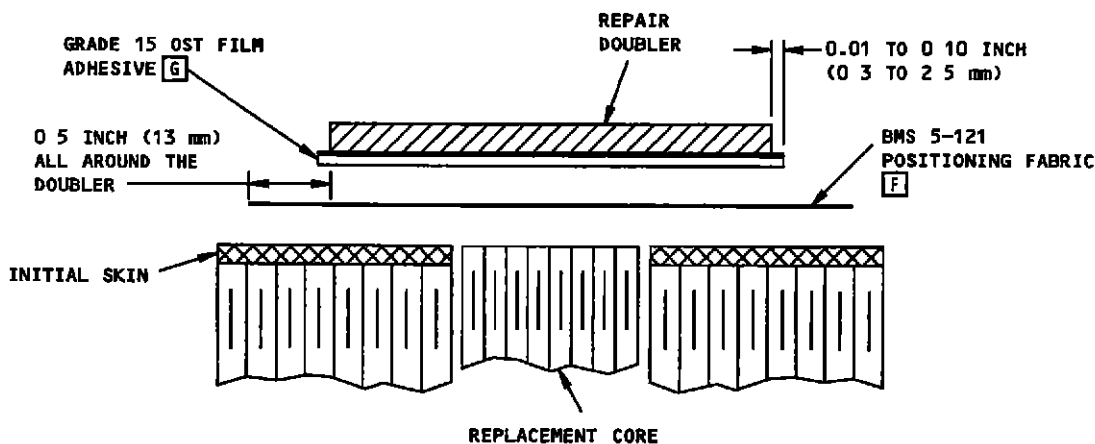
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**INTERCONTINENTAL
STRUCTURAL REPAIR**



**INSTALLATION OF EXTERNAL DOUBLER AND GRADE 5
OR GRADE 10 OST FILM ADHESIVE**



**INSTALLATION OF EXTERNAL DOUBLER AND
GRADE 15 OST FILM ADHESIVE [E]**

**INSTRUCTIONS TO APPLY ONE-SIDE-TACKY (OST)
FILM ADHESIVE [G]
DETAIL IV**

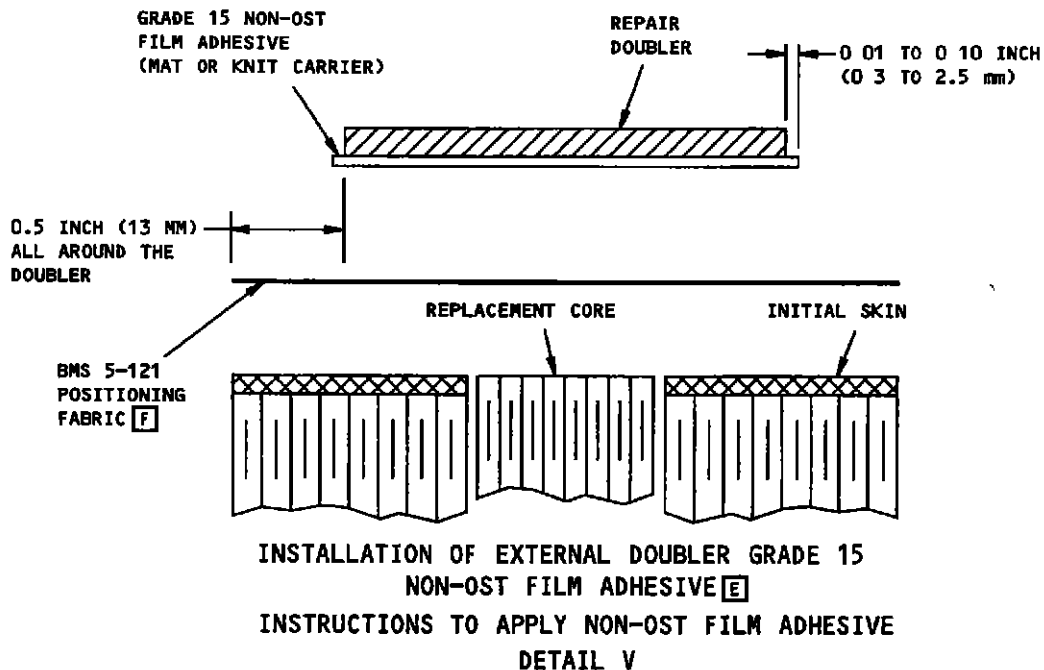
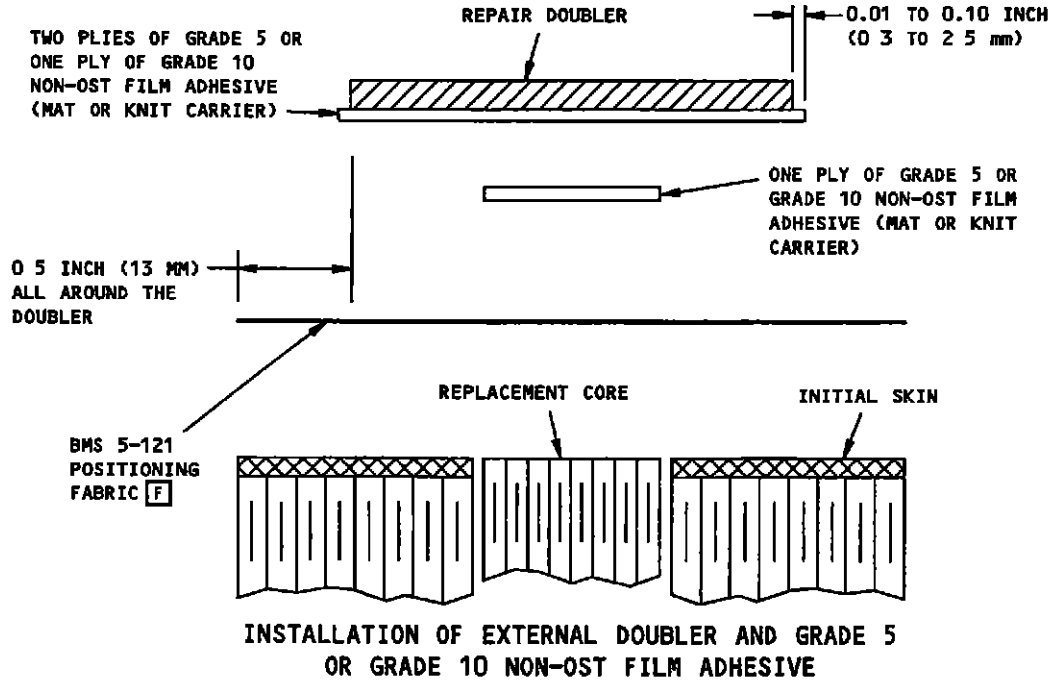
**Installation of the Repair Doubler
Figure 12 (Sheet 4)**

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**INTERCONTINENTAL
STRUCTURAL REPAIR**



Installation of the Repair Doubler
Figure 12 (Sheet 5)

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**INTERCONTINENTAL
STRUCTURAL REPAIR****NOTES**

- THIS IS APPLICABLE FOR THE FILM ADHESIVE BOND PROCEDURE.
- MAKE SURE THAT ALL SEPARATOR SHEETS ARE REMOVED BEFORE YOU ASSEMBLE THE REPAIR PARTS.
- [A] APPLY TAPE TO HOLD THE REPAIR DOUBLER IN POSITION DURING THE CURE DO NOT SEAL THE EDGES OF THE PANEL IF YOU SEAL THE EDGES OF THE PANEL WITH TAPE, IT CAN PREVENT THE FLOW OF THE ADHESIVE MATERIAL AND THE REMOVAL OF AIR DURING THE FINAL STAGE OF THE CURE APPLY LESS THAN 25 PERCENT OF THE EDGE LENGTH OF THE REPAIR DOUBLER WITH TAPE.
- [B] ONLY NECESSARY FOR SQUARE EDGED HONEYCOMB PANELS.
- [C] USE THREE PLIES OF GRADE 5, TWO PLIES OF GRADE 10 OR ONE PLY OF GRADE 15 BETWEEN THE REPAIR DOUBLER AND THE CORE. IF GRADE 5 OR GRADE 10 IS USED, MAKE THE BOTTOM PLY THE SAME DIMENSIONS AS THE CORE. MAKE THE TOP PLY (PLIES) THE SAME SIZE AS THE THE DOUBLER. SEE DETAIL IV AND DETAIL V
- [D] USE THREE PLIES OF GRADE 5, TWO PLIES OF GRADE 10 OR ONE PLY OF GRADE 15 CUT TO THE SAME DIMENSIONS AS THE HOLE
- [E] DO NOT USE GRADE 15 FILM ADHESIVE IF THE DOUBLER TO BE BONDED IS ≤ 0.020 GAGE
- [F] WHEN YOU DO A REPAIR THAT IS NOT CURED IN A PRESSURIZED AUTOCLAVE, USE BMS 5-121 POSITIONING FABRIC ON A SIDE THAT HAS AN EXTERNAL DOUBLER.
- [G] IF OST IS INSTALLED WITH BMS 5-121 POSITIONING FABRIC, THEN PUT THE TACKY SIDE DOWN AGAINST THE POSITIONING FABRIC IF OST IS INSTALLED WITHOUT POSITIONING FABRIC (WHEN THERE IS 64 SQUARE INCHES (400 SQUARE cm) OR LESS OF OPEN CORE) THEN PUT THE MAT SIDE DOWN AGAINST THE OPEN CORE

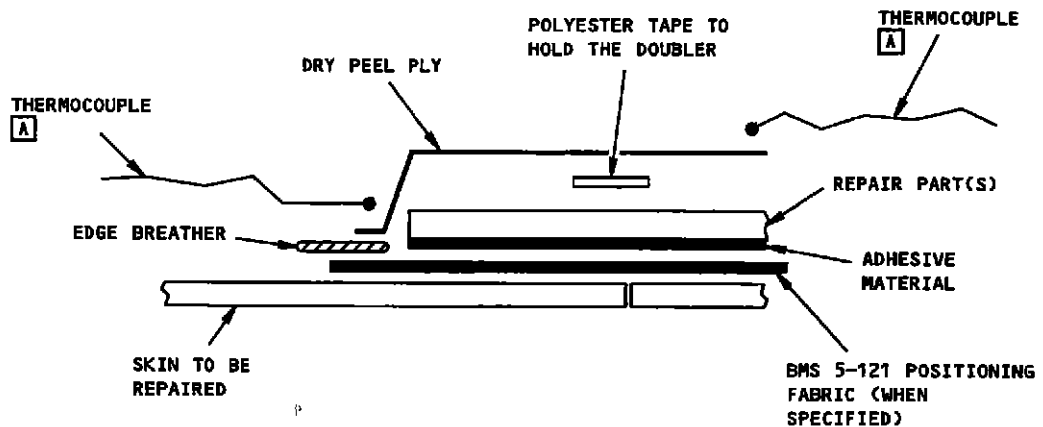
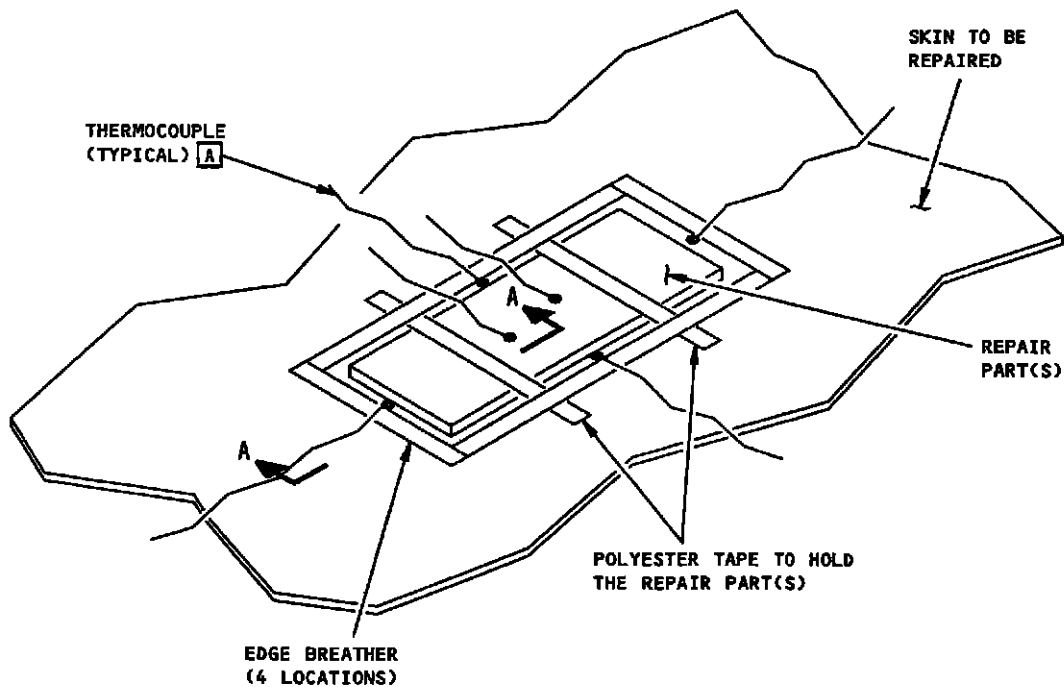
Installation of the Repair Doubler
Figure 12 (Sheet 6)

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INTERCONTINENTAL STRUCTURAL REPAIR



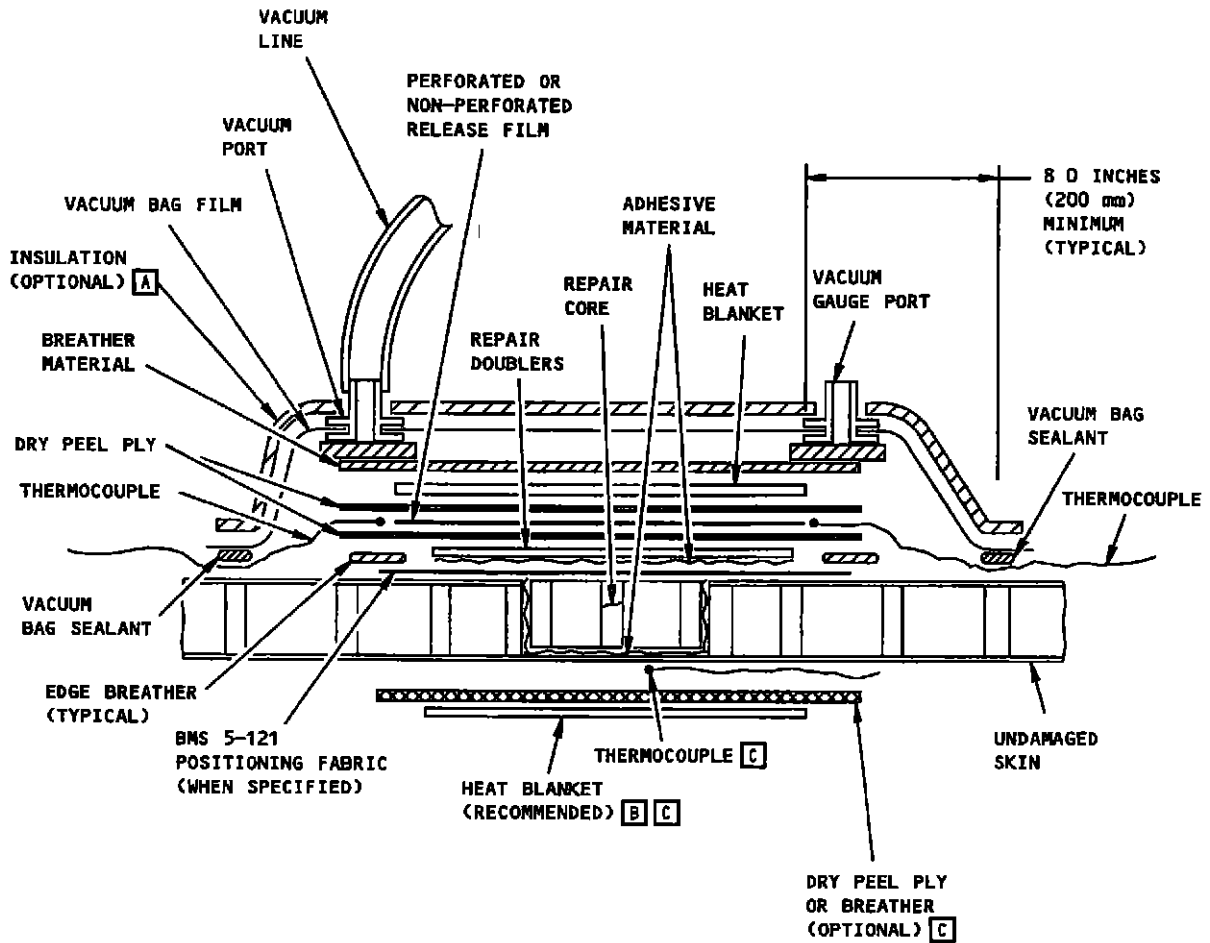
SECTION A-A

- A** REPAIRS MUST HAVE A MINIMUM OF ONE THERMOCOUPLE ABOVE THE REPAIR PART(S) AND TWO THERMOCOUPLES AT THE EDGES OF THE LARGEST REPAIR PART. ONE THERMOCOUPLE ABOVE THE REPAIR PART(S) FOR EVERY 36 SQUARE INCHES (0.025 SQUARE METERS) IS RECOMMENDED SPACE THE THERMOCOUPLES EQUAL DISTANCES ABOVE AND AROUND THE REPAIR PART(S).

Thermocouple Locations
Figure 13



INTERCONTINENTAL STRUCTURAL REPAIR

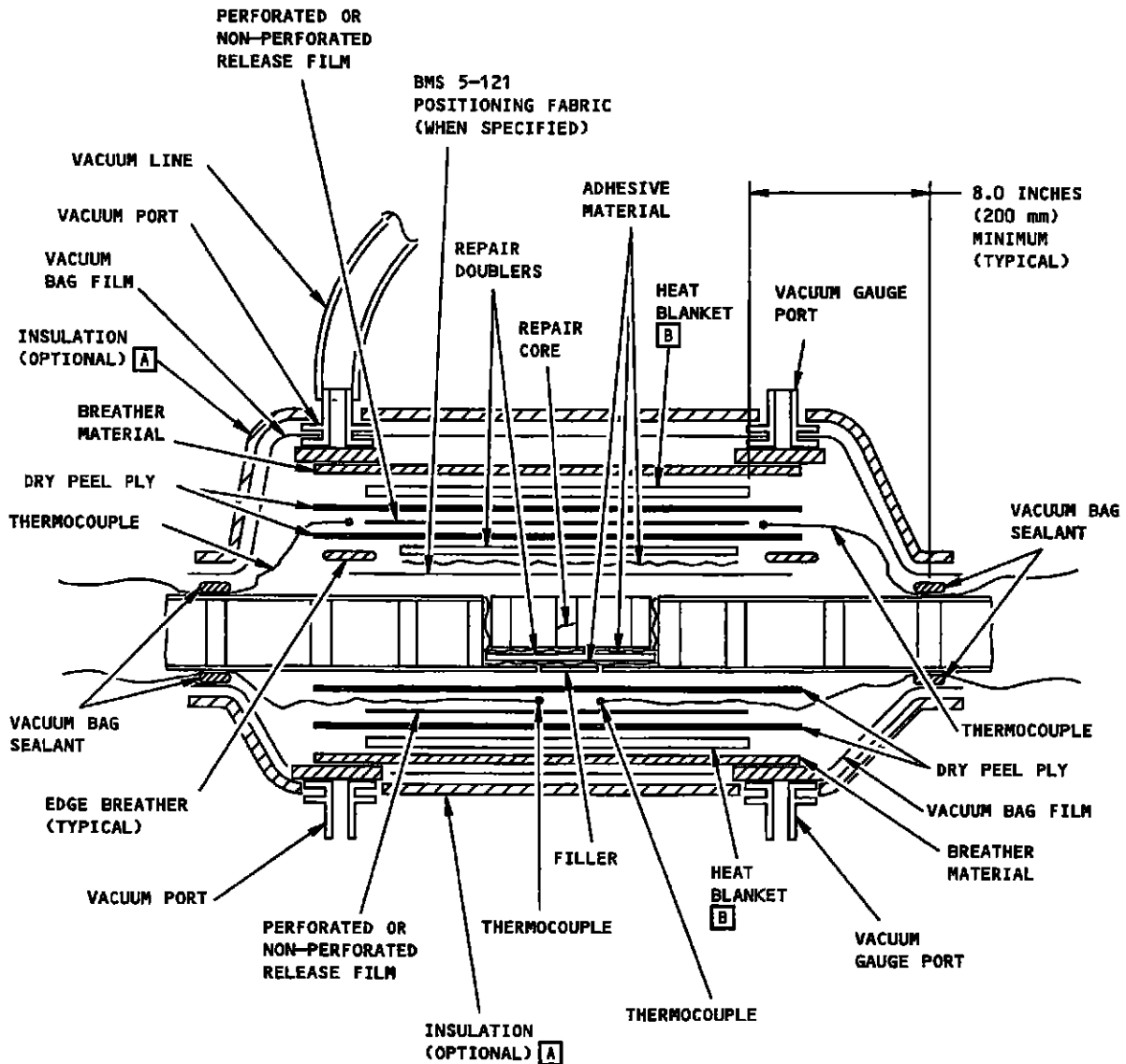


REPAIR OF DAMAGE TO ONE SIDE
DETAIL I

Layup of Vacuum Bagging Materials
Figure 14 (Sheet 1)



INTERCONTINENTAL STRUCTURAL REPAIR



REPAIR OF DAMAGE TO BOTH SIDES
(SEPARATE VACUUM BAGS)
DETAIL II

Layup of Vacuum Bagging Materials
Figure 14 (Sheet 2)

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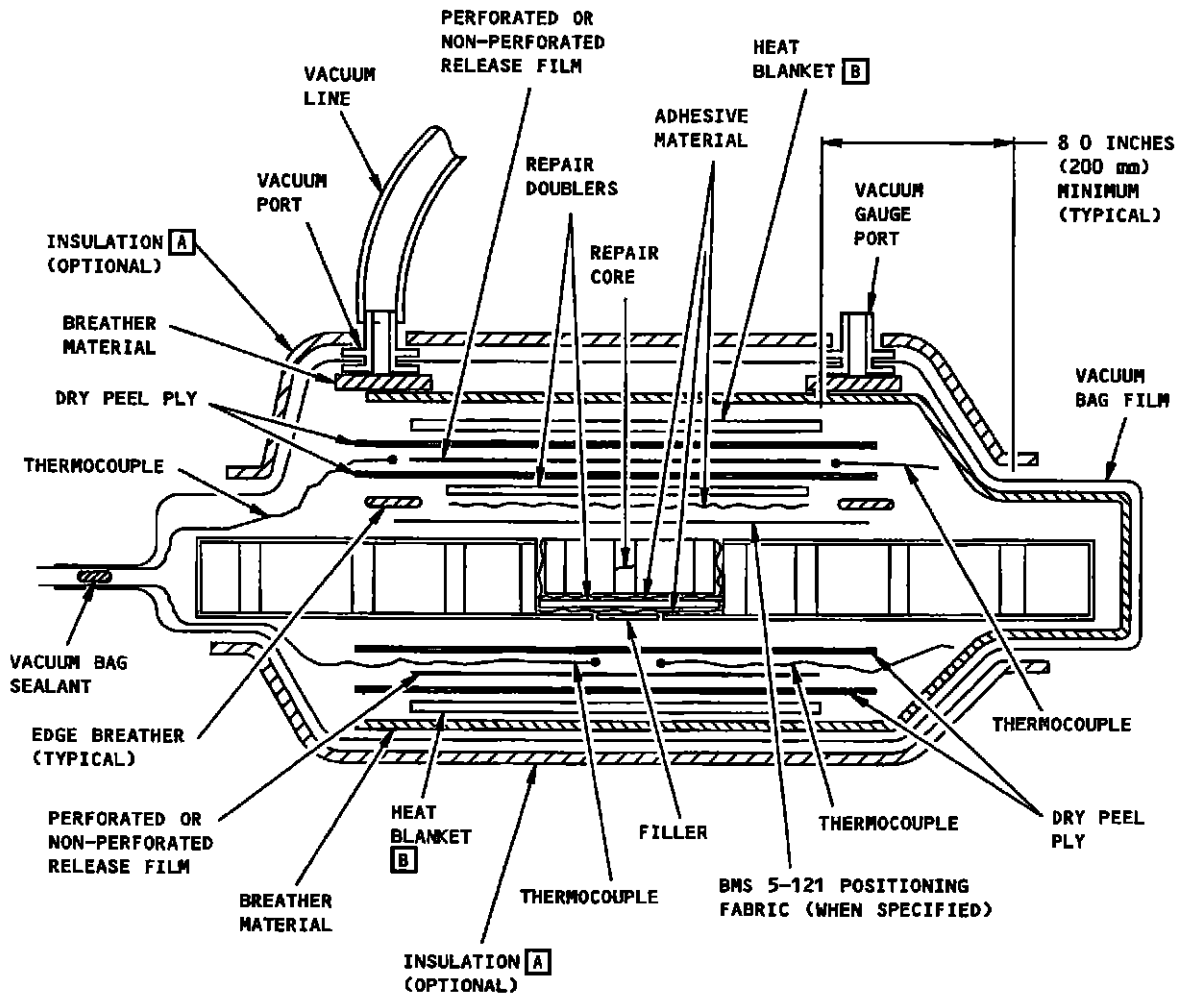
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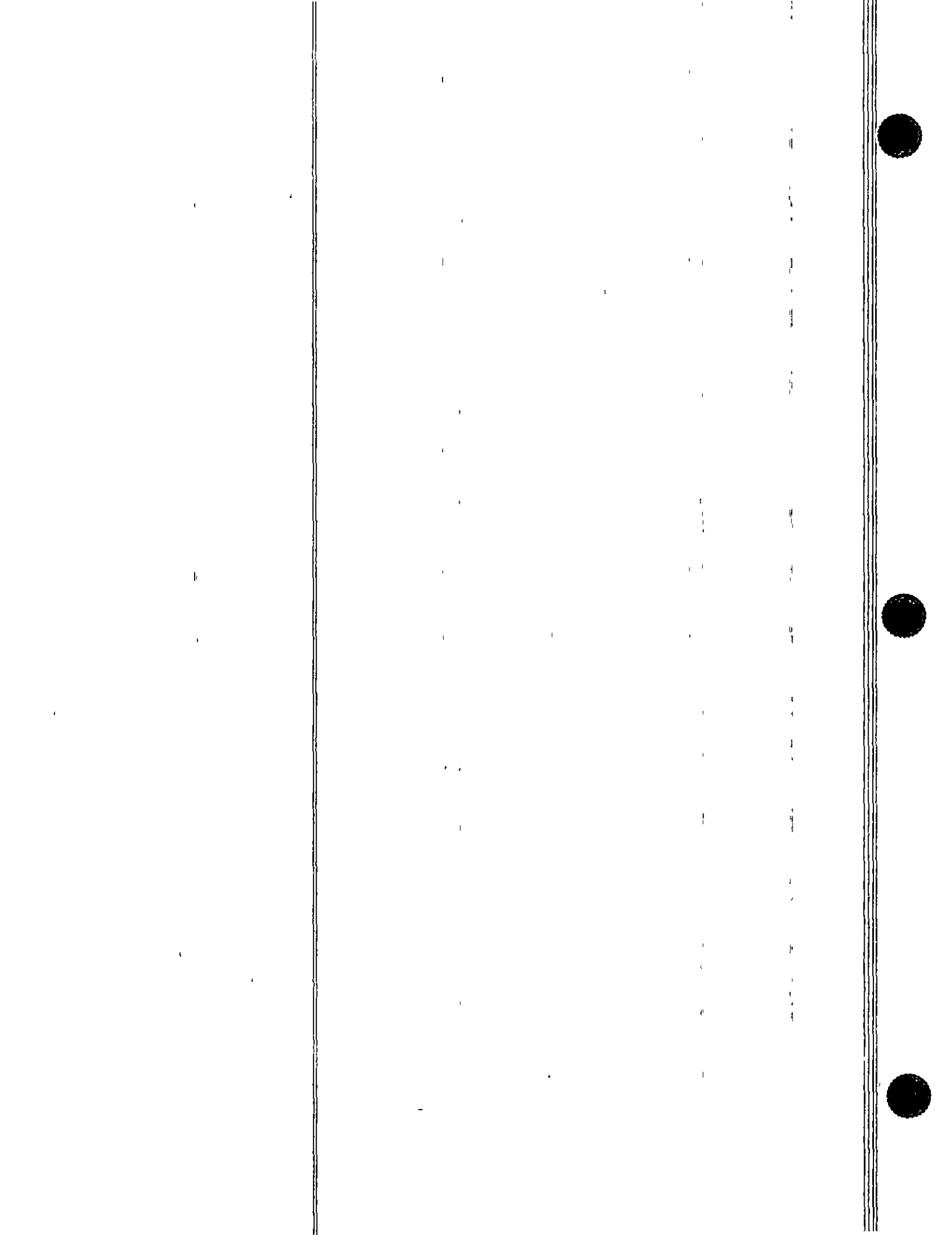


INTERCONTINENTAL STRUCTURAL REPAIR



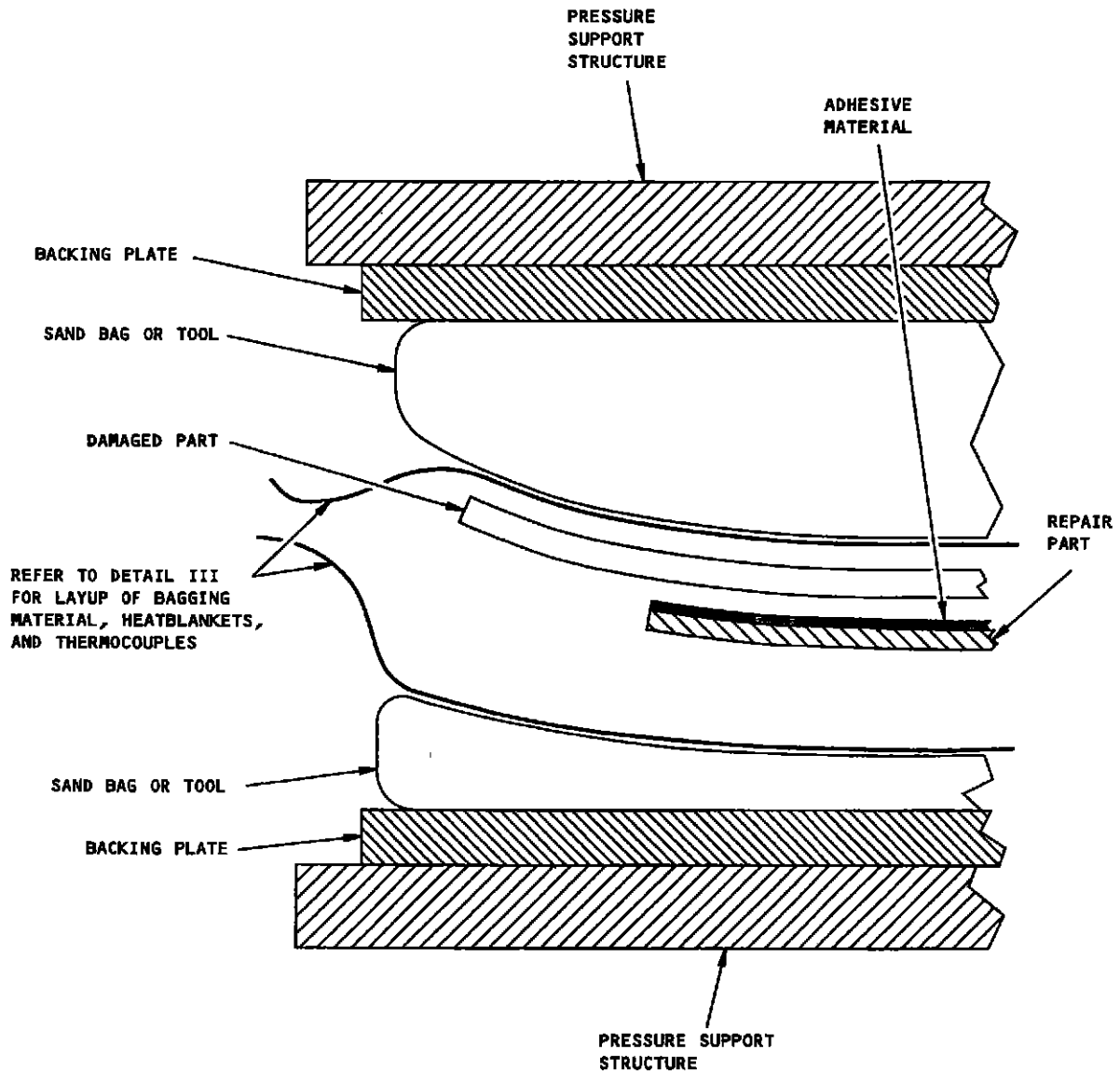
REPAIR OF DAMAGE TO BOTH SIDES
(ENVELOPE BAG)
DETAIL III

Layup of Vacuum Bagging Materials
Figure 14 (Sheet 3)





**INTERCONTINENTAL
STRUCTURAL REPAIR**



**APPLICATION OF PRESSURE FOR ROUNDED OR
CONTOURED PANELS**

DETAIL IV

**Layup of Vacuum Bagging Materials
Figure 14 (Sheet 4)**

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**INTERCONTINENTAL
STRUCTURAL REPAIR**

NOTES

- THIS FIGURE SHOWS THE LAYUP FOR A ONE STAGE CURE PROCEDURE THE LAYUP FOR THE SECOND STAGE OF A TWO STAGE CURE PROCEDURE IS ALMOST THE SAME REFER TO FIGURE 9 FOR THE INSTRUCTIONS TO DO THE FIRST STAGE OF A TWO STAGE CURE PROCEDURE
 - [A]** 4-8 PLIES OF BREATHER MATERIAL IS AN EXAMPLE YOU CAN USE OTHER INSULATING MATERIALS ALSO THIS WILL KEEP THE HEAT IN THE REPAIR AREA
 - [B]** YOU CAN USE THESE THERMOCOUPLES TO MAKE SURE THAT IF THE HEAT BLANKET GETS TOO HOT, YOU CAN TURN OFF THE POWER SUPPLY BEFORE YOU DAMAGE THE SKIN PANEL
 - [C]** IF YOU DO A TWO STAGE CURE PROCEDURE TO REPAIR THE CORE, REFER TO FIGURE 8 FOR THE FIRST STAGE OF THE PROCEDURE. IF YOU DO THE ONE STAGE CURE PROCEDURE, THEN YOU MUST HAVE ACCESS TO EACH SIDE OF THE HONEYCOMB PANEL.
 - PUT A THERMOCOUPLE ON THE UNDAMAGED FACESHEET AT THE LOCATION OF THE REPAIR CORE. IT IS RECOMMENDED THAT YOU PUT A DRY PEEL PLY OR BREATHER AND HEAT BLANKET ABOVE THE THERMOCOUPLE ON THE UNDAMAGED SKIN
- TWO STAGE CURE PROCEDURE IS NECESSARY TO REPAIR THE CORE IF
- THE DAMAGE IS LARGER THAN 64 SQUARE INCHES (0.041 SQUARE METERS) OR,
 - IF YOU CAN NOT PUT A THERMOCOUPLE AT THE REPAIR CORE LOCATION ON EACH SIDE OF THE HONEYCOMB PANEL.

Layup of Vacuum Bagging Materials
Figure 14 (Sheet 5)

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INTERCONTINENTAL
STRUCTURAL REPAIR

REPAIR OF A DISBOND AT AN EDGE OF ALUMINUM HONEYCOMB STRUCTURE

1 Applicability

- A This procedure is a typical repair that is applicable to damage on the edge of an aluminum honeycomb panel

2 General

- A The illustrations and instructions in this repair show different examples of repairs and types of damage. You can do repairs that put together one or more of these examples. Use the correct repair procedure for each type of example.
- B Refer to Fig. 1 for this procedure.
- (1) A disbond of a facesheet cannot be deeper than 0.50 inch (12.5mm) into the panel edgeband.
- (2) The cumulative (total) length of multiple disbonds cannot be longer than 30 percent of the length of the edge.
- (3) The initial adhesive primer (between the separated skins) must be satisfactory.

3 References

- SRM 51-9-3 Repair General – Aluminum Honeycomb Repairs – 250°F (121°C) Cure
- SRM 51-9-7 Repairs to Large Damage

4 Repair Procedures

- A Find the limits of the damage. If you have cracks or corrosion to the edge, then refer to 51-9-7, for the repair instructions.
- B Remove all of the water and other contamination, in and around the damaged area.
- NOTE** The area must be fully dry before you continue on with this repair procedure. If necessary, you can dry the area at a faster rate with an external heat source. Limit the temperature to a maximum of 150°F (66°C).
- C Inspect the primer to make sure that it has not been damaged as given in 51-9-3, Par. 6.
- D Prepare and apply a two part paste adhesive in the disbanded area as given in 51-9-3, Par. 19.

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**INTERCONTINENTAL
STRUCTURAL REPAIR**

- E Use a clamp to hold the skins together Use a light clamping pressure to hold the skins together

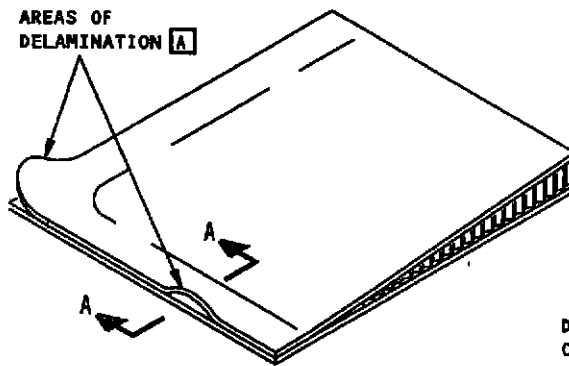
NOTE To apply the clamping pressure equally, use wood, metal, or phenolic wedges (or blocks, if more applicable) between the skin and clamps

- (1) Make sure that there is no air caught in-between the adhesive material and the skins
(2) Remove unwanted adhesive material that can appear from the edge of the disbanded area

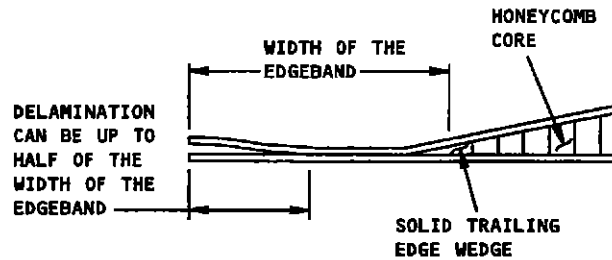
- F Cure the repair as given in 51-9-3, Par 20
G Examine the repair as given in 51-9-3, Par 21
H Clean, seal and finish as given in 51-9-3, Par 22



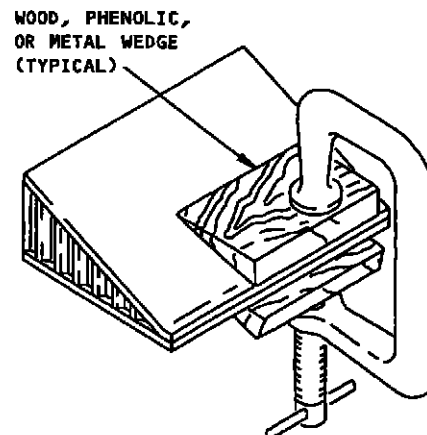
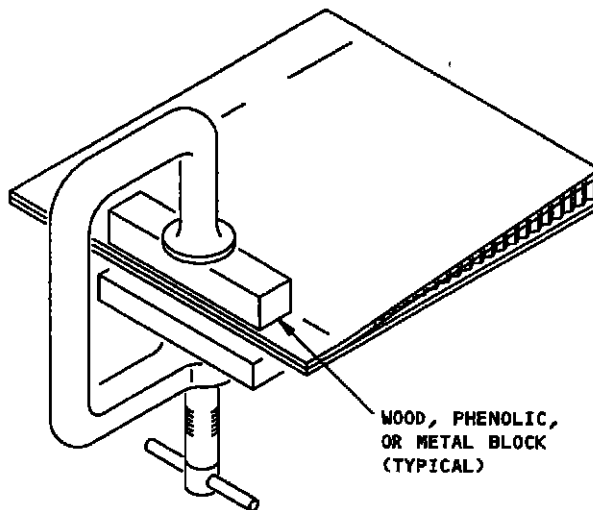
**INTERCONTINENTAL
STRUCTURAL REPAIR**



**EXAMPLES OF
DELAMINATION
DETAIL I**



SECTION A-A



**EXAMPLES OF ALUMINUM SKINS THAT
ARE HELD TOGETHER WITH CLAMPS**

DETAIL II

NOTES

- A** THE DISBOND MUST NOT GO INTO THE HONEYCOMB CORE. DISBONDS AT FASTENER HOLES ARE NOT PERMITTED. THE CUMULATIVE (TOTAL) LENGTH OF MULTIPLE DISBONDS MUST BE LESS THAN 30% OF THE LENGTH OF THE EDGE BAND.

**Repair of Disbonds at an Edge
Figure 1**



INTERCONTINENTAL
STRUCTURAL REPAIR

REPAIRS TO SMALL DAMAGE

1 Applicability

- A This procedure has typical repairs that are applicable to dents, nicks, creases, gouges, cracks and small holes on one side of an aluminum honeycomb sandwich structure. Refer to 51-10-1 for the damage definitions.

NOTE These repairs are limited to damage that is 2.0 inches (50 mm) or less in length and diameter. These repairs are interim when paste adhesive is used. Inspect past adhesive repairs each 24 months or less, or each 3500 flight cycles or less (no later than the interval that occurs first). Refer to Fig. 1 for other repair options.

- B Refer to 51-9-7 for all damage that is larger than 2.0 inches (50 mm) in length and diameter.

2 General

- A The illustrations and instructions in this repair show different examples of repairs and types of damage. You can do repairs that put together one or more of these examples. Use the correct repair procedure for each type of example.

- B Proximity of repairs

- (1) Repair doublers must be a minimum of 2.0 inches (50 mm) apart, edge to edge.
- (2) If a repair doubler will be closer than 2.0 inches (50 mm) to an adjacent repair doubler, then use one doubler for the multiple damage areas.

NOTE If the repair doubler will be too close to a doubler from an old repair, then you can remove the old doubler. Then use one large doubler for the old damage and the new damage.

- C Refer to 51-9-3, Fig. 1 for repair sizes and options.

- (1) Refer to Fig. 1 for the layout of a dent repair.
- (2) Refer to Fig. 2 for the layout of a repair to a nick, gouge or crack in the skin.
- (3) Refer to Fig. 3 for the layout of a small hole repair.

- D Refer to 51-9-3, Table 3 for the cure information for the adhesive.

3 References

SRM 51-9-3	Repair General - Aluminum Honeycomb Repairs - 250°F (121°C) Cure
SRM 51-9-7	Repairs to Large Damage
SRM 51-13-1	Inspection and Removal of Damage
NDT Part 1, 51-04-00	Ultrasonic Bond Inspection of Metal-to-Metal Bonding and Honeycomb Structures
NDT Part 1, 51-05-01	Tap Test Inspection of Honeycomb Sandwich Structure



**INTERCONTINENTAL
STRUCTURAL REPAIR**

4 Repair Instructions

- A** Do a non-destructive inspection (NDI) to find the limits of the visible damage. If there is delaminated skin then cut out the damaged area and do a hole repair. Refer to NDT Part 1, 51-05-01 or NDT Part 1, 51-04-00.
- B** Remove the surface finish and all contamination as specified in 51-9-3.
- C** Repair to a surface that has a crack
- (1) Stop drill the ends of cracks as specified in 51-13-1
 - (2) If there is an adhesive primer on the surface then do an inspection as specified in 51-9-3, par 6 B. If the primer is in a satisfactory condition, then permit the primer to remain. Clean the primer as specified in 51-9-3, par 6 B.
 - (3) If there is no adhesive primer, or if the primer is not in a satisfactory condition, then do a surface preparation procedure as specified in 51-9-3, par 11.
- D** Repair to a surface that has a small hole
- (1) Remove the damaged skin and core
 - (2) The maximum size of a hole that can be filled with potting compound is 1.0 inch (25 mm) in diameter. If the hole is larger than 1.0 inch (25 mm), then make and install a repair core as specified in 51-9-3, par 8, and 51-9-3, par 9.
 - (3) If there is an adhesive primer on the surface then do an inspection as specified in 51-9-3, par 6 B. If the primer is in a satisfactory condition, then permit the primer to remain. Clean the primer as specified in 51-9-3, par 6 B.
 - (4) If there is no adhesive primer, or if the primer is not in a satisfactory condition, then do a surface preparation procedure as specified in 51-9-3, par 11.
- E** Repair of dents
- (1) If the depth of a dent is equal or deeper than two times the skin thickness, then the dent repair is time-limited. Remove the doubler at 24 months (or less) or each 3500 flight cycles or less (no later than the interval that occurs first) and do a hole repair.
 - (2) Apply strong finger pressure to the damaged area to see if the core compresses. If the core compresses, then the dent repair is time-limited. Remove the doubler at 24 months (or less) or each 3500 flight cycles or less (no later than the interval that occurs first) and do a hole repair.
 - (3) If there is an adhesive primer on the surface then do an inspection as specified in 51-9-3, par 6 B. If the primer is in a satisfactory condition, then permit the primer to remain. Clean the primer as specified in 51-9-3, par 6 B.



**INTERCONTINENTAL
STRUCTURAL REPAIR**

(4) Fill the dent Do one of the procedures that follow:

(a) Potting compound procedure.

- 1) Abrade the area of the dent with 180 grt sandpaper Fill with BMS 5-28, Type 6 or 7 potting compound
- 2) Cure as specified in 51-9-3, Table 3
- 3) Abrade the potting compound until it is flush with the undamaged skin If there is adhesive primer on the surface to be bonded, do not damage the primer during the sanding procedure
- 4) If there is no adhesive primer on the surface to be bonded, or if the primer is not in a satisfactory condition, then do a surface preparation procedure as specified in 51-9-3, par 11

(b) Paste adhesive procedure

- 1) If there is no adhesive primer on the surface to be bonded, or if the primer is not in a satisfactory condition, then do a surface preparation procedure as specified in 51-9-3, par 11
- 2) Fill the dent with the same paste adhesive that will be used to bond the doubler

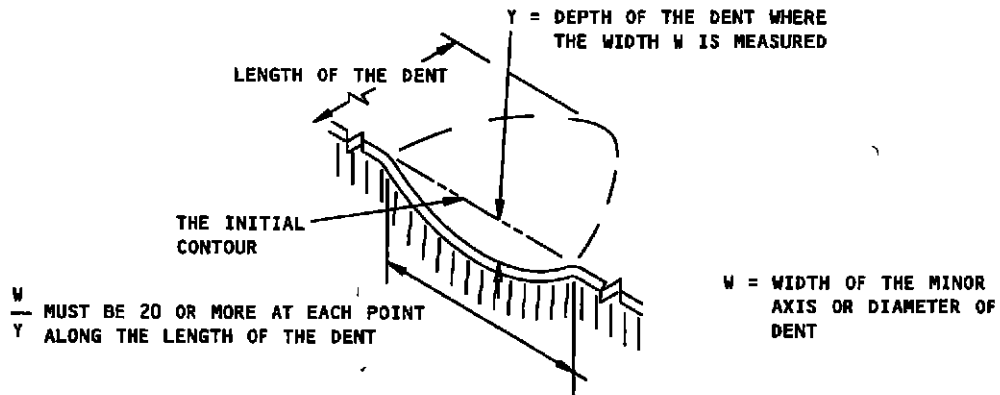
(c) Film adhesive procedure

- 1) If there is no adhesive primer on the surface to be bonded, or if the primer is not in a satisfactory condition, then do a surface preparation procedure as specified in 51-9-3, par 11
- 2) Fill the dent with the same film adhesive that will be used to bond the doubler You can add BMS 5-121 positioning fabric to the adhesive inside the dent, (if necessary)

F Refer to 51-9-3 for the bonding procedure and other repair steps

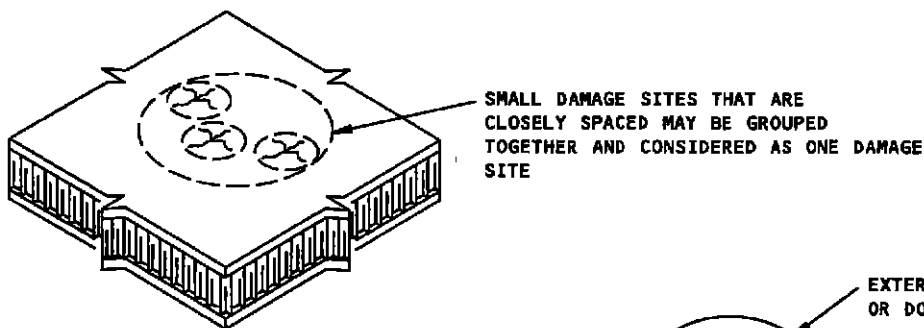


**INTERCONTINENTAL
STRUCTURAL REPAIR**

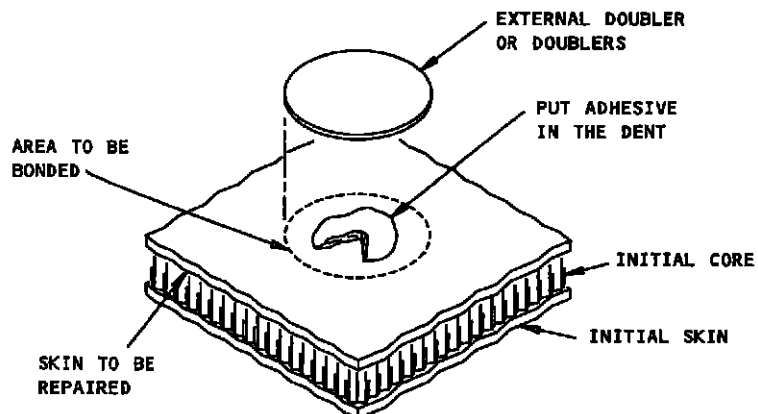


**DENT THAT IS PERMITTED IN METAL
HONEYCOMB STRUCTURE**

DETAIL I



DETAIL II



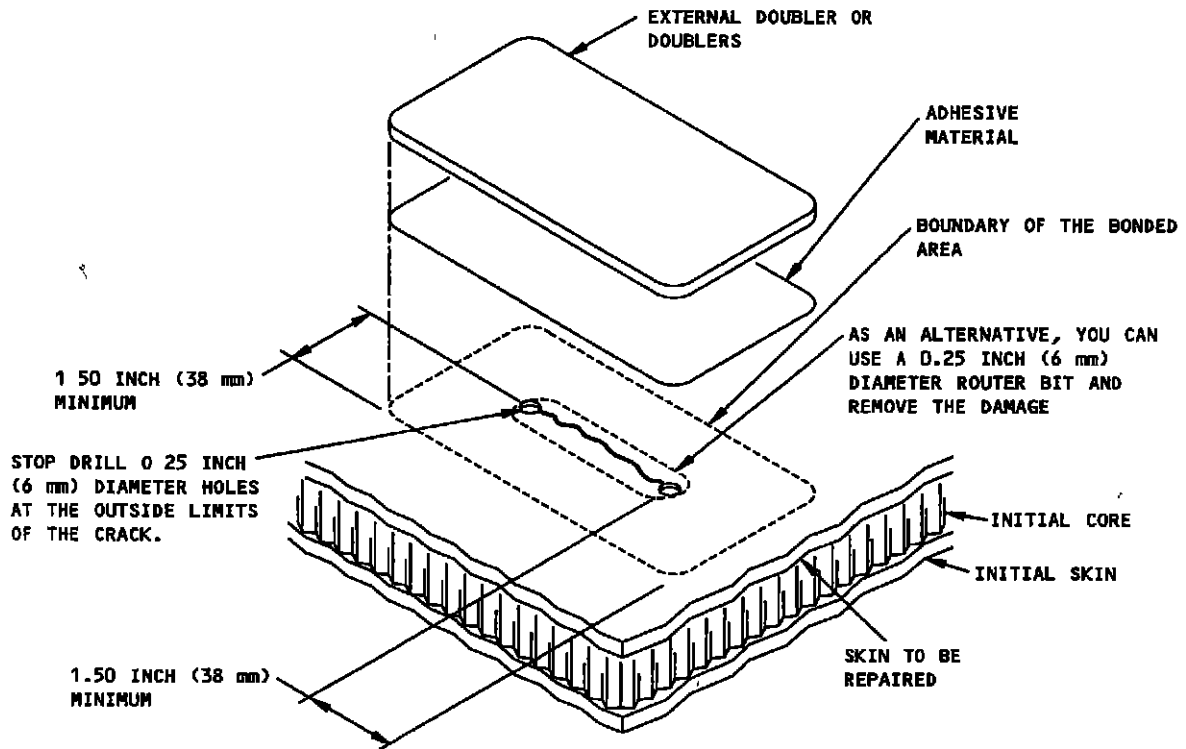
LAYOUT OF THE REPAIR PARTS

DETAIL III

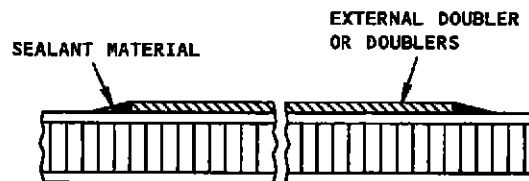
**External Doubler Repair of a Dent
Figure 1**



**INTERCONTINENTAL
STRUCTURAL REPAIR**



**LAYOUT OF THE REPAIR PARTS
DETAIL I**

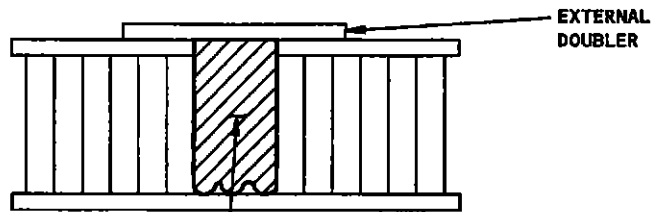


**SECTION THROUGH THE REPAIR
(TYPICAL)**

**External Doubler Repair of a Nick, Gouge, or Crack in the Skin
Figure 2**

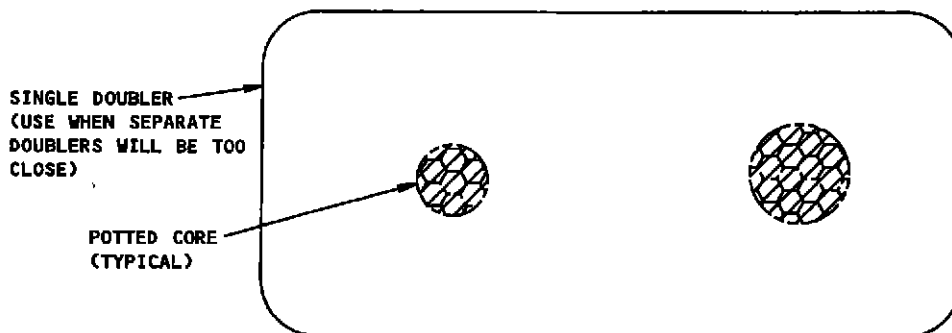
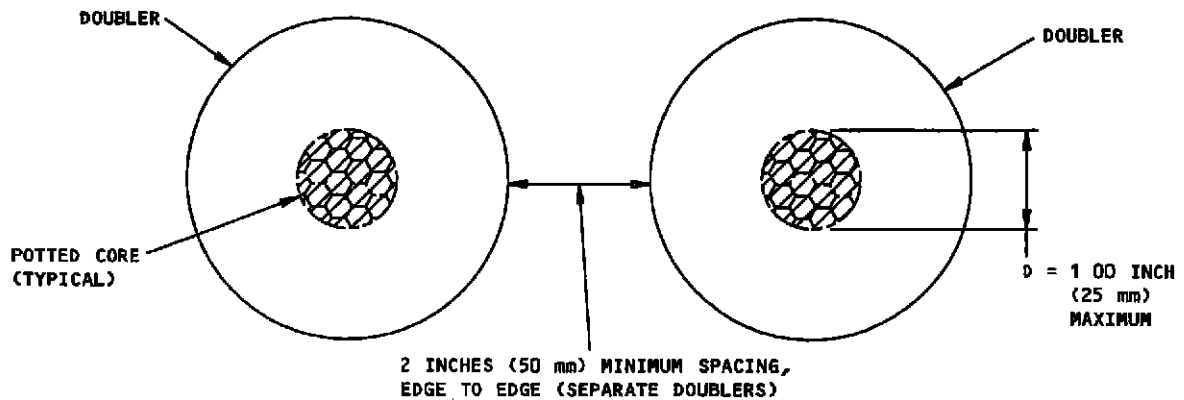


**INTERCONTINENTAL
STRUCTURAL REPAIR**



FILL THE CORE CELLS WITH BMS 5-28 TYPE 6 OR 7 POTTING COMPOUND
MAKE THE CELL WALLS STRAIGHT, OR CUT OUT THE CORE IF NECESSARY,
TO MAKE IT EASY TO APPLY THE POTTING COMPOUND

**PERMITTED DEPTH OF POTTING COMPOUND
DETAIL I**



**PERMITTED SPACING OF POTTED AREAS
DETAIL II**

**Potted Core Repair for Small Damage
Figure 3**



INTERCONTINENTAL
STRUCTURAL REPAIR

SEPTUMIZED CORE REPAIRS

1 Applicability

- A This procedure is an alternative to the full depth honeycomb core repair
- B This repair uses a septum
 - (1) To bond a partial depth core to an initial core, or
 - (2) To bond two separate cores together to make a full depth core

2 General

- A The illustrations and instructions in this repair show different examples of repairs and types of damage. You can do repairs that put together one or more of these examples. Use the correct repair procedures for each type of example.
- B Refer to 51-9-3 and 51-9-7, to repair the removed skin.
- C Refer to Fig 1 for the configuration of the repair parts in a partial depth core replacement.
- D Refer to Fig 3 for the configuration of the repair parts in a full depth core replacement.

3 References

51-9-2	Glass Fabric Reinforced Epoxy and Phenolic Laminates Repair
51-9-3	Repair General – Aluminum Honeycomb Repairs – 250°F (121°C) Cure
51-9-7	Repairs to Large Damage
51-11-1	Glass Fabric Strengthened Epoxy Laminates and Nonmetallic Honeycomb Sandwich Repairs – 250°F (121°C) Cure

4 Remove the Damage

- A Find the size limits for the damage as given in 51-9-3, par 6.
- B Remove the damage as given in 51-9-3, par 7.
 - (1) If the core material removed is less than 1/3 the full depth of the core, then remove a sufficient quantity of the core so that the repair septum will be located at a depth of 1/3 to 2/3 the full depth of the core. Then do the steps in par 5.
 - (2) If the core material removed is more than 2/3 the full depth of the core, then do one of the steps that follow:
 - (a) Do the full depth septumized core steps in par 6 or,
 - (b) Do a full depth core repair steps as specified in 51-9-3, par 9.

**5 Partial Depth Septumized Core Repair**

NOTE This repair is cured in two stages

- A** Make the repair septum from pre-cured BMS 9-3 glass fabric impregnated with BMS 8-301 Class I epoxy resin, or pre-cured BMS 8-79 glass fabric reinforced plastic (GFRP) laminate or an aluminum alloy sheet. Make the septum the same size as the hole in the component to be repaired.

- (1) Refer to 51-11-1 to make pre-cured GFRP

(a) Lightly abrade the surface resin with 180-grit or finer abrasive paper to remove the glossy surface from the pre-cured GFRP

(b) Do not sand into the glass fibers

- (2) If you use an aluminum sheet septum, then refer to 51-9-3 and do the steps that follow:

NOTE Do not use clad 7000 series alloy aluminum as a septum

(a) Do a surface preparation on each side of the septum, then

(b) Put an adhesive primer on each side of the septum

- B** Make the honeycomb repair core. Refer to 51-9-3, par 8

- C** Apply the adhesive materials. Refer to Fig 1 for the applicable adhesive and the steps that follow:

(1) Put film adhesive into the hole. Refer to 51-9-3, par 9

(2) Put the septum in the hole

(3) Put a layer of film adhesive on the septum as specified in Fig 1

(4) Install the honeycomb repair core. Refer to 51-9-3, par 9

- D** Do the first stage of the two stage cure. Refer to 51-9-3, par 9

- E** Do a visual inspection of the repair area after the cure is completed and the thermocouples have been removed:

(1) Look for areas of disbond in the adhesive bond between the repair core and the initial core. There must be no gaps or disbands in these areas

NOTE If you find disbands in the adhesive surface, then fill them with BMS 5-28, Type 6 or Type 7 potting compound. Cure the BMS 5-28 potting compound during the final stage of the cure



INTERCONTINENTAL
STRUCTURAL REPAIR

- (2) Look for disbands in the adhesive materials between the septum and the repair core
 - (a) If the diameter of the repair septum is larger than 2.0 inches, (50 mm) and you find disbands that are larger than 3/8 inch (10 mm) in diameter, then the repair is not satisfactory
 - (b) If the diameter of the repair septum is less than 2.0 inches (50 mm), then no visible disbands are permitted

6 Full Depth Septumized Core Repair

NOTE This repair is cured in three stages

- A Cut two pieces of honeycomb core that are a minimum of 1.0 inch (25 mm) diameter larger than the hole in the component to be repaired
- B Each piece of honeycomb core must be a minimum of 1/3 the depth of the hole and a maximum of 2/3 the depth of the hole
- C The core/septum assembly must be higher than the depth of the hole

NOTE This will permit you to abrade the top of the core to make it flush with the skin surface

- D Make the repair septum from pre-cured BMS 9-3 glass fabric impregnated with BMS 8-301 Class I epoxy resin, or pre-cured BMS 8-79 glass fabric reinforced plastic (GFRP), or an aluminum alloy sheet

NOTE Make the septum approximately the same size as the repair core blankets

- (1) Refer to 51-9-2 or 51-11-1 to make pre-cured GFRP laminate
 - (a) Lightly abrade the surface resin of the cured GFRP laminate with 180-grit or finer abrasive paper to remove the glossy surface
 - (b) Do not sand into the glass fibers
- (2) If you use an aluminum sheet septum, then refer to 51-9-3 and do the steps that follow:

NOTE Do not use clad 7000 series alloy aluminum as a septum

- (a) Do a surface preparation on each side of the septum, then
- (b) Put an adhesive primer on each side of the septum

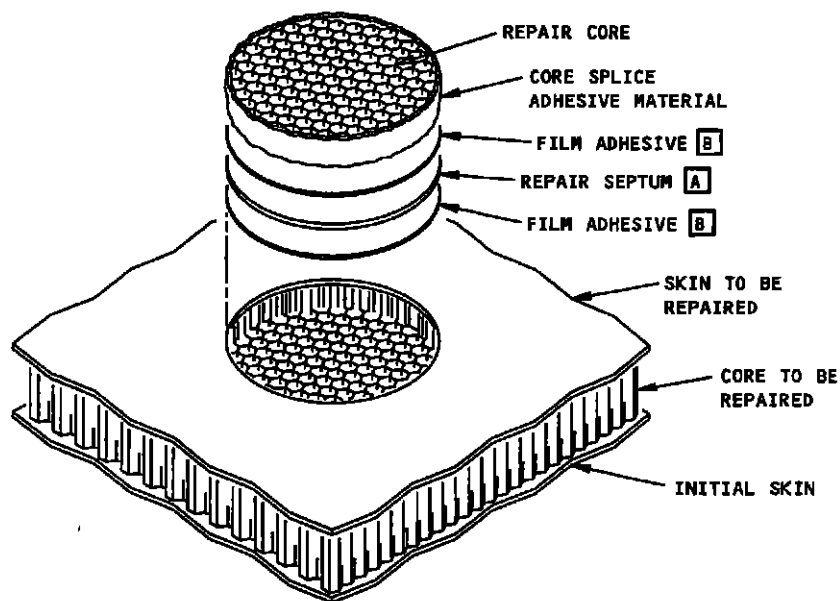


**INTERCONTINENTAL
STRUCTURAL REPAIR**

- E** Apply the adhesive materials Refer to Fig 2 for the applicable adhesive and the steps that follow
- (1) Put film adhesive on the mating surface of the first honeycomb core blanket that you will bond the septum to
 - (2) Put the septum on the first honeycomb core blanket
 - (3) Put film adhesive on the septum
 - (4) Put the second honeycomb core blanket on to the septum Make sure that the ribbon direction is the same as the bottom core
- F** Cure the honeycomb core/septum assembly Refer to Fig 2
- (1) Put the assembly on a clean, hard, and flat surface
 - (2) Put edge support blocks against the edges of the assembly
 - (3) Do the vacuum bag layup
 - (4) Cure the assembly as specified in 51-11-1, if the GFRP septum is used or 51-9-3, par 20 if the aluminum septum is used
- G** Cut the core/septum assembly to the necessary shape (A core cylinder, for example)
- H** Look for disbonds in the adhesive materials between the septum and the two honeycomb repair cores
- (1) If the diameter of the repair septum is larger than 2 0 inches, (50 mm) and you find disbonds that are larger than 3/8 inch (10 mm) in diameter, then the repair is not satisfactory
 - (2) If the diameter of the repair septum is less than 2 0 inches (50 mm), then no visible disbonds are permitted
- I** Install the honeycomb repair core/septum assembly and do the second stage of the three stage cure Refer to 51-9-3, par 9
- 7** Complete the Repair
- A** Complete the repair as specified in 51-9-3 and 51-9-7

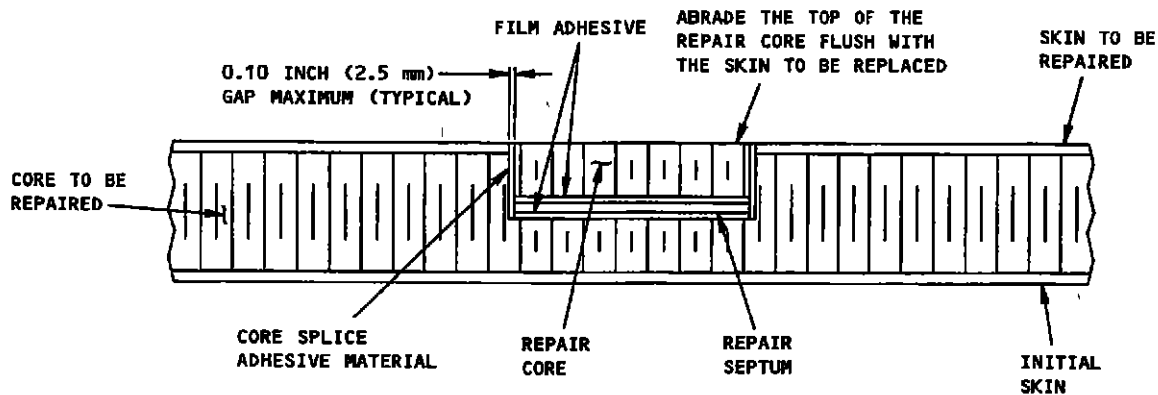


**INTERCONTINENTAL
STRUCTURAL REPAIR**



LAYOUT OF THE REPAIR PARTS

DETAIL I



SECTION THROUGH THE CENTER OF THE REPAIR AREA

**Bonded Doubler Repair That Uses an Internal Septum For a
Less Than Full Depth Core Replacement
Figure 1 (Sheet 1)**

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**INTERCONTINENTAL
STRUCTURAL REPAIR**

NOTES

- REFER TO 51-9-3 FOR REPAIR CORE INSTALLATION PROCEDURES.

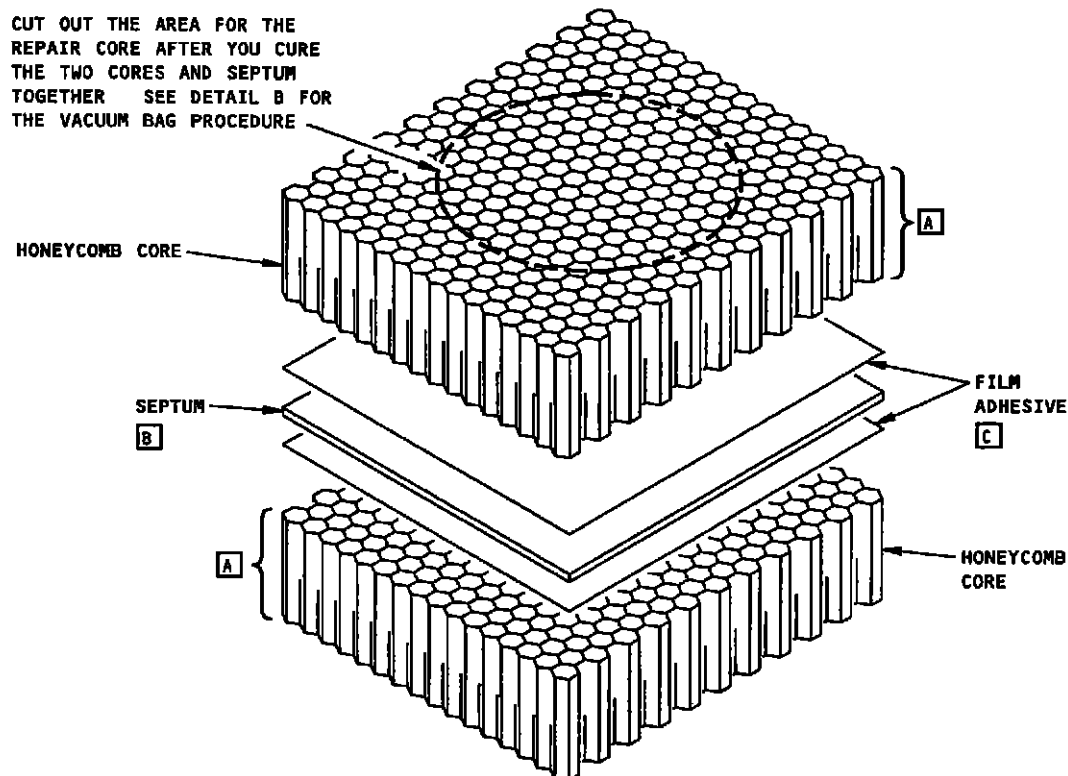
- [A]** MAKE THE SEPTUM OUT OF PRE-CURED GLASS FABRIC REINFORCED PLASTIC (GFRP) LAMINATE OR AN ALUMINUM ALLOY SHEET
- A.** TO MAKE A RE-CURED GFRP LAMINATE FROM DRY FABRIC, REFER TO 51-9-2 MAKE ONE OF THE LAMINATES THAT FOLLOW:
- IMPREGNATE AND THEN CURE TWO PLIES OF BMS 9-3, TYPE H-2 GLASS FABRIC AND BMS 8-301, CLASS I EPOXY RESIN, OR
 - IMPREGNATE AND THEN CURE THREE PLIES OF BMS 9-3, TYPE D GLASS FABRIC AND BMS 8-301. CLASS I EPOXY RESIN.
- B.** TO MAKE A PRE-CURED GFRP PREPREG LAMINATE, REFER TO 51-11-1. MAKE ONE OF THE LAMINATES THAT FOLLOW
- TWO PLIES OF BMS 8-79, CLASS III, STYLE 1581 OR 7781, OR
 - THREE PLIES OF BMS 8-79, CLASS III, STYLE 120 OR 220
- C** TO MAKE AN ALUMINUM ALLOY SHEET SEPTUM, USE 0 012 - 0 020 INCH THICK ALUMINUM
- USE THE SAME BOEING MATERIAL SPECIFICATION (BMS) ALUMINUM MATERIAL, (OR AN EQUIVALENT ALUMINUM MATERIAL). USE THE SAME (OR SIMILAR) HEAT-TREAT AS THE INITIAL ALUMINUM SKIN THAT IS TO BE REPAIRED.
 - DO NOT USE 7000 SERIES ALUMINUM THAT HAS A CLAD SURFACE IF THE SKIN TO BE REPAIRED IS A CLAD 7000 SERIES ALUMINUM, THEN USE AN UNCLAD 7000 SERIES ALUMINUM.
- [B]** APPLY THE ADHESIVE MATERIALS TO THE TWO MATING SURFACES OF THE REPAIR SEPTUM AS FOLLOWS
- A** FOR THE PRE-CURED GFRP SEPTUM
- APPLY TWO LAYERS OF BMS 5-129, TYPE IV, GRADE 10 ADHESIVE FILM.
- B** FOR THE ALUMINUM SEPTUM
- APPLY TWO LAYERS OF BMS 5-101, GRADE 10 OR ONE LAYER OF BMS 5-101, GRADE 15 ADHESIVE FILM.

Bonded Doubler Repair That Uses an Internal Septum For a
Less Than Full Depth Core Replacement
Figure 1 (Sheet 2)

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**INTERCONTINENTAL
STRUCTURAL REPAIR**



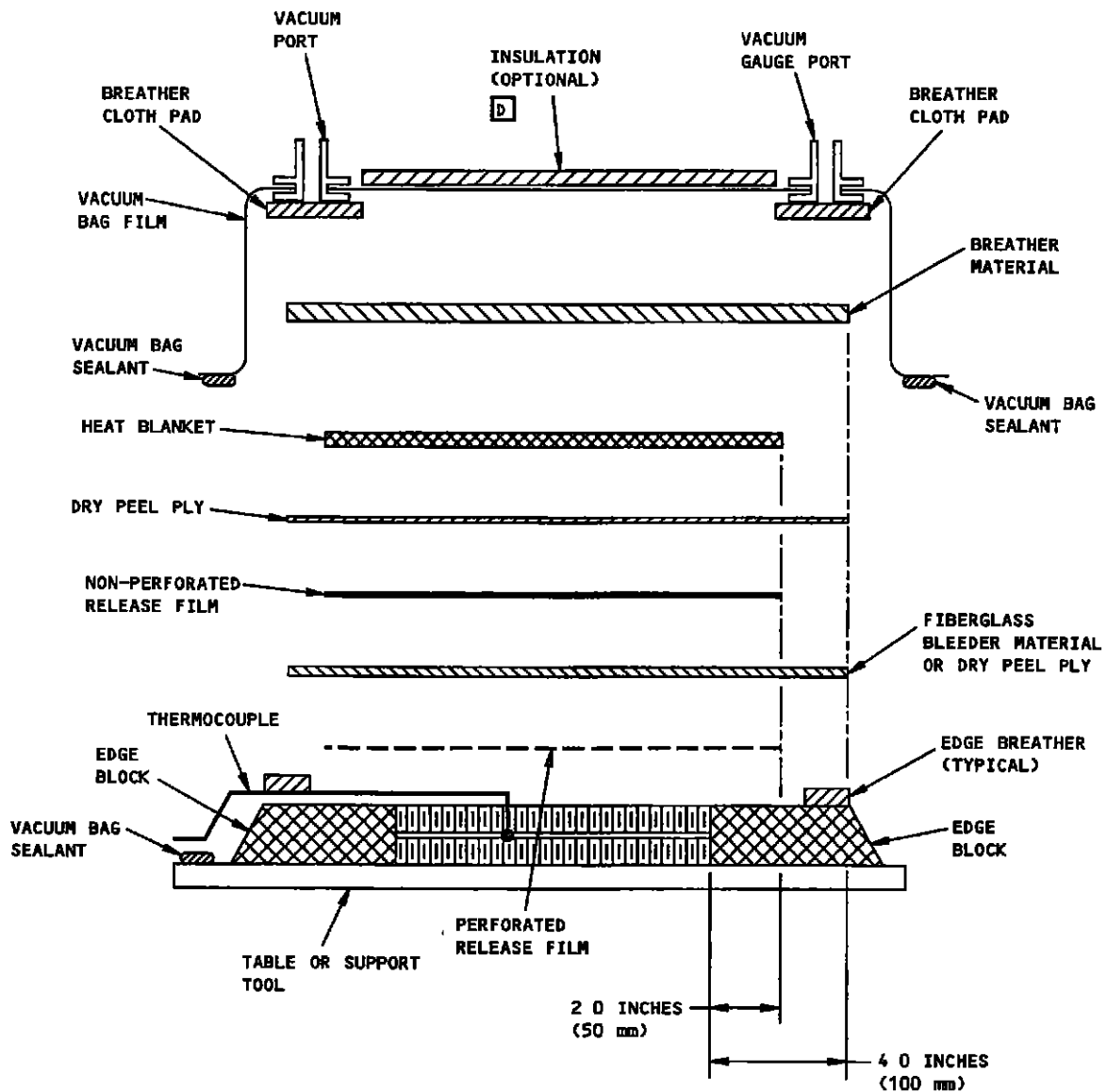
LAYOUT OF THE CORE SEPTUM ASSEMBLY

DETAIL I

**Bonded Doubler Repair That Uses Two Cores and an
Internal Septum for Full Core Replacement
Figure 2 (Sheet 1)**



**INTERCONTINENTAL
STRUCTURAL REPAIR**



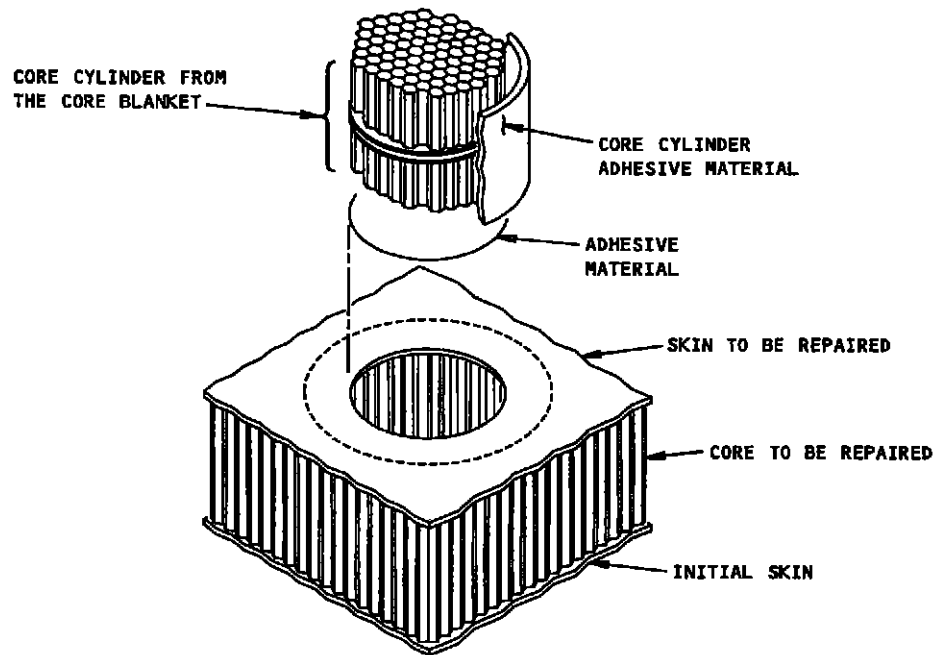
VACUUM BAG PROCEDURE

DETAIL II

Bonded Doubler Repair That Uses Two Cores and an
Internal Septum for Full Core Replacement
Figure 2 (Sheet 2)

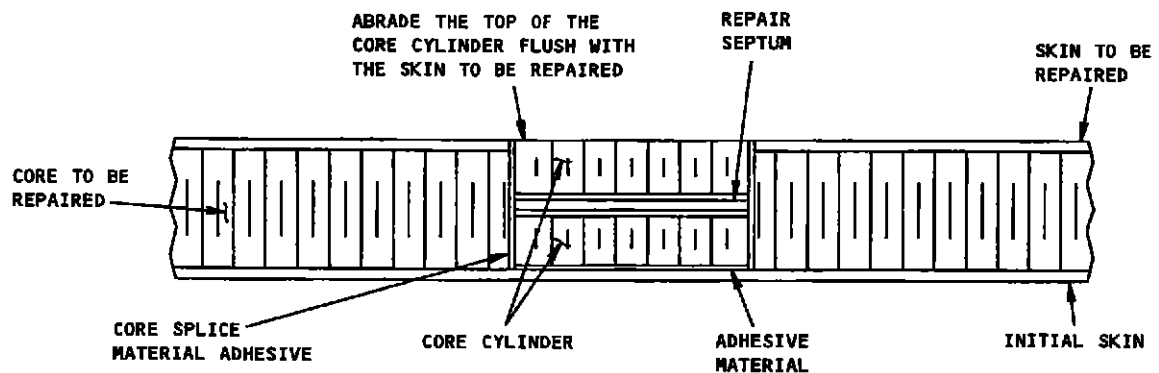


**INTERCONTINENTAL
STRUCTURAL REPAIR**



LAYOUT OF THE REPAIR PARTS FOR DAMAGE
TO FULL DEPTH CORE AND ONE SKIN

DETAIL III



SECTION THROUGH THE CENTER OF THE REPAIR AREA

Bonded Doubler Repair That Uses Two Cores and an
Internal Septum for Full Core Replacement
Figure 2 (Sheet 3)

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STRUCTURAL REPAIR****NOTES**

- REFER TO 51-9-3 FOR REPAIR CORE INSTALLATION PROCEDURES.
- [A]** THE HEIGHT OF EACH CORE MUST BE A MINIMUM OF 1/3 THE DEPTH OF THE HOLE AND A MAXIMUM OF 2/3 THE DEPTH OF THE HOLE.
- [B]** MAKE THE SEPTUM OUT OF PRE-CURED GLASS FABRIC REINFORCED PLASTIC (GFRP) LAMINATE OR AN ALUMINUM ALLOY SHEET:
 - A TO MAKE A PRE-CURED GFRP LAMINATE FROM DRY FABRIC, REFER TO SRM 51-9-2 MAKE ONE OF THE LAMINATES THAT FOLLOW
 - IMPREGNATE AND THEN CURE TWO PLIES OF BMS 9-3, TYPE H-2 GLASS FABRIC AND BMS 8-301, CLASS I EPOXY RESIN, OR
 - IMPREGNATE AND THEN CURE THREE PLIES OF BMS 9-3, TYPE D GLASS FABRIC AND BMS 8-301, CLASS I EPOXY RESIN.
 - B. TO MAKE A PRE-CURED GFRP PREPREG LAMINATE, REFER TO SRM 51-11-1 MAKE ONE OF THE LAMINATES THAT FOLLOW
 - TWO PLIES OF BMS 8-79, CLASS III, STYLE 1581 OR 7781, OR
 - THREE PLIES OF BMS 8-79, CLASS III, STYLE 120 OR 220.
 - C. TO MAKE AN ALUMINUM ALLOY SHEET SEPTUM, USE 0 D12 - 0.020 INCH THICK ALUMINUM
 - USE THE SAME BOEING MATERIAL SPECIFICATION (BMS) ALUMINUM MATERIAL, (OR AN EQUIVALENT ALUMINUM MATERIAL) USE THE SAME (OR SIMILAR) HEAT-TREAT AS THE INITIAL ALUMINUM SKIN THAT IS TO BE REPAIRED
 - DO NOT USE 7000 SERIES ALUMINUM THAT HAS A CLAD SURFACE IF THE SKIN TO BE REPAIRED IS A CLAD 7000 SERIES ALUMINUM, THEN USE AN UNCLAD 7000 SERIES ALUMINUM.
- [C]** APPLY THE ADHESIVE MATERIALS TO THE TWO MATING SURFACES OF THE REPAIR SEPTUM AS FOLLOWS
 - A FOR THE PRE-CURED GFRP SEPTUM:
 - APPLY TWO LAYERS OF BMS 5-129, TYPE IV, GRADE 10 ADHESIVE FILM
 - B FOR THE ALUMINUM SEPTUM:
 - APPLY TWO LAYERS OF BMS 5-101, GRADE 10 OR ONE LAYER OF BMS 5-101, GRADE 15 ADHESIVE FILM.
- [D]** 4-8 PLIES OF BREATHER MATERIAL FOR EXAMPLE YOU CAN USE OTHER INSULATION MATERIALS ALSO THIS WILL KEEP THE HEAT IN THE REPAIR AREA.

Bonded Doubler Repair That Uses Two Cores and an
Internal Septum for Full Core Replacement
Figure 2 (Sheet 4)

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INTERCONTINENTAL
STRUCTURAL REPAIR
REPAIRS TO LARGE DAMAGE

1 Applicability

- A Repair 4 has typical repairs for aluminum honeycomb sandwich structure with large damage
- B In these repairs, it will be necessary to remove and replace the damaged area of the skin and/or core

2 General

- A The illustrations and instructions in this repair show different examples of repairs and types of damage. You can do repairs that put together one or more of these examples. Use the correct repair procedures for each type of example.
- B If you have damage to the skin and core away from the edge, then refer to Fig. 1 for the layout of the repair parts.
- C If you have damage at the edge, then refer to Fig. 2 for the layout of the repair parts.
- D If you have damage from an edge to an edge, then refer to Fig. 3 for the layout of the repair parts.

3 References

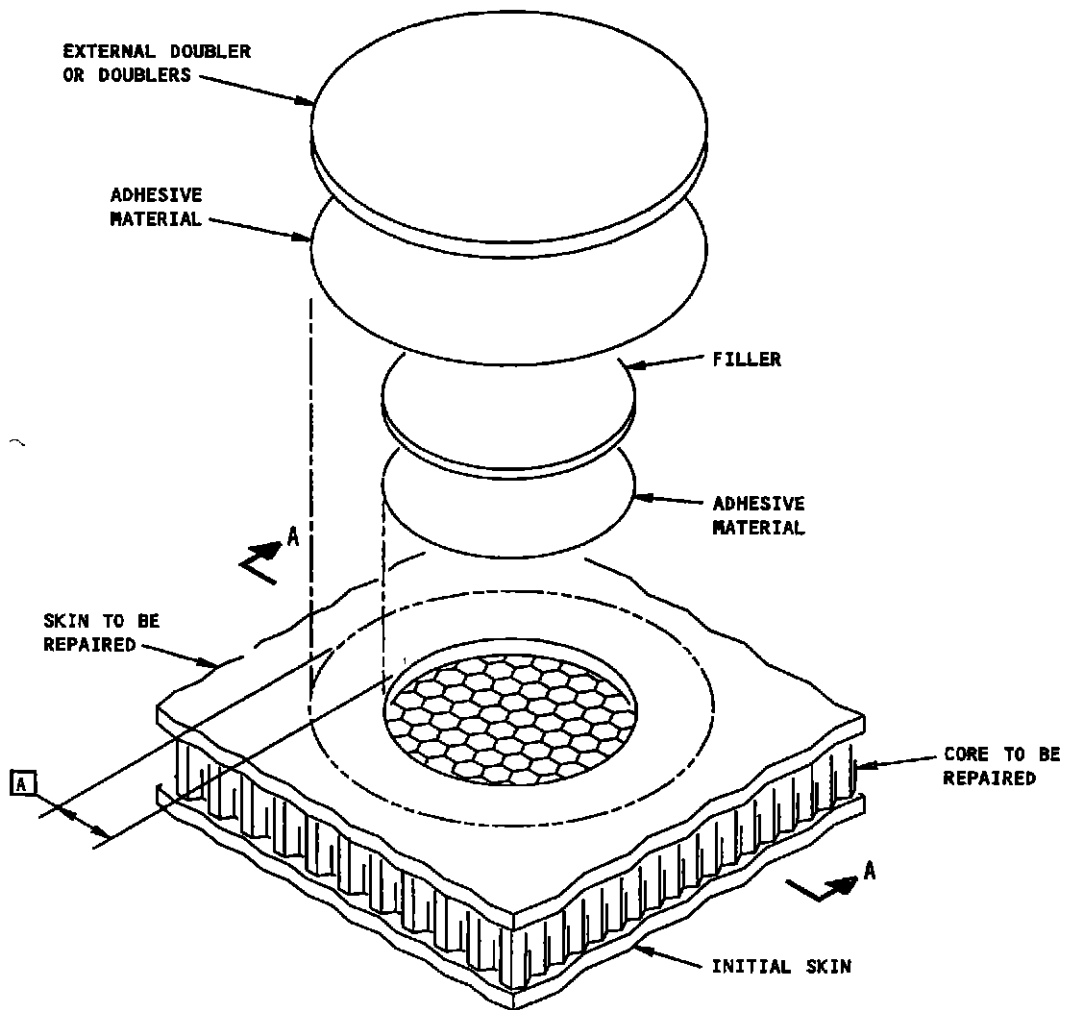
SRM 51-9-3 Repair General – Aluminum Honeycomb Repairs – 250°F (121°C) Cure

4 Repair Instructions

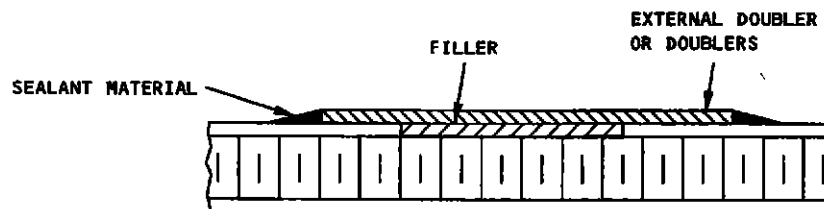
- A Find and remove the damage as specified in 51-9-3, par. 6 and par. 7.
- B Refer to the component engineering drawings or use NDI procedures to find the locations of internal doublers and other repairs. Refer to the repair figures for the doubler thicknesses and overlaps to use when cutouts are near a panel edgeband.
- C Refer to 51-9-3 for the repair steps.



**INTERCONTINENTAL
STRUCTURAL REPAIR**



**EXTERNAL DOUBLER AND FILLER REPAIR TO ONE SKIN
DETAIL I**



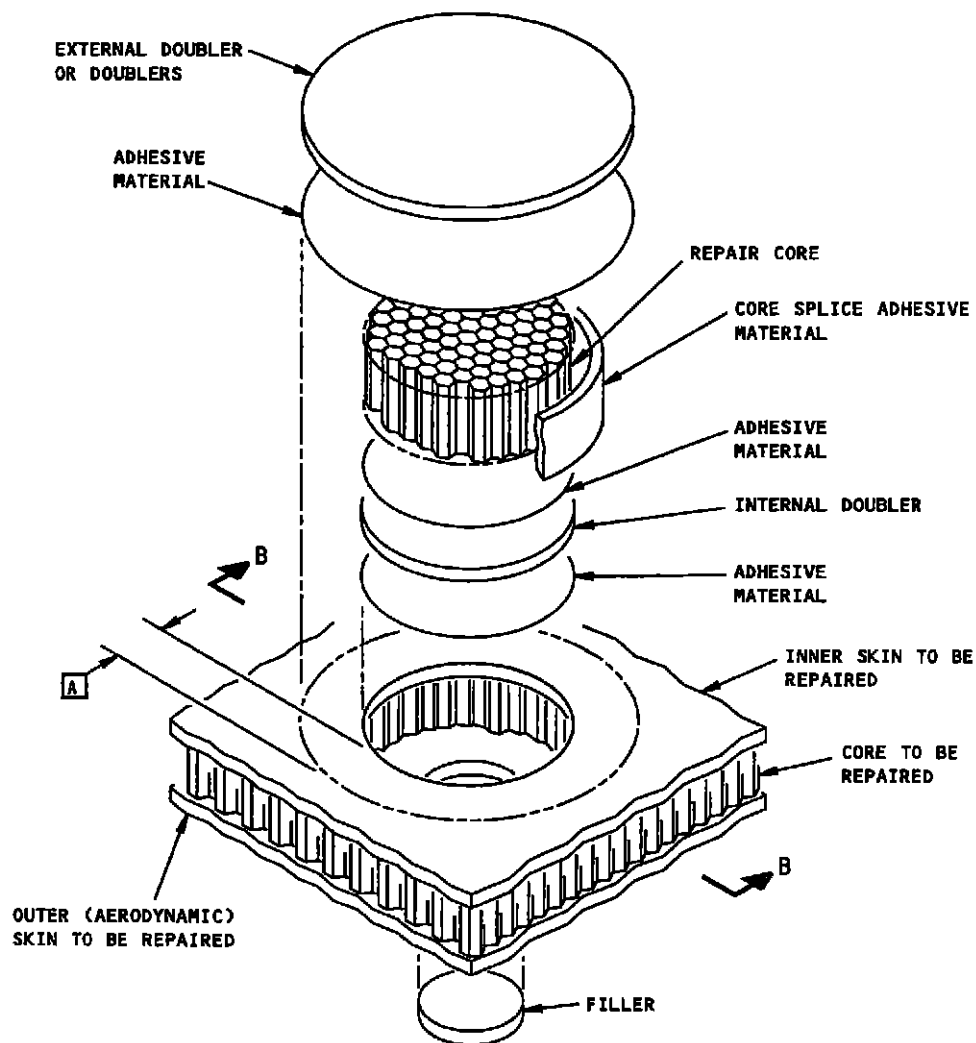
SECTION A-A

**Repair of Damage Away From the Panel Edges
Figure 1 (Sheet 1)**

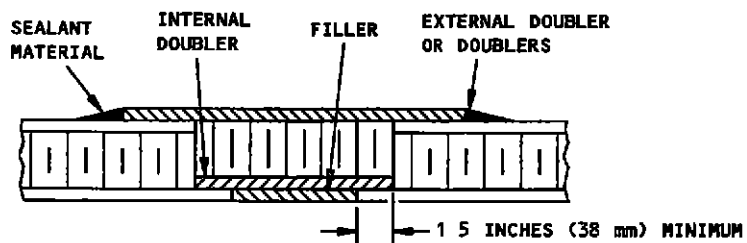
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**INTERCONTINENTAL
STRUCTURAL REPAIR**



**REPAIR TO CORE AND TWO SKINS
DETAIL II**



SECTION B-B

**Repair of Damage Away From the Panel Edges
Figure 1 (Sheet 2)**

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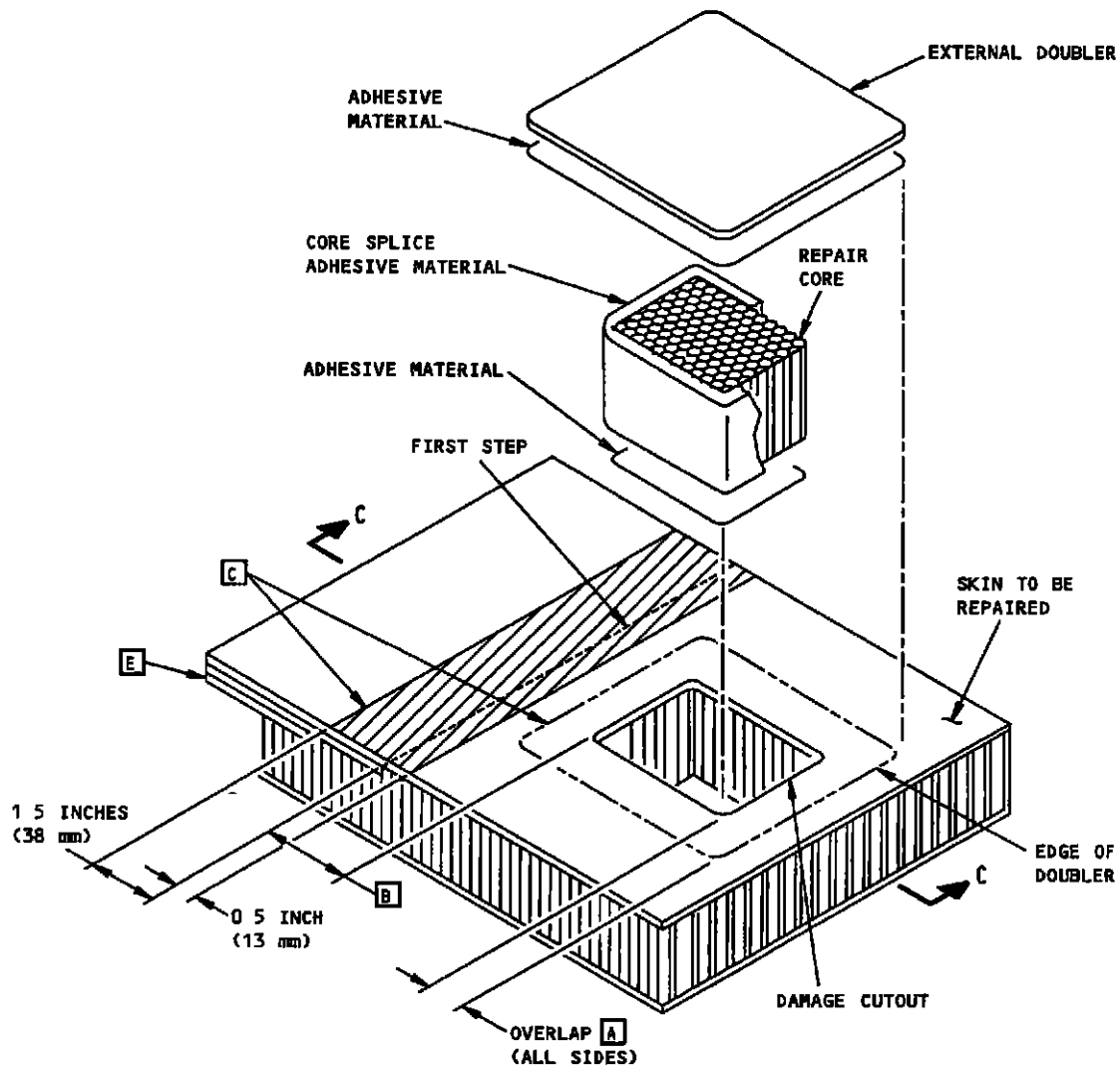
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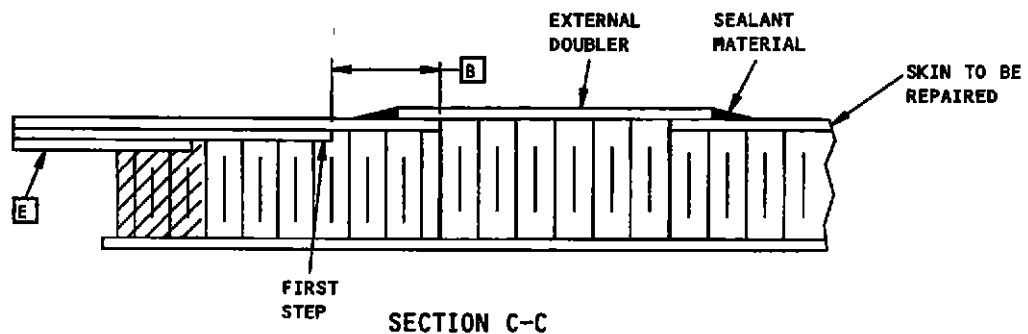
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**INTERCONTINENTAL
STRUCTURAL REPAIR**



**REPAIR NEAR AN INTERNAL DOUBLER
DETAIL III**



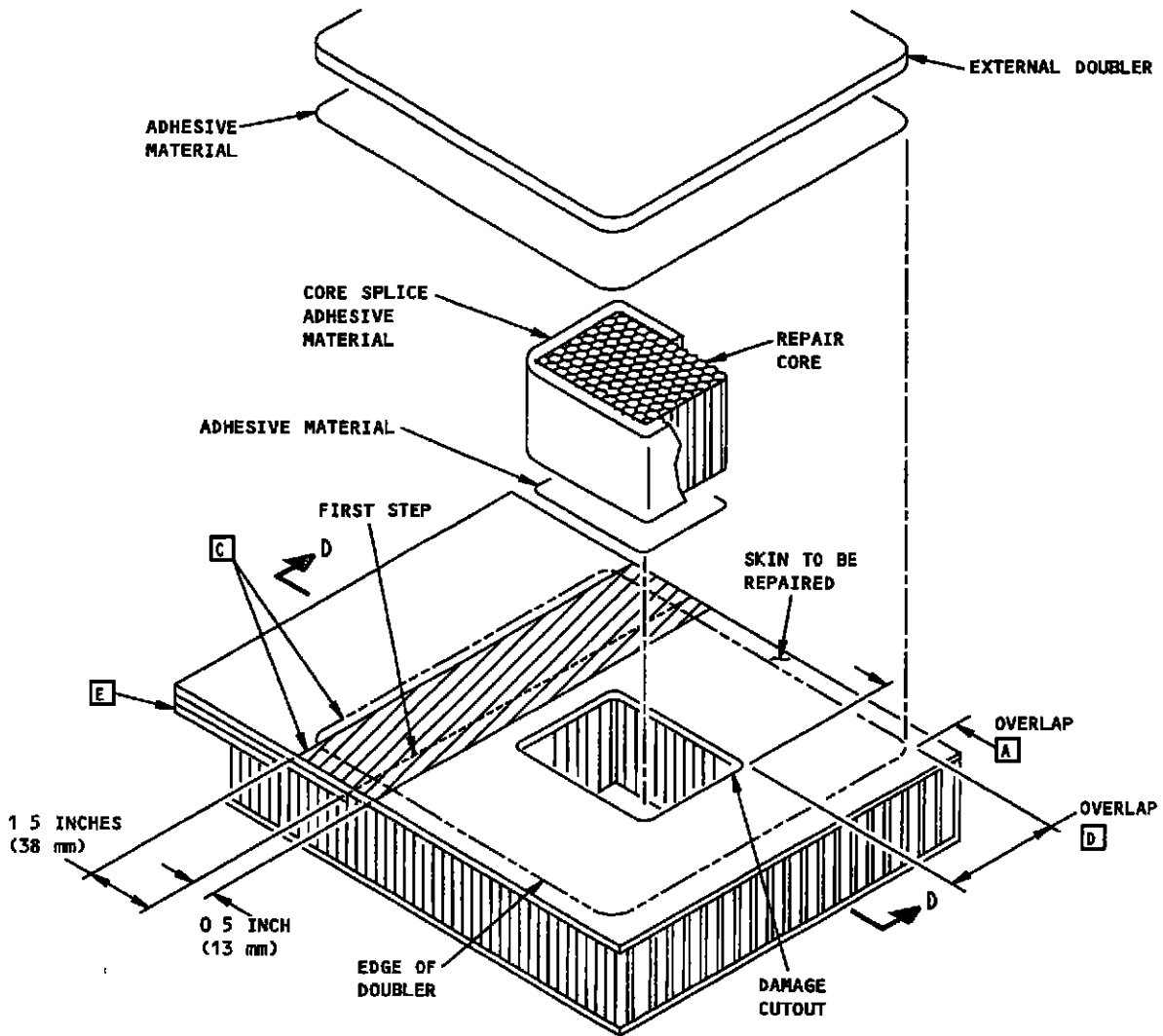
**Repair of Damage Away From the Panel Edges
Figure 1 (Sheet 3)**

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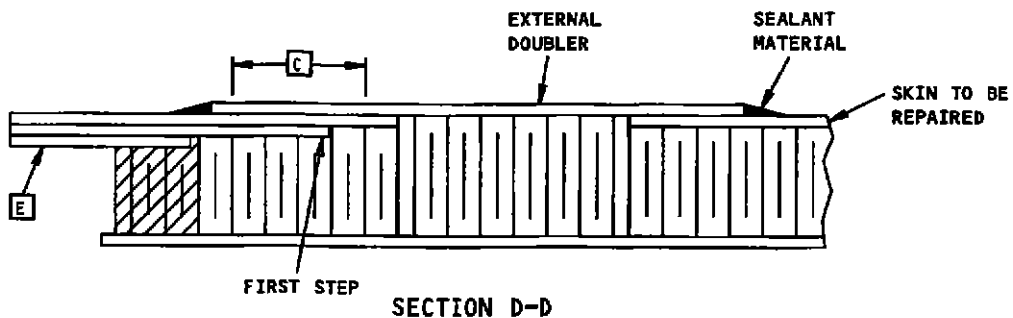
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**INTERCONTINENTAL
STRUCTURAL REPAIR**



**REPAIR TO PART OF AN INTERNAL DOUBLER
DETAIL IV**



**Repair of Damage Away From the Panel Edges
Figure 1 (Sheet 4)**

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**INTERCONTINENTAL
STRUCTURAL REPAIR**

NOTES

- REFER TO 51-9-3 FOR THE REPAIR STEPS.
- IT IS PERMITTED TO USE NDI PROCEDURES OR ENGINEERING DRAWINGS TO FIND THE LOCATIONS OF INTERNAL DOUBLERS AND MACHINED STEPS
- [A]** REFER TO 51-9-3, FIG 7 OR 8 (AS APPLICABLE) FOR THE MINIMUM OVERLAP DIMENSION.
- [B]** IF THE EDGE OF THE CUTOUT IS CLOSER THAN 0.5 INCHES (13 mm) TO THE EDGE OF AN INTERNAL DOUBLER (OR THE EDGE OF A CHEM-MILLED OR MACHINED STEP) THEN DO ONE OF THE STEPS THAT FOLLOW
 - REFER TO THE SPECIFIC COMPONENT REPAIR SECTION TO SEE IF THERE IS AN APPLICABLE REPAIR.
 - CUT OUT THE DAMAGE TO THE EDGE OF THE PANEL AND THEN DO ONE OF THE REPAIRS IN 51-9-7, FIG 2
 - ASK BOEING
- [C]** IF THE EDGE OF AN EXTERNAL DOUBLER WILL BE CLOSER THAN 0.5 INCH (13 mm) TO THE FIRST STEP, OR WILL NOT BE FARTHER THAN 1.5 INCHES (38 mm) PAST THE FIRST STEP, THEN SEE DETAIL IV AND DO THE STEPS THAT FOLLOW:
 - EXTEND THE EXTERNAL DOUBLER SO THAT THE EDGE OF THE DOUBLER WHICH IS CLOSEST TO THE FIRST STEP IS FARTHER THAN 1.5 INCHES (38 mm) PAST THE EDGE OF THE FIRST STEP
- [D]** INCREASE THE OVERLAP ON BOTH SIDES OF THE CUTOUT BY 0.5 INCH (13 mm)
- [E]** A PANEL WITH AN EDGE BAND THAT WAS MANUFACTURED WITH MULTIPLE DOUBLERS IS SHOWN. USE THE SAME PROCEDURE TO REPAIR A PANEL WITH A MACHINED OR CHEM-MILLED SKIN IF AN INTERNAL DOUBLER IS DAMAGED, SEE **[B]**

Repair of Damage Away From the Panel Edges
Figure 1 (Sheet 5)

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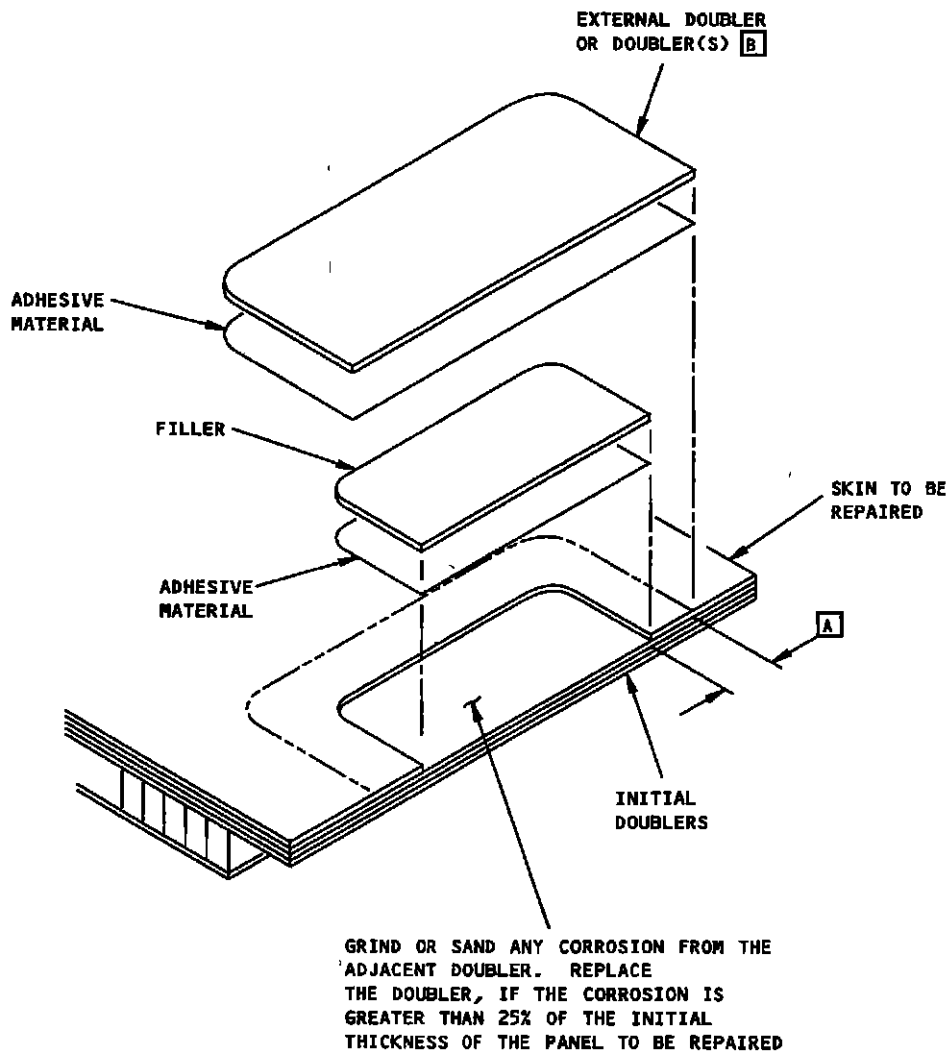
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**INTERCONTINENTAL
STRUCTURAL REPAIR**

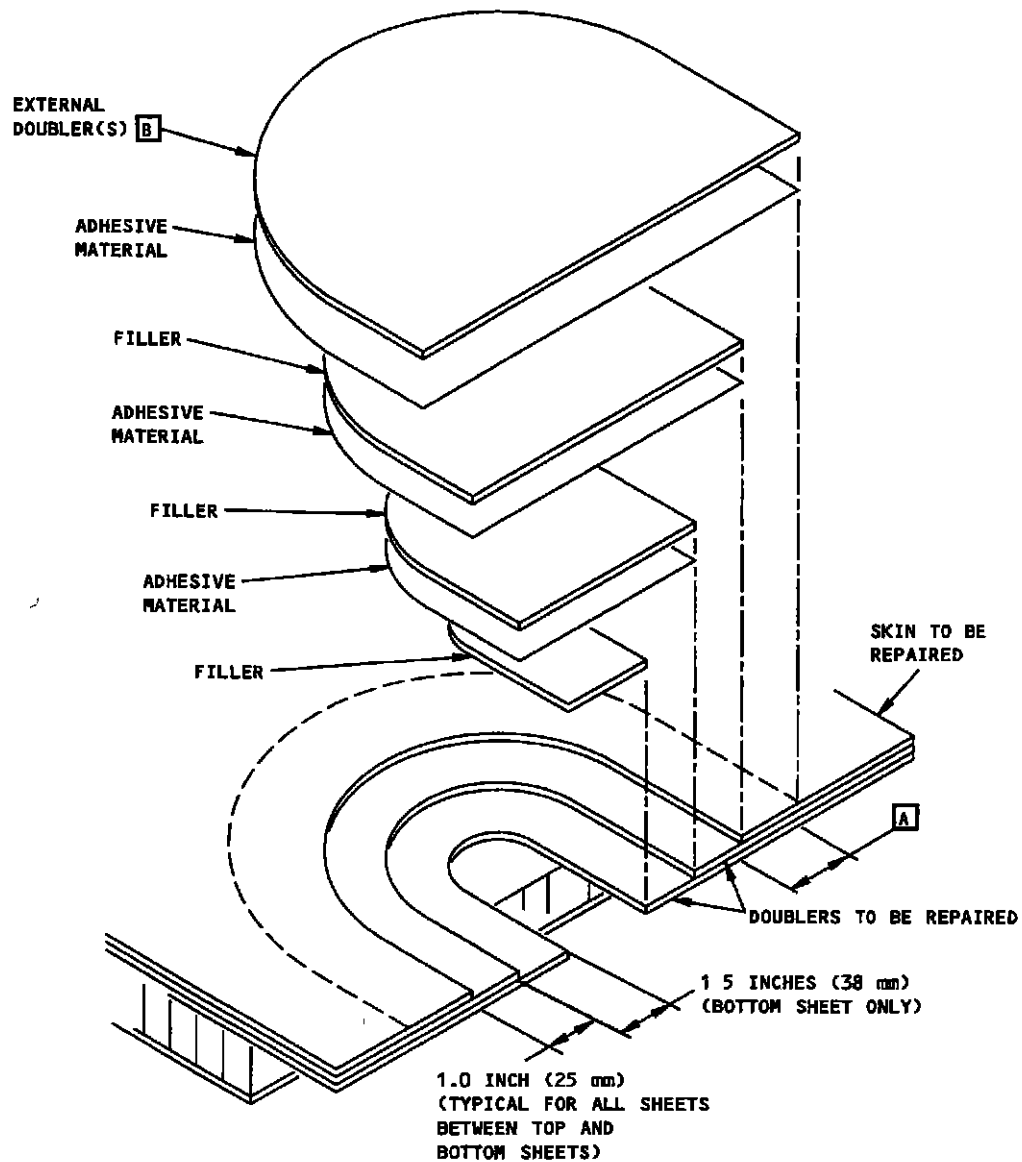


DETAIL I

**Repair of Damage at the Edge of a Panel
Figure 2 (Sheet 1)**



**INTERCONTINENTAL
STRUCTURAL REPAIR**

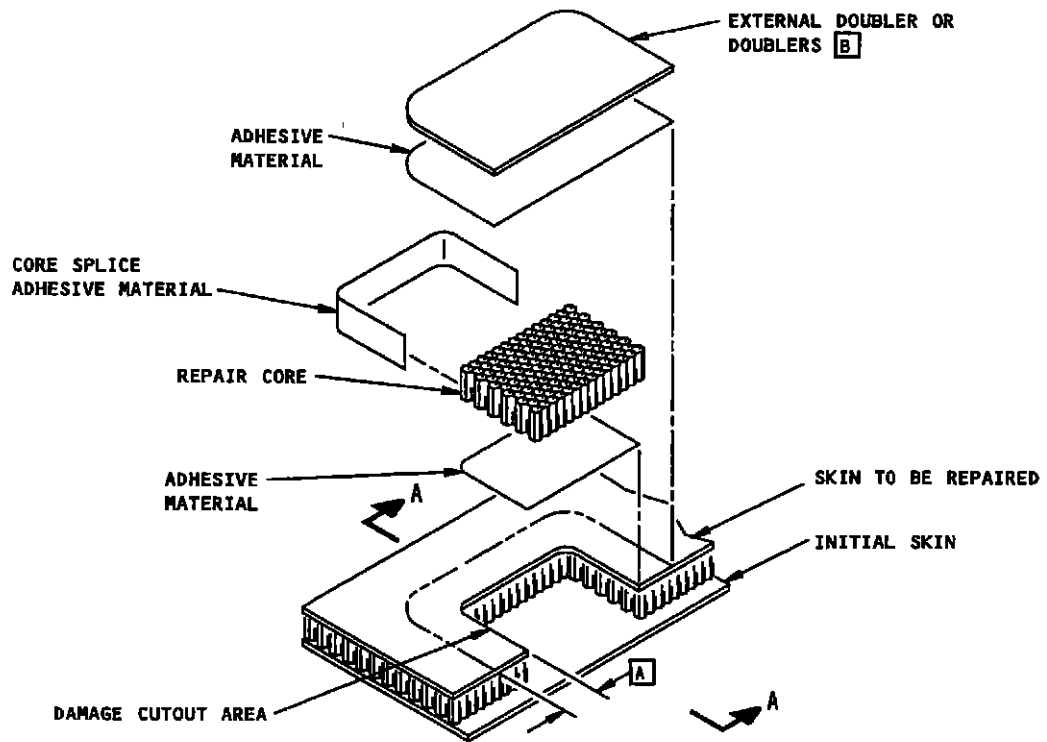


DETAIL II

Repair of Damage at the Edge of a Panel
Figure 2 (Sheet 2)

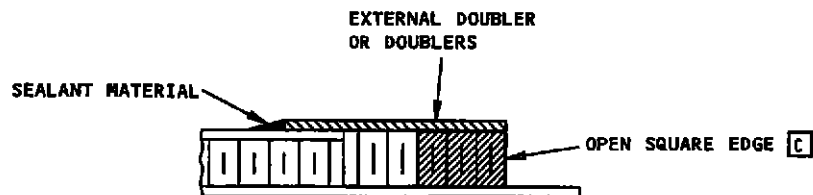


**INTERCONTINENTAL
STRUCTURAL REPAIR**



**REPAIR TO ONE SKIN ONLY
(SQUARE EDGE CONFIGURATION)**

DETAIL III

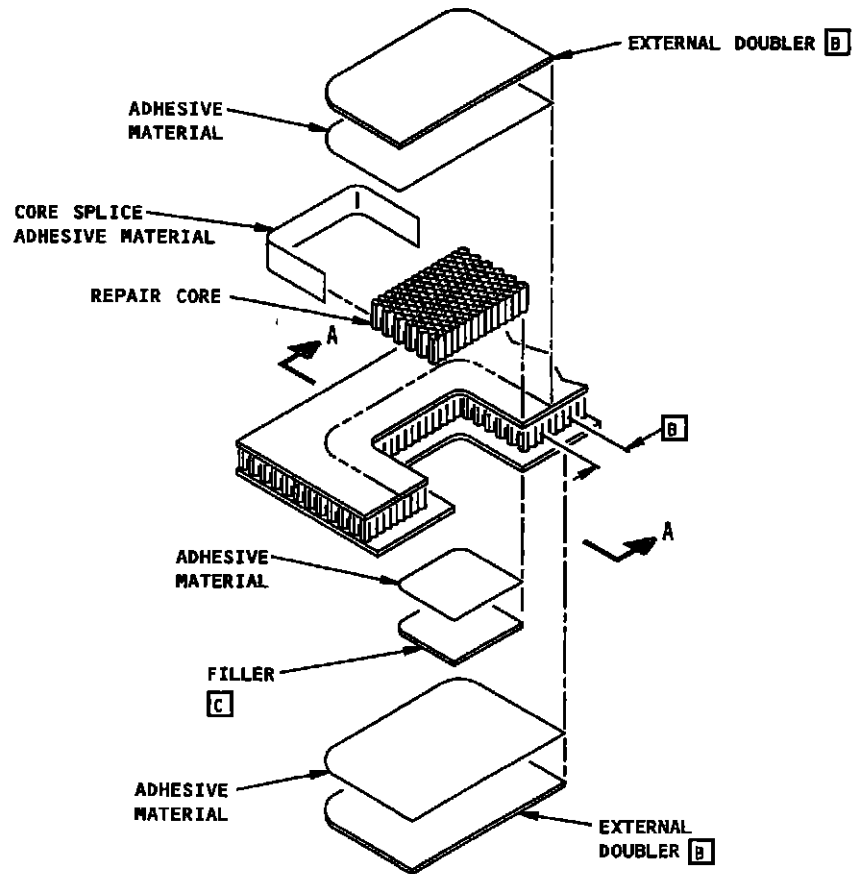


SECTION A-A

**Repair of Damage at the Edge of a Panel
Figure 2 (Sheet 3)**

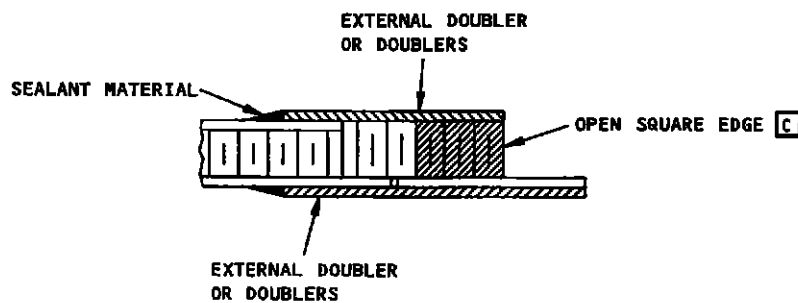


**INTERCONTINENTAL
STRUCTURAL REPAIR**



**REPAIR TO BOTH SKINS
(SQUARE EDGE CONFIGURATION)**

DETAIL IV

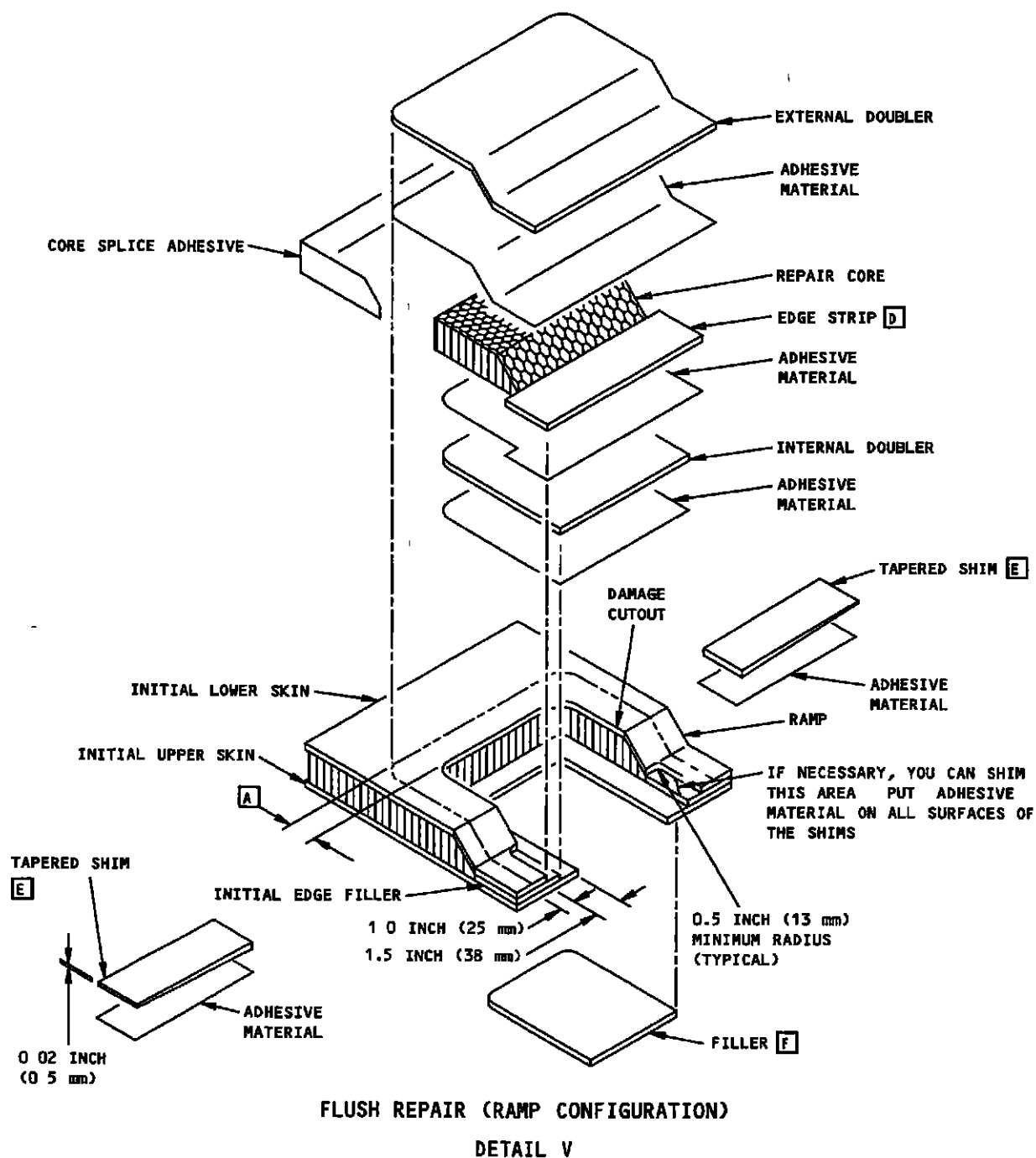


SECTION B-B

**Repair of Damage at the Edge of a Panel
Figure 2 (Sheet 4)**



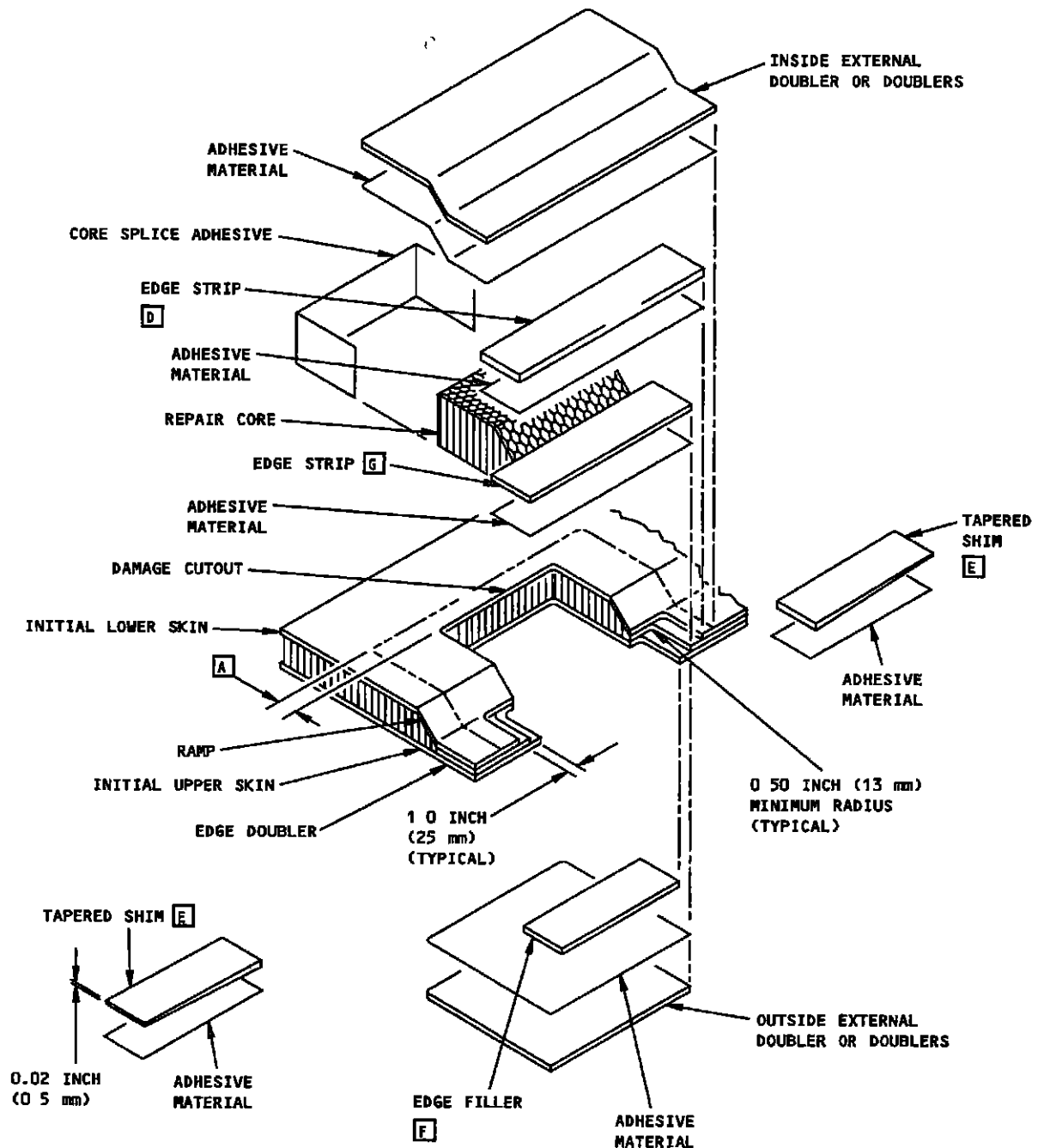
INTERCONTINENTAL STRUCTURAL REPAIR



Repair of Damage at the Edge of a Panel
Figure 2 (Sheet 5)

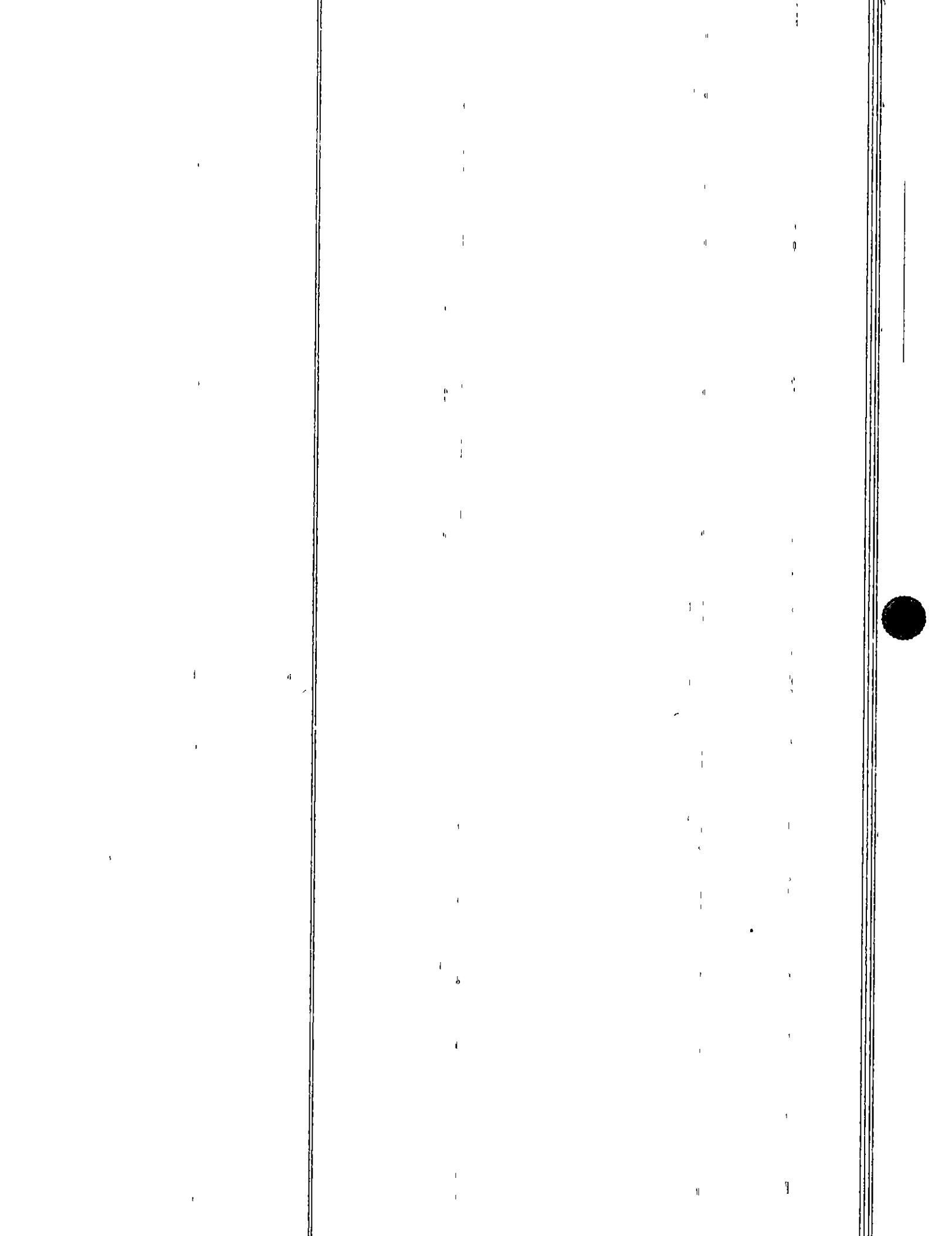


INTERCONTINENTAL STRUCTURAL REPAIR



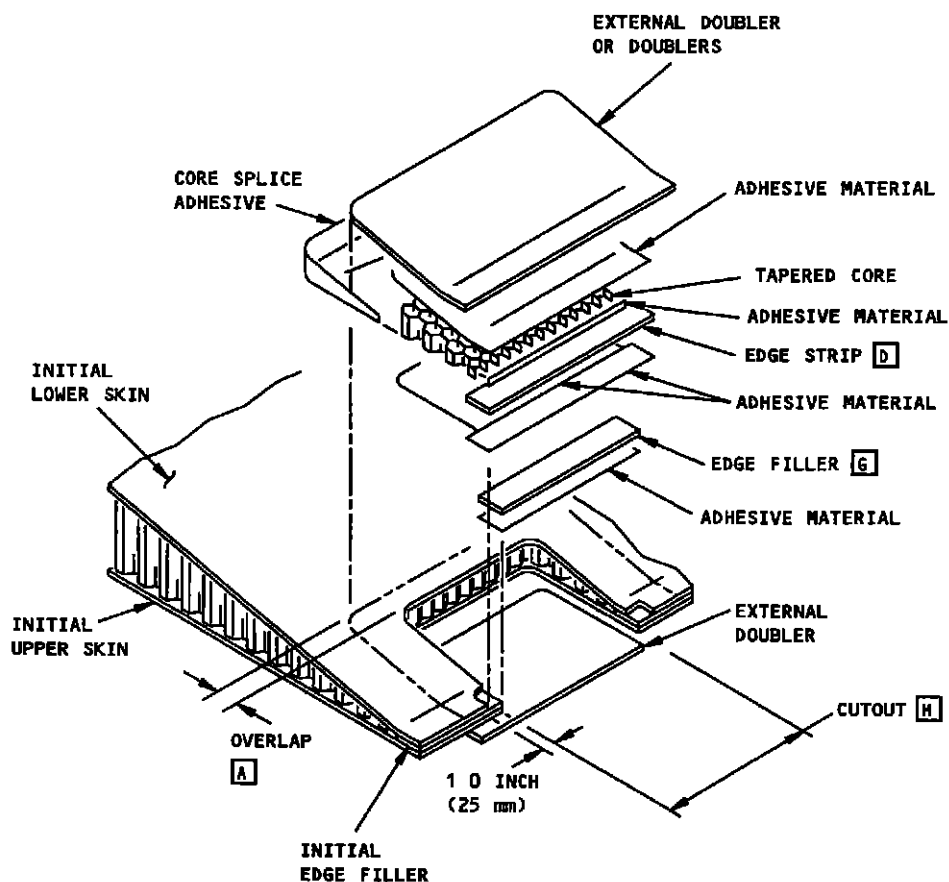
NON-FLUSH REPAIR (RAMP CONFIGURATION)
DETAIL VI

Repair of Damage at the Edge of a Panel
Figure 2 (Sheet 6)





**INTERCONTINENTAL
STRUCTURAL REPAIR**

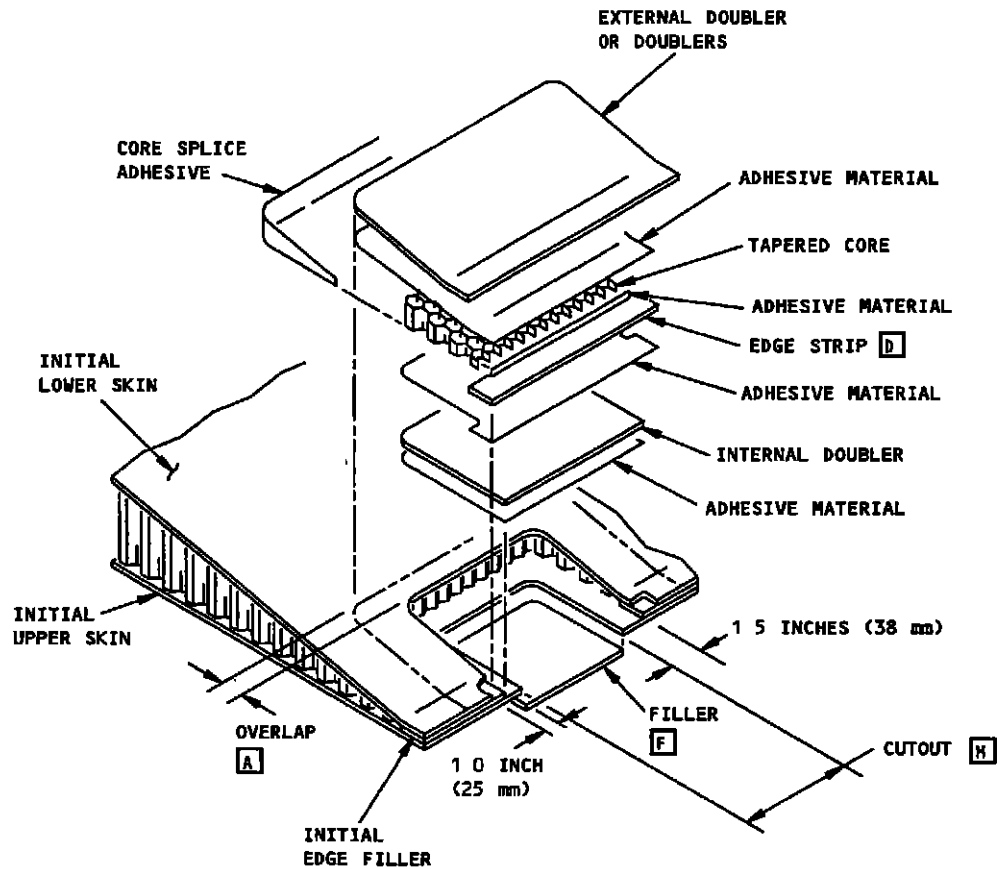


**TRAILING EDGE REPAIR WITH TWO EXTERNAL DOUBLERS
DETAIL VII**

Repair of Damage at the Edge of a Panel
Figure 2 (Sheet 7)



**INTERCONTINENTAL
STRUCTURAL REPAIR**



**TRAILING EDGE REPAIR WITH AN EXTERNAL AND INTERNAL DOUBLER
DETAIL VIII**

Repair of Damage at the Edge of a Panel
Figure 2 (Sheet 8)

**INTERCONTINENTAL
STRUCTURAL REPAIR****NOTES**

- REFER TO 51-9-3 FOR THE REPAIR STEPS

- A** REFER TO 51-9-3, FIG 7 OR FIG. 8 (AS APPLICABLE) FOR THE MINIMUM OVERLAP DIMENSION.
- B** IF THE LENGTH OR WIDTH OF THE MATERIAL THAT IS REMOVED FROM THE OUTER SKIN IS 1.0 INCH (25 mm) OR LESS, THEN USE AN EXTERNAL DOUBLER(S) THICKNESS AS SPECIFIED IN 51-9-3, FIG. 8.
IF THE LENGTH OR WIDTH OF THE MATERIAL THAT IS REMOVED FROM THE OUTER SKIN IS MORE THAN 1.0 INCH (25 mm), THEN USE AN EXTERNAL DOUBLER(S) THICKNESS AS SPECIFIED IN 51-9-3, FIG 8 FOR AN INITIAL SKIN THICKNESS THAT IS ONE GAGE RANGE THICKER.
- C** SEAL THE OPEN EDGE OF THE REPAIR CORE AS GIVEN IN 51-9-3, PAR. 9.F.
- D** MAKE THE EDGE FILLER FROM THE SAME BOEING MATERIALS SPECIFICATION (BMS) MATERIAL OR AN EQUIVALENT MATERIAL THAT IS THE SAME THICKNESS AS THE INITIAL UPPER OR LOWER SKIN AS APPLICABLE.
- E** PUT THE TAPERED SHIMS NEXT TO THE INSIDE EXTERNAL DOUBLER ON THE EDGE BAND.
- F** MAKE THE FILLER FROM THE SAME BOEING MATERIALS SPECIFICATION (BMS) MATERIAL OR AN EQUIVALENT MATERIAL THAT IS THE SAME THICKNESS AS THE INITIAL UPPER OR LOWER SKIN AS APPLICABLE.
- G** MAKE THE EDGE FILLER FROM THE SAME THICKNESS AS THE INITIAL EDGE FILLER.
- H** THE MAXIMUM PERMITTED WIDTH OF CUTOUT IN THE TRAILING EDGE IS 50% OF THE TOTAL INITIAL WIDTH. IF MORE THAN 50% OF THE WIDTH IS DAMAGED, THEN DO THE STEPS THAT FOLLOW:
 - GET AN ENGINEERING REVIEW
 - USE APPROVED ENGINEERING DRAWINGS FOR THE COMPONENT
 - USE APPROVED MATERIALS AND MANUFACTURING PROCESSES SPECIFIED IN THE COMPONENT ENGINEERING DRAWINGS

Repair of Damage at the Edge of a Panel
Figure 2 (Sheet 9)

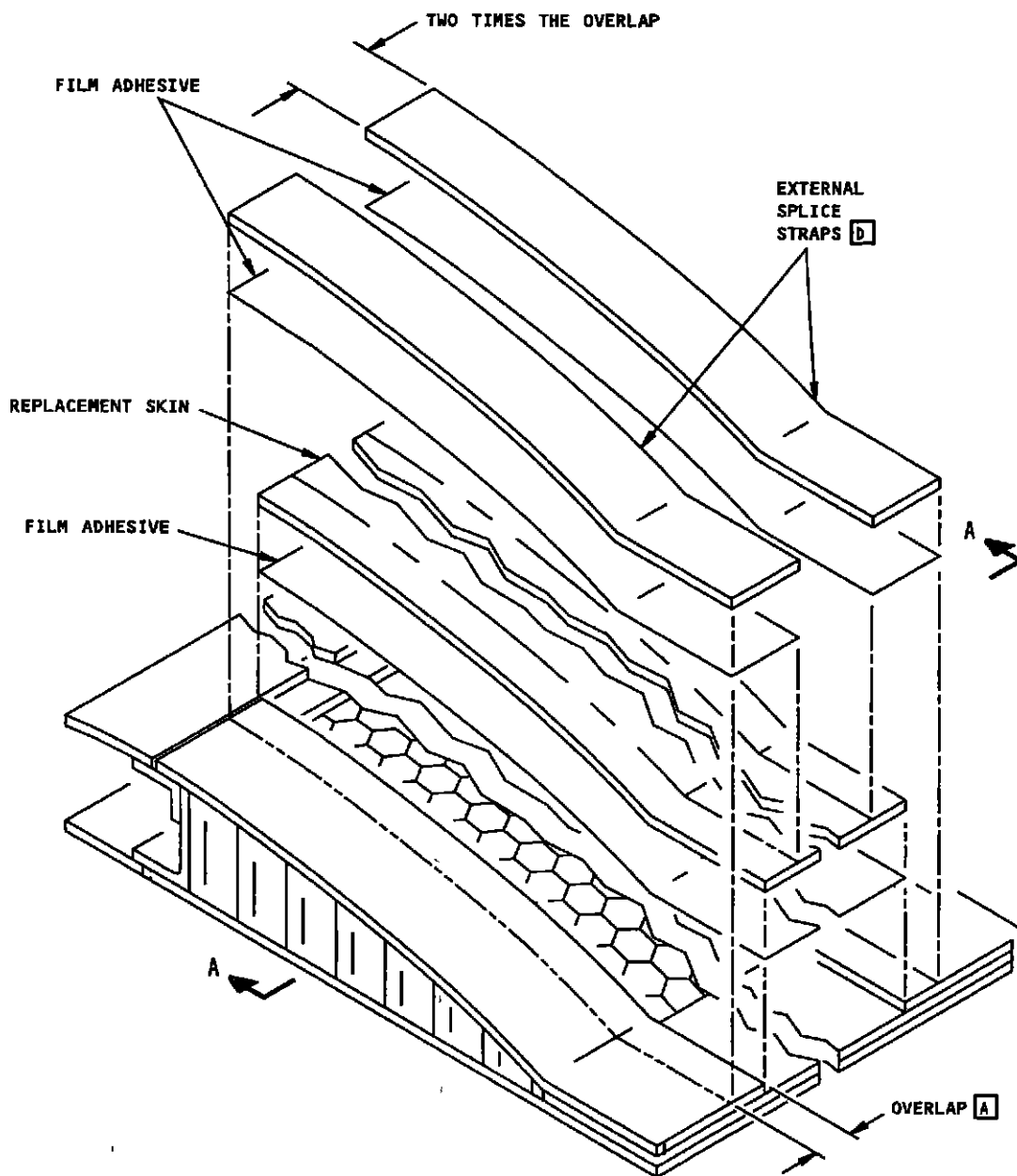
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**INTERCONTINENTAL
STRUCTURAL REPAIR**



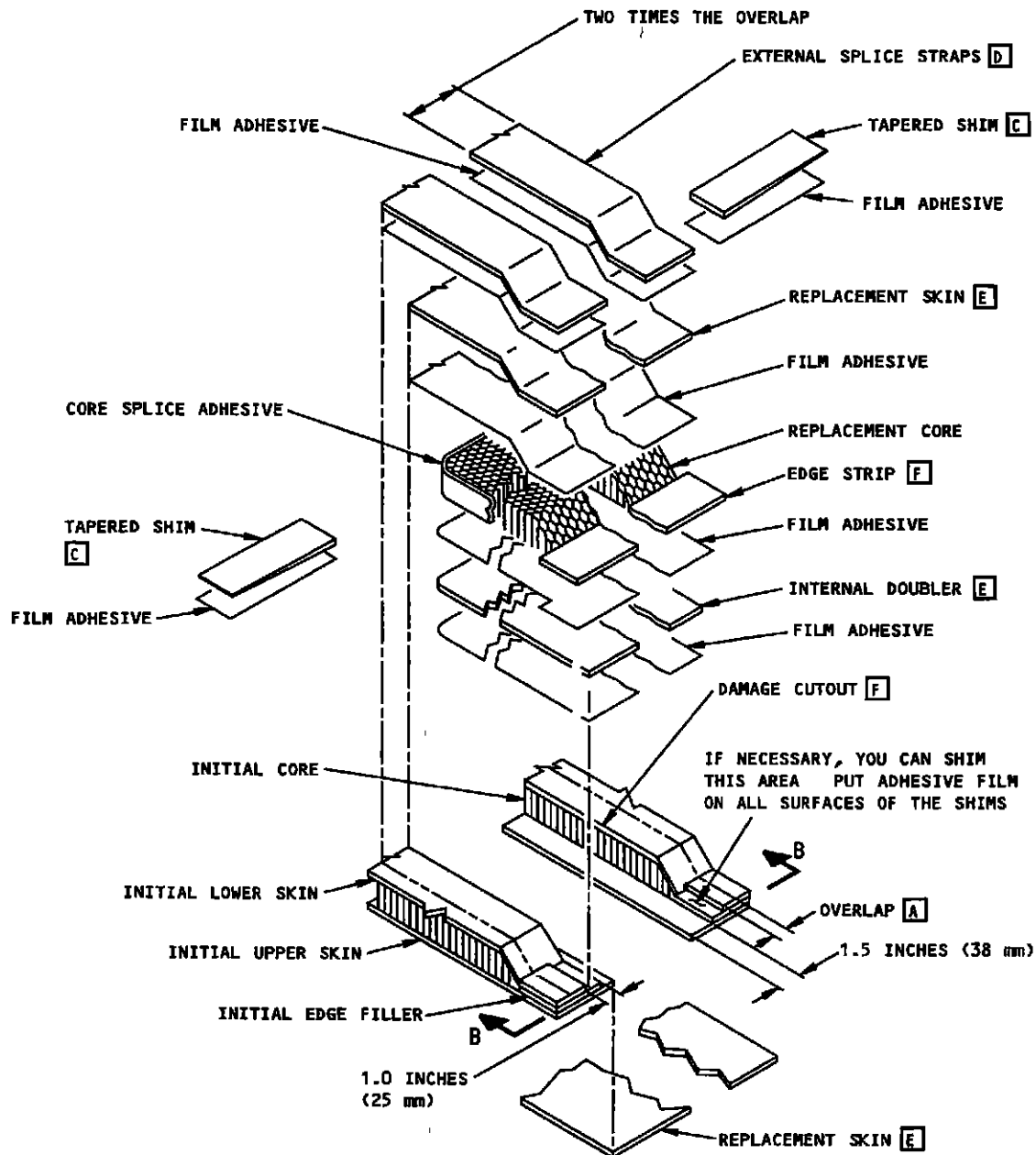
**REPAIR TO ONE SKIN ONLY
DETAIL I**

**Repair of Damage That is from Edge to Edge
Figure 3 (Sheet 1)**





INTERCONTINENTAL STRUCTURAL REPAIR



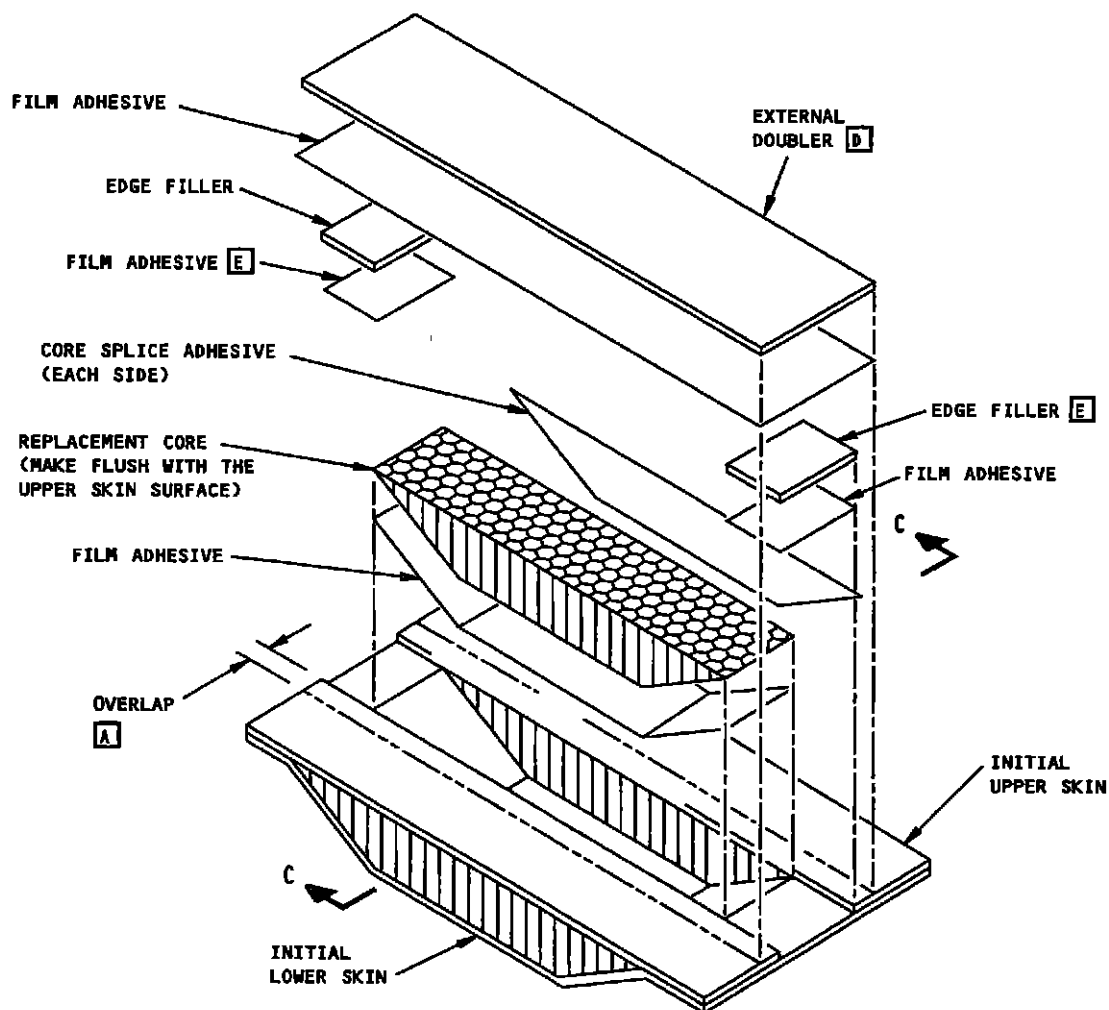
REPAIR TO TWO SKINS AND CORE
(REPLACEMENT CORE FLUSH WITH INITIAL CORE)

DETAIL II

Repair of Damage That is from Edge to Edge
Figure 3 (Sheet 2)



**INTERCONTINENTAL
STRUCTURAL REPAIR**



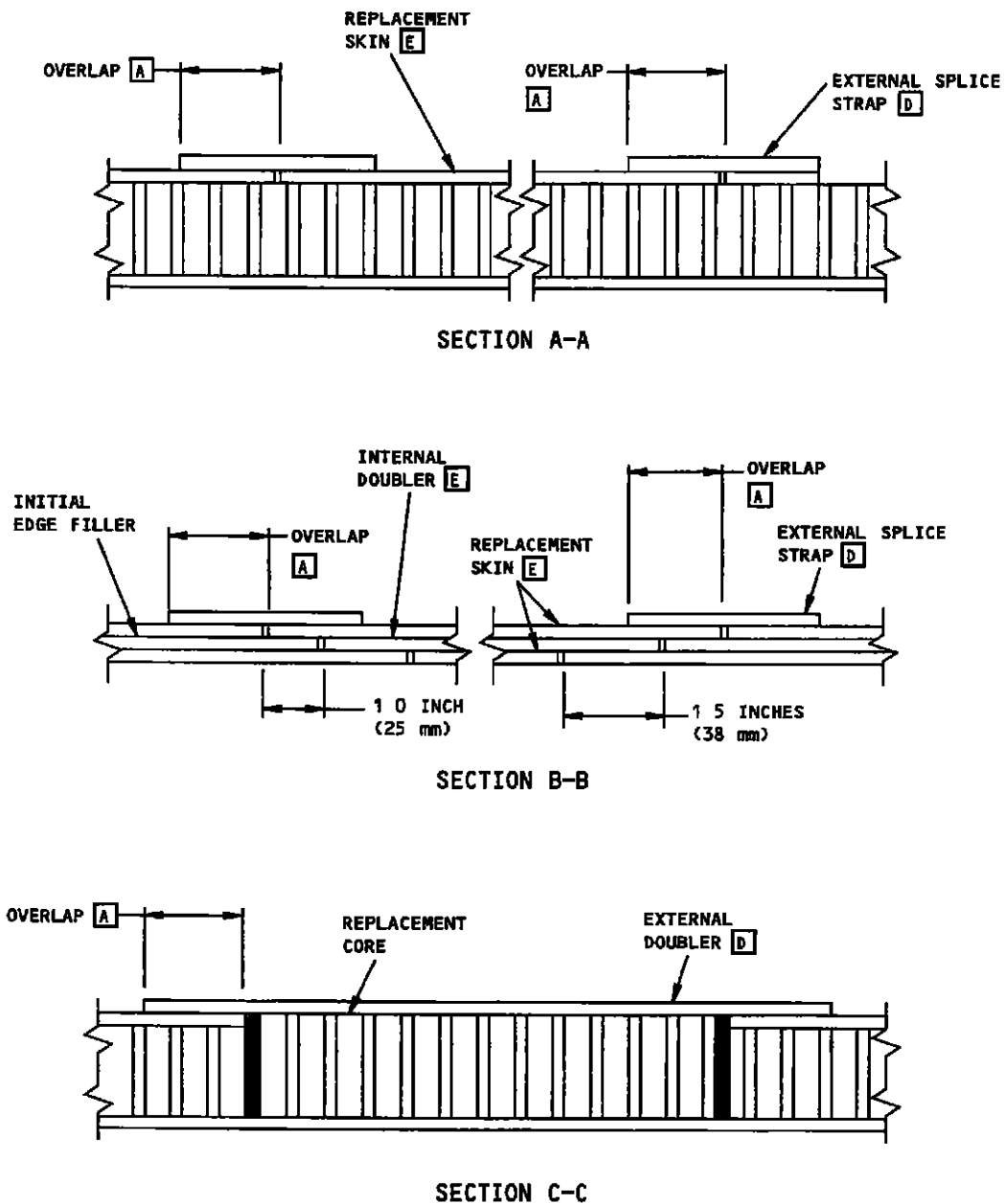
**REPAIR TO ONE SKIN AND CORE
(REPLACEMENT CORE FLUSH WITH AN INITIAL SKIN)**

DETAIL III

**Repair of Damage That is from Edge to Edge
Figure 3 (Sheet 3)**



INTERCONTINENTAL
STRUCTURAL REPAIR



Repair of Damage That is from Edge to Edge
Figure 3 (Sheet 4)

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**INTERCONTINENTAL
STRUCTURAL REPAIR**

NOTES

- REFER TO 51-9-3 FOR THE REPAIR STEPS.
- A** REFER TO 51-9-3, FIG 7 OR FIG. 8 (AS APPLICABLE) FOR THE MINIMUM OVERLAP DIMENSION
- B** USE SHIMS IF NECESSARY
- C** PUT A TAPERED SHIM NEXT TO EACH OF THE INSIDE EXTERNAL DOUBLERS ON THE EDGE BAND
- D** REFER TO 51-9-3, FIG 7 OR 8 FOR DOUBLER THICKNESS.
- E** MAKE FROM THE SAME BOEING MATERIALS SPECIFICATION (BMS) MATERIAL OR AN EQUIVALENT MATERIAL THAT IS THE SAME THICKNESS AS THE INITIAL UPPER OR LOWER SKIN AS APPLICABLE.
- F** MAKE FROM THE SAME THICKNESS AS THE INITIAL EDGE FILLER.
- G** AS AN ALTERNATIVE, YOU CAN CUT THE INITIAL SKIN AWAY FROM THE EDGE OF THE CORE. THERE IS NO MINIMUM OR MAXIMUM DISTANCE FROM THE EDGE OF THE THE SKIN TO THE EDGE OF THE CORE

Repair of Damage That is from Edge to Edge
Figure 3 (Sheet 5)

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