REPAIRS TO ALUMINUM HONEYCOMB — REPAIRS

NOTICE: THE PROCEDURES IN THIS REPAIR PAGEBLOCK (PAGES 201-2XX) ARE GENERAL IN NATURE AND ARE INTENDED AS GUIDELINES FOR OPERATORS IN ACHIEVING REPAIR INSTALLATIONS ACCEPTABLE TO THEIR LOCAL APPROVAL AUTHORITY.

REPAIR INSTALLATION SPECIFICS AND CLASSIFICATION (MAJOR OR MINOR) WILL BE DICTATED BY THE NATURE OF THE STRUCTURE BEING REPAIRED.

IT IS THE RESPONSIBILITY OF THE OPERATOR TO ENSURE THAT THE REPAIR INSTALLATION, DOCUMENTATION AND ANY REQUIRED ENGINEERING ACTION (EVALUATION, DESIGN, ANALYSIS, ETC.) MEET THE REGULATIONS OF THE FAA OR OTHER GOVERNING REGULATORY AGENCY, AS APPLICABLE, BEFORE RETURNING THE AIRCRAFT TO SERVICE.

1. Scratches, Nicks and Dings on Face Sheets of Aluminum Sandwich Assembly
   A. Preparation
      CONSUMABLES
      Aluminum oxide paper, 320 grit or finer ............................................................ MIL-A-21380
      Solvent .................................................................................................................. Acetone
      Solvent .................................................................................................................. Methyl Ethyl Ketone (MEK) or equivalent
      Solvent .................................................................................................................. Methyl Propyl Ketone (MPK) or equivalent
   B. Limitations
      (1) Repair installations utilizing this repair must result in equal to or greater capability than original structure.
      (2) The repaired structure must perform original structure’s intended function such as fuel or air tightness, etc.
      (3) Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.
   C. Repair
      (1) Remove loose paint and blend / polish out rough edges with aluminum oxide paper.
      (2) Perform Nondestructive Testing (NDT) to ensure no core damage or face sheet to core disbonds exist.
      (3) Maintain minimum scratch limitations. See Minor Scratches, Wrinkles, Dents or Depressions in Pressurized and Non Pressurized Sheet Metal, 51-70-00, Repair.
      (4) Scratch shall be no closer to any fastener hole than two times the fastener hole diameter.
      (5) Where cladding damage is suspected, test and repair. See Minor Scratches, Wrinkles, Dents or Depressions in Pressurized and Non Pressurized Sheet Metal, 51-70-00, Repair.
      (6) Vacuum or wipe off loose dust.
      (7) Wipe area using cheesecloth dampened with solvent.
      (8) Immediately follow with a dry wiper before solvent can evaporate.
Continue wiping until cheesecloth remains clean.

Surface treat skin. See Cleaning and Chemical Surface Treatment of Aircraft Surfaces, 51-21-00, Repair.

Apply two coats of epoxy primer. See Epoxy Primer Coating - Preparation and Application (Including Finish 2012), 51-07-10, Repair or Waterborne Epoxy Primer - Preparation and Application (Finish 3012), 51-07-10, Repair.

Apply customer topcoat if required. See Surface Preparation and Painting Procedure, 51-07-10, Repair.

2. Minor Skin Dents and Depressions in Aluminum Sandwich Assembly

A. Preparation

**CONSUMABLES**

- Adhesive ...................................................................................................................... EC 1751 B / A
- Aluminum oxide paper, 240 - 320 grit ........................................................................... MIL-A-21380
- Solvent ................................................................................................................................... Acetone
- Solvent .............................................................................. Methyl Ethyl Ketone (MEK) or equivalent
- Solvent ............................................................................ Methyl Propyl Ketone (MPK) or equivalent

B. Limitations

1. Repair installations utilizing this repair must result in equal to or greater capability than original structure.

2. The repaired structure must perform original structure’s intended function such as fuel or air tightness, etc.

3. Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.

C. Restrictions

1. Contact Gulfstream Technical Operations for any panel having more than six individual dents or depressions and for any Condition 2 dents or depressions located inside of or in front of engine intake ducts. See Step 2.D.(2) for Condition 2 criteria.

2. Maintain a minimum separation of 1.00 inch between dent edge and any hole, edge, fastener or adjacent skin, splice or framing member.

3. If there are cracks, jagged or sharp edges contained within or adjacent to dents, coordinate repair with Small Puncture on External or Internal Sandwich Assemblies, 51-79-00, Repair or Skin Puncture or Crack Through One Skin Only With Core Damage Depth Being 20% of Depth or Less, 51-79-00, Repair as applicable.

4. This repair does not apply to composite structures.

5. Perform Nondestructive Testing (NDT) to verify surrounding skin to core is not unbonded.

6. A minimum separation of 4.00 inches is required between edges of individual dents.

7. See Figure 201 to determine which repair condition is applicable.

8. Any dents or depressions that exceed the range of Figure 201 in size require contact with Gulfstream Technical Operations for disposition.

D. Repair

1. Condition 1
If damage can at all be classified as a scratch or sharp edged nick with no damage to underlying core material, see Scratches, Nicks and Dings on Face Sheets of Aluminum Sandwich Assembly, 51-79-00, Repair for classification and treatment of sheet metal surface.

If damage can be categorized as Condition 1 type damage, use as is. See Figure 201.

(2) Condition 2

**WARNING:** ADEQUATE PROTECTION MUST BE WORN TO PREVENT TURCO PAINT STRIPPER FROM GETTING ON YOUR SKIN AND / OR EYES.

(a) Expose primer over an area that is 0.50 inches larger than defect by either sanding off topcoat paint with aluminum oxide paper or by stripping. See Surface Preparation and Painting Procedure, 51-07-10, Repair.

(b) Lightly scuff sand depression with aluminum oxide paper to remove surface gloss.

(c) Apply two coats of epoxy primer. See Epoxy Primer Coating - Preparation and Application (Including Finish 2012), 51-07-10, Repair or Waterborne Epoxy Primer - Preparation and Application (Finish 3012), 51-07-10, Repair.

(d) Wipe area using cheesecloth dampened with solvent.

(e) Immediately follow with a dry wiper before solvent can evaporate.

(f) Continue wiping until cheesecloth remains clean.

(g) Fill defect with Proseal 895 or equivalent sealer. See Aerodynamic Sealant Compound, 51-21-00, Repair or Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.

**NOTE:** EC 1751 B / A may be used as an alternate. See Approved Repair Adhesive Charts, 51-34-00, General.

(h) After cure sand flush with surrounding surface.

(i) Touch up reworked area with Alodine 600. See Chromate Conversion Coating of Aluminum Alloys, 51-21-00, Repair.

(j) Apply two coats of epoxy primer. See Epoxy Primer Coating - Preparation and Application (Including Finish 2012), 51-07-10, Repair or Waterborne Epoxy Primer - Preparation and Application (Finish 3012), 51-07-10, Repair.

(k) Apply customer topcoat if required. See Surface Preparation and Painting Procedure, 51-07-10, Repair.

(3) Condition 3

(a) Contact Gulfstream Technical Operations for a disposition on repairability.
Dent and Depressions

Figure 201

A = MAXIMUM MEASURED DEPTH
B = LEAST MEASURED WIDTH

Dent and Depressions
Figure 201
3. Small Puncture on External or Internal Sandwich Assemblies

NOTE: This procedure for a maximum repair diameter of 0.30 inches.

A. Preparation

**CONSUMABLES**

- Adhesive ................................................................. EA 934 N / A
- Adhesive ................................................................. EA 956 A / B or equivalent
- Adhesive ................................................................. TE 5246 / HD 3520
- Aluminum oxide paper, 240 - 320 grit ................................................................. MIL-A-21380
- Solvent ......................................................................................... Acetone
- Solvent ......................................................................................... Methyl Ethyl Ketone (MEK) or equivalent
- Solvent ......................................................................................... Methyl Propyl Ketone (MPK) or equivalent
- Tape, flashbreaker ............................................................................. 3M - 855

B. Limitations

NOTE: Clamps and caul plates are heat sinks. Be sure repair area is at specified temperature for the required time.

1. Repair installations utilizing this repair must result in equal to or greater capability than original structure.
2. The repaired structure must perform original structure’s intended function such as fuel or air tightness, etc.
3. Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.

C. Repair

1. Perform Nondestructive Testing (NDT) to verify skin and core are not unbonded and to verify and measure any cracking.
2. Maintain a minimum of 2D edge distance, where D is fastener hole diameter and 4D spacing between repair hole and any other hole where D is the larger of the fastener hole or repair hole diameter.
3. Using an appropriate size drill (0.30 diameter maximum).
4. Remove damage from face sheet by centering on puncture and drilling.
5. Do not increase depth of core damage.
6. Using a wiping action away from repair hole diameter, wipe area with clean cheesecloth dampened with solvent.
7. Continue wiping until cheesecloth remains clean.
8. Blend / smooth out edges of repair hole to obtain a smooth burr free surface.
9. Maximum width of clean up is 0.30 inches.
10. Vacuum out loose debris.
11. If assembly has been subjected to moisture, be sure assembly is dried. See Water Removal From Sandwich Assemblies with Known Water Entrapment or with a Skin Puncture, 51-79-10, Repair.
12. Lightly scuff sand any surrounding depression with aluminum oxide paper to remove surface gloss.

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(13) Apply flashbreaker tape around puncture / depression to reduce clean up.

(14) To assist flow of repair adhesive, preheat area to 120° - 130° F for at least 20 minutes. Use at least two thermocouples or equivalent temperature indicating devices.

(15) Immediately after preheating, pressure inject core cavity and depression with TE 5246 / HD 3520 or EA 934 N/A adhesive. See Approved Repair Adhesive Charts, 51-34-00, General for mix and cure instructions.

(16) When injecting, allow a path for entrapped air to escape. See Figure 202.

(17) Let adhesive settle for approximately 5 minutes.

(18) Repeat injection cycle until all settling has stopped or adhesive pot life has expired.

(19) If necessary, vacuum injection method can be used. See Vacuum Injection of Liquid Repair Adhesives, 51-79-10, Repair.

**WARNING:** 20 PSI IS MAXIMUM INJECTION PRESSURE FOR USE ON HONEYCOMB SANDWICH ASSEMBLIES.

(20) Cure per applicable adhesive cure cycle using at least two thermocouples or equivalent temperature indicating devices.

(21) After cure, sand adhesive flush with outer surface.

(22) Wipe or vacuum off sanding dust.

(23) Wipe over exposed potting on external surfaces with either EA 956 A / B or equivalent adhesive listed in Approved Repair Adhesive Charts, 51-34-00, General.

(24) Apply two coats of epoxy primer. See Epoxy Primer Coating - Preparation and Application (Including Finish 2012), 51-07-10, Repair or Waterborne Epoxy Primer - Preparation and Application (Finish 3012), 51-07-10, Repair.

4. Voids / Unbond Around Fastener Holes on Bonded Metal Panels

A. Preparation

**CONSUMABLES**

<table>
<thead>
<tr>
<th>Adhesive</th>
<th>EA 956 A / B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvent</td>
<td>Acetone</td>
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<tr>
<td>Solvent</td>
<td>Methyl Ethyl Ketone (MEK) or equivalent</td>
</tr>
<tr>
<td>Solvent</td>
<td>Methyl Propyl Ketone (MPK) or equivalent</td>
</tr>
</tbody>
</table>

B. Limitations

1. Repair installations utilizing this repair must result in equal to or greater capability than original structure.
2. The repaired structure must perform original structure’s intended function such as fuel or air tightness, etc.
3. Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.

C. Restrictions

1. Void must be injectable from extremity to extremity.
2. This procedure must not be used as a shimming repair.
3. This repair applies to voids equal to or less than a maximum diameter given by:
   \[ D_{\text{max}} = (D) + (t_{\text{washer}}) + (t_{\text{plate}}) \]

**NOTE:** \( t_{\text{plate}} = \) Thinnest of the members in the joint
D = The smaller of the bolt head or the nut bearing surface diameter.

D. Repair

(1) Perform Nondestructive Testing (NDT) to locate void / unbonded area.

(2) Mark perimeter on skin using a china marker wax pencil or equivalent.

(3) Ensure that void is not due to a fit up problem.

(4) If contamination is suspected to have entered unbonded area, flush area with solvent using a clean spray device (squeeze bottle or syringe).

   **NOTE:** If possible, turn assembly so excess solvent will drain away.

(5) If a solvent is used, air dry for at least 20 minutes.

(6) Obtain temporary fastener hardware. See Table 201.

(7) In an area away from repair site apply approved mold release agent to all parts.

(8) Release agent is to be thoroughly dry before bringing parts to repair area.

   **NOTE:** Two washers with each hex head bolt are required. All washers are to extend a minimum of 0.060 inch beyond defect.

(9) Attach a mold release plate with vacuum sealant tape or equivalent. See Figure 203.

(10) Prepare for vacuum injection by building an adhesive reservoir dam and pretesting sealing capability of injection cup installation. See Vacuum Injection of Liquid Repair Adhesives, 51-79-10, Repair.

(11) To assist flow of liquid repair adhesive, preheat area to 120° - 130° F for at least 20 minutes. At least two thermocouples or equivalent temperature indicating devices are required.

(12) After removal of heat source, immediately fill reservoir with EA 956 A / B or equivalent liquid repair adhesives listed in Approved Repair Adhesive Charts, 51-34-00, General.

(13) Start vacuum injection process. See Vacuum Injection of Liquid Repair Adhesives, 51-79-10, Repair.

(14) When completed, remove excess adhesive and install temporary mold release fastener and washers as shown in Figure 204.

(15) Torque per Table 201 requirements.

(16) Cure adhesive per applicable hot bond cure cycle using at least two thermocouples or equivalent measuring device.

(17) Remove temporary hardware and excess adhesive.

(18) Ream hole to correct diameter and countersink, if required.

(19) NDT for any remaining voids or disbonds. Notify Gulfstream Technical Operations if voids or unbonds are in excess of acceptable limits.

(20) Install fastener wet with Proseal 895 or equivalent sealer. See Aerodynamic Sealant Compound, 51-21-00, Repair or Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.
<table>
<thead>
<tr>
<th>DIAMETER OF DEFECTIVE HOLE</th>
<th>CLAMP UP BOLT SIZE</th>
<th>MAXIMUM TORQUE INCH POUNDS</th>
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<tbody>
<tr>
<td>3/16</td>
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<td>15</td>
</tr>
<tr>
<td>1/4</td>
<td>No. 10 - 32</td>
<td>25</td>
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<tr>
<td>5/16</td>
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<td>5/16 - 24</td>
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<td>3/8 - 24</td>
<td>240</td>
</tr>
<tr>
<td>1/2</td>
<td>7/16 - 20</td>
<td>500</td>
</tr>
</tbody>
</table>
Aluminum Honeycomb Repair - Mold Release Plate

**Figure 203**

**METHOD 1**

- METAL STRUCTURE
- ADHESIVE
- VOID
- INTERNAL BEAD OF SEALANT TAPE
- METAL STRUCTURE
- ADHESIVE
- INTERNAL BEAD OF SEALANT TAPE
- MOLD RELEASE PLATE

**METHOD 2**

- INTERNAL BEAD OF SEALANT TAPE
- MOLD RELEASE PLATE

**DETAIL A - A**

Aluminum Honeycomb Repair - Mold Release Plate
Figure 203
Aluminum Honeycomb Repair - Adhesive Cure

Figure 204

DETAIL A - A

FASTENER

WASHER

BONDLINE ADHESIVE

ADHESIVE FILLED VOID

BONDLINE ADHESIVE

METAL STRUCTURE

WASHER
5. Skin Puncture Through Both Skins of a Sandwich Assembly

NOTE: This repair requires a maximum diameter of 3.0 inches and uses two external surface patches.

A. General

This repair uses multiple bond steps. Based on support equipment available and experience of technician, it is permissible to accomplish this repair in one operation. It will be the responsibility of repair technician to make appropriate procedural changes to this repair method.

Patch repair material must be of same material and heat treat as part being repaired, unless otherwise noted.

Clamps and caulk plates are heat sinks. Be sure repair area is at specified temperature for required time.

B. Preparation

CONSUMABLES

Adhesive ....................................................................................................................... EA 9628
Adhesive ................................................................................................ EC 1751 B / A or equivalent
Aluminum oxide paper, 240 - 320 grit ........................................................................... MIL-A-21380
Primer ..................................................................................................................................... BR 127
Sealant ...................................................................................................... Proseal 895 or equivalent
Solvent ........................................................................................................................ ........... Acetone
Solvent .............................................................................. Methyl Ethyl Ketone (MEK) or equivalent
Solvent ............................................................................ Methyl Propyl Ketone (MPK) or equivalent
Tape .................................................................................................................. 3M 855 or equivalent

C. Limitations

(1) Repair installations utilizing this repair must result in equal to or greater capability than original structure.

(2) The repaired structure must perform original structure’s intended function such as fuel or air tightness, etc.

(3) Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.

D. Repair

(1) Using a wiping action away from defect, wipe area with clean cheesecloth dampened with solvent.

(2) Continue until cheesecloth remains clean.

(3) Perform Nondestructive Testing (NDT) surrounding surfaces to determine extent of damage and if concentrations of fluids exist.

(4) Mark on skin all core to skin defects, core only defects and location of fluid concentrations using china marker wax pencil or equivalent.

(5) Make a smooth circular cutout that will remove defective skin / core. See Removal of Two Discrepant Skins and Core, 51-79-10, Repair.

(6) Deburr any rough edges.

(7) Maintain 1.25 minimum from edge of final cutout to edge of any structural member.

(8) If replacement core is not available, contact Gulfstream Technical Operations giving exact
location and size of core required so correct amount and type can be supplied.

(9) If appearance of fluids or possibility of fluids entry exists, dry discrepant area. See Water Removal From Sandwich Assemblies with Known Water Entrapment or with a Skin Puncture, 51-79-10, Repair.

(10) Bond in replacement core. See Removing and Installing Replacement Core, 51-79-10, Repair.

(11) After cure sand core flush with outer surfaces.

(12) Make repair patches of same or equivalent material and thickness as skin being repaired.

(13) Each patch should overlap cutout edge by 1.00 - 1.25 inches.

(14) Form contours per approved repair methods.

(15) Wipe each patch with clean cheesecloth dampened with solvent noted in Step 5.D.(1).

(16) Trial install patches.

(17) Only light hand pressure should allow patch to fit without wrinkles or bulges.

   NOTE: It is permissible to add up to two additional layers of EA 9628 in locally low areas of core fill material.

(18) Over an area extending at least 1.50 inch from edge of patches, apply flash breaker or 3M 855 tape or equivalent. See Approved Materials and Solutions, 51-30-00, General.

WARNING: ADEQUATE PROTECTION MUST BE WORN TO PREVENT STRIPPER FROM GETTING ON YOUR SKIN AND / OR EYES.

ADEQUATE PROTECTION MUST BE WORN TO PREVENT TURCO PAINT STRIPPER FROM GETTING ON YOUR SKIN AND / OR EYES.

DRILLING FROM LOWER SKIN SURFACE IS PREFERRED IN ORDER TO REDUCE CHANCE OF FLUIDS LEAKING THROUGH A REPAIR, OPEN CORE CAVITY OR POTTING.

(19) Remove paint and primer from assembly a minimum of 1.50 inch around repair areas. See Methods for Removing Paint and Primer From Aluminum Surface, 51-79-10, Repair.


WARNING: THE FOLLOWING REQUIRES THE USE OF CLEAN WHITE COTTON GLOVES.

(21) Within 8 hours of cleaning, apply BR 127 primer to assembly and patches as follows:

   (a) Allow primer to warm up to room temperature until all condensation has stopped.

   (b) Shake vigorously for at least 1 minute.

   NOTE: The solids in primer settle out quickly. Shake / stir continuously while in use.

   (c) Prime cleaned bonding surfaces by either spraying or brushing.

   NOTE: Spraying is preferred method. The surfaces once primed should have a light yellow green color.

(22) Air dry primer for 30 - 45 minutes at room temperature followed by one of the elevated cure cycles:

   (a) Two hours at 200°F ±5°.
(b) Four hours at 180°F ±5°.

(23) To determine if primer is cured, wipe all bonding surfaces with clean cheesecloth dampened with solvent.

(24) If not cured, BR 127 primer will come off with a moderate wipe. Continue with primer cure cycle until no traces of primer exist on wiper.

(25) If patches are not bonded within 168 hours after cure, the primer must be removed and cleaning and priming operation started over.

(26) Unless otherwise directed by Gulfstream Technical Operations, EA 9628 is the only approved repair film adhesive for this repair.

**WARNING:** **ENTRAPPED MOISTURE CAN EXPAND RAPIDLY DURING THE HIGH TEMPERATURE BOND CURE CYCLE. ENSURE THAT ALL MOISTURE HAS BEEN REMOVED FROM THE DAMAGED ASSEMBLY USING REPAIR TECHNIQUE (WATER REMOVAL FROM SANDWICH ASSEMBLIES WITH KNOWN WATER ENTRAPMENT OR WITH A SKIN PUNCTURE, 51-79-10, REPAIR) PRIOR TO INITIAL HEAT CYCLE.**

(27) After all condensation has stopped forming on protective bag, remove EA 9628 adhesive and cut one layer to extend 0.25 - 0.30 inches beyond first patch to be bonded.

(28) Return adhesive to protective bag, reseal and store in a cool dry place.

**NOTE:** Do not refreeze adhesive unless second patch repair cannot be accomplished within the next eight hours. Discard all unused adhesive in an approved hazardous waste container.

(29) Apply EA 9628 adhesive to assembly bond surface.

(30) Starting at one corner work patch down in such a manner as to allow entrapped air to escape. Adhesive is to overlap 0.25 - 0.30 inches beyond edge of patch.

(31) It is permissible to use flashbreaker or 3M - 855 tape to hold patch in place.

(32) Working from the center towards edge of patch, use a roller to apply pressure over the entire surface of patch.

(33) Install vacuum bag and support equipment. See Pressure Application Examples Using Clamps, Dead Weights and Vacuum Bag, 51-79-10, Repair.

(34) Verify leak rate is no greater than 1 inch Hg per minute. If necessary, place a local vacuum bag over open cutout to prevent vacuum leaks.

(35) Using a heat up rate of 1° - 7°F / minute, cure at 240° ±10°F for 90 - 100 minutes.

(36) Cool down rate is 1° - 7°F / minute under full vacuum.

**NOTE:** Cure time starts when lagging thermocouple reaches 240°F temperature.

(37) After cure, lightly sand off excess adhesive build up using aluminum oxide paper.

(38) NDT to check for voids.

(39) If voids remain after final NDT or if 100% adhesion between existing and replacement core is not obtained, contact Gulfstream Technical Operations.

(40) Apply Alodine 600 to patch and surrounding surface. See Chromate Conversion Coating of Aluminum Alloys, 51-21-00, Repair.

(41) Blend in patch with Proseal 895 or equivalent sealer. See Aerodynamic Sealant Compound,
51-21-00, Repair or Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.

(42) Apply Alodine 600. See Chromate Conversion Coating of Aluminum Alloys, 51-21-00, Repair.

(43) Apply two coats of epoxy primer. See Epoxy Primer Coating - Preparation and Application (Including Finish 2012), 51-07-10, Repair or Waterborne Epoxy Primer - Preparation and Application (Finish 3012), 51-07-10, Repair.

(44) Apply customer topcoat if required. See Surface Preparation and Painting Procedure, 51-07-10, Repair.

(45) Bond on second patch using Steps 5.D.(20) thru 5.D.(44).

NOTE: It is recommended to install a vacuum bag or other clamping device over first patch to prevent it from disbonding during second heat cycle.

6. Skin Puncture on Both Skins of a Sandwich Assembly

NOTE: This repair requires a maximum diameter of 3.0 inches and has a flush patch applied to external surface.

A. General

This repair involves multiple bond steps. Based on the support equipment available and experience of technician, it is permissible to accomplish the bonding of this repair in one operation. It will be the responsibility of the repair technician to make the appropriate procedural changes to this repair method.

B. Preparation

CONSUMABLES

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesive</td>
<td>........................</td>
<td>EA 9628</td>
</tr>
<tr>
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<td>EA 934 N / A</td>
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<tr>
<td>Tape</td>
<td>........................</td>
<td>3M 855 or equivalent</td>
</tr>
</tbody>
</table>

C. Limitations

NOTE: Patch repair material must be of same material and heat treat as part being repaired, unless otherwise noted.

- Clamps and caul plates are heat sinks. Be sure repair area is at specified temperature for required time.
- Drilling from lower skin surface is preferred in order to reduce chance of fluids leaking through a repair, open core cavity or potting.

(1) Repair installations utilizing this repair must result in equal to or greater capability than original structure.

(2) The repaired structure must perform original structure’s intended function such as fuel or air tightness, etc.

(3) Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.
D. Repair

(1) Maintain 1.25 inches minimum from edge of cutout to edge of any structural member.

(2) Using a wiping action directed away from defect, wipe area using clean cheesecloth dampened with solvent.

(3) Continue this operation until wipers remain clean.

(4) Perform Nondestructive Testing (NDT) surrounding surfaces to determine extent of damage and if concentrations of fluids exist.

(5) Mark on skin all skin to core discrepancies and concentrations of fluids using a china marker wax pencil or equivalent.

(6) Make a smooth circular cutout that will remove defective skin / core. See Removal of Two Discrepant Skins and Core, 51-79-10, Repair.

(7) Deburr any rough edges.

(8) On internal surface remove additional skin and core. See Figure 205.

(9) Core is to be removed down to skin adhesive layer.

(10) Lightly scuff sand this adhesive layer to remove glossy surface finish.

NOTE: In no case is adhesive to be removed.

(11) If replacement core is not available, contact Gulfstream Technical Operations giving the exact location and size of core required so correct amount and type can be supplied.

(12) If appearance of fluids or possibility of fluids entry exist, dry discrepant area. See Water Removal From Sandwich Assemblies with Known Water Entrapment or with a Skin Puncture, 51-79-10, Repair.

(13) Remove paint and primer. See Methods for Removing Paint and Primer From Aluminum Surface, 51-79-10, Repair.

(14) Make the following repair patches per guidelines listed below using same or equivalent material and thickness as skin being repaired. Form contours per approved repair methods (see Figure 206 for assembly of repair):

   (a) Patch (A) to fit cutout in outer skin.

   (b) Patch (B) to fit cutout in core. This patch will be installed on inner surface of outer skin.

   (c) Patch (C) to extend 1.00 - 1.25 inches beyond edge of inner skin cutout.

(15) Solvent wipe patches with clean cheesecloth dampened with solvent prior to trial installation fit up.

(16) Temporary install patch (B). See Figure 206.

(17) Final core height shall be flush with inner skin surface.

(18) After final shaping, trial install patch (A) and (C).

(19) With light hand pressure patches should fit without wrinkles or bulges.

(20) It is permissible to add up to two additional layers of EA 9628 in locally low areas of core fill material.

(21) Apply flashbreaker or 3M-855 tape around patch (C) to assist in its location at time of final bond.

WARNING: THE FOLLOWING STEPS REQUIRE THE USE OF CLEAN WHITE COTTON
GLOVES.

(22) Clean all bonding surfaces except for outer skins with scuff sanded surfaces. See Cleaning Aluminum for Bonding Using Pasa Jell 105 Acid Paste, 51-79-10, Repair.

(23) Apply primer to bonding surfaces of all patches as follows:

NOTE: Apply within 8 hours of cleaning.

(a) Allow primer to warm up to room temperature until all condensation has stopped.

(b) Shake vigorously for at least 1 minute.

NOTE: The solids within the primer settle out quickly. Shake / stir primer continuously while being used.

(c) Prime cleaned bonding surfaces by either spraying or brushing.

NOTE: Spraying is preferred method. The primed surfaces should have a light yellow green color.

(24) Air dry primer for 30 - 45 minutes at room temperature followed by one of the elevated cure cycles noted below:

(a) Two hours at 200°F ±5°.

(b) Four hours at 180°F ±5°.

(25) To determine if primer is cured, wipe all bonding surfaces with clean cheesecloth dampened with solvent.

(26) If not cured, BR 127 primer will come off with a moderate wipe.

(27) Continue with primer cure cycle until no traces of primer exist on cloth.

(28) After all condensation has stopped forming on protective bag, remove repair adhesive and cut required layer to extend 0.25 - 0.30 inches beyond patch (C) as determined during prefit.

(29) Return the adhesive to the protective bag, reseal and store in a cool dry place.

NOTE: Do not refreeze adhesive unless the repair cannot be accomplished within the next eight hours. Discard all unused adhesive in an approved hazardous waste container.

(30) Apply flashbreaker or 3M - 855 tape around inner surface cutout to reduce clean up excess adhesive.

(31) Apply film adhesive to the mating bond surfaces of patch (A) and (B).

(32) Install the patch (B) into the core cavity pressing firmly in place against outer skin.

(33) Apply EA 934 N / A or equivalent paste adhesive to core plug and exposed assembly core. See Approved Repair Adhesive Charts, 51-34-00, General and Removing and Installing Replacement Core, 51-79-10, Repair.

(34) Install core plug maintaining correct ribbon direction.

(35) Wipe off excess adhesive.

(36) Apply porous release film with sufficient weight to hold core in place.

(37) Cure paste adhesive. See Removing and Installing Replacement Core, 51-79-10, Repair.

(38) After one hour cure install patch (A).

(39) Use several pieces of flashbreaker or 3M-855 tape to hold it in place.
(40) On outer surface install vacuum bag and support equipment. See Pressure Application Examples Using Clamps, Dead Weights and Vacuum Bag, 51-79-10, Repair.

(41) Verify that leak rate is no greater than 1 inch Hg per minute.

(42) Leaks from the open inner skin can be sealed over with a vacuum bag.

(43) Prior to curing film adhesive verify the core has not been pushed out of place.

(44) Using a heat up rate of 1 - 7°F per minute, cure EA 9628 and core paste adhesive at 240° ±10°F for 90 - 100 minutes.

(45) Cool down rate is 1° - 7°F per minute under full vacuum.

NOTE: Cure time starts when the lagging thermocouple reaches 240°F temperature.

(46) After cure locally NDT patch (A) and (B) for void indications.

(47) Notify Gulfstream Technical Operations if there are any remaining voids.

(48) Recheck core height.

(49) Sand off any excess core and paste adhesive flush with inner surface.

(50) Starting at one corner, work patch (C) down in such a manner as to allow entrapped air to escape.

(51) Adhesive is to overlap 0.25 - 0.30 inches beyond edge of patch.

(52) Use several pieces of flashbreaker or 3M-855 tape to hold patch in place.

(53) Working from center towards edge of patch, use a roller to apply pressure over entire surface of patch.

(54) Install vacuum bag and support equipment. See Pressure Application Examples Using Clamps, Dead Weights and Vacuum Bag, 51-79-10, Repair.

(55) Verify leak rate is no greater than one inch Hg per minute.

(56) Using a heat up rate of 1° - 7°F / minute, cure at 240° ±10°F for 90 - 100 minutes.

(57) Cool down rate is 1° - 7°F / minute under full vacuum.

NOTE: Cure time starts when the lagging thermocouple reaches the 240°F temperature.

(58) After cure, locally NDT. Any remaining voids should be reported to Gulfstream Technical Operations.

(59) Seal any open butt gaps between patch (A) and outer skin with Proseal 895 or equivalent sealer. See Aerodynamic Sealant Compound, 51-21-00, Repair or Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.

(60) Apply Alodine 600 to patch (A) and (C) and surrounding surface. See Chromate Conversion Coating of Aluminum Alloys, 51-21-00, Repair.

(61) Blend in patch with skin using EC 1751 or approved sealer.

See Approved Repair Adhesive Charts, 51-34-00, General, Aerodynamic Sealant Compound, 51-21-00, Repair or Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.


(63) Apply two coats of epoxy primer. See Epoxy Primer Coating - Preparation and Application (Including Finish 2012), 51-07-10, Repair or Waterborne Epoxy Primer - Preparation and Application (Finish 3012), 51-07-10, Repair.
(64) Apply customer topcoat if required. See Surface Preparation and Painting Procedure, 51-07-10, Repair.
Aluminum Honeycomb Both Skins Punctured - Repair

Figure 205

**STRUCTURAL REPAIR MANUAL**

**ADDITIONAL SKIN AND CORE REMOVED**
**TO PROVIDE BONDING SURFACE**

HOLE SAW / CUTTER DIAMETER TO BE LARGE ENOUGH TO PROVIDE 1.00 - 1.25 INCHES ON BONDING SURFACE

Aluminum Honeycomb Both Skins Punctured - Repair

Figure 205
7. Skin Puncture or Crack Through One Skin Only With Core Damage Depth Being 20% of Depth or Less

NOTE: Repair uses an external surface patch a maximum of 3.00 inches in diameter.

A. Preparation

CONSUMABLES

- Adhesive: Corfil 615 / DTA or equivalent
- Adhesive: EA 9628
- Adhesive: EC 1751 B / A
- Primer: BR 127
- Solvent: Acetone
- Solvent: Methyl Ethyl Ketone (MEK) or equivalent
- Solvent: Methyl Propyl Ketone (MPK) or equivalent
- Tape: 3M 855

B. Limitations

NOTE: Patch repair material must be of same material and heat treat as part being repaired, unless otherwise noted.

(1) Repair installations utilizing this repair must result in equal to or greater capability than original structure.
(2) The repaired structure must perform original structure’s intended function such as fuel or air tightness, etc.
(3) Repair installations utilizing this repair must account for any effect from all previous repairs or
modifications.

C. Repair

1. Maintain 1.25 inches minimum from edge of cut out to edge of any structural member.

2. Using a wiping action directed away from defect, wipe area using clean cheesecloth dampened with solvent.

3. Continue until cheesecloth remains clean.

4. Perform Nondestructive Testing (NDT) surrounding surfaces to determine extent of damage and if concentrations of fluids exist.

5. Mark on skin the total area of damage with a china marker wax pencil or equivalent.

6. Make a smooth circular or race track cutout that will remove defective skin / core. See Removal of Two Discrepant Skins and Core, 51-79-10, Repair.

7. Deburr rough edges.

8. If appearance of fluids or possibility of fluid entry exist, dry discrepant area. See Water Removal From Sandwich Assemblies with Known Water Entrapment or with a Skin Puncture, 51-79-10, Repair.

9. Pot local areas of core damage with Corfil 615 / DTA or equivalent materials listed in Approved Repair Adhesive Charts, 51-34-00, General.

10. After cure, sand potting flush with outer surface using aluminum oxide paper.

11. Make repair patch from same or equivalent material and thickness as skin being repaired.

12. Patch should overlap cutout edge by 1.00 - 1.25 inches.

13. Form contours per approved repair methods.

14. Wipe patch with clean cheesecloth dampened with solvent.

15. Trial install patch.

16. Only light hand pressure should allow patch to fit without wrinkles or bulges.

17. It is permissible to add up to two additional layers of EA 9628 in locally low areas of core fill material.

18. Maintaining a distance between 0.40 - 0.60 inches from edge of each patch, apply flashbreaker or 3M - 855 around patch location to assist in excess adhesive removal.

WARNING: ADEQUATE PROTECTION MUST BE USED TO PREVENT PAINT STRIPPER FROM ENTERING OPEN CORE CAVITY.


WARNING: THE FOLLOWING REQUIRES THE USE OF CLEAN WHITE COTTON GLOVES.

21. Apply primer to assembly and patch bonding surface as follows:

NOTE: Apply within 8 hours of cleaning.

(a) Allow primer to warm up to room temperature until all condensation has stopped.
(b) Shake vigorously for at least 1 minute.

**NOTE:** The solids within the primer settle out quickly. Shake / stir primer continuously while being used.

(c) Prime the cleaned bonding surfaces by either spraying or brushing.

**NOTE:** Spraying is preferred method. The primed surfaces should have a light yellow green color.

(22) Air dry primer for 30 - 45 minutes at room temperature followed by one of the elevated cure cycles noted below:

(a) Two hours at 200°F ±5°.

(b) Four hours at 180°F ±5°.

(23) To determine if primer is cured, wipe all bonding surfaces with a clean cheesecloth wiper dampened with solvent.

(24) If not cured, primer will come off with a moderate wipe.

(25) Continue with primer cure cycle until no traces of primer exist on wiper.

(26) If patch is not bonded within 168 hours after cure, the primer must be removed and entire clean and prime operation started over.

(27) Unless otherwise directed by Gulfstream Technical Operations, EA 9628 is the only approved repair film adhesive for this repair.

(28) After all condensation has stopped forming on protective bag, remove EA 9628 adhesive and cut one layer to extend 0.25 - 0.30 inches beyond patch.

(29) Return adhesive to protective bag, reseal and store in a cool dry place.

(30) Do not refreeze adhesive unless repair cannot be accomplished within the next 8 hours.

(31) Discard all unused adhesive in an approved hazardous waste container.

(32) Apply EA 9628 adhesive to assembly bond surface.

(33) Starting at one corner work patch down in such a manner as to allow entrapped air to escape.

(34) Adhesive is to overlap 0.25 - 0.30 inches beyond edge of patch.

(35) It is permissible to use flashbreaker or 3M - 855 tape to hold patch in place.

(36) Working from center towards edge of patch, use a roller to apply pressure over entire surface of patch.

(37) Install vacuum bag and support equipment. See Pressure Application Examples Using Clamps, Dead Weights and Vacuum Bag, 51-79-10, Repair.

(38) Verify leak rate is no greater than 1 inch Hg per minute.

**WARNING:** ENTRAPPED MOISTURE CAN EXPAND RAPIDLY DURING THE HIGH TEMPERATURE BOND CURE CYCLE. ENSURE THAT ALL MOISTURE HAS BEEN REMOVED FROM THE DAMAGED ASSEMBLY PRIOR TO INITIAL HEAT CYCLE.

(39) Using a heat up rate of 1 - 7°F / minute, cure at 240 ±10°F for 90 - 100 minutes.

(40) Cool down rate is 1 - 7°F / minute under full vacuum.

**NOTE:** Cure time starts when lagging thermocouple reaches 240°F temperature.
(41) After cure lightly sand off excess adhesive build up using 240 - 320 grit aluminum oxide paper.

(42) NDT to check for voids.

(43) Voids less than 0.50 inch in diameter that do not extend to edge of patch and are no closer than 2.0 inches from a like defect are acceptable.

(44) Apply Alodine 600 to patch and surrounding surface. See Chromate Conversion Coating of Aluminum Alloys, 51-21-00, Repair.

(45) Blend in patch with skin using EC 1751 or approved sealer. See Approved Repair Adhesive Charts, 51-34-00, General, Aerodynamic Sealant Compound, 51-21-00, Repair or Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.


(47) Apply two coats of epoxy primer. See Epoxy Primer Coating - Preparation and Application (Including Finish 2012), 51-07-10, Repair or Waterborne Epoxy Primer - Preparation and Application (Finish 3012), 51-07-10, Repair.


8. Unbond Between Skin and Core on One Side Only — Pressure Injection Method

A. Preparation

**CONSUMABLES**

<table>
<thead>
<tr>
<th>Adhesive</th>
<th>EA 956 A / B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvent</td>
<td>Acetone</td>
</tr>
<tr>
<td>Solvent</td>
<td>Methyl Ethyl Ketone (MEK) or equivalent</td>
</tr>
<tr>
<td>Solvent</td>
<td>Methyl Propyl Ketone (MPK) or equivalent</td>
</tr>
<tr>
<td>Tape</td>
<td>3M 855 or equivalent</td>
</tr>
</tbody>
</table>

B. Restrictions

1. Maximum allowable number of voids on any single panel shall not exceed three.

2. Maximum dimension of void shall be 3 inches with no more than two such voids in any one square foot area encompassing both voids.

3. Individual voids shall be separated by at least 3 inches of sound adhesive line.

4. Maximum cumulative length of individual or adjacent voids along a generally transverse or longitudinal path shall not exceed 10 percent of corresponding panel dimension.

5. No void edge shall extend closer than one inch from core edge.

C. Limitations

**NOTE:** Drilling from lower skin surface is preferred in order to reduce chance of fluids leaking through a repair. Drill stops or other depth controlling drilling devices are to be used to prevent damage to surrounding structure.

1. Repair installations utilizing this repair must result in equal to or greater capability than original structure.

2. The repaired structure must perform original structure’s intended function such as fuel or air tightness, etc.
(3) Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.

D. Repair

(1) Using a wiping action directed away from defect, wipe area using clean cheesecloth dampened with solvent.

(2) Continue until cheesecloth remains clean.

(3) Perform Nondestructive Testing (NDT) to determine extent of damage.

(4) Mark defect areas on skin using china marker wax pencil or equivalent.

(5) Maintain at least a 0.50 inch center to center spacing and maintain 4D, where D is diameter of fastener hole, from existing fastener holes.

(6) Drill at least two No. 40 diameter holes through skin.

(7) Vacuum out loose debris.

(8) Verify a flow path exists. See Air Flow Test for Verifying an Adhesive Flow Path, 51-79-10, Repair.

(9) If no air flow exists, proceed with Unbond Between Skin and Core on One Side Only - Vacuum Injection Method, 51-79-00, Repair.

(10) To assist flow of repair adhesive, preheat area to 120° - 130°F for at least 20 minutes.

(11) At least two thermocouples or equivalent temperature indicating devices are required.

(12) Immediately after preheating, pressure inject EA 956 A / B or equivalent liquid repair adhesive listed in Approved Repair Adhesive Charts, 51-34-00, General, into one hole until it flows from next hole with a bubble free flow. See Figure 207.

(13) Allow adhesive to settle for approximately five minutes then inject a second time.

(14) Repeat process if air bubbles were still observed coming from discrepant area and adhesive pot life has not expired.

**WARNING:** 20 PSI IS MAXIMUM INJECTION PRESSURE FOR USE ON HONEYCOMB SANDWICH ASSEMBLIES.

(15) If possible turn assembly so repaired area faces down.

(16) Allow a small amount of adhesive to flow from holes before applying flashbreaker or 3M-855 tape over holes. Otherwise, fill void area from face sheet to face sheet.

(17) Apply local pressure. See Pressure Application Examples Using Clamps, Dead Weights and Vacuum Bag, 51-79-10, Repair.

(18) Cure per applicable adhesive cure cycle using at least two thermocouples or equivalent temperature indicating devices.

(19) Repeat NDT and notify Gulfstream Technical Operations if a unbond / void exists after final NDT.

(20) Fill and seal external injection holes by wiping over with repair adhesive used or Proseal 895. See Aerodynamic Sealant Compound, 51-21-00, Repair or Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.

(21) After cure sand flush with surrounding surface.

(22) Touch up surface scratches with Alodine 600. See Chromate Conversion Coating of Aluminum
Alloys, 51-21-00, Repair.

(23) Apply two coats of epoxy primer. See Epoxy Primer Coating - Preparation and Application (Including Finish 2012), 51-07-10, Repair or Waterborne Epoxy Primer - Preparation and Application (Finish 3012), 51-07-10, Repair.


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9. Unbond Between Skin and Core on One Side Only — Vacuum Injection Method

Figure 207

A. Preparation

CONSUMABLES

Adhesive ................................................................. EA 956 A / B
Solvent .................................................................................. Acetone
Solvent ................................................................. Methyl Ethyl Ketone (MEK) or equivalent
Solvent ................................................................. Methyl Propyl Ketone (MPK) or equivalent
Tape ................................................................. 3M 855 or equivalent

B. Restrictions

(1) Maximum allowable number of voids on any single panel shall not exceed three.
(2) Maximum dimension of void shall be three inches with no more than two such voids in any one square foot area encompassing both voids.
(3) Individual voids shall be separated by at least 3 inches of sound adhesive line.
(4) Maximum cumulative length of individual or adjacent voids along a generally transverse or longitudinal path shall not exceed 10% of corresponding panel dimension.
(5) No void edge shall extend closer than 1 inch from core edge.

C. Limitations

NOTE: Drilling from lower skin surface is preferred in order to reduce chance of fluids leaking through a repair.

Drill stops or other depth controlling drilling devices are to be used to prevent damage to surrounding structure.

(1) Repair installations utilizing this repair must result in equal to or greater capability than original structure.

(2) The repaired structure must perform original structure's intended function such as fuel or air tightness, etc.

(3) Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.

D. Repair

(1) Using a wiping action directed away from defect, wipe area using clean cheesecloth dampened with solvent.

(2) Continue until cheesecloth remains clean.

(3) Perform Nondestructive Testing (NDT) to determine extent of damage.

(4) Mark defect areas on skin using china marker wax pencil or equivalent.

(5) Drill one No. 30 diameter hole through unbonded skin only.

(6) Maintain a minimum spacing of four times fastener hole diameter from existing fasteners.

(7) Vacuum out loose debris.

(8) Before preheating, prepare area for vacuum injection by building an adhesive reservoir dam and testing sealing capability of vacuum cup installation. See Vacuum Injection of Liquid Repair Adhesives, 51-79-10, Repair.

(9) To assist flow of repair adhesive, preheat area to 120° - 130°F for at least 20 minutes. Use at least two thermocouples or equivalent temperature indicating devices.

(10) Immediately after preheating, fill reservoir with EA 956 A / B or alternate liquid repair adhesive listed in Approved Repair Adhesive Charts, 51-34-00, General.


(12) If possible, turn assembly so repair faces down.

(13) Allow a small amount of adhesive to flow from hole before applying flashbreaker or 3M - 855 tape over hole. Otherwise, fill void area from face sheet to face sheet.

(14) Apply local pressure. See Pressure Application Examples Using Clamps, Dead Weights and Vacuum Bag, 51-79-10, Repair.

(15) Cure per applicable adhesive cure cycle using at least two thermocouples or equivalent temperature indicating devices.

(16) NDT inspect for voids. See Ultrasonic Quality Requirements for Aluminum Alloy Products, 51-29-00, Repair.

NOTE: Notify Gulfstream Technical Operations if disbond still exists after final NDT.
10. Voids / Unbond Along a Foam Fill Joint

A. Preparation

CONSUMABLES

<table>
<thead>
<tr>
<th>Solvent</th>
<th>Acetone</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEK or equivalent</td>
<td>Methyl Ethyl Ketone (MEK) or equivalent</td>
</tr>
<tr>
<td>MPK or equivalent</td>
<td>Methyl Propyl Ketone (MPK) or equivalent</td>
</tr>
<tr>
<td>Adhesive</td>
<td>EA 956 A / B</td>
</tr>
</tbody>
</table>

B. Restrictions

(1) Maximum allowable number of voids on any single panel shall not exceed three.

(2) Maximum dimension of void shall be 3 inches with no more than two such voids in any one square foot area encompassing both voids.

(3) Individual voids shall be separated by at least 3 inches of sound adhesive line.

C. Limitations

NOTE: Drilling from lower skin surface is preferred in order to reduce chance of fluids leaking through a repair.

Drill stops or other depth controlling drilling devices are to be used to prevent damage to surrounding structure.

Clamps and caul plates are heat sinks. Be sure repair area is at specified temperature for required time.

(1) Repair installations utilizing this repair must result in equal to or greater capability than original structure.

(2) The repaired structure must perform original structure’s intended function such as fuel or air tightness, etc.

(3) Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.

D. Repair

(1) Perform Nondestructive Testing (NDT) surfaces to determine size of discrepancy and if concentrations of fluids exist.

(2) Mark all surfaces using a china marker wax pencil or equivalent.
(3) Drill a No. 40 diameter hole at each end of void.

(4) Minimum center to center spacing is 0.50 inch.

(5) If fluids are present, dry assembly. See Water Removal From Sandwich Assemblies with Known Water Entrapment or with a Skin Puncture, 51-79-10, Repair.


(7) When air flow can not be established, fly cut core and try air flow test again. See Fly Cutting Honeycomb Core, 51-79-10, Repair.

(8) If no air flow exists, proceed with Unbond Between Skin and Core on One Side Only - Vacuum Injection Method, 51-79-00, Repair or notify Gulfstream Technical Operations.

(9) To assist adhesive flow, turn assembly to allow entrapped air to escape and preheat area to 120° - 130°F for at least 20 minutes. At least two thermocouples or equivalent temperature indicating devices are required.

(10) Immediately after preheating, pressure inject EA 956 A / B or equivalent liquid repair adhesive listed in Approved Repair Adhesive Charts, 51-34-00, General, into one hole until it flows from next hole with a bubble free flow. See Figure 208.

(11) Allow adhesive to settle for approximately five minutes then inject a second time.

(12) Repeat process if air bubbles are still observed coming from discrepant area and adhesive pot life has not expired.

**WARNING:** 20 PSI IS MAXIMUM INJECTION PRESSURE FOR USE ON HONEYCOMB SANDWICH ASSEMBLIES.

(13) In cases where a skin is involved, local clamp up pressure should be applied. See Pressure Application Examples Using Clamps, Dead Weights and Vacuum Bag, 51-79-10, Repair.

(14) Cure per applicable adhesive cure cycle. At least two thermocouples or equivalent temperature indicating devices are required.

(15) Fill any open injection hole with either the repair adhesive used or Proseal 895. See Aerodynamic Sealant Compound, 51-21-00, Repair or Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.

(16) Repeat NDT inspection.

(17) Disbonds that still exist, but are now within size limits and not open to an edge will be acceptable.

(18) Notify Gulfstream Technical Operations if disbond is still beyond acceptable limits or proceed with Skin Puncture or Crack Through One Skin Only With Core Damage Depth Being 20% of Depth or Less, 51-79-00, Repair.


(20) All other holes shall be overcoated with Pro Seal 895. See Aerodynamic Sealant Compound, 51-21-00, Repair or Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.
11. Depression in Aluminum Sandwich Assembly with a Diameter Less Than 1.5 Inch — Minor Core Damage

A. Preparation

CONSUMABLES

- Adhesive: EA 956 A / B
- Solvent: Acetone
- Solvent: Methyl Ethyl Ketone (MEK) or equivalent
- Solvent: Methyl Propyl Ketone (MPK) or equivalent
- Tape: 3M 855 or equivalent

B. Restrictions

1. Ensure that dent has no more than one radius and that dent is gradual with no sharp edges or creases.
2. Maximum dent depth is 20 percent of panel thickness.

C. Limitations

NOTE: Drilling from lower skin surface is preferred in order to reduce chance of fluids leaking through a repair.
   Drill stops or other depth controlling drilling devices are to be used to prevent damage to surrounding structure.
   Clamps and caul plates are heat sinks. Be sure repair area is at specified temperature for required time.

1. Repair installations utilizing this repair must result in equal to or greater capability than original structure.
(2) The repaired structure must perform original structure’s intended function such as fuel or air tightness, etc.

(3) Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.

D. Repair

(1) Perform Nondestructive Testing (NDT) to verify skin and core are not unbonded and that no cracks exist.

(2) Using a wiping action directed away from defect, wipe area using clean cheesecloth dampened with solvent.

(3) Continue wiping until cheesecloth remains clean.

(4) Through center of defect, drill a 0.125 - 0.164 inch diameter hole.

(5) Control depth to prevent excessive damage to core.

(6) Vacuum out loose debris.

(7) Fly cut core from discrepant skin. See Fly Cutting Honeycomb Core, 51-79-10, Repair.

(8) Vacuum out loose debris.

(9) To assist adhesive flow, turn assembly to assist entrapped air to escape and preheat area to 120° - 130° F for at least 20 minutes. Use at least two thermocouples or equivalent temperature indicating devices.

(10) Immediately after preheat, pressure inject core cavity with EA 956 A / B or equivalent liquid repair adhesive listed in Approved Repair Adhesive Charts, 51-34-00, General.

(11) Allow a path for entrapped air to escape while injecting. See Figure 209.

(12) After injecting, let adhesive settle for approximately 5 minutes.

(13) Repeat injection cycle until all settling has stopped or adhesive pot life has expired.

(14) If necessary, vacuum injection can be used. See Vacuum Injection of Liquid Repair Adhesives, 51-79-10, Repair.

WARNING: 20 PSI IS MAXIMUM INJECTION PRESSURE FOR USE ON HONEYCOMB SANDWICH ASSEMBLIES.

(15) After injection, if possible, turn assembly so repair area faces down.

(16) Allow a small amount of adhesive to flow from hole before applying flashbreaker or 3M - 855 tape over hole.

(17) Apply local pressure. See Pressure Application Examples Using Clamps, Dead Weights and Vacuum Bag, 51-79-10, Repair.

(18) Cure per applicable adhesive cure cycle using at least two thermocouples or equivalent temperature indicating devices. No further NDT required.

(19) Fill low area in skin with sealant. See Aerodynamic Sealant Compound, 51-21-00, Repair or Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.

(20) On air passage surfaces touch up with topcoat. See Surface Preparation and Painting Procedure, 51-07-10, Repair.
12. Spinning Insert with Access for Removal

A. Preparation

CONSUMABLES

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>Adhesive</td>
<td>EA 934 N</td>
<td>A</td>
</tr>
<tr>
<td>Adhesive</td>
<td>EA 956 A</td>
<td>B</td>
</tr>
<tr>
<td>Solvent</td>
<td>Acetone</td>
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<td>Methyl Ethyl Ketone (MEK) or equivalent</td>
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</tr>
<tr>
<td>Solvent</td>
<td>Methyl Propyl Ketone (MPK) or equivalent</td>
<td></td>
</tr>
</tbody>
</table>

B. Limitations

(1) Repair installations utilizing this repair must result in equal to or greater capability than original structure.

(2) The repaired structure must perform original structure's intended function such as fuel or air tightness, etc.

(3) Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.

C. Repair

(1) Remove insert. See Recommended Methods for Removing Inserts, 51-79-10, Repair.

(2) After removal of insert, inspect face sheets around the insert hole for damage and perform Nondestructive Testing (NDT) as required.

(3) If damage is detected, determine extent of damage. See Skin Crack / Puncture Around Inserts - Honeycomb Board, 51-79-00, Repair, if applicable.
(4) Wipe outer surface of sleeve and plug with cheesecloth dampened with solvent.
(5) Insert sleeve into panel.
(6) Inject cavity around sleeve with either EA 934 N / A or EA 956 A / B or their equivalent listed in Approved Repair Adhesive Charts, 51-34-00, General.
(7) Install plug and allow adhesive to cure at room temperature for at least 4 hours or at 150° F for 2 hours before installing fastener.

13. Skin Crack / Puncture Around Inserts — Honeycomb Board

NOTE: Board is not removable.

A. Preparation

<table>
<thead>
<tr>
<th>CONSUMABLES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesive ................................................</td>
<td>EA 9309.1</td>
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<td>Adhesive ................................................</td>
<td>TE 5246 / HD 3520</td>
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<td>Adhesive ................................................</td>
<td>EA 934 N / A</td>
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<tr>
<td>Adhesive ................................................</td>
<td>EC 1751 B / A</td>
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<tr>
<td>Aluminum oxide paper, 180 - 240 grit...............</td>
<td>MIL-A-21380</td>
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<tr>
<td>Aluminum oxide paper, 240 - 320 grit...............</td>
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<tr>
<td>Solvent ..................................................</td>
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<tr>
<td>Solvent ..................................................</td>
<td>Methyl Ethyl Ketone (MEK) or equivalent</td>
</tr>
<tr>
<td>Solvent ..................................................</td>
<td>Methyl Propyl Ketone (MPK) or equivalent</td>
</tr>
<tr>
<td>Tape .......................................................</td>
<td>3M 855 or equivalent</td>
</tr>
</tbody>
</table>

B. Limitations

NOTE: Patch repair material must be of same or equivalent material and heat treat as part being repaired, unless otherwise noted.

- Drill stops or other depth controlling drilling devices are to prevent drilling through opposite skin and causing excessive damage to core.

(1) Repair installations utilizing this repair must result in equal to or greater capability than original structure.
(2) The repaired structure must perform original structure’s intended function such as fuel or air tightness, etc.
(3) Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.

C. Repair

(1) Using a wiping action directed away from defect, wipe area using clean cheesecloth dampened with solvent.
(2) Continue wiping until cheesecloth remains clean.
(3) Remove exposed insert half in discrepant skin. See Recommended Methods for Removing Inserts, 51-79-10, Repair for recommended removal procedures.
(4) Liquid penetrant inspect per ASTM E 1417 to determine and mark ends of cracks.
(5) Trim out crack maintaining a smooth transition with edge of insert hole. Avoid excessive core damage.
(6) Visually inspect trim using a 10X power glass for evidence of remaining cracks.
(7) Rework as necessary.

(8) Fluorescent penetrant inspect per ASTM E 1417 after rework to ensure crack removal. See Figure 210 for examples of crack removal.

(9) Make repair doubler from same or equivalent material and thickness as production skin.

(10) The preferred overlap with crack / insert hole is 1.00 inch.

   NOTE: Where clearance with an adjacent insert or structure prevents 1.00 inch, a minimum overlap as defined in Figure 211 is acceptable.

(11) Install a non bondable rod into remaining insert half to prevent potting adhesive from entering inside diameter.

   NOTE: Rod should be Teflon (TFE or FEP), plastic, mold release coated metal or etc.

(12) Apply flashbreaker or 3M-855 tape, listed in Approved Materials and Solutions, 51-30-00, General, around repair area to reduce adhesive clean up. See Figure 212 for example.

(13) Fill core cavity with TE 5246 / HD 3520, EA 9309.1 or their equivalent listed in Approved Repair Adhesive Charts, 51-34-00, General.

(14) Allow adhesive to settle approximately 5 minutes then refill if necessary.

(15) Cure per applicable adhesive cure cycle.

   WARNING: THE FOLLOWING REQUIRES THE USE OF CLEAN WHITE COTTON GLOVES.

(16) Using 180 - 240 grit sandpaper, sand the following areas:

   (a) Exposed potting adhesive to remove glossy surface finish.

   (b) Bonding surface of doubler.

   (c) Bonding surface of skin to remove paint / primer over an area extending 0.25 - 0.50 inches from beyond edge of doubler.

(17) Vacuum off debris.


(19) Allow parts to air dry for at least 20 minutes.

(20) Apply EA 934 N / A or equivalent adhesive listed in Approved Repair Adhesive Charts, 51-34-00, General, to both surfaces.

(21) Remove large air bubbles from adhesive.

(22) Install doubler applying cure pressure. See Pressure Application Examples Using Clamps, Dead Weights and Vacuum Bag, 51-79-10, Repair.

(23) Install portion or entire insert as required.

(24) Wipe off excess adhesive from insert inside diameter and / or threads.

(25) Cure per applicable adhesive hot bond cure cycle.

(26) After cure lightly sand off adhesive build up using 240 - 320 grit aluminum oxide paper.

(27) Apply Alodine 600 to surface scratches. See Chromate Conversion Coating of Aluminum Alloys, 51-21-00, Repair.
(28) Customer option to blend in patch with skin using EC 1751. See Approved Repair Adhesive Charts, 51-34-00, General or approved sealant per Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.

(29) Apply Alodine to surface scratches. See Chromate Conversion Coating of Aluminum Alloys, 51-21-00, Repair.

(30) Apply two coats of epoxy primer. See Epoxy Primer Coating - Preparation and Application (Including Finish 2012), 51-07-10, Repair or Waterborne Epoxy Primer - Preparation and Application (Finish 3012), 51-07-10, Repair.

14. Impact Damage on Extreme Trailing Edge (Dents or Fracture) — External Surface Patch

NOTE: Maximum span damage 1.50 inch - maximum chord damage 0.75 inch.
A. Preparation

CONSUMABLES

<table>
<thead>
<tr>
<th>Adhesive</th>
<th>EC 1751 B / A</th>
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<tbody>
<tr>
<td>Adhesive</td>
<td>Corfil 615 / DTA or equivalent</td>
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<tr>
<td>Adhesive</td>
<td>TE 5246 / HD 3520</td>
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<td>EA 9309.1</td>
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<tr>
<td>Tape</td>
<td>3M 855 or equivalent</td>
</tr>
<tr>
<td>Primer</td>
<td>BR 127</td>
</tr>
</tbody>
</table>

B. Restrictions

(1) Not for use on skins greater than 0.040 inches thick.

C. Limitations

**NOTE:** Drilling from lower skin surface is preferred in order to reduce chance of fluids leaking through a repair.

Patch repair material must be of same or equivalent material and heat treat as part being repaired, unless otherwise noted.

(1) Repair installations utilizing this repair must result in equal to or greater capability than original structure.

(2) The repaired structure must perform original structure’s intended function such as fuel or air tightness, etc.

(3) Repair installations utilizing this repair must account for any effect from all previous repairs or modifications.

D. Repair

(1) Using a wiping action directed away from defect, wipe area using clean cheesecloth dampened with solvent.

(2) Continue until cheesecloth remains clean.

(3) Check for skin cracks using fluorescent dye check per ASTM E 1417.

(4) Cut out damaged skin and core as shown in Figure 213. See Removal of Two Discrepant Skins and Core, 51-79-10, Repair.

(5) If appearance of fluids or possibility of fluids entry exists, dry area. See Water Removal From Sandwich Assemblies with Known Water Entrapment or with a Skin Puncture, 51-79-10, Repair.

(6) Make a repair patch from same thickness and material (or equivalent) as production skin to required diameter and bend over to match contour.

(7) Trim patch to overlap cutout. See Figure 216 dimensions.

(8) Mask around cutout to control potting and clean up.

(9) Apply a single thickness of either flashbreaker or 3M - 855 tape to bond surface of patch.
(10) Fill core cavity using either the following potting procedures or by the adhesive injection method listed in Step 14.D.(11):

(a) Fill cavity with Corfil 615 / DTA or equivalent adhesive listed in Approved Materials and Solutions, 51-30-00, General.
(b) Wrap potting with one layer of either porous release cloth or teflon film.
(c) Locate patch.
(d) Use small pieces of flashbreaker or 3M-855 tape to hold patch in place.
(e) Apply light clamp up pressure. See Pressure Application Examples Using Clamps, Dead Weights and Vacuum Bag, 51-79-10, Repair.
(f) Cure potting per applicable adhesive cure cycle.

(11) Pressure injection procedures for filling core cavity (Optional method).

(a) On lower surface of patch drill two No. 40 diameter injection hole as shown in Figure 214.
(b) Locate patch to maintain 1.32 - 1.50 inch overlap.
(c) Maintaining a distance between 0.50 - 0.75 inches from edge of patch, apply an outer border of flashbreaker or 3M-855 tape around patch to assist in its location at final bond. See Figure 215.
(d) Seal around patch to hold in place and prevent leakage as shown in Figure 216.
(e) Caul plates and clamps can be used. See Pressure Application Examples Using Clamps, Dead Weights and Vacuum Bag, 51-79-10, Repair.

WARNING: MAXIMUM INJECTION PRESSURE IS 40 PSI.
(f) With trailing edge pointing down as much as possible, inject TE 5246 / HD 3520, EA 9309.1 or their equivalent listed in Approved Repair Adhesive Charts, 51-34-00, General, from aft No. 40 injection hole until it flows from forward No. 40 hole.
(g) Allow adhesive to settle for approximately 5 minutes then inject again.
(h) Tape over injection holes and cure per applicable adhesive cure cycle.

(12) Remove patch.

(13) Sand potting adhesive with 180 - 240 grit paper to remove high areas and glossy surface finish.
(14) Low areas in potting less than 0.010 inch in height or small pits / air bubbles less than 0.25 inch in diameter shall be filled with extra film adhesive at time of bonding.
(15) Larger areas shall be filled with original potting material.
(16) Protect area after final sanding to prevent contamination.

WARNING: USE OF A CHEMICAL STRIPPER REQUIRES ADEQUATE PROTECTION BE USED TO PREVENT PAINT STRIPPER FROM ENTERING OPEN CORE CAVITY.

(17) Remove paint and primer. See Methods for Removing Paint and Primer From Aluminum Surface, 51-79-10, Repair.

WARNING: THE FOLLOWING REQUIRES THE USE OF CLEAN WHITE COTTON
(19) Apply primer to patch as follows:

**NOTE:** Apply within 8 hours of cleaning.

(a) Allow primer to warm up to room temperature until all condensation has stopped.

(b) Shake primer vigorously for at least 1 minute.

**NOTE:** The solids within primer settle out quickly. Shake / stir primer continuously while being used.

(c) Prime the cleaned bonding surfaces by either spraying or brushing.

**NOTE:** Spraying is preferred method. The primed surfaces should have a light yellow green color.

(20) Air dry primer for 30 - 45 minutes at room temperature followed by one of the elevated cure cycles noted below:

(a) Two hours at 200°F ±5°.

(b) Four hours at 180°F ±5°.

(21) To determine if primer is cured, wipe all bonding surfaces with a clean cheesecloth dampened with solvent.

**NOTE:** If not cured, BR 127 primer will come off with a moderate wipe.

(22) Continue with primer cure cycle until no traces of primer exist on wiper.

(23) If patch is not bonded within 168 hours after cure, the primer must be removed and cleaning and priming operation started over.

**WARNING:** ENTRAPPED MOISTURE CAN EXPAND RAPIDLY DURING THE HIGH TEMPERATURE BOND CURE CYCLE. ENSURE THAT ALL MOISTURE HAS BEEN REMOVED FROM THE DAMAGED ASSEMBLY PRIOR TO INITIAL HEAT CYCLE.

(24) After all condensation has stopped forming on protective bag, remove EA 9628 adhesive and cut one layer to extend 0.25 - 0.30 inches beyond patch.

(25) Cut addition layers of adhesive as determined during sanding operation.

(26) Return adhesive to protective bag, reseal and store in a cool dry place.

**NOTE:** Do not refreeze adhesive unless repair cannot be accomplished within the next 8 hours. Discard all unused adhesive in an approved hazardous waste container.

(27) Apply EA 9628 adhesive to assembly bond surface.

(28) Starting at aft end, work patch down so entrapped air can escape.

(29) Adhesive is to overlap 0.25 - 0.30 inches beyond edge of patch.

(30) Use small pieces of flashbreaker or 3M - 855 tape to hold patch in place.

(31) Working from center towards edge of patch, use a roller to apply pressure over entire surface of patch.

(32) Install vacuum bag and support equipment. See Pressure Application Examples Using Clamps, Dead Weights and Vacuum Bag, 51-79-10, Repair.

(33) Verify leak rate is no greater than 1 inch Hg per minute.
Using a heat up rate of 1° - 7°F / minute, cure at 240° ±10° F for 90 - 100 minutes.

Cool down rate is 1° - 7°F / minute under full vacuum.

**NOTE:** Cure time starts when lagging thermocouple reaches 240°F temperature.

After cure lightly sand off excess adhesive build up using 240 - 320 grit paper.

Seal any open butt gaps with either the repair adhesive used or Proseal 895. See Aerodynamic Sealant Compound, 51-21-00, Repair or Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.

Perform Nondestructive Testing (NDT) to check for voids.

Total void area less than 0.50 square inches and not extending to edge of patch are acceptable.

Apply Alodine 600 to patch and surrounding surfaces. See Chromate Conversion Coating of Aluminum Alloys, 51-21-00, Repair.

Blend in patch with skin using EC 1751 or approved sealant. See Approved Repair Adhesive Charts, 51-34-00, General, Aerodynamic Sealant Compound, 51-21-00, Repair or Sealing of Surfaces for Aerodynamic Smoothness, 51-14-00, Repair.

Apply Alodine. See Chromate Conversion Coating of Aluminum Alloys, 51-21-00, Repair.

Apply two coats of epoxy primer. See Epoxy Primer Coating - Preparation and Application (Including Finish 2012), 51-07-10, Repair or Waterborne Epoxy Primer - Preparation and Application (Finish 3012), 51-07-10, Repair.

Apply customer topcoat if required. See Surface Preparation and Painting Procedure, 51-07-10, Repair.

Comply with any applicable balancing requirements. Refer to Aircraft Maintenance Manual.
Trailing Edge - Filler Injection
Figure 214

Flashbreaker / Tape Application
Figure 215
Trailing Edge - Filler Injection Locations
Figure 216

29566C00