PNEUMATIC SURFACE DEICE - MAINTENANCE PRACTICES

1. General

A. Pneumatic surface deice maintenance practices consist of pneumatic deice boot removal/installation, adjustment/test, approved repairs, and component removal/installation.

2. Tools, Equipment and Materials

A. Refer to Ice and Rain Protection - General, for required tools, equipment and materials

3. Preparation for Installation of Deice Boot

A. Requirements.

(1) Fill all gaps and metal mismatches with Type I aerodynamic fairing compound and sand smooth. Brush chem film on bare metal areas where chem film was removed during sanding process.

(2) Adhesives, primers and coatings shall not be used beyond original expiration date, even if they have been retested and approved. Jelled or contaminated adhesives shall not be used.

(3) Do not use EC776 or EC1300L adhesives for deice boot installation if adhesives have been stored for six months or more in the 80°F to 90°F range. Do not use for boot installation if the adhesives have been stored for 5 days or more at temperatures above 90°F.

(4) Containers for adhesives, primers and coatings shall be kept tightly closed when the materials are not being used, unless otherwise specified.

(5) Preassembly operations, such as fitting, drilling, deburring, punching, trimming, masking, etc., shall be completed prior to cleaning and bonding. Slight tensioning of deice boot may be required when reducing internal pressure to remove minor wrinkles and to obtain a smooth surface both for adhesive application and installation. An air ejector or jet pump shall be used to reduce the internal pressure of the boot to 10 Hg absolute pressure or less during cleaning and bonding of deice boot.

(6) Surfaces must be clean and dry, free from dust, lint, chips, grease, oil, condensation or other moisture, as well as other contaminating substances, prior to application of adhesives, primers, coatings, and ice release promoters.

(7) Deice boots and wing leading edge shall be cleaned with Methyl n-Propyl Ketone.

(8) All paints, lacquers, etc., shall be removed prior to cleaning and bonding. Primed surfaces shall be cleaned with ScotchBrite pads wetted with Methyl n-Propyl Ketone, then solvent wiped.

(9) Cleaning and bonding shall not be accomplished when temperature of structure, deice boots or bonding materials is below 60°F, nor when relative humidity is 90 percent or greater.

(10) Faying surfaces shall be placed together while one or both surfaces exhibit an aggressive tack. Bonding must be accomplished before adhesive becomes too dry.

(11) Adhesive bonds shall be free of wrinkles and entrapped air bubbles, shall not be loose at edges, nor exhibit poor adhesion. Wrinkles in boots, which prevent acceptable installation, may be removed.

(12) To prevent damage to deice boots, do not use metal hand stitcher roller over areas of boot with internal tubes or wires.

(13) Airplane may be flown one hour after installation/bonding deice boots, provided the boots are not operated for 48 hours following bonding.

(14) Adhesives, primers and coatings shall be stirred thoroughly prior to application.

B. Surface Treatment.

(1) Waxes or wax like materials shall not be used on deice boots. Rubber protective agents/ice release promoters such as Age-Master Number 1, Icex, Acroseal, ShineMaster Prep and ShineMaster are the only acceptable surface treatments for deice boots. Refer to Chapter 12, Deicing - Maintenance Practices.

C. Positioning.

(1) Indexing marks shall be placed on metal surface outside of bonding area or a chalk line shall be snapped lengthwise down bonding area approximately on centerline of leading edge. Faying surface of boot shall be marked in a similar manner to provide for correct alignment during installation and attachment of boot. Intensify chalk line on leading edge and reference line on boot using a felt tip marking pen after first application of adhesive is thoroughly dry.

(2) Deice boot or a pattern shall be positioned on metal surface to which boot is to be bonded to provide a guide for masking and to check boot fit.

(3) Leaving an edge margin of approximately one-half inch from boot or pattern, a single strip of one-inch wide masking tape shall be applied to metal surface around periphery of boot or pattern. Masking shall be accurate so clean up time will be minimal. Boot or pattern shall then be removed.

D. Cleaning.

NOTE: All bare metal surfaces shall be brush coated with Iridite Chemical Film prior to adding aerodynamic smoothing compound or adhesive.

(1) All paint in masked off area shall be removed by sanding. Primed surfaces shall be cleaned with ScotchBrite pads wetted with Methyl n-Propyl Ketone, then solvent wiped. Loosened paint and remover shall be wiped off, thoroughly rinsed with clean water and dried with clean cheesecloth.

(2) All surfaces to be bonded shall be clean and dry.

(3) If no primer is present in area area, lightly abrade metal surface using ScotchBrite pads.

(a) Using air ejector or jet pump, reduce pressure in boot to 10 inches of mercury (absolute) or less, smooth surface on back side of boot.

(b) Using a clean cloth moistened with Methyl n-Propyl Ketone, scrub metal surface in masked off area and rough, unglazed faying surface of deice boot. Cloth must not be saturated to the point where dripping will occur.

(c) Using a clean cloth, wipe Methyl n-Propyl Ketone from surfaces before evaporation to ensure oils, grease, wax, etc., will not be redeposited.

(4) Cleaning solvent must never be poured or sprayed on a structure.

(5) Final cleaning shall be accomplished immediately prior to bonding. Previously cleaned areas shall be thoroughly recleaned. As an area is being scrubbed with a moistened cloth in one hand, another clean dry cloth shall be held in opposite hand and used to dry area before solvent evaporates.

(6) Bonding procedures shall begin as soon as possible after cleaning and drying surfaces. Do not allow handling of surfaces between cleaning and bonding operations.

(7) Caution must be observed during cleaning and bonding. Solvents, adhesives, etc., are toxic and flammable. Fresh air masks and/or adequate ventilation are required for all closed areas. Structure shall be electrically grounded before beginning any cleaning or bonding operation.

4. Preparation and Application of Fuel Barrier

A. Procedure.

(1) Adhesive EC776 must be thoroughly stirred prior to application as a barrier coat. A small amount of Methyl n-Propyl Ketone may be added to EC776 to achieve a more applicable consistency. One uniform coat of barrier shall be brushed over all rivet heads which penetrate the integral fuel tank and allowed to dry thoroughly until it does not have any tack. Apply a second uniform coat and allow to dry a minimum of two hours.

5. Preparation and Application of Bonding Material

A. Procedure.

WARNING: Cement and solvent vapors are toxic and extremely flammable. Use only in a well ventilated area away from sparks or vapors. Excess exposure could cause injury or death. If dizziness or nausea occur, obtain fresh air immediately. Avoid contact with skin or eyes. Use solvent resistant gloves to minimize skin exposure. Use safety glasses to minimize chance of eye contact. If eye contact occurs, flush eyes with water for 15 minutes and see a physician. If skin contact occurs, wash thoroughly with soap and water. If swallowed, do not induce vomiting. See a physician immediately.

WARNING: Verify aircraft is electrically grounded to prevent static sparks which could ignite solvent vapors.

(1) Adhesive EC1300L must be thoroughly stirred prior to application. A uniform coat of adhesive shall be brushed onto masked off metal surface and onto faying surface of deice boot. When brushing adhesives on, use good quality, clean nylon brushes. Avoid hot air drafts from heaters or fans which can cause dragging and produce a very rough surface. Adhesive shall be allowed to dry thoroughly and shall not exhibit any tack. A second uniform coat of adhesive shall be brushed onto each faying surfaces and allowed to dry thoroughly and shall not exhibit tack.

NOTE: Minimum drying time is one hour at 77°F and 50 percent relative humidity. Lower temperatures and/or higher humidities require longer drying times.

(2) Dry adhesive shall be covered and kept clean until reactivated. Adhesive shall be reactivated within 48 hours by

wiping lightly with clean cheesecloth, slightly moistened with Methyl n-Propyl Ketone (MPK) solvent. Only a small area, approximately 3 inches by 18 inches or less, shall be reactivated at one time. Do not allow adhesive to become too dry before placing deice boot in contact with metal surface. Excessive rubbing or solvent usage shall be avoided to ensure adhesive will not be removed.

6. Pneumatic Deice Boots Removal/Installation

WARNING: Cement and solvent vapors are toxic and extremely flammable. Use only in a well ventilated area away from sparks or vapors. Excess exposure could cause injury or death. If dizziness or nausea occur, obtain fresh air immediately. Avoid contact with skin or eyes. Use solvent resistant gloves to minimize skin exposure. Use safety glasses to minimize chance of eye contact. If eye contact occurs, flush eyes with water for 15 minutes and see a physician. If skin contact occurs, wash thoroughly with soap and water. If swallowed, do not induce vomiting. See a physician immediately.

WARNING: Verify aircraft is electrically grounded to prevent static sparks which could ignite solvent vapors.

A. Remove Pneumatic Deice Boot.

(1) Apply Methyl n-Propyl Ketone (MPK) solvent along bond line of deice boot. Solvent will soften and undercut adhesive.

CAUTION: Do not use excessive amounts of solvent. Do not apply excessive tension to the deice boot.

(2) Carefully apply tension to deice boot while applying solvent to bond line, then peel deice boot from airplane. Removal process should be slow enough to allow solvent to undercut the adhesive to ensure boot will not be damaged.

(3) Separate hose from deice boot.

B. Install Pneumatic Deice Boots (Refer to Figure 201).

(1) Verify type of pneumatic deice boot to be installed.

NOTE: Fastboot pneumatic de-ice boots incorporate a bonding system with a unique pressure sensitive adhesive applied to the de-icer bond side in the manufacturing process. For fastboot installation refer to the instructions included with each boot or refer to the manufacturer's installation instructions listed in Introduction - List of Publications.

(2) Clean mating surfaces of airplane and deice boot to be bonded. Refer to Preparation for Installation of Deice Boot, Cleaning.

NOTE: Use removed boot bond line as a guide for cleaning paint surface to which boot adheres.

(3) Identify position and location of deice boot on airplane. Refer to Preparation for Installation of Deice Boot, Positioning.

(4) Repeat applicable cleaning requirements. Refer to Preparation for Installation of Deice Boot, Cleaning.

(5) Apply fuel barrier. Refer to Preparation and Application of Fuel Barrier.

(6) Apply bonding material. Refer to Preparation and Application of Bonding Material.

(7) Attach hoses, connected to a vacuum source (air ejector or jet pump), to deice boot nipples with clamps.

(8) Route hose and nipple through skin. Attach vacuum to open end of hose and activate vacuum. Reduce pressure in boot to 10 inches of mercury (absolute) or less. Maintain vacuum in boot throughout entire installation process to inhibit amount of air trapped within deice boot during installation.

(9) Ensure smooth outer surface of boot is clean, then roll boot up with adhesive side out, starting from end opposite air connections.

(10) Position boot with reference centerline aligned with and against reference centerline on leading edge. Ensure air connections match airfoil holes. Ensure hoses are routed through correct holes to prevent improper inflation sequence. Each hose must be centered in its mating hole and not crimped. Clamp each hose to respective air supply tube to maintain proper positioning.

(11) Using a clean wiping cloth dampened with Methyl n-Propyl Ketone (MPK), reactivate adhesive on a 2 to 3 inch wide by approximately 18 inch long section on wing leading edge, outboard from air connections. Reactivate a matching section of adhesive on boot and press boot to leading edge, ensuring reference centerlines coincide and each air connection is centered on its mating hole in leading edge.

(12) Using a rubber roller, roll boot down firmly against leading edge skin in reactivated area. Be careful not to trap any air under boot. Distortion of boot shall be held to a minimum.

NOTE: Reactivating adhesive is a very critical step in achieving a good bond. After cloth is thoroughly

saturated with MPK, remove excess by squeezing, wringing, and/or snapping. A properly prepared cloth should be damp, but not wet or dripping. Reactivating both surfaces will help assure 100 percent tack when pressing down and rolling boot. When in doubt, check tack with a finger before rolling boot down.

(13) Repeat steps 6.B.(10) and (11) along leading edge on inboard end of boot. Reactivate and install area around each air connection hole. Use metal stitcher roller around each air connection.

(14) Complete installation of boot along leading edge.

(a) Reactive adhesive on leading edge and boot 2 to 3 inches wide and an additional 2 feet to 3 feet outboard.

(b) Unroll boot against leading edge, maintaining light tension on boot to prevent wrinkling. Align reference centerlines of boot and leading edge.

(c) Roll boot down firmly with rubber roller. When outboard edge of boot is reached, roll it down with metal stitcher roller.

(d) After entire length has been bonded at centerline of leading edge, roll reactivated area again using rubber roller.

NOTE: Installation along leading edge is best accomplished using two persons; one to hold and guide boot during installation, the other to reactivate adhesive and roll boot down.

(15) If boot should attach "off-course" (reference centerline on leading edge not coinciding with reference centerline on boot), apply Methyl n-Propyl Ketone (MPK) with a small brush or squirt bottle to soften bond line.

(a) Apply only a small amount of MPK while applying sufficient tension to peel back softened adhesive.

(b) To prevent damage to the boot, avoid twisting, sharply bending, or jerking boot loose from bonded area. Allow solvent wetted area to dry thoroughly before continuing with applications. Reapply EC1300L adhesive as needed.

(16) After boot is bonded along leading edge centerline, begin to reactivate adhesive on either the upper or lower surface and install remainder of boot.

(a) Starting at inboard end, hold boot back to reveal bond line.

(b) Using a clean cloth dampened with MPK, wipe adhesive on leading edge, 2 to 3 inches wide by approximately 18 inches long. Wipe corresponding area of boot, keeping damp cloth tight into fold of bond line. To avoid trapping air, do not allow reactivated surfaces to touch until they are rolled down.

NOTE: Maintain bond line as straight as possible, allowing bond line to be more closely monitored and aid in eliminating pockets where air can be trapped.

(c) Roll reactivated area firmly with rubber roller, starting at bond line and rolling with span while working toward outboard end of boot. Roll boot, leaving an open angle at end of reactivated section of boot to permit easy access for reactivating next section.

(d) Constantly check for bubbles and poor adhesion as installation progresses. Rework problem areas as soon as they are discovered.

(e) As outboard edge is achieved for each 2 to 3 inches of width, roll it down with metal stitcher roller.

1 If boot lifts after rolling and/or adhesive shows a "cobweb" appearance, adhesive is too wet. Wait until adhesive becomes tacky and reroll.

(17) Run a Methyl n-Propyl Ketone (MPK) dampened cloth along each span edge of the boot which has previously been rolled down with rubber roller. Immediately roll edge with metal stitcher roller.

(18) Using a sharp knife, trim inboard edge of boot to butt against adjacent structure.

(19) Apply wash primer to area around periphery of boot. Coverage area shall include entire exposed adhesive surface and approximately 0.50 inch margin on the boot itself. Wash primer shall be allowed to dry a minimum of one hour.

NOTE: Black polyurethane enamel may be applied as an alternate to 78-U-1003 and U-1001 edge seal in applications where a greater luster and gloss is desired. Refer to Tools, Equipment and Materials approved polyurethane enamels.

(20) Using manufacturer's instructions, mix edge seal coating components, 78-U-1003 black enamel and U-1001 catalyst, for application over washer primer. If black polyurethane enamel is utilized, apply per manufacturer's instructions.

NOTE: Edge seal components, 78-U-1003 and U- 1001, are packaged together in a kit and are to be

mixed in a ratio of two parts black enamel to one part catalyst. Edge seal is to be thoroughly stirred prior to application.

(21) Apply a uniform film of coating around periphery of the deice boot to edge seal and dress up appearance. Coverage shall include the entire wash primed area.

(22) Remove the masking tape immediately following application of coating.

NOTE: Edge sealing shall be accomplished after final paint to aid in protecting leading edge paint from erosion.

(23) Attach hose to air line with clamp.

(24) Ensure bleed air tubes are sealed with RTV106 wherever they pass through a rib panel.

(25) Secure access panel and heated wing leading edge panel.

(26) Airplane may be flown one hour after installing a deice boot, provided deice boots are not operated for 48 hours following bonding.

7. Pneumatic Deice Flow Control Valve Removal/Installation

A. Remove Pneumatic Deice Flow Control Valve (Refer to Figure 202).

NOTE: All three control valves are mounted on outboard side of left wing root. Each valve may be removed separately.

(1) Remove wing root access plate 511AB, located under left wing. Refer to Chapter 6, Access Plates and Panels Identification - Description and Operation.

(2) Ensure airplane electrical power is OFF.

(3) Tag for identification and remove electrical wires from solenoid (39) and pressure switch (22) on flow control valve being removed.

(4) Disconnect all lines at flow control valve (41) fittings.

(5) Plug and cap all open lines and fittings.

(6) Remove flow control valve (41) fittings if flow control valve is to be replaced.

(7) Remove screws (37) securing flow control valve (41) to bracket (40). Remove flow control valve from airplane.

B. Install Pneumatic Deice Flow Control Valve (Refer to Figure 202).

(1) Ensure airplane electrical power is OFF.

(2) Install fittings to flow control valve (41), if removed, and clock in proper direction.

(3) Position flow control valve (41) in place. install screws (37).

(4) Remove plugs and caps from lines and fittings and connect lines to flow control valve (41) fittings.

(5) Connect electrical wires and remove tags.

(6) Install wing root access plate 511AB under left wing. Refer to Chapter 6, Access Plates and Panels Identification - Description and Operation.

8. Pneumatic Deice Pressure Switches Removal/Installation

A. Remove Pneumatic Deice Pressure Switches (Refer to Figure 202).

NOTE: Three pressure switches are mounted in left wing root area. Each pressure switch is installed in line, downstream of flow control valves, and may be removed separately.

(1) Ensure airplane electrical power is OFF.

(2) Remove wing root access plate 511AB, located under left wing. Refer to Chapter 6, Access Plates and Panels Identification - Description and Operation.

(3) Determine which pressure switch (22) is to be removed. Tag for identification and remove electrical wires from pressure switch.

(4) Rotate pressure switch (22) counterclockwise until fully disengaged from block (23) and remove from airplane.

(5) Plug block (23) to prevent entry of foreign material.

B. Install Pneumatic Deice Pressure Switches (Refer to Figure 202).

(1) Ensure airplane electrical power is OFF.

(2) Remove plug from block (23).

(3) Position pressure switch (22) to block (23) and rotate clockwise until fully seated.

(4) Identify electrical wires, remove tags and connect to pressure switch (22).

(5) Install wing root access plate 511AB under left wing. Refer to Chapter 6, Access Plates and Panels Identification - Description and Operation.

9. Pneumatic Deice Timer Removal/Installation

A. Remove Pneumatic Deice Timer (Refer to Figure 202).

NOTE: Timer (26) is mounted on outboard side of left wing root.

(1) Remove wing root access plate 511AB, located under left wing.

(2) Ensure airplane electrical power is OFF.

(3) Disconnect electrical connector (27) from timer (26).

(4) Remove four screws (25) securing timer (26) to wing root and remove from airplane.

B. Install Pneumatic Deice Timer (Refer to Figure 202).

(1) Align timer (26) with nutplates in wing root.

(2) Install four screws (25) to secure timer (26).

(3) Connect electrical connector (27) to timer (26).

(4) Install wing root access plate 511AB under left wing. Refer to Chapter 6, Access Plates and Panels Identification - Description and Operation.

10. Bleed Air System Pressure Regulator Removal/Installation

NOTE: For removal/installation of pressure regulator, refer to Chapter 36, Pneumatic Distribution - Maintenance Practices.

11. Pneumatic Deice System Adjustment/Test

NOTE: Use filtered, regulated shop air to perform the following tests. Refer to Chapter 36, Pneumatic Distribution - Maintenance Practices, for procedures on connecting shop air to pneumatic system. If shop air is not available, the following warning must be complied with.

WARNING: In order to perform some of the following test procedures, the engine must be operating. Do not stand or allow anyone else to stand close to the arc of the airplanes propeller while conducting these test procedures.

A. Electrical Test.

(1) Engage deice boot circuit breaker.

(2) Place deice boot press switch to OFF (center) position.

(3) Position battery master switch to ON.

(4) Press annunciator panel test switch to check light circuit and lamps.

(5) With engines running, momentarily position deice boot press switch to AUTO (up) position and verify following conditions are exhibited sequentially.

(a) Boots on vertical fin and horizontal stabilizers inflate for a period of six seconds.

(b) Boots on inboard wings inflate for a period of six seconds.

(c) Boots on outboard wings and wing struts inflate for a period of six seconds.

(d) System deactivates.

(6) Repeat step 12.A.(5) and verify deice pressure light, located on annunciator panel, remains illuminated for a period of six seconds during each of the three sequential cycles and extinguishes momentarily between cycles.

(7) Position and hold deice boot press switch to manual (down) and verify all boots inflate simultaneously and deice pressure light illuminates.

(8) Position wing light switch to ON (up) and verify ice detector light is illuminated.

(9) Shut off engine.

B. Pneumatic Deice System Conductivity Test.

NOTE: This test will apply a voltage charge directly to the surface of deice boot and measure resistance to airplane structure to determine if the resistance is within a specified megohm range.

(1) Obtain a megohmmeter capable of applying 500 volts and set to 500 volts.

(2) Place a wetted cloth, approximately the size of a paper towel, over surface of deice boot.

(3) Place one probe of megohmmeter in contact with cloth.

(4) Place other probe in contact with an exposed rivet head near point of contact with first probe.

NOTE: Do not apply second probe to a painted rivet head, as it needs to make good contact with structure. It may be necessary to open an inspection panel and use a screw or rivet inside wing.

(5) Obtain three measurements along length of wing boots.

(6) Obtain two measurements along tail and strut boots.

(7) Ensure measurements are all less than 1 megohm to approximately 10 megohms. Maximum allowable measurement is 100 megohms.

(8) If a boot reading above 100 megohms is present, boot must be replaced.

C. Pneumatic Deice System Timer Test.

(1) Check for system voltage between pins 3 and 1 of deice timer with deice switch OFF. Verify voltage is indicated.

(2) Check for system voltage between pins 6 and 1 of deice timer with deice switch ON. Verify voltage is indicated.

(3) Check for system voltage between pins 8 and 1 of deice timer with deice switch ON. Verify voltage is indicated as timer cycles.

(4) Check for system voltage between pins 9 and 1 of deice timer with deice switch ON. Verify voltage is indicated as timer cycles.

(5) Check for system voltage between pins 7 and 1 of deice timer with deice switch ON. Verify voltage is indicated as timer cycles.

(6) If system voltage is not present between any of pins tested, timer is defective and must be replaced. Refer to Pneumatic Deice Timer Removal/Installation.

(7) Place all switches in OFF position.

D. Air Leakage Test.

NOTE: Air leakage test can be performed in engine compartment.

(1) Disconnect air pressure supply line from engine bleed air system pressure regulator (outlet side).

(2) Disconnect vacuum hoses from vacuum regulator, located on aft side of firewall. Remove vacuum regulator and cap line.

(3) Remove vacuum ejector and install a union and cap.

(4) Connect a source of clean air to end of supply line.

NOTE: Inlet pressure must be a minimum of 18 to 20 PSIG to perform this test. Include a pressure gage in air line to observe system pressures.

(5) Disconnect electrical power leads from each of three flow control valve solenoids.

NOTE: For testing and troubleshooting, one flow control valve solenoid may be actuated at a time to test and isolate each system.

(6) Apply 18 PSI pressure to system and, by means of an in-line hand operated valve, trap pressure in deice system. Observe system for leakage and verify leakage rate does not exceed a pressure drop of 3.0 PSI per minute.

(7) Ensure all deice boots inflate and no leaks are present.

(8) Remove test equipment. Lubricate all threads and connect all previously disconnected components.

(9) Remove the 28 VDC electrical source from flow valves and reconnect airplane electrical system.

12. Cleaning

CAUTION: Only use the instructions in this section when you clean deice/anti-ice boots. Disregard instructions which recommend petroleum base liquids (methyl n-propyl ketone, unleaded gasoline, etc.) which can harm the boot material if you allow it to soak on the material.

A. Clean boots with mild soap and water, then rinse them thoroughly with clean water.

NOTE: Isopropyl alcohol or toluene can be used to remove grime which cannot be removed with soap. If isopropyl alcohol or toluene is used for cleaning, wash each area with mild soap and water, then rinse the area thoroughly with clean water and allow the boots to dry completely.

B. Apply a layer of Age Master No. 1 on each wing and stabilizer leading edge deicing boot in accordance with the Age Master No. 1 application instructions, every 150 flight hours or six months, regardless of the operation status or climatic conditions.
Apply a coating of Age Master No. 1 to the boots in accordance with application instructions on the container and allow the boots to dry.

NOTE: Age Master No. 1 is beneficial for its ozone and weather resistance features.

C. After boots have been treated with Age Master No. 1, apply a coating of ICEX II to the boots in accordance with application instructions on the ICEX II container.

NOTE: ICEX II may be beneficial as an ice adhesion depressant. Both Age Master No. 1 and ICEX II are distributed by BFGoodrich Company.

(1) Apply a layer of ICEX II every 50 flight hours or less on the leading edge deicers; apply a layer every 15 hours or less on the propeller boots.

CAUTION: ICEX II contains silicone, which lessens paint adhesion. Use care when applying ICEX II and protect the adjacent surfaces from overspray. An overspray of ICEX II will make touchup painting almost impossible. AGE MASTER No. 1 and ICEX II last approximately 50 hours on wing and stabilizer deice boots and 15 hours on propeller anti-ice boots.

13. Approved Repairs (Cold Patch)

NOTE: Surface coatings and surface refurbishing kits will not repair leaks. Use repair kit materials. When repairing deice boots utilizing patch, exercise care to prevent trapping air beneath patch. Should air blisters appear after boots have been installed for a length of time, it is permissible to cut a slit in deice boot. Slit and repair are only appropriate if blister is a result of surface ply delamination. If blister is a result of debonding or stitch line failure, this repair is not appropriate. If it is a delamination air blister, it is recommended that slit be no larger than 0.75 inch, or within 0.125 inch of a stitch line, otherwise deice boot should be replaced. An alternate method of repair is to peel deice boot back using Methyl n-Propyl Ketone solvent and reapply using normal adhesives.

A. Repair surface damage using 74-451- AA Universal Repair Kit. Repair instructions are provided with each individual package of patches. Refer to Ice and Rain Protection - General, Tools, Equipment and Materials.

B. Repair pinholes using 74-451-AE Pinhole Repair Kit. Repair instructions are provided with each individual package of patches. Refer to Ice and Rain Protection - General, Tools, Equipment and Materials.

14. Pneumatic Deice Boot Winterization Procedure

A. Winterize Deice Boots.

(1) Winterizing pneumatic deice system several weeks prior to flight into freezing weather, followed by periodic maintenance during freezing season, improves reliability, while reducing chance of moisture freezing within deice boots.

(2) Moisture can enter deice system through unrepaired pin size holes, cuts or abrasions when vacuum is applied to boots. Moisture can also be caused by condensation of compressor bleed air during boot activation. Accumulated moisture can pool at low points within system lines, fittings and valves and then freeze, causing blockage. Moisture in system can also result in deterioration and sticking of pneumatic deice flow control valves.

(3) Proper cleaning and treating procedures protect exterior surface of boots from ultraviolet rays and ozone exposure while retarding ice adhesion during flight. Refer to BFGoodrich Service Newsletter 91-015.

(4) Inspect deice boots for weathering, unglued edges and damage. Repair deice boots as required.

NOTE: All holes found in deice boots should be patched, as this is the first line of defense in preventing moisture entry into deice system; however, do not attempt to extend life of deice boots in poor condition. Replace deice boots which have numerous patches, deteriorated areas or holes.

(5) Work moisture out of strut deice boots.

(6) Work moisture from inboard and outboard wing deice boots.

(7) Drain moisture from supply lines located inside left inboard wing access panel.

(8) Drain stabilizer deice supply line at cross fitting connection in tailcone.

(9) Perform an operational check of system after steps 15.A.(1) through (8) have been accomplished.

(10) Obtain filter/regulator/lubricator specified in Tools, Equipment and Materials. An equivalent substitute may be utilized.

(11) Mix a 50/50 solution of isopropyl alcohol (TT-I-735A) and Dow Corning 200, 100cs industrial grade fluid. Fill reservoir of lubricator with mixed solution.

(12) Disconnect deice supply line at elbow fitting, located inside cockpit at firewall, immediately forward of pilot's position. Connect and apply shop air supply to filter/regulator/lubricator and preset regulator for a maximum of 17 to 19 PSIG. Remove shop air supply and connect filter/regulator/lubricator to disconnected line using necessary adapter fitting(s).

NOTE: Attach filter/regulator/lubricator as close to disconnected supply line as possible for optimum lubricator operation.

(13) Remove access panel at inboard leading edge of left wing to expose pneumatic deice flow control valves. Temporarily install a hose on each valve outlet port for drainage collection.

(14) With regulator preset to 17 to 19 PSIG maximum pressure, connect shop air to inlet port on filter/regulator/lubricator and begin to apply 17 to 19 PSIG through lubricator containing mixed solution.

CAUTION: TT-L-735A isopropyl alcohol is flammable by itself or in mixture with Dow Corning 200, 100CS fluid. Do not allow Dow Corning 200 solution to come in contact with painted surfaces of airplane. Silicone based compounds, such as Dow Corning 200, will impair the ability to paint/refinish any surface it contacts.

(15) Look for solution drainage at hoses attached to outlets of pneumatic deice flow control valves to ensure solution (mist from lubricator) is being introduced into boots.

(16) Cycle deice boots for seven minutes to inject a fine mist of solution throughout deice system. Approximately 17 cycles will be required.

NOTE: Begin cycling boots as soon as shop air is connected. Wait six seconds after a cycle is complete and reactuate deice switch. When the system is not being cycled, mixture is being pumped directly through flow control valve, into discharge container. After cycling deice boots, watch for fluid weeping from pin size holes or cuts in boots. Mark locations of needed repairs. Repair holes immediately to avoid further moisture contamination.

(17) Shut off deice system and remove/disconnect lubricator from supply line. Allow supply line to drain, then reconnect supply line to filter/regulator/lubricator.

(18) Using hands or rollers, work boots to aid in coating inside surfaces. Work outboard to inboard on wing and stabilizer deice boots; bottom to top on strut deice boots.

(19) Operate deice boots again through five complete cycles to remove any pooling of solution.

(20) Disconnect drain hoses from pneumatic deice flow control valves. Disconnect filter/regulator/lubricator from supply line. Reconnect supply line to firewall fitting and restore deice system.

(21) Install access panel on inboard leading edge of left wing.

(22) Repeat procedure every 100 hours or as required throughout freezing season.

(23) To increase deice boot life and improve ice removal in flight, regularly wash boots with a mild soap and warm water. If necessary, isopropyl alcohol may be used to clean boot surfaces. Apply Age Master No. 1 every 150 hours or six months, regardless of operation status or climatic conditions. Apply Icex every 50 hours, or less, (every 15 hours or less on propeller boots) during icing season.

15. Pneumatic Flow Control Valves Disassembly/Cleaning/Assembly Procedure

A. Disassemble/Clean Pneumatic Flow Control Valve (Refer to Figure 202).

(1) Remove access panel 511AB on left inboard wing leading edge. Refer to Chapter 6, Access Plates/Panels Identification.

(2) Remove flow control valve (41). Note clocking of drain port and bracket to aid in reassembly. Refer to Pneumatic Deice Flow Control Valve Removal/Installation.

(3) Remove solenoid (65) from valve body assembly (57). Wrenches should be positioned on solenoid hex and on body

assembly wrench flats.

(4) Remove overboard reservoir assembly (63), compression washers (62) and bracket (59). Clean parts using isopropyl alcohol.

(5) Remove stainless ball (61) and spring (60). Clean parts using isopropyl alcohol.

(6) Remove pushrod (64) from solenoid (65), if not secured with epoxy, and clean using isopropyl alcohol.

(7) Check all fittings for tightness and ability to seal against leakage.

(8) Check and clean seats for compression washers (62) in overboard reservoir assembly (63).

CAUTION: Do not intermix parts between components. Parts removed from one component for cleaning must be reinstalled in the same component.

(9) Check seal of compression washers (62).

(10) Clean valve assembly components, except solenoid (65), using isopropyl alcohol.

(11) Check mounting brackets for cracks and damage.

(12) Check electrical wiring to solenoid assembly for evidence of wear and chafing.

(13) Using a soft brush, remove any dirt accumulated on solenoid (65), particularly in pushrod (64) area.

B. Assemble Pneumatic Flow Control Valves (Refer to Figure 202).

(1) If pushrod (64) has not previously been epoxied to solenoid, seat pushrod (64) in solenoid (65) and epoxy using EA9309 or equivalent. Mix adhesive per manufacturer's instructions. Remove excess adhesive from pushrod shaft and allow to cure per manufacturer's instructions.

(2) Install new compression washers (62).

(3) Lubricate all valve components, except solenoid (65), using full strength Dow Corning 200, 100cs lubricant. Ensure spring (60) and stainless ball (61) are thoroughly coated.

(4) Insert spring (60) and stainless ball (61) into overboard reservoir assembly (63).

(5) Assemble solenoid (65), overboard reservoir assembly (63), bracket (59) and valve body assembly (57). Torque per decal (58) located on valve body.

NOTE: Ensure overboard reservoir assembly (63) and bracket (59) are clocked correctly prior to torquing.

(6) Perform and operational test of flow control valves (41).

(a) Remove cover from top of solenoid (65) and depress plunger, while simultaneously checking movement of internal assembly at inlet port. Verify assembly shifts approximately 0.02 inch.

(b) Verify compression washer (62) provides sufficient seal to prevent random movement of overboard reservoir assembly (63) on bracket (59).

(c) Connect solenoid (65) to adjustable source of 28 VDC power.

(d) Apply rated pressure of 18 PSIG to valve inlet port. Verify vacuum is present at deicer port.

(e) Energize solenoid (65) and verify valve shifts such that pressurized air is directed to deicer port with none being dumped overboard.

(f) Adjust power with minimum 24 VDC and maximum 32 VDC. Energize solenoid (65) at each setting and verify valve shifts satisfactorily from vacuum to pressure supply at deicer port.

(7) Reinstall valve(s) on airplane. Refer to Pneumatic Deice Flow Control Valve Removal/Installation.

(8) Reinstall access panel 511AB on left inboard wing leading edge. Refer to Chapter 6, Access Plates/Panels Identification.

Figure 201 : Sheet 1 : Deice Boot Installation

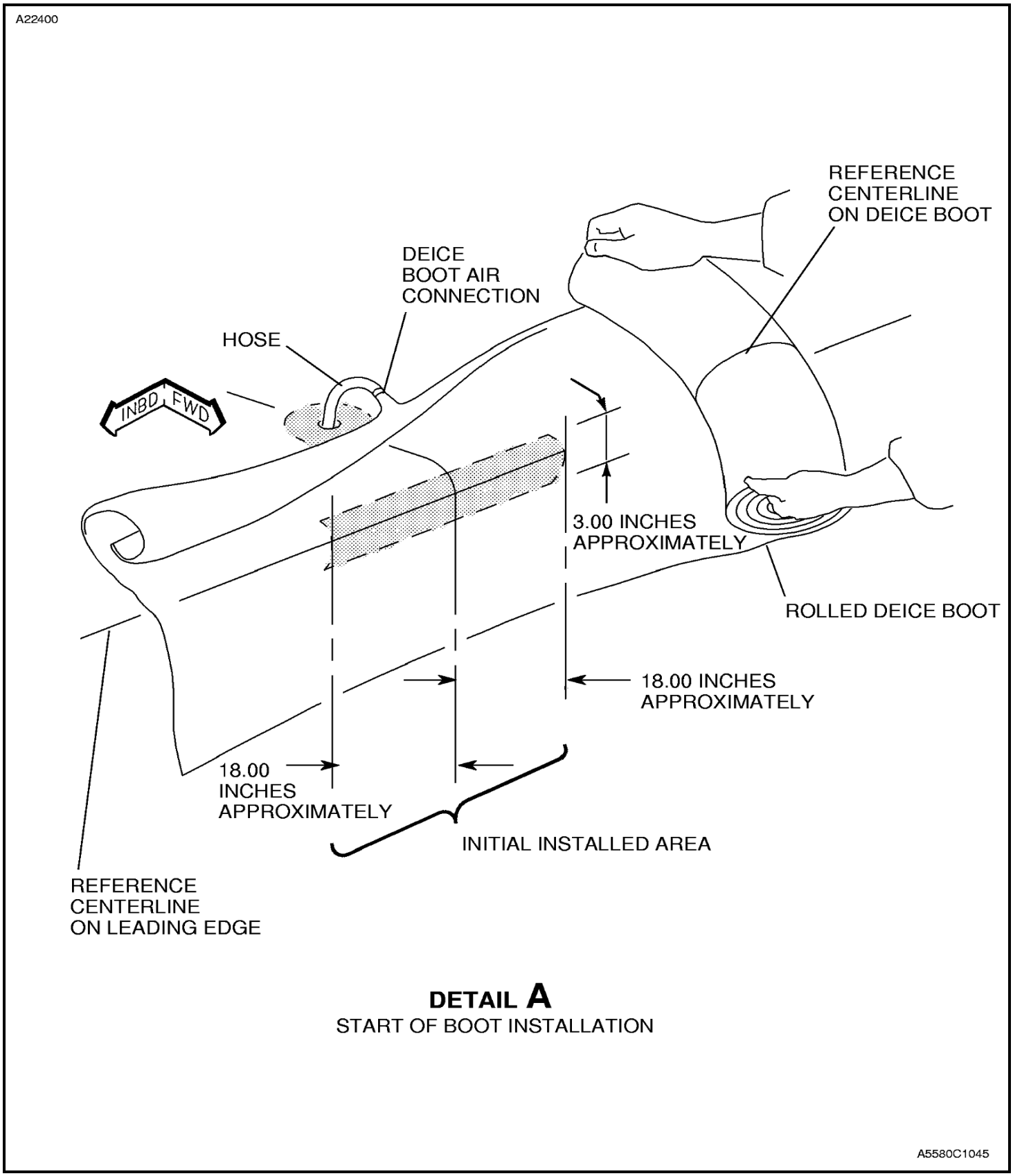


Figure 201 : Sheet 2 : Deice Boot Installation

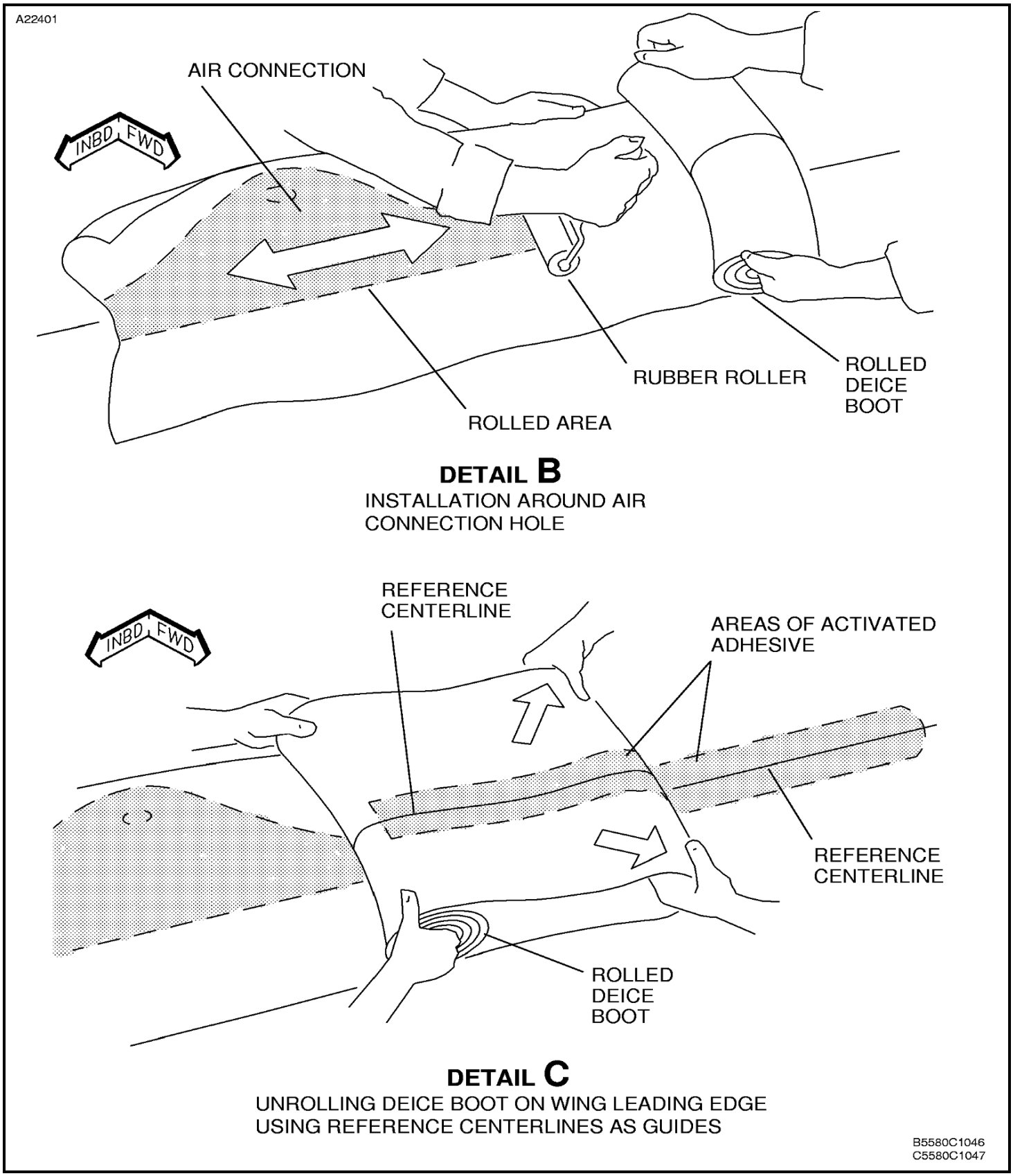
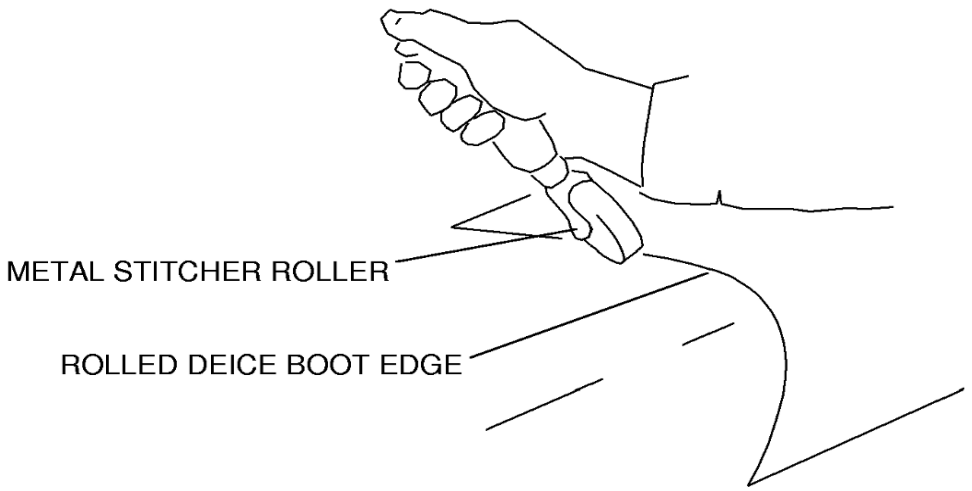
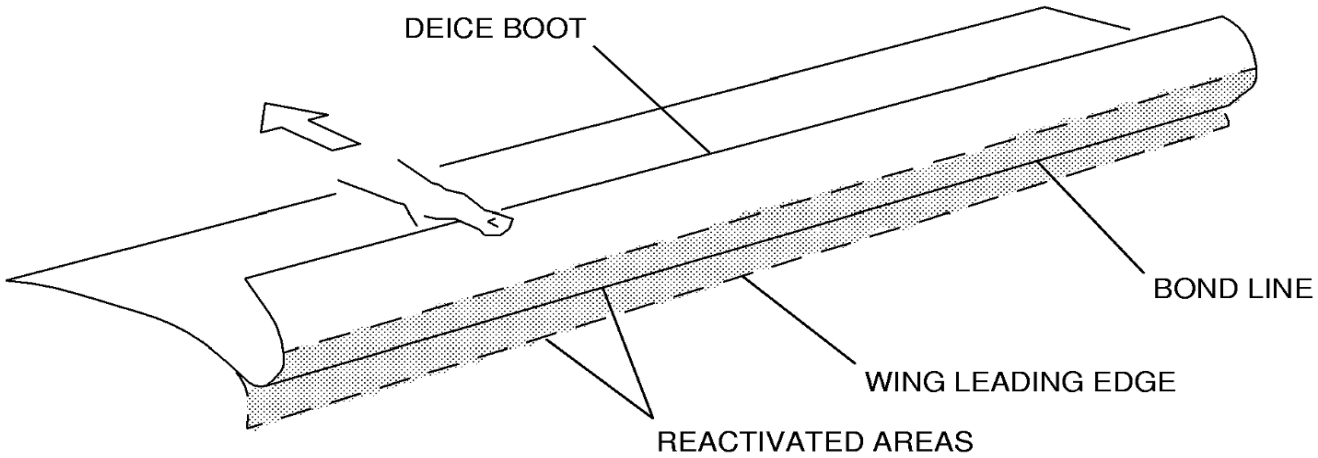


Figure 201 : Sheet 3 : Deice Boot Installation

A22402



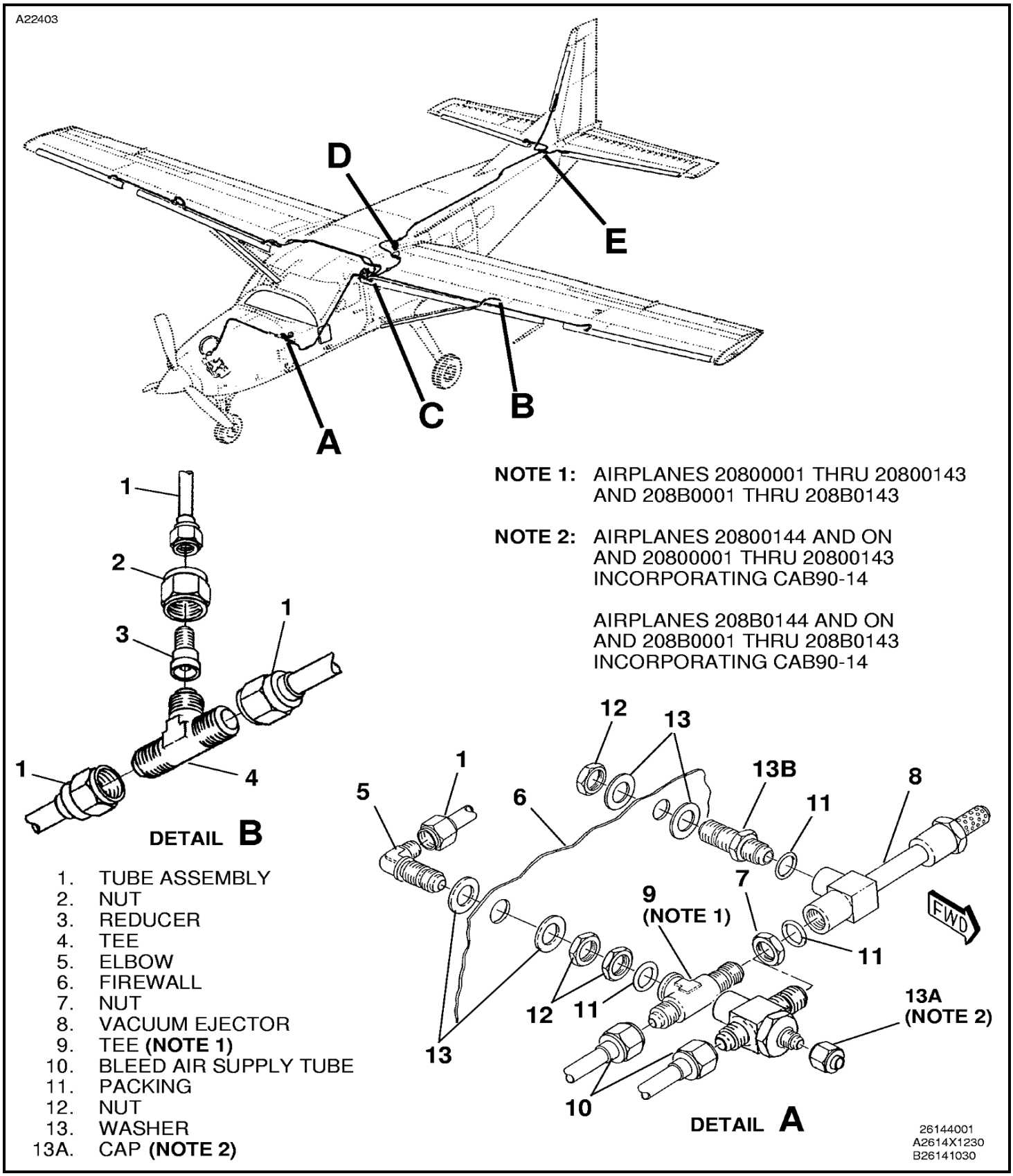
DETAIL D
ROLLING DEICE BOOT EDGE WITH
METAL STITCHER ROLLER



DETAIL E
EXPOSING BOND LINE FOR
ADHESIVE REACTIVATION

D5580C1048
E5580C1049

Figure 202 : Sheet 1 : Pneumatic Deice System Installation



1. TUBE ASSEMBLY
2. NUT
3. REDUCER
4. TEE
5. ELBOW
6. FIREWALL
7. NUT
8. VACUUM EJECTOR
9. TEE **(NOTE 1)**
10. BLEED AIR SUPPLY TUBE
11. PACKING
12. NUT
13. WASHER
13A. CAP **(NOTE 2)**

Figure 202 : Sheet 2 : Pneumatic Deice System Installation

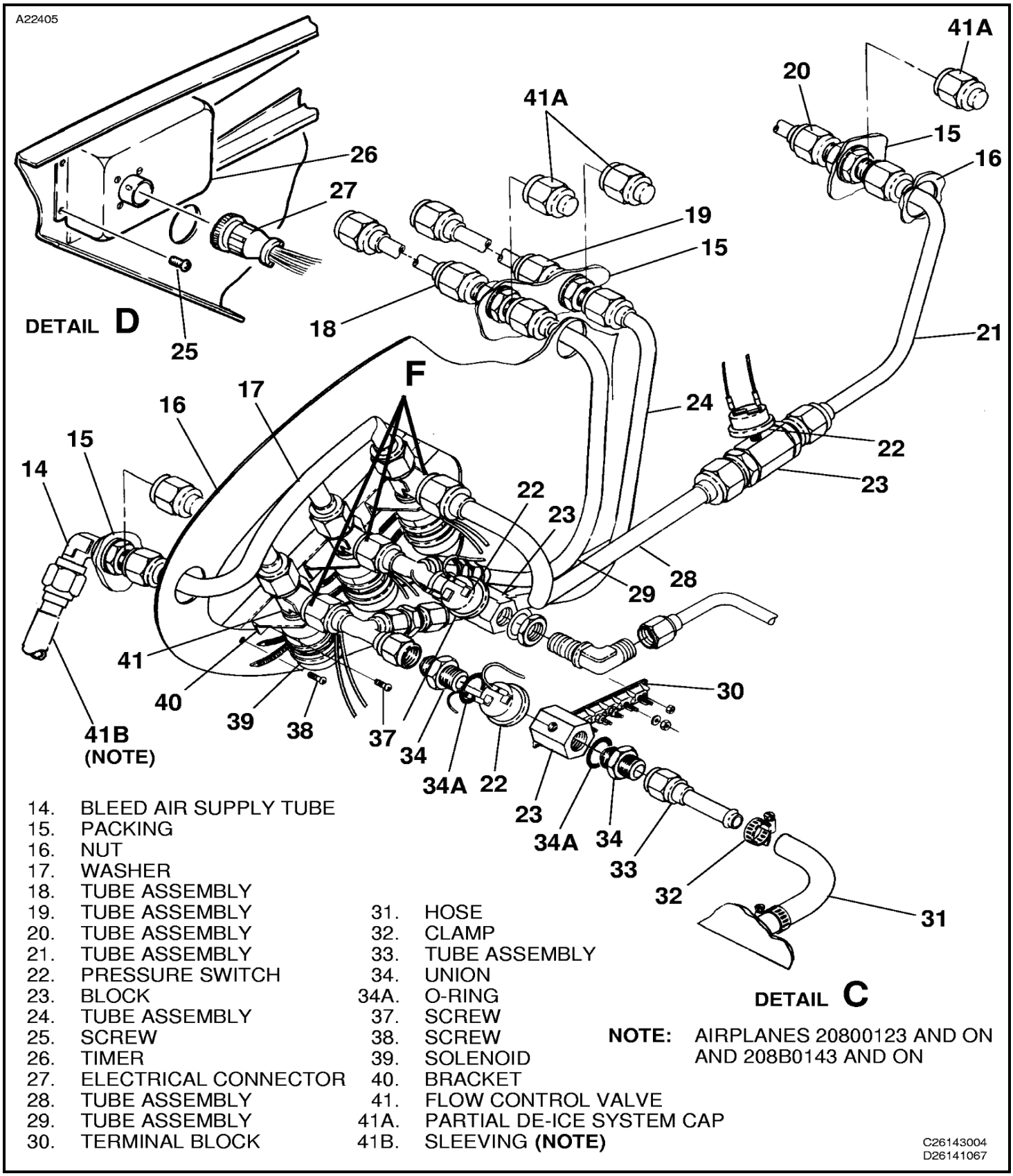
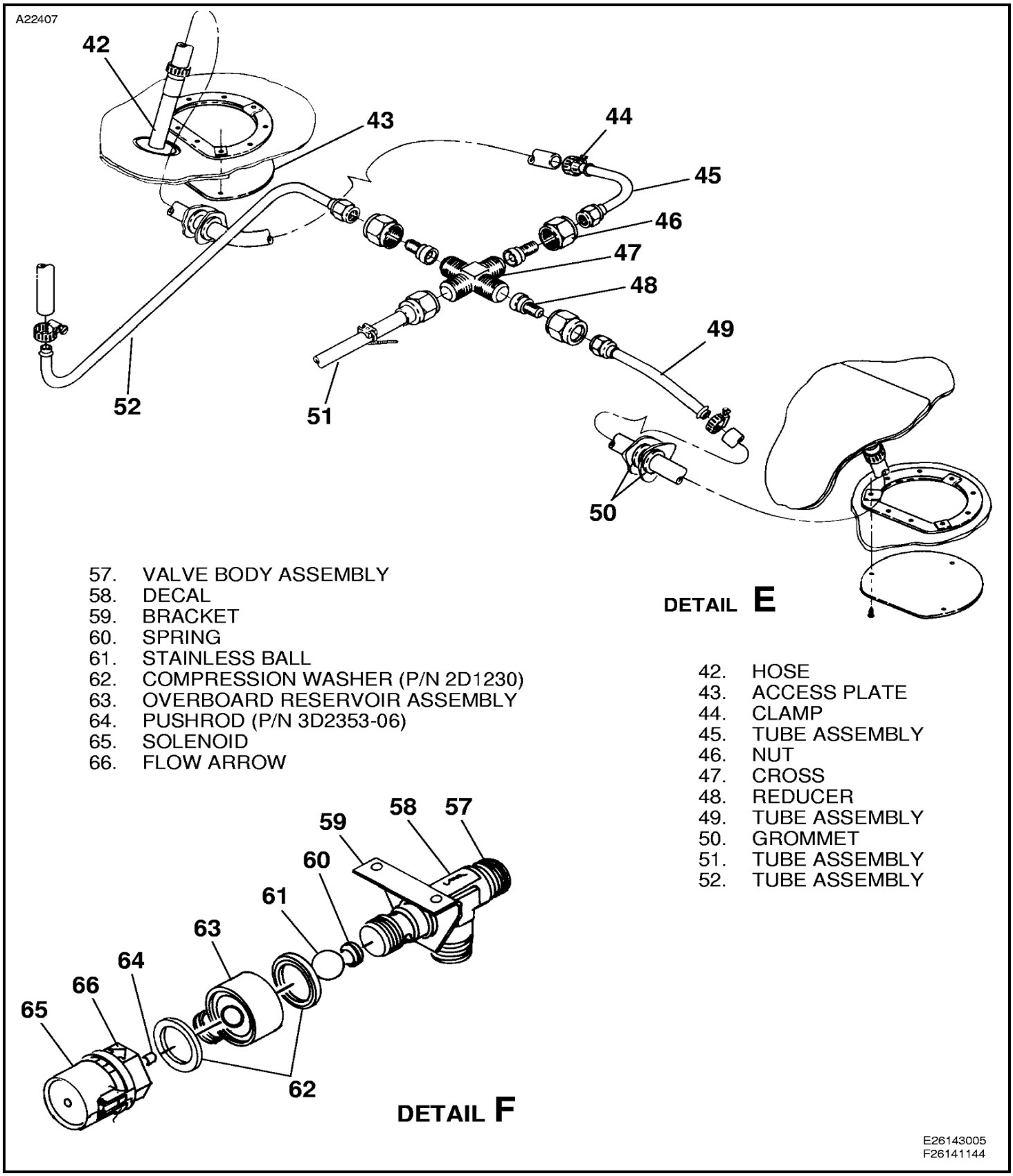


Figure 202 : Sheet 3 : Pneumatic Deice System Installation



57. VALVE BODY ASSEMBLY
58. DECAL
59. BRACKET
60. SPRING
61. STAINLESS BALL
62. COMPRESSION WASHER (P/N 2D1230)
63. OVERBOARD RESERVOIR ASSEMBLY
64. PUSHROD (P/N 3D2353-06)
65. SOLENOID
66. FLOW ARROW

42. HOSE
43. ACCESS PLATE
44. CLAMP
45. TUBE ASSEMBLY
46. NUT
47. CROSS
48. REDUCER
49. TUBE ASSEMBLY
50. GROMMET
51. TUBE ASSEMBLY
52. TUBE ASSEMBLY