CHAPTER 56

WINDOWS

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* Asterisk indicates pages revised, added, or deleted by the current revision. The portion of the text affected by the current revision is indicated by a vertical line in the outer margin of the page.

Revision Number	Status	Date	Location	Insertion Date	Inserter's Initials	Removal Date	Removers Initials
56-1	Inactive	Sep 25/9	56-10-02 Page 209	May 29/92	LJ	Sep 25/92 Rev 57	LJ
56-2	Inactive	Feb 11/00	56-10-02 Page 201	Feb 7/94	LJ	Feb 11/00 Rev 68	LJ
56-3	Inactive	Jan 12/96	56-10-01 Page 210	Jul 15/94	LJ	Jan 12/96 TR 56-6	LJ
56-4	Inactive	Feb 11/00	56-10-01 Page 210	Nov 11/94	LJ	Feb 11/00 Rev 68	LJ
56-5	Not Used						
56-6	Inactive	Aug 16/96	56-10-01 Page 210	Jan 12/96	LJ	Aug 16/96 TR 56-7	LJ
56-7	Inactive	Feb 11/00	56-10-01 Page 210	Aug 16/96	LJ	Feb 11/00 Rev 68	LJ
56-8	Inactive	Oct 17/96	56-10-02 Page 209	Aug 16/96	LJ	Oct 17/96 TR 56-9	LJ
56-9	Inactive	Feb 11/00	56-10-02 Page 209	Oct 17/96	LJ	Feb 11/00 Rev 68	LJ
56-10	Inactive	Jan 11/02	56-10-01 Page 216	May 18/01	LJ	Jan 11/02 Rev 71	LJ
56-11	Inactive	Nov 7/03	56-10-02 Page 201	Nov 7/03	LJ	Jan 17/05 Rev 73	LJ
56-12	Inactive	Nov 7/03	56-10-02 Page 203	Nov 7/03	LJ	Jan 17/05 Rev 73	LJ
56-13	Inactive	Feb 12/04	56-20-01 Page 204	Feb 12/04	LJ	Jan 17/05 Rev 73	LJ

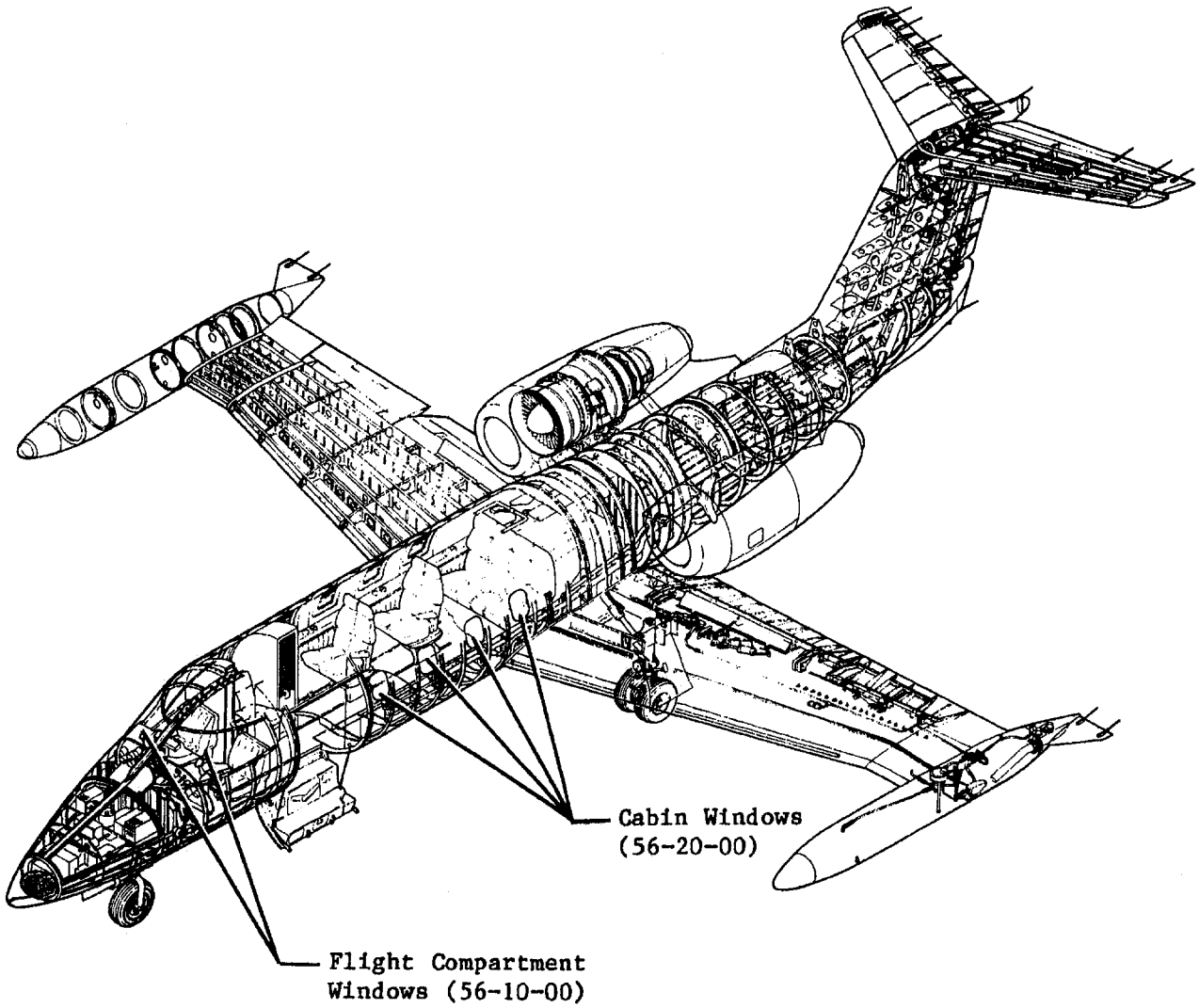
WINDOWS - DESCRIPTION AND OPERATION

1. Description

A. The windows consist of the flight compartment windows and the cabin windows.

(1) The flight compartment windows consist of the pilot's and copilot's windshield halves. The two-piece impact resistant plexiglass windshield is attached to the fuselage structure and the windshield center post structural members with screws and retainers.

(2) The cabin windows consist of plexiglass windows attached to the fuselage structure by screws and retainers.



Windows Locator
Figure 1

WINDOWS - MAINTENANCE PRACTICES

1. General

A. Deleted. Refer to 12-24-00 for window cleaning procedures.

FLIGHT COMPARTMENT WINDOWS- DESCRIPTION AND OPERATION

1. Description

A. The flight compartment windows consist of the pilot's and copilot's windshield halves.

B. *On Aircraft 35-002 thru 35-670 and 36-002 thru 36-063*, the Swedlow (standard) windshield is made up of three laminated layers of acrylic plastic. Both outer layers are made of stretched acrylic 0.460 (+0.046/-0.030) inch thick. The middle layer is cast in place with acrylic 0.060 inch thick. The overall thickness is 1.04 (+0.09/-0.00) inches.

C. The two piece impact-resistant plexiglass windshield is attached to the fuselage structure and windshield centerpost structural members with screws and retainers.

D. *On Aircraft 35-671 and Subsequent; 36-064 and Subsequent*, the Sierracin electric heated windshield is made up of four laminated layers. Two layers of polycarbonate (0.25 inch [6 mm] each) are sandwiched between an outer faceply (0.12 inch [3 mm] plexiglass) and an inner crewshield (0.12 inch [3 mm] plexiglass). The overall thickness, including spacer and fillers, is 0.955 inch. A stopcrack is cut on either side of the windshield through the outer plexiglass layer. The stopcrack is filled with RTV sealant. A spacer is bonded to the interior side of the windshield. The windshield has an integral electric heater and heat sensors. The electric heating element consists of a thin layer of gold laminated into the windshield. Because of the gold layer, the windshield has a yellow or gold color cast. The function of the heater is to provide windshield defogging. Terminal blocks are embedded in the windshield and provide the means for wiring the electric heater to the aircraft wiring.

E. The two piece impact resistant electric windshield is secured to the fuselage structure and windshield center post with screws, Hi-Loc pins, washers, nuts, and retainers. A silicone filler is installed between the windshield and inner retainer to absorb shock.

FLIGHT COMPARTMENT WINDSHIELD - MAINTENANCE PRACTICES

1. General

A. Removal and installation procedures are identical for both the right and left windshield with the exception of the amount of primer to be applied.

B. When installing a new windshield, the old windshield must be retained for use as a template for cutting and drilling the new windshield.

C. Replacement windshields do not contain the necessary attach holes. Therefore, special drilling precautions outlined below must be followed when installing a replacement windshield.

(1) Recommended drill speeds are: hand drill, 1400 to 2200 rpm, automatic constant speed drill, 2100 rpm.

(2) Recommended feed rate is 0.001 inch per revolution. The drill should be allowed to do all the work with little or no force by the operator. It is highly recommended that a significant amount of practice drilling be accomplished on the removed windshield to provide the person drilling with a "feel" for the material, drill speeds, and feed rate.

(3) The drill bit shall be dipped in lubricant 5 to 6 times per hole while drilling. Do not allow chips to build up in the hole or on the drill bit. The drill shall be backed out several times to clear chips. If a chip becomes lodged in the hole, do not force the drill as this may generate excessive heat and score the hole. The person drilling will notice a different feel when the bit is about to break through the back side. At this point, relieve any applied force and let the bit feed itself, maintaining the same drilling speed. Forcing the drill will cause the backside of the windshield to chip or flake as the drill breaks through.

NOTE: After obtaining a new or newly sharpened bit, drill several test holes through old windshield to break in the bit. Ensure that desired hole quality is obtained in the test holes prior to drilling holes in the new windshield. A drill bit that is too dull can generate excessive heat, causing cracking in the plies. Too sharp a bit can cause chipping as it passes out the far side.

2. Tools and Equipment

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
#12 Drill bit sharpened to a point		Manufactured Locally	Drill pilot holes.
3/8 In. drill with a #12 pilot	ST 00380	Learjet Inc. Wichita, KS	Final hole drilling.
Silastic Adhesive	140	Dow Corning Midland, MI	To bond seals.

NAME	PART NUMBER	MANUFACTURER	USE
Glycerin	G1015-2	Commercially Available	Lubricate drills.
Motor Oil (30 Wt. or higher)		Commercially Available	Lubricate drills.
Hydrocal	(100# bag)	Commercially Available	Cast old wind shield.
Hemp	(5 pounds)	Freeman Supply Co. Fort Worth, TX	Mix with hydrocal.
Flannel Cloth	(4 yds X 36 in.)	Commercially Available	Protective facing for hydrocal cast
Pro-Seal 890B	Class B	PRC Desoto International Berkley, CA	Seal windshield and retainers.
Super Koropon Green Primer	515X400	PRC Desoto International Sealants, Adhesives and Coatings Division Berkley, CA	
Super Koropon Curing Solution	910X350	PRC Desoto International Sealants, Adhesives and Coatings Division Berkley, CA	
Reducer	020X304	PRC Desoto International Sealants, Adhesives and Coatings Division Berkley, CA	
Aliphatic Naptha	Fed. Spec. TT-N-95 Type II	Commercially Available	Clean windshield.
Sanding Discs	36 and 320 grit	Commercially Available	Smooth windshield edge.
Abrasive Paper (wet or dry)	220 grit or finer	Commercially Available	Smooth windshield edge.

NAME	PART NUMBER	MANUFACTURER	USE
Hand Drill	2100 to 2500 rpm	Commercially Available	Drill holes in windshield.
Electric Drill Motor (constant speed)	2100 rpm	Commercially Available	Drill holes in windshield.
Band Saw	Cutting speed 4000 fpm	Commercially Available	Trim windshield.
Sander		Commercially Available	Smooth windshield edge.
Reamer	#12	Commercially Available	Ream holes in seal.
Step Pins (alternate method)		Manufactured Locally	Locate drill bushings.
Drill Bushings (alternate method)		Manufactured Locally	For windshield drilling operation.
Rubber Cement		Commercially Available	To glue flannel to hydrocal cast.
Kraft Paper		Commercially Available	To cover workbench and mask windshield.
Adhesive (white, translucent, or black)	Silastic 732-RTV	Dow Corning Corp. Midland, MI	To bond retainer seals.
	RTV-102 (White)	G.E. Waterford, NY	Alternate.
	RTV-103 (Black)	G.E. Waterford, NY	Alternate.
	RTV-108 (Translucent)	G.E. Waterford, NY	Alternate.
	RTV-106 (Red)	G.E. Waterford, NY	Alternate.

3. Removal/Installation

A. Removal of Swedlow Windshield (See Figure 201.)

(1) Remove electrical power from aircraft.
(2) Remove nose compartment access doors.
(3) Remove external defog nozzle. (Refer to Chapter 30.)
(4) Remove screws and lower instrument panel. (Refer to Chapter 31.)
(5) Remove headliner and side panels as required.
(6) Remove internal defog diffuser. (Refer to Chapter 21.)
(7) Remove screws, nuts, and washers which pass through the outer center post, inner center post, retainer, windshield, and inner angles. Remove inner and outer center posts.
(8) Remove two rows of screws securing retainer. Remove retainer and windshield from aircraft.

B. Preparation for Installation of Existing Swedlow Windshield
(1) Inspect entire surface of windshield for scratches, chips, crazing, and damage of any kind.
(2) If repair is required, refer to Approved Repairs for correct procedures.
(3) Carefully remove any dirt or sealer that is adhering to surface of windshield.
(4) Carefully remove any peeling primer.
(5) Mask off windshield. Using 220 grit or finer abrasive paper, very carefully feather edges of chipped or peeled areas.

NOTE: Unused, mixed primer over eight hours old shall be discarded

(6) Mix one part Super Koropon Fluid Resistant Primer (green) 515X400 and one part Curing Solution 910X350. Thorough mixing with a paddle is sufficient agitation. Use a fine brush to touch up small areas. Add up to 10% of reducer 020X304 to thin primer for spraying large areas. Build up touched up areas of left windshield a minimum thickness of 0.007 inch [0.018 cm] and 0.003 inch [0.008 cm} for a right windshield.

NOTE: If primer is applied in a dust free area, additional coats of primer may be applied when previous coat is still tacky or when it is just past tacky stage. If primer is not applied in a dust free area, allow primer to dry thoroughly. Use fine grit abrasive paper to sand off dust or dirt that may have adhered to primer surface and to roughen surface for next coat. When dry, this primer is so hard and slick, additional coats of primer or paint will not stick unless primed surface is roughened.

(7) Allow primer to dry a minimum of two hours prior to application of sealer.
(8) Peel old seals from inner and outer retainers. Thoroughly clean retainers using rags dampened in MEK or equivalent. While parts are still wet, wipe dry with clean cotton rags.
(9) Install windshield. (Refer to Step E.)

C. Preparation for Installation of New Swedlow Windshield (Preferred Method) *(Aircraft 35-002 thru 35-538, 35-589 thru 35-592 and 36-002 thru 36-057.)* (See Figure 201.)
(1) Carefully clean surface of work bench and cover with Kraft paper.
(2) Position existing windshield on work bench. Remove old inserts and bushings from windshield.
(3) Verify edge distances on existing windshield. Note any edge distances that look close to minimum for possible trimming change on new windshield.
(4) Mix hydrocal according to manufacturer's instructions.

(5) Saturate hemp in hydrocal and apply around edge of windshield as shown. As hydrocal and hemp mixture begins to set, scrape excess from along sides. Do not let hemp extend over side of windshield.
(6) After hydrocal has set a minimum of one hour, remove hydrocal cast from windshield.
(7) Using rubber cement, glue flannel cloth to windshield side of hydrocal cast. This will help protect new windshield.
(8) Using care not to scratch new windshield, trim protective paper back approximately two inches from edge.
(9) Position hydrocal cast on new windshield. Adjust cast for best fit with new windshield contour.
(10) Mark a line on protective covering of new windshield matching outer trim of mold.

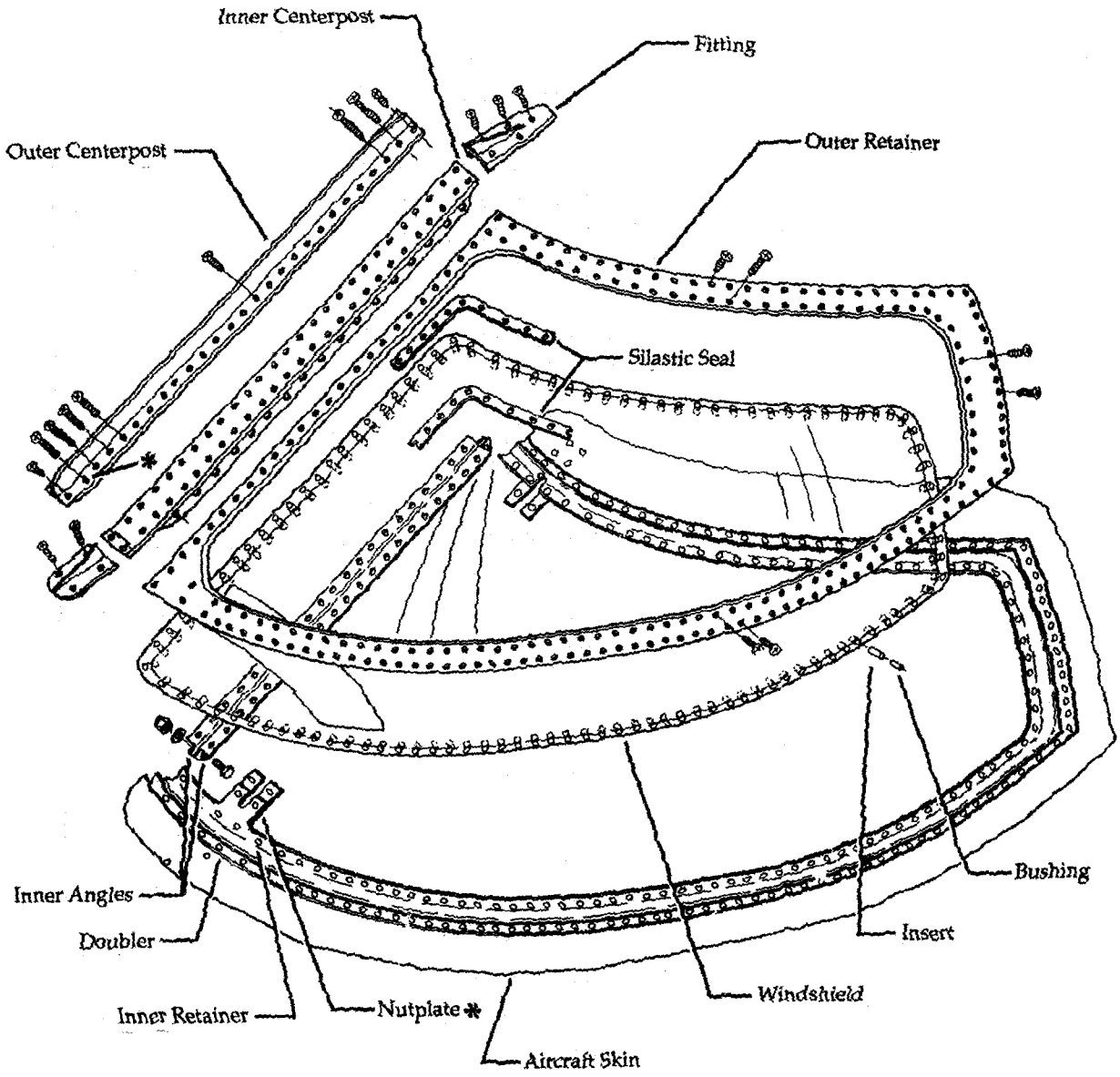
NOTE: The windshield must be cut using a 0.25 inch [0.64 cm] wide, five to six (5 to 6) teeth per inch (TPI), skip tooth blade at 4,000 to 6,000 Feet Per Minute (FPM). A support block should be used to protect the windshield during cutting. Three maintenance personnel are required to safely support and guide the windshield during trimming.

(11) Band saw new windshield outer edge to trim line. Adjust trim line as required to meet minimum edge distance requirements. (See Figure 201.)

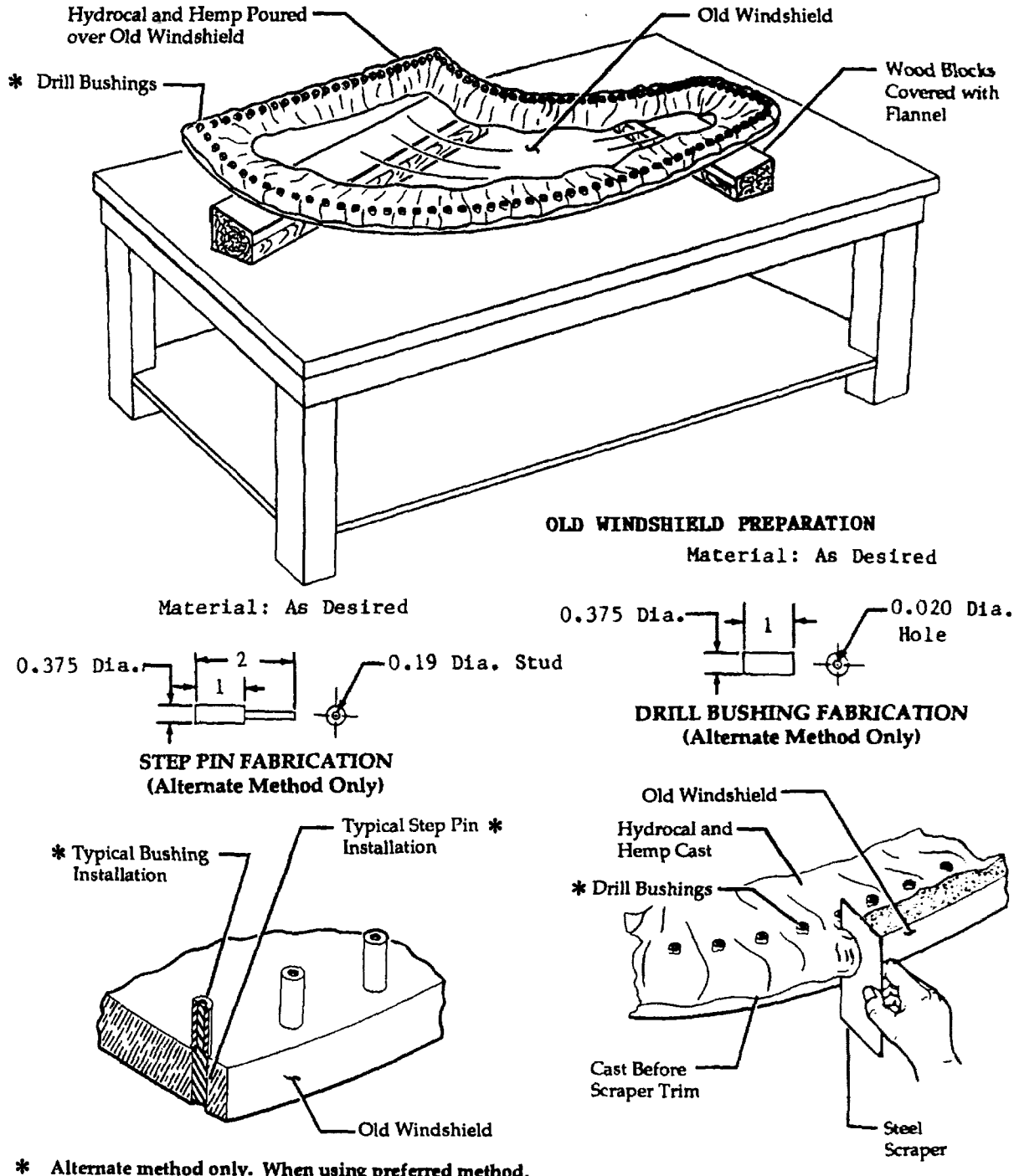
NOTE: Sand edge of windshield to remove burrs and rough spots

(12) Hand finish edge with 220-230 grit sandpaper to remove grind marks.
(13) Chamfer edge and corners of windshield approximately 0.12 inch [0.30 cm] radius x 45°.
(14) Pull back and cut off the protective covering approximately 3.5 inches [8.9 cm] from edge.
(15) Mark a line around the outer edge of the windshield 0.55 inches [1.40 cm] from center post edge. This represents the minimum edge distance line. The center line of any hole drilled should not extend beyond this line.
(16) Position windshield on inner retainer.
(17) Position outer retainer on windshield and temporarily hold windshield in position by installing screws through retainer and windshield attach holes.
(18) From inside the aircraft, inspect for gaps between the windshield and inner retainer. Select the largest gap area.
(19) Shine a flashlight in the existing hole in inner retainer in the area of the widest gap between inner retainer and windshield.
(20) Drill first hole in the center of the widest gap using a 3/16 inch [4.762 mm] bit, ground to a sharp point, approximately 20° included angle in 0.50 inch [1.27 cm].
(21) Drill three more evenly spaced holes around windshield, install fasteners and tighten. Maintain and mark sequence in which bolts are installed.
(22) Mark all accessible holes in inner retainer on the windshield with a grease pencil. Mark holes with limited access using a 90° scribe.
(23) Using a 3/16 inch [4.762 mm] drill bit, start a hole in the windshield approximately 0.25 inch [0.64 cm] deep at the center of each hole in outer retainer.

* CAUTION: WHEN DRILLING HOLE IN WINDSHIELD AT THIS LOCATION, DO NOT DRILL COMPLETELY THROUGH WINDSHIELD AS DAMAGE TO NUTPLATE COULD RESULT.

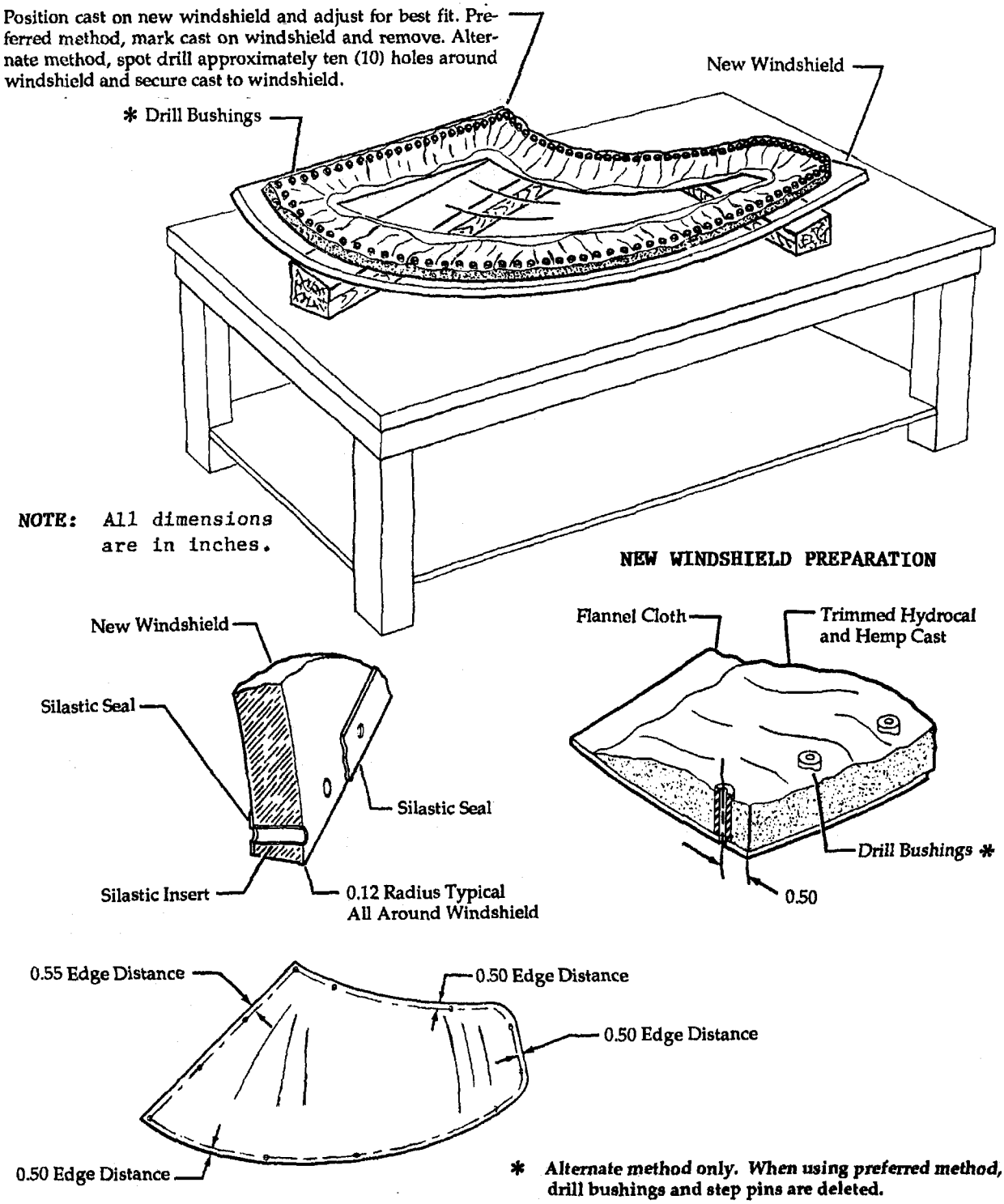


Windshield Installation
Figure 201 (Sheet 1 of 3)



* **Alternate method only. When using preferred method, drill bushings and step pins are deleted.**

Windshield Installation
Figure 201 (Sheet 2 of 3)



Windshield Installation
Figure 201 (Sheet 3 of 3)

CAUTION: WHEN DRILLING HOLES IN WINDSHIELD AT OUTER CENTERPOST AREA, DO NOT COMPLETELY DRILL THROUGH NEXT TO LAST HOLE LOCATED AT THE LOWER LEFT SIDE OF CENTERPOST. DAMAGE TO THE NUTPLATE LOCATED BEHIND HOLE COULD RESULT. START HOLE WHILE WINDSHIELD IS STILL IN PLACE, REMOVE WINDSHIELD, AND FINISH DRILLING HOLE. (SEE FIGURE 201.

(24) Drill a 3/16 inch [4.762 mm] hole through windshield at each location in the outer center post using existing holes as a drill guide.
(25) Remove windshield.
(26) Drill 3/16 inch [4.762 mm] pilot holes through windshield from the 0.25 inch [0.64 cm] drill starts and visually guide drill bit to exit at the center of the marks previously made on the inner surface of the windshield.
(27) Tape back over exposed windshield area.
(28) Using a 3/8 inch [4.762 mm] piloted drill bit, drill pilot holes out to full size.
(29) Countersink all holes on both sides of windshield using a 0.50 inch [1.27 cm] diameter rotary ball.
(30) Run tape around the periphery of the holes on the inside of the windshield to protect it from silastic sealer when installing inserts.
(31) Install nylon inserts into windshield.
(32) Install plastic center insert inside nylon inserts.

NOTE: Inserts are to be flush with both sides of windshield. If these protrude, trim excess with a razor blade. Always trim toward edge of windshield.

(33) Position outer retainer on windshield and temporarily attach to windshield by inserting screws through retainer and windshield attach holes.
(34) Mask off area leaving 0.12 to 0.14 inch [0.30 to 0.36 cm] between masking tape and inboard edge of retainer.

CAUTION: WHEN CLEANING UNMASKED AREA WITH ALIPHATIC NAPTHA, ENSURE THAT NAPTHA IS THOROUGHLY REMOVED FROM WINDSHIELD. PROLONGED EXPOSURE OF NAPTHA CAN CAUSE SOFTENING OF ACRYLIC AND DISTORTION OF WINDSHIELD.

(35) Remove retainer from windshield and clean unmasked area with aliphatic naptha. Ensure that masking tape adheres to windshield and naptha is not allowed to seep under masking tape.
(36) Mix one part super Koropon Fluid Resistant Primer (green) 515X400 and one part curing solution 910X350. Thorough mixing with a paddle is sufficient agitation. Add up to 10% of reducer 020X304 to primer for spraying.

NOTE: Unused, mixed primer over eight hours old shall be discarded.

(37) Apply a spray coat of mixed primer to unmasked portion of outer windshield to give a dry film thickness of 0.0006 to 0.0012 inch [0.0152 to 0.0305 mm]. Apply seven coats to left windshield and

three to right windshield to obtain a minimum thickness of 0.007 inch [0.178 mm] for left windshield and 0.003 inch [0.076 mm] for right windshield.

NOTE: If primer is applied in a dust free area, additional coats of primer may be added when previous coat is still tacky or when surface is just past tacky stage. If primer is not applied in a dust free area, allow primer to dry thoroughly. Use fine grit abrasive paper to sand off dust or dirt that may have adhered to primer surface and to roughen surface for next coat.

(38) Allow primer to dry a minimum of two hours prior to application of sealer.
(39) Install windshield. (Refer to Step E.)

D. Preparation for Installation of New Swedlow Windshield (Alternate Method) *(Aircraft 35-002 thru 35-538, 35-589 thru 35-592 and 36-002 thru 36-057.)* (See Figure 201.)
(1) Carefully clean surface of work bench and cover with Kraft paper.
(2) Position existing windshield on work bench. Remove old inserts and bushings from windshield.
(3) Fabricate step pins as shown in Figure 201 and install step pins in holes where inserts were removed.
(4) Fabricate drill bushings as shown in Figure 201 and install drill bushings on step pins.
(5) Mix hydrocal according to manufacturer's instructions.
(6) Saturate hemp in hydrocal and apply around edge of windshield as shown in Figure 201. As hydrocal and hemp mixture begins to set, scrape excess from along sides. Do not let hemp extend over side of windshield.
(7) After hydrocal has set a minimum of one hour, remove step pins and hydrocal cast from windshield.
(8) Using rubber cement, glue flannel cloth to windshield side of hydrocal cast. This will help protect new windshield.
(9) Using care not to scratch new windshield, trim protective paper back approximately two inches from edge.
(10) Position hydrocal cast on new windshield. Adjust the cast for best fit with new windshield contour.
(11) Spot drill approximately 10 pilot holes around windshield using drill bushings cast into hydrocal cast. Secure cast to windshield by installing bolts through these holes.
(12) Using hydrocal cast as a blade guide, trim windshield to size using a band saw. Sand edge of windshield to remove burrs and rough spots.
(13) Drill remainder of pilot holes around windshield and remove cast from windshield.
(14) Using a 3/8 inch [9.525 mm] drill with #12 pilot, enlarge pilot hole to final size.
(15) Sand completely around windshield so that corners are radiused 0.12 inch [0.30 cm].
(16) Install inserts into windshield.
(17) Apply a small amount of liquid soap to bushings and install into inserts.

NOTE: Inserts and bushings are to be flush with both sides of windshield. If these protrude, trim excess with a razor blade. Always trim toward edge of windshield.

(18) Position outer retainer on windshield and temporarily attach to windshield by inserting screws through retainer and windshield attach holes.

(19) Mask off windshield leaving 0.12 to 0.14 inch [0.30 to 0.36 cm] between masking tape and inboard edge of retainer.

CAUTION: WHEN CLEANING UNMASKED AREA WITH ALIPHATIC NAPTHA, ENSURE THAT NAPTHA IS THOROUGHLY REMOVED FROM WINDSHIELD. PROLONGED EXPOSURE OF NAPTHA CAN CAUSE SOFTENING OF ACRYLIC AND DISTORTION OF WINDSHIELD.

(20) Remove retainer from windshield and clean unmasked area with aliphatic naptha. Ensure that masking tape adheres to windshield and naptha is not allowed to seep under masking tape.

(21) Mix one part super Koropon Fluid Resistant Primer (green) 515X400 and one part curing solution 910X350. Thorough mixing with a paddle is sufficient agitation. Add up to 10% of reducer 020X304 to primer for spraying.

NOTE: Unused, mixed primer over eight hours old shall be discarded.

(22) Apply a spray coat of mixed primer to unmasked portion of outer windshield to give a dry film thickness of 0.0006 to 0.0012 inch [0.0015 to 0.0030 cm]. Apply seven coats to left windshield and three to right windshield to obtain a minimum thickness of 0.007 inch [0.018 cm] for left windshield and 0.003 inch [0.008 cm] for right windshield.

NOTE: If primer is applied in a dust free area, additional coats of primer may be added when previous coat is still tacky or when surface is just past tacky stage. If primer is not applied in a dust free area, allow primer to dry thoroughly. Use fine grit abrasive paper to sand off dust or dirt that may have adhered to primer surface and to roughen surface for next coat.

(23) Allow primer to dry a minimum of two hours prior to application of sealer.

(24) Install windshield.

E. Installation of Windshield (See Figure 201.)

NOTE: At the first 600 hours following replacement of a windshield, inspect the fastener area of the windshield installation. Use prism techniques described in Part 4, Chapter 56, of the NDI Manual.

(1) Apply silastic RTV-732 adhesive around outer face of inner retainer and around inner face of outer retainer and install new seals.

(2) Using a No. 12 reamer, ream holes in new seal. Retainers should be used as a guide for reaming operation.

(3) Position new windshield on inner retainer. Apply fillet seal along entire inner edge of outer retainer between crimp and seal, immediately prior to installation of outer retainer. Apply sufficient sealer to ensure a continuous bead will be forced from under retainer when retainer is secured and torqued.

(4) Position windshield on aircraft and position outer retainer on windshield.

(5) Position inner and outer center posts on aircraft.

(6) Secure centerposts and outer retainer with screws, nuts and washers. Torque to 30 inch-pounds [3.4 Nm].

NOTE: Prior to installing screws through the windshield, dip the threads in sealer.

(7) Remove excess sealer from windshield using approved cutting tool and soft, clean cloth.
(8) Install bolts, nuts and washer which secure inner angles together.
(9) Pressure test aircraft to 9.5 psi [65.5 kPa] (9.9 psi [68.3 kPa] on *Aircraft 35-107, 35-113 and Subsequent and 36-032 and Subsequent)*. (Refer to Chapter 53 for Maximum Service Pressure Proof Test.)
(10) After pressure test, back windshield nuts off and re torque to 30 inch-pounds [3.4 Nm]. If screw turns when backing off nut, reseal screw body as required.
(11) Fill two lower center post screw holes with aerodynamic fairing compound.
(12) Install internal defog diffusers. (Refer to Chapter 21.)
(13) Install external defog nozzle. (Refer to Chapter 30.)
(14) Install side panels and headliner.
(15) Raise instrument panel and secure with screws.
(16) Install nose compartment access doors.
(17) Remove protective paper from windshield and clean if necessary.

4. Repairs

CAUTION: THE FOLLOWING DATA APPLIES ONLY TO FACTORY AUTHORIZED WINDSHIELDS. LEARJET CAN NOT PROVIDE DAMAGE CRITERIA, REPAIR PROCEDURES OR LIMITATIONS, OR ASSIST IN DISPOSITION OF NON-FACTORY AUTHORIZED WINDSHIELDS.

A. Windshield Repair Limitations *(Aircraft Equipped with Swedlow Windshields)* (See Figure 202.)

NOTE: The windshield is divided into two (2) zones for classification of crack and flaw criticality. The Critical Bird Impact Zone requires special consideration in regard to criticality. (See Figure 202.)

In some instances repairs may be allowable with respect to the structural integrity of the windshield, but not allowable with respect to the optical distortion incurred during the repair process. Optical distortion of the windshield caused by the repair is considered the responsibility of the owner, operator, and maintenance facility performing the repair. (See Figure 203 for optical areas of the windshield and locations of grid board for checking optical distortion.)

Limitation and rejection criteria are defined for individual types of flaws and assumes that multiple flaw sites are present on the windshield being assessed. In those instances where several flaw types coexist in the same area or where an otherwise flawless wind-

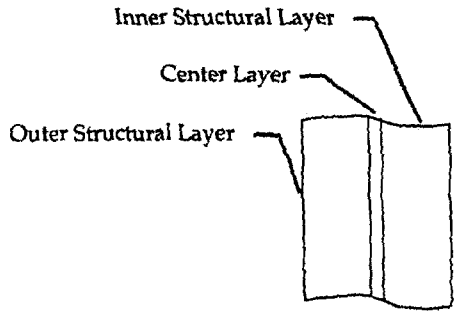
shield has a singular flaw exceeding the defined rejection criteria, evaluation on a case-by-case basis is required. Contact Learjet Field Service for disposition.

All windshield reports being forwarded to Learjet Field Service for evaluation will have recorded all flaws along with the windshield's part number, serial number, and date of manufacture.

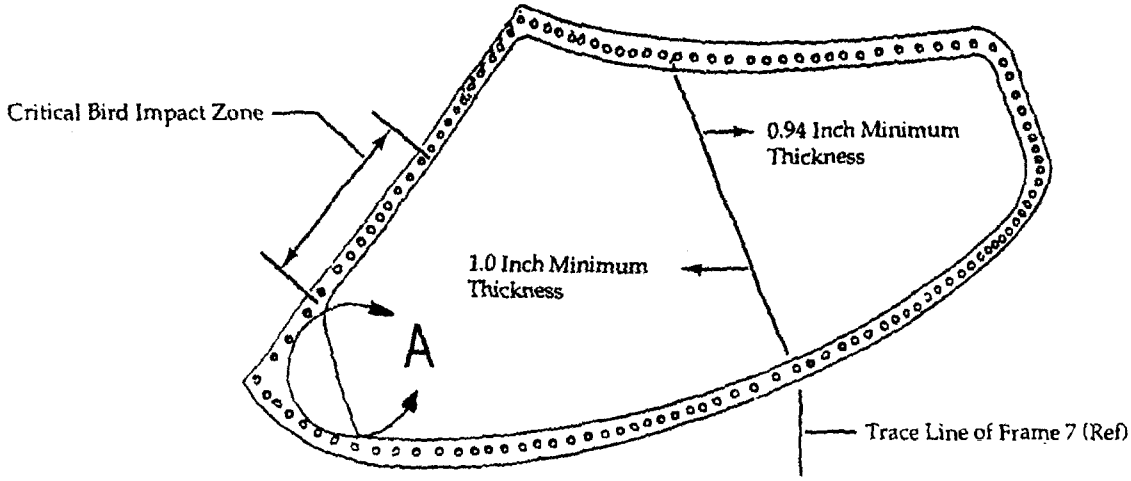
(1) Significant Flaw Size
  (a) The following magnitudes represent flaw sizes considered significant:
    1) Center Layer Normal Crack - Greater than 0.10 inch [0.25 cm].
    2) Hole Halo (either inter-laminate crack or delamination extending from edge of hole) - Greater than 0.10 inch [0.25 cm].
    3) Edge Crack (inter-laminate crack or delamination of structural layer extending from edge) - Greater than 0.10 inch [0.25 cm].
    4) Structural Layer Normal Crack - Greater than 0.05 inch [0.13 cm].

(2) Installation Fastener Area - Critical Bird Impact Zone
  (a) Windshields with significant flaws in this designated zone are considered unserviceable and shall be removed from service.

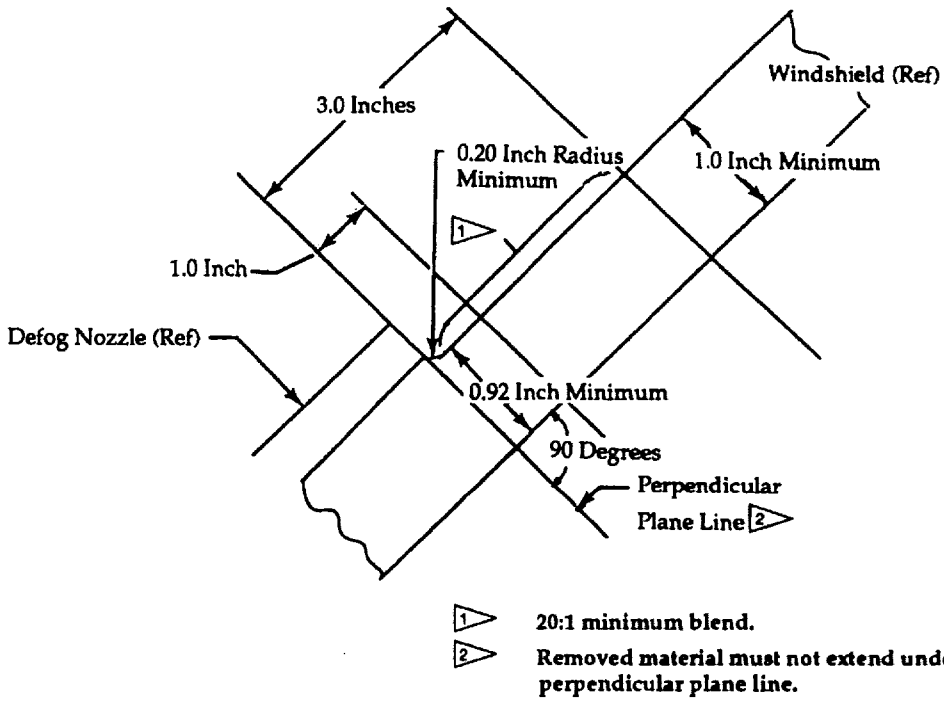
(3) Installation Fastener Area - Outside of Critical Bird Impact Zone
  (a) Windshield with the following significant flaws are considered unserviceable and shall be removed from service.
    1) Center layer normal crack extending from hole-to-hole, from hole-to-edge, or into the viewing area.
    2) Edge crack extending to the fastener hole line or if more than one structural ply is affected at any given location.
    3) Hole halos overlapping from hole-to-hole, extending from hole-to-edge, or into the viewing area.
    4) Hole halos in both structural plies at any given hole.
    5) Structural layer normal crack which extends through one entire structural ply thickness and length exceeds 0.30 inch [0.76 cm]



Windshield Cross Section



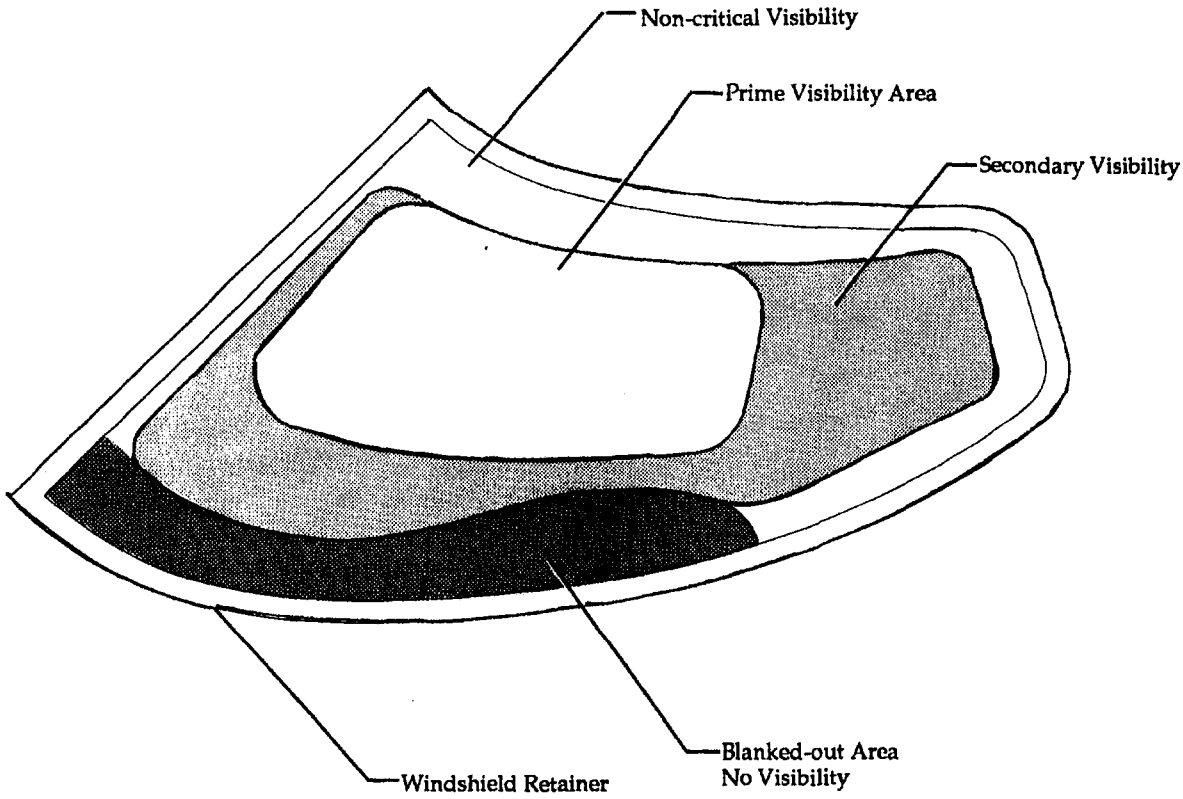
Windshield Crack and Flaw Repair Limitations
Figure 202 (Sheet 1 of 2)



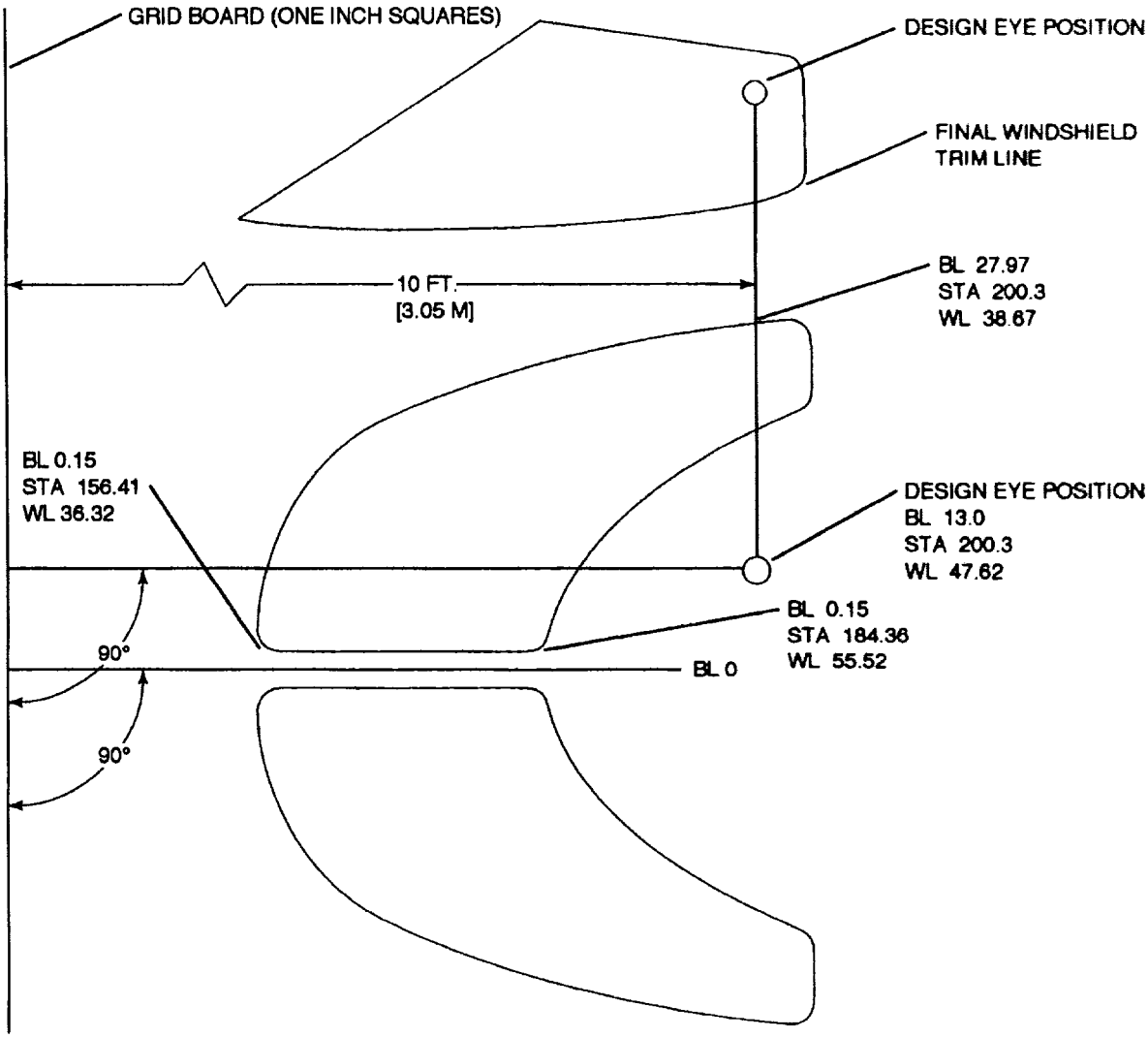
EXTERIOR SURFACE OF WINDSHIELD WITHIN 1 INCH OF DEFOG NOZZLE

DETAIL A

Windshield Crack and Flaw Repair Limitations
Figure 202 (Sheet 2 of 2)



Windshield Optical Repair Limitations
Figure 203 (Sheet 1 of 2)



Windshield Optical Repair Limitations
Figure 203 (Sheet 2 of 2)

6) Structural layer normal cracks in adjacent holes with facing crack tips (i.e. propagation would connect into single crack).
7) Structural layer normal crack in both structure plies at any given hole.

(4) Windshield Surface
(a) Scratches, nicks, crazing or pits requiring material removal to blend that reduces the windshield thickness to less than 1.00 inch [2.54 cm] are not permitted outside the following areas:
(b) Exterior surface of the windshield, within one inch above the defog nozzle, not to exceed the width of the nozzle. (See Figure 202.)
1) Material removal within the one inch area above the defog nozzle may reduce the minimum windshield thickness to 0.92 inch [2.34 cm] provided:
a) The steepness of the step created by material removal shall be held to a minimum and under no circumstances extend beyond perpendicular to the surface of the windshield (i.e., penetrated under the defog nozzle).
b) The radius at the windshield surface to the step at the base of the step shall be as large as possible. A radius of less than 0.20 inch [0.51 cm] is not permitted.
c) The material removed must be transition to the center of the windshield with a minimum blend ratio of 20 to 1. This transition to the one inch minimum windshield thickness must be completed at a distance not greater than three (3) inches [7.62 cm] from the edge of the defog nozzle.
(c) The interior surface of the windshield, aft of the line shown in Figure 202.
1) Minimum windshield thickness of 0.94 inch [2.39 cm] shall be maintained.
2) A minimum blend ratio of 20 to 1 shall be maintained in all directions.

(5) Minor chipping about a fastener hole can be repaired with the following limitations:
(a) Chipped out material shall not exceed 0.030 inch [0.076 cm] in depth or 0.188 inch [0.478 cm] radially.
(b) Repairs on inside and outside surfaces of the same hole are not allowed.
(c) Repairs on any surface of more than three (3) adjacent holes are not allowed.
(d) Repairs on more than 20 percent of the total fastener holes is not allowed.

(6) Discrepancies, in the windshield edge, can be removed by trimming material from the edge provided a minimum of 0.400 inch [1.016 cm] edge margin (distance from edge of hole to windshield edge) can be maintained.

(7) Surface flaws around fastener holes which can be removed and repaired under item (5) above.

B. Inspection Requirements
(1) Any windshield having allowable significant flaws in accordance with the above paragraphs, except paragraph A.4, shall be inspected at 1,200 hour intervals using the optical prism technique described in Part 4, Chapter 56, of the NDI manual, windshield inspection (current inspection requirement).

(2) A diagram of the discrepant locations shall be maintained to allow a means to compare progression of these areas if it occurs. Progression of the flaws beyond the above limitations will require the windshield to be removed from service.

(3) Windshields scratches in the form of crazing are not desirable and should be polished out at the earliest possible time. Severe crazing can reduce the remaining windshield thickness below the 1.00 inch [2.54 cm] minimum and should be removed.

NOTE: Severe crazing is defined by depths greater than 0.040 inch [1.016 mm].

(a) After removal of crazing, a windshield measurement must be taken to assure minimum windshield thickness is maintained.

C. Removal of Scratches or Pits from Windshield or Cabin Windows

(1) Tools and Equipment

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Ultrasonic Thickness Gage	Model Nova 201	NDT Instruments, Inc. Huntington Beach, CA	Check windshield thickness.
	Magnaflux Model DR100	Magnaflux, Inc. Harwood, IL	Check windshield thickness.
Depth Gage		Commercially Available	Measure depth of scratches and pits.
Abrasive Paper (wet or dry)	400A & 600A grit	Commercially Available	Smooth windshield surface.
Polishing Compound	Cerium Oxide #2	L.L. Fusco Co. Los Angeles, CA	Polish windshield defects.
Rubber Block (Med-Hard)	40-50 Shore H	Commercially Available	
Cotton Flannel Cloth		Commercially Available	Wipe and clean repaired area.
Cleaner	403D Fed. Spec. P-P560 Type 1	Commercially Available	Clean repaired area.
Cleaner	Wilco Anti-Static Cleaner	Wilco Co. Los Angeles, CA	Clean repaired area.
Wax	Simonize Paste Auto, Johnson Paste Auto, DuPont Paste Auto	Commercially Available	Protective coating.

(2) Using an ultrasonic thickness gage, determine thickness of glass adjacent to scratch or pit. Follow manufacturer's operating instructions for instrument.
(3) Using a depth gage or other similar device, measure depth of scratch or pit as accurately as possible.
(4) Using thickness measured in step 4.C.(2) and depth of scratch or pits as measured in step 4.C.(3), determine whether repairs are allowable.

NOTE: Refer to paragraph 4.A. for repair limitations for aircraft equipped with Swedlow windshields.

Refer to 56-10-02, Repairs for repair limitations for aircraft equipped with electric heated windshield.

Refer to 56-20-01, Inspection/Check for repair limitations for the cabin windows.

(5) Thoroughly clean windshield or cabin window to be repaired. This will remove all foreign matter which may cause more scratches when repairs are begun.

CAUTION: EXTREME CARE MUST BE USED DURING REPAIRS TO PREVENT OPTICAL DISTORTION.

DO NOT USE SANDING BLOCK IN A BACK-AND-FORTH MOTION.

(6) Wrap abrasive paper (400A, wet or dry) around a rubber sanding block.
(7) Using large amounts of water, lightly sand over and around imperfection in a circular motion. Sand an area two to three (2 to 3) times that of imperfection in order to minimize optical distortion and excessive thinning.
(8) Continue sanding lightly, using large amounts of water, until initial imperfection is no longer apparent.
(9) Change to 600A, wet or dry abrasive paper.
(10) Using large amounts of water, continue to lightly sand until hairline scratches caused by first sanding are no longer apparent. Sand an area two to three (2 to 3) times larger than covered by first sanding to minimize optical distortion and to feather out repaired area.
(11) Mix cerium oxide #2 with water to form a thin paste.

NOTE: Poly-Sand may be used in lieu of cerium oxide #2. Follow manufacturer's instructions.

(12) Wrap sanding block in two to three (2 to 3) layers of clean, cotton, flannel cloth to form a polishing pad.

CAUTION: DO NOT ALLOW CERIUM OXIDE #2 PASTE TO BECOME DRY.

(13) Apply cerium oxide paste to surface of windshield or cabin window and lightly rub in a circular motion. Constantly add water to prevent paste from drying out and increase area of circular motion.

(14) After sanding marks are removed, continue rubbing with polishing pad. Do not apply additional paste to rework area, just water. Continue rubbing surface while adding water. This action will restore a glossy surface to windshield or cabin window.
(15) Using a clean, cotton, flannel cloth, dry surface of windshield or cabin window.
(16) Apply cleaner with clean, cotton, flannel cloth. After cleaner has dried, wipe off cleaner film.
(17) Apply wax and polish surface to high gloss.
(18) After completion of repairs, windshield shall be inspected by aircraft owner, crew, and/or facility performing repair work to determine whether optical distortion (if any) is acceptable.

NOTE: This inspection shall be performed under both daytime and nighttime conditions.

D. Removal of Scratches or Pits from Windshield or Cabin Windows (Micro-Mesh Scratch Removal and Restoration Kit)
(1) Tools and Equipment

NOTE: Equivalent substitutes may be used in lieu of the following:

NAME	PART NUMBER	MANUFACTURER	USE
Scratch Removal and Restoration Kit	HP-100	Micro-Surface Finishing Prod. Wilton, IA	To remove scratches.
Depth Gage		Commercially Available	Measure depth of scratches or pits.

(2) Using an ultrasonic thickness gage, determine thickness of glass adjacent to scratch or pit. Follow manufacturer's operating instructions for instrument.
(3) Using a depth gage or other similar device, measure depth of scratch or pit as accurately as possible.
(4) Using thickness measured in step 4.D.(2) and depth of scratch or pits as measured in step 4.D.(3), determine whether repairs are allowable.

NOTE: Refer to paragraph 4.A. for repair limitations for aircraft equipped with Swedlow windshields.

Refer to 56-10-02, Approved Repairs for repair limitations for aircraft equipped with electric heated windshield.

Refer to 56-20-02, Inspection/Check for repair limitations for the cabin windows.

(5) Perform windshield or window repairs. Carefully follow manufacturer's instruction included in the kit.

ELECTRIC HEATED WINDSHIELD - MAINTENANCE PRACTICES

1. Removal/Installation

A. Tools and Equipment

(1) Get the necessary tools and equipment.

NOTE: You can use equivalent alternatives for these items:

When you use the windshield sealant, follow the manufacturer's instructions about mixing, and the maintenance precautions for this sealant.

NAME	PART NUMBER	MANUFACTURER	USE
Abrasive Paper (Wet or Dry)	220 to 320 Grit	Commercially Available	Prepare surface for the adhesive.
Abrasive Paper (Wet or Dry)	40 Grit	Commercially Available	Sanding of the new windshield.
Epoxy Primer		Refer to 20-55-00	Prepare surface for the adhesive.
Adhesive (Type III)		Refer to 20-11-00	Bond the retainer seals.
Corrosion Resistant Primer, Light Green	515K011 Primer Base 910-012 Curing Solution	Refer to 20-55-00	To paint outer portion of windshield.
Kraft Paper		Commercially Available	Cover the workbench and mask the windshield.
Aliphatic Naphtha	Federal Spec. TT-N-95, Type II	Commercially Available	Clean windshield.
Windshield Sealant	AC-251 (Class B, Black)	A-C TECH Garden Grove, CA	Fill the windshield stop crack and/or protect the trimmed areas. (Used in place of the Pro-Seal 890)
Aerodynamic Fairing Compound	EC1751	3M Co. St. Paul, MN	Fill the lower screw holes in the center post.

CAUTION: THE WINDSHIELD MUST BE REMOVED AND INSTALLED ONE SIDE AT A TIME. IF BOTH WINDSHIELDS ARE REMOVED AT THE SAME TIME, AIRCRAFT STRUCTURAL DAMAGE MAY OCCUR.

B. Removal of the Electric Heated Windshield (See Figure 201.)

WARNING: THE WINDSHIELD ELECTRIC HEATER IS POWERED BY HIGH VOLTAGE INVERTERS. REMOVE THE ELECTRICAL POWER FROM AIRCRAFT TO AVOID INJURY TO PERSONNEL.

(1) Remove the electrical power from the aircraft.
(2) Remove the nose compartment access doors to get access to the defog nozzle and the parts that attach the windshields.
(3) Remove the external defog nozzle. (Refer to 30-40-03.)
(4) Remove the screws and lower the instrument panel.
(5) Remove the parts that attach the glareshield and remove the glareshield.
(6) Remove the headliner and the side panels as required to get access to the parts that attach the windshield.
(7) Remove the internal defog diffuser.
(8) Identify and disconnect the electrical wires from the windshield.
(9) Identify and remove the screws, Hi-Loc pins, washers, and nuts which pass through the outer center post, inner center post, outer and upper outer retainers, windshield, and inner angles.
(10) Identify and remove the outer row of screws and inner row of Hi-Loc pins, washers, and nuts which attach the outer and upper outer retainers.
(11) Identify and remove the bolts, washers, and nuts which attach the inner angles together. Remove the inner angles, inner and outer center posts.

WARNING: USE EXTREME CAUTION WHEN REMOVING THE OUTER AND UPPER OUTER RETAINERS. SPECIAL RAMPS, FILLERS AND WASHERS HAVE BEEN INSTALLED AND MUST BE REINSTALLED IN THE EXACT POSITION FROM WHICH THEY WERE REMOVED OR INJURY TO PERSONNEL CAN OCCUR.

(12) Carefully remove the upper outer retainer from the aircraft. Make sure that the positions of all the ramps, fillers, and washers are noted.
(13) Carefully remove the outer retainer from the aircraft. Make sure that the positions of all the ramps, fillers, and washers are noted.
(14) Remove the windshield from the aircraft.

NOTE: If the windshield is to be reinstalled, cover both sides with clean protective paper (Pater #20V or equivalent) and place in a protective rack.

C. Preparation of the Existing Electric Heated Windshield for Installation
(1) Inspect the entire surface of the windshield for scratches, chips, crazing, and other damage.
(2) If a repair is required, refer to the approved repairs for correct procedures.
(3) Carefully remove any dirt or sealer that is on the surface of the windshield.

(4) Carefully remove any peeling primer.
(5) Mask off the windshield.
(6) Very carefully feather the edges of the chipped or peeled primer using 220 grit or finer abrasive paper.
(7) Mix one part of the Super Koropon fluid resistant primer base with one part of the curing solution.

NOTE: Fully mix them with a paddle.

(8) Use a fine brush to touch up the small areas.
(9) For spraying large areas, thin primer up to 10% with a reducer.
(10) Build up the primer to a minimum thickness of 0.007 inch [0.178 mm] on the left windshield and 0.003 inch [0.076 mm] on the right windshield.

NOTE: Unused mixed primer over 8 hours old must be discarded. If the primer is applied in a dust free area, build up coats of primer may be applied when the previous coat is still tacky or just past the tacky stage. If the primer is not applied in a dust free area, allow the primer to dry fully. Use fine grit abrasive paper to remove the dust or dirt that may have attached to the primer surface and to roughen the surface for the next coat. When it is dry this primer is hard and slick so, additional coats of primer or paint will not stick unless primer surface is roughened.

(11) Allow the primer to dry a minimum of 2 hours prior to the application of the sealer.
(12) Remove the old seals and sealant from the inner, outer, and upper outer retainers and inner angles.
(13) Fully clean the retainers and inner angles using rags dampened with a cleaning solvent.

NOTE: While the parts are still wet, wipe dry with clean, cotton rags.

(14) Remove the old sealant from the windshield fasteners, ramps, fillers, and washers.

D. Preparation of the New Electric Heated Windshield for Installation (See Figure 201.)
(1) Position the windshield on the inner retainer, and install fasteners, with an AN960D10 washer under the head, around the perimeter of the windshield.

NOTE: The AN960D10 washer under the head of washer is to prevent the head of the Hi-Loc from pulling down into the sleeve and bushing.

(2) Tighten the fasteners snugly, no more than 10 inch pounds [1.13 Nm] over drag torque.

(3) From the outside of the aircraft check for the proper clearance between the lower edge of the windshield and the inner retainer. The minimum clearance must be 0.080 inch [2.032 mm] between the lower edge of the windshield and the inner retainer.

NOTE: If there is a gap of more than 0.50 inch [12.7 mm], contact Learjet Field Service for assistance.

If a gap of 0.080 inch [2.032 mm] is not maintained or the windshield rides up on the inner retainer it is permissible to trim the lower and outboard edge of the windshield as shown.

The windshield may be trimmed using #40 grit sandpaper. Hand finish the edge with 220 to 320 grit abrasive paper to remove the grind marks and chamfer the edges slightly.

If a gap of 0.080 inch [2.032 mm] cannot be obtained without exceeding the shown edge distances, contact Learjet Field Service for assistance.

CAUTION: THE TRIMMED AREA MUST BE PROTECTED FROM THE PRO-SEAL 890 USED TO FILL THE VOID AROUND THE WINDSHIELD. IF THE PRO-SEAL 890 CONTACTS THE POLYCARBONATE LAYERS, IT MAY CAUSE THE POLYCARBONATE LAYERS TO YELLOW AND CRAZE.

(4) If any area of the windshield is trimmed for fitting, the trimmed portion must be protected as follows:

(a) Preferred method:

1) Coat the trimmed area with windshield sealant equal in thickness to the surrounding coating.

(b) Alternate method:

1) Prime the trimmed area as follows:

a) Mix 1 part of the primer base with 1 part of the curing solution.

NOTE: Fully mix them with a paddle.

b) Use a fine brush to touch up the small areas.

c) For spraying large areas, thin the primer up to 10% with reducer.

d) Build up the primer to a minimum thickness of 0.007 inch [0.178 mm] on the left windshield and 0.003 inch [0.076 mm] on the right windshield.

NOTE: Unused mixed primer over 8 hours old must be discarded. If the primer is applied in a dust free area, coats of primer may be applied when the previous coat is still tacky or just past tacky stage. If the primer is not applied in a dust free area, allow the primer to dry fully. Use a fine grit abrasive paper to remove the dust or dirt that may have attached to the primer surface and to roughen the surface for the next coat. When it is dry, this

primer is so hard and slick, additional coats of primer or paint will not stick unless the primer surface is roughened.

(c) Let the trimmed area cure.

(5) Carefully clean the surface of the work bench and cover it with kraft paper.

(6) Position the new windshield on the work bench.

(7) Carefully trim the protective paper back approximately 2 inches [5 cm] from the edge on the exterior side only.

(8) Bond the outer doubler and spacers to the inner doubler with windshield sealant. (Refer to Figure 201, Detail C.) (Refer to 20-10-00.)

NOTE: This bonded assembly (inner and outer doublers and spacers) may be temporarily held in place on the windshield with a very thin fay-seal of windshield sealant for ease of windshield retainer installation.

(9) Fill the stopcrack groove with windshield sealant, where necessary.

(10) Position the outer and upper outer retainers on the windshield and temporarily attach to the windshield using Hi-Loc pins, washers, and nuts.

(11) Mask off the windshield leaving 0.12 to 0.24 inch [3 to 6 mm] between the masking tape and the inboard edge of the retainers.

(12) Remove the retainers from the windshield and clean the unmasked area with aliphatic naptha. Make sure that the masking tape adheres to the windshield and the naptha is not allowed to seep under the masking tape.

(13) Mix 1 part of the primer base with 1 part of the curing solution.

NOTE: Fully mix them with a paddle.

(14) Thin the primer up to 10% with a reducer for spraying.

NOTE: Unused mixed primer over 8 hours old must be discarded.

(15) Apply a spray coat of the mixed primer to the unmasked area on the windshield exterior to give it a dry film thickness of 0.0006 to 0.0012 inch [0.015 to 0.030 mm]. Apply 7 coats to the left windshield and 3 coats to the right windshield to get a minimum thickness of 0.007 inch [0.178 mm] on the left windshield and 0.003 inch [0.076 mm] on the right windshield.

NOTE: If the primer is applied in a dust free area, coats of primer may be applied when the previous coat is still tacky or just past tacky stage. If the primer is not applied in a dust free area, allow the primer to dry fully. Use a fine grit abrasive paper to remove the dust or dirt that may have attached to the primer surface and to roughen the surface for the next coat. When it is dry this primer is hard and slick so, additional coats of primer or paint will not stick unless the primer surface is roughened.

(16) Allow the primer to dry a minimum of 2 hours prior to application of the sealer.

(17) Remove the old seals and sealant from the inner, outer, and upper outer retainers and the inner angles.
(18) Fully clean the retainers and inner angles using rags dampened with a cleaning solvent.

NOTE: While the parts are still wet, wipe dry with clean, cotton rags.

(19) Remove the old sealant from the windshield fasteners, ramps, fillers, and washers.
(20) Apply the windshield sealant to the innerface of the upper and lower outer retainers along the entire perimeter 0.010 to 0.020 inch [0.2 to 0.5 mm] thick and let cure. (See Figure 201 Detail D.)
(21) Install silicone filler on the interior side of the windshield. The gap between the end of the filler and spacer on the windshield must not exceed 0.040 inch [1 mm]. Trim the edges to clear any interference with the adjacent structure.

E. Installation of the Electric Heated Windshield (See Figure 201.)
(1) Clean the seals using a clean rag dampened with a cleaning solvent. While the surface is still wet, wipe dry with a clean, cotton rag.
(2) Spread a uniform layer of adhesive, 0.010 to 0.020 inch [0.254 to 0.508 mm] thick, on the inner and outer retainers only and the inner angles. Install the new seals using enough pressure to displace the air but not so much that the adhesive is forced out of the joint. Allow the adhesive to cure for 24 hours.
(3) Using a #12 reamer, ream the holes in new seals. Use the retainer holes as a guide for the reaming operation.
(4) Install the upper outer and outer retainer as follows:
(a) Apply a fillet seal of windshield sealant along the entire width and length of the upper outer retainer. Apply sufficient sealant to make sure that a continuous bead will be forced from under the retainer when the retainer is attached and torqued.
(b) Position the ramps and fillers on the windshield where noted during the removal procedures.
(c) Fill the ramp and filler area on the windshield with windshield sealant.
(d) Apply a fillet seal of windshield sealant along the entire inner edge of the outer retainer between the crimp and seal.
(e) Remove the fasteners and washers used to check for proper windshield clearance.
(f) Carefully position the upper outer and outer retainer on the aircraft and windshield. Install the fasteners (where noted during removal procedures) through the fillers, ramps, windshield, and inner retainer.

NOTE: Prior to installing the screws and Hi-Loc pins, dip the shanks in the windshield sealant.

(g) Check each fastener on the nut side for the amount of drag torque required to turn the nut on the fastener threads. Add this drag torque value to the required torque.

NOTE: If 5 inch-pounds [0.56 Nm] of torque is required to turn the nut on a fastener, then 5 inch-pounds [0.56 Nm] of torque must be added to the required torque values.

CAUTION: IMPROPER TORQUING/TIGHTENING CAN CAUSE DAMAGE TO THE WINDSHIELD.

(h) Torque each windshield fastener to 10 inch-pounds [1.13 Nm] plus drag torque on the nut side using a rotational sequence beginning at the lower forward corner of the windshield. Tighten the nuts along the lower side of windshield, up the aft edge, and then forward along the top of the windshield to the center post.

(i) Repeat steps (4)(f) and (4)(g) and increase torque on the fasteners to 20 inch-pounds [2.26 Nm]; then to 30 inch-pounds [3.39 Nm].

(5) Install the inner and outer center posts.

(6) Torque the inner and outer center post fasteners beginning at the lower corner and working up using the torque values of 10, 20, and 30 inch-pounds [1.13, 2.26, and 3.39 Nm].

NOTE: Prior to installing the screws and Hi-Loc pins, dip the shanks in windshield sealant.

(7) Form a fillet seal with sealer that is forced from under the retainers. Remove the excess sealer with a clean, soft cloth.

(8) Install the bolts, washers, and nuts that attach the inner angles together.

(9) After the sealer has cured, pressure test the aircraft. (Refer to 53-10-01.)

(10) After the pressure test, back the windshield nuts off and retorque to 30 inch-pounds [3.39 Nm]. If the Hi-Loc pin turns when backing off the nut, reseal the pin shank.

(11) Fill the two lower center post screw holes with aerodynamic fairing compound.

(12) Identify and connect the electrical wires to the windshield.

(13) Install the internal defog diffuser.

(14) Install the external defog nozzle. (Refer to 30-40-03.)

(15) Install the headliner and side panels.

CAUTION: MAKE SURE THAT THE GLARESHIELD DOES NOT CONTACT THE WINDSHIELD. PROLONGED CONTACT OF THE GLARESHIELD WITH THE WINDSHIELD WILL RESULT IN CRAZING DAMAGE TO THE WINDSHIELD.

(16) Install the glareshield. (Refer to 31-12-00.)

(17) Install the instrument panel.

(18) Install the nose compartment access doors.

(19) If the existing windshield is installed, remove the protective paper from the windshield, clean if necessary, and restore the electrical power to the aircraft. If a new windshield is installed, do the Windshield Defog System Functional Test.

2. Repairs

A. Windshield Repair Limitations (Aircraft equipped with Sierracin Electric Heated Windshield) (See Figure 202.)

CAUTION: THE FOLLOWING DATA APPLIES ONLY TO FACTORY AUTHORIZED WINDSHIELDS. LEARJET CANNOT PROVIDE DAMAGE CRITERIA, REPAIR PROCE-

DURES OR LIMITATION, OR ASSIST IN DISPOSITION OF NONFACTORY AUTHORIZED WINDSHIELDS.

(1) The electrical heated windshield is constructed of seven layers of material. (See Figure 202.) The general purpose and allowable damage for each of these layers is as follows:

(a) Outer Face Ply - Exterior Face Ply of the Windshield

1) This ply is composed of hard acrylic. It provides environmental protection for the windshield. This layer is not structural, so damage in the form of chips, pits, cracks, scratches, or delamination does not affect the structural integrity of the windshield. Damage in the pilot or copilot viewing area which compromises viewing is cause for rejection at the discretion of the crew. Damage in the area adjacent to the windshield bleed air outlet, which may adversely affect windshield anti-ice airflow, is cause for rejection.

NOTE: Care should be taken to avoid removing this ply when polishing or sanding to remove minor defects. If this ply is removed, the inner layer and outer main ply will be exposed to the environment and deteriorate.

(b) Inner Layers - Between the Outer Face Ply or Crewshield and Main Plies

1) These plies are composed of soft silicone. They provide the adhesive bond between the face ply or crewshield and the main plies. These layers are not structural and delamination does not affect the structural integrity of the windshield. They are not susceptible to cracking because of their flexibility. Delaminations in the pilot's or copilot's viewing area which compromises viewing is cause for rejection at the discretion of thecrew.

(c) Main Plies - Two Thickest Plies Which Provide the Main Structure of Windshield

1) These plies are composed of hard polycarbonate. They provide the main structural strength of the windshield. Any damage to these layers or delamination of these layers from the center polyurethane inter layers is generally not permitted. For Learjet Engineering disposition of minor flaws, send the following information to Learjet Field Service: Aircraft serial number, windshield part number and serial number, and complete description of the damage.

(d) Inner Layer (Polyurethane) - Center Layer of Windshield

1) This layer is composed of polyurethane adhesive. It provides the bond between the two main plies of the windshield. Any damage to this layer or delamination from the main plies is generally not permitted. For Learjet Engineering disposition of minor flaws, send the following information to Learjet Field Service: Aircraft serial number, windshield part number and serial number, and complete description of the damage.

(e) Heated Crewshield - Interior Face Ply of the Windshield

1) This ply is composed of hard acrylic. It provides protection for the gold film and bus bar. This layer is not structural so damage in the form of chips, pits, cracks, scratches, or delamination does not affect the structural integrity of the windshield. Damage in the pilots or copilots viewing area which compromises viewing is cause for rejection at the discretion of the crew. Cracks in this layer will also crack the gold film. If the gold film is cracked in the electrically heated portion, the windshield defog may eventually become inoperable.

(f) Gold Film - Conductive Film on Inside Surface of Crewshield

1) This is a thin, electrically conductive, gold film applied to the inside surface of the crewshield. Electrical power is conducted through this film to generate heat for windshield defog. This film is not structural so damage to the film does not affect the structural integrity of the windshield. In some cases, when the gold film becomes damaged, it will create sufficient heat to bubble and/or discolor the crewshield. This type of damage does not affect the structural integrity of the windshield, but will eventually lead to the defog becoming inoperable. For operational limitations, refer to aircraft's Minimum Equipment List (MEL) or other applicable documents.

B. Removal of Scratches or Pits from electrically heated windshields.

(1) Tools and Equipment

(a) Get the necessary tools and equipment.

NOTE: You can use equivalent alternatives for these items:

NAME	PART NUMBER	MANUFACTURER	USE
Ultrasonic Thickness gage	Nova 800 (LCD) with AE01805 cable/probe assembly and NBR01 cable unit or Nova 810 (LED) with AE01805 cable/probe assembly and NBR01 cable unit	NDT Instruments, Inc. Huntington Beach, CA	Check windshield thickness.
Scratch removal	HP-100	Micro-Surface Finishing Prod. Wilton, IA	To remove restoration kit scratches.
Abrasive paper (wet or dry)	400A & 600A grit	Commercially Available	Smooth windshield surface.
Polishing Compound	Cerium Oxide #2	L.L. Fusco Co. Los Angeles, CA	Polish windshield defects.
Rubber block (Med-Hard)	40-50 Shore H	Commercially Available	
Cotton flannel cloth		Commercially Available	Wipe and clean repaired area.
Cleaner	403D Fed. Spec. P-P560 type 1. Wilco Anti-static cleaner	Commercially Available Wilco Co. Los Angeles, CA	Clean repaired area.

(2) Using an ultrasonic thickness gage calibrated to measure 0.125 inch [0.032 mm] outer faceply, determine the thickness of windshield adjacent to the scratch or pit. Follow the manufacturer's operating instructions for the instrument.

CAUTION: A ROUNDED POINT ON DEPTH GAGE WILL GIVE A FALSE INDICATION OF DEPTH OF A SCRATCH OR PIT. THIS MAY CAUSE THE REMOVAL OF MORE MATERIAL THAN IS PERMITTED.

(3) Using a depth gage with a sharp needle point or other similar device, measure the depth of the scratch or pit as accurately as possible.
(4) Using the thickness measured in step 2.B.(2) and the depth of scratch or pits as measured in step 2.B.(3), determine whether the repairs are permitted.
(5) Fully clean the windshield or cabin window to be repaired. This will remove all unwanted material which may cause more scratches when the repairs are started.

CAUTION: EXTREME CARE MUST BE USED DURING REPAIRS TO PREVENT OPTICAL DISTORTION.

(6) Wrap the abrasive paper, 400A wet or dry, around a rubber sanding block.
(7) Using large amounts of water, lightly sand over and around the imperfection in a back and forth motion parallel to the contours of the windshield. Sand an area two to three times that of the imperfection in order to minimize optical distortion and excessive thinning.
(8) Continue sanding lightly, using large amounts of water, until the initial imperfection is no longer apparent.
(9) Change to 600A wet or dry abrasive paper.
(10) Using large amounts of water, continue to lightly sand until hairline scratches caused by the first sanding are no longer apparent. Sand an area two to three times larger than covered by the first sanding to minimize optical distortion and to feather out the repaired area.
(11) If additional sanding is required, refer to steps (12) and (13) for sanding procedures using the Micro-Mesh scratch removal and restoration kit. If additional sanding is not required, proceed to step (14).

NOTE: When using the Micro-Mesh scratch removal and restoration kit, sand in circular motions instead of back and forth motions previously used.

Use the same sanding time for each grit sanding stage. Rinse the windshield between each stage.

(12) Use six grit sanding stages when sanding the windshields. The grit stages are: 1,800, 2,400, 3,200, 3,600, 4,000, and 6,000 grit. (See manufacturer's instruction.)
(13) After completing the sanding process, inspect the windshield to make sure that the basic optical quality has been restored.

(14) Mix cerium oxide #2 with water to form a thin paste.

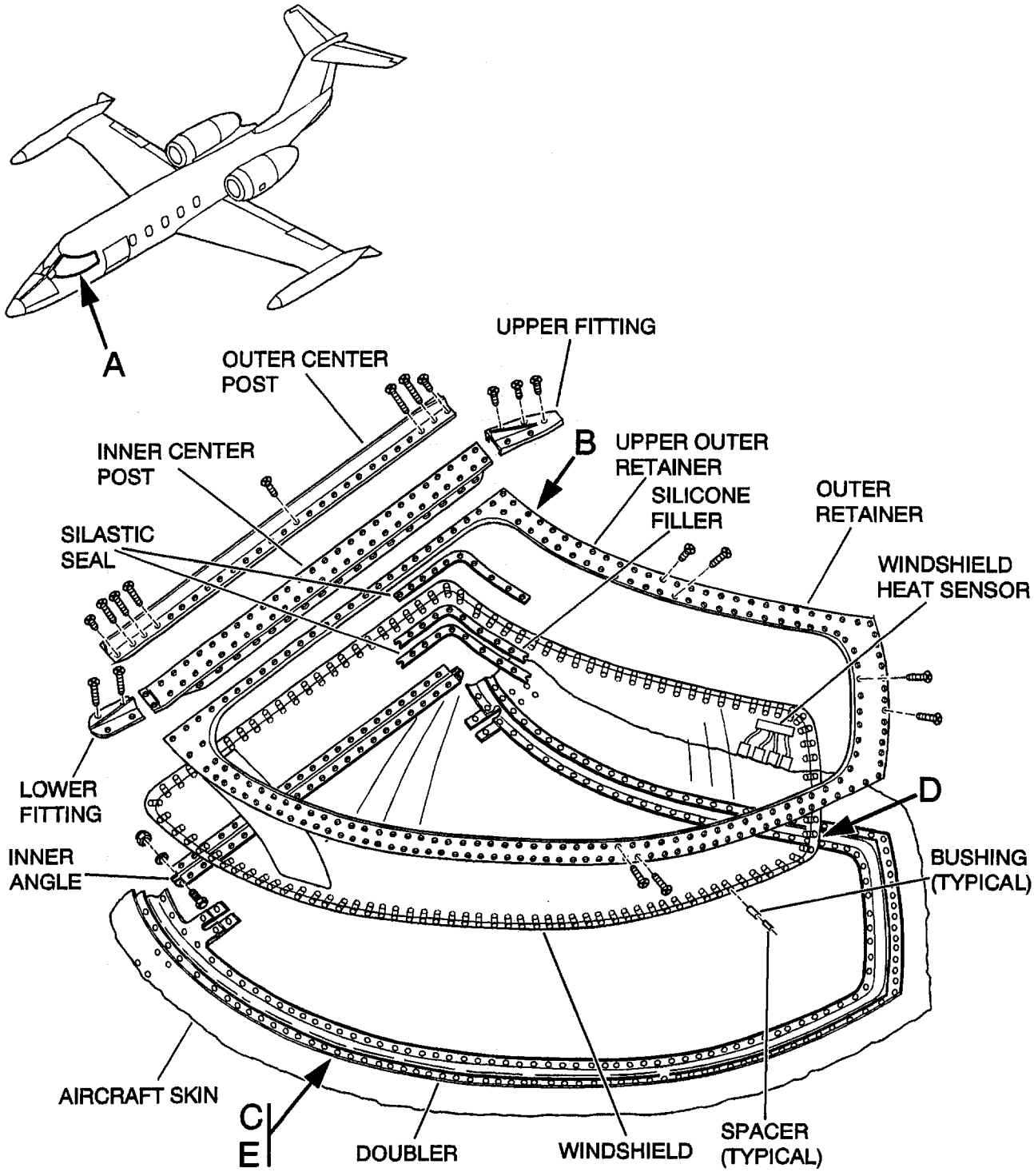
NOTE: Poly-Sand may be used in place of cerium oxide #2. Follow the manufacturer's instructions.

(15) Wrap the sanding block in two to three layers of clean, cotton, flannel cloth to form a polishing pad.

CAUTION: DO NOT ALLOW CERIUM OXIDE #2 PASTE TO BECOME DRY.

(16) Apply the cerium oxide paste to the surface of the windshield and lightly rub in a circular motion. Constantly add water to prevent the paste from drying out and increase the area of circular motion until the entire area of the windshield is covered.
(17) After the sanding marks are removed, continue rubbing with a polishing pad. Do not apply additional paste to the rework area, just water. Continue rubbing the surface while adding water. This action will restore a glossy surface to the windshield.
(18) Using a clean, cotton, flannel cloth, dry the surface of the windshield.
(19) Apply the cleaner with clean, cotton, flannel cloth. After the cleaner has dried, wipe off the cleaner film.
(20) After the completion of repairs, the windshield must be inspected by the aircraft owner, crew, and/or facility performing the repair work to determine whether optical distortion (if any) is acceptable.

NOTE: This inspection must be done under both daytime and night time conditions.

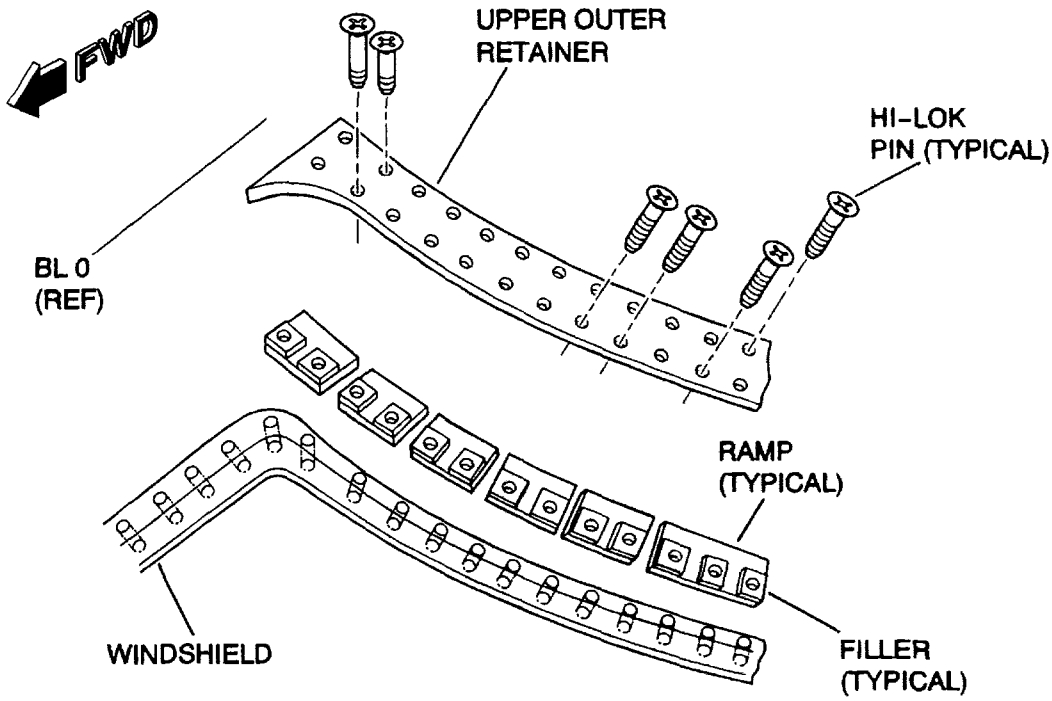


Detail A

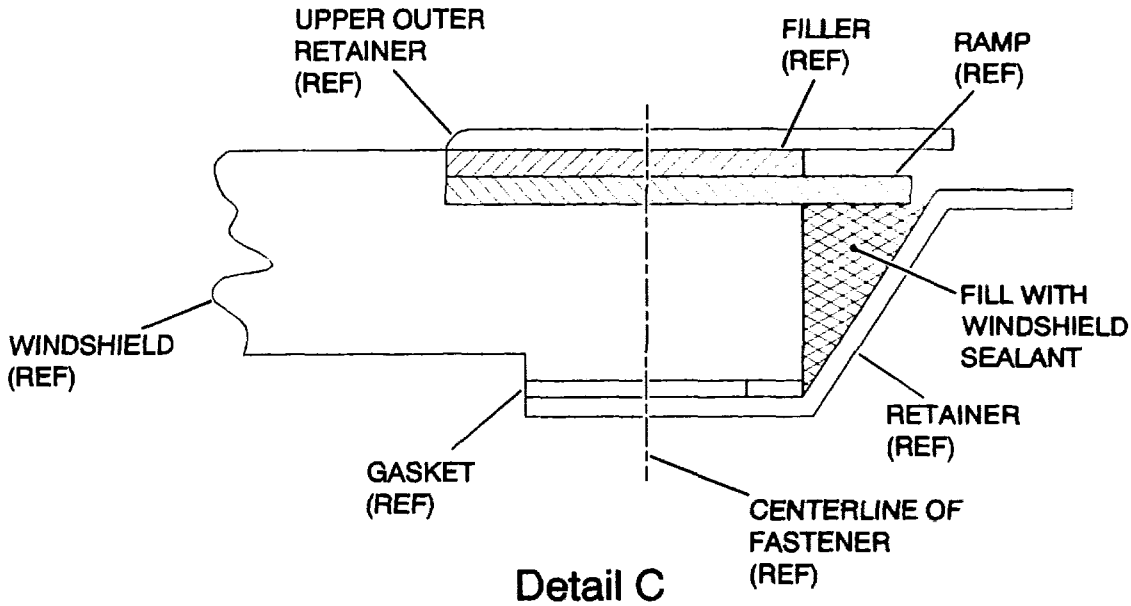
M35-561002-201-01

Windshield Installation

Figure 201 (Sheet 1 of 4)



Detail B

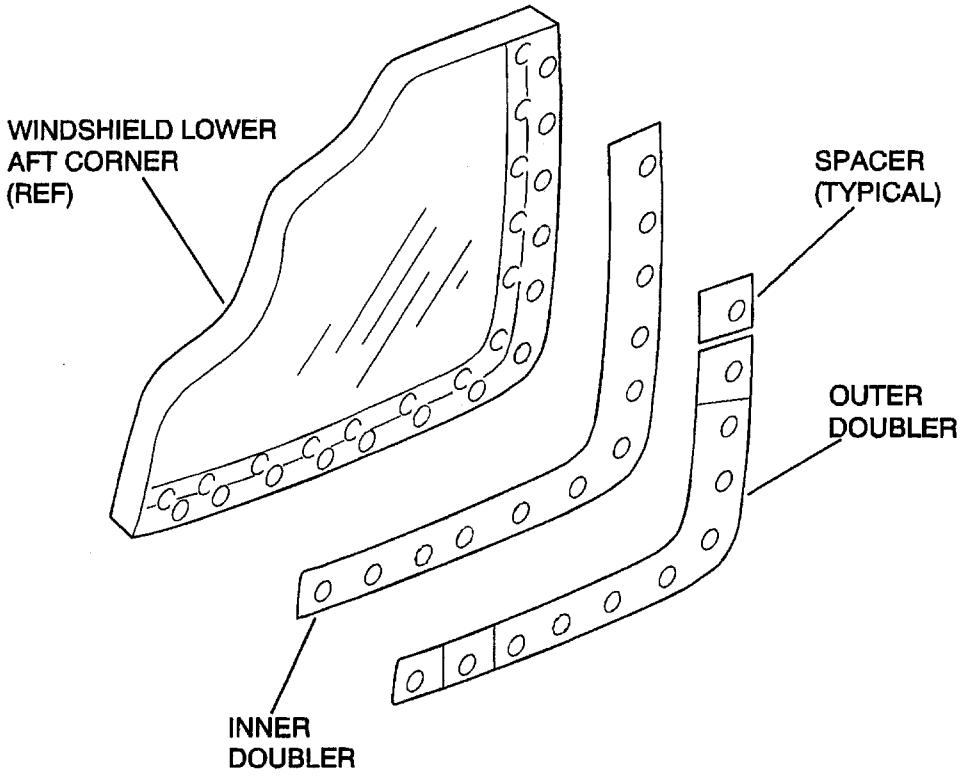


Detail C

M35-561002-201-02

Windshield Installation

Figure 201 (Sheet 2 of 4)

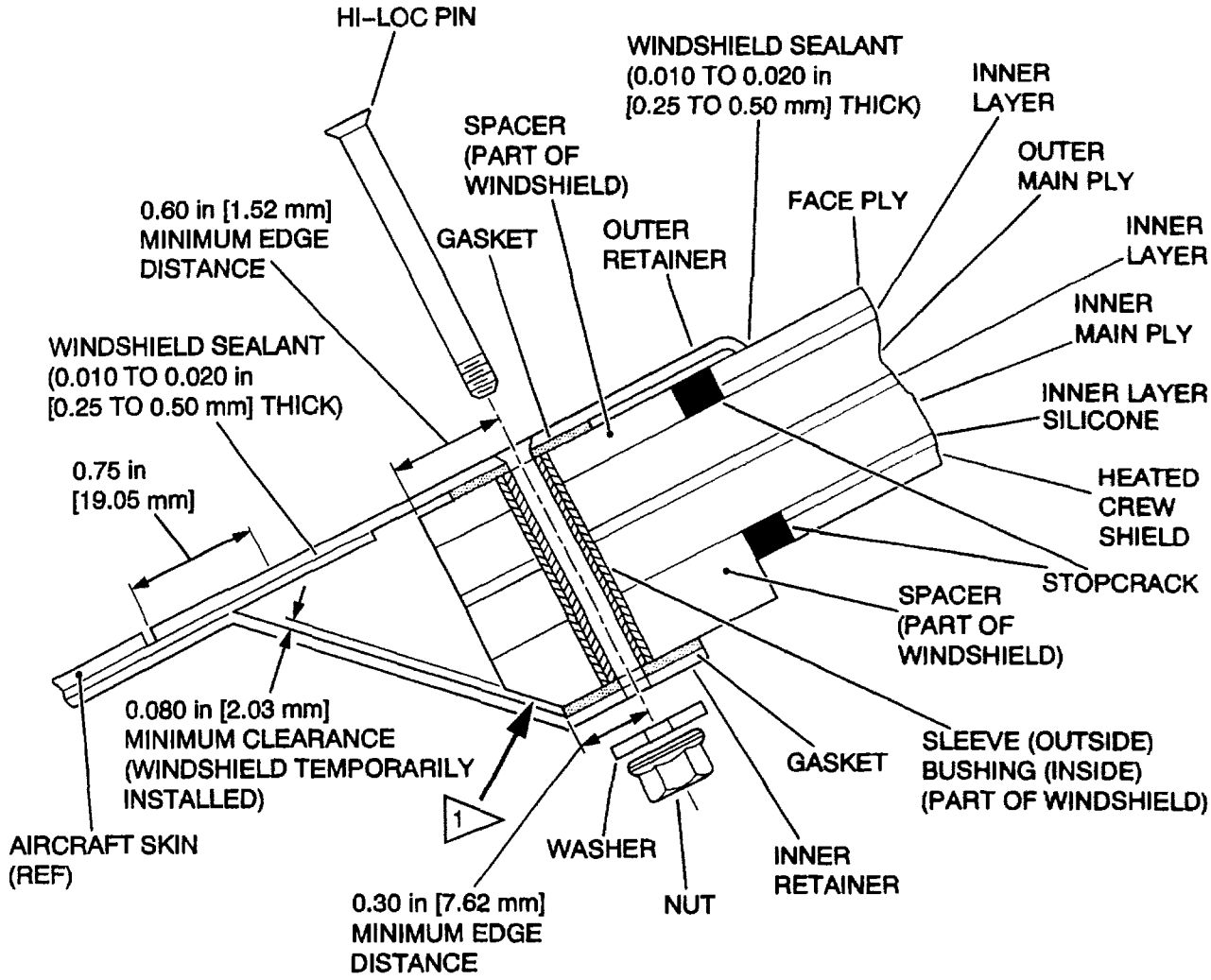


Detail D

M35-561002-201-03

Windshield Installation
Figure 201 (Sheet 3 of4)

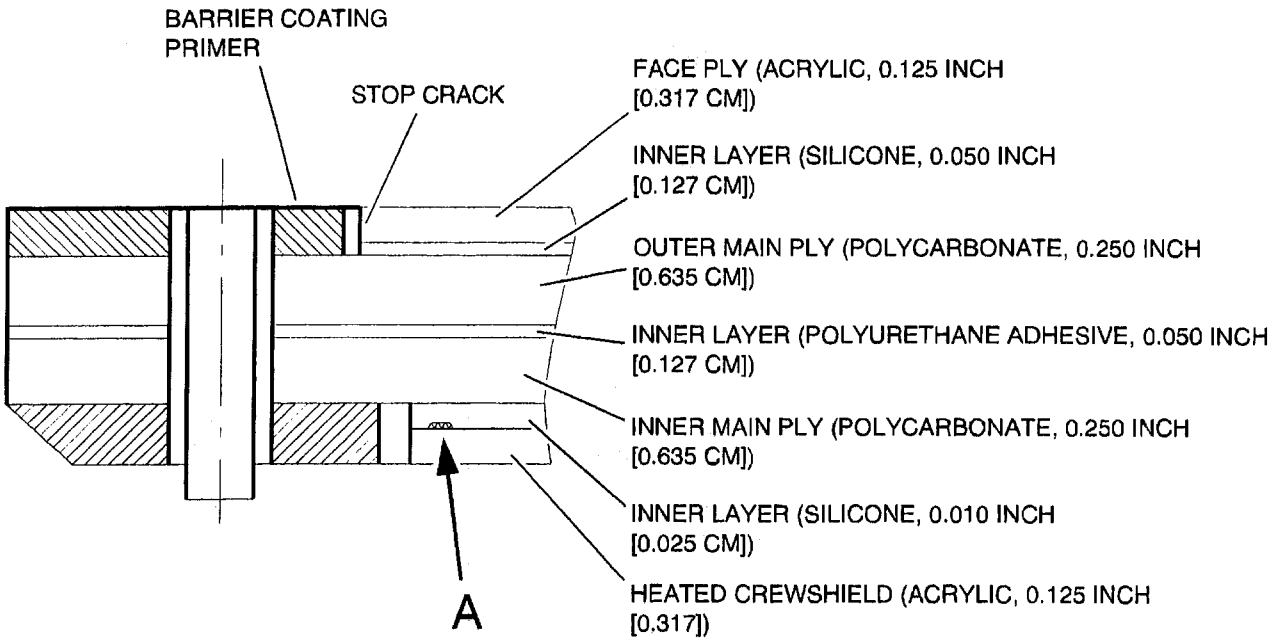
1 THE WINDSHIELD SPACER ONLY MAY BE TRIMMED USING #40 GRIT SANDPAPER. HAND FINISH EDGE WITH 220 TO 320 GRIT TO REMOVE GRIND MARKS AND CHAMFER EDGES SLIGHTLY

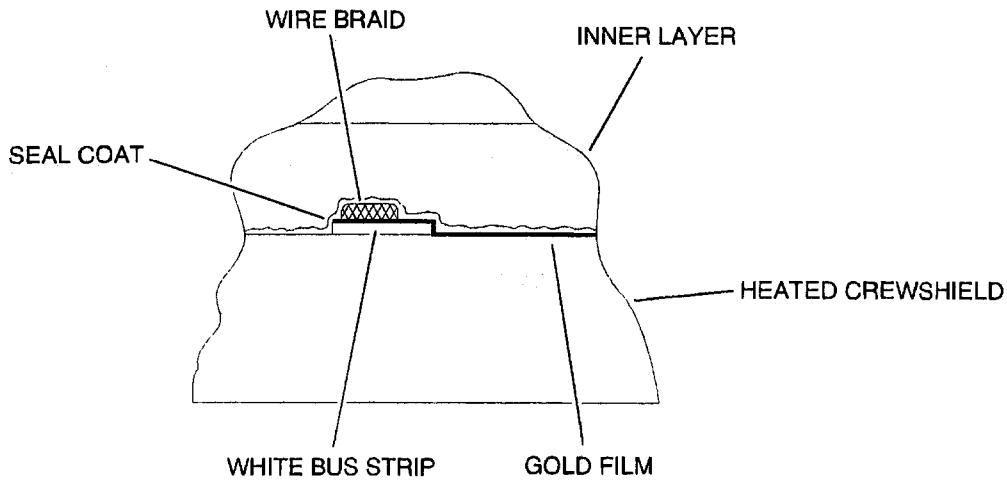


Detail E

M35-561002-201-04

Windshield Installation
Figure 201 (Sheet 4 of4)





Detail A

M35-561002-202-01

Electric Heated Windshield Construction Layers

Figure 202

CABIN WINDOWS- DESCRIPTION AND OPERATION

1. Description

A. There are nine cabin windows installed in the aircraft including the emergency exit door window. Five are installed on the RH side and four on the LH side of the fuselage.

B. The cabin windows are made up of two panes of acrylic with a dead air space in between them. The two panes are held apart and sealed air tight by a spacer. The outer pane is stretched acrylic 0.252 inch thick. The air space between panes is 0.090 inch.

C. Some model 35/35A aircraft may have a fifth window installed on the LH side aft of fuselage station 355.

CABIN WINDOWS - MAINTENANCE PRACTICES

1. Removal/Installation

A. Removal of the Cabin Window. (See Figure 201.)

NOTE: Removal and installation procedures for the cabin windows are identical with the exception of the emergency exit door window.

(1) Remove the upholstery in the immediate area of the window to be replaced.
(2) Using a suitable instrument, remove the foam as required to get access to the window retainers.
(3) Insert a small allen wrench into the shank portion of the fastener and, using an allen wrench to hold the fastener stationary, loosen and remove the nuts attaching the window retainers and window.
(4) Remove the window retainers and window.

B. Installation of the Cabin Window. (See Figure 201.)
(1) Get the necessary tools and equipment.

NOTE: You can use equivalent alternatives for these items:

NAME	PART NUMBER	MANUFACTURER	USE
Solvent Cleaner: Methyl Propyl Ketone (MPK)		Eastman Chemical Kingsport, TN	Metal cleaning.
Aliphatic Naphtha	TT-N-95 Type II	Commercially Available	Window cleaning.
Reamers: 0.218 Inch [0.554 cm]		Commercially Available	Reaming holes in new window.
0.195 Inch [0.495 cm]		Commercially Available	Reaming window holes in aircraft skin and retainer.
Hole De-Burring Tool		Commercially Available	De-burring holes in new window.
Brush		Commercially Available	Cleaning holes in new window.
Twist Drill	#4	Commercially Available	Enlarging holes in bracket and retainer.
Drill Motor		Commercially Available	Drilling, reaming, and de-burring.

NAME	PART NUMBER	MANUFACTURER	USE
Faying & Fillet Sealant		Refer to 20-10-00	Fay and fillet seal window.
Shims: Bracket-To-Retainer Bracket-To-Skin	 5410600-53 5410600-31	Learjet Inc. Wichita, KS	Shimming window bracket.

(2) Remove the old sealant from the structure. (Refer to 20-10-00.)
(3) Remove the old sealant from the window.
(4) Prepare a new window for installation as follows:
(a) Make sure that the attaching parts will install easily.

CAUTION: DO NOT FORCE THE HI-LOK PINS, DAMAGE TO THE WINDOW MAY RESULT. STOP THE INSERTION OF A HI-LOK PIN WHEN IT BINDS.

1) Position the window assembly on the aircraft and install all attaching parts by hand only.
2) If binding of an attaching part(s) has occurred, proceed as follows:
a) Mark the location of the binding attaching part.
b) Remove the attaching parts and the window from the aircraft.
c) Ream a marked window hole to 0.218 inch [0.554 cm]. Keep the reamer cool by dipping it in water several times while reaming the hole.
d) De-burr the hole in the window if required.

CAUTION: DO NOT BLOW THE HOLES WITH AIR. POSSIBLE DAMAGE TO WINDOW SURFACE COULD OCCUR.

e) Clean out the hole(s) in the window with a brush.
f) Drill a marked window hole in the retainer to 0.209 inches [0.531 cm] or #4 drill.
g) Repeat steps 1.B.(4)(a)1) thru 1.B.(4)(a)2)a).
h) If no binding is evident, proceed to step 1.B.(4)(a)3).
i) If binding persists, remove the attaching parts and the window from the aircraft.
j) Ream the marked hole in the aircraft skin to 0.195 inch [0.495 cm].
k) Repeat steps 1.B.(4)(a)1) thru 1.B.(4)(a)2)a).
l) If no binding is evident, proceed to step 1.B.(4)(a)3).
m) If binding persists, contact Learjet Field Service.
3) If no binding is evident, check clearance and length of all the attaching parts.
(b) Attach the retainer and window to the aircraft with clecos.
(c) Place the retainer in position and check the clearance between the aircraft skin and bracket and/or retainer and bracket.
(d) Determine the number of shims necessary to fill the retainer-to-bracket gap, maximum thickness of three shims.

(e) Determine if a shim is necessary to fill the skin-to-bracket gap, maximum thickness of one shim.

(5) Apply a faying surface seal, approximately two inches wide and 0.004 inch [0.102 mm] thick, around the perimeter of the window cutout in the aircraft structure. Allow the sealant to cure before proceeding with the installation.

(6) After the sealant has cured, apply an additional faying surface seal to the mating surfaces of the aircraft structure and window.

(7) Insert four Hi-Lok pins through the cabin window attaching holes, equally spaced around the perimeter.

(8) Install the window, retainers, brackets, and shims, if required, over the pins. Install the new Hi-Lok collars on pins and tighten finger-tight.

(9) Install the remaining pins and new collars and tighten finger-tight.

(10) Torque the Hi-Lok fasteners in a clockwise direction starting at 12, 3, 6, and 9 o'clock. The collars incorporate a break-off torque limit. This makes sure that the fasteners will be correctly torqued.

(11) Fillet seal the gap between the window and the aircraft structure. (Refer to 20-10-00.)

(12) After allowing the sealant to cure, pressure test the aircraft. (Refer to 53-10-01.)

(13) Clean the areas, install the upholstery, and touch up the exterior as necessary.

2. Inspection/Check

A. Inspection of the Cabin windows

NOTE: Cabin windows are assembled from a 0.414 in [10.51 mm] thick outer stretched acrylic, a 0.252 in [6.40 mm] thick inner stretched acrylic, and a 0.090 in [2.28 mm] thick spacer, sealed airtight between the inner and outer stretched acrylic.

(1) Get the necessary tools and equipment.

NOTE: You can use equivalent alternatives for these items:

NAME	PART NUMBER	MANUFACTURER	USE
Depth Gage		Commercially Available	Measure the depth of the window damage.
Stretched Acrylic 0.414 [10.51 mm]	Per MIL-P-25690	Commercially Available	Calibrate the gage.
Stretched Acrylic 0.252 [6.40 mm]	Per MIL-P-25690	Commercially Available	Calibrate the gage.

NAME	PART NUMBER	MANUFACTURER	USE
Ultrasonic Thickness Gage	Nova 800 (LCD) with AE01805 cable/probe assembly and NBR01 cable unit or Nova 810 (LED) with AE01805 cable/probe assembly and NBR01 cable unit or Magnaflux Model DR100	NDT Systems, Inc. Huntington Beach, CA Magnaflux, Inc. Glenview, IL	Test and check the windshield material.

(2) Inspect the cabin window damage and evaluate any damage found, using the steps that follow:
  (a) Use the manufacturers operating instructions for the ultrasonic thickness gage to determine the thickness of the acrylic adjacent to the scratch, chip, or pit.
  (b) Measure the depth of the scratch, chip, or pit as accurately as possible using a depth gage or other similar device.
  (c) Subtract the depth of the scratch, chip, or pit measured in step (2)(b) from the thickness of the acrylic measured in step (2)(a) to determine if the repairs are allowable.

NOTE: Repeat the acrylic thickness measurement after repair to make sure that the minimum outer thickness of 0.370 in [9.39 mm] and 0.220 in [5.58 mm] inner thickness is met or exceeded.

(3) The discrepancies that follow are not repairable. Cabin windows with any one of these discrepancies must be removed from service. (Refer to the NDI Manual [NDI-1, Part 4].)
  (a) Any scratch, nick, or pit reducing the outer window thickness to less than 0.370 in [9.39 mm], or any sharp-bottomed "V" scratch or nick that cannot be repaired without reducing the outer window thickness to less than 0.370 in [9.39 mm].
  (b) Any scratch, nick, or pit that reduces the inner window thickness to less than 0.220 in [5.58 mm] or any sharp-bottomed "V" scratch or nick that cannot be repaired without reducing the inner window thickness to less than 0.220 in [5.58 mm].
  (c) Any continuous crack extending between two or more fastener holes.
  (d) Any cracks originating from the radius of the step in the outer window, or any location other than a fastener hole.
  (e) Any fastener hole crack greater than 0.20 in [5.08 mm] in length extending toward the center of the window, or any fastener hole crack greater than 0.35 in [8.89 mm] extending in any other direction.
  (f) Cracks in more than three adjacent fastener holes.
  (g) Cracks in more than 5 out of 10 adjacent fastener holes.
  (h) Cracks in more than 12 fastener holes for the entire window.

(i) Two or more cracks originating from the same fastener hole toward the edge, which could result in a section breaking out of the window.

(j) Any chipping extending more than 0.09 in [2.28 mm] radially from the edge of holes on more than eight holes.

(k) Any chipping on the perimeter of the window, or on machined fillets, extending more than 0.09 in [2.28 mm] from the surface or edge.

(l) More than two chips in any 6 in [15.24 cm] length.

(4) Remove all sharp edges of acceptable chips by sanding. (Refer to 56-10-01.)

(5) Repeat the acrylic thickness measurement after the repairs to make sure that the minimum outer thickness of 0.370 in [9.39 mm] and an inner thickness of 0.220 in [5.58 mm] is met or exceeded.

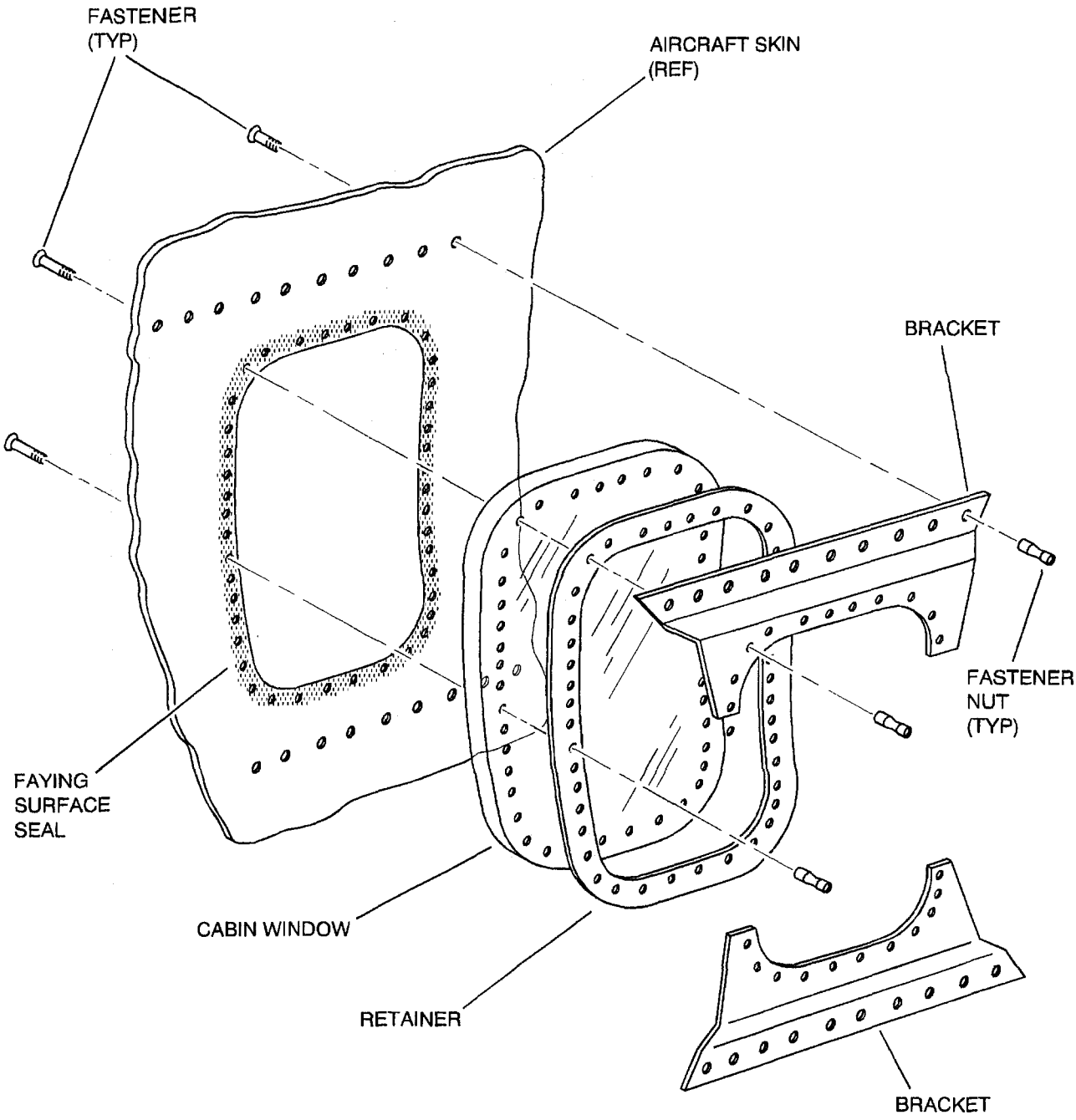
(6) Inspect the cabin window for a trapped water appearance (appears as water between the panes) in the center of the window.

NOTE: The trapped water appearance is usually caused by the inner and outer window panes touching.

(a) If the window shows signs of water in the trapment box but passes all the inspection criteria in step 2.A.(3), the window is allowed to remain in service but must be replaced within 100 flight hours of the inspection.

3. Repairs

A. Refer to 56-10-01, Repairs.



(TYPICAL)

M35-562001-202-01

Cabin Window Installation
Figure 201