TO: ALL HOLDERS OF PASSENGER WINDOW ASSEMBLY OVERHAUL MANUAL, 56-21-31

REVISION NO. 15, DATED JUL 1/01

HIGHLIGHTS

DESCRIPTION OF CHANGE	TOPICS AFFECTED												
	D & O	D / Assy	Cleaning	Insp/Chk	Repair	Assy	F/C	Test	T/Shooting	S/Tools	Storage	IPL	L/Overhaul
Changed the speed callout for the rotary buffer					X								

PASSENGER WINDOW ASSEMBLY

56-21-31

BOEING P/N 65-45790-3, -13, -19, -505, -510, -512

AIRLINE P/N

THE FOLLOWING DIRECTIVES APPLY TO THIS SUBJECT:

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVES	DATE DIRECTIVE INCORPORATED INTO TEXT
56-1007		PRR 32818-1 PRR 33891	Jan 5/81 Mar 5/86

LIST OF EFFECTIVE PAGES

* Indicates pages revised, added or deleted in latest revision

F Indicates foldout pages - print one side only

	PAGE	DATE	PAGE	DATE	PAGE	DATE
	56-21-31					
	T-1	Dec 5/86				
	T-2	BLANK				
*	LEP-1	Jul 1/01				
	LEP-2	BLANK				
	T/C-1	Sep 5/84				
	T/C-2	BLANK				
	1	Dec 5/86				
	2	Sep 5/84				
	3	Sep 5/84				
	4	Sep 5/84				
	5	Sep 5/84				
*	6	Jul 1/01				
	7	Sep 5/84				
	8	Mar 1/99				
	9	Mar 1/95				
	10	Sep 5/84				
	11	Dec 1/96				
	12	Sep 5/84				
	13	Mar 5/91				
	14	Mar 5/91				

TABLE OF CONTENTS

PASSENGER WINDOW ASSEMBLY

1. DESCRIPTION AND OPERATION

A. Description

(1) The passenger window assemblies covered by this subject are of two types. Window assemblies, P/N 65-45790-3, -13, -505, and -510, are unitized assemblies consisting of an outer seal and two acrylic plastic panes bonded to a spacer ring and inner seal (Fig. 4). Window assembly, P/N 65-45790-512, and -19 consists of two acrylic plastic panes and a single molded seal which spaces the panes and seals the assembly without bonding.

(2) Both windowpanes are made of acrylic plastic. The outer pane is stretched acrylic, curved to conform to the fuselage contour and has beveled edges to fit the window frame. The middle (inner) pane is of modified acrylic sheet with unbeveled edges, is also curved, and has a small breather hole near the bottom.

B. Leading Particulars

Height	-- 16 inches (approximately)
Width	-- 12 inches (approximately)
Thickness	-- 7/8 inch (approximately)
Weight	-- 4 pounds (approximately) (P/N 65-45790-3, -13, -505, -510)
	-- 3-1/2 pounds (approximately) (P/N 65-45790-512, -19)

NOTE: Special instructions for testing, trouble shooting and special tools are not required.

2. DISASSEMBLY

A. General

(1) If exposed surfaces of windowpanes do not have a protective covering, apply protective tape, cellulose sheeting, or equivalent, to prevent damage during handling.

B. Disassemble bonded window assembly (Fig. 4)

(1) Remove outer seal (35) from spacer ring (17 or 25).

(2) Separate middle pane (5) from seal (10).

(3) Carefully strip seal (10) from spacer ring (17 or 25). Use wooden or plastic scraper to aid seal removal.

(4) Separate outer pane (16 or 20) from spacer ring (17 or 25).

3. CLEANING (Fig. 4 and 5)

A. Clean old adhesive from edges of windowpanes (5, 16, and 20, Fig. 4, and 5 and 15, Fig. 5) by scraping carefully with wooden or plastic scraper. Clean up adhesive film with aliphatic naphtha applied with a clean, oil-free absorbent material.

B. Clean windowpanes with lukewarm water and castile soap. Use soft, clean cloth for transfer of soap solution to pane, but go over surface with bare hand only to detect and remove dirt that could scratch surface. Wipe dry with clean, damp chamois.

CAUTION: DO NOT RUB DRY PLASTIC WITH DRY CLOTH. THIS CAN CAUSE SCRATCHES AND AN ELECTROSTATIC CHARGE WHICH ATTRACTS DUST PARTICLES.

C. Clean seals (10 and 35) and spacer ring (17 or 25, Fig. 4) with aliphatic naphtha applied with a clean, oil-free, absorbent material. Wipe off solvent before it evaporates, using a clean, oil-free and lint-free cloth. Repeat applications of clean solvent as necessary.

4. INSPECTION/CHECK (Fig. 4 and 5)

A. Check seals (10 and 35, Fig. 4, and 10, Fig. 5) for cuts, nicks, cracks and other imperfections.

B. Acrylic window defect definitions are as follows:

(1) Crazing: A series of very fine fissures perpendicular to surface of the pane. Due to extremely narrow width of fissures, crazing is very difficult to detect when viewed normal to the surface. It can be seen by reflection from smooth surfaces of fissures when viewed at varying angles to the incident light.

(2) Crack: A fissure which has visible width when viewed parallel to the faces of the fissure. A crack may propagate at any angle to the surface of a plastic pane depending on direction of the driving force. Cracks in stretched acrylic may have a chevron or clamshell growth lines (Fig. 1). A crack will propagate from a stress riser such as a scratch or craze.

(3) Scratch: The removal or displacement of material from the surface of a pane along a line. The ratio of depth to width is usually quite small.

(4) Chips:

(a) Spall (shell type) chips have circular or curved periphery with many fine hairlines or ridges that follow the outline of outer edge and degenerate toward the center or deepest point of chip, similar to a clamshell.

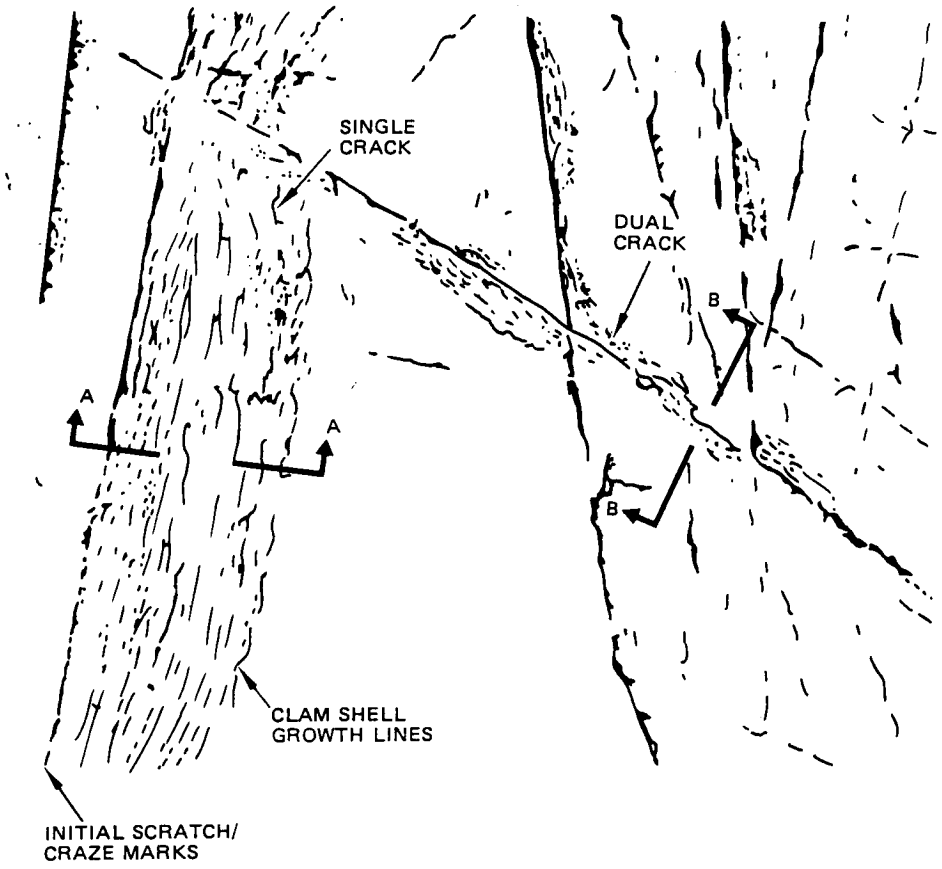
(b) Vee shaped chips have sharp narrow "V" shape and appear to propagate toward the interior of plastic.

(5) In-plane cracking (also called delamination):

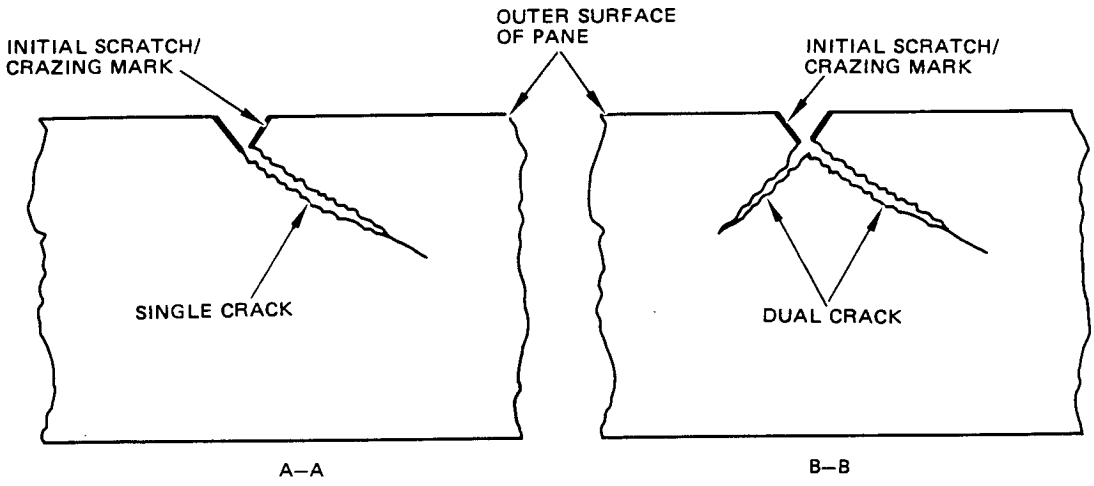
A smooth surfaced fissure, or series of fissures, parallel to pane surfaces. In-plane cracking can occur in stretched acrylic and starts at edges of pane or at deep penetrations of the surface. It is most readily detected by the reflection of light from the smooth surfaces of the fissure.

C. Check windowpanes (5, 16, and 20, Fig. 4, and 5 and 10, Fig. 5) for cracks, crazing, delamination, chips and scratches as follows:

(1) Cracked panes -- not acceptable.



WINDOW SURFACE

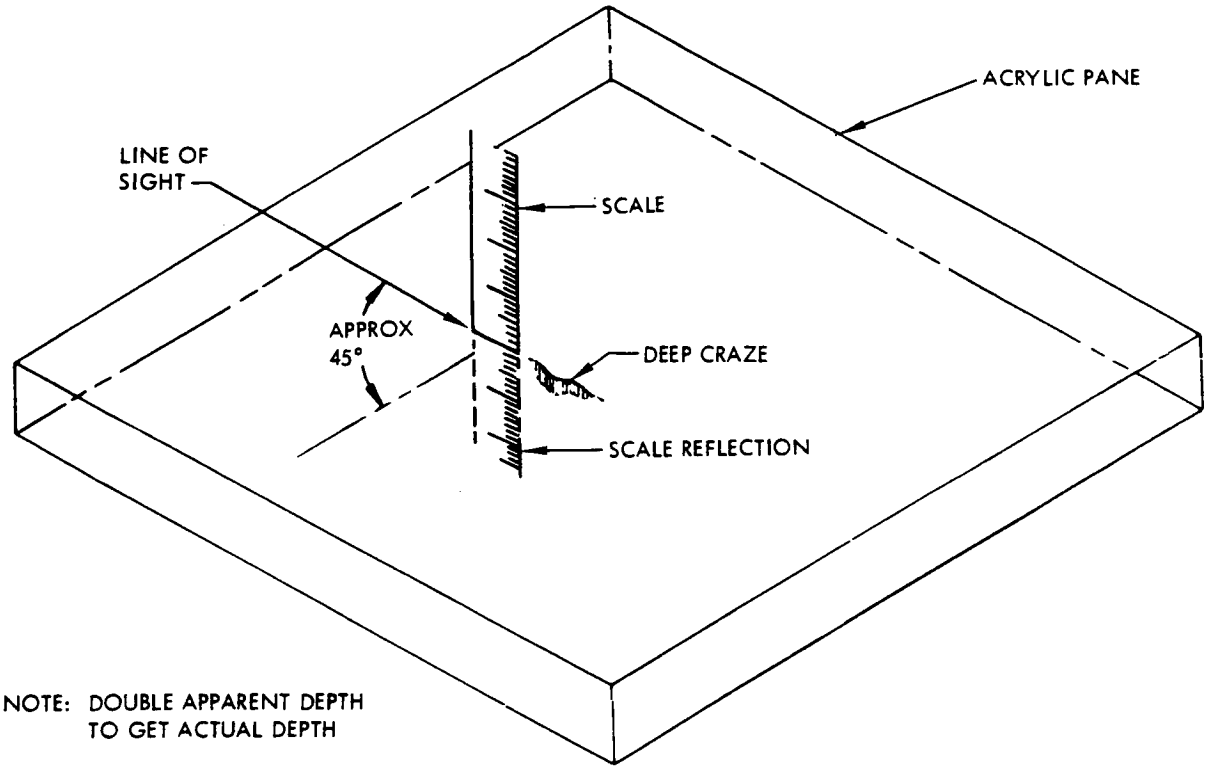


Window Surface Damage
Figure 1

(2) Crazed middle pane (5) -- not acceptable.

(3) Crazed outer pane (16 and 20, figure 4, or 15, figure 5) -- permissible at other than beveled edge if depth does not exceed 0.05 inch in local area not over 2 inches in diameter.

NOTE: To determine depth of crazing, hold a 6-inch metal scale normal to and contacting surface of pane where crazing is deepest. View reflection of scale at about 45 degrees to determine apparent depth of craze. Double apparent depth to get approximate actual depth. (See figure 2.)



Method of Measuring Depth of Crazing
Figure 2

(4) In-plane cracking on middle pane (5) -- not acceptable.

(5) In-plane cracking on outer pane (16, 20, Fig. 4, or 15, Fig. 5) -- permissible at extreme edge within following limit:

(a) Maximum extension from edge -- 0.55 inch

(6) Chips and in-plane cracks on outer pane (16, 20, Fig. 4, or 15, Fig. 5) -- permissible on surface other than extreme edge within the following limits:

(a) Maximum chip depth -- 0.04 inch

(b) Maximum size of delamination -- 0.40-inch diameter

(c) Minimum distance between defects -- twice maximum damage diameter

NOTE: In-plane cracks will continue to grow. Reuse of outer panes that exhibit in-plane cracks is not recommended.

(7) Chipped middle pane (5) -- Surface chips and V-shaped edge chips no greater than 0.06 inch in the maximum dimension are permissible.

5. REPAIR

A. Repair

(1) Repair chipped or scratched windowpanes.

(a) Cover undamaged side of pane with protective tape or coating.

(b) Remove superficial scratches by applying a polish to a wet, clean cloth and rubbing window. Use a circular motion, starting at the pane center, and work outward. Use a clean flannel cloth for each operation.

CAUTION: AVOID OVERHEATING WINDOW. KEEP BUFFING WHEEL IN CONSTANT MOTION OVER WINDOW SO THAT WINDOW SURFACE TEMPERATURE DOES NOT EXCEED 130°F. AT THIS TEMPERATURE, WINDOW WILL NOT FEEL HOT WHEN TOUCHED BY BACK OF HAND WITHIN 2 SECONDS AFTER REMOVING PANE FROM BUFFING WHEEL.

(c) Remove minor scratches by machine polishing or buffing.

1) If required, initially buff with coarse compound (Learock S-30) at wheel surface speed of 3200 feet per minute, using stitched muslin wheel.

2) Polish to high gloss with Learock 888, using loosely stitched flannel wheel at wheel surface speed of 4200 feet per minute.

(d) Remove chips or buildup material on major scratches by hand-sanding.

1) Using presoaked wet-or-dry No. 400-A sandpaper wrapped around sanding block, sand across buildup at approximately 45 degrees within diameter of approximately 4 inches. Change sandpaper as required.

2) Remove sanding abrasions by sanding with No. 600-A wet-or-dry sandpaper.

3) Polish to remove frosted appearance per Paragraph 5.A.(1)(c).

(e) Check thickness:

1) Minimum thickness of outer windowpane (16 and 20, Fig. 4, or 15, Fig. 5) -- 0.265 inch

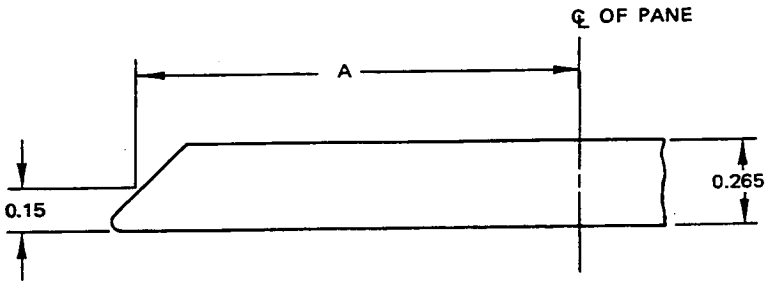
2) Minimum thickness of middle windowpane (5) -- 0.157 inch

(2) Repair crazed outer windowpane beveled edge.

NOTE: Deleted

(a) Machine entire seal plane of beveled edge to depth required to remove crazing. Minimum size of windowpane after repair is shown in Fig. 3.

CAUTION: TAKE CARE TO MAINTAIN REQUIRED SEAL PLANE.



A: 5.28 – 5.30 FROM VERTICAL CENTERLINE
7.28 – 7.30 FROM HORIZONTAL CENTERLINE

ALL DIMENSIONS ARE IN INCHES

Outer Windowpane Repair
Figure 3

(b) Check machined edge for any evidence of crazing. Windowpane must be removed from service if any crazing is apparent after maximum machining of beveled edge.

B. Refinish (optional)

CAUTION: DO NOT WET OR MAR THE WINDOW SURFACES AFTER TREATMENT.

(1) Apply antistatic agent to acrylic windowpanes.

(a) Soak a boiled cheese cloth with Static Stop solution and apply to the inner surface of the outer pane and both surfaces of the middle pane.

(b) Polish with a boiled cheese cloth using a brisk, straight motions and maintaining as light a pressure as possible.

C. Materials

NOTE: Use listed materials or equivalent substitutes.

(1) Buffing Compound

(a) Learok No. 888 -- (Ref 20-60-04)

(b) Learok No. S-30 -- (Ref 20-60-04)

(2) Polishes

(a) Plastishine A -- Cee Bee Chemical Co. Inc., 9520 East Cee Bee Drive, Downey, California 90241

(b) Plex-I-Glow -- McAleer Manufacturing Co., 101 South Waterman Ave., Detroit, Michigan 48217

(c) Mirror Glaze M10 or M17 -- Meguiars Inc., 17991 Mitchell S., Irvine, California 92614

(d) Simoniz Wax -- Simoniz Company, 2100 South Indiana Ave., Chicago, Illinois 60616

(3) Protective Coating, Spraylat SC-1071 -- Spraylat Corp., One Park Ave., New York, New York 10016

(4) Protective Tape

(a) Gizard Protex 20V -- Mak-Off Co., 435 West Maple Ave., Monrovia, California 91016

(b) Permacel No. 75 -- Permacel, New Brunswick, New Jersey

(c) 3M No. 670 or Y-9017 -- Minnesota Mining and Manufacturing Co., St. Paul, Minnesota 55101

(5) Static Stop -- General Plastics Manufacturing Co., 4910 Burlington Way, P.O. Box 9097, Tacoma, Washington 98409-2833

6. ASSEMBLY

A. General

(1) It is very important to assure cleanliness during window assembly. Dust will not only mar the appearance of the window but contaminents will reduce the effectiveness of adhesives on the bonded assemblies. A controlled environment room or clean booth that can be isolated and provided with a filtered air supply is recommended. Personnel should cleanse themselves of loose contaminents and wear lint-free outer garments, gloves and head covering, and polyethylene covering for the feet.

(2) The assembly bench should be covered with a soft, lint-free cover to preclude damage to the plastic panes.

B. Assemble bonded window assemblies P/N 65-45790-3, -13, -505, and -510 (Fig. 4).

NOTE: Seal 65-76765-5 may replace seal (10), spacer ring (17, 25) and seal (35). If so, assemble per par. C.

(1) Sand both faying surfaces of the spacer ring (17 or 25) thoroughly with 400-grit aluminum oxide paper until all gloss is removed. Optional: Wet abrasive-blast all surfaces of spacer ring with Liquabrasive, 140 grit, as required to remove all surface gloss.

(2) Sand both faying surfaces of middle windowpane seal (10) thoroughly with 180-grit aluminum oxide cloth. Optional: Dry abrasive-blast both sides of seal with G-80 angular steel grit, as required to remove glossy powdered mica.

(3) Thoroughly clean the faying surfaces common to seal (10) and middle pane (5) with aliphatic naphtha and wipe dry.

WARNING: ALIPHATIC NAPHTHA IS FLAMMABLE.

NOTE: Apply cleaner with a clean, oil-free, absorbent material. Wipe off cleaner, while wet, with a clean, oil and lint-free, absorbent material such as new cheesecloth, or equivalent. The use of excessive cleaner should be avoided.

(4) Thoroughly clean faying surfaces common to seal (10) and spacer ring (17 or 25) with aliphatic naphtha and wipe dry.

(5) Thoroughly clean faying surfaces common to spacer ring (17 or 25) and outer pane (16 or 20) with aliphatic naphtha and wipe dry.

(6) Cut and remove material on each side, at horizontal centerline of middle windowpane seal (10) to allow seal to lay smoothly around periphery of middle pane (5). Butt splice seal allowing no gap at cut.

(7) Bond faying surfaces of outer pane (16 or 20) to spacer ring (17 or 25) with BMS 5-79, class B sealant per 20-50-12, type 44. Ensure that pane is centered with part number at top. Gaps on opposite sides of the assembly should be equal within 0.03 inch.

(8) Bond faying surfaces of middle windowpane seal (19) to spacer ring (17 or 25) with BMS 5-79, class B sealant per 20-50-12, type 44.

NOTE: Adhesive bead extruding from under seal on inner edge of spacer ring is satisfactory. Polyethylene film, used as a slip sheet over spacer ring, may facilitate seal positioning.

(9) Clean outer and middle panes.

(a) Remove protective covering from windowpanes. Retain covering for reapplication.

(b) Clean residual masking adhesive and other contaminents from panes with aliphatic naphtha. Wipe panes dry with clean oil and lint-free material before solvent evaporates.

(c) Remove all dust and lint from surfaces of panes, using a soft-tipped vacuum hose.

(d) Optional – Apply a moderate amount of antistatic agent to entire surface of the windowpane.

(10) Bond faying surfaces of middle windowpane seal (10) and middle windowpane (5) with BMS 5-55 cement per 20-50-12, type 12. Breather hole must be at bottom of pane.

NOTE: Polyethylene film, used as a slip sheet over seal, may facilitate positioning of middle pane.

(11) Clean up as necessary with aliphatic naphtha.

(12) Replace protective covering on windowpanes.

C. Assemble window assemblies P/N 65-45790-19, -512 (Fig. 5).

(1) Assemble outer windowpane, with part number at top of pane, and middle windowpane with breather hole at bottom of the pane, and the seal/spacer as a unit. Do not remove protective diaphragm molded integrally with seal. This is to be removed after window assy is installed.

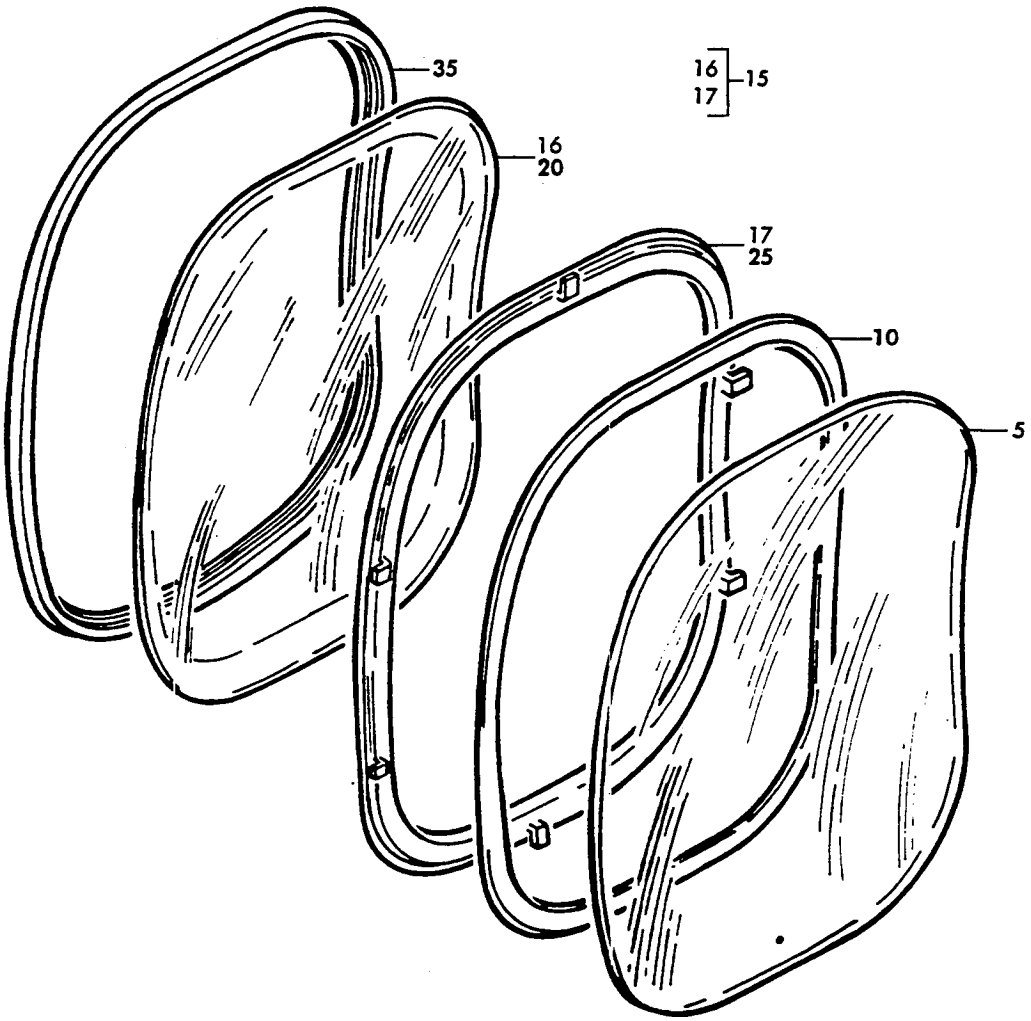
(2) Apply protective covering to exposed surface of middle pane, using protective tape, cellulose sheeting, or equivalent, and secure parts together with tape or by other suitable means.

7. STORAGE INSTRUCTIONS

A. Wrap entire assembly in vapor barrier paper and place wrapped assembly in an airtight, dustproof container.

B. For further information, refer to 20-44-02, Temporary Protective Coatings, and to 20-70-01, Protection, Storage and Handling of Airplane Components.

8. ILLUSTRATED PARTS LIST

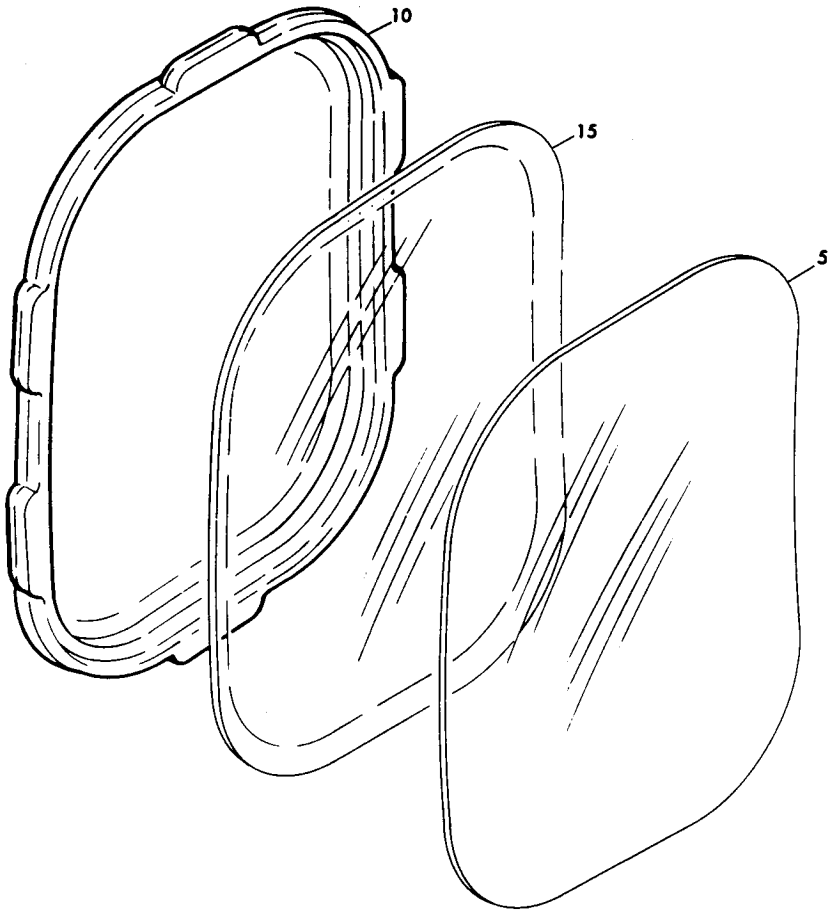


Passenger Window Assembly
Figure 4

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
4-					
	65-45790-3		PASSENGER WINDOW ASSY	A	RF
	65-45790-13		PASSENGER WINDOW ASSY (SB 56-1007)	B	RF
	65-45790-505		PASSENGER WINDOW ASSY	C	RF
	65-45790-510		PASSENGER WINDOW ASSY	D	RF
	65-45790-38		DELETED		
5	65-45792-1		. PANE, MIDDLE	A	1
5	65-45792-2		. PANE, MIDDLE	BCD	1
10	69-36646-1		. SEAL	ACD	1
10	69-36646-1		. SEAL (PRE SB 56-1007)	B	1
15	65-45790-5		. PANE ASSY, OUTER	A	1
15	65-45790-15		. PANE ASSY, OUTER	BC	1
16	65-45791-1		. . PANE, OUTER (USED ON 65-45790-5)		1
16	65-45791-2		. . PANE, OUTER (USED ON 65-45790-15)		1
17	65-45789-2		. . RING, SPACER (USED ON 65-45790-5)	AC	1
17	65-45789-2		. . RING, SPACER (USED ON 65-45790-5) (PRE SB 56-1007)	B	1
17	65-45789-3		. . RING, SPACER (USED ON 65-45790 -15)	AC	1
17	65-45789-3		. . RING, SPACER (USED ON 65-45790 -15) (PRE SB 56-1007)	B	1
20	65-45791-2		. PANE, OUTER	D	1
25	65-45789-3		. RING, SPACER	D	1
35	65-62296-1		. SEAL (PREF) *[1]	ACD	1
35	65-62296-1		. SEAL (PRE SB 56-1007)	B	1
35	69-36645-1		. SEAL (OPT) *[1]	ACD	1
35	69-36645-1		. SEAL (PRE SB 56-1007	B	1
40	65-76765-4		. SEAL (OPT TO 65-76765-5) (POST SB 56-1007) *[2]	B	1
40	65-76765-5		. SEAL (OPT TO 65-76765-4) (POST SB 56-1007) *[2]	B	1

*[1] 65-62296-1 seal is functionally interchangeable with 65-36645-1 seal when center diaphragm is removed.

*[2] Seal (69-36646-1), ring (65-45789-2 or -3), and seal (65-62296-1 or 69-36645-1) are replaced by seal (65-76765-4 or -5).



Passenger Window Assembly
Figure 5

FIG. & ITEM NO.	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USE CODE	QTY PER ASSY
5-					
	65-45790-512		PASSENGER WINDOW ASSY	A	RF
	65-45790-19		PASSENGER WINDOW ASSY	B	RF
	65-45790-20		DELETED		
	65-45790-38		DELETED		
5	65-45792-2		. PANE, MIDDLE		1
10	65-76765-6		DELETED		
10	65-76765-5		DELETED		
10	65-76765-4		. SEAL	B	1
10	65-76765-1		. SEAL	A	1
15	65-45791-2		. PANE, OUTER		1