

ADDENDUM TO INSTRUCTIONS

Page 2: Warranty

After inspection, re-install protective paper before installation for protection. Trim approximately two inches from around edge so paper does not interfere with installation. Tape down edges.

Page 3a: Discussion of installation

Note 6: Moving defroster vents forward to base of new windshield must be done before final installation of new windshield.

Note 7: You will need a helper to lift windshield up into place approximately 8 to 10 times. Installation of this windshield is not difficult, but is time consuming to do correctly. It is safe to say that you will need 40 to 50 hours, not including making dash and trim panels.

Note 8: Most trimming / grinding if needed should be done on the lower rear of each side for fit into rear supports # 162-31801-4. Keep paper on windshield to protect from scratches and nicks while fitting. Fold or trim paper back 2 inches and tape down into place.

Note 9: Do not cut on or drill holes into a cold windshield. Acrylics are somewhat brittle when cold. Temperatures above 70 degrees work's best. Do not use standard drill bits when drilling on your new windshield. (they will dig in and crack the acrylic) Use only specially ground plexiglass drills. They can be purchased through most sources for acrylic products, Aircraft Spruce, and Sears. Trimming can be done with a Dremel tool using a thin cutting Disk, or and air tool. Cutting with any type of saw is not recommended. Sanding on the edges works well with a palm sander. If you have never worked with plexiglass it is suggested that you develop you drilling and cutting techniques, and get a feel for this material on a scrap piece. Double and triple check all your measurements before any drilling or cutting, and through out the project step back and review the big picture, (don't work your self into a corner).

Note 10: Consider making a pattern for dash pad. Do this before final install.

Note 11: When removing " roll reinforcement " as instructed from inside skin, instructions call for cutting of spot welds. Some spot weld cutters will punch a pilot hole clear to the out side. You don't want this ! You can grind through the weld from the back side with a small air tool and a stone, or a Dremel and cut off wheel. Care must be taken not to build up to much heat, or you can warp the outer skin. The illustration on page 12 depicts some guy needing a shave, prying the roll reinforcement off with a big screwdriver. DON'T DO THIS !

Navion AIRCRAFT

Type 162-31801 Windshield

Installation Instructions

AMERICAN NAVION SOCIETY, LTD.



**American Navion
Society, Ltd.**

(360) 833-9921 Admin (May-Oct)
(623) 975-4052 Admin (Nov-Apr)
(970) 835-5096 Parts
(970) 835-5097 Parts FAX

AMERICAN NAVION SOCIETY, LTD
Eckert, CO 81418

* TABLE OF CONTENTS *

<u>Table of Contents</u>	<u>Page a</u>
Notice of Change	1
Warranty	2
Discussion	3a
Tools Required	4
Parts List	4a
Installation Instructions A B D E F	5a
Installation Instructions A B D E F (Continued)	6a & 6b
Installation Instructions G & H	7
Installation Instructions G & H (Continued)	8
Drawing	9 a & 9b
Details	10 a
Drawing 162-31801-8	11
Pictures	12
Pictures	13
Pictures	14

NOTICE OF CHANGE

<u>Change</u>	<u>Date</u>	<u>Page</u>	<u>Paragraph</u>	<u>Description</u>
A	7-13-83	a		Add Table of Contents
A	" " "	5	13	Correct drill size
A	" " "	5	12	Delete Paragraph 12 Add 12a
A	" " "	6	18	Delete Paragraph 18 Add 18a
A	" " "	6	25	Add fourth sentence
A	" " "	6	23	Correct part number
A	" " "	6	17	Correct drill size
A	" " "	6	22	Change wording
A	" " "	8	17	Re-word = same meaning
B	11-14-83	3		delete page 3
B	11-14-83	3a		Add page 3a
B	11-14-83	14		Add page 14
B	11-14-83	4		Add 2 x 3 woodblocks
B	11-14-83	5		Delete page 5
B	" " "	5a		Add page 5a
B	" " "	6		Delete page 6
B	" " "	6a		Add page 6a
B	" " "	6b		Add page 6b
B	" " "	9		Delete page 9
B	" " "	9a		Add page 9a
B	" " "	9b		Add page 9b
B	" " "	10		Delete page 10
B	" " "	10a		Add page 10a
B	" " "	11		Add page 11
B	" " "	12		Add page 12
B	" " "	13		Add page 13
C	8-21-84	5a	9	Delete 9, Add 9a

WARRANTY

1. The Type 162-31801 windshield is unconditionally guaranteed against defective material and workmanship. We cannot assume any liability for improper installation or damages incurred in transit. Warranty is limited to replacement of defective parts or refund of purchase price.
2. Upon receipt of the windshield, the carton should be opened immediately and the paper wrapping removed. The windshield should be inspected for any damage in shipping. Make certain there are no scratches or other defects. If any defect is found, return it to the retailer from which it was purchased.

"Discussion of Installation of Type
162-31801 Navion Aircraft Windshield"

1. The windshield has been manufactured to rigid specifications. If the windshield is properly installed and given good care, it will return many years of service.
2. Proper installation is most important. FAA requires a licensed aircraft mechanic supervise the installation and return the aircraft to service. The mechanic should keep in mind that acrylic is weak in tension and is notch sensitive. There should not be any sharp objects, such as rivets or burrs from broken spot welds that will contact the acrylic.
3. The windshield must fit the opening perfect without the installation of any screws thru the acrylic. The only function of the screws thru the acrylic is to aid waterproofing. The screw holes in the acrylic must be large enough to allow the acrylic to contract to its size at the coldest temperature, without placing any tensil stress on the acrylic. The nuts must be left loose enough to allow this movement.
4. The windshield must be supported by the metal supports on each side (162-31801-4 Ref.) and the fit at the bow. All other attachments are redundant and serve primarily for water-proofing.
5. The cowling under the windshield should be painted flat black color to prevent glare.

"Tools Required for Installation of
Windshield Type 162-31801"

High speed $\frac{1}{4}$ " drill motor

#10 drill ground for plastic

#34 Drill ground for plastic

#34 drill

100° counter sink

Flat and half round file

Spot weld cutter or equal

Aviation snips (left & right)

#1 Philips screw driver

$\frac{1}{4}$ socket or nut runner

$\frac{1}{4}$ end wrench

Fitting of windshield may require sanding or filing

Masking tape, hammer, misc. screw drivers

Plyer vise grip, etc.

Paint and interior has not been considered

Two blocks of wood approximately 2" x 3" x $\frac{3}{4}$ "

PARTS LIST

<u>PART NO.</u>	<u>QUANTITY</u>	<u>MODEL</u>
162-31801-1	1	A B D E F
162-31801-2	1	G & H
162-31801-8	1	G & H
162-31801-4 LR	2	ALL
162-31801-5 LR	2	ALL
162-31801-6	3	G & H
AN365-440	144	ALL
AN960-4	86	ALL
AN507-440-6	46	ALL
AN507-440-7	90	ALL
AN506-440-8	8	ALL
PRESTITE (Sealing Compound)	126"	ALL
AN366F-1032	6	G & H
AN526-1032-8	6	G & H
AN470-3-3	12	G & H
TEMPLATE/P162-31801-6	1	ALL
AN507-440-4	9	A B D E F
AN365-440	9	A B D E F
162-31801-9 RH	1	A B D E F
162-31801-9 LR	1	A B D E F
AN525-10R 28	2	A B D E F
AN364-1032 A	2	A B D E F
3/8 OD - 9/16 SPACER	4	A Only

TYPE 162-31801 WINDSHIELD
CANOPY MODELS A B D E & F

1. Remove old windshield.
2. Place paper template #P162-31801-6 on top of windshield bow. The straight rear edge must be even with the canopy opening. Mark for cutting.
3. Cut off center post $1\frac{1}{2}$ " aft of proposed windshield opening. Applies to A thru G models only. See picture and E-E.
4. Remove center post and rolled reinforcement over windshield. Cut opening at top where marked under instruction 2. (See picture).
- 5a. $1/8$ " aft of the instrument panel station, draw a vertical line on the outside of the airplane, starting at the bottom of the existing windshield and extending down approximately 6". Do the same on the opposite side of the aircraft.
- 5b. (This does not apply to G or H Model.) Part 162-31801-9 may be fitted at this time. Place the part next to the remaining portion of the center post. The wedge shaped angle should be near the center with the widest part to the rear, Sec. E-E. Trim the rear edge so that it will fit under the skin and butt the bow section. Mark the front along the opening cut under instruction 4, for future trimming.
6. Place new windshield over the skin at the position it will be in when installed, except the glass is outside the metal.
- 7a. Draw a line on the cowling at the bottom of the windshield, starting at one of the vertical lines (drawn in Instruction 5), and extending around the front of the windshield to the other line on the opposite side.
- 8a. Remove new windshield from the aircraft. Remove roll reinforcement under each side of existing windshield opening, by cutting spot welds. Cut the skin at the vertical line drawn in Instruction 5a, from the existing windshield opening to the line drawn in Instruction 7a. Do the same to the opposite side. If you find it necessary to cut deeper, make sure the cut will be concealed by part 162-31081-5 LR.
- 8b. Paint the cowling within the line drawn in Instruction 7a. This paint must be a dull black to prevent glare from the windshield.
- 8c. Mark for future drilling the location of screws at the rear & top of the proposed windshield, as follows: Draw a line $\frac{1}{4}$ " from edge of skin. Mark the line for proposed screw holes starting at the top at the exact center. Locate one screw in center and one screw $1 \text{ \& } 3/8$ " each side of center. The other screws are located 2" min. on center. Utilize existing holes where possible.
- 9a. Temporarily install the windshield by putting the lower rear portion in first, then aft under the opening, when it is near the final aft position, lower the front portion on to the cowling utilizing the cuts made under instruction 8a (it may require deeper cuts). Be sure to protect the windshield from sharp metal that may scratch.
10. Remove rubber seal at bow (optional) and adjust canopy fit before proceeding.

Installation Instructions
Canopy Models A B D E & F

- 11a. Adjust windshield to its proper position and support on 2" x 3" woodblocks. Place a woodblock under each side of the windshield. Move the blocks to the rear until the windshield fits tight at the top. It may require a light hammer to drive the blocks in tight. If the windshield does not fit properly it may require trimming at top and or rear edges
- 12a. Fasten the windshield in temporarily with clecos or screws by drilling some of the proposed screw holes marked in Instruction 8c.
13. Now with #34 drill, temporarily install parts 162-31801-5, L & R without putty, fasten with clecos or screws. Temporarily fasten windshield at the sides. Arrange holes to avoid drilling thru a frame.
14. (delete)
15. Check for fit of the windshield. Check for canopy fit. Do not close latch with the rubber installed because it will distort the shape of the bow.
- 16a. If everything fits, draw a line on each side of the plane, starting at the rear top of parts 162-31801-5, L & R, then to the rear to meet the curve at the lower rear corner of the windshield.
- 16b. The block supporting the windshield may be removed and parts 162-31801-4, L & R may be fitted in place. Part 162-31801-4, L & R must fit tight at the bottom of the windshield, also it must be at the same level as part 162-31801-5 L & R at front and the line drawn in Instruction 16a. Minor adjustments can be made by trimming the top of part 162-31801-4, L & R or the bottom of the windshield.
17. All holes may now be drilled with a #34 drill. Holes shall be placed 2" or less between centers. Maintain a 5/16" edge distance for acrylic and 1/4" edge distance for metal. Utilize existing holes where possible.
- 17b. The holes thru acrylic within 6" forward of the instrument panel on each side should extend thru the skin. The holes thru the skin are to be reamed to 3/8" prior to final installation of the windshield to allow clearance for the 4-40 nuts holding the acrylic.
18. Remove windshield. Ream holes in skin per instruction 17b and install parts #162-31801-4, L & R temporarily.

Installation Instructions
Canopy Models A B D E & F

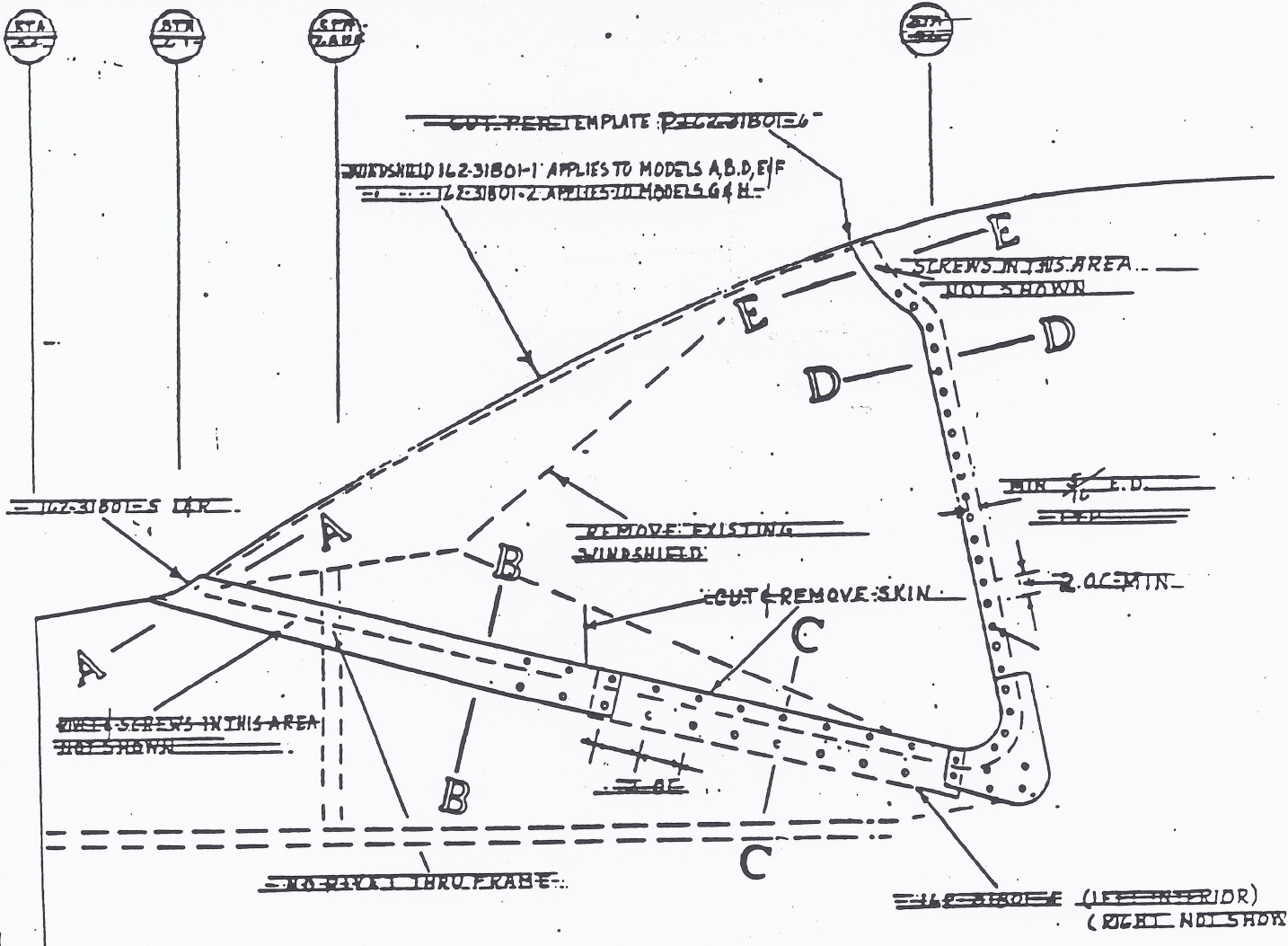
19. Drill a stop hole at the end of the vertical cut made under instruction #8.
20. Cut the skin along the horizontal line drawn in instruction #16a. Trim the top of part 162-31801-4 to the same level as this cut if it leaves the required 5/16" edge distance.
21. Ream all holes in acrylic with a #10 drill that is ground for use on acrylic glass. Chamfer all holes with a countersink.
22. Countersink required holes with a 100° tool for flush screws.
23. Apply putty to bottom of windshield and attach parts 162-31801-5 L & R with AN 507-440-7 screws, nuts and washers. (See picture)
24. Place windshield in airplane loosely and apply putty where needed.
25. Raise windshield to its final position and place 3" wood block under each side to force it tight against the top. It takes time for the putty to adjust. You may need to adjust the block several times. Reinstall part 162-31801-4 L&R
26. Install all screws, nuts and washers. Leave the screws loose, then tighten evenly. It requires time for the putty to adjust. After putty has adjusted, loosen 1/4 turn to allow movement. The acrylic will contract at low temperature and it must be free to contract or it will crack.
- 27a. It is necessary to remove the screws at the top of the windshield to install part 162-31801-9. This part must be fit into place. The center rear portion fits tight against the skin. The front and outboard side fit inside the windshield. Trim the part oversize utilizing the mark made under instruction 5b. When part has been trimmed to size, it may be drilled for screws at the rear edge. There shall be 9 screws on each side. The inboard screw should be 1/2" from the angle and the rest spaced 1 3/4" o.c. Maintain 1/4" edge distance. Install part temporarily. Drill two #10 holes in remaining center post. Utilize existing holes or space 2" O.C. Min. If the center post is extruded it will require four 3/8" O.D. Spacers with #10 holes. Adjustment after 10-32 bolts are installed. See detail drawing. Drill all required holes and install all screws and nuts.
- 27b. Install canopy rubber seal. Latching canopy should not deflect windshield
28. Complete paper work.
29. Fly

INSTALLATION INSTRUCTIONS
TYPE 162-31801-2 WINDSHIELD
RANGEMASTER MODELS G & H

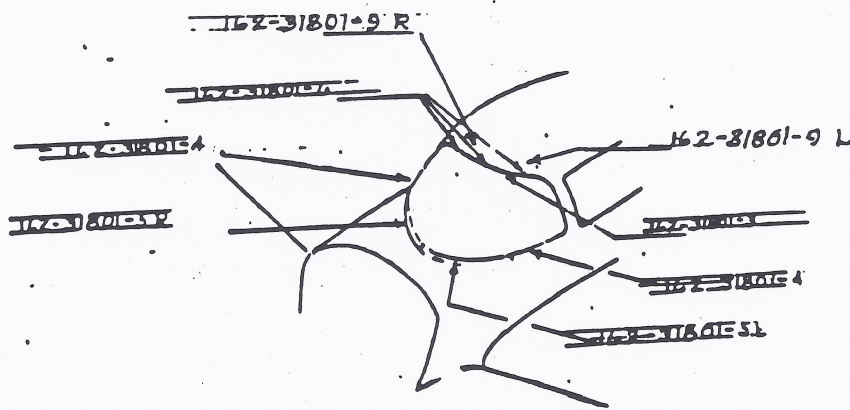
1. Remove trim at side and bottom of windshield.
2. Disconnect the battery and remove the overhead panel. Disconnect ground wire, wire to cabin lights and radio speaker. Cables should be long enough to place the panel on the floor under the instrument panel. Cover panel to keep metal chips out of electrical portion.
3. Place paper template P162-31801-6 on top of plane, the side must be even with the existing opening. The straight rear edge must parallel the rivet line across the top of the plane.
4. Follow instructions 3 thru 14 and 16 thru 26 of instructions for canopy models.
5. Install one part 162-31801-6 in the center and one part 8" c.c. on each side per detail E-E. Use longer screws, AN506-440-8.
6. Fit Adapter 162-31801-8 to windshield and install with #10 screws.
7. Make certain that the panel is the same as the drawing of original equipment.
8. Remove nuts & washers holding breakers to panel. Do not remove wires.
9. Remove rheostat knobs, nuts and washers. Do not remove wires.
10. The overhead panel may now be cut and drilled, as per drawing 162-31801-8.
11. Lift the breakers and rheostats out of the way without disconnecting the wires. Place the overhead panel in position under the adapter.
12. Fasten the overhead panel in place with screws at the rear edge.
13. The panel may be attached to the adapter with trim screws or just marked for drilling to mate the panel to the adapter.
14. Remove overhead panel and the adapter.
15. Drill the adapter to mate with the panel.
16. A welt may be installed with contact cement or equal. (Optional)

Installation Instructions
Rangemaster Models G & H

17. Install the breakers, rheostats; also adjust nuts and washers as required for the double thickness. It may be necessary to remove plastic wrapping of wires for the relocation of breakers. The wrapping may be reinstalled after the breakers and rheostats are relocated.
18. Connect ground wire, wires to the cabin lights, and radio speakers.
19. Install overhead panel with adapter using 6-Ax526-1032-8 at front of the adapter
20. Install new trim.
21. Connect battery.
22. Complete required paper work.
23. Fly.



LEFT EXTERIOR



KEY

~~AN 5017-1 AAD SCREW~~
~~AN 5015-1 445 NUT~~
~~AN 960-1 WASHER~~ YP

~~AN 5017-1 AAD SCREW~~
~~AN 5015-1 445 NUT~~
OR
~~CRUIZEA NUTS~~

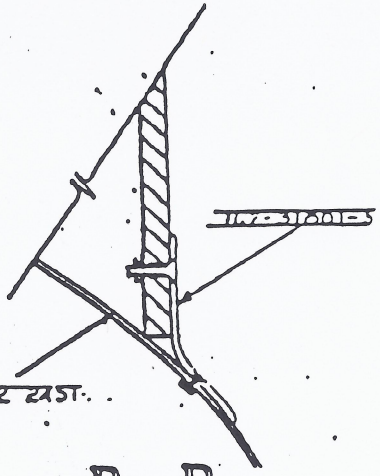
~~AN 5017-1 AAD SCREW~~

~~WASHER REF~~



~~EXIST SKIN .032 24ST~~

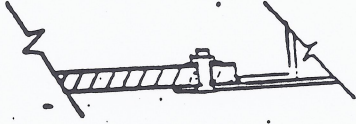
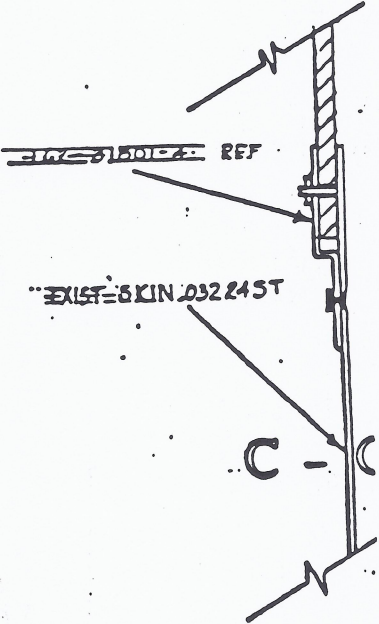
~~AN 5017-1 AAD SCREW~~



~~AN 5017-1 AAD SCREW~~ REF

~~EXIST SKIN .032 24ST~~

C-C

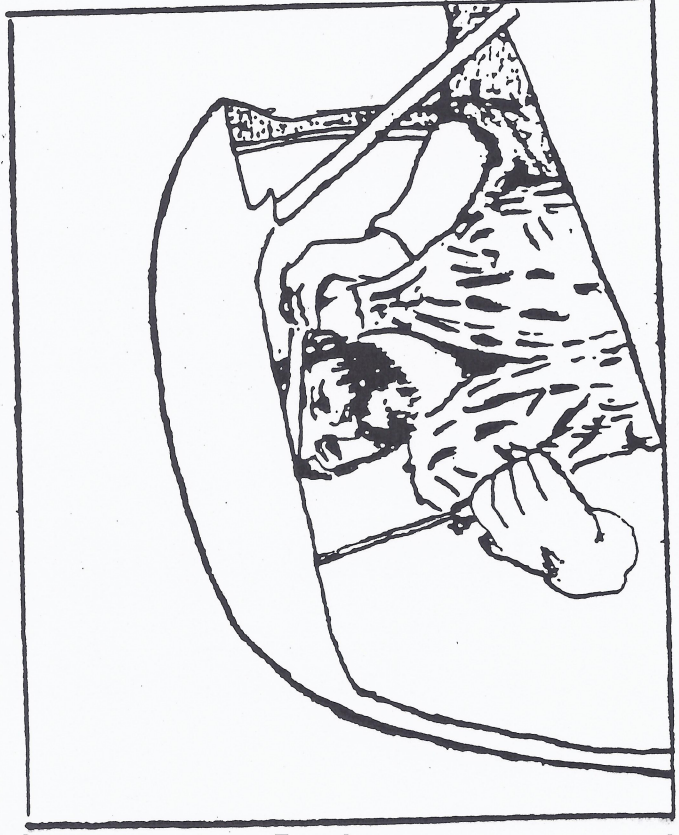




INSTRUCTION 3 & 4 Page 5
Removing Center Post



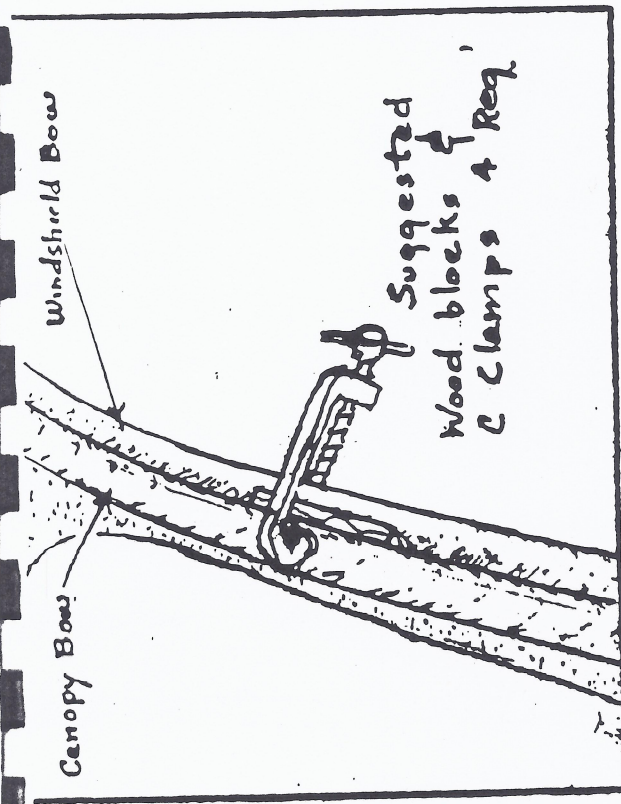
INSTRUCTION 4 Remove Center Post Page 5



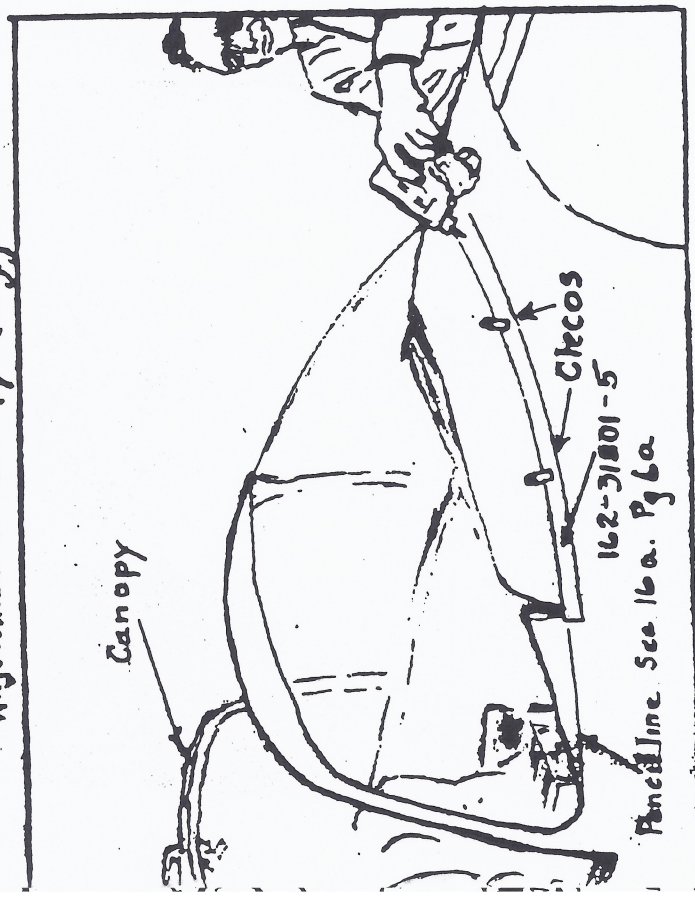
INSTRUCTION 4 Page 5
Remove Rolled Reinforcement



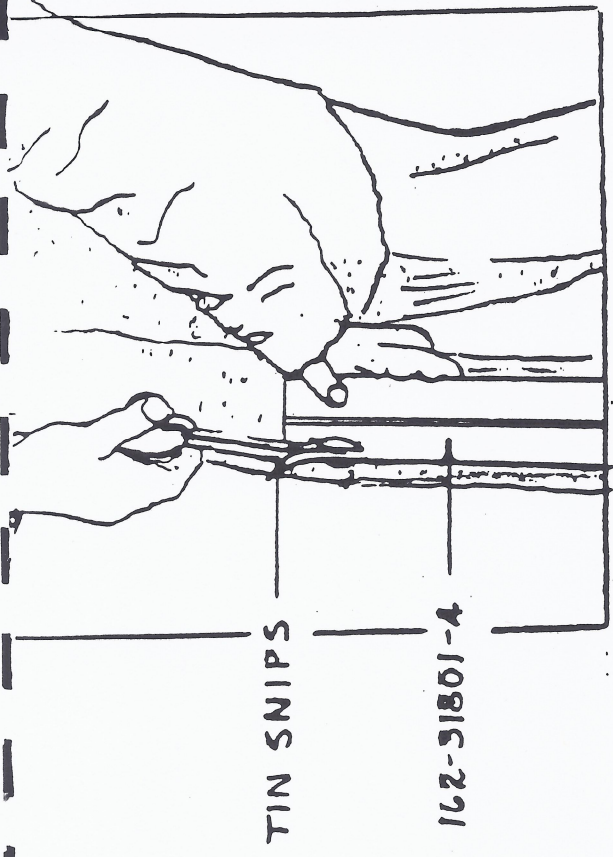
INSTRUCTION 8 Page 5
Remove Rolled Reinforcement



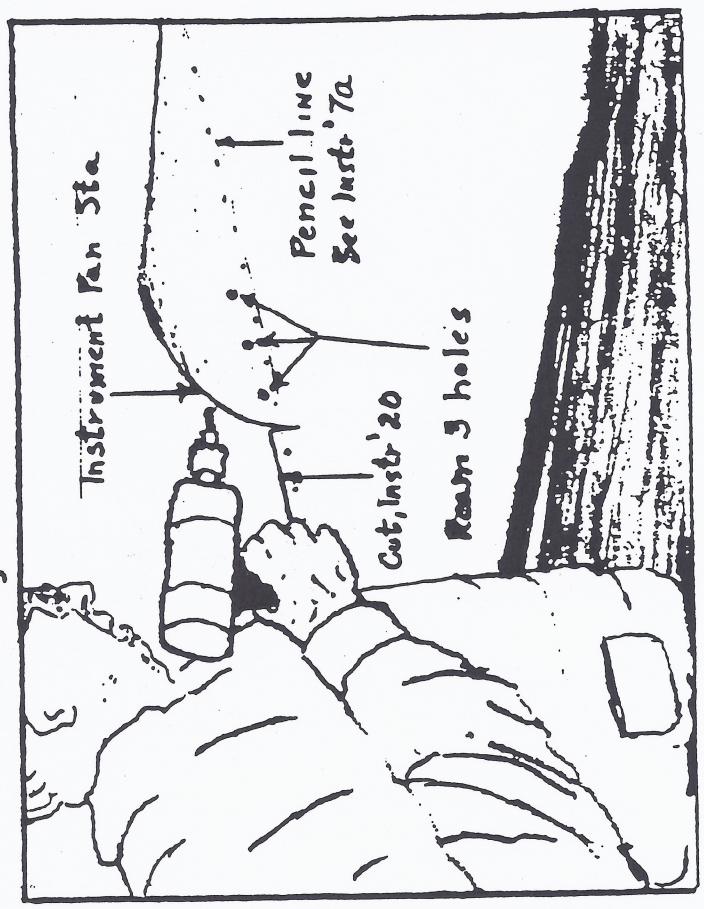
INSTRUCTION 10 Page 5
Adjustment of Canopy (suggested)



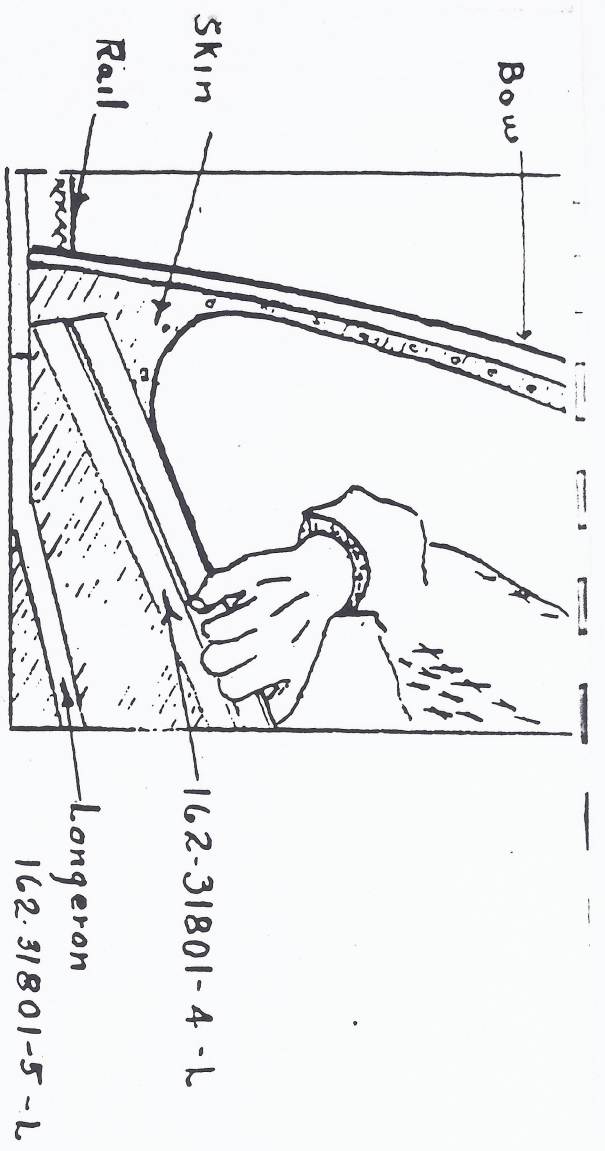
INSTRUCTION 17b Page 6a.
Drill 34 HOLES



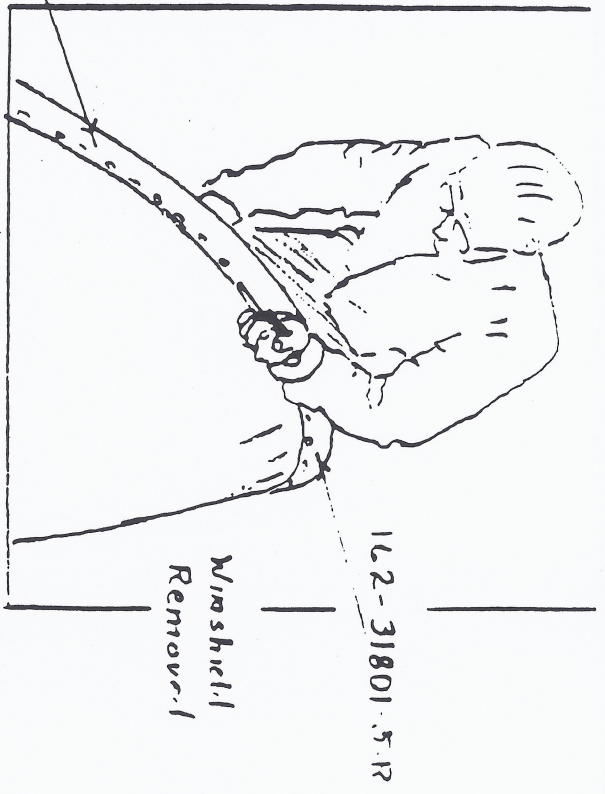
INSTRUCTION 20 Page 6b.
Trimming Part 162-31801-4



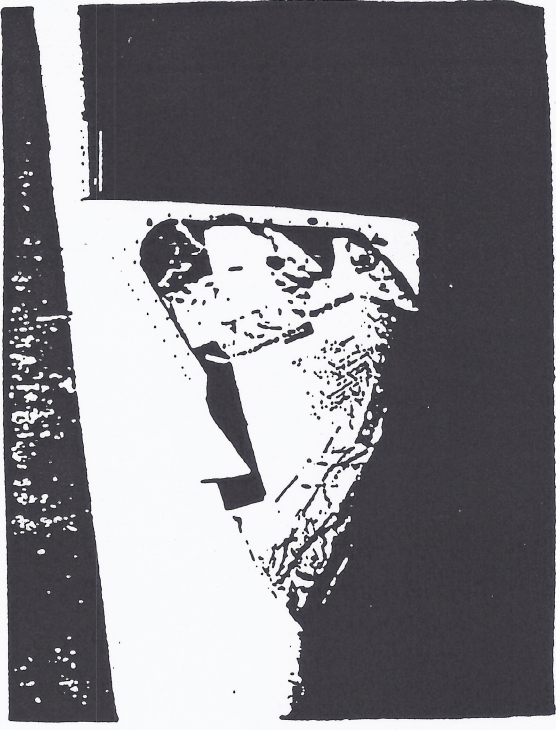
INSTRUCTION 18, Page 6a.
Ream holes within 6" forward of



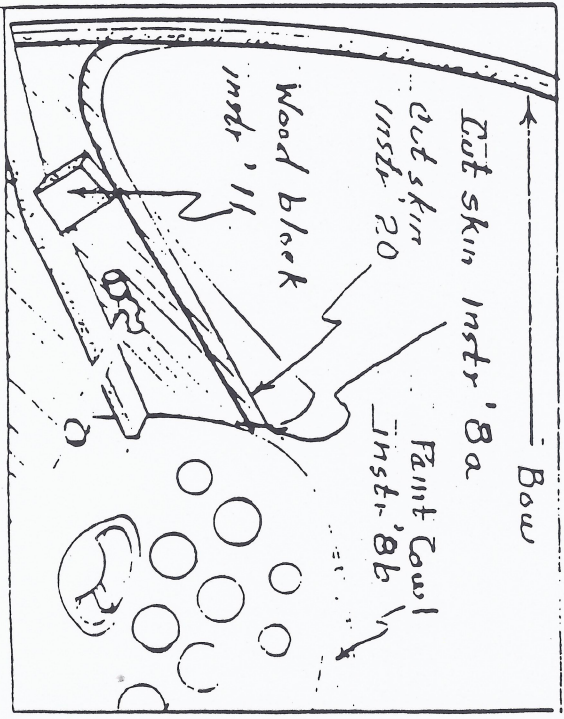
INSTRUCTION 18 Page 6
Temporarily Install Part 162-31801-4-L & R



INSTRUCTION 29 Page 6
Attach Part 162-31801-5-L & R



Instruction 9 Page 5a
Utility cuts made in instruction 8



Instructions 8a & 8b Page 5a,
11 Page 6a, 20 Page 6b