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GOODRICH (B F) AEROSPACE AND DEFENSE PRODUCTS AKRON OHIO F/G 17/1
PRESSURIZED BOW DOME OF A CABLE REINFORCED RUBBER CONSTRUCTION --ETC(U)
JAN 66 R A JOHNSTON
NOBSR-89483

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Contract NObsr-89483
Serial No. SS041-001
Task 8156

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Project 0865

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**PRESSURIZED BOW DOME
OF A CABLE REINFORCED RUBBER CONSTRUCTION
FOR USE WITH AN/SQS-26 SONAR**

PRODUCT MANUFACTURING SPECIFICATION

TO

A.S.W. S.P.O.

Department of the Navy

Washington, D. C.

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1.0 PURPOSE

1.1 The purpose of this specification is to define the fabrication of a pressurized rubber cable-reinforced bow dome window (BFG Part No. 6S-1052) for the AN/SQS-26 sonar.

2.0 GENERAL METHOD

2.1 The bow dome window is fabricated in four sections.
A. Forward, Port
B. Forward, Starboard
C. Aft, Port
D. Aft, Starboard

Each section is fabricated by "hand lay-up" in an individual concave building form and vulcanized.

The vulcanized sections are then assembled and spliced together. The finished product is a one piece window.

3.0 APPLICABLE DOCUMENTS

3.1 Building Forms

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Part Location</u>
6S-1033-1	Starboard Quarter Form Assembly	Fwd.
6S-1033-2	Port Quarter Form Assembly	Fwd.
6S-1041-1	Starboard Quarter Form Assembly	Aft.
6S-1041-2	Port Quarter Form Assembly	Aft.

3.2 Building Form Cart

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Part Location</u>
5S-1171	Building Form Cart	Fwd. & Aft.
4S-1157	Dolly	Fwd. & Aft.
4S-1158	Tow Bar	Fwd. & Aft.

3.3 Bow Dome Construction

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Part Location</u>
5S-1176	Templates	Fwd. & Aft.
3S-1147	Extrusions	Fwd. & Aft.
3S-1191	Extrusions	Fwd. & Aft.
4S-1160	Cross-Section - Bead Area	Fwd.

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3.3 Bow Dome Construction (Con't)

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Part Location</u>
5S-1213	Cross-Sections Splice Area-Panel Cure	Fwd.
4S-1178-1-2	Cross-Section Splice Cure-Bead Area	Fwd.
4S-1178-2-2	Cross-Section Splice Cure-Panel Area	Fwd.
4S-1183	Cross-Section Bead Area	Aft.
5S-1229	Cross-Section Aft End-Bead Area	Aft.
5S-1234	Cross-Section Splice Area-Panel Cure	Aft.
5S-1241	Cross-Section Splice Cure-Port & Starboard	Fwd. & Aft.

3.4 Cable and Coupling

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Part Location</u>
3S-1123	Cable and Coupling Orientation	Fwd. & Aft.
3S-1115	Cable Coupling Assembly	Fwd. & Aft.
3S-1117	Coupling, External Thread	Fwd. & Aft.
3S-1118	Coupling, Internal Thread	Fwd. & Aft.
3S-1119	Retainer-Coupling	Fwd. & Aft.
3S-1120	Collar-Coupling	Fwd. & Aft.
3S-1121	Washers-Coupling	Fwd. & Aft.
3S-1122	Bead Stop-Collar	Fwd. & Aft.
3S-1135	Bead Cable Assembly	Fwd. & Aft.

3.5 Hydrotest Fixture

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Part Location</u>
6S-1046	Hydrotest Fixture Assembly	Fwd. & Aft.
3S-1142	Piping Schematic (Water)	Fwd. & Aft.
3S-1167	Piping Schematic (Steam)	Fwd.

3.6 Seaming Fixtures

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Part Location</u>
5S-1175	Seaming Fixture Assembly	Fwd. Ctr.
5S-1182	Strongback Assembly	Fwd. Ctr.
5S-1169	Seaming Fixture Assembly	Port & Starboard
5S-1179	Strongback Assembly	Port & Starboard

3.7 Seam Heating Equipment

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Part Location</u>
4S-1166	Heating Element	Fwd.
4S-1167	Heating Element	Port & Starboard
4S-1168	Instrument Panel	--

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3.8 Handling Equipment - Internal

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Part Location</u>
4S-1150	Bead Clamps	Fwd. & Aft.
4S-1154	Radius Rods	Fwd. & Aft.
4S-1155	Spreader Bars	Fwd. & Aft.

3.9 Handling Equipment - External

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Part Location</u>
6S-1050	Support Fixture Assembly	Fwd.
6S-1051	Support Fixture Assembly	Aft.

3.10 Shipping Fixture

<u>Drawing No.</u>	<u>Drawing Title</u>	<u>Part Location</u>
6S-1054	Shipping Fixture Assembly	---

4.0 MATERIALS

NOTE: The tolerances listed in this section apply to all like material referenced throughout the specification.

<u>Common Name</u>	<u>Description</u>	<u>Gauge or Sizes Req'd.</u>
Stock #01	Neoprene rubber compound #35003 manufactured by The B.F. Goodrich Co., Akron, Ohio, to meet the specifications outlined in Section 5.0. Stock is calendered.	.030 ± .003 .090 ± .005 .135 ± .005 .265 ± .005
Fillet #02	Neoprene rubber compound #35003 manufactured by The B.F. Goodrich Co., Akron, Ohio, to meet the specifications outlined in Section 5.0. Stock is extruded into tapered fillets per the following specifications.	
	Ref. Dwg. No.	
	3S-1147-1	
	3S-1147-2	
	3S-1147-3	
	3S-1191-1	
	3S-1191-2	

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4.0 MATERIALS (Con't)

<u>Common Name</u>	<u>Description</u>	<u>Gauge or Sizes Req'd.</u>
Wire Cord #03	A brass coated, high carbon steel. Five (5) strands of seven (7) wires each are laid concentrically around the three (3) wire strands.	.048
Fabric #04	A weftless wire cord (see above) fabric containing ten (10) wires per inch, primed with Chemlok 220 and coated with BFG #35003 Neoprene rubber compound manufactured by The B.F. Goodrich Co., Akron, Ohio, to meet the specifications outlined in Section 5.0. Stock is calendered.	.075 ± .004 .090 ± .005
Chemlok 220	A commercial product manufactured by the Hughson Chemical Co., Erie, Pa.	
Cement #05	A two part commercial adhesive manu- factured by the United Shoe Machining Co., Cambridge, Mass. as: Bostik 1036 A Cement and Bostik 1036B Accelerator	
Cement #06	A Neoprene base cement manufactured by The B.F. Goodrich Co., Akron, Ohio. BFG Number 021004	
Fabric #07	Nylon twill woven fabric, 4.9 ounce, end count 76 x 77, 2 x 2 twill weave. Warp/fill tensile of 375 x 375 lbs. Coated with BFG #35003 Neoprene rubber compound manufactured by The B.F. Goodrich Co., Akron, Ohio to meet the specifications outlined in Section 5.5.	.020 ± .002
Teflon Fabric	Teflon coated glass fabric, square woven, 2.75 ounces.	
Nylon Fabric #08	Square woven nylon fabric, 2.12 ounce, end count 100 x 96, warp/fill tensile 85/65 lbs.	
Shim Stock	Stainless Steel	.005

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4.0 MATERIALS (Con't)

<u>Common Name</u>	<u>Description</u>	<u>Gauge or Sizes Req'd.</u>
Bead Cable	6 x 37 I.W.R.C. spiral wrapped steel cable, with couplings. Reference Dwg. No. 3S-1135.	1-7/8" dia.
Washing Solvent	Hexane	
Solvent	Methyl Ethyl Ketone	
Degreasing Solution	Trichloroethylene	
Bag Stock	Butyl rubber compound manufactured by The B.F.Goodrich Co., Akron, Ohio. Stock is calendered.	.100 ± .005
Cement #09	Rubber cement manufactured by The B.F.Goodrich Co., Akron, Ohio.	
Cloth #10	Fiberglass fabric, 38" wide, 12.2 oz count 28 x 16.	.018
Felt Back Sizing	27BS felt lightback sizing.	1/2" x 77"
Protective Film	A vinyl plastic film manufactured by The B.F.Goodrich Co., Akron, Ohio. BFG No. S-115-F	
Holland Cloth	65 x 59 count, 4.4 oz. per square yard.	.005
Buffing Pads	3M type AR medium (red) pads	
Asbestos Fabric	15 x 13 count, 16.8 oz. per square yard.	.030
Release Agent	A fluoro carbon mold release under trade number MS122.	
Liquid Wax	A wax release under the trade number V-50.	
Perforated Discs	Stainless Steel	.015 x 3/4"

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4.0 MATERIALS (Con't)

<u>Common Name</u>	<u>Description</u>	<u>Gauge or Sizes Req'd.</u>
Thermocouple Wiring	Copper - Constantan	
Metal Cover Inserts	Commercial	15/16"
Bostik 1007	A commercial product manufactured by The United Shoe Machinery Co., Cambridge, Mass.	
Metal Primer "Plastilock 315"	A rubber to metal primer manu- factured by The B.F. Goodrich Co., Akron, Ohio.	
Alkaline Cleaning Solution	A commercial product manufactured by The Wyandotte Chemical Co., Wyandotte, Mich. under the trade name of "Altrex".	
Pickling Solution	A diluted sulfuric acid solution	

5.0 MATERIALS TESTING SPECIFICATIONS

5.1 Purpose of this section is to define the method of testing materials used in the fabrication of the bow dome window.

The results of all tests must equal or exceed the minimum requirements as defined in the requirement sections of this specification before their release for production use.

5.2 Neoprene rubber compound must meet the following specifications as outlined in Table I.

5.3 Lap shear adhesion test No. 04 of fabric.

5.3.1 Sample fabrication procedure:

5.3.1.1 Select an appropriate metal plate and clean one (1) surface using methyl ethyl ketone.

5.3.1.2 Cut No. 04 fabric into two (2) 1" x 15" strips with wires extending lengthwise. Maintain stock identification.

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TABLE I

<u>Property</u>	<u>Test Method</u>	<u>Title</u>	<u>Requirements</u>								
Specific Gravity	ASTM D 297-61T	Chemical Analysis of Rubber Products	1.32 ± .02								
Durometer, Shore A	ASTM D 676-59T	Method of Test for Identification of Rubber by means of a Durometer (Tentative)	50 ± 5								
Tensile Strength	ASTM D 412-61T	Method of Tension Testing of Vulcanized Rubber (Tentative)	2500 psi min								
Modulus (300% elong.)	ASTM D 412-61T	Method of Tension Testing of Vulcanized Rubber (Tentative)	375 psi min								
Ultimate Elongation	ASTM D 412-61T	Method of Tension Testing of Vulcanized Rubber (Tentative)	650% min								
Compression Set 22 hrs @ 158°F	ASTM D 395-61	Methods of Test for Compression Set of Vulcanized Rubber	45% max								
Tear Resistance Die "C"	ASTM D 624-54	Method of Test for Tear Resistance of Vulcanized Rubber	150 psi min								
Sound Velocity Distilled Water 25°C @ 600 KC	BFG Aerospace & Defense 606-37-1	Standard Sound Velocity Measurements	1520 ± 25 meters/sec								
Gehman Freeze	ASTM 1053-58T	Method of Measuring Low Temperature Stiffness of Rubber and Rubber-like materials by means of a torsional wire apparatus	45°C min 35°C max								
Dynamic Modulus	ASTM 945-59	Method of Test for Mechanical Properties of Elastomeric Vulcanizates under compressive or sheer strains by the mechanical Oscillograph	760 psi min								
Resilience	ASTM 945-59	Same as above	72-82%								
Water Absorption Distilled Water 48 hrs @ 25°C Volume Change Weight Change	ASTM 471-54T	Method of Test for change in properties of Elastomeric Vulcanizates resulting from Immersion in Liquids (Tentative)	+ 2.5% max + 2.0% max								
3% Salt Water 48 hrs @ 25°C Volume Change Weight Change			+ 2.0% max + 1.5% max								
Sound Absorption 25°C @ 600 KC	BFG Aerospace & Defense 606-37-2	Standard Sound Absorption Measurements	7.5 db/in max								
Ozone Resistance	ASTM D 1149-55T	Accelerated Ozone cracking of Vulcanized Rubber 50 pphm 48 hrs 3 loop 120°	No cracks or bloom								
Aging	ASTM D 573-53	Accelerated aging of Vulcanized Rubber 70 hrs @ 212°F	<table border="1"> <thead> <tr> <th><u>Property</u></th> <th><u>Max. Change</u></th> </tr> </thead> <tbody> <tr> <td>Hardness</td> <td>+ 15</td> </tr> <tr> <td>Tensile</td> <td>- 15%</td> </tr> <tr> <td>Elongation</td> <td>- 35%</td> </tr> </tbody> </table>	<u>Property</u>	<u>Max. Change</u>	Hardness	+ 15	Tensile	- 15%	Elongation	- 35%
<u>Property</u>	<u>Max. Change</u>										
Hardness	+ 15										
Tensile	- 15%										
Elongation	- 35%										

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- 5.3.1.3 Wash one (1) surface of each strip with methyl ethyl ketone.
- 5.3.1.4 Apply two (2) coats of No. 05 cement to each of the cleaned surfaces.
- 5.3.1.5 Position the cemented surfaces together providing a 7" lap. (Reference Figure I)
- 5.3.1.6 Press laminated surfaces together thoroughly.
- 5.3.1.7 Wrap adhesion sample in No. 08 nylon fabric.
- 5.3.1.8 Place one (1) ply of fill rubber on the cleaned metal plate and position adhesion sample over the fill gum. (Reference Figure I)
- 5.3.1.9 Position the second piece of fill material over adhesion sample. (Reference Figure I).

FIGURE I



- 5.3.1.10 Cover the sample with two (2) plies No. 10 fiberglass cloth.
- 5.3.1.11 Cover with bag stock, cementing to the metal.
- 5.3.1.12 Install vacuum valve in convenient location, but not over the adhesion sample.

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5.3.2 Vulcanization

5.3.2.1 Vulcanize 45 minutes at $292^{\circ} \pm 2^{\circ}\text{F}$, 80 ± 2 psig. Maintain a minimum of 10" hg. vacuum. Cool to $150^{\circ} \pm 5^{\circ}\text{F}$. before removal.

5.3.2.2 Debag and remove adhesion sample from metal plate.

5.3.3 Testing

5.3.3.1 The adhesion value in lbs. per inch of width shall be determined for each 7" lap shear sample on the Tinius Olsen machine per ASTM-D-429.

5.3.3.2 The following data shall be permanently recorded.

5.3.3.2.1 Material identification (gauge, roll number and date calendered).

5.3.3.2.2 Adhesion value in pounds pull per one inch width.

5.3.3.2.3 Type of failure.

5.3.4 Shear Requirement

5.3.4.1 Minimum adhesion of 2400 lbs. per one inch width for a 7" lap.

5.4 Peel test adhesion of No. 04 fabric.

5.4.1 Fabrication procedure.

5.4.1.1 Select an appropriate metal plate and clean one (1) surface, using methyl ethyl ketone.

5.4.1.2 Cut No. 04 fabric into two (2) 1" x 8" strips with wires extending lengthwise. Maintain stock identification.

5.4.1.3 Wash one (1) surface of each strip with methyl ethyl ketone.

5.4.1.4 Apply two (2) coats of No. 05 cement to each of the previously cleaned surfaces.

5.4.1.5. Position the cemented surfaces together providing a 7" bond surface and 1" lack of bond area.

NOTE: Use holland cloth to separate 1" lack of bond area.

5.4.1.6 Press laminated surfaces thoroughly on the plate.

5.4.1.7 Cover the adhesion sample with one (1) ply of No. 08 nylon fabric, and two (2) plies of fiberglass No. 10 cloth.

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- 5.4.1.8 Cover with bag stock, cementing to the metal, using No. 09 cement.
- 5.4.1.9 Install vacuum valve in convenient location, but not over the adhesion samples.
- 5.4.2 Vulcanization.
 - 5.4.2.1 Vulcanize 45 minutes at $292^{\circ} \pm 2^{\circ}\text{F}$, 80 ± 2 psig. Maintain a minimum of 10" Hg. vacuum. Cool to $150^{\circ} \pm 5^{\circ}\text{F}$. before removal.
 - 5.4.2.2 Debag and remove adhesion sample from metal plate.
- 5.4.3 Testing.
 - 5.4.3.1 Pull in Scott Tester at the rate of one inch per minute.
 - 5.4.3.2 Maintain tension until the adhesion value on the indicator is stabilized or 1.50" of the sample has been delaminated.
 - 5.4.3.3 The following data shall be permanently recorded.
 - 5.4.3.3.1 Material identification (gauge, roll number and date calendered).
 - 5.4.3.3.2 Adhesion value in pounds pull per one inch width.
 - 5.4.3.3.3 Type of failure.
- 5.4.4 Adhesion requirement.
 - 5.4.4.1 Minimum adhesion: 40 lbs. per 1" width.
- 5.5 Peel test adhesion of No. 07 fabric.
 - 5.5.1 Fabrication procedure.
 - 5.5.1.1 Select an appropriate metal plate and clean one (1) surface, using methyl ethyl ketone.
 - 5.5.1.2 Cut No. 04 fabric into three (3) 2" x 9" strips. Maintain stock identification.
 - 5.5.1.3 Wash one (1) surface of each strip with methyl ethyl ketone.
 - 5.5.1.4 Apply two (2) coats of No. 05 cement to each of the previously cleaned surfaces.

NOTE: Allow each coat to air dry until tacky.

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5.5.1.5 Position the cemented surfaces together providing an 8" bond surface and 1" lack of bond area.

NOTE: Use holland cloth to separate 1" lack of bond area.

5.5.1.6 Stitch and roll the laminated surfaces thoroughly on the plate.

5.5.1.7 Cover the adhesion sample with one (1) ply of nylon No. 08 fabric, and two (2) plies of fiberglass cloth.

5.5.1.8 Cover with bag stock, cementing to the metal, using No. 09 cement.

5.5.1.9 Install vacuum valve in convenient location, but not over the adhesion sample.

5.5.2 Vulcanization.

5.5.2.1 Vulcanize 45 minutes at $292^{\circ} \pm 2^{\circ}\text{F}$, 80 ± 2 psig. Maintain a minimum of 10" Hg. vacuum. Cool to $150^{\circ} \pm 5^{\circ}\text{F}$. before removal.

5.5.2.2 Debag and remove adhesion sample from metal backup plate.

5.5.3 Testing.

5.5.3.1 Pull in Scott tester at the rate of one inch per minute.

5.5.3.2 Maintain tension until delaminated.

5.5.3.3 The following data shall be permanently recorded.

5.5.3.3.1 Material identification (gauge, roll number and date calendered).

5.5.3.3.2 Adhesion value in pounds pull per one inch width.

5.5.3.3.3 Type of failure.

5.5.4 Adhesion requirement.

5.5.4.1 Minimum adhesion: 40 lbs. per 1" width.

5.6 Test air vulcanizing adhesion properties of No. 05 cement with addition of accelerator.

5.6.1 Material.

5.6.1.1 Metal adhesive - Bostik 1007

5.6.1.2 Cement Bostik 1036A
Accelerator - Bostik 1036B

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5.6.1.3 Three (3) pieces vulcanized neoprene rubber button. Die cut,
(1" diameter x 0.50" thick).

5.6.1.4 Six (6) aluminum cylinders (1.25" diameter x 2") with eye bolt
attached.

NOTE: Adhesion tests are to be run on each lot of the above cement
and accelerator. A permanent record shall be maintained
according to the lot numbers date tested and the adhesion
results.

5.6.2 Procedure.

5.6.2.1 Grit blast the surface of the aluminum cylinder on the end opposite
the eye bolt.

5.6.2.2 Wash the blasted surface with methyl ethyl ketone.

CAUTION: Do not touch blasted surfaces after cleaning.

5.6.2.3 Apply two (2) coats of Bostik 1007 to the cleaned blasted surfaces.

NOTE: Allow minimum of 20 minutes drying time between applications,
30 minutes after second application and 45 minutes maximum.

CAUTION: Keep clean.

5.6.2.4 Mix cement well and allow to stand five (5) minutes.

RECIPE: Cement, Bostik 1036 A - 16 fluid ounces
Accelerator, Bostik 1036B - 2 fluid ounces

5.6.2.5 Buff the contact surfaces of the neoprene buttons.

5.6.2.6 Clean the contact surfaces of the neoprene buttons with washing solvent.

5.6.2.7 Apply one (1) coat of accelerated cement to each contact surface of
the neoprene buttons and the primed surfaces of the aluminum cylinders.

5.6.2.8 Allow cement to air dry a minimum of 30 minutes and a maximum of 45
minutes.

CAUTION: Keep clean.

5.6.2.9 Center the neoprene buttons against the aluminum cylinders and apply 25
± 3 lbs. pressure to insure contact between the adhesive films.

5.6.2.10 Air vulcanize at least 48 hours, undisturbed, at room temperature.

NOTE: Complete air vulcanization requires seven (7) days at room
temperature.

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5.6.3 Testing.

5.6.3.1 The adhesion value in pounds per inch, shall be determined from the prepared sample pulled on the Tinius Olsen machine per ASTM procedure D-429.

5.6.3.2 The following data shall be permanently recorded.

5.6.3.2.1 Lot numbers of cement and accelerator and date the adhesion samples were prepared.

5.6.3.2.2 Adhesion value in terms of pounds pull per inch.

5.6.3.2.3 Type of failure.

5.6.4 Adhesion requirements.

5.6.4.1 Minimum adhesion: 40 lbs. per one (1) inch peel.

5.7 Wire cord.

5.7.1 Testing.

5.7.1.1 A break value in pounds shall be determined by pulling a sample from each lot in a Scott Tester machine.

5.7.2 Break requirement.

5.7.2.1 Minimum breaking strength: 355 pounds.

6.0 TOOLING AND EQUIPMENT

<u>Common Name</u>	<u>Drawing No. or Part No.</u>	<u>Quantity</u>
Quarter Bldg. Form - Fwd. Stbd.	BFG 6S-1033-1)	1
Quarter Bldg. Form - Fwd. Port	BFG 6S-1033-2)	1
Quarter Bldg. Form - Aft. Stbd.	BFG 6S-1041-1)	1
Quarter Bldg. Form - Aft Port	BFG 6S-1041-2)	1
Cart	BFG 5S-1171	2
Dolly	BFG 4S-1157	1
Tow Bar	BFG 4S-1158	4

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7.0 HEAT STABILIZATION OF BUILDING FORMS

7.1 Prior to actual part fabrication, new building forms shall be heat stabilized for 18 hours, using the following cycle.

1 hour @ 150°F
1 hour @ 175°F
1 hour @ 200°F
1 hour @ 225°F
1 hour @ 250°F
1 hour @ 275°F
1 hour @ 300°F
4 hours @ 325°F
1 hour @ 300°F
1 hour @ 275°F
1 hour @ 250°F
1 hour @ 225°F
1 hour @ 200°F
1 hour @ 175°F
1 hour @ 150°F

7.2 Before using a building form, inspect for blisters, cracks and delamination.

8.0 PRELIMINARY OPERATIONS

8.1 Prepare building forms.

8.1.1 Clean surface of building form with methyl ethyl ketone.

8.1.2 Apply two (2) coats of liquid wax over the entire building surface.

8.1.2.1 Allow wax to dry thoroughly, then polish with a clean white cloth.

8.1.3 Apply two (2) coats of release agent over the entire building surface.

8.1.4 Apply one (1) coat of No. 06 cement over the entire building surface.

8.1.5 Place perforated stainless steel discs over the vacuum line openings in the building form.

8.1.6 Position No. 08 nylon fabric over the entire building surface.

8.1.7 Apply one (1) coat of No. 06 cement over the No. 08 nylon fabric.

8.1.8 Inspect for wrinkles, entrapped air and bridging of fabric in bead recess areas.

8.2 Prepare shim stock.

8.2.1 Materials: Stainless Steel, Metal Primer, Teflon fabric

B.F. Goodrich Aerospace and
Defense Products
a Division of The B.F. Goodrich Company

8.2.1.1 Metal Process Solutions and Equipment

<u>Operation</u>	<u>Solution</u>	<u>Temp.</u>	<u>Equip.</u>
Alkaline Cleaning	Altrex - 160 lbs. Deionized Water 6400 lbs.	180°F to boiling	Stainless Steel Air Agitated Tank.
Rinsing	Deionized Water	Available	Stainless Steel Spray Tank.
Stainless Steel Pickling	Sulfuric Acid - 765 lbs. Deionized Water - 6885 lbs.	158°F to 185°F	Triflex Rubber Liner Tank.
Hand Degreasing Sanding	Methyl Ethyl Ketone	Room Temp.	Hoover Model 5020 scrubber, modified for use on table.

8.2.2 Solution Control

8.2.2.1 The quality of the deionized water is measured by its conductivity as shown by a meter on the apparatus. The meter should be read daily after water is allowed to run down the drain for five (5) minutes.

8.2.2.1.1 Inspection

8.2.2.1.1.1 Record the water meter reading and the conductivity each day.

8.2.2.1.1.2 Conductivity must be 17 maximum.

8.2.2.1.1.3 Deionizer must be regenerated every two (2) weeks when in operation.

8.2.2.2 Alkaline Cleaning Solution must be checked for temperature each time it is used. A titration must be performed twice a week. The analysis must be 2.9 to 3.5 milliliters. PH must be run twice weekly. PH must be 11.5 to 12.5.

8.2.2.3 Stainless Steel Pickling Solution is to be gravity checked each day. The Sp. Gr. should be:

	<u>Minimum</u>	<u>Maximum</u>
60°F	1.065	1.085
160°F	1.043	1.063

The temperature correction factor is - .00022 units per °F increase.

8.2.3 Metal Cleaning Procedure

8.2.3.1 Hand degrease both sides of stainless steel.

8.2.3.2 To hand degrease, wipe surface with methyl ethyl ketone solvent soaked rag, followed immediately with a dry rag. Do not allow solvent to air dry on the metal.

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8.2.3.3 Sand metal surfaces thoroughly.

8.2.3.4 Make sure all solutions have been approved before proceeding.

NOTE: The following operations should be treated as an uninterrupted cycle. Taking longer than 2 hours to complete one cycle shall be cause for rejection.

8.2.3.5 Immerse the steel in the tanks in the following sequence:

Alkaline clean metal 8 to 10 minutes,
Rinse 8 to 10 minutes
Pickle 8 to 12 minutes
*Rinse 8 to 10 minutes
Dry - Air dry at room temperature

*Steel is not to have any water breaks after this operation.

8.2.3.6 Inspect the steel after the process is complete.

8.2.3.7 A carbon steel rod must be rubbed against the steel in the pickle tank to start gassing. If the steel does not gas, no pickle is taking place.

NOTE: The part must emerge from the alkaline cleaning tank completely free of dirt, finger prints, wax pencil marks, etc. Solution must be agitated at all times. SEE PARAGRAPH 8.2.2.2

8.2.3.8 Inspection

8.2.3.8.1 Coming out of the pickle tank, steel must be a uniform gray-to-black and free of water breaks.

8.2.3.8.2 A piece of steel may receive the above cleaning only two times before permanent rejection.

8.2.4 Priming

8.2.4.1 Within four (4) hours after the steel is dry, apply two (2) coats of metal primer to each side. Apply the coats to the first side before turning over. Lay primed side on teflon fabric.

8.2.4.2 Allow approximately 20 minutes drying time between coats.

8.2.4.3 Allow second coat of first side to dry one (1) hour minimum.

8.2.4.4 Allow last coat to dry 20 minutes minimum to 24 hours maximum.

8.2.5 Baking

8.2.5.1 Bake the primed steel 30-35 minutes at 340° - 350°F.

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9.0 GENERAL INSTRUCTIONS

- 9.1 All materials are to be tested and approved before release for production use.
- 9.2 Allow all cemented surfaces to air dry until tacky.
- 9.3 Avoid contamination of stock.
- 9.3.1 Wash all stock solvent before building into assembly.
- 9.4 Press all stock and fillets in place to insure proper contact.
- 9.4.1 Remove trapped air, if any, after positioning each piece of stock into place.
- 9.5 Splice separators are fabricated by positioning teflon fabric between two (2) layers of No. 08 nylon fabric.
- 9.5.1 Use No. 06 cement to fabricate separator.
- 9.6 In instances where not specifically stated, tolerances on fabricating dimensions are listed on the referenced drawings.

10.0 FABRICATION OF FORWARD SECTIONS

- 10.1 Apply .265 gauge No. 01 stock in fill areas using templates.
Ref. Dwg. 4S-1160.
- 10.1.1 Apply No. 05 cement to the bond area of stock and to the surface of the fill area in the building form before positioning stock in building form.
- 10.2 Apply fillets (3S-1191-1) to the edges of No. 01 stock in fill areas.
- 10.2.1 Use No. 05 cement.
- 10.3 Inspect contour of the fill areas using templates. (Ref. Dwg. 5S-1176)
- 10.3.1 Limitations in "Out of Fairness": A feeler 1/8" \pm 1/16" must be excluded over 75% of the length of template.
- 10.4 Apply one (1) ply of .265 ga. No. 01 stock over the building surface.
(Ref. Dwg. 4S-1160)
- 10.4.1 Use No. 05 cement.

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- 10.5 Inspect. Check for trapped air and make sure seams are well knitted.
- 10.6 Apply bead fillet 3S-1147-2 to bead areas. (Ref. Dwg. 4S-1160)
- 10.6.1 Use No. 05 cement.
- 10.7 Inspect. Check the fillet for proper location.
- 10.8 Apply No. 07 fabric to the bead area. (Ref. Dwg. 4S-1160)
- 10.8.1 Remove film backing from fabric.
- 10.8.2 Use No. 05 cement.
- 10.8.3 Press fabric into position.
- 10.8.4 Seams may be lapped 1/4" maximum.
- 10.9 Inspect the location of fabric.
- 10.10 Apply the previously prepared shim stock (See 8.2) to the bead area.
(Ref. Dwg. 4S-1160)
- 10.10.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 10.10.2 Clean both surfaces of shim stock and building surface with solvent.
- 10.10.3 Use No. 05 cement.
- 10.10.4 Press shim stock into bead areas.
- 10.11 Inspect. Check the shim stock for proper location.
- 10.12 Apply first vertical ply of .090 ga. No. 04 fabric.
- 10.12.1 Position splice separator. (Ref. Dwg. 5S-1213)
- 10.12.2 Apply 4-1/2 inch wide spacer ply of No. 04 fabric over the splice
separator.
- 10.12.3 Mark location of 4-foot water level.
- NOTE: The 4-foot water level marks are scribed into the building form.
- 10.12.4 Locate the position and width of No. 04 fabric strips to be laid.
Mark along the bead cable areas and 4-foot water level.
- 10.12.4.1 Use templates to make the layout.

- 10.12.5 Inspect locations of splice separator and No. 04 fabric strips. Check width of the spacer ply.
- 10.12.6 Cut No. 04 fabric strips to the various widths as required. Cut length of strip to extend 15 inches beyond the outside edge of bead recesses.

NOTE: First strips of No. 04 fabric adjacent to all cable connectors in splice areas are to have a 1" wide strip wrapped with separator fabric from inside edge of bead recess extending outward to end of ply. (Ref. Dwg. 5S-1213.)

- 10.12.7 Apply pre-cut strips following the layout.
- 10.12.7.1 Use No. 05 cement.
- 10.12.7.2 Cut fill-in strips of No. 04 fabric.

NOTE: Fill-in strips are to be a minimum of 4 feet in length. If required length is smaller, use .090 gauge No. 01 stock.

- 10.12.7.3 Apply .090 gauge No. 01 fill after inserting No. 04 fabric strips.
- 10.13 Inspect. Make certain trapped air is removed, that there are no gaps larger than 1/16", and that fillets are applied properly.
- 10.14 Apply first angular ply of .090 ga. No. 04 fabric.
- 10.14.1 Position splice separator. (Ref. Dwg. 5S-1213)
- 10.14.2 Mark location of 4-foot water level.

NOTE: The 4-foot water level marks are scribed into the building form.

- 10.14.3 Locate first strip of No. 04 fabric $10^{\circ} \pm 2^{\circ}$ angle to the 4-foot water line. Direction must coincide as shown in Figures 2 and 3.

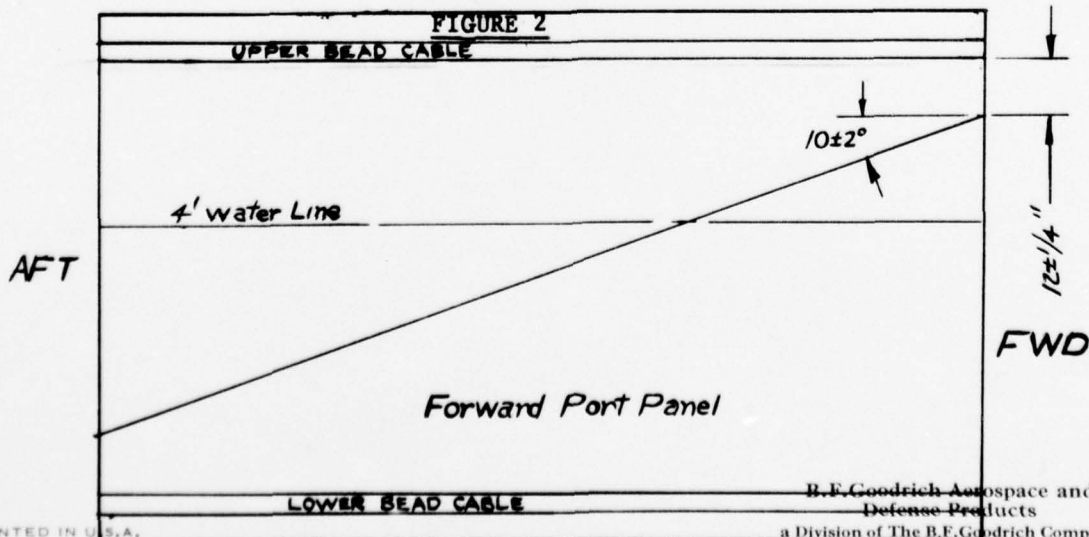
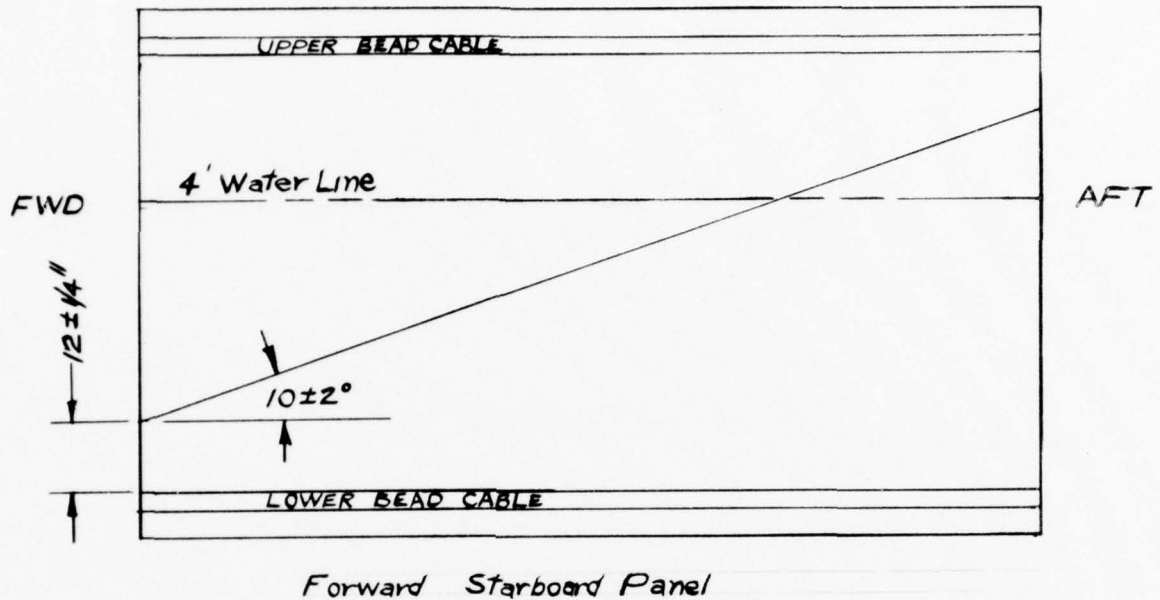


FIGURE 3



- 10.14.4 Mark a line 1-1/4 inches from the center line of the clamping area, adjacent to the bead.
- 10.14.5 Place polyethylene film approximately 6" wide, along the previously marked 1-1/4" line.
- 10.14.6 Inspect. Check splice separators for proper location; check direction of angular ply and 1-1/4" dimension.
- 10.14.7 Use No. 05 cement.
- 10.14.7.1 Apply stock.
- NOTE: Apply stock in a manner to minimize distortion due to contour.
- 10.14.7.1.1 Apply fillet 3S-1147-1 at edge of laps.
- 10.14.8 Trim plies at the 1-1/4" line.
- 10.14.9 Remove polyethylene from under the edge of plies and press plies down.
- 10.14.10 Apply fillet 3S-1147-1 along end of plies at 1-1/4" cut off.
- 10.14.10.1 Use No. 05 cement.

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- 10.15 Inspect. Make certain there are no gaps larger than 1/16" and that fillets are applied to edge of laps and end of plies along 1-1/4" dimension.
- 10.16 Apply the previously prepared shim stock (See 8.2) to the bead area. (Ref. Dwg. 4S-1160).
- 10.16.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 10.16.2 Clean both surfaces of the shims and building surface with solvent.
- 10.16.3 Use No. 05 cement.
- 10.16.3.1 Press shim stock into bead areas.
- 10.17 Inspect. Check the shim stock for proper location.
- 10.18 Apply the second vertical ply of .090 ga. No. 04 fabric.
- 10.18.1 Position splice separator. (Ref. Dwg. 5S-1213)
- 10.18.2 Apply 10 inch wide spacer ply of No. 04 fabric over the splice separator.
- 10.18.3 Inspect the splice separators for proper location. Check width of the spacer ply.
- 10.18.4 The application of the second vertical ply is similar to that of the first vertical ply application (10.12.3 thru 10.13).....
- Except: The strip width and locating template is to be off-set 1" from previous first vertical ply application, to prevent super-imposing gaps.
- NOTE: First strips of No. 04 fabric adjacent to all cable connectors in splice areas are to have a 1/2" wide strip wrapped with fabric from inside edge of bead recess extending outward to end of ply. (Ref. Dwg. 5S-1213).
- 10.19 Apply second angular ply of .090 ga. No. 04 fabric.
- 10.19.1 The application of the second angular ply is similar to the application of the first angular ply (10.14.1 thru 10.15).
- Except: The direction of the $10^{\circ} \pm 2^{\circ}$ angle to the 4-foot water line must coincide as shown in Figures 4 and 5.

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FIGURE 4

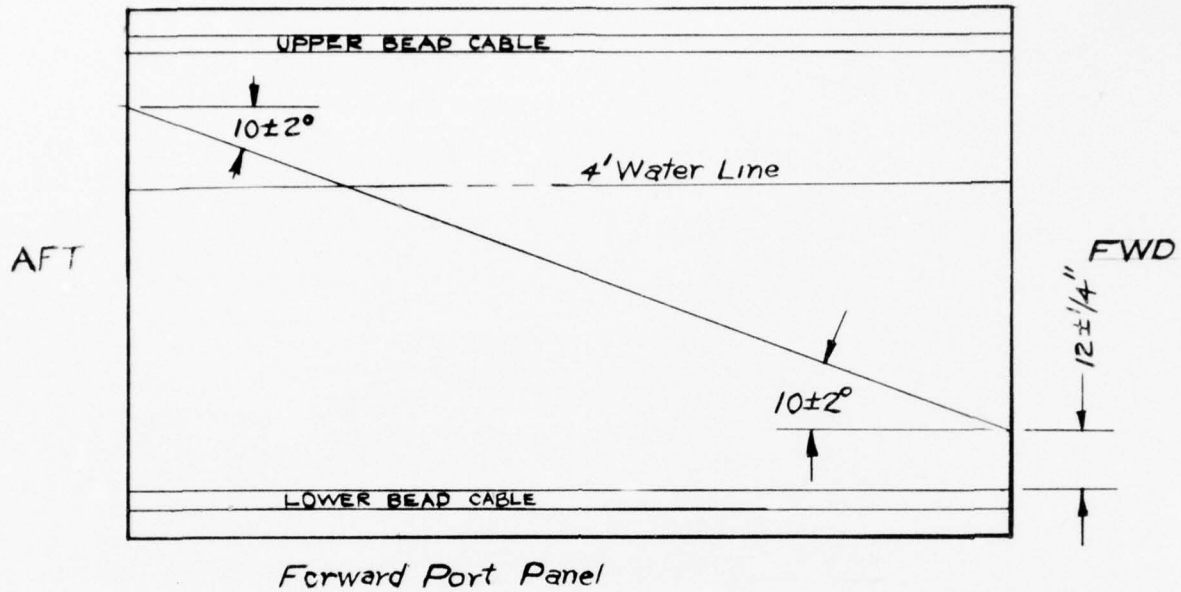
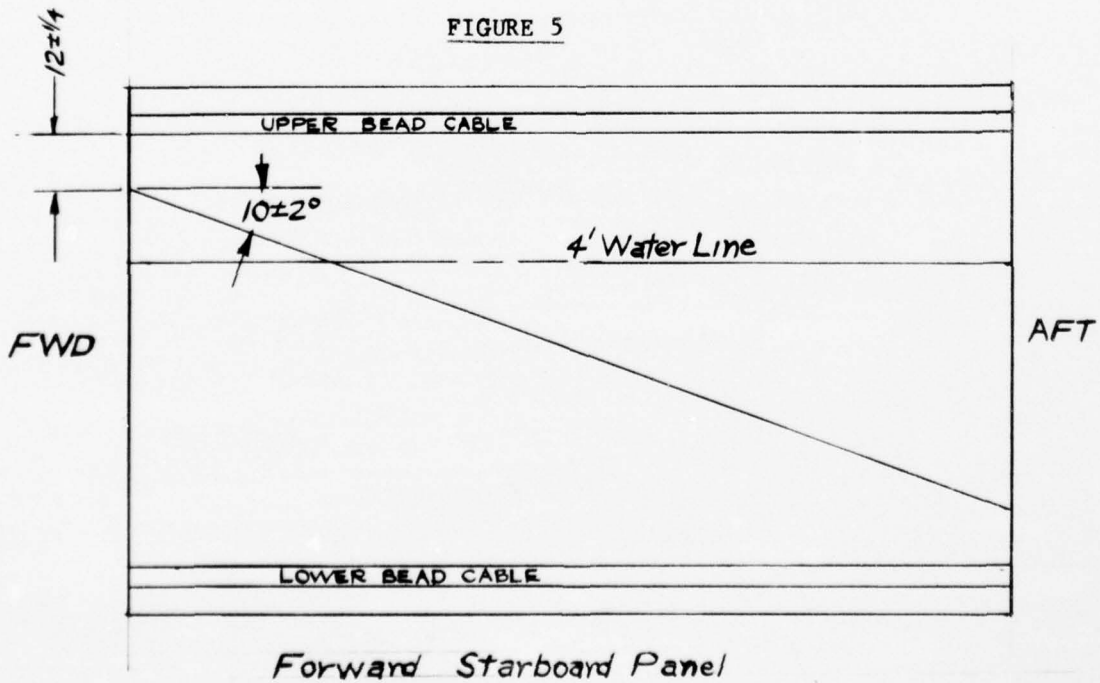


FIGURE 5



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10.20 Apply the previously prepared shim stock (See 8.2) to the bead area.
(Ref. Dwg. 4S-1160)

10.20.1 Roughen both surfaces of the shim stock. Do not remove coating.

10.20.2 Clean both surfaces of the shims and building surface with solvent.

10.20.3 Use No. 05 cement.

10.20.4 Press shim stock into bead areas.

10.21 Inspect the shim stock for proper location.

10.22 Apply spacer ply of .075 ga. No. 04 fabric.

10.22.1 Position separator in the splice area. (Ref. Dwg. 5S-1213)

10.22.2 Draw a line on the part 6-1/2 inches from the center line of the
clamping area adjacent to the bead.

10.22.3 Apply 10-1/2" wide spacer ply of No. 04 fabric over the separator in
the splice area. This ply stops at the 6-1/2 inch line previously
marked.

NOTE: Wrap a 1" wide x 25" long strip of No. 04 fabric with separator
and allow to extend into bead recess for a spacer wrap around
bead cable.

10.22.4 Inspect. Make certain splice separators are properly positioned;
check location and width of spacer ply.

10.22.5 Apply No. 04 fabric in strips. Start the strips at the 6-1/2 inch
line previously marked.

10.22.5.1 Use No. 05 cement.

10.22.5.2 Butt the strips in the bead recess areas at the 6-1/2 inch line.

10.22.6 Apply fillet 3S-1147-1 at end of plies along 6-1/2" cut off.

10.22.6.1 Use No. 05 cement.

10.23 Inspect. Make certain there are no gaps larger than 1/16"; and, that
fillets are applied at end of plies along 6-1/2" dimension.

10.24 Apply the previously prepared shim stock (See 8.2) to the bead area.
(Ref. Dwg. 4S-1160)

10.24.1 Roughen both surfaces of the shim stock. Do not remove coating.

10.24.2 Clean both surfaces of the shims and building surface with solvent.

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- 10.24.3 Use No. 05 cement.
- 10.24.4 Press shim stock into bead areas.
- 10.25 Inspect shim stock for proper location.
- 10.26 Prepare and install bead cable.
- 10.26.1 Degrease the metal cable one hour in trichloroethylene vapor.
- 10.26.1.1 From this point on, clean white gloves must be worn when handling the cable.
- 10.26.2 Apply Chemlok 220 to the cable.
- 10.26.2.1 Allow to air dry.
- 10.26.2.2 Avoid any type of contamination.
- 10.26.3 Apply No. 05 cement to the cable.
- 10.26.4 Apply fillet 3S-1191-2 between the strands of the cable. (Ref. Dwg. 4S-1160)
- 10.26.4.1 Use No. 05 cement.
- 10.26.4.2 Press stock into position.
- 10.26.5 Position cable in the bead recess. (Ref. Figures 6 and 7).

FIGURE 6

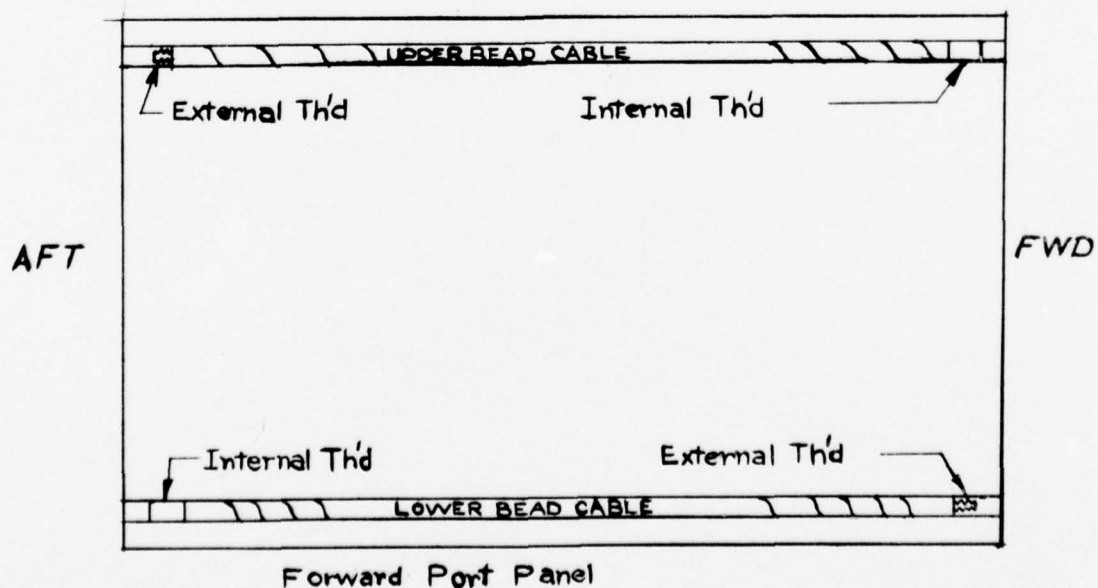
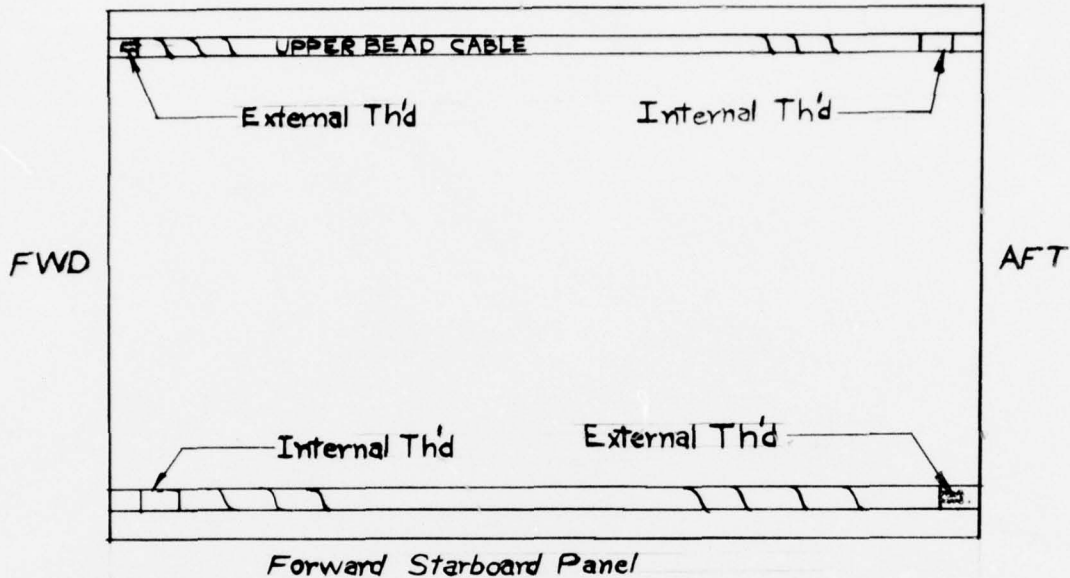


FIGURE 7



- 10.26.5.1 Clean cable and location with solvent.
- 10.26.5.2 Use No. 05 cement.
- 10.26.5.3 Clamp bead cable in place.
- 10.26.6 Inspect. Check the cable location and the direction of connectors.
- 10.26.7 Position 2-1/2" steel collars over the connectors.
- 10.27 Apply fillet 3S-1147-3 along the inside edge of the bead cable.
(Ref. Dwg. 4S-1160)
- 10.27.1 Use No. 05 cement.
- 10.28 Apply the previously prepared shim stock (See 8.2) to the bead area.
(Ref. Dwg. 4S-1160)
- 10.28.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 10.28.2 Clean both surfaces of the shims and building surface with solvent.
- 10.28.3 Use No. 05 cement.
- 10.28.4 Press shim stock into bead areas.

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- 10.29 Inspect fillet and shim stock for proper location.
 - 10.30 Turn down the bead wrap around ply over the bead cable.
 - 10.30.1 Mark a line 11-1/2 inches from the center line of the clamping area adjacent to the bead.
 - 10.30.1.1 Inspect the 11-1/2" dimension.
 - 10.30.2 Clean the stock and building surface with solvent.
 - 10.30.3 Use No. 05 cement.
 - 10.30.4 Position polyethylene film approximately 6 inches wide along the 11-1/2 inch line and extend toward the bead cable.
 - 10.30.5 Apply all stock over the bead cable and mate at the 11-1/2" line. Max. permissible gap to be 5/8".
 - 10.30.6 Trim stock along 11-1/2 inch line.
 - 10.30.7 Remove polyethylene film from under the ply.
 - 10.30.8 Apply fillet 3S-1147-1 at end of plies along 11-1/2" cut off.
 - 10.30.8.1 Use No. 05 cement.
 - 10.30.9 Apply 10-1/2" wide spacer ply of No. 04 fabric .075 ga. over previous ply and separator in splice area. This ply is to start at the 11-1/2" line and extend toward the bead cable.
- NOTE: Turn down the 1" strip of spacer ply.
- 10.31 Inspect. Make certain there are no gaps larger than 1/16" at 11-1/2" cut off.
 - 10.32 Apply the previously prepared shim stock (See 8.2) to bead area. (Ref. Dwg. 4S-1160)
 - 10.32.1 Roughen both surfaces of the shim stock. Do not remove coating.
 - 10.32.2 Clean both surfaces of shim stock and building surface with solvent.
 - 10.32.3 Use No. 05 cement.
 - 10.32.4 Press shim stock into bead areas.
 - 10.33 Inspect shim stock for proper location.

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- 10.34 Apply third vertical ply of .090 ga. No. 04 fabric.
- 10.34.1 Draw a line on the part, 1-1/2" from the center line of the clamping area adjacent to the bead.
- 10.34.2 Apply 11-1/2" wide spacer ply of No. 04 fabric over previously applied stock and separator in splice area.
- 10.34.3 Inspect the 1-1/2" dimension and width of the spacer ply in splice area.
- 10.34.4 Place polyethylene film approximately 6" wide, along the 1-1/2" line.
- 10.34.5 Use No. 05 cement.
- 10.34.6 Butt splice stock.
- NOTE: Apply stock in a manner to minimize distortion due to contour.
- 10.34.7 Trim ends of ply uniformly along the previously marked 1-1/2 inch line.
- 10.34.8 Remove polyethylene film and press stock down.
- 10.34.9 Apply fillet 3S-1147-1 at edge of laps. (1" \pm 1/4")
- 10.34.10 Apply fillet 3S-1147-1 at end of plies along 1-1/2" cut off.
- 10.34.10.1 Use No. 05 cement.
- 10.35 Inspect. Make certain there are no gaps larger than 1/16", and that fillets are applied to edge of laps and 1-1/2" cut off.
- 10.36 Turn down the second vertical ply over the bead cable.
- 10.36.1 Draw a line on the part 7-1/2 inches from the center line of clamping area adjacent to the bead.
- 10.36.2 Apply 11" wide .090 ga. spacer ply of No. 04 fabric over previously applied stock and separator in the splice area.
- NOTE: Turn down the 1/2" strip of spacer ply
- 10.36.3 Inspect the 7-1/2" dimension and width of the spacer ply in splice area.
- 10.36.4 Place polyethylene film approximately 4 inches wide, along the 7-1/2" line.
- 10.36.5 Position stock over the bead cable area and allow to gap 1/2" maximum or lap 1-1/4" maximum at the 7-1/2 inch line.
- 10.36.6 Trim ends of ply uniformly along the previously marked 7-1/2 inch line.

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- 10.36.7 Remove polyethylene film from the 7-1/2 inch line.
- 10.36.7.1 Use No. 05 cement.
- 10.36.8 Apply fillet 3S-1147-1 at edge of laps and end of plies along 7-1/2" cut off.
- 10.36.8.1 Use No. 05 cement.
- 10.37 Inspect. Make certain there are no gaps larger than 1/16"; and that fillets are applied to edge of laps and 7-1/2" cut off.
- 10.38 Apply the previously prepared shim stock (See 8.2) to bead area. (Ref. Dwg. 4S-1160)
- 10.38.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 10.38.2 Clean both surfaces of shim stock and building surface with solvent.
- 10.38.3 Use No. 05 cement.
- 10.38.4 Press shim stock into bead area.
- 10.39 Inspect the shim stock for proper location.
- 10.40 Apply fourth vertical ply of .090 ga. No. 04 fabric.
- 10.40.1 Draw a line on the part, 1" from the center line of the clamping area adjacent to the bead.
- 10.40.2 Apply 11-1/2" wide spacer ply of No. 04 fabric over previously applied stock and separator in splice area.
- 10.40.3 Inspect the 1" dimension and width of the spacer ply in splice area.
- 10.40.4 Place polyethylene film approximately 6" wide, along the 1" line.
- 10.40.5 Use No. 05 cement.
- 10.40.5.1 Apply stock.
NOTE: Apply stock in such a manner as to minimize distortion due to contour.
- 10.40.6 Apply fillet S-1147-1 at edge of laps.
- 10.40.7 Trim ends of ply uniformly along the previously marked 1 inch line.
- 10.40.8 Remove polyethylene film and press stock into position.

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- 10.40.9 Apply fillet 3S-1147-1 at end of plies along 1" cut off.
- 10.40.9.1 Use No. 05 cement.
- 10.41 Inspect. Make certain that there are no gaps larger than 1/16"; and that fillets are applied to edge of laps and 1" cut off.
- 10.42 Turn down the first vertical ply over the bead cable.
- 10.42.1 Draw a line on the part 6-1/2 inches from the center line of the clamping area adjacent to the bead.
- 10.42.2 Apply 10-1/2" wide .090 ga. spacer ply of No. 04 fabric over previously applied stock and separator in the splice area.
- NOTE: Turn down the 1 inch strip of spacer ply.
- 10.42.3 Inspect the 6-1/2" dimension and width of the spacer ply in splice area.
- 10.42.4 Place polyethylene film approximately 4 inches wide, along the 6-1/2" line.
- 10.42.5 Apply stock over the bead cable area at the 6-1/2" line.
- 10.42.6 Trim ends of ply uniformly along the previously marked 6-1/2 inch line.
- 10.42.7 Remove polyethylene film from the 6-1/2 inch line.
- 10.42.8 Use No. 05 cement.
- 10.42.9 Apply fillet 3S-1171-1 at edge of laps and end of plies along the 6-1/2 inch cut off.
- 10.42.9.1 Use No. 05 cement.
- 10.43 Inspect. Make certain there are no gaps larger than 1/16"; and that fillets are applied to edge of laps and 6-1/2" cut off.
- 10.44 Apply the previously prepared shim stock (See 8.2) to the bead area. (Ref. Dwg. 4S-1160)
- 10.44.1 Clean both surfaces of shim stock and building surface with solvent.
- 10.44.2 Use No. 05 cement.
- 10.44.3 Press shim stock into bead area.
- 10.45 Inspect the shim stock for proper location.

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- 10.46 Apply No. 07 fabric over bead cable area. (Ref. Dwg. 4S-1160)
- 10.46.1 Remove film backing from fabric.
- 10.46.2 Clean stock in bead cable area with solvent.
- 10.46.3 Use No. 05 cement.
- 10.46.4 Lap seams 1/4" maximum.
- 10.47 Inspect location of No. 07 fabric.
- 10.48 Apply two (2) plies of .135 ga. sheeted gum stock vertically over surface of part.
- 10.48.1 Position separator in splice area. (Ref. Dwg. 4S-1160)
- NOTE: Skived lap seams of the two gum plies must be staggered.
- 10.48.1.1 Use No. 05 cement.
- 10.49 Inspect. Make certain separators are properly located in splice area. Check for trapped air and that seams are well knitted.
- 10.50 Apply No. 08 nylon fabric over the bead cable area.
- 10.50.1 Clean building surface with solvent.
- 10.50.2 Apply No. 06 cement to the contact area of part.
- 10.50.3 Lap seams permissible 1" maximum.
- 10.50.4 Apply No. 06 cement over the No. 08 Nylon fabric.
- 10.51 Install bead clamps to bead cable area.
- 10.51.1 Tighten cap screws evenly.
- CAUTION: Avoid stripping of threads and loosening inserts.
- 10.52 Inspect. Make sure bead clamps are properly seated. Check for stripped bolts or loose inserts.
- 10.53 Prepare for vulcanization per 12.0.

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- 11.0 FABRICATION OF AFT SECTIONS
- 11.1 Apply .265 ga. No. 01 stock in fill areas using templates. (Ref. Dwg. 4S-1183)
 - 11.1.1 Apply No. 05 cement to bond area of stock and to the surface of the fill area in the building form before positioning stock in building form.
- 11.2 Apply fillets (3S-1191-1) to the edges of No. 01 stock in fill areas.
 - 11.2.1 Use No. 05 cement.
- 11.3 Inspect contour of the fill areas using templates. (Ref. Dwg. 5S-1176)
- 11.3.1 Limitations in "Out of Fairness": A feeler $1/8" \pm 1/16"$ must be excluded over 75% of the length of template.
- 11.4 Apply one (1) ply of .265 ga. No. 01 stock over the building surface. (Ref. Dwg. 4S-1183)
 - 11.4.1 Use No. 05 cement.
 - 11.4.2 Apply stock using butt-skived seams. Skive to be approximately 30° .
- 11.5 Inspect for trapped air and insure that seams are well knitted.
- 11.6 Apply bead fillet 3S-1147-2 to bead areas. (Ref. Dwg. 4S-1183)
 - 11.6.1 Use No. 05 cement.
- 11.7 Inspect the location of fillet.
- 11.8 Apply No. 07 fabric to the bead area. (Ref. Dwg. 4S-1183)
 - 11.8.1 Remove film backing from fabric.
 - 11.8.2 Use No. 05 cement.
 - 11.8.3 Press fabric into position.
 - 11.8.4 Maximum permissible lap is $3/8"$.
- 11.9 Inspect the fabric for proper location.
- 11.10 Apply the previously prepared shim stock (See 8.2) to the bead area. (Ref. Dwg. 4S-1183)
 - 11.10.1 Roughen both surfaces of the shim stock. Do not remove coating.

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- 11.10.2 Clean both surfaces of shim stock and building surface with solvent.
- 11.10.3 Use No. 05 cement.
- 11.10.4 Press shim stock into bead areas.
- 11.11 Inspect the location of shim stock.
- 11.12 Apply first vertical ply of .090 ga. No. 04 fabric.
- 11.12.1 Position splice separator. (Ref. Dwg. 5S-1234)
- 11.12.2 Apply 4-1/2" wide spacer ply of No. 04 fabric over the splice separator.
- 11.12.3 Inspect the location of splice separator and check width of the spacer ply.

NOTE: First strips of No. 04 fabric adjacent to all cable connectors in splice area are to have a 1" wide strip wrapped with separator fabric from inside edge of bead recess, extending outward to end of ply. (Ref. Dwg. 5S-1234)

- 11.12.4 Use No. 05 cement.
- 11.12.4.1 Butt splice stock. Apply strips in a manner to minimize distortion due to contour.
- 11.12.4.1.1 Apply fillet 3S-1147-1 at edge of laps.
- 11.12.5 It is necessary to determine the "transition point" (i.e. where vertical plies become angle plies) during the application of the first vertical ply by allowing the stock to extend into the bead cable area until the direction of the stock, after wrapping around the bead cable, assumes the same direction as the next angular ply.
- 11.12.5.1 When the transition point is reached, mark a line on the part 1-1/4" from the centerline of the clamping area adjacent to the bead.
- 11.12.5.2 Inspect. Check ply direction at the transition point and also check the 1-1/4" dimension.
- 11.12.5.3 Place 6" wide polyethylene film along the previously marked line.
- 11.12.5.4 Trim end of plies along 1-1/4" line.
- 11.12.5.5 Remove polyethylene film from under the edge of plies and press stock into position.

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- 11.12.6 Apply fillet (3S-1147-1) to edge of ply.
 - 11.12.6.1 Use No. 05 cement.
 - 11.13 Inspect. Make certain there are no gaps larger than $1/16"$, and that fillets are applied to laps and the $1-1/4"$ cut off.
 - 11.14 Apply first angular ply of .090 ga. No. 04 fabric.
 - 11.14.1 Position splice separator. (Ref. Dwg. 5S-1234)
 - 11.14.2 Mark location of the 4-foot water level.
- NOTE: The 4-foot water level marks are scribed into the building form.
- 11.14.3 Locate the first strip of No. 04 fabric at a $15 \pm 2^\circ$ angle to the 4-foot water line. Directions must coincide as shown in Figures 8 and 9.

FIGURE 8

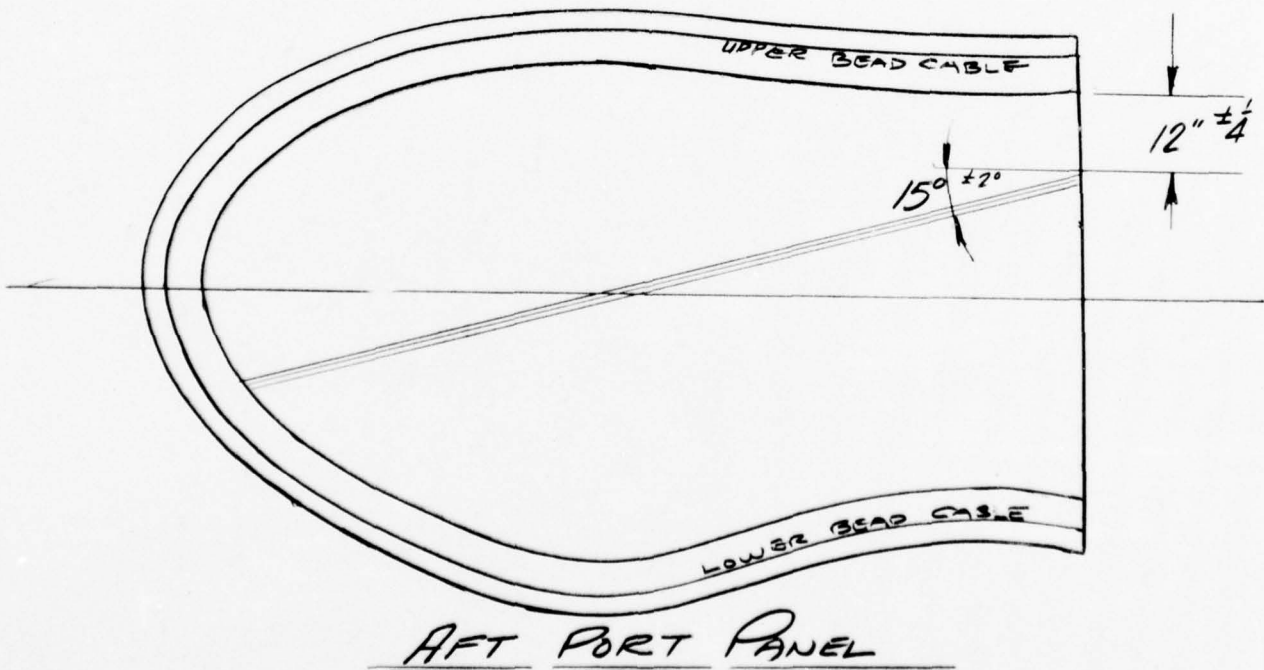
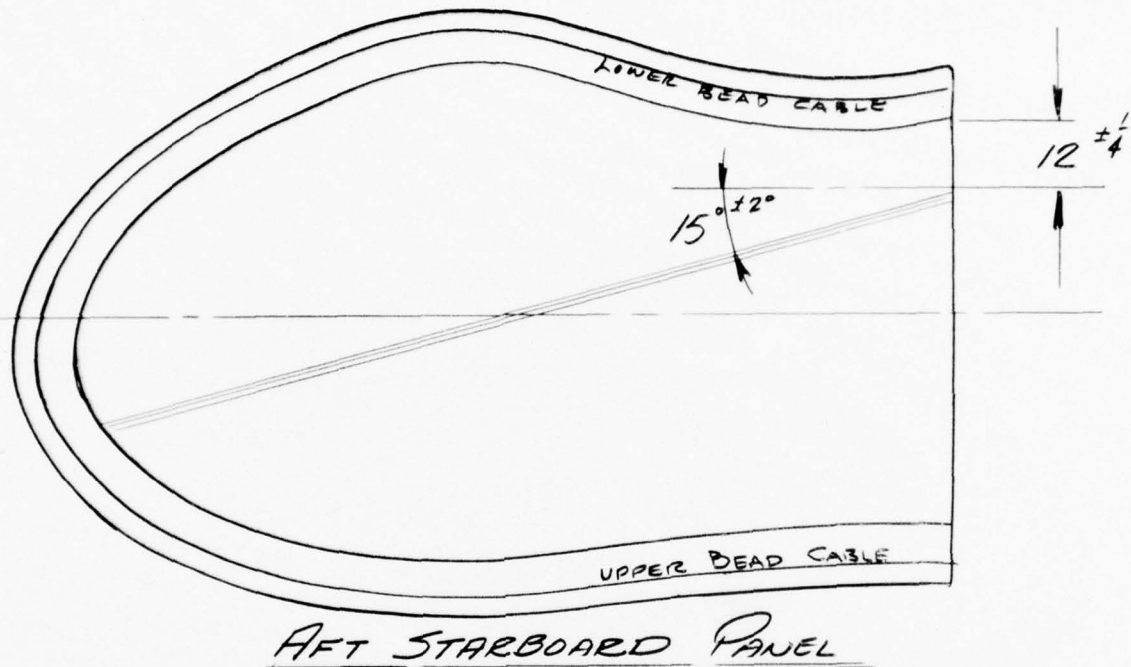


FIGURE 9



AFT STARBOARD PANEL

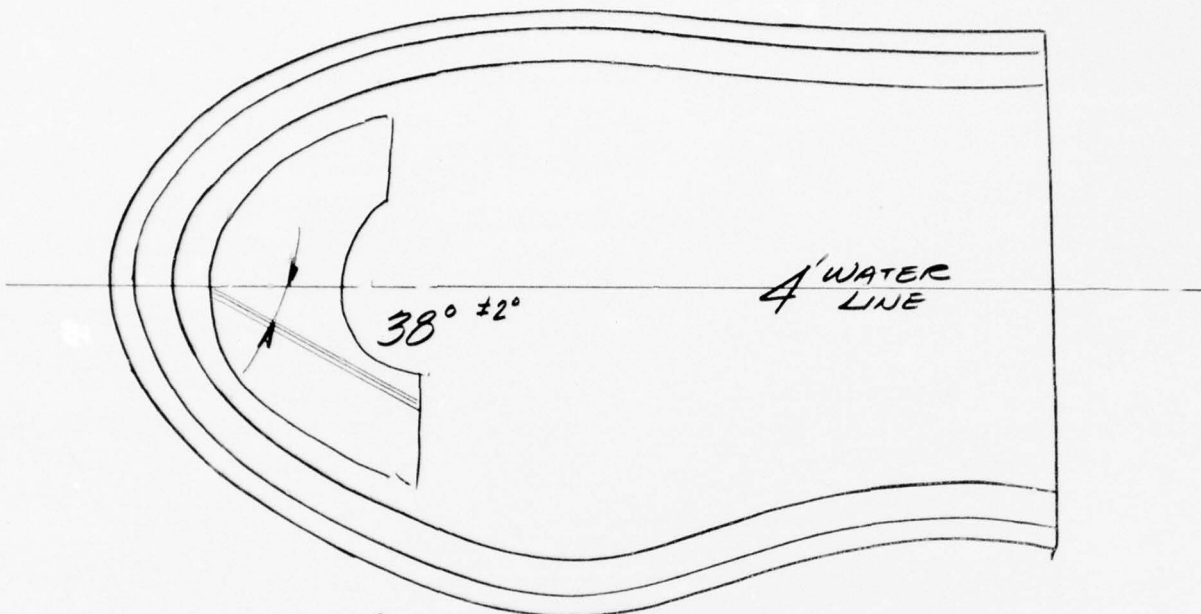
- 11.14.4 Mark a line on the part 1-1/4" from the centerline of the clamping area adjacent to the bead.
- NOTE:** This line is to be marked on the first vertical plies extending into the bead cable recess only.
- 11.14.5 Place 6" wide polyethylene film along the previously marked 1-1/4" line.
- 11.14.6 Inspect. Check the location of splice separator, also check the 15° angle, the direction of angular ply and the 1-1/4" dimension.
- 11.14.7 Use No. 05 cement.
- 11.14.7.1 Butt splice stock. Apply strips in a manner to minimize distortion due to contour.
- 11.14.7.1.1 Apply fillet (3S-1147-1) at edge of laps. ($1" \pm 1/4"$)
- 11.14.7.2 Trim plies at the 1-1/4" line.
- 11.14.7.3 Remove polyethylene film from under edge of plies.

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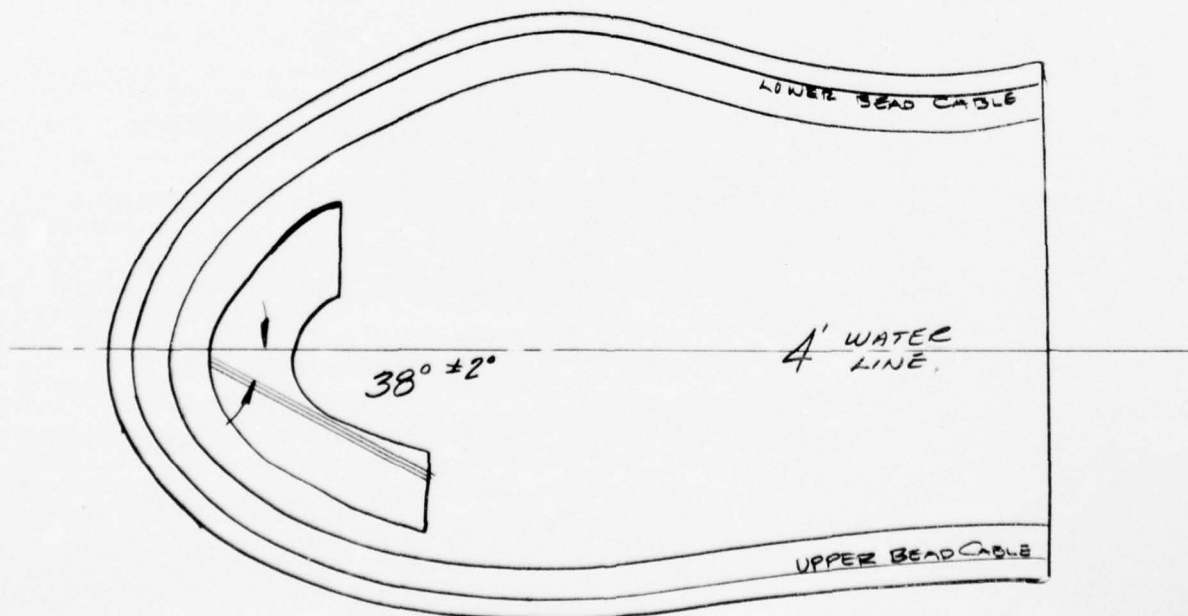
- 11.14.8 Continue application of the first angular ply, ending the stock at the 1-1/4" line. When the transition point is reached, the procedure is:
- 11.14.8.1 Allow the stock to extend into the bead cable area and lap over the edge of the form;
- 11.14.8.2 Inspect; Check the ply direction at the transition point;
- 11.14.8.3 Apply fillet (3S-1147-1) along end of plies at 1-1/4" cut off;
- 11.14.8.3.1 Use No. 05 cement.
- 11.15 Inspect. Make certain there are no gaps larger than 1/16", and, that fillets are applied to edge of laps and end of plies along 1-1/4" dimension.
- 11.16 Apply the previously prepared shim stock (See 8.2) to the bead area. (Ref. Dwg. 4S-1183)
- 11.16.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 11.16.2 Clean both surfaces of the shims and building surface with solvent.
- 11.16.3 Use No. 05 cement.
- 11.16.4 Press shim stock into bead areas.
- 11.17 Inspect. Check the shim stock for proper location.
- 11.18 Apply first angular ply of .090 ga. No. 04 fabric.
- 11.18.1 Draw a line on the part 2-1/2" from the centerline of the clamping area adjacent to the bead. Extend the mark around the aft end of the part to 12" forward to the transition point on both the upper and lower bead cable area. Measure 18" from the previous line toward the center of the part and draw a second line parallel to the first line. (Ref. Dwg. 5S-1229)
- 11.18.2 Draw a line on the part at the 4-foot water level.
- 11.18.3 Locate the first strip of No. 04 fabric at a $38 \pm 2^\circ$ angle to the 4-foot water mark. Directions must coincide as shown in Figures 10 and 11.

FIGURE 10



AFT PORT PANEL

FIGURE 11



AFT STARBOARD PANEL

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- 11.18.4 Inspect the location of angular ply. Check the 38° direction of plies.
- 11.18.5 Place polyethylene film approximately 6" wide along inside of the previously marked area.
- 11.18.6 Use No. 05 cement.
- 11.18.6.1 Butt splice stock.
- 11.18.6.2 Trim end of stock along previously marked lines.
- 11.18.6.3 Remove polyethylene film from edge of plies.
- 11.18.7 Apply fillet (3S-1147-1) to edge of ply.
- 11.18.7.1 Use No. 05 cement.
- 11.19 Apply the second vertical ply of .090 ga. No. 04 fabric.
- 11.19.1 Position splice separator. (Ref. Dwg. 5S-1234)
- 11.19.2 Apply 10 inch wide spacer ply of No. 04 fabric over the splice separator.
- 11.19.3 Inspect. Check location of splice separator and width of the spacer ply.
- 11.19.4 The application of the second vertical ply is similar to that of the first vertical ply (11.12 thru 11.13)
- EXCEPT: First strips of No. 04 fabric adjacent to all cable connectors in splice area are to have 1/2" wide strip wrapped with separator fabric from inside edge of bead recess extending outward to end of ply. (Ref. Dwg. 5S-1234)
- 11.20 Apply second angular ply of .090 ga. No. 04 fabric.
- 11.20.1 The application of the second angular ply is similar to the application of the first angular ply (11.14.1 thru 11.15)
- EXCEPT: The $15 \pm 2^{\circ}$ angle to the 4-foot water line must coincide as shown in Figures 12 and 13.

FIGURE 12

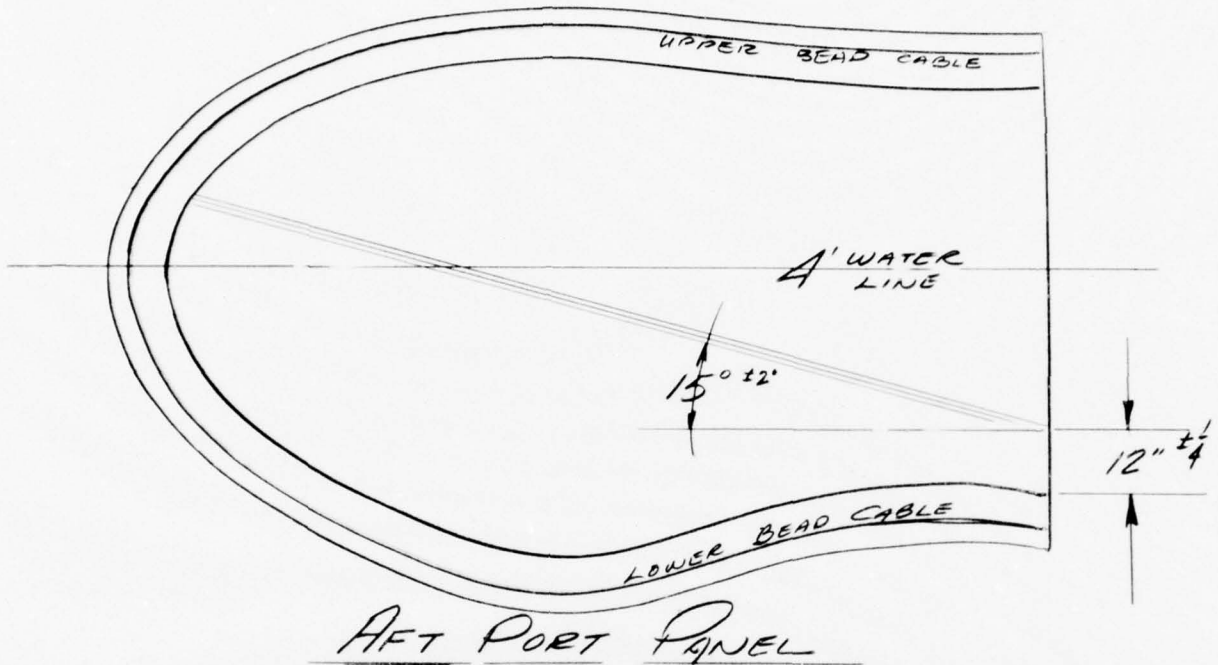
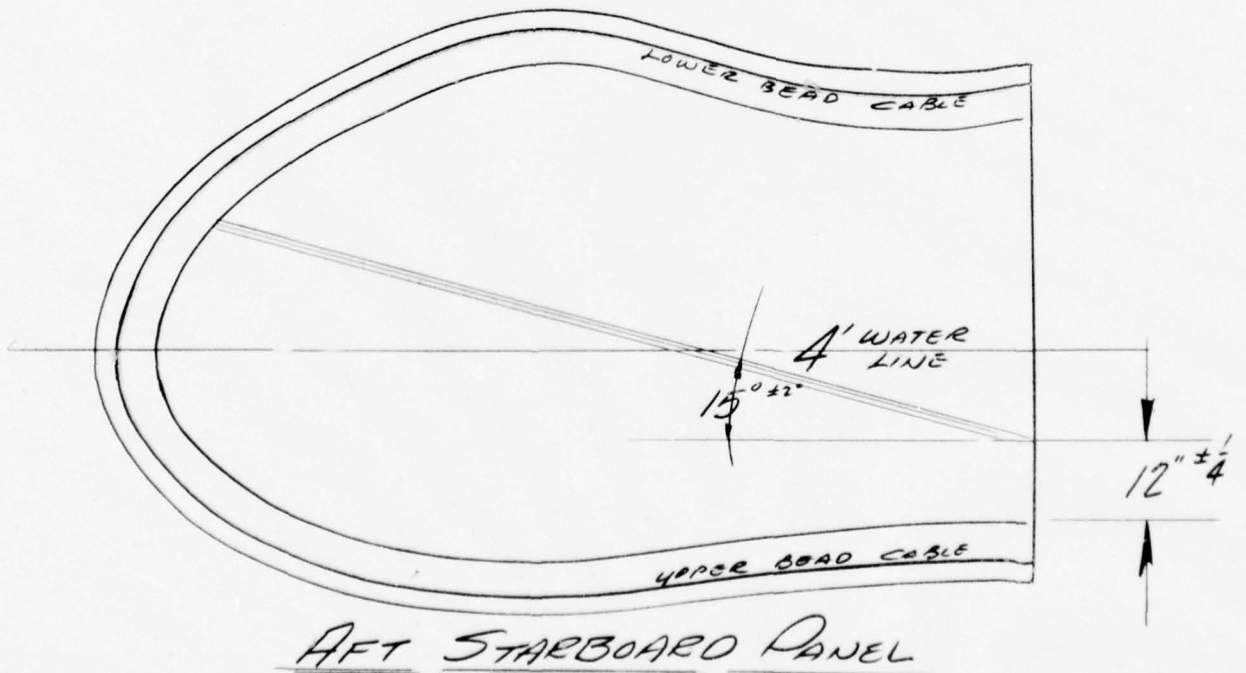


FIGURE 13



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- 11.21 Apply the previously prepared shim stock (See 8.2) to the bead area.
(Ref. Dwg. 4S-1183)
- 11.21.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 11.21.2 Clean both surfaces of the shims and the building surface with a solvent.
- 11.21.3 Use No. 05 cement.
- 11.21.4 Press shim stock into bead areas.
- 11.22 Inspect the location of shim stock.
- 11.23 Apply second angular ply of .090 ga. No. 04 fabric.
- 11.23.1 The application of the second angular ply is similar to that of the first angular ply (11.18.1 thru 11.18.7.3).

EXCEPT: The area is to be 16" wide, and the $38 \pm 2^\circ$ angle to the 4-foot water line must coincide as shown in Figures 14 and 15.

FIGURE 14

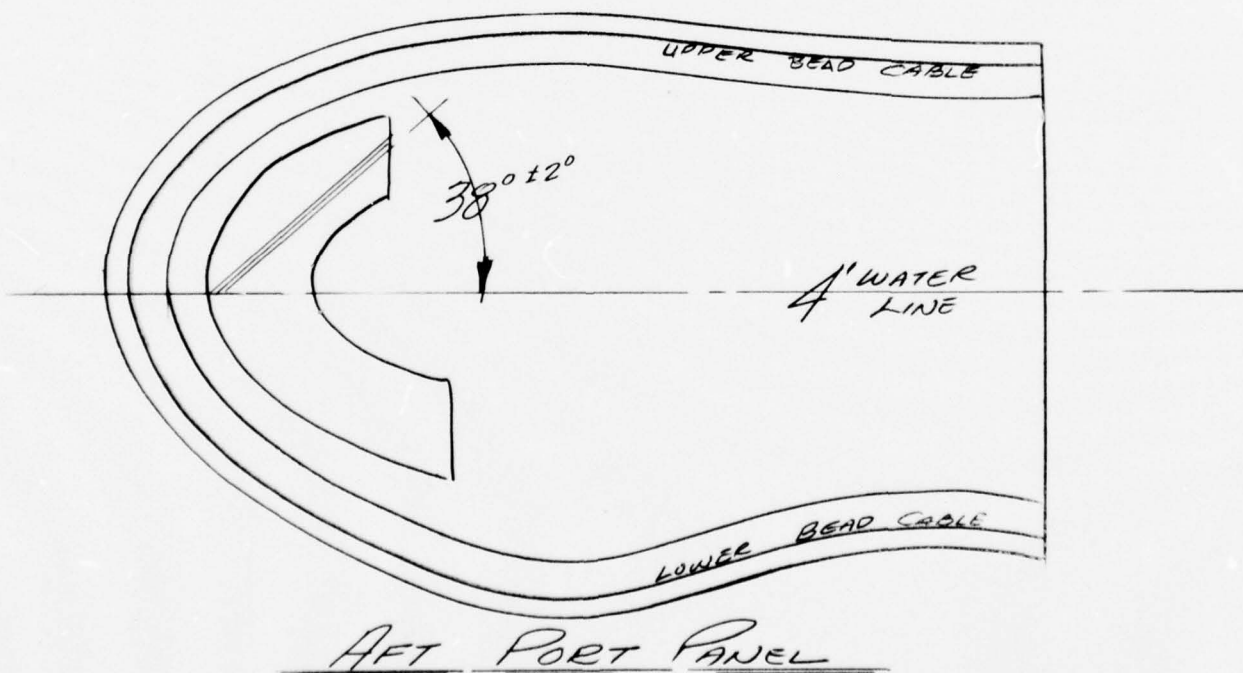
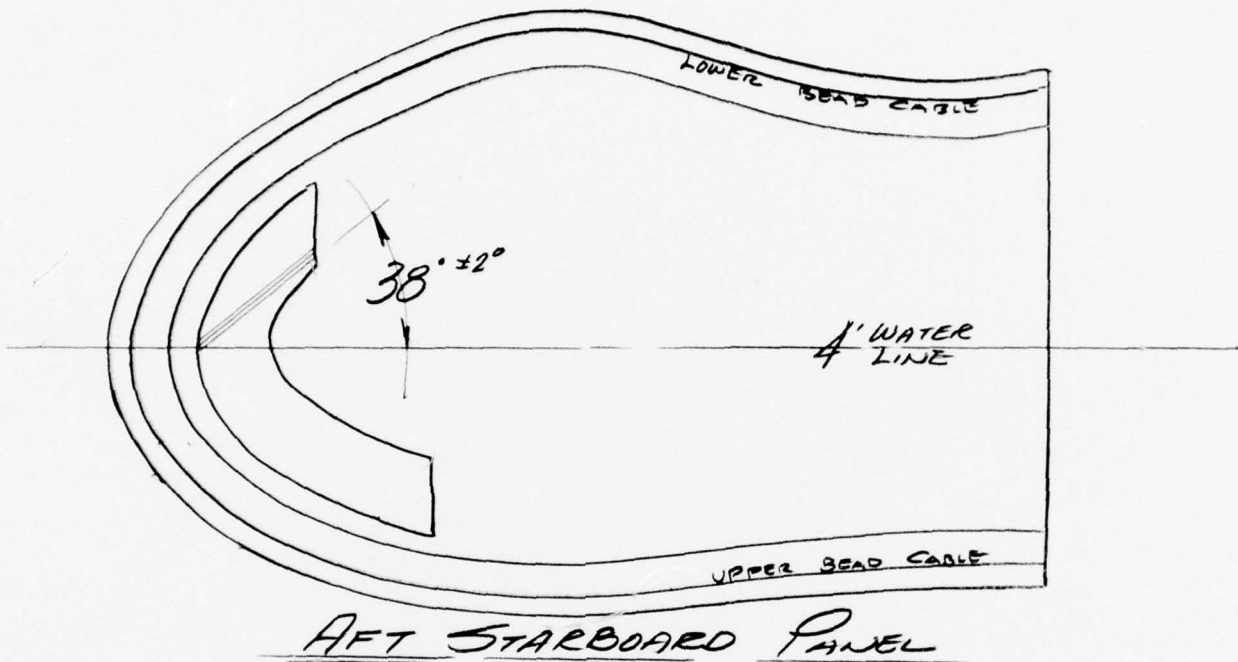


FIGURE 15



- 11.24 Apply vertical ply of .075 ga. No. 04 fabric.
- 11.24.1 Position separator in splice area. (Ref. Dwg. 5S-1234)
- 11.24.2 Draw a line on the part 6-1/2" from the centerline of the clamping area adjacent to the bead.
- 11.24.3 Apply 10-1/2" wide spacer ply of No. 04 fabric over the separator in the splice area. This ply stops at the 6-1/2" line previously marked.
- NOTE:** Wrap a 1" wide x 25" long strip of No. 04 fabric with separator and allow to extend into bead recess.
- 11.24.4 Inspect. Check the location of splice separator, the correctness of the 6-1/2" dimension, the location and width of the spacer ply.
- 11.24.5 Apply No. 04 fabric in strips. Start the strips at the 6-1/2" line previously marked.
- 11.24.5.1 Use No. 05 cement.

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- 11.24.5.2 Apply the strips in the bead recess areas. One and one-quarter inch maximum lap or 5/8" maximum gap is permissible at the 6-1/2" line.
- 11.24.5.3 Apply .090 ga. No. 01 stock to gap areas, and fillet (3S-1147-1) to lap areas.
- 11.24.6 Apply fillet (3S-1147-1) at end of plies along 6-1/2" cut off.
- 11.24.6.1 Use No. 05 cement.
- 11.25 Inspect. Make certain fillets are applied at edge of laps and end of plies along 6-1/2" dimension.
- 11.26 Apply the previously prepared shim stock (See 8.2) to the bead area. (Ref. Dwg. 4S-1183)
- 11.26.1 Roughen both surfaces over the shim stock. Do not remove coating.
- 11.26.2 Clean both surfaces of shims and the building surface with solvent.
- 11.26.3 Use No. 05 cement.
- 11.26.4 Apply shim stock into bead area.
- 11.27 Inspect. Check the shim stock for proper location.
- 11.28 Prepare and install bead cable.
- 11.28.1 Degrease the metal cable one hour in trichloroethylene vapor.
- 11.28.1.1 From this point on, clean white gloves must be worn when handling the cable.
- 11.28.2 Apply Chemlok 220 to the cable.
- 11.28.2.1 Allow to air dry.
- 11.28.2.2 Avoid contamination.
- 11.28.3 Apply No. 05 cement to the cable.
- 11.28.4 Apply fillet 3S-1191-2 between the strands of the cable (Ref. Dwg. 4S-1183).
- 11.28.4.1 Use No. 05 cement.
- 11.28.4.2 Press into the open areas between the wire strands.
- 11.28.5 Position cable in the bead recess. (Ref. Figures 16 and 17).

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FIGURE 16

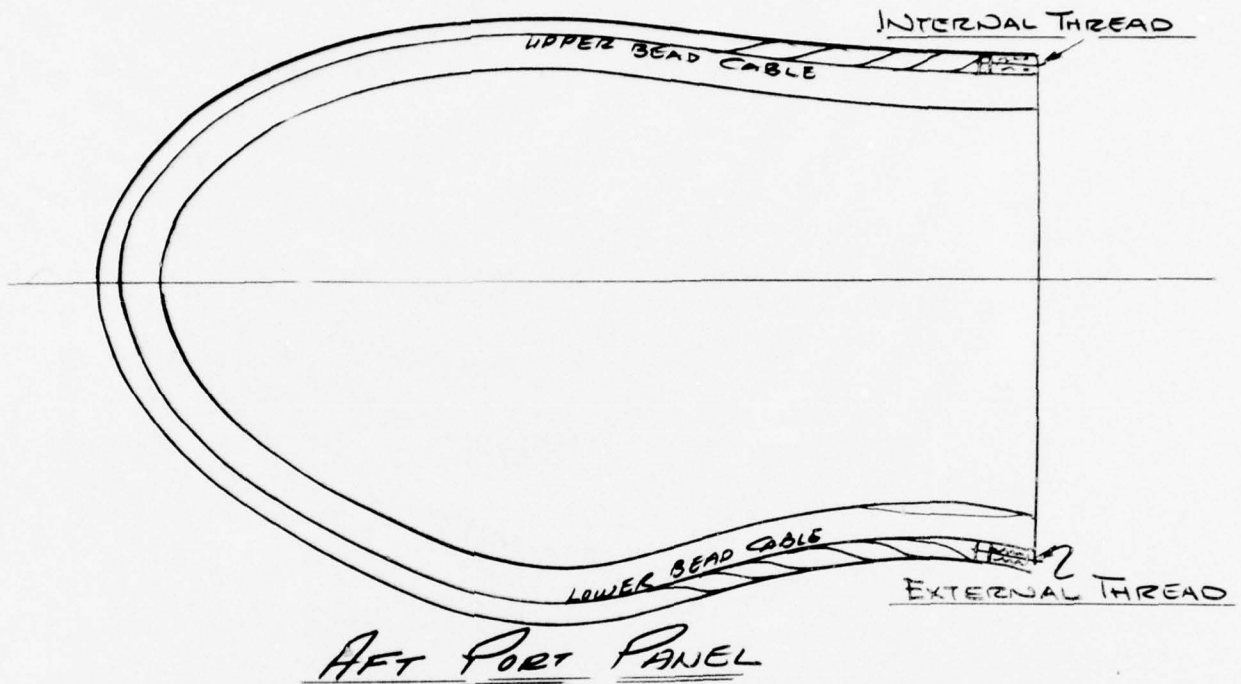
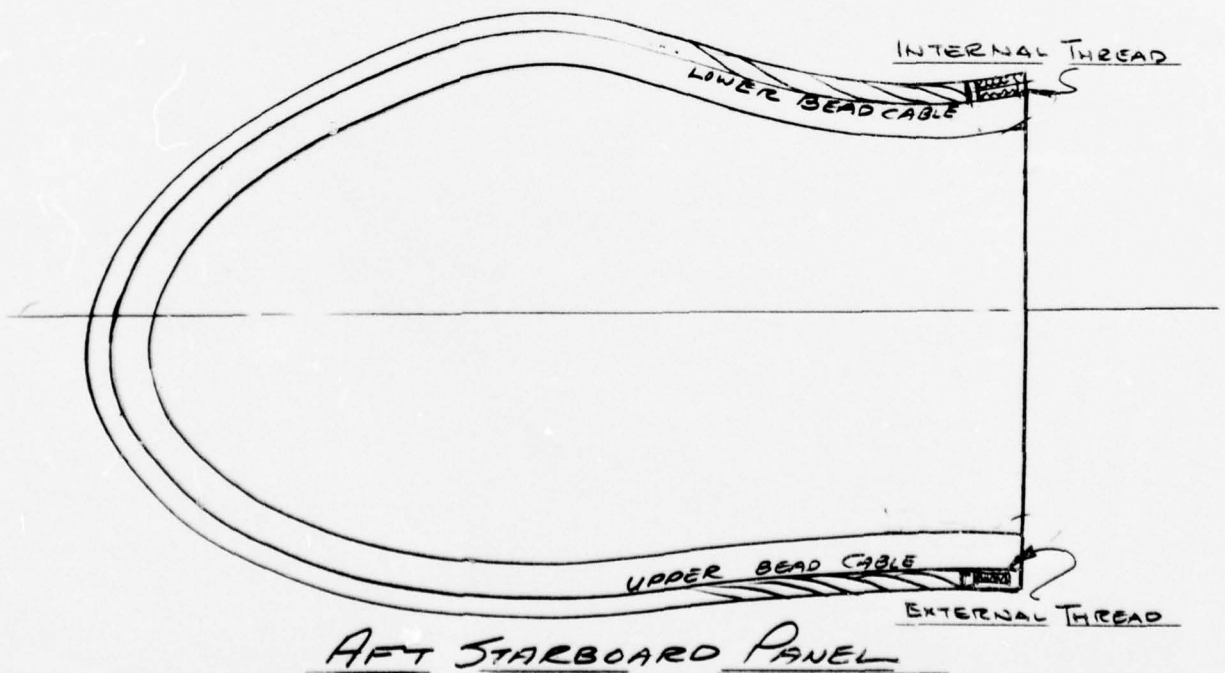


FIGURE 17



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- 11.28.5.1 Clean cable and cable cavity with solvent.
- 11.28.5.2 Use No. 05 cement.
- 11.28.5.3 Clamp bead cable in place.
- 11.28.6 Inspect. Check positioning of cables and the direction of connectors.
- 11.28.7 Place 2-1/2" steel collars over the connectors.
- 11.29 Apply fillet 3S-1147-3 along the inside edge of the bead cable. (Ref. Dwg. 4S-1183).
- 11.29.1 Use No. 05 cement.
- 11.30 Apply the previously prepared shim stock (See 8.2) to the bead area. (Ref. Dwg. 4S-1183)
- 11.30.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 11.30.2 Clean both surfaces of shims and the building surface with solvent.
- 11.30.3 Use No. 05 cement.
- 11.30.4 Press shim stock into bead area.
- 11.31 Inspect. Check the positioning of fillet and shim stock.
- 11.32 Turn down the vertical ply over the bead cable.
- 11.32.1 Mark a line 11-1/2 inches from the center line of the clamping area adjacent to the bead.
- 11.32.1.1 Inspect. Check the 11-1/2" dimension for correctness.
- 11.32.2 Clean the stock and building surface with solvent.
- 11.32.3 Use No. 05 cement.
- 11.32.4 Position 6 inches wide polyethylene film along the 11-1/2 inch line and extend toward the bead cable.
- 11.32.5 Wrap plies over the bead cable to the 11-1/2 inch line. Plies must be butt-spliced where passing over bead cable.
- 11.32.6 Trim stock along the 11-1/2 inch line.
- 11.32.7 Remove polyethylene film from under the ply.
- 11.32.8 Apply fillet 3S-1147-1 at edge of laps.

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- 11.32.9 Apply fillet 3S-1147-1 at end of plies along 11-1/2" cut off.
- 11.32.9.1 Use No. 05 cement.
- 11.32.10 Apply 10-1/2" wide spacer ply of No. 04 fabric .075 ga. over previous ply and separator in splice area. This ply is to start at the 11-1/2 inch line and extend toward the bead cable.
- NOTE: Turn down the 1" strip of spacer ply.
- 11.33 Inspect. Make certain there are no gaps larger than 1/16"; and, that fillets are applied at edge of laps and 11-1/2" cut off.
- 11.34 Apply the previously prepared shim stock (See 8.2) to bead area. (Ref. Dwg. 4S-1183).
- 11.34.1 Roughen both surfaces of shim stock. Do not remove coating.
- 11.34.2 Clean both surfaces of shim stock and building surface with solvent.
- 11.34.3 Use No. 05 cement.
- 11.35 Inspect. Check the shim stock for proper location.
- 11.36 Turn down the second vertical ply over the bead cable.
- 11.36.1 Draw a line 7-1/2 inches from the center line of the clamping area adjacent to the bead.
- 11.36.2 Apply 11 inch wide .090 ga. spacer ply of No. 04 fabric over previously applied stock and separator in the splice area.
- NOTE: Turn down the 1/2" strip of spacer ply.
- 11.36.3 Inspect the 7-1/2 inch dimension and width of the spacer ply in splice area.
- 11.36.4 Place polyethylene film approximately 4 inches wide, along the 7-1/2 inch line.
- 11.36.5 Wrap plies over the bead cable to the 7-1/2 inch line. Plies must be butt spliced where passing over bead cable.
- 11.36.6 Trim ends of ply uniformly along the previously marked 7-1/2 inch line.
- 11.36.7 Remove polyethylene film from the 7-1/2 inch line and press stock down.
- 11.36.7.1 Use No. 05 cement.

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- 11.36.8 Apply fillet 3S-1147-1 at edge of laps and end of plies along 7-1/2" cut off.
- 11.36.8.1 Use No. 05 cement.
- 11.37 Inspect. Make certain there are no gaps larger than 1/16", and that fillets are applied to edge of laps and 7-1/2 inch cut off.
- 11.38 Apply the previously prepared shim stock (See 8.2) to the bead area (Ref. Dwg. 4S-1183).
- 11.38.1 Roughen both surfaces of shim stock. Do not remove coating.
- 11.38.2 Clean both surfaces of shim stock and building surface with solvent.
- 11.38.3 Use No. 05 cement.
- 11.38.4 Press shim stock into bead area.
- 11.39 Inspect. Check the positioning of shim stock.
- 11.40 Apply vertical ply of .090 ga. No. 04 fabric.
- 11.40.1 Draw a line on the part, 1" from the center line of the clamping area adjacent to the bead.
- 11.40.2 Apply 11-1/2" wide spacer ply of No. 04 fabric over previously applied stock and separator in splice area.
- 11.40.3 Inspect. Check the 1" dimension for correctness and check the width of the spacer ply in splice area.
- 11.40.4 Place 6" wide polyethylene film along the 1" line.
- 11.40.5 Apply No. 04 fabric in various widths as required. Follow the contour with minimum distortion.
- 11.40.6 Clean the stock and building surface with solvent.
- 11.40.7 Use No. 05 cement.
- 11.40.8 Butt splice stock.
- NOTE: Apply wire plies in a manner to minimize distortion due to contour.
- 11.40.8.1 Apply fillet 3S-1147-1 at edge of laps.
- 11.40.9 Trim ends of ply uniformly along the previously marked 1" line.

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- 11.40.10 Remove polyethylene film and press stock down.
- 11.40.11 Apply fillet 3S-1147-1 at end of plies along 1" cut off.
- 11.40.11.1 Clean fillet and location with solvent.
- 11.40.11.2 Use No. 05 cement.
- 11.41 Inspect. Make certain there are no gaps larger than 1/16", and that fillets are applied to edge of laps and 1" cut off.
- 11.42 Turn down the first vertical ply over the bead cable.
- 11.42.1 Draw a line on the part 6-1/2 inches from the center line of the clamping area adjacent to the bead.
- 11.42.2 Apply 10-1/2" wide .090 ga. spacer ply of No. 04 fabric over previously applied stock and separator in the splice area.
- NOTE: Turn down the 1 inch strip of spacer ply.
- 11.42.3 Inspect the 6-1/2" dimension and width of the ply in splice area.
- 11.42.4 Place polyethylene film approximately 4 inches wide, along the 6-1/2" line.
- 11.42.5 Wrap plies over the bead cable to the 6-1/2" line. Plies must be butt spliced where passing over bead cable.
- 11.42.6 Trim ends of ply uniformly along the previously marked 6-1/2 inch line.
- 11.42.7 Remove polyethylene film from the 6-1/2 inch line.
- 11.42.7.1 Clean the stock and building surface with solvent.
- 11.42.7.2 Use No. 05 cement.
- 11.42.8 Apply fillet 3S-1171-1 at edge of laps, and end of plies along the 6-1/2" cut off.
- 11.42.8.1 Clean fillet and location with solvent.
- 11.42.8.2 Use No. 05 cement.
- 11.43 Inspect. Make certain there are no gaps larger than 1/16", and that fillets are applied to edge of laps and 6-1/2" cut off.
- 11.44 Apply the previously prepared shim stock (See 8.2) to bead area. (Ref. Dwg. 4S-1183)

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- 11.44.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 11.44.2 Clean both surfaces of shim stock and building surface with solvent.
- 11.44.3 Use No. 05 cement.
- 11.44.4 Press shim stock into bead area.
- 11.45 Inspect. Check the positioning of the shim stock.
- 11.46 Apply No. 07 fabric over bead cable area. (Ref. Dwg. 4S-1183)
- 11.46.1 Remove film backing from fabric.
- 11.46.2 Clean stock in bead cable area with solvent.
- 11.46.3 Use No. 05 cement.
- 11.46.4 Maximum permissible seam lap is 3/8".
- 11.47 Inspect. Check the positioning of No. 07 fabric.
- 11.48 Apply two (2) plies of .135 ga. No. 01 stock vertically over surface of part.
- 11.48.1 Position separator in splice area. (Ref. Dwg. 4S-1183)
- NOTE: Skived lap seams of the two plies must be staggered.
- 11.48.1.1 Use No. 05 cement.
- 11.49 Inspect. Make certain separators are properly located in splice area. Check for trapped air and be sure that seams are well knitted.
- 11.50 Apply No. 08 nylon fabric over the bead cable area.
- 11.50.1 Clean building surface with solvent.
- 11.50.2 Apply No. 06 cement to the contact area of part.
- 11.50.3 Maximum permissible seam lap is 1-1/2 inch.
- 11.50.4 Apply No. 06 cement over the nylon fabric.
- 11.51 Install bead clamps to bead cable area.
- 11.51.1 Tighten cap screws evenly.
- CAUTION: Avoid stripping threads and loosening inserts.
- 11.52 Inspect. Make sure bead clamps are properly seated. Check for stripped bolts or loose inserts.
- 11.53 Prepare for vulcanization per 12.0.

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- 12.0 PREPARATION FOR VULCANIZATION
- 12.1 Position metal cover inserts over the bead clamp cap screws.
- 12.2 Apply No. 06 cement to the surface of the part and bead clamps.
- 12.3 Position No. 08 nylon fabric over the surface of the part, including the bead clamps.
- 12.3.1 Secure nylon in place.
- 12.4 Apply bag stock over the fabric along the inside edge of the bead clamps.
- 12.4.1 Apply No. 06 cement.
- 12.5 Position one layer of fiberglass cloth over the surface covered with the nylon fabric.
- 12.6 Position one layer of felt-back sizing over the fiberglass cloth.
- 12.7 Position second layer of fiberglass cloth over the felt back sizing.
- 12.8 Position pads for vacuum valve locations. (Ref. Figures 18 and 19)
- 12.9 Apply one ply of .100 ga. bag stock over the entire surface.
- 12.9.1 Lap seams a minimum of 2".
- 12.9.2 Use No. 09 cement.
- 12.10 Install vacuum line valves over pad locations. (Ref. Figures 18 and 19)
- 12.11 Test and record vacuum systems. Maintain vacuum at 10" Hg. or better in each of the following areas:
 - 12.11.1 Surface of the part;
 - 12.11.2 Internal system of building form.
- 12.12 Apply second ply of .100 ga. bag stock.
 - 12.12.1 Use No. 09 cement.
- 12.13 Inspect and record vacuum (10" Hg. minimum)

FIGURE 18

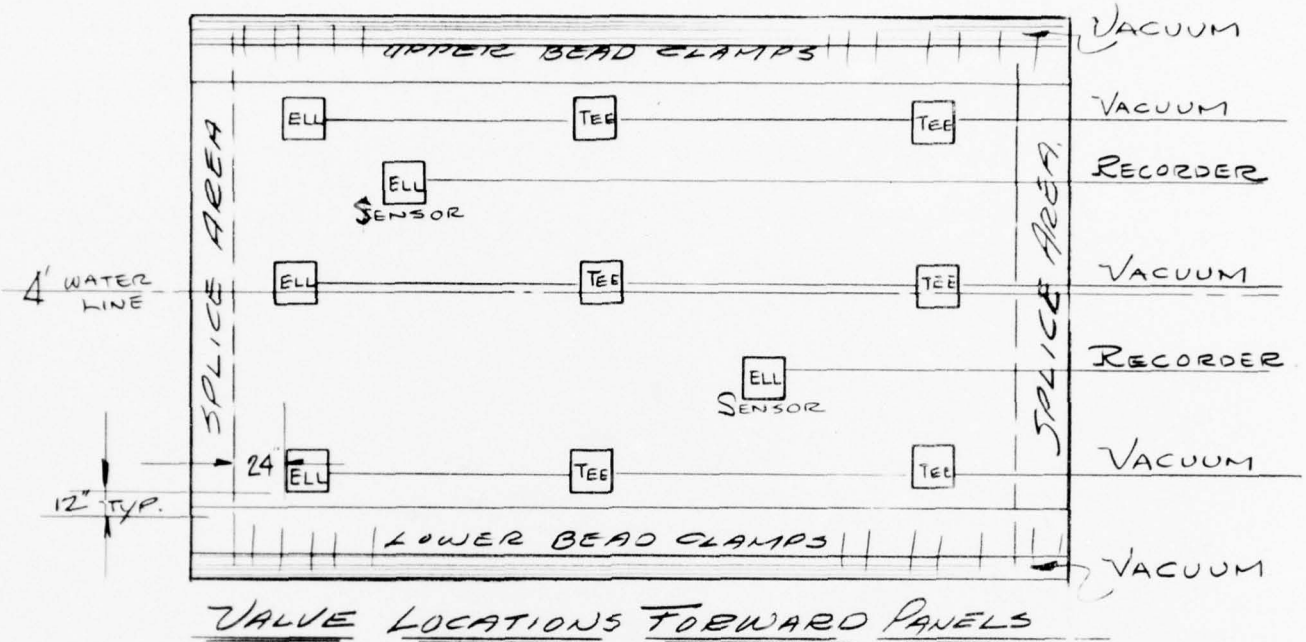
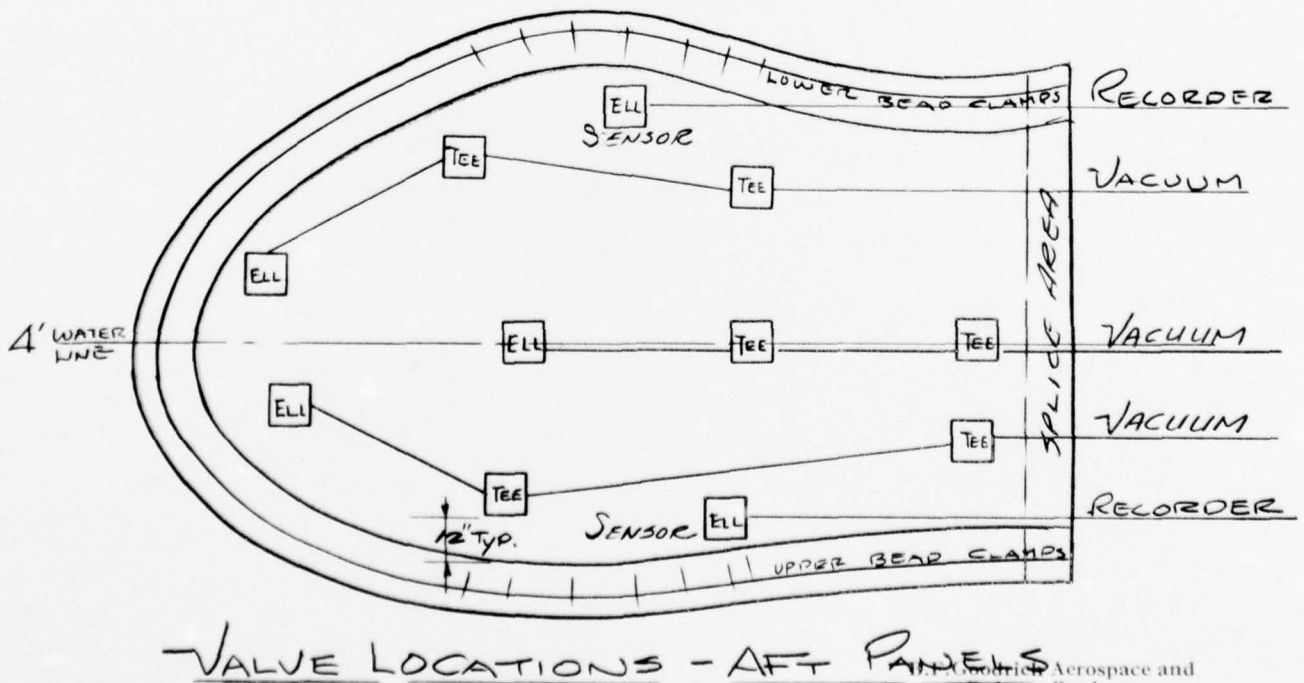


FIGURE 19



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12.14 Install thermocouple wires.

12.14.1 Thermocouple locations - forward sections (Ref. Figure 20, Table II).

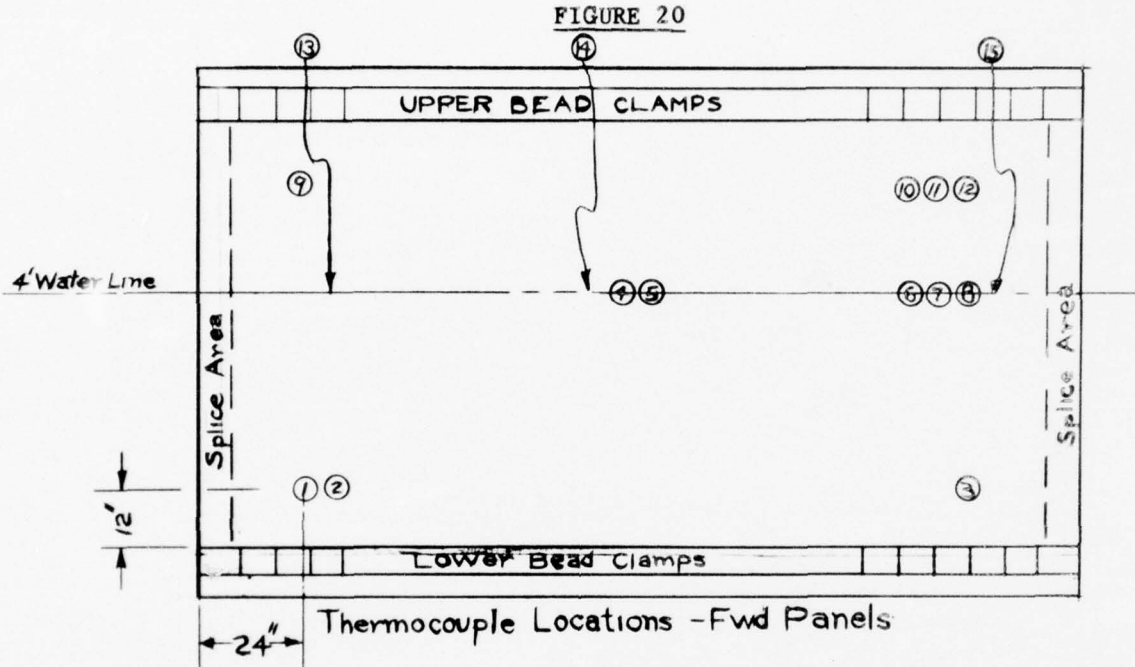


TABLE II

Thermocouple Depths

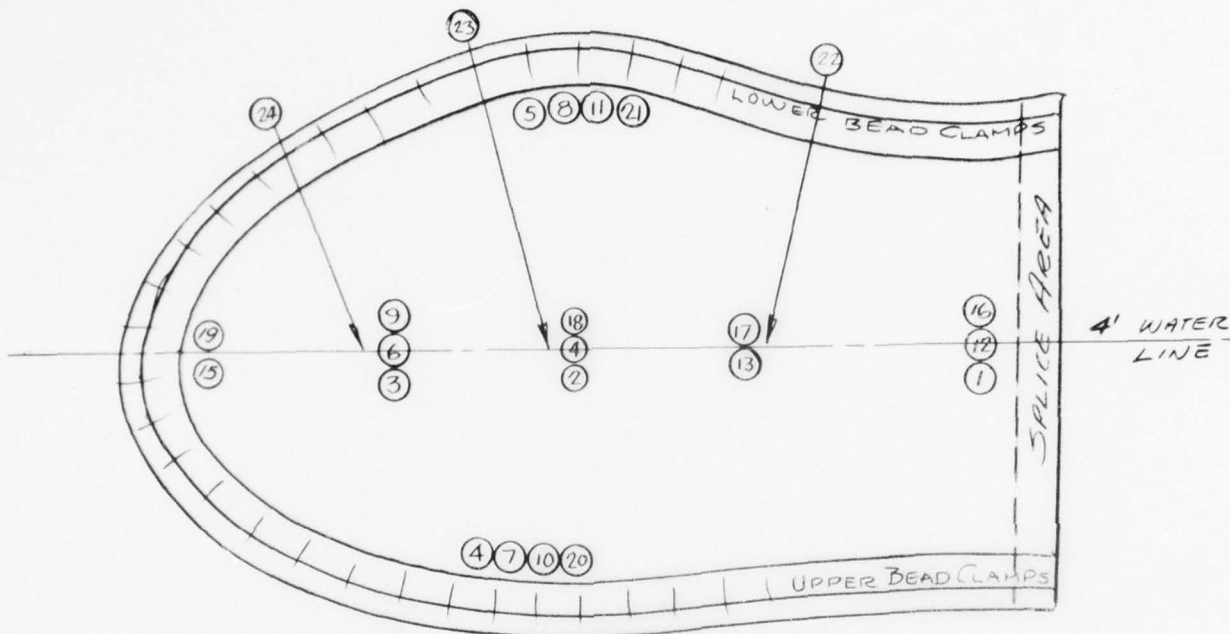
Thermocouple No.	Depth
1-3-11	Center of rubber fill
2-4-6-9-10	1/2" below surface of part
5-7-12	Surface of part
8	Surface of bag
13-14-15	Outside surface of form

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12.14 2 Thermocouple locations - aft sections (Ref. Figure 21 - Table III).

FIGURE 21



THERMOCOUPLE LOCATION - AFT PANELS

TABLE III

Thermocouple Depths

Thermocouple No.	Depth
1-2	1/2" below surface of part
3-4-5	3/4" below surface of part
6-7-8	Center of gum fill
9-10-11-12-13-14-15	Surface of part
16-17-18-19-20-21	Surface of bag
22-23-24	Outside surface of form

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- 12.14.3 Seal the vacuum bag around the thermocouple wires.
- 12.15 Inspect and record vacuum. (10" Hg. minimum)
- 13.0 VULCANIZATION PROCEDURE
- 13.1 Transport the prepared unit to the vulcanizer.
- 13.2 Secure the vacuum lines to the vacuum pump system.
- 13.3 Attach all thermocouple wires to the recorder.
- 13.4 Raise vulcanizer pressure to minimum of 85 psig maintaining vacuum (10" Hg. minimum) on the part.
- 13.5 Raise the temperature in the vulcanizer to $300^{\circ}\text{F} \pm 10^{\circ}$.
- 13.6 Maintain vulcanizer temperature at $300^{\circ}\text{F} \pm 10^{\circ}$ until the thermocouple in the center of the construction reach 275°F .
- 13.7 Reduce the vulcanizer temperature to $275^{\circ} \pm 10^{\circ}$ and hold for two hours.
- 13.7.1 Maintain vacuum (10" Hg. minimum) and pressure (85 psig minimum).
- 13.8 Cool part to 200°F maintaining vacuum and pressure.
- 13.9 Maintain vacuum and pressure until part has cooled to 150°F . Remove from vulcanizer.
- 14.0 REMOVAL OF SECTIONS FROM FORMS
- 14.1 Remove vacuum bag.
- 14.2 Remove bead clamps.
- 14.3 Loosen the bead cable from the building form.
- CAUTION: Use extreme care to prevent damage to the part or the mold.
- 14.4 Install internal lifting fixture. (Reference Figure 22)
Refer to 14.4.1 - 14.4.3 below
- 14.4.1 Clamp Dwg. 4S-1150.
- 14.4.2 Radial Frame Dwg. 4S-1154.
- 14.4.2.1 On forward parts use frame numbers 3, 6, 10, 14 and 17.
- 14.4.2.2 On aft parts use frame numbers 20, 24, 28, 32, 36 and 40.
- 14.4.3 Spreaders (Ref. Dwg. 4S-1155).

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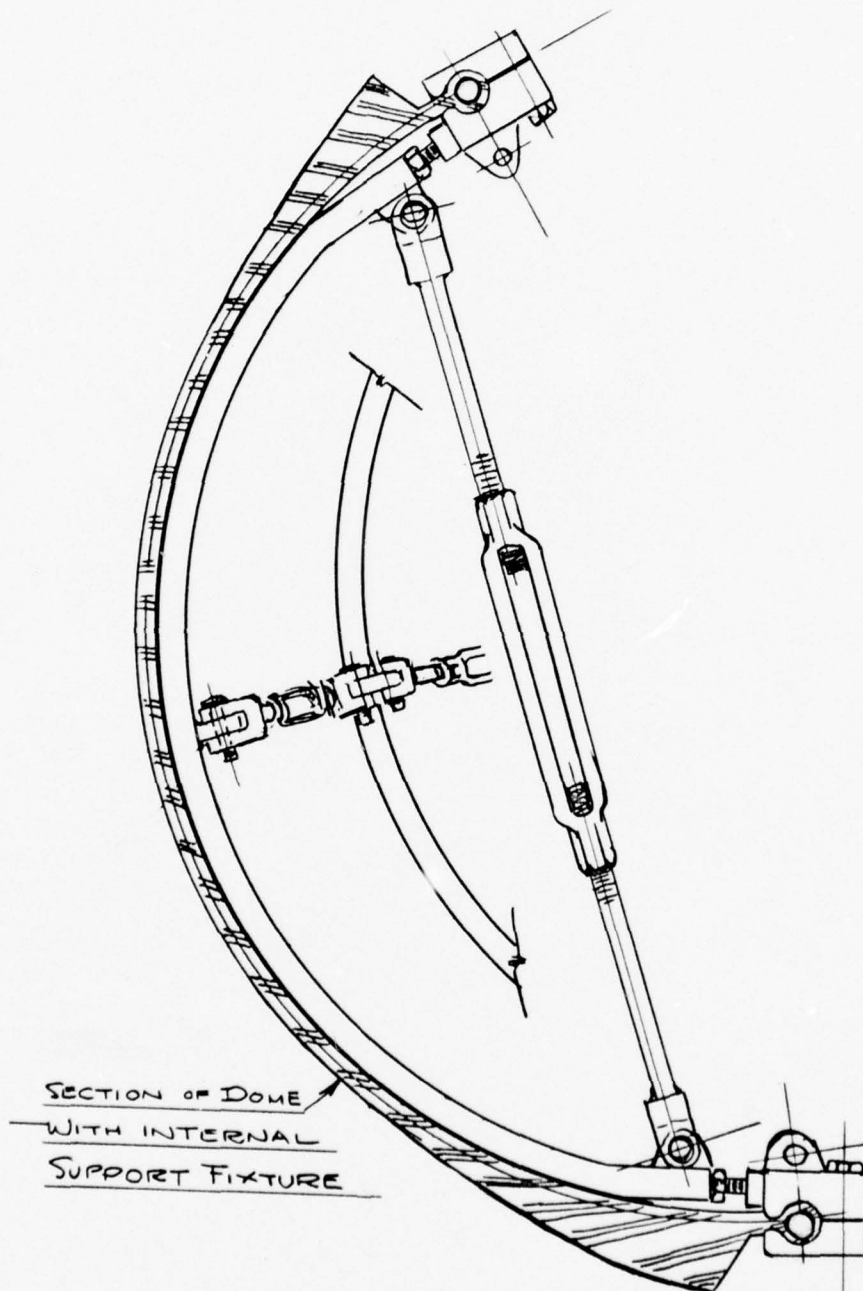


FIGURE 22

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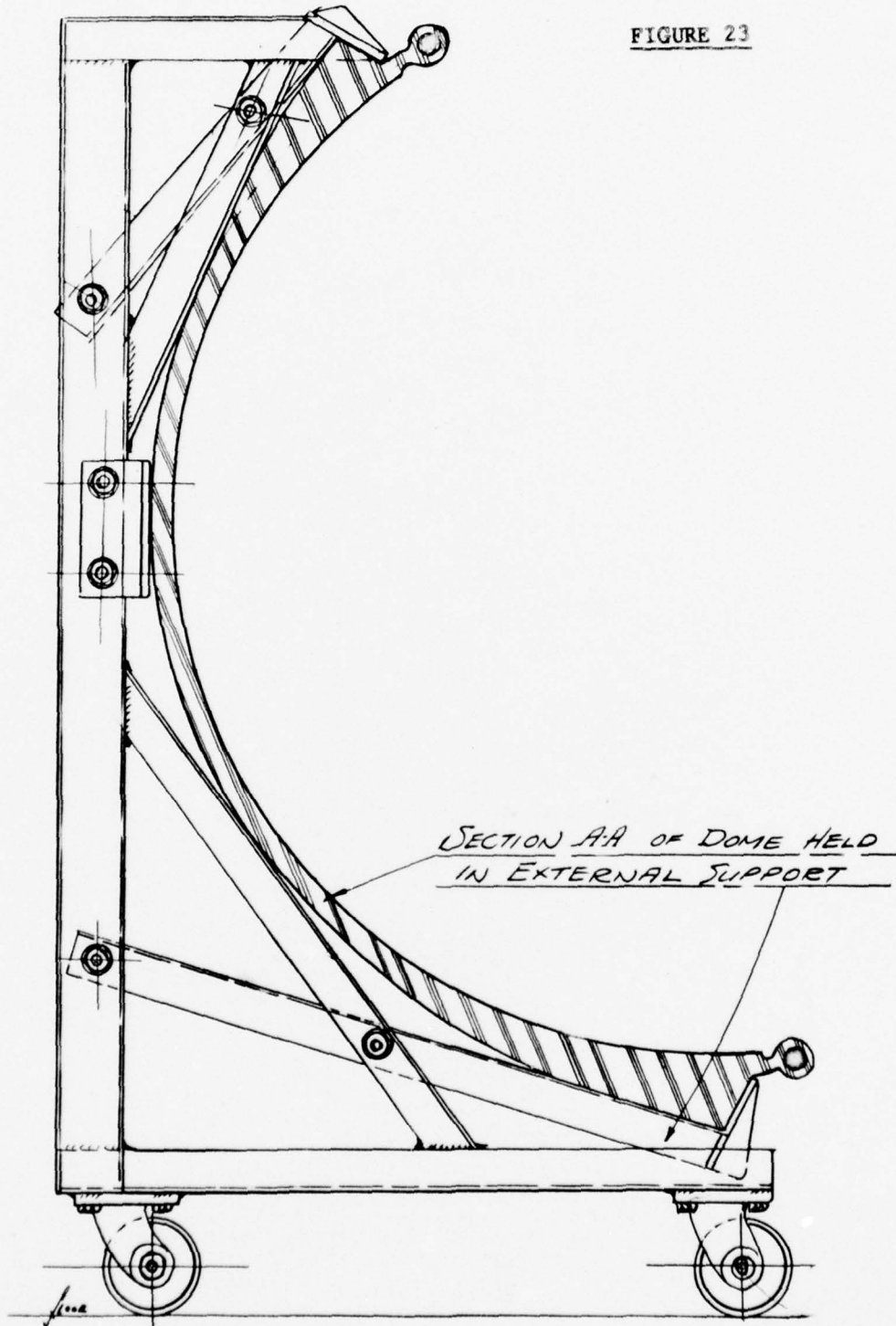
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- 14.4.4 Inspect. Check to be sure the correct internal fixture components are used and properly positioned.
- 14.5 Lift part from the building form.
- 14.5.1 Remove No. 08 nylon fabric from the part.
- 14.5.2 Remove all spacer plies from the splice areas.
- 14.6 Place the part in the external support fixture. (Reference Figure 23).
Refer to 14.6.1 - 14.6.2 below.
- 14.6.1 Forward sections Dwg. 6S-1050.
- 14.6.2 Aft sections Dwg. 6S-1051.
- NOTE: Make certain wheels on fixture are located on the upper bead cable side.
- 15.0 INSPECTION
- 15.1 Inspect. Check for surface imperfections such as cuts, gouges, loose seams and roughness.
- 15.1.1 Record all imperfections for engineering disposition.
- 15.2 Transport each section to the X-ray unit.
- NOTE: The sections are to be supported by both internal and external support fixtures.
- 15.3 Each section shall be 100% X-rayed prior to installation on the hydrostatic test fixture. Splice areas will be X-rayed again on the test fixture after completion of the joining operation.
- 15.3.1 Check X-ray negatives for broken wire cords, distortion in wire cord pattern and internal separations or voids.
- 15.3.2 Detailed charts of the X-ray results are to be kept for engineering evaluation of each section.

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FIGURE 23



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16.0 REPAIR PROCEDURES

16.1 Repairs to panel area imperfections are to be made using the procedure:

16.1.1 Buff the imperfection.

NOTE: Thermocouple wires may be cut off at the base of the rubber without removing the remainder of the wire.

16.1.2 Clean area with solvent.

16.1.3 Apply Chemlok 220 to any exposed wire cords.

16.1.3.1 Allow to air dry.

16.1.4 Apply .090 ga. No. 01 stock to the repair area.

16.1.4.1 Use No. 05 cement.

16.1.5 Position heating unit over the repair area.

16.1.6 Vulcanize as follows:

16.1.6.1 Pressure -- 85 to 90 psi.

16.1.6.2 Temperature -- $300^{\circ}\text{F} \pm 10^{\circ}\text{F}$.

16.1.6.3 Time -- Depends upon depth of repair. Minimum elapsed time for repairs up to 1/4" in depth is 45 minutes. For each additional 1/4" in depth, add 10 minutes.

16.1.6.4 Cool to 150°F while under pressure.

16.1.7 Buff surface to contour, extending area 2-1/2" beyond the periphery of the repair.

16.1.8 Inspect. Check for loose edges and porosity.

16.1.9 Apply cover of vulcanized .030 ga. No. 01 stock over repaired thermocouple locations on inside surface.

16.1.9.1 Patch to extend 2" beyond periphery of the repair.

16.1.9.2 Apply air vulcanizing cement to each contact surface. The recipe for this cement is as follows:

Bostik 1036-A -- 16 fluid ounces
Accelerator 1036B -- 2 fluid ounces

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- 16.1.9.3 Press cover into position over the repaired areas.
- 16.1.9.4 Feather the edge of cover by buffing.
- 16.1.9.5 Inspect for loose edges.
- 16.2 Prepare the bead clamping area for cover ply.
- 16.2.1 Buff bead area imperfections.
- 16.2.2 Roughen the entire surface of the bead cable area.
- 16.2.3 Wash the area with solvent.
- 16.2.4 Apply Chemlok 220 to any exposed wire cords.
- 16.2.5 Apply vulcanized .030 ga. No. 01 stock over the bead cable areas.
- 16.2.5.1 Use air vulcanizing cement (Ref. 16.1.9.2)
- 16.2.6 Maximum permissible seam lap is 1-1/4".
- 16.2.7 Allow the repaired area to air vulcanize for 3 days at room temperature.
- 16.2.8 Inspect. Check for loose edges.
- 17.0 INSTALLATION OF WINDOW SECTIONS ON HYDROSTATIC TEST FIXTURE
- 17.1 Remove the internal support fixture from the window section.
- 17.2 Apply nylon web straps on inside surface of section.
NOTE: Locate straps every two feet along lower bead cable surface and every five feet along upper bead cable area of aft sections. Position eight straps uniformly on each forward section.
- 17.2.1 Buff contact area on inside surface of part.
- 17.2.2 Clean surface with solvent.
- 17.2.3 Apply air vulcanizing cement to contact surface of part and nylon fabric strap (See 16.1.9.2).
- 17.2.4 Press strap into position.
- 17.3 Inspect. Check the straps for proper location.
- 17.4 Secure nylon straps to buckles on the external handling fixture.
- 17.5 Rotate the window section and support fixture assembly to an upright position, with the wheels resting on the floor. (Ref. Dwg. No's. 6S-1050, 6S-1051).

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- 17.6 Move section into position on the hydrostatic test fixture.
- 17.6.1 Install aft sections first on hydrostatic test fixture.
- 17.6.2 Secure bead cable by clamping every five feet.
- 17.6.3 Remove nylon straps from external support fixture.
- 17.6.4 Loosen lower clamping device of external holding fixture and rotate out of the way.
- 17.6.5 Raise section until aft end of bead cable can be lowered into bead recess of hydrostatic test fixture.
- 17.6.6 Align the 4-foot water line mark of the panel with mark on hydrostatic test fixture.
- 17.6.7 Secure bead with clamps at the 4-foot water marks.
- 17.6.8 Lower the section and brace with adjustable length tubular support.
- 17.6.9 Position lower bead cable into bead recess of hydrostatic test fixture by extending the tubular support.
- 17.6.10 Secure lower bead cable by clamping every five feet.
- 17.6.11 Remove and set aside external handling fixture.
- 17.7 Install forward sections in same manner as the aft sections.
- EXCEPT: Cable connectors must be connected simultaneously during installation of the sections.
- 17.8 Adjust and align sections by clamping to move the section in desired direction.
- NOTE: The window is in correct alignment when the marks on the hydrostatic test fixture are directly opposite of the 4-foot water line mark on the aft sections. The centers of the splice areas must be aligned with the centerline marks on the hydrostatic test fixture.
- 17.9 Inspect. Check location of sections on hydrostatic test fixture with alignment marks at the 4-foot water line and center of splice areas.
- 17.10 Secure sections to the hydrostatic test fixture with remainder of clamps.
- 17.10.1 Install seal washers on all external cap screws.

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- 17.10.2 Tighten cap screws uniformly (200 to 250 foot lbs. torque).
- CAUTION: Avoid stripping threads of bolts, clamps, and hydrostatic test fixture.
- 17.10.3 Maintain correct alignment. (See 17.8).
- 17.11 Install one internal radial frame support on each side of the splice areas.
- Reference:
- Radial frames Dwg. 4S-1154
- Spreaders Dwg. 4S-1155
- Clamps Dwg. 5S-1216
- 18.0 SPLICING OF FORWARD WINDOW SECTIONS
- 18.1 Remove bead clamps adjacent to splice area for approximately three feet on each side of splice.
- 18.2 Pull bead cable away from bead seat and secure.
- 18.3 Clean the bead cable.
- 18.4 Expose the surface of the splice area by turning back the horizontal plies.
- 18.5 Prepare splice area of window sections.
- 18.5.1 Buff rubber fill areas to form a V-groove (Ref. Dwg. 4S-1178).
- 18.5.2 Buff all mating surfaces of splice joint including two-inch area on external and internal surfaces of each section adjacent to splice opening.
- 18.5.3 Clean area with solvent.
- 18.5.4 Inspect. Check the splice area to be sure that all surfaces are buffed, that there is no foreign material present and that the bead cable is clean.
- 18.6 Position the strongback unit on the hydrostatic test fixture.
- 18.7 Apply No. 08 nylon fabric to the contact surface of the strongback.
- 18.7.1 Use No. 06 cement.

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- 18.8 Apply .265 ga. No. 01 stock to V-grooved area of external rubber fill.
- 18.8.1 Use No. 05 cement.
- 18.9 Inspect. Check for trapped air and make certain sufficient fill rubber has been applied to V-groove.
- 18.10 Prepare the bead cable and install coupling spacers.
- 18.10.1 Clean cable and spacers with solvent.
- 18.10.2 Apply Chemlok 220 to cable and spacers.
- 18.10.2.1 Allow to air dry.
- 18.10.3 Apply No. 05 cement over the Chemlok 220.
- 18.10.4 Apply .030 ga. No. 01 stock around bead cable.
- 18.10.4.1 Use No. 05 cement.
- 18.10.5 Position one (1) layer teflon fabric around bead cable.
- 18.11 Prepare work area.
- 18.11.1 Clean surfaces of hydrostatic test fixture at top and bottom of splice area with solvent.
- 18.11.2 Position polyethylene film over previously cleaned bead seat areas and secure.
- 18.12 Apply No. 08 nylon fabric in bead recess areas.
- 18.12.1 Clean bead recess areas with solvent.
- 18.12.2 Apply No. 06 cement to bead recess areas and over nylon.
- 18.13 Apply fillet 3S-1147-2 in bead recess areas (Ref. Dwg. 4S-1178).
- 18.13.1 Use No. 05 cement.
- 18.14 Apply No. 07 fabric in bead recess areas (Ref. Dwg. 4S-1178).
- 18.14.1 Remove polyethylene film backing from fabric.
- 18.14.2 Use No. 05 cement.
- 18.15 Apply the previously prepared shim stock (See 8.2) to bead area. (Ref. Dwg. 4S-1178).

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- 18.15.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 18.15.2 Clean both surfaces of shim stock and building surface with solvent.
- 18.15.3 Use No. 05 cement.
- 18.16 Inspect. Check the fillet and the shim stock for proper location.
- 18.17 Apply first vertical ply of .090 ga. No. 04 fabric 9" wide section and allow to extend 15" beyond the outside edge of the bead cable.
- 18.17.1 Use No. 05 cement.
- 18.18 Apply the previously prepared shim stock (See 8.2) to bead area. (Ref. Dwg. 4S-1178).
- 18.18.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 18.18.2 Clean cloth surfaces of shim stock and building surface with solvent.
- 18.18.3 Use No. 05 cement.
- 18.18.4 Apply shim stock into bead areas.
- 18.19 Inspect shim stock for proper location.
- 18.20 Turn back the first horizontal plies of each joining section.
- 18.20.1 Use No. 05 cement.
- 18.21 Apply fillet 3S-1147-1 at edge of horizontal plies.
- 18.21.1 Use No. 05 cement.
- 18.22 Inspect. Check the fillet for proper location.
- 18.23 Apply second vertical ply of .090 ga. No. 04 fabric, 10" wide section and allow to extend 15" beyond the outside edge of the bead cable.
- 18.23.1 Use No. 05 cement.
- 18.24 Apply the previously prepared shim stock (See 8.2) to bead areas. (Ref. Dwg. 4S-1178).
- 18.24.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 18.24.2 Clean both surfaces of shim stock and building surface with solvent.
- 18.24.3 Use No. 05 cement.

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- 18.24.4 Apply shim stock into bead areas.
- 18.25 Inspect the shim stock for proper location.
- 18.26 Turn back the second horizontal plies of each joining section.
- 18.26.1 Use No. 05 cement.
- 18.27 Apply fillet 3S-1147-1 at edge of horizontal plies.
- 18.27.1 Use No. 05 cement.
- 18.28 Inspect. Check the fillet for proper location.
- 18.29 Mark a line 6-1/2" from the center line of the clamping area adjacent to the bead.
- 18.30 Apply bead wrap around ply of .075 ga. No. 04 fabric, 11" wide section, starting at the 6-1/2" mark and allow to extend 18" beyond the outside edge of the bead cable.
- 18.30.1 Apply No. 05 cement to both contact surfaces.
- 18.31 Apply fillet 3S-1147-1 at ends of bead wrap around ply.
- 18.31.1 Use No. 05 cement.
- 18.32 Inspect. Check the 6-1/2" dimension for correctness and the fillet for proper location.
- 18.33 Re-seat bead cable in recess of hydrostatic test fixture.
- 18.33.1 Remove teflon fabric from around bead cable.
- 18.33.2 Re-install bead clamps adjacent to splice area.
- 18.34 Apply fillet 3S-1147-3 along inside edge of bead cables (Ref. Dwg. 4S-1178).
- 18.34.1 Use No. 05 cement.
- 18.35 Turn down the wrap around ply of No. 04 fabric around the bead cable. Trim 11-1/2" from the center line of the clamping area adjacent to the bead.
- 18.35.1 Use No. 05 cement.
- 18.36 Apply fillet 3S-1147-1 at ends of bead wrap around ply.
- 18.36.1 Use No. 05 cement.

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- 18.37 Apply the previously prepared shim stock (See 8.2) to bead area.
(Ref. Dwg. 4S-1178).
- 18.37.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 18.37.2 Clean both surfaces of shim stock and building surface with solvent.
- 18.37.3 Use No. 05 cement.
- 18.37.4 Apply shim stock into bead areas.
- 18.38 Inspect the 11-1/2" dimension, also check location of the fillet and shim stock.
- 18.39 Apply third vertical ply of .090 ga. No. 04 fabric, 11" wide section. Trim 1-1/2" from the center line of the clamping area adjacent to the bead.
- 18.39.1 Use No. 05 cement.
- 18.40 Apply fillet 3S-1147-1 at ends of third vertical ply. (Ref. Dwg. 4S-1178)
- 18.40.1 Use No. 05 cement.
- 18.41 Inspect the 1-1/2" dimension and location of the fillet.
- 18.42 Turn down the second vertical ply of No. 04 fabric, along with the 1/2" wide strip of cured section from each section construction, around the bead cable. Trim 7-1/2" from the center line of the clamping area adjacent to the bead.
- 18.42.1 Use No. 05 cement.
- 18.43 Apply fillet 3S-1147-1 at ends of second vertical wrap around ply.
- 18.43.1 Use No. 05 cement.
- 18.44 Apply the previously prepared shim stock (See 8.2) to bead areas.
(Ref. Dwg. 4S-1178).
- 18.44.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 18.44.2 Clean both surfaces of shim stock and building surface with solvent.
- 18.44.3 Use No. 05 cement.
- 18.44.4 Press shim stock into bead areas.

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- 18.45 Inspect. Check the 7-1/2" dimension for correctness, also check the fillet and shim stock for proper location.
- 18.46 Apply fourth vertical ply of .090 ga. No. 04 fabric, 11" wide section. Trim 1" from the center line of the clamping area adjacent to the bead.
- 18.46.1 Use No. 05 cement.
- 18.47 Apply fillet 3S-1147-1 at ends of fourth vertical ply.
- 18.47.1 Use No. 05 cement.
- 18.48 Inspect. Check the 1" dimension for correctness, also check the fillet for proper location.
- 18.49 Turn down the first vertical ply of No. 04 fabric, along with the 1" wide strip of cured section from each section construction, around the bead cable. Trim 6-1/2" from the center line of the clamping area adjacent to the bead.
- 18.49.1 Use No. 05 cement.
- 18.50 Apply fillet 3S-1147-1 at ends of first vertical wrap around ply.
- 18.50.1 Use No. 05 cement.
- 18.51 Apply the previously prepared shim stock (See 8.2) to bead areas. (Ref. Dwg. 4S-1178).
- 18.51.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 18.51.2 Clean both surfaces of shim stock and building surface with solvent.
- 18.51.3 Use No. 05 cement.
- 18.51.4 Apply shim stock into bead areas.
- 18.52 Apply No. 07 fabric in bead cable areas (Ref. Dwg. 4S-1178).
- 18.52.1 Remove polyethylene film backing from the fabric.
- 18.52.2 Use No. 05 cement.
- 18.53 Inspect the 6-1/2 dimension for correctness, also check the fillet, shim stock and fabric for proper location.
- 18.54 Turn back the vulcanized top layer.
- 18.54.1 Use No. 05 cement.

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- 18.55 Apply two (2) plies .135 ga. No. 01 stock to V-grooved area of the top layer. (Ref. Dwg. 4S-1178)
- 18.55.1 Use No. 05 cement.
- 18.56 Inspect. Check for trapped air and make certain V-groove is adequately filled with rubber.
- 18.57 Apply No. 08 nylon fabric 16" \pm 1" wide, centered over entire splice area.
- 18.57.1 Apply No. 06 cement to splice area and over nylon.
- 18.58 Install bead clamps over splice area.
- 18.59 Remove anchor pin at top, and lower outside strongback.
- 18.60 Apply 3" wide cover strip of .135 ga. No. 01 stock centered over splice joint.
- 18.60.1 Use No. 05 cement.
- 18.61 Inspect. Check for trapped air and check to be sure that the cover strip is properly located.
- 18.62 Apply No. 06 cement over entire splice area.
- 18.63 Vulcanize splice per 20.0.
- 19.0 SPLICING OF FORWARD TO AFT WINDOW SECTIONS
- 19.1 Remove bead clamps adjacent to splice area for approximately three feet on each side of splice.
- 19.2 Pull bead cable away from bead seat and secure.
- 19.3 Clean the bead cable.
- 19.4 Expose the surface of the splice area by turning back the horizontal plies.
- 19.5 Prepare splice area of window sections.
- 19.5.1 Buff fill areas to form a V-groove. (Ref. Dwg. 5S-1241)
- 19.5.2 Buff all mating surfaces of splice joint, including two inch area on external and internal surfaces of each section adjacent to splice opening.
- 19.5.3 Clean area with solvent.

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- 19.5.4 Inspect the splice area to assure all surfaces are buffed, that no foreign material is present, and that the bead cable is clean.
- 19.6 Position the strongback unit on the hydrostatic test fixture.
- 19.7 Apply No. 8 nylon fabric to the contact surface of the strongback.
- 19.7.1 Use No. 06 cement.
- 19.8 Apply .265 ga. No. 01 stock to V-grooved area of external fill.
- 19.8.1 Use No. 05 cement.
- 19.9 Inspect. Check for adequate rubber fill and be sure there is no trapped air.
- 19.10 Prepare the bead cables and install coupling spacers.
- 19.10.1 Clean cable and spacers using clean cloth and methyl ethyl ketone solvent.
- 19.10.2 Apply Chemlok 220 to cable and spacers.
- 19.10.2.1 Allow to air dry.
- 19.10.3 Apply No. 05 cement over the Chemlok 220.
- 19.10.4 Apply .030 ga. No. 01 stock around bead cable.
- 19.10.4.1 Use No. 05 cement.
- 19.10.5 Position one (1) layer teflon fabric around bead cable.
- 19.11 Prepare work area.
- 19.11.1 Clean surfaces of hydrostatic test fixture with solvent at top and bottom of splice area.
- 19.11.2 Position polyethylene film over areas and secure.
- 19.12 Apply No. 08 nylon fabric in bead recess areas.
- 19.12.1 Clean bead recess areas with solvent.
- 19.12.2 Apply No. 06 cement to bead recess areas and over nylon.
- 19.13 Apply fillet 3S-1147-2 in bead recess areas (Ref. Dwg. 5S-1241).
- 19.13.1 Use No. 05 cement.

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- 19.14 Apply No. 07 fabric in bead recess areas (Ref. Dwg. 5S-1241).
- 19.14.1 Remove polyethylene film backing from fabric.
- 19.14.2 Use No. 05 cement.
- 19.15 Apply the previously prepared shim stock (See 8.2) to bond area.
(Ref. Dwg. 5S-1241).
- 19.15.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 19.15.2 Clean both surfaces of shim stock and building surface with solvent.
- 19.15.3 Use No. 05 cement.
- 19.15.4 Position shim stock into bead areas.
- 19.16 Inspect. Check the fillet and the shim stock for proper location.
- 19.17 Apply first vertical ply of .090 ga. No. 04 fabric, 9" wide section
and allow to extend 15" beyond the outside edge of the bead cable.
- 19.17.1 Use No. 05 cement.
- 19.18 Apply the previously prepared shim stock (See 8.2) to bead area.
(Ref. Dwg. 5S-1241).
- 19.18.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 19.18.2 Clean both surfaces of shim stock and building surface with solvent.
- 19.18.3 Use No. 05 cement.
- 19.18.4 Apply shim stock into bead areas.
- 19.19 Inspect. Check the shim stock for proper location.
- 19.20 Turn back the first horizontal plies of each joining sections.
- 19.20.1 Use No. 05 cement.
- 19.21 Apply fillet 3S-1147-1 at edge of horizontal plies.
- 19.21.1 Use No. 05 cement.
- 19.22 Inspect. Check the fillet for proper location.
- 19.23 Apply second vertical ply of .090 ga. No. 04 fabric, 10" wide section
and allow to extend 15" beyond the outside edge of the bead cable.

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- 19.23.1 Use No. 05 cement.
- 19.24 Apply the previously prepared shim stock (See 8.2) to bead areas.
(Ref. Dwg. 5S-1241).
 - 19.24.1 Roughen both surfaces of the shim stock. Do not remove coating.
 - 19.24.2 Clean both surfaces of shim stock and building surface with solvent.
 - 19.24.3 Use No. 05 cement.
 - 19.24.4 Place shim stock into bead areas.
- 19.25 Inspect. Check the shim stock for proper positioning.
- 19.26 Turn back the second horizontal plies of each joining section.
 - 19.26.1 Use No. 05 cement.
- 19.27 Apply fillet 3S-1147-1 at edge of horizontal plies.
 - 19.27.1 Use No. 05 cement.
- 19.28 Inspect. Check the fillet for proper location.
- 19.29 Mark a line 6-1/2" from the center line of the clamping area adjacent to the bead.
- 19.30 Apply bead wrap around ply of .075 ga. No. 04 fabric, 11" wide section, starting at the 6-1/2" mark and allow to extend 18" beyond the outside edge of the bead cable.
 - 19.30.1 Use No. 05 cement.
- 19.31 Apply fillet 3S-1147-1 at ends of bead wrap-around ply.
 - 19.31.1 Use No. 05 cement.
- 19.32 Inspect. Check the 6-1/2" dimension for correctness; also check the fillet for proper location.
- 19.33 Re-seat bead cable in recess of hydrostatic test fixture.
 - 19.33.1 Remove teflon from around bead cable.
 - 19.33.2 Re-install bead clamps adjacent to splice area.
- 19.34 Apply fillet 3S-1147-3 along inside edge of bead cables. (Ref. Dwg. 5S-1241)
 - 19.34.1 Use No. 05 cement.

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- 19.35 Turn down the wrap-around ply of No. 04 fabric around the bead cable and trim 11-1/2" from the center line of the clamping area adjacent to the bead.
- 19.35.1 Use No. 05 cement.
- 19.36 Apply fillet 3S-1147-1 at ends of bead wrap-around ply.
- 19.36.1 Use No. 05 cement.
- 19.37 Apply the previously prepared shim stock (See 8.2) to bead area. (Ref. Dwg. 5S-1241).
- 19.37.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 19.37.2 Clean both surfaces of shim stock and building surface with solvent.
- 19.37.3 Use No. 05 cement.
- 19.37.4 Place shim stock into bead areas.
- 19.38 Inspect. Check the 11-1/2" dimension for correctness; also check the fillet and shim stock for proper location.
- 19.39 Apply fillet 3S-1147-1 at edge of third vertical ply on the forward section (Ref. Dwg. 5S-1241).
- 19.39.1 Use No. 05 cement.
- 19.40 Inspect. Check the fillet for proper location.
- 19.41 Turn down the second vertical ply of No. 04 fabric, along with the 1/2" wide strip of cured section from each section construction, around the bead cable. Trim 7-1/2" from the center line of the clamping area adjacent to the bead.
- 19.41.1 Use No. 05 cement.
- 19.42 Apply fillet 3S-1147-1 at ends of second vertical wrap around ply.
- 19.42.1 Use No. 05 cement.
- 19.43 Apply the previously prepared shim stock (See 8.2) to bead areas. (Ref. Dwg. 5S-1241)
- 19.43.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 19.43.2 Clean both surfaces of shim stock and building surface with solvent.
- 19.43.3 Use No. 05 cement.

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- 19.43.4 Press shim stock into bead areas.
- 19.44 Inspect the 7-1/2" dimension, location of the fillet and shim stock.
- 19.45 Apply fourth vertical ply of .090 ga. No. 04 fabric, 11" wide section, and trim 1" from the center line of the clamping area adjacent to the bead.
- 19.45.1 Use No. 05 cement.
- 19.46 Apply fillet 3S-1147-1 at ends of fourth vertical ply.
- 19.46.1 Use No. 05 cement.
- 19.47 Inspect. Check the 1" dimension for correctness; also check the fillet for proper location.
- 19.48 Turn down the first vertical ply of No. 04 fabric, along with the 1" wide strip from each section construction, around the bead cable. Trim 6-1/2" from the center line of the clamping area adjacent to the bead.
- 19.48.1 Use No. 05 cement.
- 19.49 Apply fillet 3S-1147-1 at ends of first vertical wrap-around ply.
- 19.49.1 Wash stock with solvent.
- 19.49.2 Apply No. 05 cement.
- 19.50 Apply previously prepared shim stock (See 8.2) to bead areas. (Ref. Dwg. 5S-1241).
- 19.50.1 Roughen both surfaces of the shim stock. Do not remove coating.
- 19.50.2 Clean both surfaces of shim stock and building surface with solvent.
- 19.50.3 Apply No. 05 cement.
- 19.50.4 Position shim stock into bead areas.
- 19.51 Apply No. 07 fabric in bead cable areas. (Ref. Dwg. 5S-1241).
- 19.51.1 Remove polyethylene film backing from the fabric.
- 19.51.2 Apply No. 05 cement.
- 19.51.3 Press stock into position.
- 19.52 Inspect. Check the 6-1/2" dimension for correctness; also check the fillet, shim stock and fabric for proper positioning.

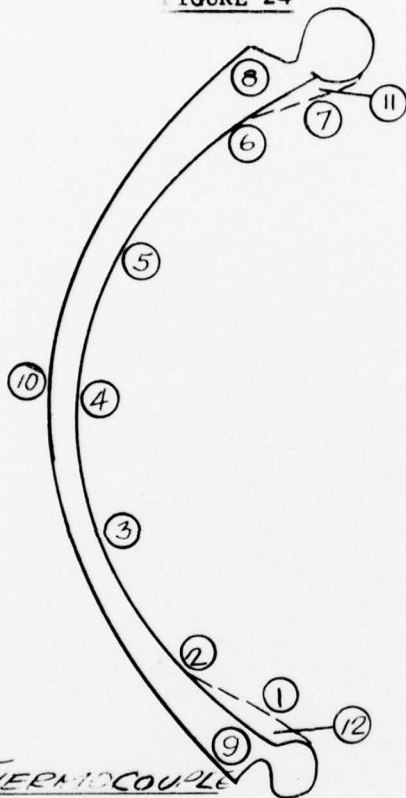
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- 19.53 Turn back the vulcanized top layer.
- 19.53.1 Wash stock with solvent.
- 19.53.2 Apply No. 05 cement.
- 19.54 Apply two (2) plies .135 ga. No. 01 stock to V-grooved area of the top gum layer. (Ref. Dwg. 5S-1241)
- 19.54.1 Wash stock with solvent.
- 19.54.2 Apply No. 05 cement.
- 19.55 Inspect. Check for trapped air.
- 19.56 Apply No. 08 nylon fabric, 16" \pm 1" wide, centered over entire splice area.
- 19.56.1 Apply No. 06 cement to splice area and over nylon.
- 19.57 Install bead clamps over splice area.
- 19.58 Remove anchor pin at top, and lower outside strongback onto floor.
- 19.59 Apply 3" wide cover strip of .135 ga. No. 01 stock centered over splice joint.
- 19.59.1 Wash stock with solvent.
- 19.59.2 Use No. 05 cement.
- 19.60 Inspect. Check for trapped air and check the cover strip for proper location.
- 19.61 Apply No. 06 cement over entire splice area.
- 19.62 Vulcanize splice per 20.0.

- 20.0 VULCANIZATION OF SPLICES
- 20.1 Install thermocouple wires. (Ref. Figure 24, Table IV.)

FIGURE 24



SPLICE AREA THERMOCOUPLE LOCATIONS

TABLE IV

Thermocouple Depths

Thermocouple No.	Depth
1-2-3-4-5-6-7-	Internal surface
8-9	Approx. 4" from outside edge of fill (next to No. 04 fabric)
10	External surface
11-12	Internal surface of part

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- 20.2 Position external seam mold strongback and secure with anchor pins.
- 20.2.1 Install tapered steel end plates and adjust to fit rubber fill area.
- 20.3 Connect steam inlet and discharge lines to the external seam mold strongback.
- 20.4 Apply .265 ga. No. 01 stock at bead clamp area and apply pressure. (Inside surface).
- 20.5 Apply 16" wide teflon fabric over splice area.
- 20.6 Swing the internal hydro-pressure strongback into position over splice area.
- 20.6.1 Secure in place using turn-buckle adjustable rods and anchor bolts.
- 20.7 Position two layers of asbestos fabric over the pressure bag.
- 20.8 Position teflon fabric over the asbestos fabric.
- 20.9 Position flexible electric heating element over the splice area.
- 20.9.1 Use 4S-1166 element for forward.
- 20.9.2 Use 4S-1167 element for aft.
- 20.10 Connect water inlet and discharge lines to internal hydro-pressure strongback.
- 20.10.1 Pressurize to 100 ± 5 psig.
- 20.11 Connect thermocouples to recorder.
- 20.12 Connect recorder to 120V outlet.
- 20.13 Connect electric heating element to temperature control panel.
- 20.14 Connect temperature control panel to 220V outlet.
- 20.15 Pressurize the hydro-pressure unit to 100 ± 5 psig.
- 20.16 Vulcanize at minimum of 250°F for four (4) hours.
- 20.17 Allow to cool until all thermocouples record a maximum of 150°F before releasing pressure.

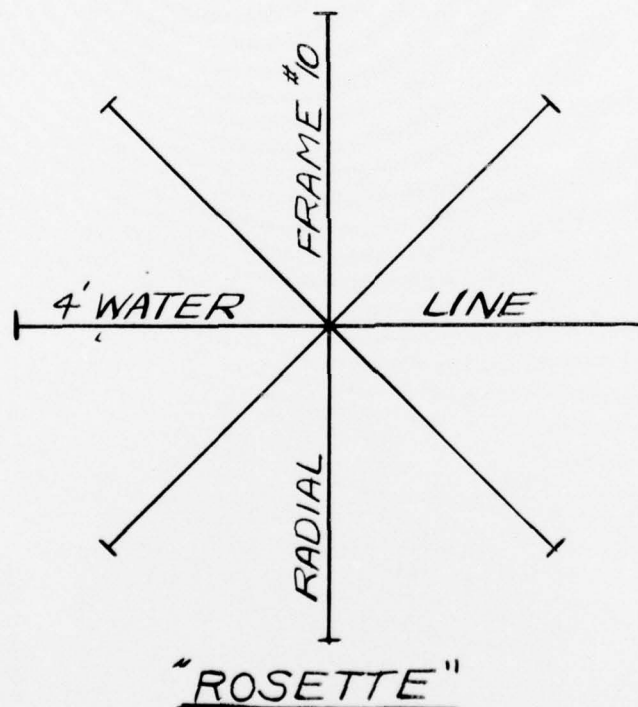
NOTE: At this point, the four panels have been assembled to form a one-piece, cable reinforced rubber window.

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- 21.0 TESTING
- 21.1 Preliminary
 - 21.1.1 Mark surface of window as specified below.
 - 21.1.1.1 4-foot water line.
 - 21.1.1.2 Radial Frames.
 - 21.1.1.3 Locate two "Rosettes" at forward radial frame #10 as shown in Figure 25.

FIGURE 25



- 21.1.1.3.1 Diameter of "Rosette" is 6 feet.
- 21.2 Inspect "Rosette" for correct layout.
 - 21.2.1 Record measurements:
 - 21.2.1.1 Circumferential distance at the 4-foot water line;

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- 21.2.1.2 Radii of radial frame #10 at the 4-foot water line on each "Rosette";
- 21.2.1.3 Arc Lengths of each "Rosette".
- 21.3 Tighten all clamp bolts to 200 to 250 foot pounds torque.
- 21.4 Install flow meter on the inlet supply line.
- 21.5 Install automatic cycle recorder on the discharge line.
- 21.6 Install pressure gauge on hydrostatic test fixture.
- 21.7 Close and secure access hatch covers on hydrostatic test fixture.
- 21.8 Pressurize hydrostatic test fixture with air to 10 psig maximum.
- 21.8.1 Close discharge valve.
- 21.8.2 Connect inlet to air supply and open valve.
- 21.9 Inspect for leakage around bead seat, clamp bolts, and hatch covers.
- 21.10 Eliminate any leaks.
- 21.11 Open discharge valve and exhaust air pressure.
- 21.12 Close discharge valve and connect to discharge line.
- 21.13 Remove inlet line from air supply and connect to water supply.
- 21.14 Fill hydrostatic test fixture with water.
- 21.14.1 Open valve on water supply line.
- 21.15 Stabilize the window:
 - 21.15.1 Cycle pressure between 10 psig and 50 psig for 25 times.
 - 21.15.2 Inspect.
 - 21.15.2.1 Record cycle time and flow meter reading after each cycle.
 - 21.15.2.2 Record arc lengths of the "Rosette" after 25 cycles.
- 21.16 Repeat steps 21.15.1 thru 21.15.2.2.

NOTE: The window is stabilized if the measurements taken after 25 cycles and 50 cycles are within $\pm 1/32"$. If not, further repetition of steps 21.15.1 thru 21.15.2.2 is necessary until measurements are stabilized.

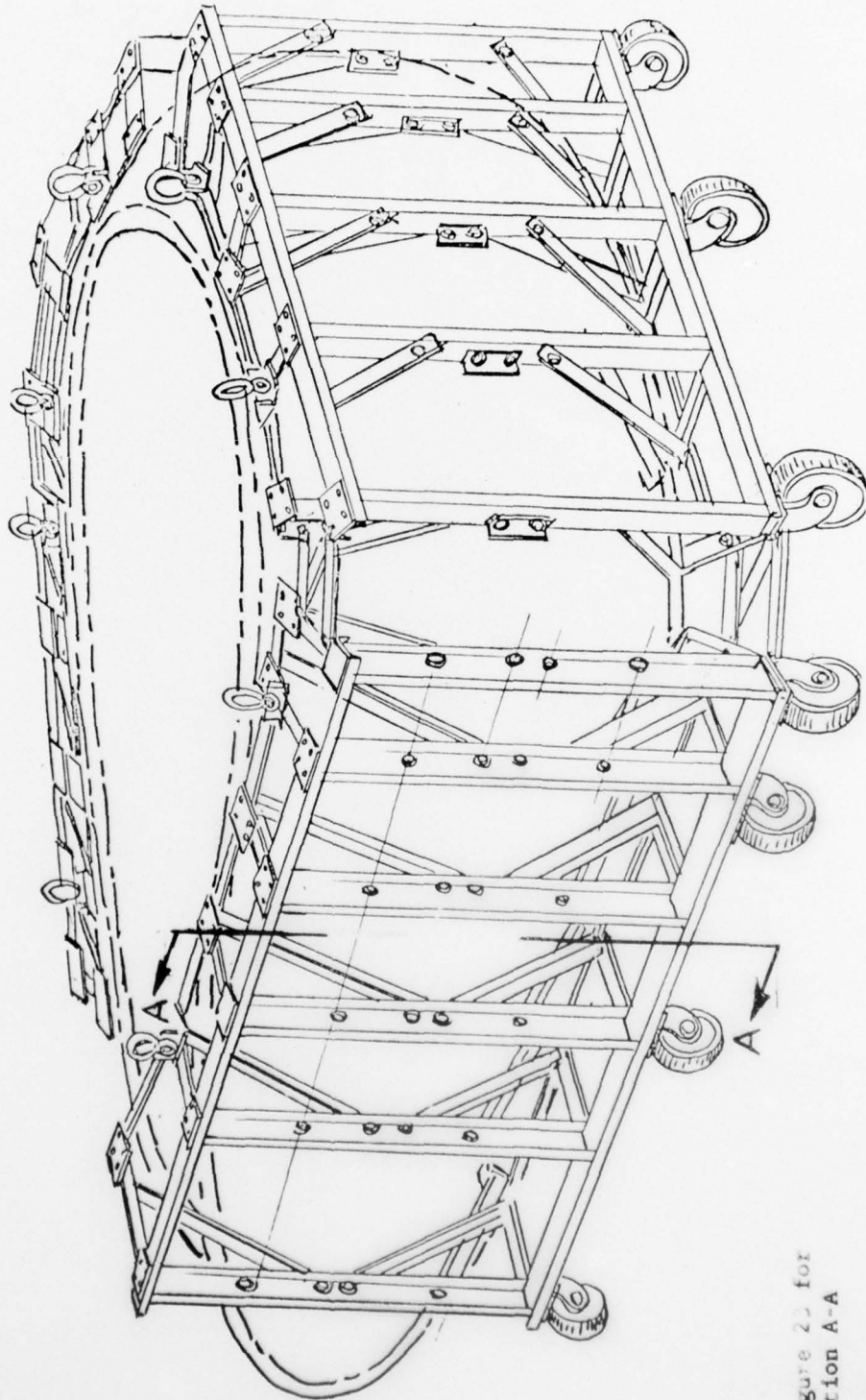
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- 21.17 Strength test:
- 21.17.1 Increase pressure to 80 psig and hold for one (1) hour.
- 21.17.2 Repeat steps 21.15.2 thru 21.15.2.2.
- 21.17.3 Reduce pressure to 40 psig and hold for four (4) days.
- 21.18 Inspect.
- 21.18.1 Repeat steps 21.2.1 thru 21.2.1.3 at beginning and end of four (4) day hold period.
- 21.18.2 Check contour using a 36" long flexible batten (wood, metal or plastic).
- 21.18.2.1 Hold both ends of batten tightly against surface of window.
- 21.18.2.2 Limitations in "Out of Fairness": A feeler 1/16" \pm .008 excluded for at least 75% of length. A feeler 1/8" \pm .008 excluded over entire length.
- 21.19 Final filling and fairing will be accomplished after installation on ship.
- 22.0 REMOVAL OF WINDOW FROM TEST FIXTURE
- 22.1 Position external holding fixtures around window and secure jaws over edge of top rubber fill areas. (Ref. Figure 26)
- NOTE: Hydrostatic test fixture is inverted. Reference to top and bottom is relative to actual ship installation.
- 22.2 Open discharge valve and drain hydrostatic test fixture.
- 22.3 Open hatch covers.
- 22.4 Remove bead clamps, retaining one every ten (1) feet for support.
- 22.5 Loosen bead cable from the bead seat.
- 22.6 Insert the nylon web straps out between panel and fixture and secure to the buckles on the external handling fixture.
- 22.7 Remove the remaining bead clamps.
- 22.8 Remove the aft end first by lifting out and upward while working bead cable out of bead seat.
- CAUTION: Moving aft end of window outward is necessary, but must be kept to absolute minimum.

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see figure 25 for
Section A-A

FIGURE 26

EXTERNAL SUPPORT FIXTURES
IN PLACE

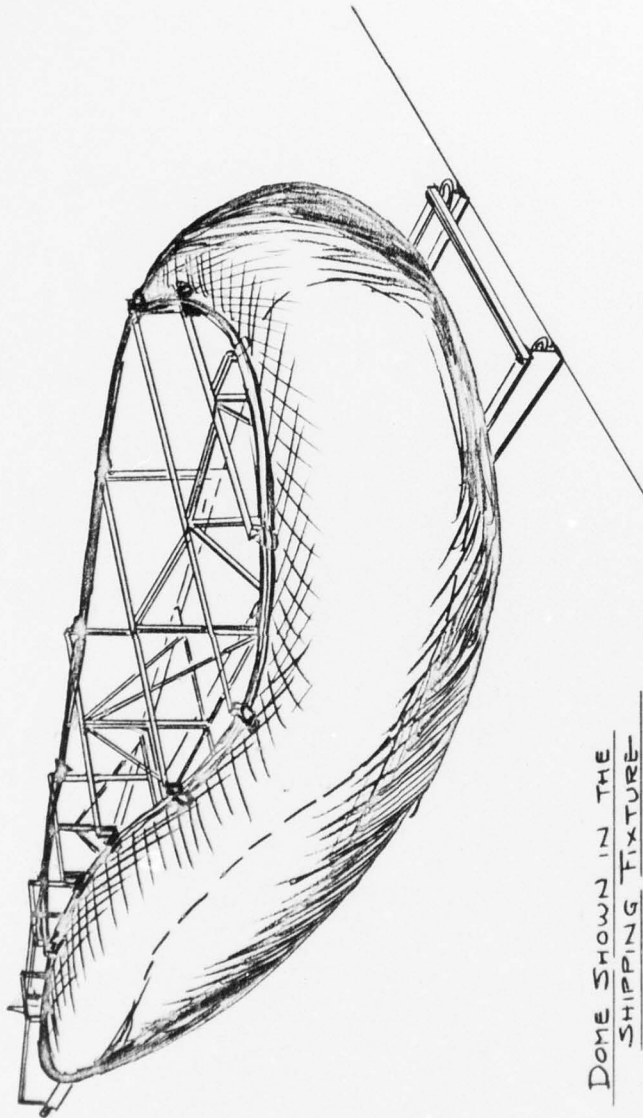
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- 22.9 Repeat step 22.8 on opposite side of window.
- 22.10 Lift and move forward to remove bead from bead seat on the forward end.
- 22.10.1 Spread aft ends of window apart to clear the outside edge of hydrostatic test fixture.
- 23.0 PREPARATION FOR SHIPMENT.
- 23.1 Clean internal surface with solvent.
- 23.2 Apply two heavy coats of protective vinyl film to internal surface.
- 23.2.1 Allow to air dry.
- 23.3 Install window in shipping support fixture.
- 23.4 Spread aft ends of window apart only as necessary to install fixture.
- 23.5 Insert one-half (1/2) of shipping support fixture.
- 23.5.1 Secure bead cable to fixture with clamps and bolts.
- 23.6 Repeat steps 23.4 thru 23.5.1 for second half of shipping support fixture.
- 23.7 Align the two sections and secure together with bolts. (Ref. Figure 27).
- 23.8 Unfasten nylon straps from external handling fixture.
- 23.9 Remove and set aside external handling fixtures.
- 23.10 Clean external surface with solvent.
- 23.11 Apply two heavy coats of protective vinyl film to external surface.
- 23.11.1 Allow to air dry.
- 23.12 Cover entire window, including fixture, with canvas tarpaulin and ship.

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DOME SHOWN IN THE
SHIPPING FIXTURE

FIGURE 27