MATERIALS ENGINEERING LABORATORY
INTERIM REPORT, LF-8 AND LF-9
SUPPORT PAD FABRICATION

<u>Order Number</u>	<u>LASL Engineer</u>
CM7-69316-1	R. B. Ferrell

K. E. Creed
Materials Engineering Laboratory

March 23, 1977

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Neutron Devices Department
P. O. Box 11508
St. Petersburg, Florida 33733

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INTRODUCTION

This project was for the fabrication of 50 LF-8 and LF-9 support pads (clamshells) which would conform to the Los Alamos Scientific Laboratory (LASL) drawing shown in Appendix A. Discussions on this contract were initiated in early October and involved delivery of all the pads by January 31, 1977. The project was initiated by order CM7-69316-1 dated November 10, 1976 and was modified to deliver only 10 pads by the above date. However, since the period encompassed Thanksgiving and Christmas shutdowns, it was decided at a meeting with R. B. Ferrell, WX-1, that delivery of four units by February 11, 1977 would be satisfactory to all concerned. The remainder would follow on a timely basis.

This report outlines the status of the project at the present time. The data are divided into the following categories for clarity purposes:

- Mold master definition and fabrication,
- Process drawings,
- Mold and piece part fabrication.

MOLD MASTER

Prior orders have utilized molds replicated from a pad which had been hand contoured at Sandia Laboratores, Albuquerque (SLA). The part approximated the required shape but as indicated in General Electric Neutron Devices Department (GEND) Materials Engineering Laboratory Final Report, "LF-8 and LF-9 Support Pad Fabrication," December 1976, it did not meet the drawing requirements, especially on the spherical radius. To ensure that this order had the proper dimensions, an aluminum metal master was machined so as to provide all the critical features indicated on the LASL drawing (included in Appendix A). The mold master machining layouts are delineated in drawings 46D920925-T3 and T4, included in Appendix B. The final machined shapes are detailed in drawings 46D920925-T5 and T6 (Appendix C). The metal masters are illustrated in Figure 1.

7725-1

Figure 1. Machined Aluminum Mold Masters. (One mold master is assembled on a baseplate, showing the mold body used to fabricate the plastic tooling.)

PROCESS DRAWINGS

In anticipation of eventual fabrication of the support pads in production facilities, drawings were generated to detail the purchasing information and incoming quality inspection criteria for the materials utilized in the formulation of the support pads. Copies of these are included in Appendix D (1) Drawing No. SS323903, Urethane Casting Elastomer, and (2) Drawing No. SS295729, Filler, Hollow Glass Microspheres. The process details for fabrication of the piece parts are shown in Drawing No. 46A922951, Encapsulation Process, Support. This may be found in Appendix D (3).

It is anticipated that drawings detailing this version of the clamshell will be generated within the next month. As part of this, the piece parts will be identified by drawing and serial numbers. It is recommended that the ink utilized for this operation be Drawing No. SS264775-200, -209, Appendix D (4).

MOLD AND PIECE PART FABRICATION

Discussion with knowledgeable mold fabrication personnel indicated that a metal mold would be very complex, difficult to fabricate and thus costly. Since the design has not been finalized, the quantities to be fabricated are small and lead time was short, it was decided that the use of plastic tooling would be most expedient. Using the masters shown in Figure 1, molds were prepared using an aluminum filled epoxy resin, Epocast 4D, Furnace Plastics, Inc., Los Angeles, California. These are illustrated in Figure 2.

The support pads were cast following the procedure outline in Appendix D (3). Castings after removal from the mold are illustrated in Figure 3 (1). To ensure perpendicularity on the sides of the pads and to meet the dimensional requirements, the pads were milled on the production tracer mill. The piece part after milling is shown in Figure 3 (2). The finished support with appropriate drawing and serial number identification is shown in Figure 3 (3).

Figure 2. Plastic Tooling Molds Used to Fabricate the Support Pads. (1) Rough Plastic Mold, (2) Finished Mold and Baseplate Assembly With Metal Inserts, and (3) Assembled Top and Bottom Molds

Figure 3. Support Pads
 (1) Support Pad as Removed From the Mold
 (2) Support Pad After Milling
 (3) Support Pad as a Finished Part

The first two pieces milled were checked for dimensions and the results are shown in Table 1.

Corrections were made in the tracer mill stylus and the next six pieces machined were measured for width and length dimensions in the GEND Gage Laboratory. The results of these measurements are shown in Table 1. As may be seen, the dimensions are close to the drawing measurements. However, discussions are required before finalization of the tolerance requirements.

Table 1. Critical Dimensions of the LF-8 and LF-9 Support Pads After Milling

	Piece 1 (Inches)	Piece 2 (Inches)	Mill Adjusted Average of 6 Pieces (Inches)
Average Width	3.102	3.106	3.101
Sigma	± 0.003	± 0.002	± 0.003
Range	0.008	0.005	0.010
Change From Drawing Dimensions	+0.002	+0.006	+0.001
Average Length	6.376	6.378	6.381
Sigma	± 0.019	± 0.018	± 0.012
Range	0.034	0.034	0.039
Change From Drawing Dimensions	-0.034	-0.032	-0.029

The initial contract called for delivery of the pads by January 31, 1977. This was not practical and was modified to ten piece parts by January 31, 1977. With vacations and shut-down, the program was delayed and this was discussed with R. B. Ferrell. Based on this, he indicated that he would like four pads by February 11, 1977. Against this date, six pads were shipped FW 7. Delivery of the remaining will be as follows:

- FW 9 - 4 special order; 6 to LASL,
- FW 11 - 20 to LASL,
- FW 13 - 14 to LASL - to complete the order.

Revisions to add details and corrections to Drawings 46D920925-T1 and T6 are scheduled to be initiated FW 9. It is anticipated that final drawings defining the LF-8 and LF-9 support pads also will be started at that time.

APPENDIX A

LASL Drawing Defining the Dimensions
and Contours of the LF-8 and LF-9
Support Pads

APPENDIX B

Mold Master Machining Layout

- (1) 46D920925-T3 Top Mold Master
- (2) 46D920925-T4 Bottom Mold Master

Figure B-2. Bottom Mold Master - Machining Layout

APPENDIX C

Mold Master

- (1) 46D920925-T5 Top Mold Master
- (2) 46D920925-T6 Bottom Mold Master

APPENDIX D

Material and Process Drawings

- (1) Urethane Casting Elastomer
Drawing No. SS323903
- (2) Filler, Hollow Glass Microspheres
Drawing No. SS295729
- (3) Encapsulation Process, Support
Drawing No. 46A922951
- (4) Ink, Marking, Epoxy
Drawing No. SS264775-200, -209

MANUFACTURING AGENCY GENERAL ELECTRIC NEUTRON DEVICES DEPT.		DWG CLASSIFICATION LEVEL		DEVELOPMENT		
DESIGN AGENCY CONTROL NO.		REVISIONS				
-200	A	DESCRIPTION	PREPARED BY	DATE	CHKR	ENGR
			Mr. Baggs	10-6-76		
<p>1. <u>GENERAL:</u></p> <p>1.1 <u>Scope</u> - This specification covers a two component liquid urethane casting compound.</p> <p>2. <u>DOCUMENTS:</u></p> <p>2.1 ASTM D2240 Indentation Hardness of Rubber and Plastics by Means of a Durometer.</p> <p>2.2 ASTM D2236 Dynamic Mechanical Properties of Plastics by Means of a Torsional Pendulum</p> <p>2.3 ASTM D412 Tension Testing of Vulcanized Rubber</p> <p>2.4 SS284619 Storage, Handling & Sampling Chemicals</p> <p>3. <u>REQUIREMENTS:</u></p> <p>3.1 <u>Manufacturers and Product Designation</u></p> <p>3.1.1 Hexcel Corp., Rezolin Div.----- Uralite 3121S, A & B Components</p> <p>3.2 <u>Material</u> (Mixed Compound after Cure)</p> <p>3.2.1 Hardness, Shore "A"-----80 min.</p> <p>3.2.2 Shear Modulus, MPa----- 24 ± 7</p> <p>3.2.3 Tensile Strength, MPa----- 27.5 Min.</p>						
AGENCY APPROVALS			TITLE			
ORG	DATE	INITIALS	URETHANE CASTING ELASTOMER			
			PART CLASSIFICATION			
			DWG CLASSIFICATION LEVEL			
			UNCLASSIFIED			
			SIZE	CODE IDENT NO.	DWG NUMBER	
			A	14213	SS323903	
			SCALE		SHEET 1 OF 2	

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Figure D-1. Urethane Casting Elastomer

DWG CLASSIFICATION LEVEL		UNCLASSIFIED										
<p>4. <u>QUALITY PROVISIONS:</u></p> <p>4.1 <u>Certification</u> - At the discretion of the Purchasing Agency, the Supplier shall submit with each shipment of material: (1) a statement of compliance to this specification and issue letter and/or (2) variables test data as requested. This certification shall include the purchase order number, quantity shipped, and one or more of the following where applicable: (1) lot number, (2) batch number, or (3) melt number.</p> <p>4.2 <u>Test Methods</u> (Mandatory only in case of dispute)</p> <p>4.2.1 Thoroughly mix 100 parts of "A" component with 40 parts of "B" component, cast and cure at $71^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 3-3.5 hours.</p> <p>4.2.1 Hardness----- ASTM D2240</p> <p>4.2.2 Shear Modulus----- ASTM D2236</p> <p>4.2.3 Tensile Strength----- ASTM D412</p> <p>5. <u>PACKAGING AND HANDLING:</u></p> <p>5.1 <u>Packaging</u> - The material shall be packaged in a manner to ensure safe delivery and storage and comply with carrier's regulations.</p> <p>5.2 <u>Marking</u> - Each container shall be legibly marked or tagged with buyer's specification number, issue letter and supplier's name and product designation. Additional marking is optional.</p> <p>5.3 <u>Storage, Handling and Sampling Conditions</u> (GE Use Only)</p> <p>5.3.1 Code 1-G-12R-12-I2-S2 per SS284619.</p> <p>5.3.2 Shelf Life Retest Requirements - Para. 3.2.3.</p> <p>6. <u>NOTES:</u></p> <p style="padding-left: 40px;">None</p>												
ISSUE	A	DWG CLASSIFICATION LEVEL	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">SIZE</td> <td style="width: 35%;">CODE IDENT NO.</td> <td style="width: 50%;">DWG NUMBER</td> </tr> <tr> <td style="text-align: center;">UNCLASSIFIED</td> <td style="text-align: center;">A 14213</td> <td style="text-align: center;">SS323903</td> </tr> <tr> <td colspan="2"></td> <td style="text-align: center;">SHEET 2 OF 2</td> </tr> </table>	SIZE	CODE IDENT NO.	DWG NUMBER	UNCLASSIFIED	A 14213	SS323903			SHEET 2 OF 2
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Figure D-1 (Continued). Urethane Casting Elastomer

MANUFACTURING AGENCY GENERAL ELECTRIC NEUTRON DEVICES DEPT.		DWG CLASSIFICATION LEVEL		PREPRODUCTION			
DESIGN AGENCY PART OR CONTROL NO.		REVISIONS					
SEE TABLE BELCW		ISSUE	DESCRIPTION	PREPARED BY	DATE	CHKR	ENGR
		D	760238GE	Jr. Bagan	5- -76		
		E	760310GE	M. Cole	6-29-76	JCB	
		F	760508GE	M. Cole	10-27-76	JCB	
<p>1. <u>GENERAL:</u></p> <p>1.1 <u>Scope</u> - This specification covers hollow unicellular glass microspheres used as a filler for encapsulating resins.</p> <p>2. <u>DOCUMENTS:</u></p> <p>2.1 ASTM D2841 - Sampling Hollow Microspheres</p> <p>2.2 ASTM D1214 - Sieve Analysis of Glass Spheres</p> <p>2.3 ASTM D2840 - Particle Density of Hollow Microspheres</p> <p>2.4 46A102060 - Mold Release</p> <p>2.5 SS268084 - Mold Release</p> <p>2.6 128A1494 - Epoxy Resin</p> <p>2.7 4604020 - Curing Agent, Diethanolamine</p> <p>2.8 SS302227 - Trichloroethane, INHIB.</p> <p>3. <u>REQUIREMENTS:</u></p> <p>3.1 <u>Manufacturer's and Product Designation</u></p> <p>3.1.1 3M CO.</p> <p style="margin-left: 40px;">Part -200 -----Type B22A</p> <p style="margin-left: 40px;">Part -201 -----Type B40A</p> <p style="margin-left: 40px;">Part -202 -----Type B18A</p>							
-202		0.16 Average Particle Density			LF8-LF9 Support		
-201		0.37 Average Particle Density			MC2735		
-200		0.20 Average Particle Density			MC2735		
Part No.		Material			First Made For		
AGENCY APPROVALS ORG DATE INITIALS		PART CLASSIFICATION		TITLE FILLER, HOLLOW GLASS MICROSPHERES			
				DWG CLASSIFICATION LEVEL UNCLASSIFIED			
		DWG CLASSIFICATION LEVEL UNCLASSIFIED		SIZE A	CODE IDENT NO. 14213	DWG NUMBER SS295729	
				SCALE		SHEET 1 of 7	

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SF 5300-AN (3-67)
 FC-303 (2-74) *D12 C-12*

Figure D-2. Filler, Hollow Glass Microspheres

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<p>3.2 <u>Appearance</u> - Material shall appear uniformly white to slight green; free flowing and free from gross contaminants.</p> <p>3.3 <u>Size</u></p> <p>3.3.1 Parts -200 & -201 Minimum 90% by volume shall be between 20 and 80 microns.</p> <p>3.4 <u>Particle Density</u></p> <p>Part -200-----0.18 to 0.22 Part -201----- 0.35 to 0.40 Part -202----- 0.12 to 0.18</p> <p>3.5 <u>Volatile Content</u>----- 0.5% Max. by Wt.</p> <p>3.6 <u>Thermal Shock</u> -</p> <p>Part -201 Only, Vendor Not Liable, pass test per 4.2.6. Part -202 - Test not required.</p> <p>4. <u>QUALITY PROVISIONS:</u></p> <p>4.1 <u>Certification</u> - At the discretion of the purchasing agency, the supplier shall submit with each shipment of material: (1) a statement of compliance to this specification and issue letter and/or (2) variables test data as requested. This certification shall include the purchase order number, quantity shipped, and one or more of the following where applicable: (1) lot number, (2) batch number, or (3) melt number.</p> <p>4.2 <u>Test Methods</u> (Mandatory Only in Case of Dispute)</p> <p>4.2.1 Sampling -----ASTM D2841</p> <p>4.2.2 <u>Appearance</u> - When poured from its container, the filler shall flow freely, and there shall be no evidence of crusts, caking, or lumps which are not readily broken up under light pressure. In addition, there shall be no evidence of gross contamination in the filler. Contaminants are defined as foreign materials which can be detected visually without magnification.</p>																											
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Figure D-2 (Continued). Filler, Hollow Glass Microspheres

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<p>4.2.3 <u>Size</u></p> <p>4.2.3.1 Part -200 &-201 -----Coulter Counter</p> <p>4.3 <u>Particle Density</u></p> <p>ASTM D2840</p> <p>4.4 <u>Volatile Content</u></p> <p>Ohaus Moisture Balance Model 6010, Heater control setting of 6, heater to pan distance of 1 inch for 10 minutes on a 10 gram sample or equivalent setting to give a sample area temperature of 121°C.</p> <p>4.5 <u>Thermal Shock</u></p> <p>4.5.1 <u>Materials and Apparatus</u></p> <ul style="list-style-type: none"> A. Molds: 6 hot drink cups, 8 oz. capacity Unwaxed, such as No. 2338, Dixie Corporation, Division of American Can. B. Epoxy resin per 128A1494 C. Diethanolamine curing agent per 4604020. D. Mold release per 46A102060 or SS268084 E. Six hollow steel cylinders made from seamless, low-carbon, cold drawn steel tubing, 1 1/4 inch OD x 0.12 inch wall. All surfaces shall be machined or polished to obtain a bright surface of 50 microinches maximum. See Figure 2. F. Hobart Mixer 																					
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Figure D-2 (Continued). Filler, Hollow Glass Microspheres

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<p>4.5.2 <u>Resin - Filler Mixture</u></p> <p>NOTE: Tolerance on weights of materials shall be ± 1 percent.</p> <p>A. Pour 1300 grams of epoxy resin per 128A1494 into a Hobart Container. Warm the resin to $79^{\circ}\text{C} \pm 3^{\circ}\text{C}$.</p> <p>B. Carefully fold 433 grams of microsphere sample into the resin by hand in order to prevent loss of material (a spatula has been found satisfactory to perform this operation). Mix thoroughly in a Hobart Mixer at speed number 1 using a flat beater until the sample has been wetted and thoroughly dispersed throughout the resin. The mixing operation shall be completed in approximately 3 minutes to avoid excessive crushing of the microspheres.</p> <p>C. Heat or cool the resin sample mixture from (B) to $66^{\circ}\text{C} \pm 3^{\circ}\text{C}$. Add 156 grams of curing agent per 4604020 and mix thoroughly as described in (B) for at least 3 minutes.</p> <p>D. After mixing, evacuate the mixture at a pressure of 0.5 to 3 Torr for a minimum of 1 minute after the original foam rise collapses. The mixture is now ready for pouring.</p> <p>E. At the time of pouring, the mixture shall be at a temperature of 82°C to 91°C.</p> <p>4.5.3 <u>Specimen Preparation</u></p> <p>Prepare six test specimens as follows:</p> <p>A. Clean the cylinder by vapor degreasing in trichloroethane per SS302227. Allow to dry.</p> <p>B. Coat the inside of the mold with an even film of mold release agent per 46A102060 or SS268084.</p> <p>C. Center the cylinder in the mold as shown in Figure 3, using 18 AWG solid conductor vinyl insulated wire.</p> <p>D. Preheat the mold and cylinder to $79^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and maintain them at this temperature until ready to pour the resin-filler mixture.</p> <p>E. Prepare and process the resin-filler mixture as specified in 4.5.2, and pour into each of the molds to the dimensions shown in Figure 3. After cure, allow the castings to cool for at least 4 hours at room temperature, then remove paper mold.</p>		
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Figure D-2 (Continued). Filler, Hollow Glass Microspheres

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<p>4.5.4 <u>Test Procedure</u></p> <ul style="list-style-type: none"> A. Place the specimens in a refrigerated cold box maintained at a temperature of $-53.9 + 1^{\circ}\text{C}$ for at least 4 hours. Place the specimens at least 1/2 inch apart. B. Remove the specimens from cold box. Place on bench top at room temperature, spacing specimens at least 1/2 inch apart. Allow specimens to come to equilibrium at room temperature (at least 4 hours). C. Repeat steps (A) and (B) for 2 more complete cycles. D. After the specimens have warmed to room temperature, examine them visually for any evidence of cracking or other indications of failure in the casting. At least 5 of the 6 specimens shall pass the test. <p>5. <u>PACKAGING AND HANDLING</u></p> <p>5.1 <u>Packaging</u> - The material shall be packaged in a manner to ensure safe delivery and storage and comply with carrier's regulations.</p> <p>5.2 <u>Marking</u> - Each container shall be legibly marked or tagged with buyer's specification number, issue letter and supplier's name and product designation. Additional marking is optional.</p>																																		
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Figure D-2 (Continued). Filler, Hollow Glass Microspheres

Figure D-2 (Continued). Filler, Hollow Glass Microspheres

Figure D-2 (Continued). Filler, Hollow Glass Microspheres

DWG CLASSIFICATION LEVEL		UNCLASSIFIED			
<p>1. <u>GENERAL:</u></p> <p>1.1 <u>Scope.</u> This specification covers the preparation of LF8-LF9 supports.</p> <p>2. <u>DOCUMENTS:</u></p> <p>2.1 <u>Required.</u> See Sheet 1</p> <p>3. <u>REQUIREMENTS:</u></p> <p>3.1 <u>Equipment.</u></p> <p>3.1.1 Encapsulator capable of maintaining 0.1 Torr to 10 Torr.</p> <p>3.1.2 Pressure system capable of attaining 100 PSI.</p> <p>3.2 <u>Tolerance.</u> All tolerances shall be $\pm$ 5% unless otherwise specified</p> <p>3.3 <u>Mold Preparation.</u></p> <p>3.3.1 Apply Item 4 to the support mold.</p> <p>3.3.2 Assemble mold. Edges and bolt heads may be sealed with Item 3.</p> <p>3.4 <u>Polyurethane Mix Preparation.</u></p> <p>3.4.1 Add 100 parts by weight of Item 1 - Part A to 40 parts by weight of Item 1 - Part B and mix thoroughly. Add 21 parts by weight of Item 2 and mix thoroughly.</p> <p>3.4.2 Deaerate the mixture at 5 Torr to 10 Torr for 1 minute maximum after the foam collapses.</p> <p>3.5 <u>Encapsulation Procedure.</u></p> <p>3.5.1 Fill the mold and deaerate assembly for 1 minute maximum. Vary the vacuum level to maintain the mixture within the mold sprue.</p> <p>3.5.2 Return the mold assembly to atmospheric pressure.</p> <p>3.5.3 Pressurize the mold assembly to 90 PSI $\pm$ 10 PSI. Pressure can be removed to add additional molds to the system. Limit the precure time to 1 hour maximum.</p>					
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		UNCLASSIFIED	A		46A922951
					SHEET 2 OF 3

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Figure D-3 (Continued). Encapsulation Process, Support

DWG CLASSIFICATION LEVEL		UNCLASSIFIED										
<p>3.5.4 Cure supports using one of the following processes:</p> <p>3.5.4.1 Sixteen hours minimum at $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ and 90 PSI $\pm$ 10 PSI plus 2 hours at 71°C.</p> <p>3.5.4.2 Three hours minimum at $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ and 90 PSI $\pm$ 10 PSI plus 2 hours at $71^{\circ}\text{C} \pm 3^{\circ}\text{C}$ at atmospheric.</p> <p>3.5.5 Disassemble the support from the mold while still warm and perform secondary machining operations after parts reach room temperature.</p> <p>SECTIONS 4, 5 and 6 - NOT APPLICABLE.</p>												
ISSUE	A	DWG CLASSIFICATION LEVEL	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">SIZE</td> <td style="width: 10%;">CODE IDENT NO.</td> <td style="width: 80%;">DWG NUMBER</td> </tr> <tr> <td style="text-align: center;">UNCLASSIFIED</td> <td style="text-align: center;">A</td> <td style="text-align: center;">46A922951</td> </tr> <tr> <td colspan="2"></td> <td style="text-align: center;">SHEET 3 OF 3</td> </tr> </table>	SIZE	CODE IDENT NO.	DWG NUMBER	UNCLASSIFIED	A	46A922951			SHEET 3 OF 3
SIZE	CODE IDENT NO.	DWG NUMBER										
UNCLASSIFIED	A	46A922951										
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Figure D-3 (Continued). Encapsulation Process, Support

MANUFACTURING AGENCY GENERAL ELECTRIC NEUTRON DEVICES DEPT.		DWG. CLASSIFICATION LEVEL UNCLASSIFIED		DWG. STATUS SEE MATERIAL BLOCK	
REVISIONS					
ISSUE	DESCRIPTION	ISSUE	DESCRIPTION	ISSUE	DESCRIPTION
W	740543 GE 2. Revis 12-9-74				
CONTROL NO.	MATERIAL				FIRST MADE FOR
-200	EPOXY BASE, BLACK				PRODUCTION MC 1648
-201	EPOXY BASE, BROWN				DEVELOPMENT
-202	EPOXY BASE, RED				DEVELOPMENT
-203	EPOXY BASE, ORANGE				DEVELOPMENT
-204	EPOXY BASE, YELLOW				ICO MC 1649TR
-205	EPOXY BASE, GREEN				DEVELOPMENT
-206	EPOXY BASE, BLUE				DEVELOPMENT
-207	EPOXY BASE, WHITE				PRODUCTION MC 1314A
-208	CATALYST (A), AIR CURE				PRODUCTION MC 1648
-209	CATALYST (B), HEAT CURE				PRODUCTION MC 1648
-210	EPOXY KIT, *BLACK				PRODUCTION MC 2043
-211	EPOXY KIT, *WHITE				PRODUCTION MC 1871B
-212	THINNER				PRODUCTION MC 1871B

*KIT CONSISTS OF BASE AND CATALYST

1. GENERAL.

1.1 SCOPE.

THIS SPECIFICATION COVERS EPOXY MARKING INK SUPPLIED AS BASE AND CATALYST INDICATED BY NUMBERS ABOVE. MATERIAL IS USED FOR MARKING GLASS, METAL AND THERMOSETTING PLASTICS.

2. DOCUMENTS

2.1 SS284619 - STORAGE, HANDLING & SAMPLING CHEMICALS

3. REQUIREMENTS

3.1 MANUFACTURERS AND PRODUCT DESIGNATION

3.1.1 WORNOW PROCESS PAINT CO. -200 M-O-N BLACK SERIES M INK

APPLIED PRACTICES		DIST. CODE		SD 5B B L 153 1001	
UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING				DESIGN AGENCY APPROVAL	
SURFACES		TOLERANCES ON DIMENSIONS		TITLE	
<div style="display: flex; justify-content: space-around;"> <div>DECIMALS ± .010</div> <div>DECIMALS ± .015</div> <div>ANGLES ± 1°</div> </div>		ORG.		DATE	INITIALS
MFG. AGENCY APPROVAL				SIZE CODE IDENT.	
MADE BY <u>WIR</u>		DATE		A 14213	
ORIGINATED AT		APPROVAL		DWG. NO.	
GEXF-PAT DUCHE		T.H.R. 5-23-74		SS264775	
				SHEET 1 OF 3	

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Figure D-4. Ink, Marking, Epoxy

DWG. CLASSIFICATION LEVEL		ISSUE	Y	W				
UNCLASSIFIED								

Markem Machine Co.

- 201 M-1-N Brown Series M Ink
- 202 M-2-N Red Series M Ink
- 203 M-3-N Orange Series M Ink
- 204 M-4-N Yellow Series M Ink
- 205 M-5-N Green Series M Ink
- 206 M-6-N Blue Series M Ink
- 207 M-9-N White Series M Ink
- 208 Catalyst A (Air Cure)
- 209 Catalyst B (Heat Cure)
- 210 Type 7908 Black Epoxy Ink (A & B)
- 211 Type 7908 White Epoxy Ink (A & B)
- 212 Type "N" Thinner

3.2 Material - Infrared spectrogram of catalyst shall be similar to a standard. Spectrogram of base material shall verify epoxy/amine formulation. Vendor is not liable for this requirement.

4. QUALITY PROVISIONS:

4.1 Certification - At the discretion of the purchasing agency, the supplier shall submit with each shipment of material:
 (1) A statement of compliance to this specification and issue letter and/or (2) variables test data as requested. This certification shall include the purchase order number, quantity shipped, and one or more of the following where applicable: (1) Lot Number, (2) Batch Number, or (3) Melt Number.

4.2 TEST METHODS (Mandatory Only in Case of Dispute)

4.2.1 Make comparison to infrared spectrogram of prior approved material.

5. PACKAGING AND HANDLING:

5.1 Packaging - The material shall be packaged in a manner to ensure safe delivery and storage and comply with carrier's regulations.

5.2 Marking - Each container shall be marked or tagged with buyer's specification number, issue letter and supplier's name and product designation. Additional marking is optional.

SIZE	DWG. NO.
A	SS264775
SHEET	OF
2	3

Figure D-4 (Continued). Ink, Marking, Epoxy

APPENDIX E

Mold Inserts

- (a) Drawing 46D920925-T1
Inserts for the Bottom Mold, Mold Baseplate
and Box for Casting the Plastic Tooling
- (b) Drawing 46D920925-T2
Inserts for the Top Mold and Mold Baseplate

Figure E-1 (Continued). Inserts for the Bottom Mold, Mold Baseplate and Box for Casting the Plastic Tooling