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NOSC TR 648

NOSC TR 648

Technical Report 648

Manufacturing Technology Program FIBER OPTIC MULTIPIN HYBRID CONNECTOR

GM Holma
RA Greenwell

17 December 1980

Final Report for Period November 1977 to March 1980

Prepared for
Naval Air Systems Command
NAVAIR 360G

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) A hybrid fiber optic and electrical multipin connector was developed for bundle type (0.045 inch bundle diameter) fiber optic cable. This task was performed under the Manufacturing Technology Program for fiber optic components. The connector was built by means of high volume production techniques and was tested for suitability to the military environment.		

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OBJECTIVE

Develop and document fiber optic component manufacturing processes to allow distribution of manufacturing information among second sources and to provide low cost, high volume production capabilities in industry for fiber optic components suitable for use in a military environment.

RESULTS

1. A hybrid multipin fiber optic connector for bundle cable (0.045 inch diameter glass bundle) was successfully built and tested.
2. The connector was built by means of high volume production machinery. A cost analysis shows a cost reduction of 73% for production runs.
3. The connector passes the environmental specifications of MIL-C-26482. Failures during testing resulted from fiber optic cable problems.
4. Fiber optic cable is the limiting factor in high temperature performance of the cable-connector interface.
5. Full documentation is available for the manufacturing of these connectors.

RECOMMENDATIONS

1. Standardize connectors and cables to guarantee compatibility between components.
2. Develop single-fiber multipin connectors for 125 and 140 μm cable based on the same approach — a standard electrical pin shell with fiber optic contacts replacing the electrical contacts.

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INTRODUCTION

The goal of the fiber optic manufacturing technology program is to develop and document fiber optic component manufacturing processes. This allows the distribution of manufacturing information among second sources and provides low cost, high volume production capabilities in industry for fiber optic components. These components are designed specifically for their application to high volume, low cost production, and for their ability to pass the environmental specifications of MIL-C-26482.

In November 1977, a contract was awarded to Bunker Ramo Corporation (Amphenol) for the development of a multipin fiber optic connector. The connector was to incorporate both wire contacts, for power, and fiber optic bundle contacts, for short cable runs (less than 50 metres).

PROGRAM PLAN

The contract was performed in three phases. Phase I consisted of developing the design and manufacturing processes for a quantity of 10 connectors. These connectors were exposed to limited testing. Phase II consisted of manufacturing a production run of 100 connector pairs. Phase III consisted of testing to evaluate the ability of the connectors to pass the environmental specifications of MIL-C-26482. The documentation consisted of a fabrication specification, engineering drawings, a cost analysis, and a test specification and report. The engineering drawings are contained in the appendix. The fabrication specification and the test specification and report are available to both industry and DoD agencies; contact the Manufacturing Technology Office, NOSC Code 9204.

The cost analysis is available to DoD agencies only.

PRODUCT FABRICATION SPECIFICATION

The Product Fabrication Specification includes a list of the operations necessary for production, the assembly instructions, and the stages at which inspection is performed. As indicated in the engineering drawings, the connector manufacturing process uses standard machining techniques. The connector shell is a standard Amphenol/Merlin series 118 MIL-C-26482G connector, available off the shelf. The fiber optic contacts, both male and female, use a crimp/epoxy combination for attachment of the cable strength members. The outside dimensions of the fiber optic contacts and size 12 electrical contacts are similar. The fiber optic contacts are aligned by a Delrin alignment sleeve, when the plug and receptacle are mated. This provides for a typical optical loss of 3 dB for bundle cables. During tests, the typical loss measured was 3-5 dB, due to a mismatch between the cable bundle diameter and the contact hole size. The fiber optic glass bundle size used in tests was too small, resulting in a large packing fraction loss in initial connector insertion. Loss measurements using cable with a better packing fraction and smaller numerical aperture (0.61 and 0.65) resulted in losses of 2.43 and 3.16 dB respectively during Phase I testing.

COST ANALYSIS

An analysis was done on the manufacturing cost of the connectors. A cost comparison was made between the 10 prototype connectors built in the model shop and the production run of 100 mating pairs done in the production facility. Estimates were extrapolated

to the production cost of 1000 mating pairs. The analysis included the costs of material, production setup, handling and processing, and assembly. The unit cost in quantities of 100 mating pairs was 34% of the unit cost of 10 manufactured in the model shop. The unit cost of 1000 mating pairs was 27% of the model shop cost.

TEST REPORT

The production/acceptance Inspection Test Report describes the testing performed under this contract. The tests follow the general pattern of MIL-C-26482G connector tests, with the added requirement of monitoring the increase of connector loss after each test. An arbitrary 1 dB increase was established as the amount of acceptable degradation after each test. The testing sequence is shown in table 1, with all tests referenced to MIL-C-26482G. Table 2 summarizes the test results. Summation of the testing showed that each of Bunker Ramo's fiber optic connectors and contacts was capable of meeting the mechanical, electrical, and/or environmental requirements specified in the test procedure.

Failures occurred during the testing sequence. The faults that existed in the test results reflect optical discrepancies directly related to cable shrinkage at elevated temperatures. These deficiencies took place under thermal shock (-55° to 125°C) and fluid immersion at 85°C.

Analysis of failed test specimens revealed two modes of failure with similar characteristics; both resulted from shrinkage of the cable at elevated temperatures.

One mode of failure is shrinkage of the cable out of the crimped contact ferrule assembly. The result is mechanical failure of the unsupported optical fibers in the contact during subsequent testing. This specific failure is resolved by applying epoxy to the strength members prior to crimping the ferrule. The epoxy is then cured subsequent to the crimp. Corrective action in this mode has been made by modifying the termination procedure to include this operation. The termination procedure is included with the enclosed drawings.

The second mode of failure results from fixing the strength member as described above. Shrinkage results in random crushing and fracture of the fibers throughout the cable length.

The fiber optic cable used in the Phase III testing program did not meet the original specification, as outlined in NOSC Technical Report 274 (ref 1).

It has been verified that the initial cable developed under the specification contained in reference 1 did meet the environmental requirements of the Production/Acceptance Test Procedure. The difference between the cables is that the original contained braided strength members whereas the cable used in Phase III testing contained straight strength members (not braided or woven). Phase III cable was not rejected, however, because of the long lead time in obtaining replacement.

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1. NOSC TR 274, Manufacturing Technology for Fiber Optic Bundle Cabling, by GM Holma and RA Greenwell, 10 July 1978.

Table 1. Testing sequence.

Test Para.	Group I Sample Number	Group II Sample Number	Group III Sample Number	Group IV Sample Number	Group V Sample Number
MIL-C-26482G	1	2	3	4	5
Examination of Product	X	X	X	X	X
Insertion Loss (Reference Cable)					
Preparation of Samples	X	X	X	X	X
Insertion Loss (Contacts A & H)	X	X	X	X	X
Magnetic Permeability	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X
Contact Insertion & Removal Forces	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X
Contact Retention	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X
Mating and Unmating Forces	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X
Dielectric Withstanding Voltage - Sea Level	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X
Insulation Resistance, 25°C	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X
Shell Conductivity	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X
Thermal Shock	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X
Durability	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X
Vibration, Random	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X
Physical Shock	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X
Humidity	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X
Thermal Shock	X	X	X	X	X
Fiber Optic Attenuation	X	X	X	X	X

Rev. "B" (X) Denotes removal from Test Sequence
Rev. "C" (X) Denotes added to Test Sequence

Table 1. (cont)

Test Para.	Group I Sample Number		Group II Sample Number		Group III Sample Number		Group IV Sample Number ***		Group V Sample Number		
MIL C-26482G	1	2	3	4	5	6	7	8	9		
Salt Spray (Corrosion)	(X)(X)	(X)(X)		(X)	(X)						
Fiber Optic Attenuation											
Fluid Immersion, 85°C											
Fiber Optic Attenuation											
Altitude Immersion											
Fiber Optic Attenuation											
Contact Retention											
Fiber Optic Attenuation											
Dielectric Withstanding Voltage --											
Sea Level											
Fiber Optic Attenuation											
Dielectric Withstanding Voltage --											
Altitude											
Fiber Optic Attenuation											
Shell Conductivity											
Fiber Optic Attenuation											
Insulation Resistance, 25°C											
Fiber Optic Attenuation											
Insulation Resistance, High Temp.											
Fiber Optic Attenuation											
Contact Resistance											
Fiber Optic Attenuation											
Insert Retention											
Fiber Optic Attenuation											
External Bending Moment											
Fiber Optic Attenuation											
Final Examination of Product											
Thermal Shock											

* Per Amphenol RF Specification No. 349-50205

** Per Amphenol RF Specification No. 349-50206

*** Control Sample - Not Identified as Test Sample

Rev. "B" "D" (X) Denotes removal from Test Sequence

Rev. "C" (X) Denotes added to Test Sequence

Rev. "F" (X) Test discontinued per NOSC and Amphenol RF

(E)

Table 2. Test results.

ITEM: Fiber Optic Connectors SPEC: MIL-C-26482G	Test Group	Data Ref. Page	Spec. Ref. Para	Test Condition	MFR'S TYPE: 801-104 (Receptacles) MFR: Bunker Ramo Corporation	Specification Limits	DATE TEST COMPLETED: 12-01-79 DATE TEST BEGUN: 9-10-79			SAMPLE NOS. FR. 1 TO 9	
							Measured Values		Number Samples		
							Minimum	Maximum			Tested
I Thru V Samples 1 Thru 9	107	4.6.1	•	EXAMINATION OF PRODUCT		Conform to applicable specification and drawings	Complies to applicable specifications and drawings	Connectors	9	9	Met Requirements
N/A	108			INSERTION LOSS (REFERENCE CABLE)		Determine insertion loss	Lock In Amplifier Readings MV .450 .760	Reference Cables	8	8	Reference Cable Loss Determined ***
Groups I Thru V, Samples 1 Thru 9	107	4.6.1		PREPARATION OF SAMPLES (See Examination of Product)		No Damage	No Damage		9	9	Connectors and Contacts Met Requirements
Groups I Thru V, Samples 1 Thru 9	109-110		•	INSERTION LOSS (CONTACTS A & H)		Determine insertion loss	Lock In Amplifier Readings MV .350 .610 Insertion Loss MV .130 .220 dB Equivalents 3.378 5.301	Signal Cables	18	18	Insertion Loss Determined
Group I Samples 1 & 2	111-112	4.6.48		MAGNETIC PERMEABILITY Fiber Optic Attenuation		Shall be less than 2.0 MU	<1.10 MU	Connectors	2	2	Met Requirements
		**				Change not to exceed 1 dB	0.03 dB 0.600 dB	Contacts	4	4	
Groups I & III Samples 1, 2, 4 and 5	113-117	4.6.11		CONTACT INSERTION REMOVAL FORCES		Insertion Force, 15 lbs. Max. Removal Force, 10 lbs. Max.	Insertion Force 3.0 5.5 Removal Force 1.25 4.5	Contacts	64	64	Met Requirements
		**				Change not to exceed 1 dB	0.057 dB 0.370 dB		8	8	
Groups I, II & III, Samples 1, 2, 3, 4 and 5	118-128	4.6.32		Fiber Optic Attenuation CONTACT RETENTION		No damage to contact or retention system. Hold 25 lb. axial load. Displacement not to exceed .012 inches	Contacts held 25 lb. axial load, no damage	Contacts	80	80	Met Requirements
		**				Change not to exceed 1 dB	Axial Displacement Inches .0005 .007	Contacts	10	10	
Groups I & II, Samples 1, 2 and 3	129-130	4.6.4		Fiber Optic Attenuation MATING AND UNMATING FORCES		Max. engagement and disengagement not to exceed 25 lbs. Min. disengagement 4 lbs.	Engagement In./lbs. 5 9 Disengagement In./lbs. 10 13	Connectors	3	3	Met Requirements
		**				Change not to exceed 1 dB	0.068 dB 0.877 dB	Contacts	6	6	

• Per Amphenol RF Specification No. 349-50205

•• Per Amphenol RF Specification No. 349-50206

••• Reference Page 108 for Cable Light Transmitting Information (associated Amphenol test report)

Table 2. (cont)

ITEM: Fiber Optic Connectors SPEC: MIL-C-26482G			MFR: Bunker Ramo Corporation		MFR'S TYPE: 801-104 (Receptacles) 801-105 (Plug)		DATE TEST COMPLETED: 12-01-79 DATE TEST BEGUN: 9-10-79		SAMPLE NOS. FR. 1 TO 9	
Test Group	Data Ref. Page	Spec. Ref. Para.	Test Condition	Specification Limits	Measured Values		Number Samples		Remarks	
					Minimum	Maximum	Tested	Passed		
Group II & V, Samples 3, 6, 7, 8 and 9	131-141	4.6.10.1	<u>DIELECTRIC WITHSTANDING VOLTAGE - SEA LEVEL</u>	Hold 500 Volts AC RMS current leakage less than 5.0 MA	Held 1500 volts AC RMS No flashover or breakdown, current leakage did not exceed 2 u MA		Connectors 3	3	Met Requirements	
Group I & V, Samples 1, 2, 6, 7, 8 and 9	142-154	** 4.6.8.1	Fiber Optic Attenuation <u>INSULATION RESISTANCE, 25°C</u>	Change not to exceed 1 dB 500 Megohms Min.	0.055 dB	0.700 dB	Contacts 10	10		
Group I Samples 1 & 2	155-156	** 4.6.39	Fiber Optic Attenuation <u>SHELL CONDUCTIVITY</u>	Change not to exceed 1 dB 200 Millivolts Max. @ 1.0 ampere	2 x 10 ⁶ Megohms	2 x 10 ⁶	Connectors 6	6	Met Requirements	
Group I Samples 1 & 2	157-158	4.6.13	Fiber Optic Attenuation <u>THERMAL SHOCK</u>	Change not to exceed 1 dB No damage after 5 cycles -55°C, +125°C	0.066 dB	0.774 dB	Contacts 12	12		
					35.0	Millivolt Drop 39.0	Connectors 2	2	Met Requirements	
					0.045 dB	0.227 dB	Contacts 4	4		
					Cable insulation jacket receded from connector		Connectors 2	0	Fiber Optic Cable jacket due to 125°C temperature receded from contact and connector preventing an attenuation measurement. Fiber Optic Cable jacket unable to withstand high temperature extreme.	
					dB value not measurable		Contacts 4	0		
Group III Samples 4 & 5, Rev. B	159-160	4.6.18	<u>DURABILITY</u>	No damage after 500 cycles mate and unmate	No Damage		Connectors 2	2	Met Requirements	
Group III Samples 4 & 5 Rev. B	161-162	** 4.6.22	Fiber Optic Attenuation <u>RANDOM VIBRATION</u>	Change not to exceed 1 dB No discontinuity greater than one microsecond (power contacts). Monitor for optical discontinuity (fiber optic contacts). No damage	0.190 dB	0.898 dB	Contacts 4	4		
			50-2000 Hz 44 g's Max. 16 hours	Change not to exceed 1 dB No discontinuity greater than one microsecond (power contacts). Monitor for optical discontinuity (fiber optic contacts). No damage.	No optical discontinuity. No electrical discontinuity. No damage		Connectors 2	2	Met Requirements	
Group III Samples 4 & 5 Rev. B	163-164	** 4.6.24	Fiber Optic Attenuation <u>PHYSICAL SHOCK</u>	Change not to exceed 1 dB 300 g's, 3 msec Min.	0.020 dB	0.200 dB	Contacts 4	4		
					No optical discontinuity. No electrical discontinuity. No damage		Connectors 2	2	Met Requirements	
					0.150 dB	0.560 dB	Contacts 4	4		

* Per Amphenol RF Specification No. 349-50205

** Per Amphenol RF Specification No. 349-50206

Table 2. (cont.)

ITEM: Fiber Optic Connectors SPEC: MIL-C-26482G		: Amphenol "RF" Operations MFR: Buzier Ramo Corporation		MFR TYPE: 501-05 (Type 1)		: 301-05 (Type 1)		DATE TEST BEGUN: 9-10-79 DATE TEST COMPLETED: 12-01-79		SAMPLE NOS. FR. 1 TO 9	
Test Group	Data Ref. Page	Spec. Ref. Para.	Test Condition	Specification Limits	Measurements Values		Number Samples		Remarks		
					Minimum	Maximum	Tested	Passed			
Group III Samples 4 & 5 Rev. B	165-177	4.6.26	<u>HUMIDITY</u>	10 cycles, per MIL-STD-1344 Method 1002.2	No damage except slight recession of fiber optic cable jacket		<u>Connectors</u> 2		Met Requirements		
			Insulation Resistance	5000 megohms min.	Megohms						
			1) Initial	100 megohms min.	2 X 10 ⁶		2		2		
			2) During 10th cycle	5000 megohms min.	20,000		2		2		
			3) After 24 hrs. drying		2 X 10 ⁶		2				
Group III Samples 4 & 5 Rev. C	178-179	4.6.13	Fiber Optic Attenuation	Change not to exceed 1 dB	0.095 dB		<u>Contacts</u> 4		4		
			<u>THERMAL SHOCK</u>	No damage after 5 cycles -55°C, +25°C	Cable insulation jacket recessed from connector		<u>Connectors</u> 2		0		
			(Due to fiber optic cable receding from connector, test was repeated using Group III Samples 4 & 5)								
			Fiber Optic Attenuation	Change not to exceed 1 dB	dB value not measurable		<u>Contacts</u> 4		0		
Group Samples 6 & 7	180-181	4.2.28.1	<u>FLUID IMMERSION</u>	No damage, hand narrative, monitor for optical fiber attenuation	Cable insulation jacket recessed from connector		<u>Connectors</u> 2		0		
			Fiber Optic Attenuation	Change not to exceed 1 dB	Not Performed		-		-		
Sample 1-A Special Prepared Sample	182-183	4.6.13	<u>THERMAL SHOCK</u>	No damage after 5 cycles, -55°C, +125°C	Cable insulation jacket recessed from connector		<u>Connectors</u> 1		0		
			Replacement sample with new fiber optic cable assembly to contact method								
			Fiber Optic Attenuation	Change not to exceed 1 dB	dB value not measurable		<u>Contacts</u> 2		1		

PROGRAM DISCONTINUED PER NSC AND AMPHENOL "RF" OPERATIONS INSTRUCTIONS

• Per Ammend RF Specification No. 349.50205

Per Ampibond RF Specification No. 349-50206

SUMMARY OF RESULTS

→ The connector developed was Amphenol's 801 series multichannel bundle connector. The design consisted of adapting fiber optic bundle contacts to have the same external dimensions as an existing electrical contact for a multipin electrical connector. This was accomplished with a size 12 fiber optic contact, which fit into an unmodified MIL-C-26482G multipin electrical connector shell. This approach was compatible with the desired goal of the program. The connector shell was an already approved, tested MIL-SPEC component with off-the-shelf availability. The contacts can be mass-produced on automatic screw machines. This same principle was used in Amphenol's 801 series single fiber connector. The strength member attachment had to be designed so as not to interfere with the scheme for optical contact retention, which was identical to that for electrical contact retention. The connector can accommodate any combination of a total of eight wire or fiber optic bundle contacts in a quick-disconnect, size 18 shell, MIL-C-26482G series 2, class L, fluid resistant connector. The connector developed under their contract met all the initially established requirements. ←

Failures that occurred during tests were attributed to the fact that the fiber optic cable jacket and strength members did not meet the originally specified temperature extremes of -55° to 150°C. The connector design in MIL-C-26482G has a top temperature of 200°C. Although tests were limited to 125°C because of the cable limitations, shrinkage of the cable jacket and strength members resulted in failures during the fluid immersions and temperature shock tests. Procurement of fiber optic cable which meets the original cable specifications as listed in reference 1 would eliminate these failures.

RECOMMENDATIONS

1. Standardize connectors and cables to guarantee compatibility between components.
2. Develop single-fiber multipin connectors for 125 and 140 μm cable based on the same approach — a standard electrical pin shell with fiber optic contacts replacing the electrical contacts.

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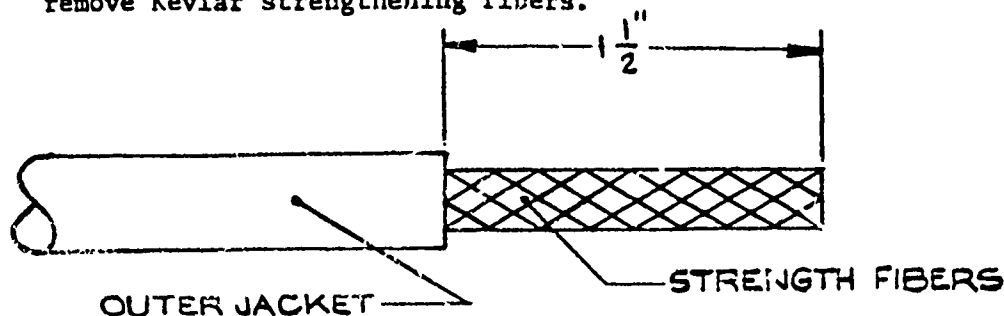
REVISIONS

SYM.	DESCRIPTION	DATE	APPROVED
A	RELEASE 26050	6/16/78	<i>[Signature]</i>
B	DELETE NOTE ON CABLE DEVELOPMENT	10/30/78	<i>[Signature]</i>
C	SHEET 2 AND 3 RE-DRAWN (ECR # 27259)	11/31/80	GMC <i>[Signature]</i>

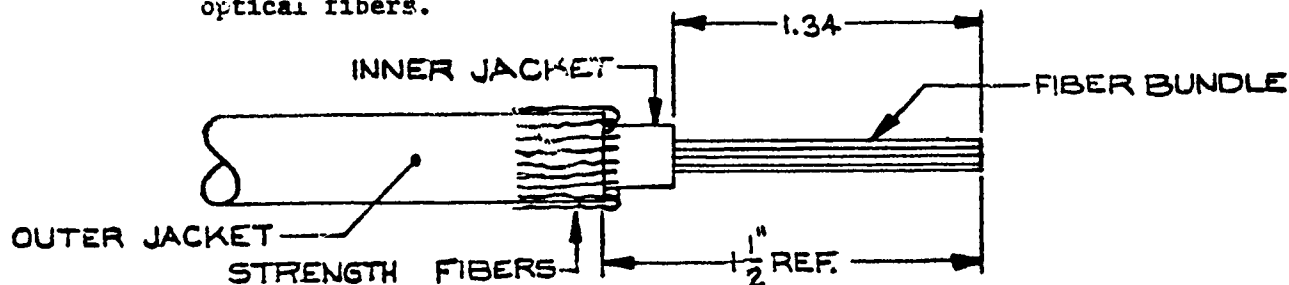
NAME		DATE	AMPHENOL RF DIVISION DANBURY, CONN.		
REP. <i>KJ Monaghan</i>		6/16/78	SPECIFICATION TITLE: Termination & Polishing Procedure for Multi Channel Fiber Optic Connectors Using Strengthened Optical Cable		
BY <i>J. Laporte</i>		6/16/78			
CHKD <i>[Signature]</i>		6/16/78			
DATE ISSUED <i>JUNE 16, 1978</i>		6/16/78			
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FRACTIONS $\pm \frac{1}{64}$	DECIMALS $\pm .005$	ANGLES $\pm 1^\circ$	SCALE: NONE	SHEET 1 CONT. ON 2	

1. Cable Preparation

- 1.1 Remove outer jacket for a length of $1\frac{1}{2}$ ". CAUTION: Do not cut or remove Kevlar strengthening fibers.



- 1.2 Draw strength fibers back over outer jacket. Remove 1.34" of inner cable jacket to expose the optical fibers. (Remove serving thread that is wrapping the fibers.) Be careful not to break any of the optical fibers.



- 1.3 Clean the exposed fiber bundle and 1 to 2 inches under the jacket by either dipping the cable and in liquid Freon TF or by spraying the fibers with spray Freon TF. CAUTION: Do not breathe vapors.
- 1.4 Mix the epoxy per the manufacturer's instructions (recommended epoxy is EPO-TEK 353 N.D. mixed 100 parts of resin and 10 parts of catalyst by weight.)
- 1.5 Bundle strength fibers together and lay parallel to glass fiber bundle. Carefully slip ferrule over both and slide onto cable up to approx. $\frac{3}{8}$ " from the outer jacket of fiber optic cable.
- 1.6 Apply epoxy sparingly to exposed strength members and slide ferrule over epoxied area to abut with the outer jacket of fiber optic cable.
- 1.7 Separate strength fibers from glass fiber bundle and draw in direction of ferrule from exposed glass fibers.
- 1.8 Apply a drop of epoxy to the glass fiber bundle and work into bundle to cause epoxy to cover the surfaces of the fibers for a distance up to within $\frac{1}{2}$ " of the inner jacket.

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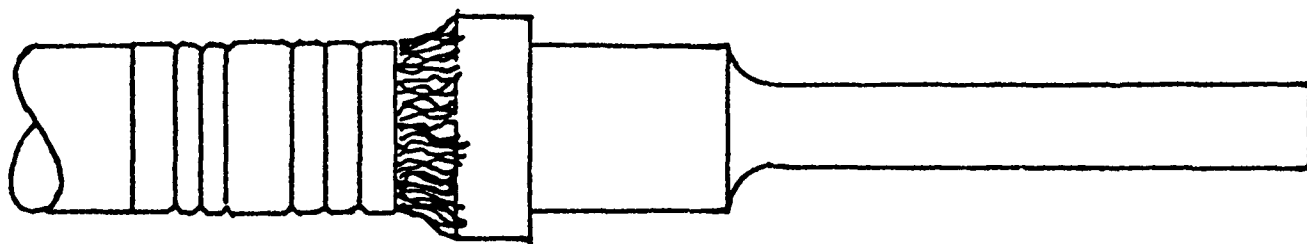
Bunker Ramo Corporation • Danbury, Connecticut

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ARE: FRACTIONS DECIMALS ANGLES $\pm \frac{1}{64}$ $\pm .005$ $\pm 1^\circ$	CODE IDENT.	SPECIFICATION No. 349-50239	ISSUE C
SCALE		SHEET 2 CONT. ON 3	

- 1.9 Slip contact onto glass fiber bundle until it butts against the crimp ferrule. Draw strength fibers tight, keep contact in place against ferrule. Place assembly into crimping tool (Handle Amphenol #227-944, Die Set Amphenol #227-909-2022) and register contact collar in recess provided for it. Check for maintaining positioning of contact ferrule and that strength fibers are held tight. Close handle of crimp tool affecting crimping of the ferrule. Put one drop of epoxy on fibers where they project through nose of contact.
- 1.10 Place crimped assembly under a source of heat and cure epoxy at a temperature of 120° C for 15 minutes minimum. When epoxy on fibers at nose of contact turns red, the epoxy is cured. Care should be exercised so that curing temperature is not exceeded or cable jacket will be damaged.
- NOTE: Red epoxy should also be evident at back of crimped ferrule on strength members if properly assembled.
- 1.11 Allow assembly to cool to room temperature.
2. Polishing Procedure
- 2.1 Snap off excess fibers that project from end of contact.
- 2.2 Insert contact into polishing tool.
Use Tool #227-909-2021 for socket contact (801-999-5124).
and Tool #227-909-2020 for receptacle contact (801-999-5125).
- 2.3 Polish using 60 micron polishing film; bring fibers to within .010" of contact tip. Polish using water as a lubricant and coolant.
- 2.4 Using successively finer polishing film, repeat process until fibers are brought into plane of end of contact and no further material is removed. The final polishing step should be accomplished using 1 micron polishing film.
- 2.5 Dry and examine under 50X magnification for gross imperfections. Be sure the optical surface is flat and free of scratches, chips or epoxy smears.
- 1 EPO-TEK 353 N.D. -- Epoxy Technology, Inc.
65 Grove Street
Watertown, Mass. 02172
- 1 Imperial -- Lapping Film Sheets
3M Company
St. Paul, Minn. 55101
- 2.6 Remove strength fibers from front end of ferrule (cut flush with razor blade). Inspect retention collar area of contact. Be certain that any stray epoxy is removed from the surfaces. (See following page for illustration.)

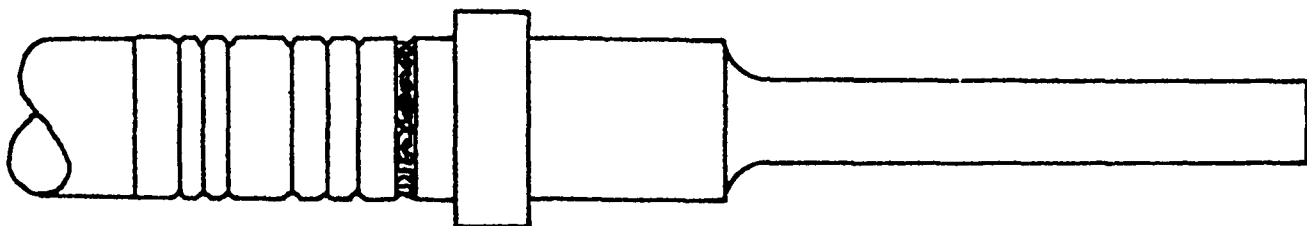
BUNKER RAMO AMPHENOL NORTH AMERICA Bunker Ramo Corporation • Danbury, Connecticut	
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES: AND TOLERANCES ARE: FRACTIONS DECIMALS ANGLES $\pm \frac{1}{64}$ $\pm .005$ $\pm 1^\circ$	CODE IDENT. SPECIFICATION No. 349-50239 SCALE
SHEET 3 CONT. ON 4	ISSUE C

CAUTION: If procedure described in 2.6 is not adhered to during terminating a fiber optic cable, the contact retention system of the connector will be damaged and the contact will fail to remain captivated.



IMPROPER ASSEMBLY

FIG. 1.



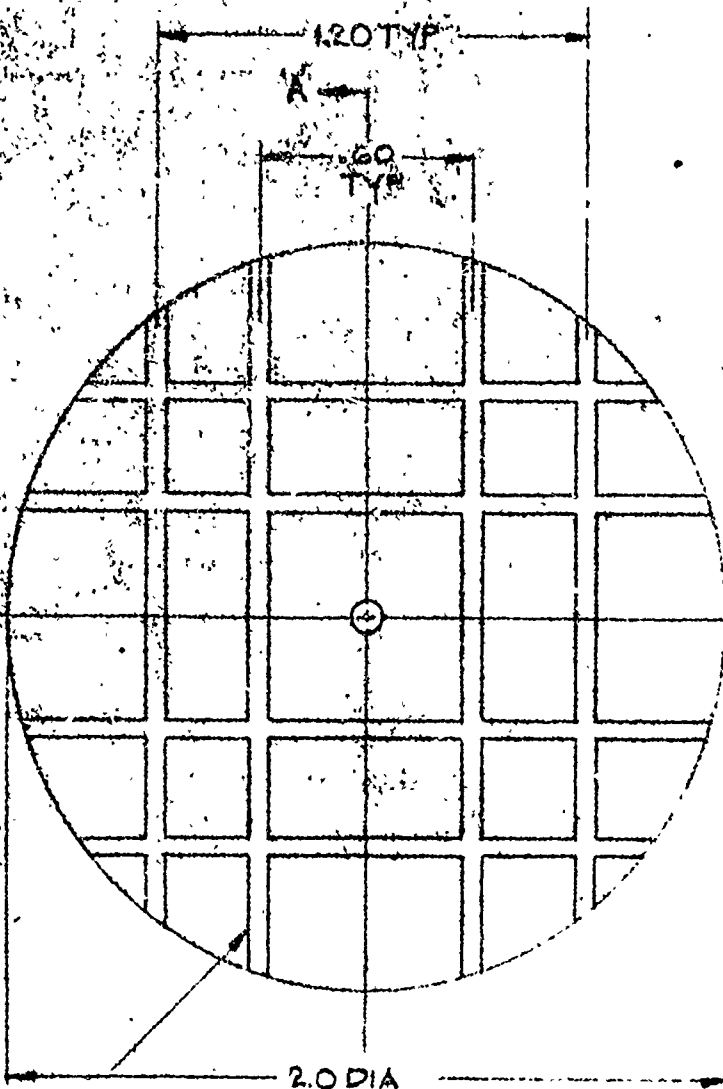
THIS AREA TO BE FREE OF PROJECTING STRENGTH FIBERS
AND STRAY DEPOSITS OF EPOXY
CORRECT ASSEMBLY

FIG. 2.

AMPHENOL RF DIVISION, DANBURY, CONN.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. AND TOLERANCES ARE:			CODE IDENT.	SPECIFICATION No.	ISSUE
FRACTIONS	DECIMALS	ANGLES		349-50239	C
$\pm \frac{1}{64}$	$\pm .005$	$\pm 1^\circ$	SCALE: —	SHEET 4 CONT. ON	

DO NOT SCALE THIS DRAWING



.015 x 45° CHAMFER
8 PLACES

+ .0004
- .0000
.072 DIA
1 A .001

+ .0003
- .0000
.0377

.03 x .03 SLOTS
8 REQ'D.

614

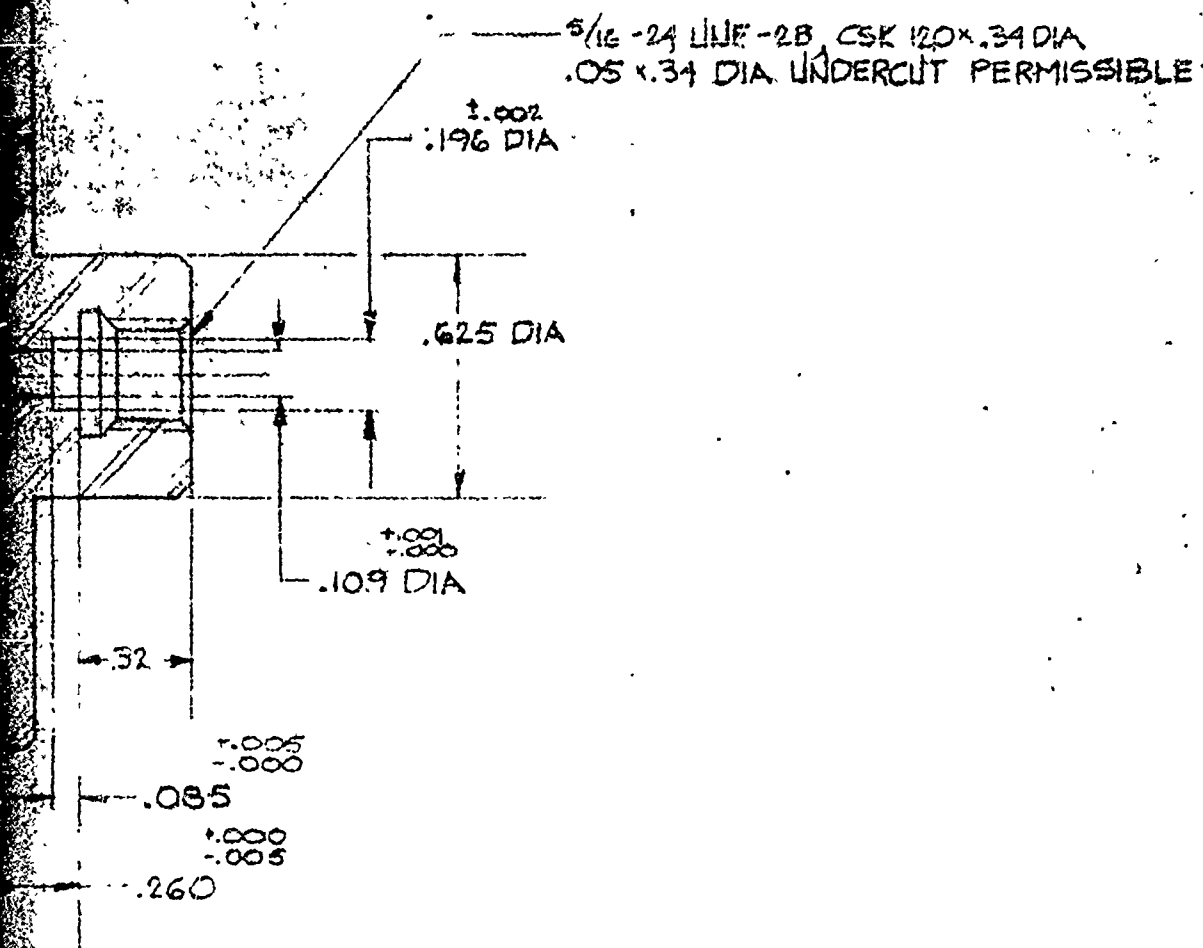
SECTION

REMOVE ALL BURRS, BREAK CORNERS
AND SHARP EDGES .005 MAXIMUM
UNLESS OTHERWISE SPECIFIED

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		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES NOT OTHERWISE SPECIFIED ARE:			DRAWN RE		
NEXT ASSY		USED ON		2 PLACE DECIMAL ±.015 (0,381 mm)	3 PLACE DECIMAL ±.005 (0,127 mm)	ANGLES °	CHECK K.M.
MATERIAL		STAINLESS STL		REFERENCE DRAWING NO			END K.M.
SPECIFICATION		TYPE 303		1530-700111			APPRO OVAL
FINISH		PASSIVATE					APPRO OVAL

ENG 227-909-5022	REVISIONS				
DRAWING NUMBER	SYM	DESCRIPTION	DATE	E.C.O. NO.	APPR
	A	OFFICIAL ENG. RELEASE TO MFG.	6/16/78	26050	RPM



SECTION A-A

PART NO.	QUAN	UOM	ITEM LIST NO	DESCRIPTION	CODE	FINISH
LIST OF MATERIAL						

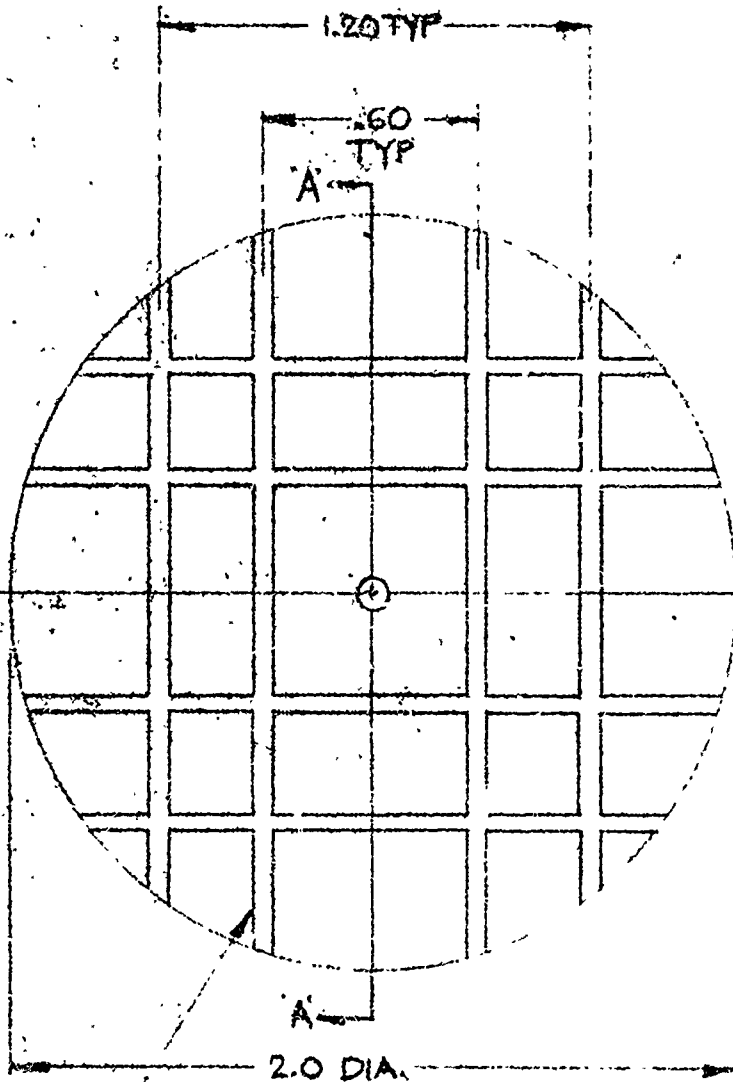
DRAWN BY REM		DATE 6/6/78		TITLE	
CHECKED K. J. Morahan		DATE 6/8/78		POLISHING DISK SOCKET CONTACT	
ENGINEER R. R. Ricketts		DATE 6/16/78			
APPROVED [Signature]		DATE 6/16/78			
QUALITY ASSURANCE R. R. Ricketts		DATE 6/16/78			
MFG. ENG. R. R. Ricketts		DATE 6/16/78		74868 B 227-909-5022	

RELISPEC DRAWING **AMPHENOL**

AMPHENOL RF OPERATIONS
33 East Franklin St. • Danbury, Conn. 06810

SCALE 2/1 SHEET 1 OF 1

DO NOT SCALE THIS DRAWING



.03 x .03 SLOTS
Ø REQ'D

614

REMOVE ALL BURRS, BREAK CORNERS
AND SHARP EDGES .005 MAXIMUM
UNLESS OTHERWISE SPECIFIED.

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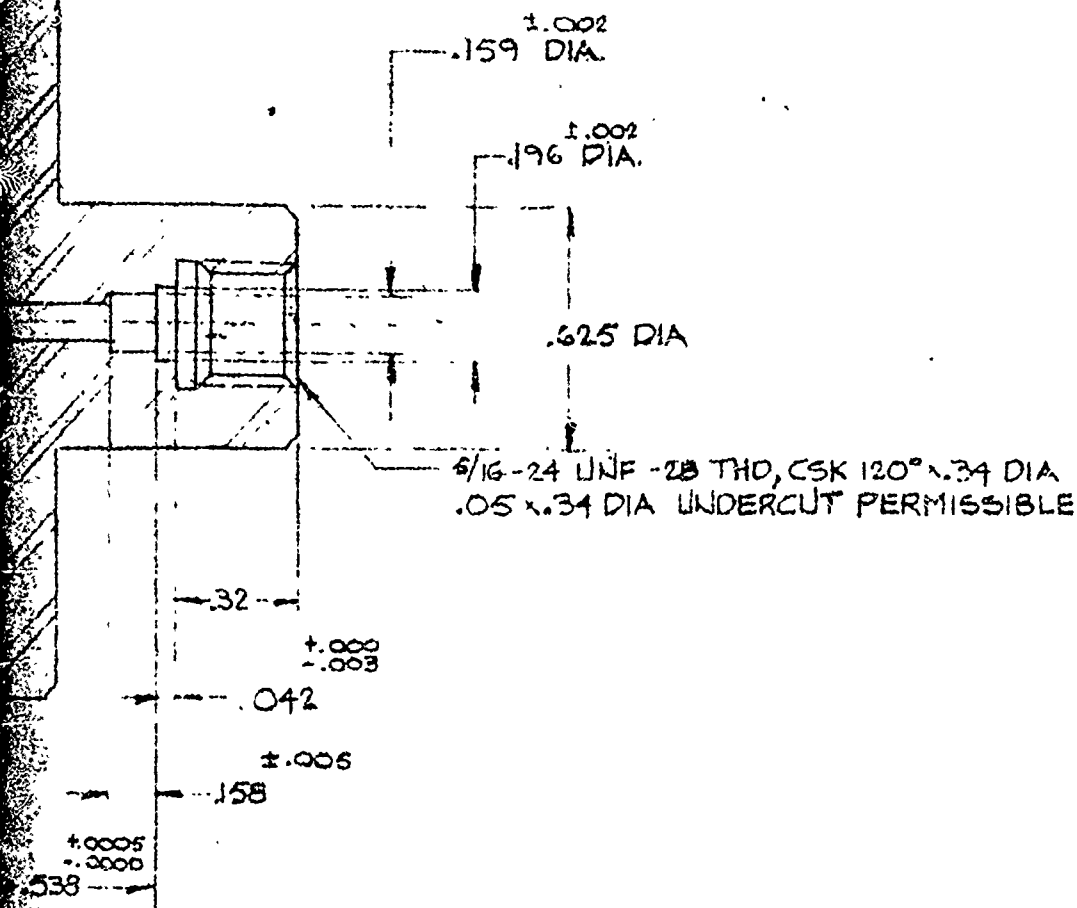
		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES NOT OTHERWISE SPECIFIED ARE. 2 PLACE DECIMAL + .015 (0.381 mm) 3 PLACE DECIMAL ± .005 (0.127 mm) ANGLES + 10 REFERENCE DRAWING NO 1530-700111 /	DR R. CH K EN APP QU M
NEXT ASSY	USED ON		
MATERIAL STAINLESS STL			
SPECIFICATION TYPE 303			
FINISH PASSIVATE			

- A -
0.002

.538

227-909-5023

DRAWING NUMBER	SYM	DESCRIPTION	DATE	E.C.O. NO.	APPR
	A	OFFICIAL ENG. RELEASE TO MFG.	6/16/78	26050	



PART NO.	QUAN	UOM	ITEM 1, 2, 3, 4, 5	DESCRIPTION	CODE	FINISH
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DRAWN BY REM	DATE 6/6/78
CHECKED BY <i>E. Monaghan</i>	DATE 6/8/78
ENGINEER <i>E. Monaghan</i>	DATE 6/16/78
APPROVED <i>E. Monaghan</i>	DATE 6/16/78
QUANTITY ASSURANCE <i>E. Monaghan</i>	DATE 6/16/78
WFO ENG. <i>E. Monaghan</i>	DATE 6/16/78

POLISHING. DISK

PH CONTACT

**SUNKER
DAME**

AMPHENOL

AMPHENOL RF OPERATIONS
33 East Franklin St. • Danbury, Conn. 06810

SCALE 2/1

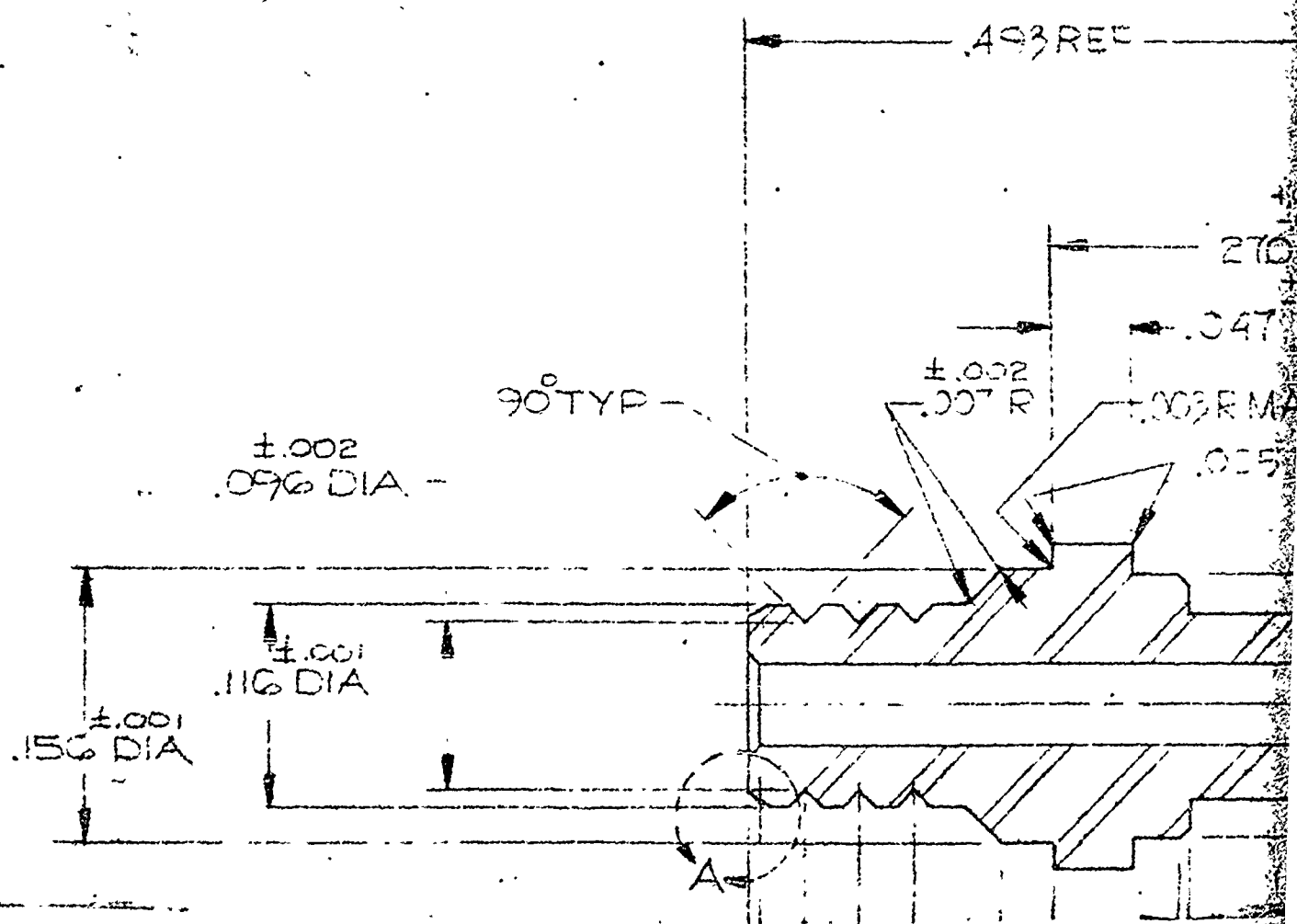
SHEET 1 OF 1

CODE IDENTIFICATION	DRAWING SIZE	DRAWING NO
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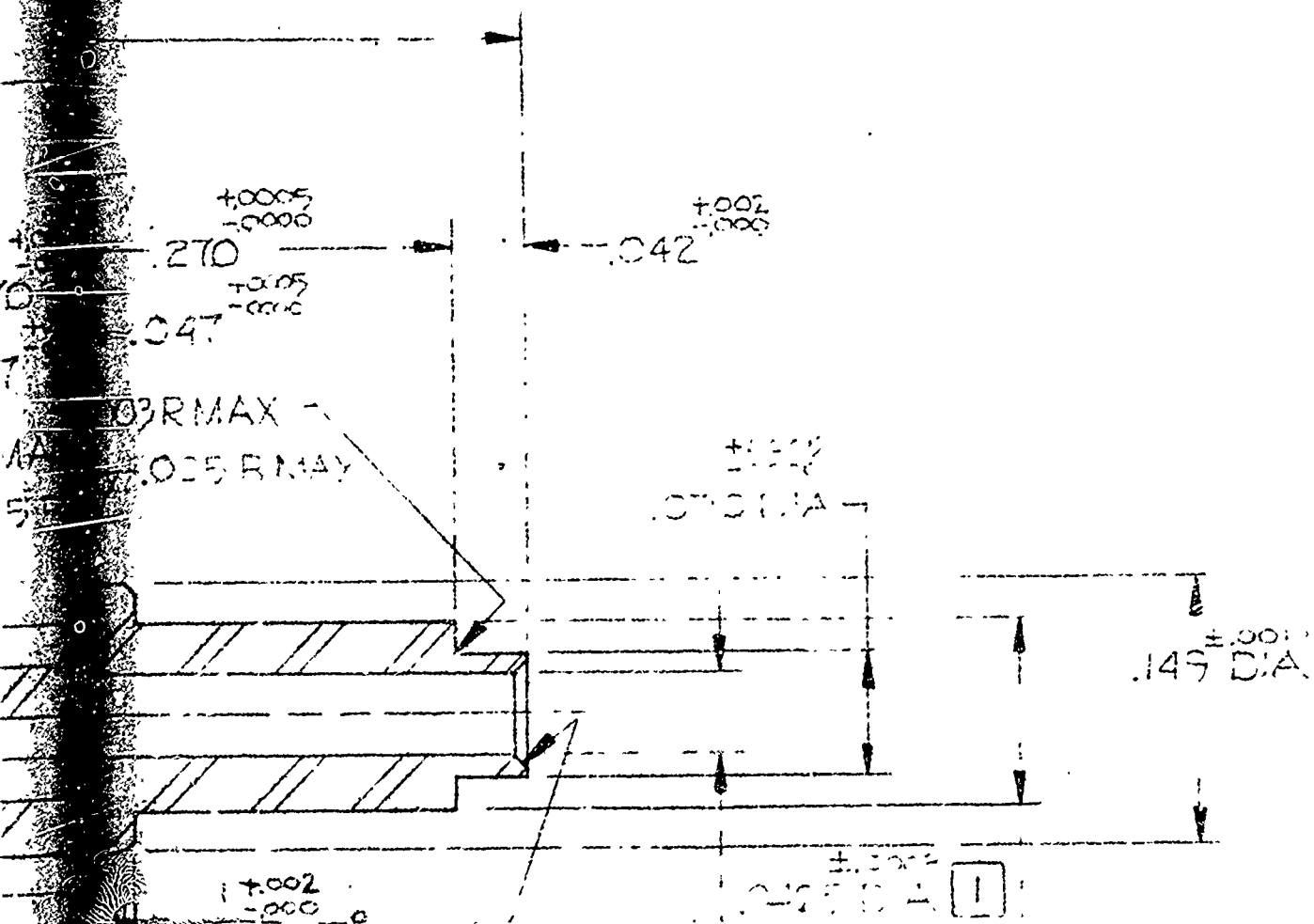
74868

B

227-909-5028

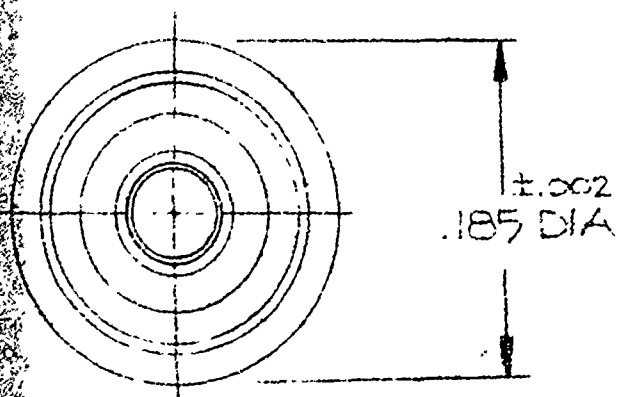


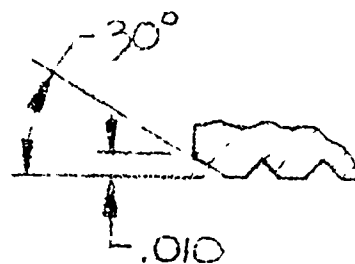
SYM	DATE
A	OFFICIAL ENG



REVISIONS

DESCRIPTION	DATE	E.C.O. NO.	APPR.
ACIAL ENG. RELEASE TO MFG.	6/16/78	26050	KM





VIEW A

.010 x 45°

.031 ±.002

.031 ±.002

±.002

.083

.80

NOTES

1. CONCENTRICITY AND HOLE SIZE SHALL APPLY FOR FIRST 1/16 OF DEPTH. FOR REMAINDER A HOLE SIZE OF .046 ±.005 DIA AND A CONCENTRICITY OF .003 DIA SHALL APPLY

REMOVE ALL SHARP BREAK CORNERS AND CHAMFER EDGES TO MAXIMUM UNLESS OTHERWISE SPECIFIED

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NEXT
MATERIAL
STA
SPECIFIC
TYPE
FINISH
PAGE

007-47
 .028 ±.002
 ±.001
 .021

⊙ A 100 A

+0003
 -0000
 L107C DIA
 -A-

BREAK EDGE .001/.003

DIA

PART NO.	QUAN	UOM	ITEM LINE NO	
LIST OF MATERIALS				

NEXT ASSY		USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES NOT OTHERWISE SPECIFIED ARE:			DRAWN BY	DATE	TITLE
SERIAL			2 PLACE DECIMAL ±.015 (0.381 mm)	3 PLACE DECIMAL ±.005 (0.127 mm)	ANGLES ± 1°	K M	6/7/78	SOCK
STAINLESS STL.			REFERENCE DRAWING NO.			CHECKED	DATE	
SPECIFICATION			1530 - 700 L11			ENGINEER	DATE	
TYPE 303						APPROVED	DATE	
SSVATE						QUALITY ASSURANCE	DATE	
						MPK BRG	DATE	

801-5024

DRAWING NUMBER

ISSUE

A

ITEM LINE NO	DESCRIPTION	CODE	FINISH
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LIST OF MATERIAL

TITLE

SOCKET CONTACT



AMPHENOL

AMPHENOL RF OPERATIONS

33 West Franklin St. Danbury, Conn. 06810

SCALE 10/1

SHEET

1 OF 1

CODE IDENTIFICATION CHANGING SIZE DRAWING NO

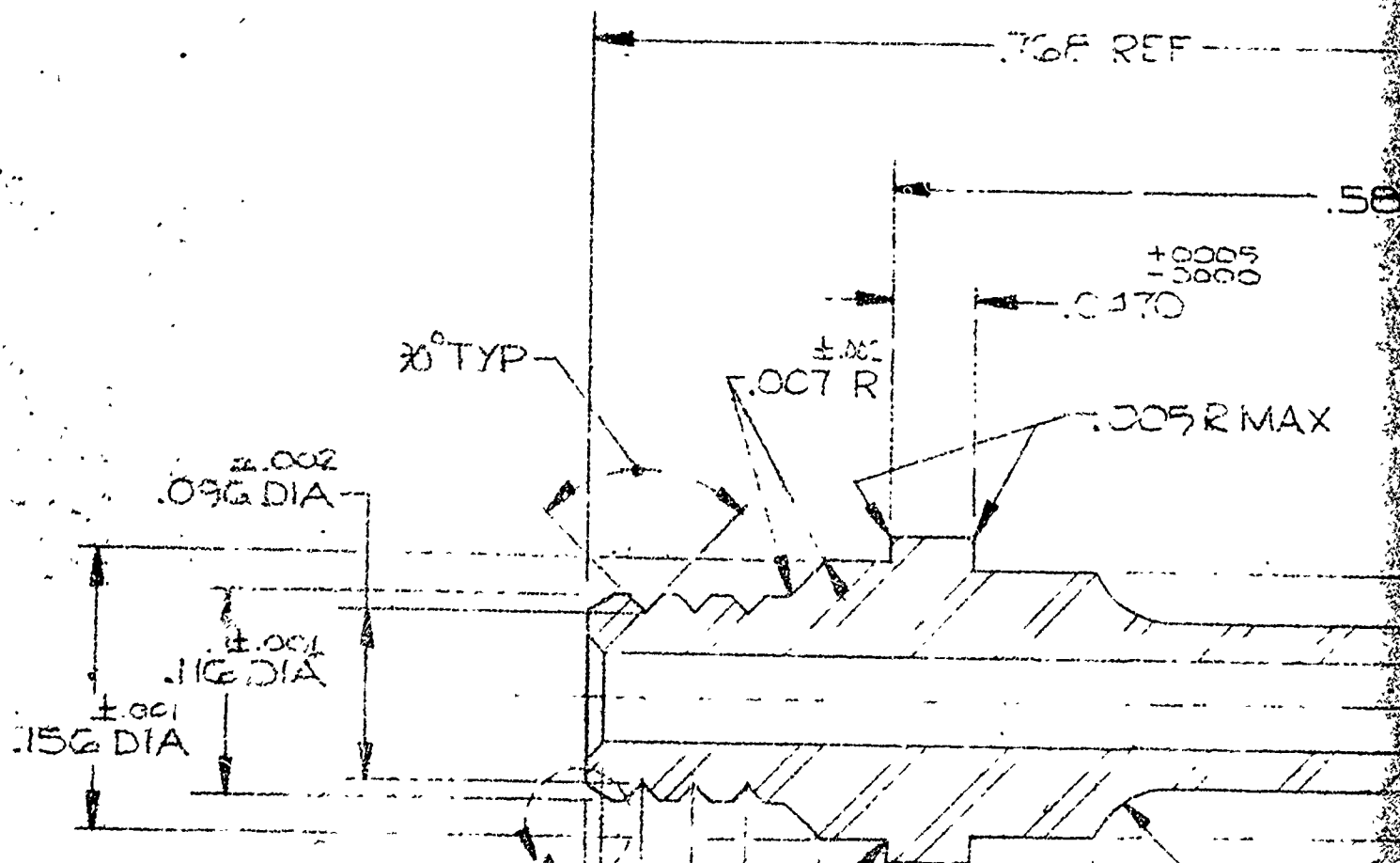
ISSUE

4868

C

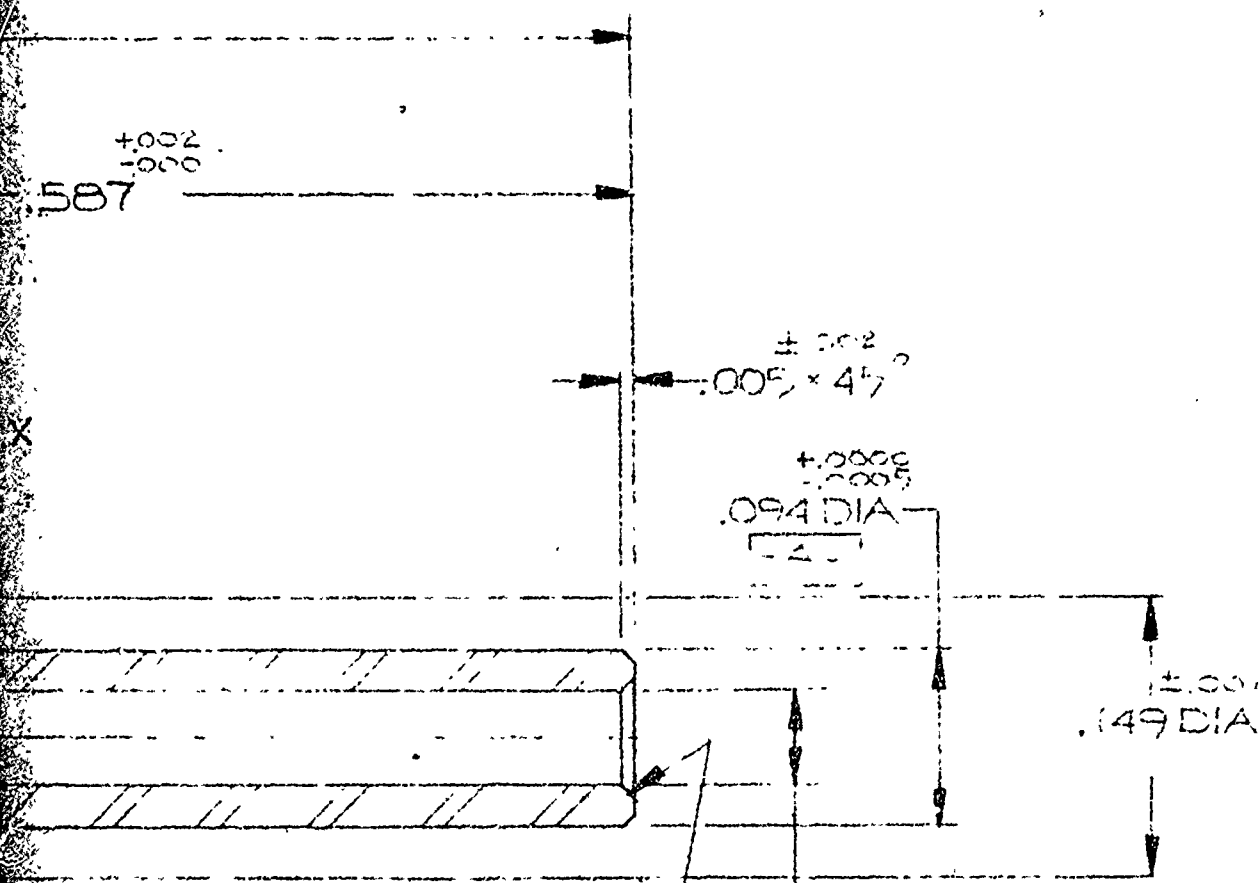
801-5024

A



DO NOT SCALE THIS DRAWING

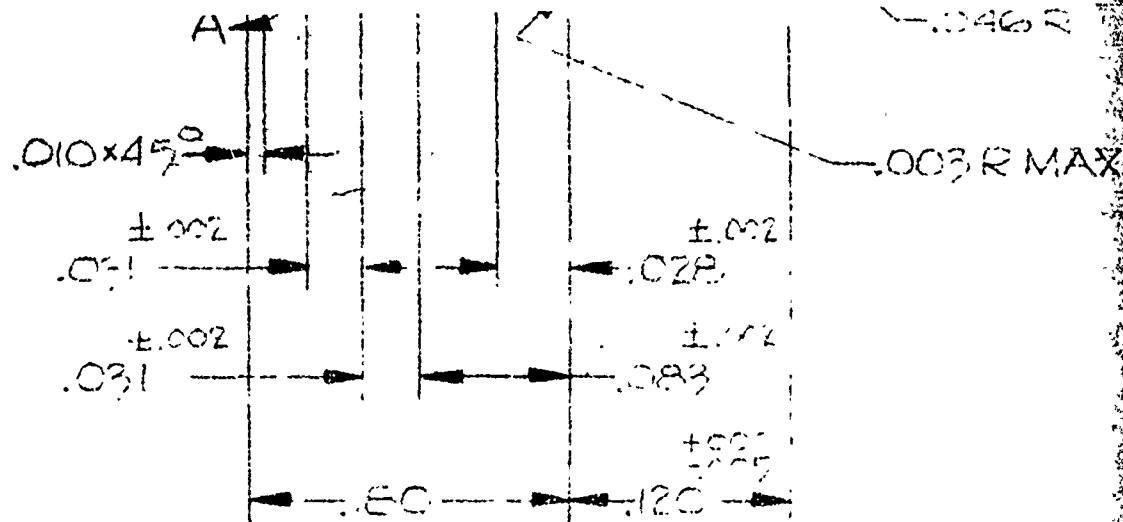
SYM	DES
A	OFFICIAL EING



REVISIONS

DESCRIPTION	DATE	E.C.O. NO.	APPR.
SPECIAL ENG. RELEASE TO MFG.	6/16/75	26050	EWJ/MS

±.002
.185 DIA



NOTES

- 1 CONCENTRICITY AND HOLE SIZE APPLY FOR FIRST .06 OF DEPTH. FOR REMAINDER, A HOLE SIZE OF .046 $\pm .002$ DIA AND A CONCENTRICITY OF .003 DIA SHALL APPLY.

614

REMOVE ALL BURRS, BREAK CORNERS AND SHARP EDGES .005 MAXIMUM UNLESS OTHERWISE SPECIFIED

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NEXT ASSY

MATERIAL
STAINLESS

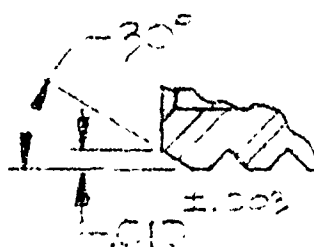
SPECIFICATION
TYPE 304

FINISH
PASSIVE

BREAK EDGE .001.003

±.0003
-.0465 DIA

±.0003 DIA



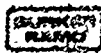
VIEW A

PART NO.	QUAN	UOM	ITEM LINE NO	

LIST OF MATERIALS

ASSY UNLESS STL. PART NO. PE 303 PRIVATE	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES NOT OTHERWISE SPECIFIED ARE: 2 PLACE DECIMAL ±.015 (0,381 mm) 3 PLACE DECIMAL ±.005 (0,127 mm) ANGLES ± 1°	DRAWN BY <i>K. M. ...</i> DATE 5/20/78	TITLE PIN COR CODE IDENTIFICATION 74868
		REFERENCE DRAWING NO	CHECKED KJM DATE 6/14/78	
		1530-700111	ENGINEER <i>K. Brickett</i> DATE 6/16/78	
			APPROVED <i>[Signature]</i> DATE 6/16/78	
			QUALITY ASSURANCE <i>[Signature]</i> DATE 6/16/78	
			MFG ENG <i>K. Brickett</i> DATE 6/16/78	

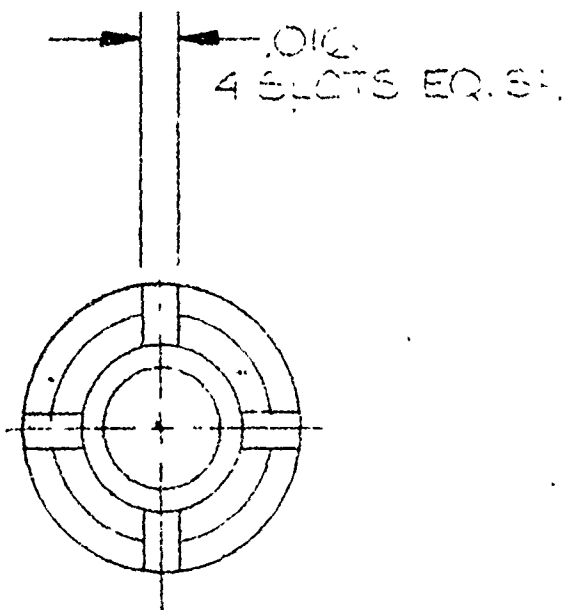
801-5025	
DRAWING NUMBER	ISSUE
	A

DESCRIPTION		CODE	FINISH
OF MATERIAL			
CONTACT		 AMPHENOL AMPHENOL RF OPERATIONS 33 East Franklin St. Danbury, Conn. 06817	
SCALE 1/4" = 1"		SHEET 1 OF 1	
IDENTIFICATION	DRAWING SIZE	DRAWING NO.	ISSUE
1868	C	801-5025	A

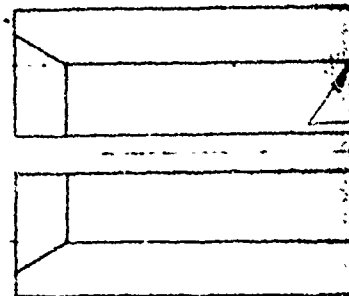
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DO NOT SCALE THIS DRAWING

REMOVE ALL BURRS BREAK CORNERS AND SHARP EDGES .005 MAXIMUM UNLESS OTHERWISE SPECIFIED



© A. R. A.



C-1

OFFICIAL ENG. REL.

NEXT ASSY

USED ON

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES NOT OTHERWISE SPECIFIED ARE

2 PLACE	3 PLACE	ANGLES
DECIMAL	DECIMAL	
.015	.005	
(0.381 MM)	(0.127 MM)	

MATERIAL
DELFIN, WHITE

SPECIFICATION

FINISH

801-5026

ORIGINAL
CHECKED
DATE

801-5026

CRAWING NUMBER

ISSUE

A

REVISIONS

ZONE	SYM	DESCRIPTION	DATE	ECO NO	APPR
	A	ENG RELEASE	6/16/78	26050	KSM/KSM

.003 MAX

30°

±.001
.074 DIA

±.0004

.106 DIA

±.002

.152 DIA

±.010

-A-

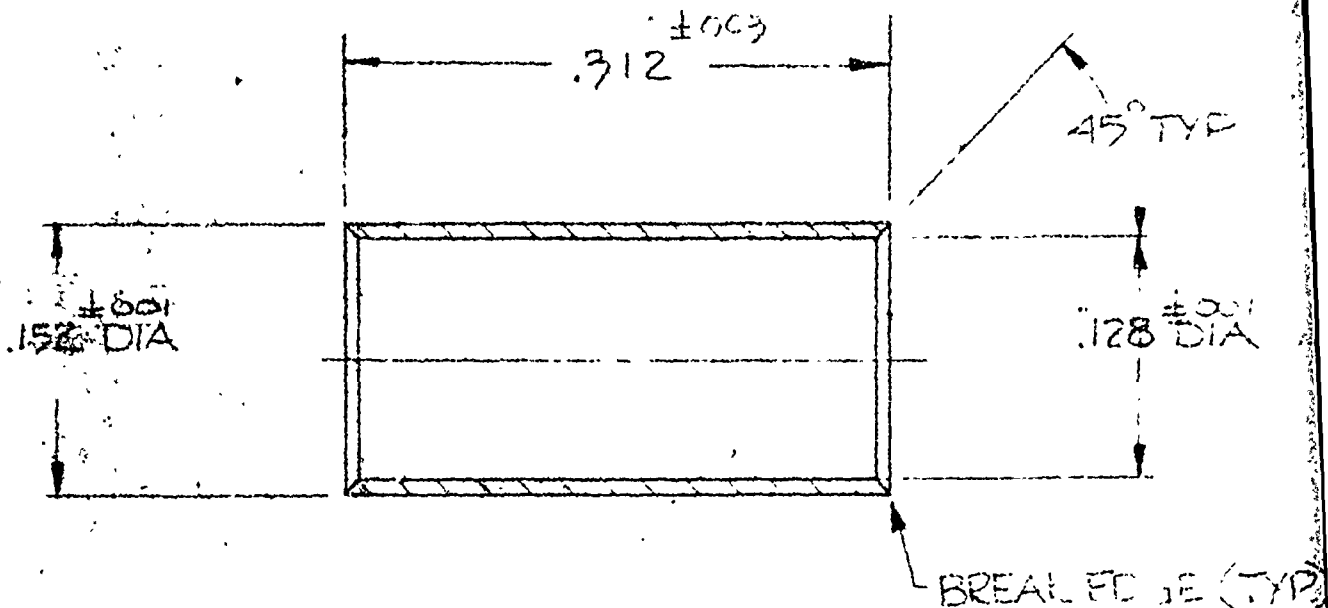
±.002

18.0

LIST OF MATERIAL

PART NO	QUAN	UOM	REV	DESCRIPTION	CODE	FINISH
Q.A. RPA 6/16/78 DESIGNED BY: K. J. H. 6/16/78 CHECKED: KSM 6/14/78 APPROVED: K. J. H. 6/16/78 REFERENCE DRAWING NO: 1530-100111						
TITLE				ALIGNMENT SLEEVE AMPHENOL AMPHENOL RF DIVISION 33 East Franklin St • Danbury, Conn 06810		
CODE IDENTIFICATION		DRAWING SIZE		DRAWING NO.		ISSUE
		B		801-5026		A
SCALE 10/1				SHEET 1 OF 1		

DO NOT SCALE THIS DRAWING



NOTES

- 1 MATERIAL: SEAMLESS COPPER TUBING, ALLOY #122 (DHP)
HARD DRAWN TO ROCKWELL 58-77 ON 30-T SCALE PER ASTM B7
- 2 AFTER MACHINING AND PRIOR TO PLATING, ANNEAL TO A ROCKWELL HARDNESS OF 55 MAX ON THE 15-T SCALE (ONLY ONE THK OF SHALL BE BETWEEN THE PENETRATOR AND THE BASE OF THE TEST)
- 3 BRIGHT NICKEL PER QQ-N-290, .00005 MIN

REMOVE ALL BURRS, BREAK CORNERS AND SHARP EDGES .005 MAXIMUM UNLESS OTHERWISE SPECIFIED.

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		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES NOT OTHERWISE SPECIFIED ARE:			DRAWN BY K. M. M.
NEXT ASSY	USED ON		2 PLACE DECIMAL ±.015 (0.381 mm)	3 PLACE DECIMAL ±.005 (0.127 mm)	CHECKED
MATERIAL 1			ANGLES + 10		ENGINEER
SPECIFICATION 2			REFERENCE DRAWING NO 31-903-31654E-2		APPROVED [Signature]
FINISH 3					QUALITY [Signature]
					INFO [Signature]

801-5027

REVISIONS

DRAWING NUMBER	SYM	DESCRIPTION	DATE	E.C.O. NO.	APP.
	A	OFFICIAL ENG. RELEASE TO MFG.	MAY 30 1978	25949	
	E	ATING CALLOUT REVISED	6-16-78	26075	

(TYP)

M L75 (NASCENT 1/4" 31-135-234)

CKEVELL
OF ATL
ESTER

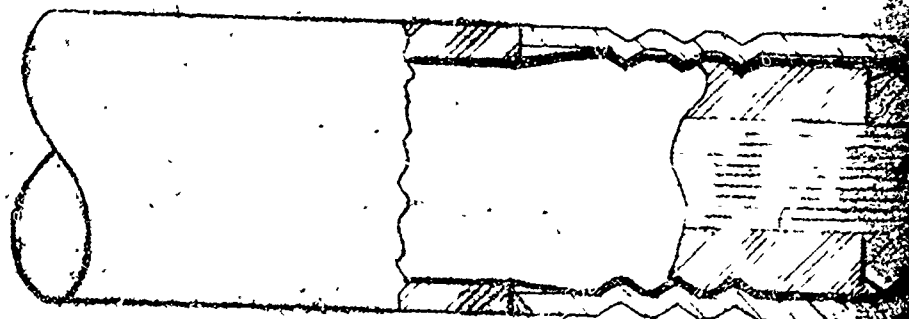
PART NO	QUAN	UOM	ITEM LIST NO	DESCRIPTION	CODE	FINISH
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LIST OF MATERIAL

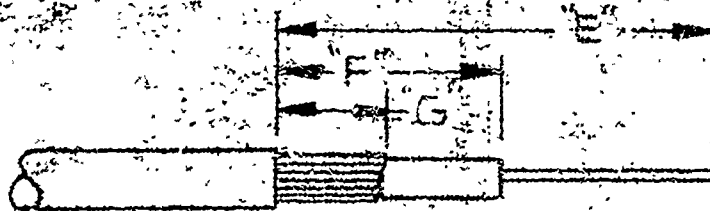
DRAWN BY <i>W. J. R. R. R.</i>	DATE 5/11/78	TITLE CRIMP FERRULE	 AMPHENOL
CHECKED	DATE		
ENGINEER	DATE		
APPROVED	DATE		
APPROVED <i>Alabala</i>	DATE 5/24/78	AMPHENOL RE OPERATIONS 33 East Franklin St. • Danbury, Conn. 06810	SCALE 20/1 SHEET 1 OF 1
QUALITY ASSURANCE <i>W. J. R. R. R.</i>	DATE 5/15/78		
DATE 5/30/78			
CODE IDENTIFICATION		DRAWING SIZE	DRAWING NO.
74868		B	801-5027

6 CABLE (REF) —

.84
21,3 mm



DO NOT SCALE THIS DRAWING



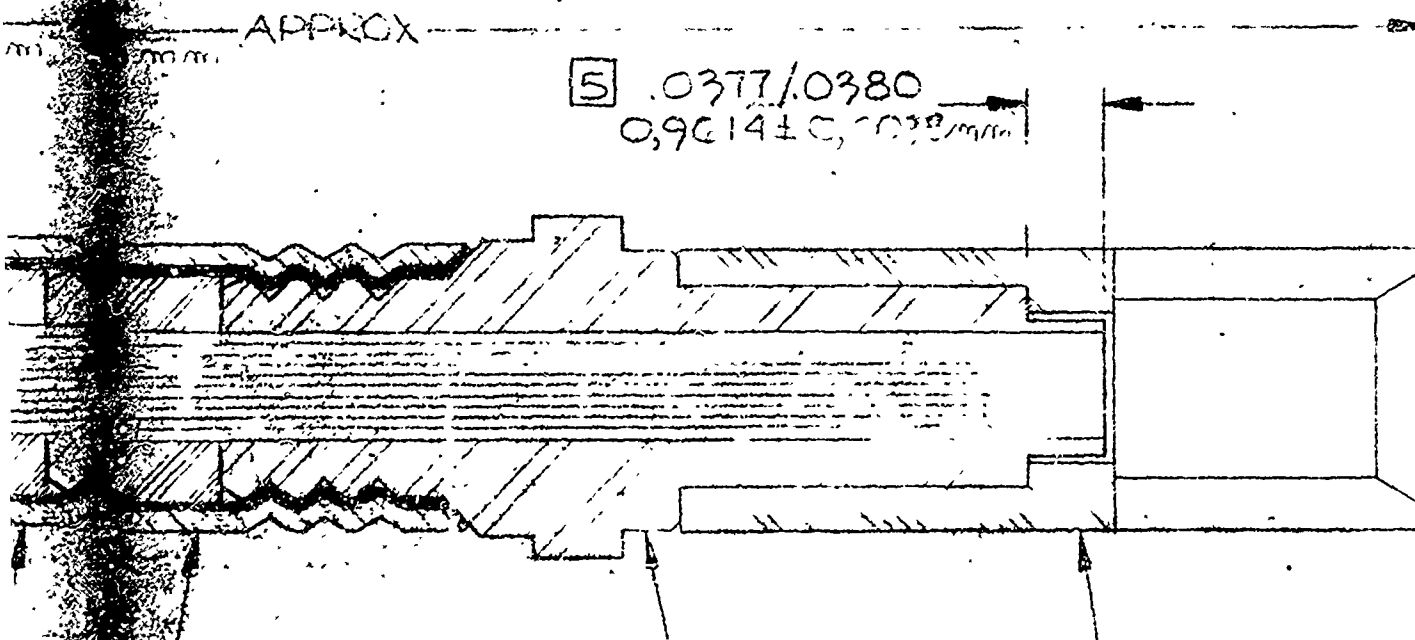
SYM	DE
A	OFFICIAL EN

RECOMMENDED STRIPPING DIMENSIONS

801-999-5124	1.5	.16	40
ASSEMBLY	"E"	"F"	"G"

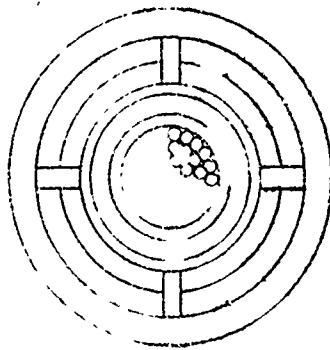
APPROX

5 .0377/.0380
0.9614 ± 0.0030 mm



REVISIONS

DESCRIPTION	DATE	E.C.O. NO.	APPR.
OFFICIAL ENG. RELEASE TO MFG.	6/16/78	26050	KSW/KM



NOTES

ITEMS 1, 2, AND 3 ARE SHIPPED LOOSE

2 THE ASSEMBLIES SHOWN ARE INTENDED FOR USE
IN THE 801-105-5208 PLUG ENVIRONMENTAL CONNECTOR
SERIES

CUSTOMER NOTE - CRIMP CABLE STRAIN RELIEF
TUBES TO CONNECTOR BODY WITH AMPHENOL FRAME
227-944 A TO AMPHENOL DIE SET 227-909-2022.
SEE AMPHENOL SPEC. 349-50239 FOR TERMINATION PROCEDURE

5 CUSTOMER NOTE - INDICATES "AFTER POLISHING" DIM.
USE AMPHENOL POLISHING TOOL 227-909-202

THIS CONTACT ASSEMBLY IS INTENDED FOR USE WITH
CABLE DEVELOPED UNDER NAVY CONTRACT NO.
N00123-77-C-0062 (AMPHENOL #9-382-46)

REMOVE ALL BURNS, BREAK CORNERS,
AND SHARP EDGES .005 MAXIMUM
UNLESS OTHERWISE SPECIFIED.

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NEXT ASSY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466
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SPECIFICATION

FINISH

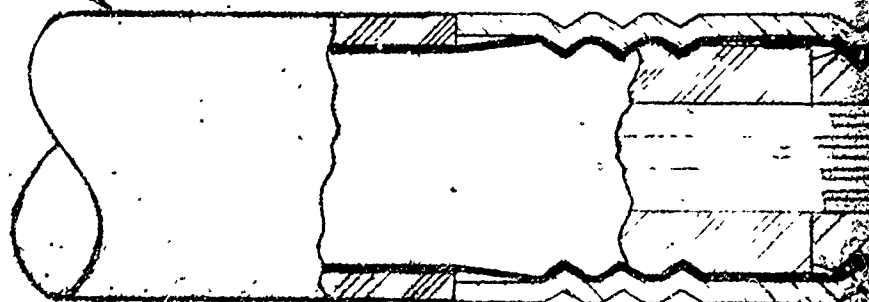
107

A

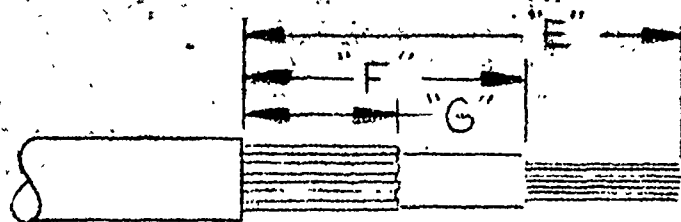
CONFIDENTIAL

6 CABLE (REF)

99
29,62 mm



DO NOT SCALE THIS DRAWING



SYM

DES

A

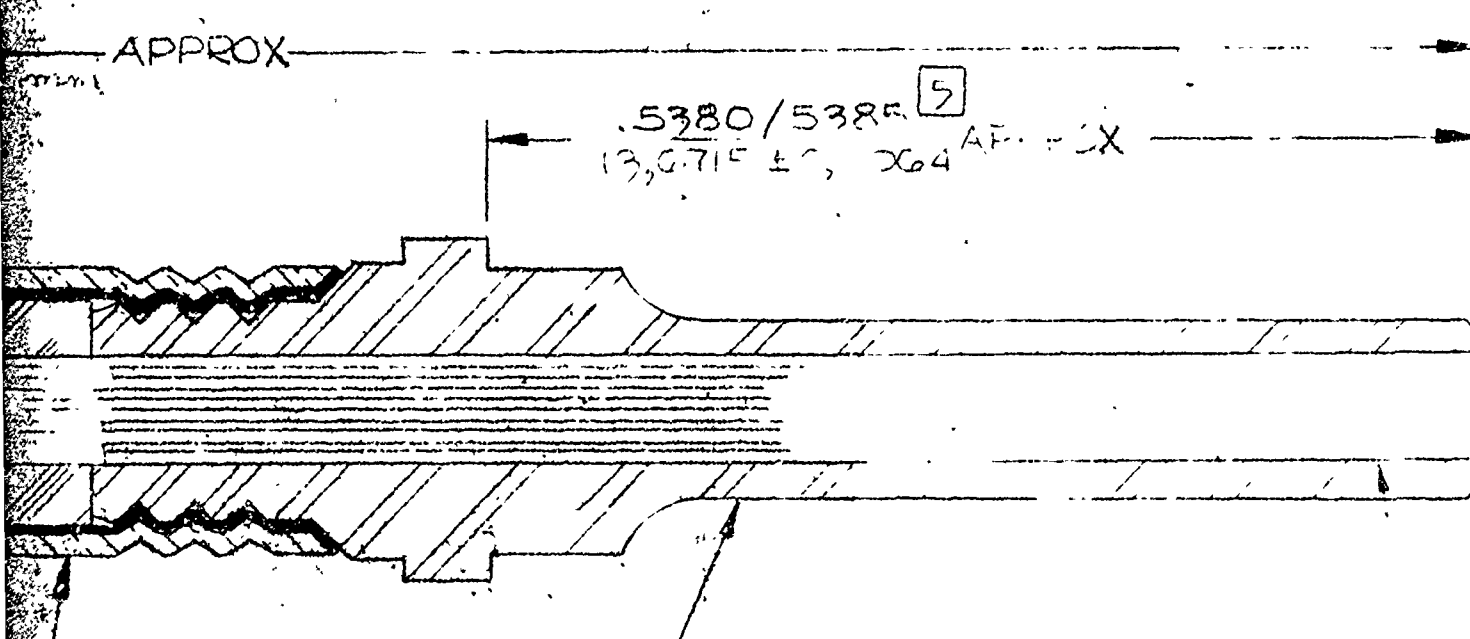
OFFICIAL ENG

RECOMMENDED STRIPPING DIMENSIONS

801-999-5125	1.50	.16	.40
ASSEMBLY	"E"	"F"	"G"

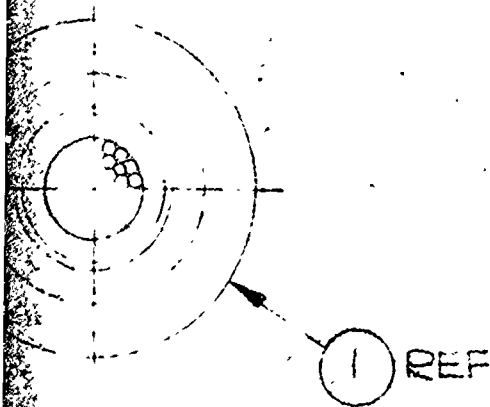
APPROX

.5380/5385 5
 13,6715 ± .004 AF - CX



REVISIONS

DESCRIPTION	DATE	E.C.O. NO.	APPR.
RELEASE TO MFG.	6/16/78	26050	K ^m /K ^m



2

4

NOTES

1 BULKY CABLE STRAIN RELIEF, NO-N-29, .00005 MIN (REF)

2 ITEMS 1, AND 2 ARE SHIPPED LOOSE

3 THE ASSEMBLIES SHOWN ARE INTENDED FOR USE IN THE 801-104-SZC8 RECEPTACLE ENVIRONMENTAL CONNECTOR SERIES.

4 CUSTOMER NOTE - CRIMP CABLE STRAIN RELIEF FIBERS TO CONNECTOR BODY WITH AMPHENOL FRAME NO. 227-944 AND AMPHENOL TOOL 227-909-2022 SEE AMPHENOL SPEC 349-50239 FOR TERMINATION PROCEDURE

5 CUSTOMER NOTE - INDICATES "AFTER POLISHING" DIM. USE AMPHENOL POLISHING TOOL 227-909-2020.

6 THIS CONTAINER FULLY IS INTENDED FOR USE WITH CABLE DEVELOPED UNDER NAVY CONTRACT NO. N00129-77-C-0062 (AMPHENOL #9-882-46)

REMOVE ALL BURRS, BREAK CORNERS, AND SHARP EDGES TO MAXIMUM UNLESS OTHERWISE SPECIFIED.

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	NEXT ASSY
	MATERIAL
	SPECIFICATION
	FINISH

614

4

1

				80I-5027	I	2	IC	FERRULE
				80I-5025	I	I	IC	BODY
PART NO.	QTY	PART NO.	QTY	PART NO.	QTY	ITEM	UOM	
E/A		E/A		80I-999-5125				
E/A		E/A		E/A				LIST OF MATERIALS

CLASS	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES NOT OTHERWISE SPECIFIED ARE: 2 PLACE DECIMAL ±.015 (0,381 mm) 3 PLACE DECIMAL ±.005 (0,127 mm) ANGLES ± 1°	DRAWN BY	DATE	TITLE	
			K. Monaghan	5/22/78		
			CHECKED	DATE		
			KJM	6/16/78		
			ENGINEER	DATE		
ATION		REFERENCE DRAWING NO. 1530 TCO III	<i>[Signature]</i>	6/16/78	CODE IDENTIFICATION 74368	
			APPROVED	<i>[Signature]</i>		6/16/78
			QA	<i>[Signature]</i>		6/16/78
			MEG ENG	<i>[Signature]</i>		6/16/78

801-999-5125

DRAWING NUMBER

ISSUE

A

PIPE

201

SEE NOTE 1

BODY

43

PASSIVATE

DESCRIPTION

CODE

FINISH

OF MATERIAL

CONTACT AREA

BLANKET
BRAND

AMPHENOL

AMPHENOL RE OPERATIONS

33 East Franklin St. • Danbury, Conn. 06810

63

SCALE 10/1

SHEET 1 OF 1

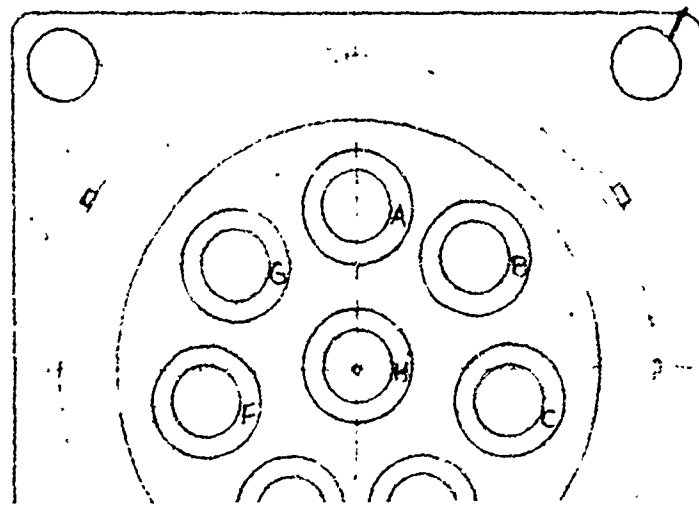
CERTIFICATION DRAWING SIZE DRAWING NO.

1968

C

801-999-5125

A



2
DO NOT SCALE THIS DRAWING

SYM

DESC

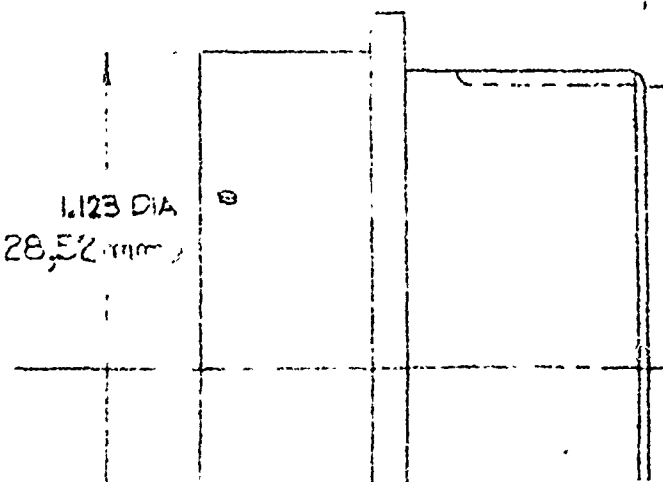
A

OFFICIAL ENG

.20 DIA - FOUR PLACES
(3,048 mm)

.131
(28,73 mm)
.436
(11,07 mm) .051
(1,29 mm)

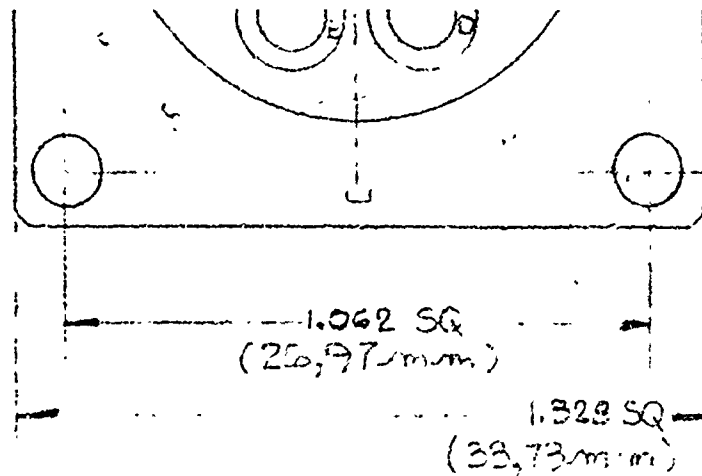
1.123 DIA
(28,52 mm)



REVISIONS

DESCRIPTION	DATE	ECO NO.	APPR.
ENG. RELEASE TO MFG.	6/16/78	26050	RM <i>[Signature]</i>

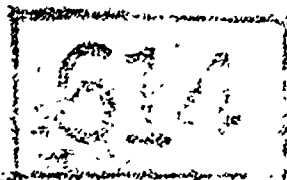
.160
(4.06mm)



NOTES

- 1 ITEMS #1 THRU #5 ARE SHIPPED LOOSE
- 2 SEE DRAWING 801-993-5125 AND AMPHENOL SPEC. 349-50239 FOR COMPLETE FIBER OPTIC TERMINATION PROCEDURE
- 3 FIBER OPTIC CONTACTS, ITEM #2, OR ELECTRICAL CONTACTS, ITEM #3 MAY BE INSERTED INTO ANY OF THE POCKET POSITIONS A THRU H. ITEM #4 MAY BE USED IN PLACE OF ITEMS 2 AND 3 FOR PROPER SEALING

REMOVE ALL BURRS, BREAK CORNERS AND SHARP EDGES TO MAXIMUM UNLESS OTHERWISE SPECIFIED.



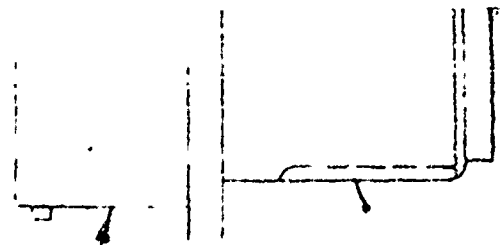
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NEXT ASSY

MATERIAL

SPECIFICATION

FINISH



①

1.10" (27.94 mm)

227-977-2018	1	10	3	INSERTION
801-5029	4	10	4	SEALING
801-5035	4	10	3	#12 ELECT
801-999-5125	4	10	2	FIBER OPTIC
801-5037	1	10	1	RECEPTACLE
PART NO.	QUAN	UOM	ITEM LINE NO.	

LIST OF MATERIAL

ASSY USED ON REGION	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES NOT OTHERWISE SPECIFIED ARE: 2 PLACE DECIMAL ±.015 (0.381 mm) 3 PLACE DECIMAL ±.005 (0.127 mm) ANGLES ± 1°			DRAWN BY REM	DATE 6/8/78	TITLE FIBER OPTIC ENVIRONMENT #18 SHELL - 6 (MULTI) CODE IDENTIFICATION 74868
				CHECKED <i>[Signature]</i>	DATE 6/14/78	
				ENGINEER <i>[Signature]</i>	DATE 6/16/78	
				APPROVED <i>[Signature]</i>	DATE 6/16/78	
				QUALITY ASSURANCE <i>[Signature]</i>	DATE 6/16/78	
REFERENCE DRAWING NO 1530-700111						

801-104-5208

DRAWING NUMBER ISSUE

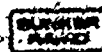
A

1 1/16 - 18 UNEF-2A

RESECTION/REMOVAL TOOL	804	
WELDING PLUG	603	
ELECTRICAL PIN CONTACT	84	
OPTIC PIN CONTACT ASSY	84	
RECEPTACLE #18-8	685	
DESCRIPTION	CODE	FINISH

OF MATERIAL

ROPTIC/ELECTRICAL
ENVIRONMENTAL RECEPTACLE
WELL - 8 CHANNEL
(MULTI-FIBER BUNDLES)



AMPHENOL

AMPHENOL RF OPERATIONS
33 East Franklin St. • Danbury, Conn. 06810

SCALE: 1/1

SHEET 1 OF 2

LOCATION: DRAWING SIZE: DRAWING NO.

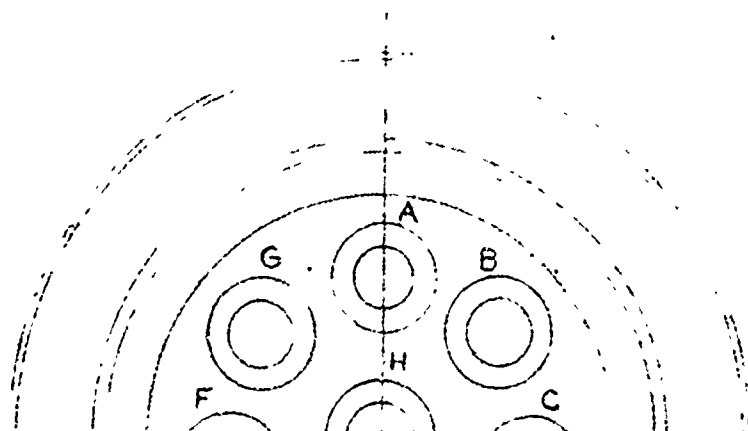
688

C

801-104-5208

ISSUE

A

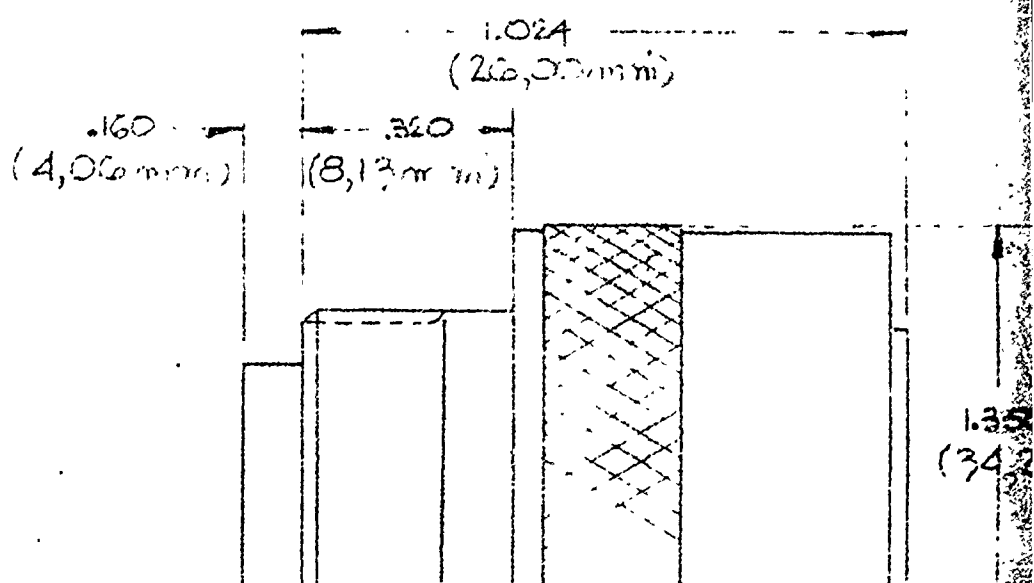


DO NOT SCALE THIS DRAWING

SYM

A

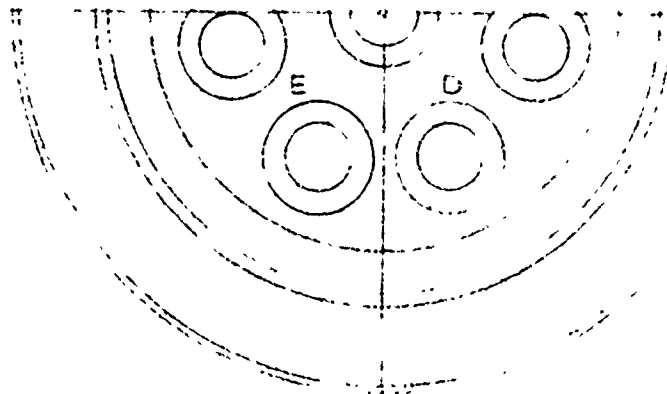
OFFICIAL



REVISIONS

DESCRIPTION	DATE	E.C.O. NO.	APPR.
OFFICIAL ENG. RELEASE TO MFG.	6/16/78	26050	RP <i>[Signature]</i>

1.350 DIA MAX
(34.29mm)



NOTES

1. ITEM #1 THRU #6 ARE SHIPPED LOOSE.
2. SEE DRAWING NO. 801-999-5124 AND AMPHENOL SPEC 349-50299 FOR COMPLETE FIBEROPTIC TERMINATION PROCEDURE.
3. FIBEROPTIC CONTACTS, ITEM 2, OR ELECTRICAL CONTACTS, ITEM #3 MAY BE INSERTED INTO ANY OF THE SOCKET POSITIONS A THRU H. ITEM #4 MAY BE USED IN PLACE OF ITEMS 2 OR 3 FOR PROPER SEALING.

REMOVE ALL BURRS, BREAK CORNERS AND SHARP EDGES .005 MAXIMUM UNLESS OTHERWISE SPECIFIED.

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NEXT ASSY	
MATERIAL	
SPECIFICATION	
FINISH	

1/16-18 UNEF-2A

1

NOT SHOWN

801-5033	1	10	6	CABLE
227-909-2018	1	10	5	INSECT
801-5029	4	10	4	*12 SE
801-5034	4	10	3	*12 E
801-999-5124	4	10	2	SOCK
801-5036	1	10	1	PLUG
PART NO.	QUAN	UOM	ITEM LINE NO.	
LIST OF MATERIALS				

		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES NOT OTHERWISE SPECIFIED ARE:		DRAWN BY REM		DATE 6/9/78		TITLE FIBER OPTIC	
NEXT ASSY		USED ON		2 PLACE DECIMAL ±.015 (0.381 mm)		3 PLACE DECIMAL ±.005 (0.127 mm)		ENVIRONMENTAL	
SERIAL				ANGLES ± 1°		CHECKED <i>K. Morahan</i>		DATE 6/14/78	
SPECIFICATION				REFERENCE DRAWING NO. 1530-700111		ENGINEER <i>K. Richter</i>		DATE 6/16/78	
						APPROVED <i>S. J. J. J.</i>		DATE 6/16/78	
						QUALITY ASSURANCE <i>K. Richter</i>		DATE 6/16/78	
						DATE 6/16/78		CODE IDENTIFICATION 7486	

801-105-5208

DRAWING NUMBER ISSUE

A

CABLE CLAMP	100	
INSERTION/REMOVAL TOOL	804	
SEALING PLUG	603	
ELEC. SOCKET CONTACT	83	
SOCKET CONTACT ASSY	89	
PLUG #18-8	43	
DESCRIPTION	CODE	FINISH

QTY OF MATERIAL

PER OPTIC/ELECTRICAL
ENVIRONMENTAL PLUG
(SHELL - 8 CHANNEL
MULTI-FIBER BLINDIES)

REGISTERED
TRADE

AMPHENOL

AMPHENOL OF OPERATIONS

29 East Franklin St., Danbury, Conn. 06810

SCALE 3/1

SHEET 2 OF 2

IDENTIFICATION: DRAWING FILE DRAWING NO.

4868

C

801-105-5208

A