

MIL-C-12520C(EL)

5 NOVEMBER 1965

SUPERSEDING

MIL-C-12520B

3 June 1959

## MILITARY SPECIFICATION

CONNECTORS, PLUG AND RECEPTACLE  
(ELECTRICAL, WATERPROOF); AND ACCESSORIES;  
GENERAL SPECIFICATION FOR

## 1. SCOPE

1.1 Scope.- This specification covers the general requirements for a series of centerlock screw coupling, waterproof, polarized, multicontact connectors and accessories for inter-connection of power and control circuits on electronic equipment. (See 6.1)

1.2 Classification.-

1.2.1 Type designation.- The type designation shall be in the following form and as specified. (See 3.1 and 6.2):

UW	1	3	20	M	A	23
Component (1.2.1.1)	Style (1.2.1.2)	Shell shape and cable accommodation (1.2.1.3)	Shell size (1.2.1.4)	Insert style (1.2.1.5)	Insert arrange- ment (1.2.1.6)	Maximum cable-size accommodation (1.2.1.7)

SHEET 1 of 34 SHEETS

FSC 5935

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1.2.1.1 Component.- Connectors are identified by the two-letter symbol "UW". (See 6.2).

1.2.1.2 Style.- The style is identified by a one-digit number; plugs by the number "1", receptacles by the number "2". (See 6.2).

1.2.1.3 Shell shape and cable accommodation.- The shell shape and cable accommodation are identified by one-digit number in accordance with Table I.

Table I - Shell shape and cable accommodation

Symbol	Shell shape and cable accommodation
0	Not applicable
1	Round; bellows clamp
2	Round; cable clamp
3	Cathedral; cable clamp

1.2.1.4 Shell size.- The shell size is identified by a two-digit number. The two-digit number indicates the major diameter of the thread size on the receptacle measured in 1/16 inch increments.

1.2.1.5 Insert style.- The insert style is identified by a single-letter; male contacts by the letter "M", female contacts by the letter "F".

1.2.1.6 Insert arrangement.- The insert arrangement is identified by a single letter in accordance with Table III. (See 3.5.3).

1.2.1.7 Maximum cable-size accommodation.- The maximum cable-size accommodation is identified by a two-digit number in accordance with Table II. The two-digit number indicates the maximum outer diameter of the cable in 1/32-inch increments.

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Table II - Cable outside diameter ranges

Symbol	Minimum	Maximum
00	Cable not applicable	Cable not applicable
11	0.292	0.343
13	.323	.406
15	.386	.468
17	.448	.531
19	.511	.593
21	.573	.656
23	.636	.718
25	.698	.781
27	.761	.843
29	.823	.906
31	.886	.968
33	.948	1.031

## 2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

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## SPECIFICATIONS

## FEDERAL

PPP-B-585	Boxes, Wood, Wirebound.
PPP-B-591	Boxes, Fiberboard, Wood-Cleated.
PPP-B-601	Boxes, Wood, Cleated, Plywood.
PPP-B-621	Boxes, Wood, Nailed and Lock-Corner.
PPP-B-636	Boxes, Fiberboard.
PPP-T-97	Tape, Pressure-Sensitive Adhesive, Filament Reinforced.
QQ-A-591	Aluminum Alloy Die-Castings.
QQ-B-626	Brass, Loaded and Non-Leaded; Rods, Shapes, Forgings and Flat Products with Finished Edges (Bars, Flat Wire and Strips).
QQ-C-530	Copper-Beryllium Alloy Bars, Rods and Wire.
QQ-C-533	Copper-Beryllium Alloy Strip.
QQ-P-416	Plating, Cadmium (Electrodeposited).
QQ-S-763	Steel Bars, Shapes and Forgings-Corrosion Resisting.

## MILITARY

MIL-P-116	Preservation, Methods of.
MIL-R-3065	Rubber and Synthetic Rubber Compounds, General Purpose (Except Tires, Inner Tubes, Sponge Rubber, and Hard Rubber).
MIL-M-13231	Marking of Electronic Items
MIL-F-14072	Finishes for Ground Signal Equipment.

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MIL-P-19833      Plastic Molding and Plastic Molded Parts,  
Glass Fiber Filled, Diallyl Pthalate  
Resin.

MIL-G-45204      Gold Plating (Electrodeposited).

#### DETAIL SPECIFICATIONS

(For applicable detail specifications, see Supplement 1.)

#### STANDARDS

MIL-STD-105      Sampling Procedures and Tables for Inspection  
by Attributes.

MIL-STD-129      Marking for Shipment and Storage.

MIL-STD-130      Identification Marking of U. S. Military  
Property.

MIL-STD-170      Moisture Resistance Test Cycle for Ground  
Signal Equipment.

MIL-STD-202      Test Methods for Electric and Electrical  
Component Parts.

#### DRAWING

##### ELECTRONICS COMMAND

SC-A-362100      Requirements for Preparation of Packaging and  
Packing Illustrations and Bills of Material.

(Copies of specifications, standards and drawings required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer. Both the title and number or symbol should be stipulated when requesting copies.)

2.2 Other publications.- The following documents form a part of the specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

#### DEPARTMENT OF DEFENSE

Handbook H4-1      Federal Supply Code for Manufacturers (Part 1).

#### NATIONAL BUREAU OF STANDARDS

Handbook H28      Screw-Thread Standards for Federal Services.

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(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington 25, D.C.)

### 3. REQUIREMENTS

3.1 Detail specifications.-- Detail requirements or exceptions applicable to particular types of connectors and accessories shall be as specified in the applicable detail specification listed in Supplement 1 to this specification. In the event of any conflict between requirements of this specification and the detail specifications, the latter shall govern. (See 6.2).

3.2 Preproduction samples.-- The contractor shall furnish preproduction samples for approval if required by the invitation for bids and contract. (See 4.3).

3.3 Marking.-- Marking shall conform to Specification MIL-M-13231. (See 4.4).

3.4 Materials.-- The material for each part shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the connector and accessories to meet the performance requirements of this specification. Acceptance as approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product.

3.4.1 Plastics.-- Insert material shall be type GDI-30 per MIL-M-19833.

3.4.2 Rubber.-- Rubber shall conform to grade RS612ABFZZ of Specification MIL-R-3065, except that compression set, suffix B, for 70 hours at 212° F., shall be 25 percent maximum. Suffix Z requirements are as follows:

(a) Change in Shore A durometer hardness after oven aging 70 hours at 212° F. shall be 10 points maximum.

(b) After conditioning 14 days at -67° F., the Shore D durometer hardness at -67° F. shall be 60 maximum (instantaneous reading). The measuring instrument shall be desiccated and cold conditioned as follows:

(1) The durometer and the specimen shall be conditioned at the prescribed temperature for at least 30 minutes before test.

(2) Whenever, for any reason, it becomes necessary to remove the durometer from a chamber at a temperature below room temperature, the durometer shall be placed in a suitable desiccator immediately upon such removal and allowed to remain there until its temperature is above the dew point of the air in the room.

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3.4.3 Metals.- Metals used for noncurrent-carrying parts shall be of a corrosion-resistant type, or shall be plated or treated to resist corrosion.

3.4.3.1 Brass.- Brass shall conform to composition 22, half-hard, of Specification QQ-B-626.

3.4.3.2 Copper beryllium.- Copper beryllium shall conform to Specification QQ-C-530 or QQ-C-533. Parts fabricated of copper beryllium shall be heat-treated.

3.4.3.3 Corrosion-resistant steel.- Corrosion-resistant steel shall conform to class 303 of Specification QQ-S-763.

3.4.3.4 Aluminum-alloy die castings.- Aluminum-alloy die castings shall conform to Specification QQ-A-591.

3.5 Design and construction.- Connectors and accessories shall be of the design, construction, and physical dimensions specified. (See 3.1).

3.5.1 Threaded parts.- Unless otherwise specified (see 3.1), all threaded parts shall be class 2 fit in accordance with Handbook H28. Where practical, all threads shall be in conformity with the coarse-thread series. The fine-thread series shall be used only for applications that might show a definite advantage through their use. Where a special diameter-pitch combination is required, the thread shall be of American National Form and of any pitch between 16 and 36 which is used in the fine-thread series.

3.5.2 Inserts.- Hollow-type inserts shall not be used. When the resultant reduction in cross-sectional area would cause structural weaknesses, depressions on front and rear male-insert disks and rear female-insert disks used to achieve creepage distance shall not be located directly opposite on front and rear surfaces of individual disks.

3.5.2.1 Male inserts.- Male contacts shall be rigidly fixed in position relative to the insert.

3.5.2.2 Female inserts.- Female contacts shall be so mounted in the insert as to provide for contact alignment.

3.5.3 Insert arrangements.- The connector insert arrangements and corresponding shell and contact sizes shall be in accordance with Table III and figure 1, as specified. (See 3.1 and 3.5.8). The dimensions shown on figure 1 are for the frontface of male inserts. Female inserts shall have corresponding dimensions and an arrangement opposite to that of the male inserts to provide for correct male-to-female connection.

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Table III - Insert arrangements

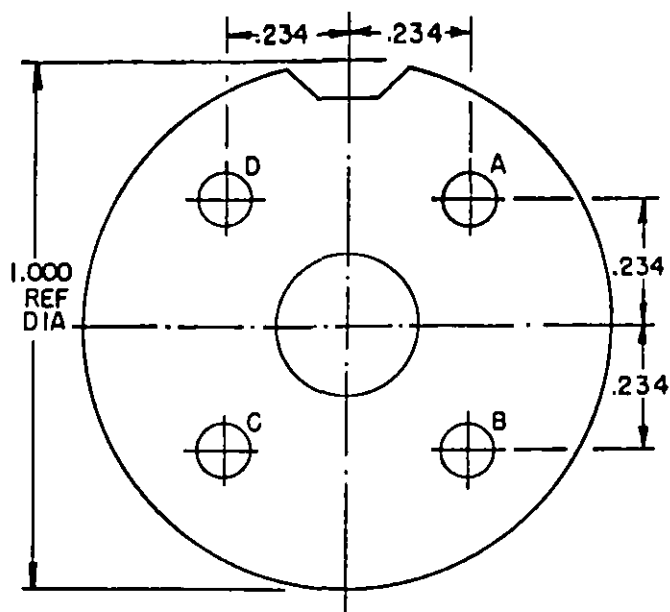
Insert arrangement	Shell size	Number of contacts	Contact size
A	20	4	12
B	20	9	16
C	26	14	16
D	26	19	16
E	26	30	20
F	26	30	20
G	26	4	8

3.5.4 Contacts.- Contacts shall be fabricated of a copper-alloy material. All contact surfaces shall be smooth and shall be Gold Plated, Type II, 0.000030 thick per MIL-G-45204 over Silver Plate M351 per MIL-F-14072.

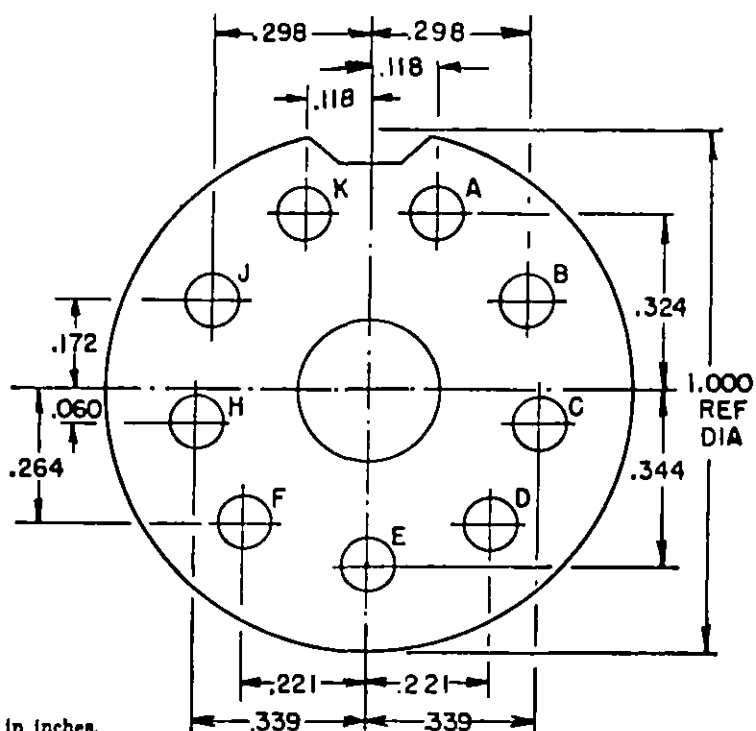
3.5.4.1 Female contacts.- All contacts and/or spring elements of contacts shall be Beryllium Copper QQ-C-533. The contacts shall be of the closed entry type, rounded and chamfered to follow for directing and centering of the entering male contact.

3.5.4.2 Male contacts.- Contacts shall be of the dimensions specified on Figure 2.





INSERT ARRANGEMENT A

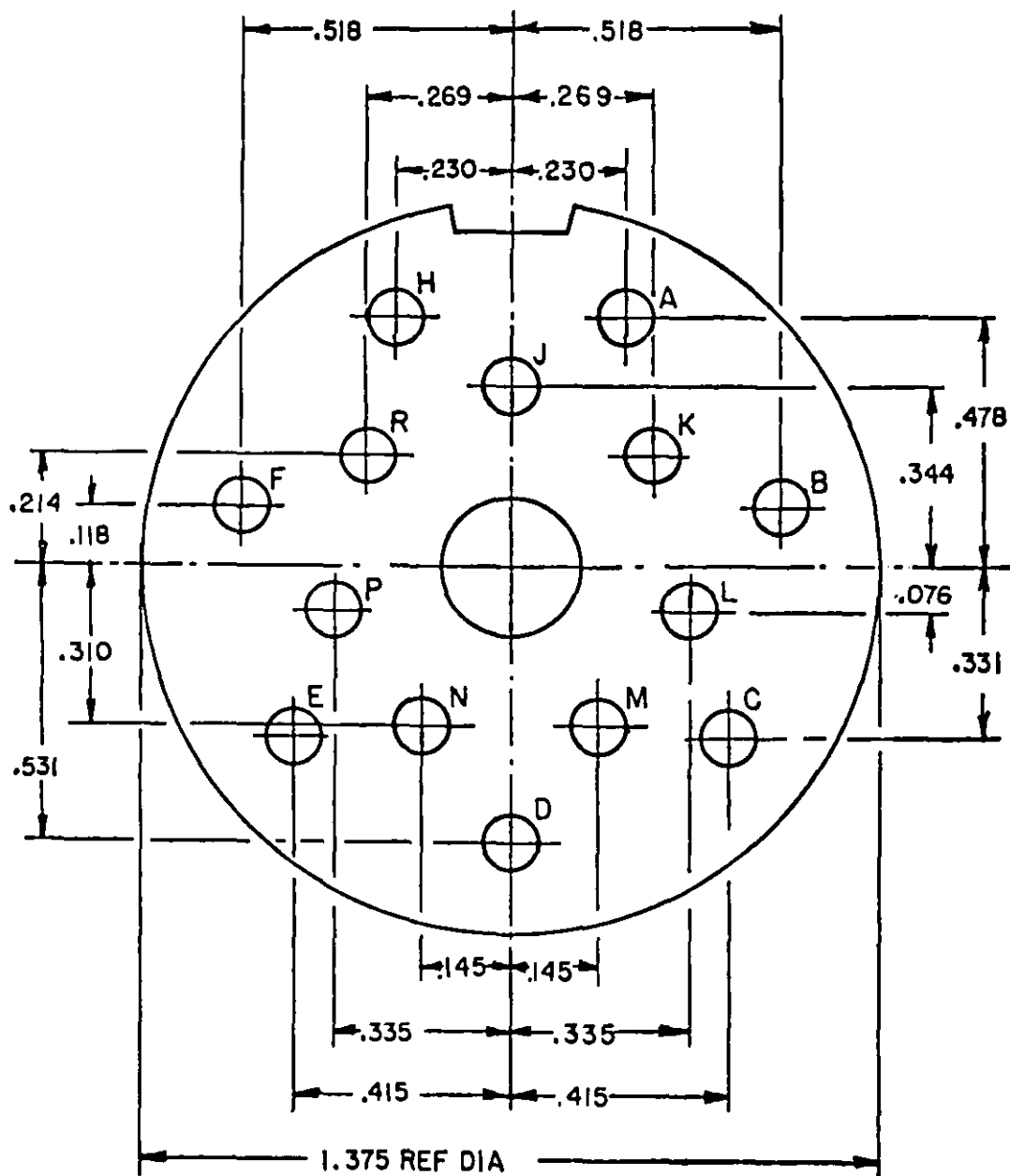


**INSERT ARRANGEMENT B**

1. All dimensions in inches.
2. Tolerance is  $\pm .002$  on decimals.

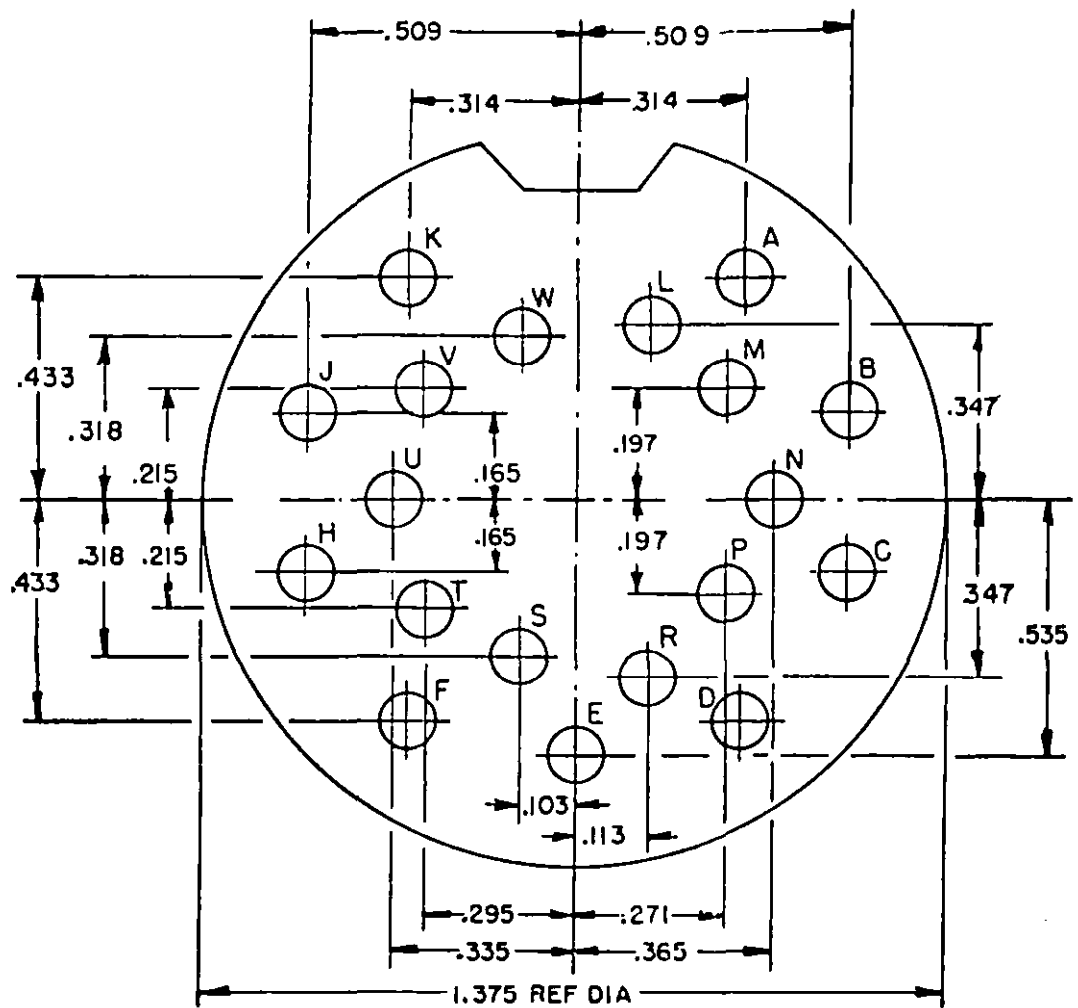
**FIGURE 1. Insert arrangements**

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INSERT ARRANGEMENT C

FIGURE 1-Continued



INSERT ARRANGEMENT D

FIGURE 1—Continued

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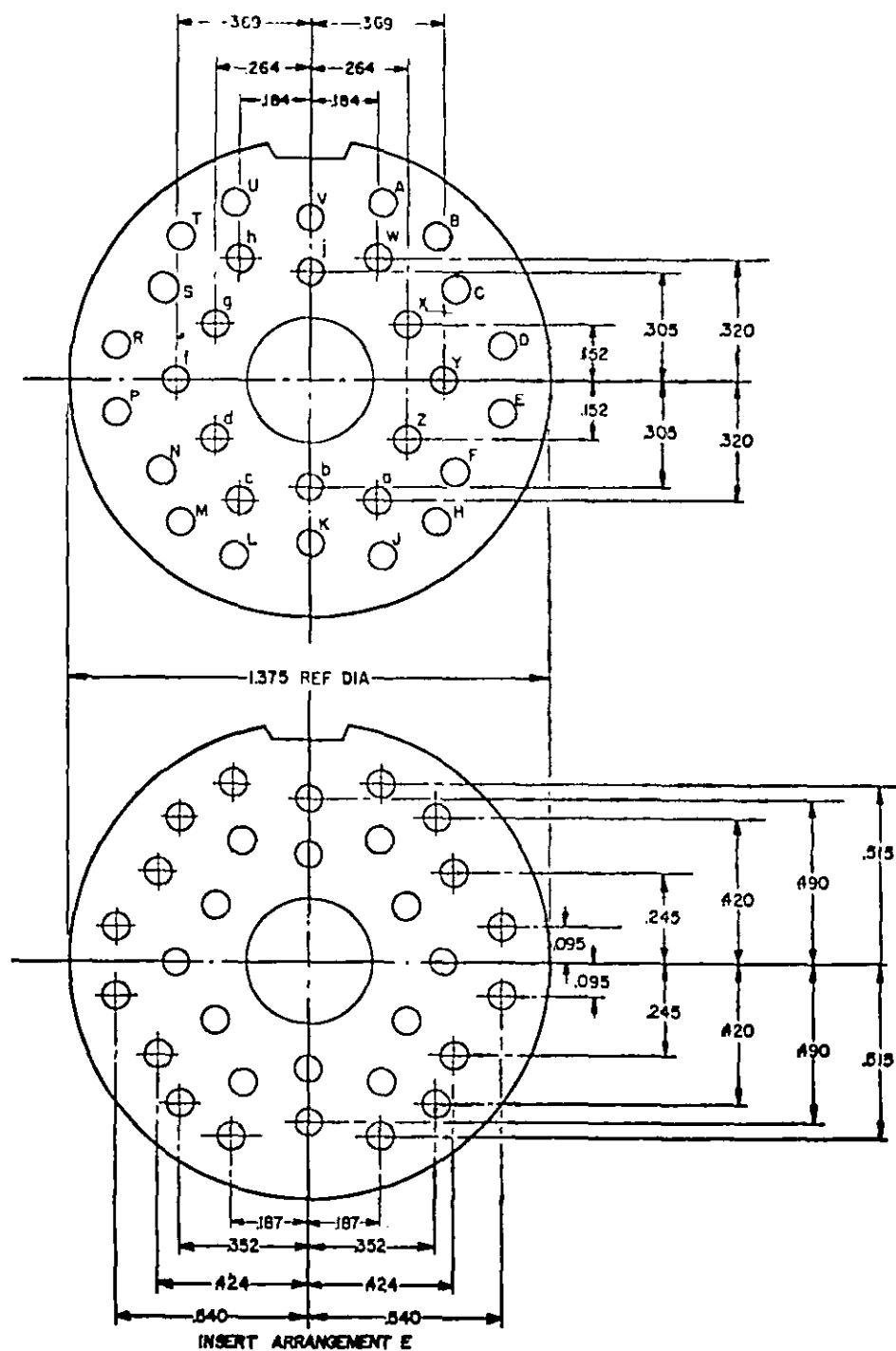
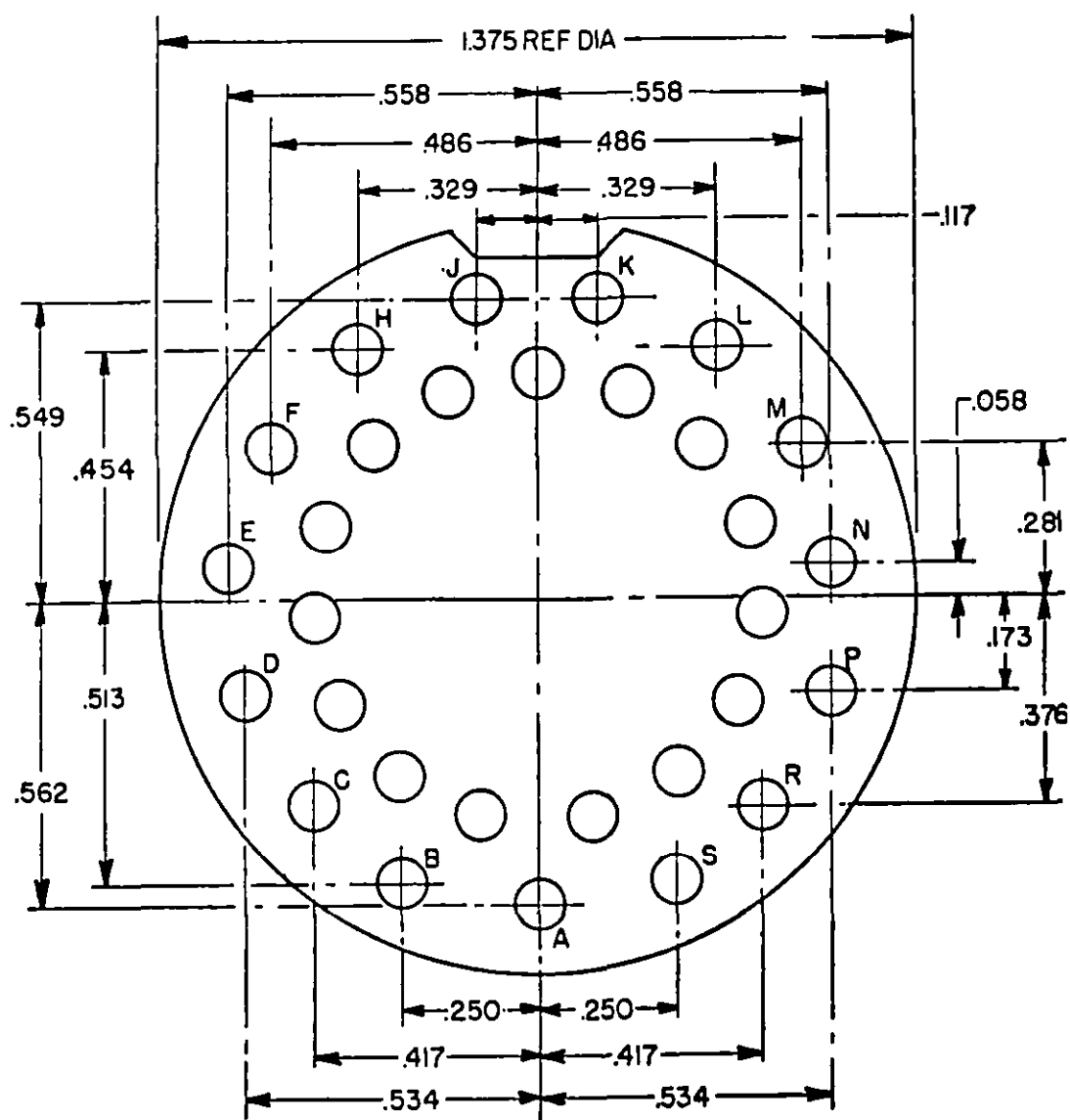


FIGURE 1—Continued



NOT TO BE USED FOR NEW DESIGN  
INSERT ARRANGEMENT F

FIGURE 1—Continued

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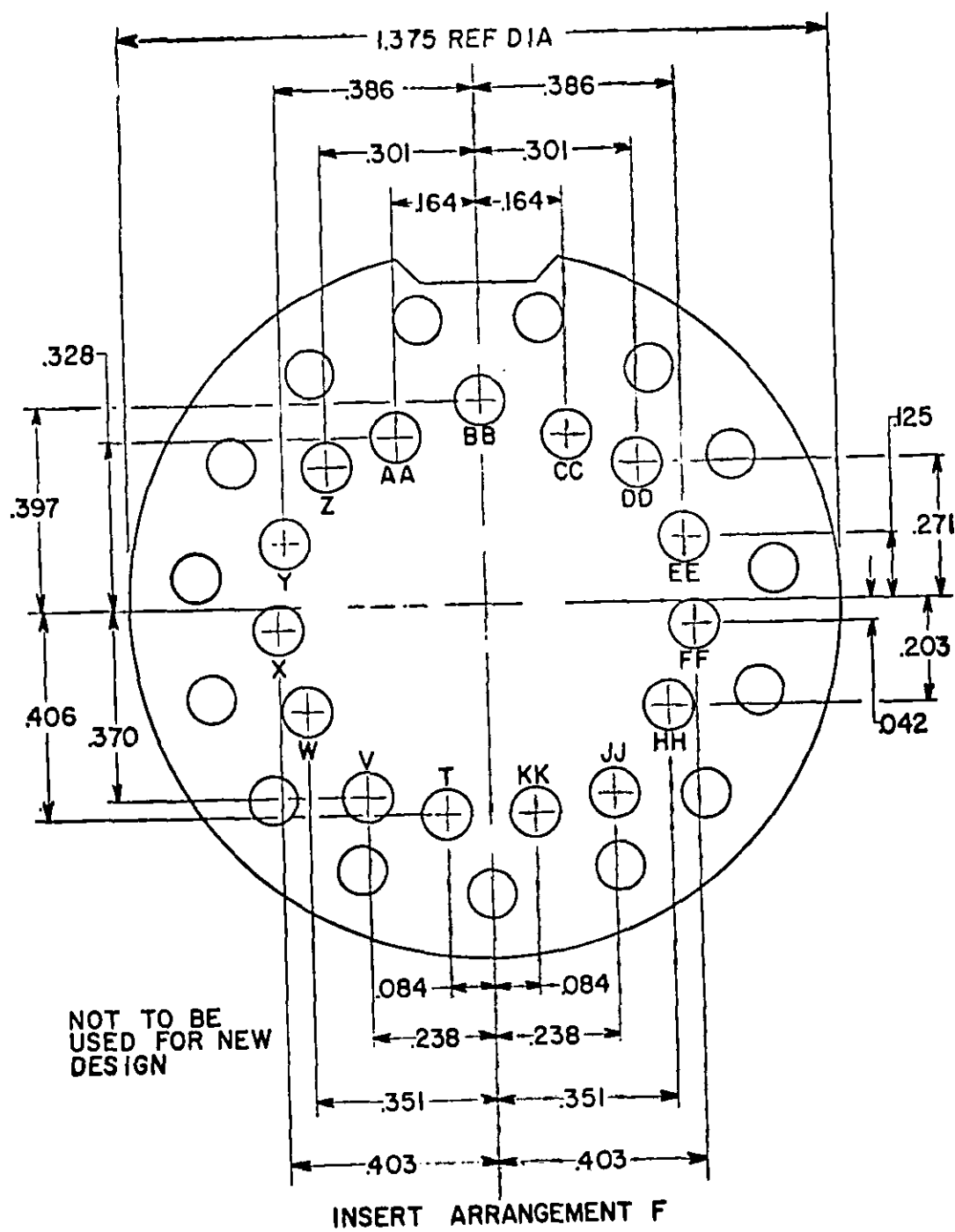
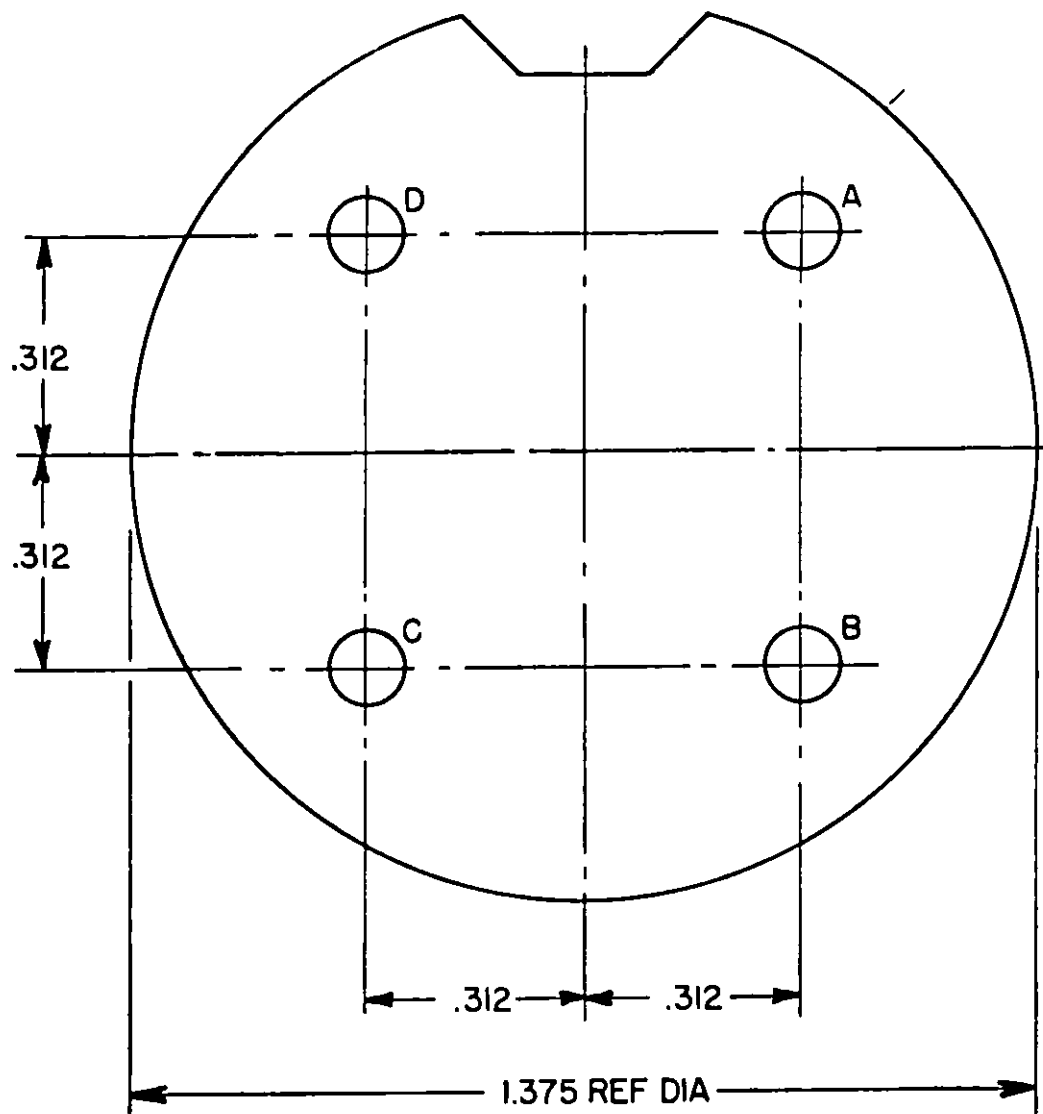


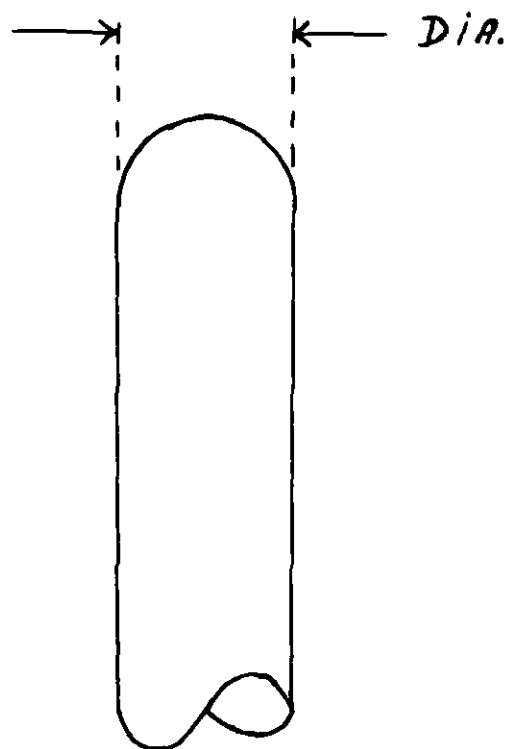
FIGURE 1—Continued



INSERT ARRANGEMENT G

FIGURE 1—Continued

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MALE CONTACT

CONTACT SIZE	DIAMETER <sup>1</sup>
20	.050 ± .001
16	.0625 ± .001
12	.094 ± .001
8	.142 ± .001

<sup>1</sup> DIMENSION IS MEASURED OVER PLATING.

FIGURE 2. MALE CONTACT DIMENSION



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3.5.5 Connector shell.- The Connector Shell shall be fabricated of brass or aluminum, the nose-piece which consists of the mating portion of the shell shall be fabricated of steel of type capable of meeting the impact requirement of paragraph 4.8.11 of this specification.

3.5.5.1 Castings shall be of uniform quality and condition, and free from cracks, harmful shrinkage, porosity, gas holes, foreign matter, and other injurious defects. The surface of the castings shall be free from pits, burns, sharp edges, parting lines, porous area, fins, ridges, nodules, raised metal, and scale. All the castings shall be completely cleaned prior to presentation for inspection. Castings shall not be plugged, or welded, nor shall imperfections be filled in.

3.5.6 Center-coupling thread (plugs).- All parts of the center-coupling thread subassembly of the plug shall be fabricated of corrosion-resistant steel. The center-coupling thread shall be capable of being turned freely in either direction, without the use of tools.

3.5.6.1 Wing blade.- The wing blade shall fold back by a snap action or be held in place against the metal body by slight friction at the hinge.

3.5.7 Center-coupling thread (receptacles).- The center-coupling thread of receptacles shall be fabricated of corrosion-resistant steel.

3.5.8 Finish.- External corrosion-resistant steel parts shall be of a fine sandblast finish. All other metal parts except electrical contacts shall be cadmium-plated conforming to class 1, type II of Specification QQ-P-416. Aluminum parts shall be zincated and copper-plated (0.0001 inch thick) prior to being finished. The resulting finish shall be dull olive drab in color.

### 3.6 Cleaning.

3.6.1 Parts.- After fabrication, parts shall be cleaned in accordance with good commercial practice, or as specified in an applicable document. Cleaning processes shall have no deleterious effect. Corrosive material shall be removed completely before the parts are assembled.

3.6.2 Units.- After assembly, units shall be cleaned thoroughly and shall be free from particles of solder, flux, and other foreign material. In addition, when necessary, such cleaning shall also be performed before final assembly of the units.

3.7 Marking.- Connectors and accessories shall be marked with letters approximately 1/16 inch high in accordance with Standard MIL-STD-130, with the type designation and the manufacturer's name or code. Code-designating numbers shall be in accordance with Handbook H4-1. (See 3.1).

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3.7.1 Identification of contacts.- All contacts shall be identified as specified on figure 1 (See 3.5.3), by letters either raised or depressed on the front and on the rear surface of each male and female insert. Lettering on the female insert shall correspond with the lettering on the male insert.

### 3.8 Soldering.-

3.8.1 Acid or acid salts.- Acid or acid salts may be used for soldering of mechanical joints not used to complete electrical circuits, but in no case shall acid or acid salts be used where they can come in contact with insulation material. Where acid or acid salts are used, they shall be completely neutralized and removed immediately after use.

3.8.2 Process.- There shall be no sharp points or rough surfaces resulting from insufficient heating. The solder shall feather out to a thin edge, indicating proper flowing and wetting actions, and shall not be crystallized, overheated, or under heated. Any means employed to remove an unavoidable excess of flux shall not incur the risk of loose particles of flux, brush bristles, or other foreign material remaining in the equipment; flux being spread over a larger area; or damage to the equipment. Insulation material has been subjected to heating during the soldering operation shall be undamaged and parts fastened thereto shall not have become loosened.

3.9 Dielectric withstanding voltage.- When mated or unmated connectors are tested as specified in 4.8.2, there shall be no arcing or dielectric breakdown.

3.10 Insulation resistance.- When mated or unmated connectors are tested as specified in 4.8.3, the insulation resistance shall be not less than 1000 megohms.

3.11 Air pressure.- When connectors are tested as specified in 4.8.4, there shall be no evidence of leakage through the body.

3.12 Voltage drop.- When female connectors are tested as specified in 4.8.5, the voltage drop across the mating contact terminals shall not exceed the value specified. (See 3.1).

3.13 Moisture resistance.- When unmated connectors are tested as specified in 4.8.6, the insulation resistance shall be not less than 1 megohm after step 6 of the final cycle and a minimum of 100 megohms after the 24 hour drying period. After the test, there shall be no evidence of breaking, cracking, spalling, or loosening of terminals. (See 4.8.6).

3.14 Insert strength.- When connectors are tested as specified in 4.8.7, there shall be no cracking or breaking of inserts, and the center locking nut shall not rotate or become disassociated from the insert.

3.15 Temperature cycling.- When connectors are tested as specified in 4.8.8, there shall be no physical damage, arcing, or dielectric breakdown. During the fifth cycle of test, connectors shall be capable of mating and unmating, and female connectors shall maintain electrical continuity.

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3.16 Water pressure.- When connectors are tested as specified in 4.8.9, there shall be no evidence of leakage through the body, and the insulation resistance shall be not less than 100 megohms.

3.17 Endurance.- When connectors are tested as specified in 4.8.10, there shall be no evidence of mechanical damage and the wing blade shall not loosen, change in shape, or be otherwise damaged. After test, the voltage drop across the female contacts shall not exceed the value specified. (See 3.1).

3.18 Impact resistance.- When connectors are tested as specified in 4.8.11, there shall be no physical damage to the shell or nosepiece, and connector shall be capable of being mated. The nosepiece is defined as the mating portion of the shell.

3.19 Vibration.- When mated connectors are tested as specified in 4.8.12, there shall be no evidence of cracking, breaking, or loosening of parts, and the plug shall not become disengaged from the receptacle. The voltage drop across the female contacts shall not exceed the value specified. (See 3.1).

3.20 Salt spray (corrosion).- After unmated connectors are tested as specified in 4.8.13, there shall be no evidence of base metal corrosion.

3.21 Interchangeability.- Like units and replaceable parts shall be physically and functionally interchangeable, without modification of such items or of the equipment. (See 4.8.14). Individual items shall not be hand-picked for fit or performance; however, matched pairs or sets, when permitted, may be interchangeable as such. Reliance shall not be placed on any unspecified dimensions, rating, characteristic, etc.

3.22 Workmanship.- The connectors shall be manufactured and assembled in accordance with the applicable portions of the following paragraphs herein:

- 3.5 Design and construction.
- 3.6 Cleaning.
- 3.8 Soldering.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection.- Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplier and services conform to prescribed requirements.

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4.2 Classification of inspection.- Inspection shall be classified as follows:

(a) Preproduction inspection (does not include preparation for delivery). (See 4.3).

(b) Inspection covered by subsidiary documents. (See 4.4).

(c) Quality conformance inspection.

(1) Quality conformance inspection of connectors before preparation for delivery. (See 4.4 and 4.5).

(2) Quality conformance inspection of preparation for delivery. (See 4.9).

4.3 Preproduction inspection.- This inspection will be performed by the Government unless otherwise specified in the contract. It shall consist of the inspection specified in the subsidiary documents covering the items listed in 4.4, and the inspection specified for group A, group B, and group C (see tables IV, V, and VI, respectively). The preproduction inspection will normally be performed in this order: (1) vibration, (2) impact resistance and (3) water pressure; other preproduction inspection may precede, follow, or be interspersed between the foregoing.

4.4 Acceptance inspection covered by subsidiary document.- The following shall be inspected under the applicable subsidiary documents as part of the acceptance inspection before preparation for delivery:

<u>Item</u>	<u>Rgt. Para.</u>
Finish	3.5.8
Marking	3.7

4.5 Quality conformance inspection of connectors before preparation for delivery.- The contractor, to demonstrate compliance with specified requirements, shall perform the inspection specified in 4.4 and 4.5.1 through 4.5.4. This does not relieve the contractor of his responsibility for performing any additional inspection which is necessary to control the quality of the product and to assure compliance with all specification requirements. The Government will review and evaluate the contractor's inspection procedures and examine the contractor's inspection records and examine the contractor's inspection records. In addition the Government--at its discretion--may perform all or any part of the specified inspection, to verify the contractor's compliance with specified requirements. (See 6.5). Test equipment for Government verification inspection shall be made available by the contractor.

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4.5.1 Group A inspection.- This inspection, including sampling, shall conform to Table IV and the ordinary inspection procedures of Standard MIL-STD-105. Group A inspection shall be performed in any order which is satisfactory to the Government.

Table IV - Group A inspection

Inspection	Rgt. Para.	Insp. Para.	AQL	
			Major	Minor
Visual and mechanical	3.1, 3.4 to 3.8 incl	4.8.1	1%	4%
Interchangeability	3.21	4.8.14	1%	*
<u>Electrical</u>				
Dielectric withstanding voltage	3.9	4.8.2	1% for the group combined	*
Insulation resistance	3.10	4.8.3		
Air pressure	3.11	4.8.4		

\* All electrical, interchangeability, and air pressure defects are considered major.

4.5.2 Group B inspection.- This inspection, including sampling, shall conform to Table V and to the special procedures for small-sample inspection of Standard MIL-STD-105. The Standard MIL-STD-105. The AQL shall be 6.5 percent defective and the inspection level shall be S-4 for normal, tightened and reduced inspection. Group B inspection shall normally be performed on inspection lots that have passed group A inspection and on samples selected from units that have been subjected to and met the Group A inspection.

4.5.2.1 Order of inspection within group B.- Group B inspection shall be performed in any order which is satisfactory to the Government.

Table V - Group B inspection

Inspection	Rgt. Para.	Insp. Para.
Voltage drop	3.12	4.8.5
Insert strength	3.14	4.8.7

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4.5.3 Group C inspection.- This inspection shall consist of tests listed in Table VI and shall normally be performed on sample units that have been subjected to and met Group A and Group B inspection requirements.

Table VI - Group C inspection

Inspection	Rqt. Para.	Insp. Para.
Temperature cycling	3.15	4.8.8
Water pressure	3.16	4.8.9
Endurance	3.17	4.8.10
Impact resistance	3.18	4.8.11
Vibration	3.19	4.8.12
Moisture resistance	3.13	4.8.6
Salt spray	3.20	4.8.13

Sample units subjected to this inspection shall not be furnished on contract.

4.5.3.1 Sampling for inspection of connectors.- For each Group C inspection, two (2) connectors of each type produced shall be selected from each month's production without regard to quality. The units inspected at the start of the contract shall be selected from the first units produced.

4.5.3.2 Noncompliance.- If a sample unit fails group C inspection, the contractor shall immediately investigate the cause of failure and shall report to the Government inspector the results thereof and details of the corrective action taken on the process and all units of product which were manufactured with the same conditions, materials, processes, etc. If the Government inspector does not consider that the corrective action will enable the product to meet specified requirements, or if the contractor cannot determine the cause of failure, the matter shall be referred to the contracting officer. (See 6.4).

4.5.4 Reinspection of conforming group B and group C sample units.- Unless otherwise specified, sample units which have been subjected to and passed group B or group C inspection, or both, may be accepted on contract, provided that they are resubjected to and pass group A inspection after repair of all visible damage.

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4.6 Inspection conditions.- Unless otherwise specified herein, all inspections shall be made at room temperature, pressure, and humidity.

4.7 Test equipment and inspection facilities.- Test equipment and inspection facilities shall be of sufficient accuracy, quality, and quantity to permit performance of the required inspection. The supplier shall establish adequate calibration of test equipment to the satisfaction of the Government.

4.7.1 Test and mating connectors.- The test and mating connectors shall have passed all applicable tests in table IV.

4.7.1.1 Test plug.- The test plug for insert-strength tests shall be identical with the mating plug except that it shall be fabricated of high-strength steel and to the minimum dimensions specified. (See 3.1). Both the insert and shell shall be so constructed as to permit their use separately or as a complete unit.

4.7.1.2 Test receptacle. The test receptacle for insert-strength tests shall be identical with the mating receptacle except that it shall be fabricated of high-strength steel and to the minimum dimensions specified. (See 3.1). Both the insert and shell shall be so constructed as to permit their use separately or as a complete unit.

4.8 Methods of examinations and tests.-

4.8.1 Visual and mechanical inspection.- Connectors shall be examined for the defects listed in Table VII.

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Table VII - Classification of visual and mechanical defects

Defect areas	Major	Minor
Dimensions	Not as specified.	
Materials and finish	Not as specified. Wrong or incomplete finish. Large amounts of flaking, peeling, or chipping of finish.	Scratches, cuts, abrasions, etc., causing exposure of base metal or relatively small amount of flaking, peeling, or chipping.
Parts	Missing parts. Inoperative, improperly assembled, or defective parts which could cause the component to fail in service. Wrong parts.	Defective parts which would reduce efficiency of use, but not cause failure in service.
Marking	Marking missing, illegible, or incorrect.	Markings dirty, smudged, or incorrectly placed, but legible.
Foreign objects	Any metallic foreign object, not firmly attached, which could cause a short circuit, an electrical-contact failure, or mechanical failure. Any nonmetallic foreign object such as insulation, dirt, or phenolic chips that could cause jamming of a mechanism or prevent electrical contact.	Any metallic foreign object in the component containing exposed electrical contacts which would not prevent contact or would probably not cause a short circuit.

4.8.2 Dielectric withstanding voltage.- The test voltage specified in 3.1 shall be applied between each contact of the connector and the remaining contacts connected together and to the shell. The voltage shall be increased gradually from zero until the specified voltage is reached and shall be maintained at that value for approximately, but not less than, one (1) minute. The voltage shall be reached within five (5) seconds.



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4.8.3 Insulation resistance (See 3.10).- The insulation resistance shall be measured between each contact of the connector and the remaining contacts connected together and to the shell.

4.8.4 Air pressure (See 3.11).- An air pressure of 2.5 pounds per square inch shall be applied to the contact face and then to the rear of the plug or receptacle, using the differential leakage tester shown on figure 3 as follows:

(a) The connector shall be attached to the leakage tester with its face against the appropriate jig of the leakage tester. With the differential gage bypass valve open, the line valve and regulator shall be adjusted to apply 2.5 pounds pressure to the connector face. After at least 15 seconds the line valve shall be closed. Then the differential gage bypass valve shall be closed and the differential gage observed for not less than 30 seconds for a continuous change in the level of the two columns (a small momentary change when the bypass valve is closed is not evidence of leakage). The bypass valve shall then be opened before removal of the connector.

(b) After completion of the above, the rear of the connector shall be attached to the proper jig of the tester and the test repeated.

(c) After completion of the above, the face of the connector shall be attached to the appropriate jig of the tester, and the mating seal shall be tested by applying a differential pressure of 2.5 pounds to the seal lip around the contact face and repeating the test.

4.8.5 Voltage drop.- The female connector shall be mated with the specified male connector, and the specified direct current shall be applied between corresponding terminals. (See 3.1). The voltage drop across the mating contact terminals shall then be measured using the voltmeter-ammeter method or equivalent. The combined error of the measurements shall not exceed 5 percent. (See 3.12).

4.8.6 Moisture resistance (See 3.13).- Connectors, mated and unmated, shall be subjected to continuous cycling for five 48-hour cycles. Temperature, relative humidity, and period of time shall conform to Standard MIL-STD-170. The connectors shall then be removed from the humidity chamber and allowed to dry for a period of approximately 24 hours at  $25^{\circ} \pm 5^{\circ}$  C, with relative humidity controlled at  $50 \pm 5$  percent. The connectors shall be then subjected to the test specified for insulation resistance in paragraph 4.8.3. (See 3.13).

4.8.7 Insert strength (See 3.14).- The connector shall be securely mounted and shall be tested with the applicable test connector (See 4.7.1) as specified in paragraphs 4.8.7.1, 4.8.7.2, and 4.8.7.3.

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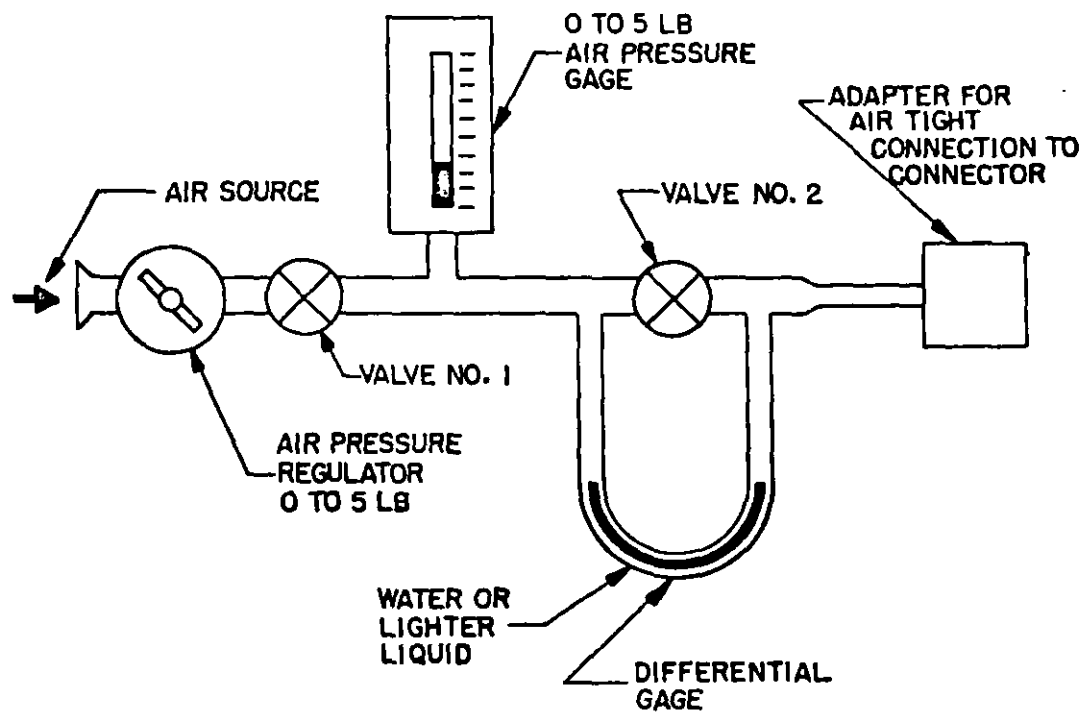


FIGURE 3. Diagram of air pressure test setup

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4.8.7.1 Axial force.-- A force parallel to the axis of the receptacle, increasing from 0 to 400 pounds in not less than 10 or more than 20 seconds shall be applied for a period of 1 minute. The force shall be applied first against the front and then the rear face of the insert. A pull of 400 pounds shall then be applied to the center coupling threaded part.

4.8.7.2 Radial torque.--

4.8.7.2.1 Plugs.-- The steel insert portion of the test receptacle (See 4.7.1.2) shall be mated with the plug under test. A gradually increasing radial torque shall be applied until a torque of 150 inch-pounds is reached, and shall be maintained for a period of 1 minute.

4.8.7.2.2 Receptacles.-- The test shall be performed as specified in 4.8.7.2.1, except that the steel insert portion of the test plug (See 4.7.1.1), shall be mated with the receptacle under test.

4.8.7.3 Torque.-- The complete test plug shall be mated with the receptacle under test. A gradually increasing torque shall be applied to the test plug by means of a lever attached to the cable entry, until a torque of 150 inch-pounds is reached. The torque shall be maintained for a period of 1 minute, and shall be applied both axially and radially.

4.8.8 Temperature cycling (See 3.15).-- Fifty (50) percent of the connectors shall be mated and fifty (50) percent unmated, and all shall be tested in accordance with method 102 of Standard MIL-STD-202. The following details and exceptions shall apply:

(a) Test condition, -D.

(b) Measurements after cycling, -During the last 5 minutes of each exposure in the fifth cycle, unmated connectors shall be mated and checked for electrical continuity, and then unmated. Mated connectors shall be checked for electrical continuity. Forty-five minutes after the end of the fifth cycle, all connectors shall be subjected to the mating and unmating operation at least once, and then be subjected to the dielectric withstanding voltage test (see 4.8.2) while unmated.

4.8.9 Water pressure (See 3.16).-- Connectors shall be immersed in tapwater to a depth of 6 feet for a period of 48 hours. Fifty (50) percent of the connectors tested shall be mated and fifty (50) percent shall be unmated.

4.8.9.1 Plugs.-- A rubber test jig shall be inserted into the cable accommodation of the plugs to prevent entrance of water. The test jig shall be approximately 6 inches long and shall have the minimum diameter specified for the cable accommodation with a tolerance of  $\pm 0.010$  inches. Plugs shall be disassembled and reassembled twice before being tested. After test, the plugs shall be examined for leakage. All excess moisture shall then be removed and the connector dried at room temperature by compressed air for a period of 5 minutes. The insulation resistance shall then be measured. (See 3.16).

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4.8.9.2 Receptacles.- Receptacles shall be mounted using the normal mounting method so that only the front face is exposed to water. After test, the receptacles shall be examined for leakage. All excess moisture shall then be removed and the connector dried at room temperature by compressed air for a period of 5 minutes. The insulation resistance shall then be measured. (See 3.16).

4.8.10 Endurance (see 3.17).- Connectors shall be coupled and uncoupled with their mating plugs or receptacles 500 times. For each coupling, a torque of  $25 \pm 1$  inch-pounds shall be applied to the wing blade in the direction to tighten. During the final coupling, the torque shall be maintained for at least 1 minute. After test, the connectors shall be examined for mechanical defects, and the voltage drop across the female contacts shall then be measured. (See 4.8.5).

4.8.11 Impact resistance.-

4.8.11.1 Connector nosepiece (see 3.18).- The plug connector under test shall be securely mounted to a hardwood base. The nosepiece shall be supported along its axial length by a hardwood block and subjected to a transverse blow of 40 inch-pounds (a weight of 2 pounds falling freely through a height of 20 inches). The blows shall be delivered by a flat, blunt object, approximately 1/8 inch wide; one to the polarizing groove and the other at a point 180° from the polarizing groove in the vicinity of the mating edge. (See fig. 4).

4.8.11.2 Connector shell.-

4.8.11.2.1 Impact resistance of shell body (see 3.18).- The shell body of the connector plug, if fabricated by means of die-casting, shall be subjected to a force of 115 inch pounds applied as shown in Figure 5.

4.8.11.2.2 Compression of shell body (see 3.18).- The shell body of the connector plug, if fabricated by means of die-casting, shall be subjected to a force of 300 pounds applied as shown in Figure 6.

4.8.12 Vibration (see 3.19).- Mated connectors shall be tested in accordance with method 201 of Standard MIL-STD-202. The following details and exceptions shall apply:

(a) Method of mounting - Connectors shall be rigidly mounted by receptacle mounting.

(b) Tests and measurements after vibration, - The connector shall be subjected to the dielectric withstanding voltage test (see 4.8.2) and the voltage drop test (see 4.8.5).

(c) Duration and direction of motion, - Two hours in each of three mutually perpendicular directions. One direction shall be with the contact axis in a horizontal plane.

4.8.13 Salt spray (corrosion) (see 3.20).- Unmated connectors shall be tested in accordance with method 101, test condition B, of Standard MIL-STD-202. After test, the connector shall be visually examined for evidence of base metal corrosion.

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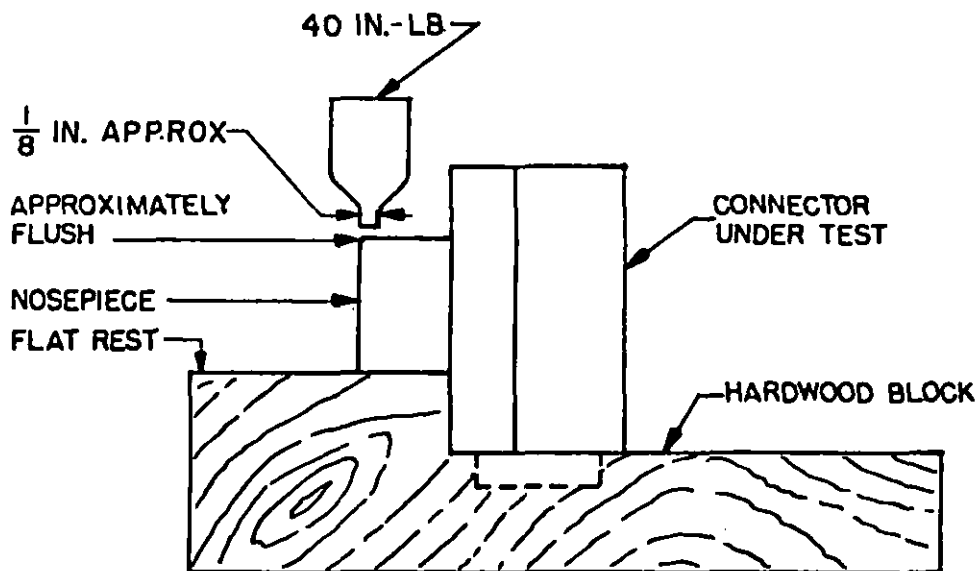


FIGURE 4. Impact resistance test setup

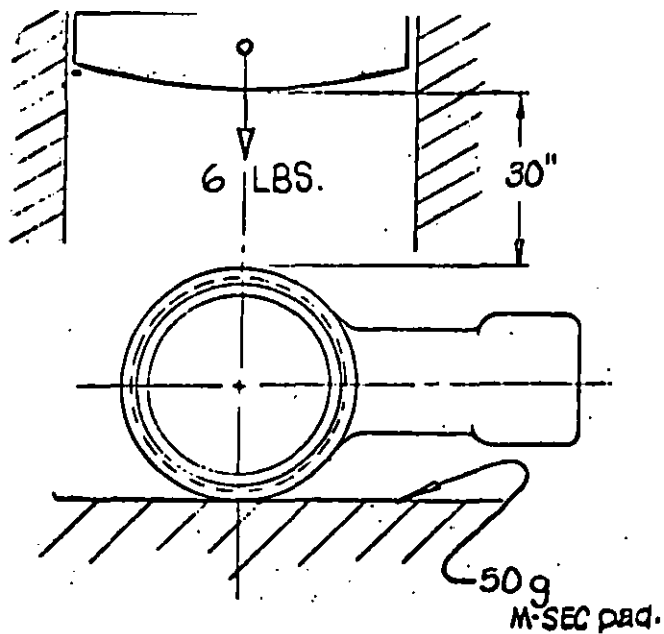
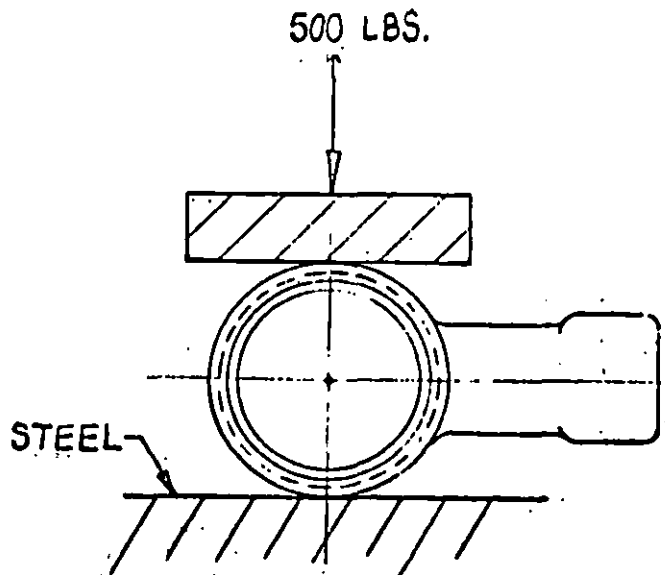
Fig. 5 Impact Resistance  
of Shell Body

Fig. 6 Compression of Shell Body

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4.8.14 Inspection for dimensional interchangeability.- (See 3.21).

4.9 Quality conformance inspection of preparation for delivery.-  
Preparation for delivery shall be inspected in accordance with Specification MIL-P-116 to determine conformance to the requirements of section 5.

## 5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging.-

5.1.1 Level A.- The connectors shall be preserved, packaged and tested in accordance with the applicable provisions of Specification MIL-P-116 and in a manner that will afford adequate protection against corrosion, deterioration and damage during worldwide shipment, handling and open storage. (See 4.9).

5.1.2 Level C.- The connectors shall be afforded preservation and packaging in accordance with the suppliers' normal commercial practice.

5.2 Packing.- The connectors, packaged as specified, shall be packed in shipping containers conforming to the requirements of the specifications referenced below for the designated level. The gross weight shall not exceed the weight shown unless an individually packed item exceeds that amount. Closure and strapping shall be as prescribed in the applicable box specification or appendix thereto, except that bands of reinforced, pressure-sensitive adhesive tape, 1/2 inch wide and conforming to Specification PPP-T-97 for Grade IV, shall be used for fiberboard boxes in lieu of metal strapping.

5.2.1 Level A.-

	<u>BOX SPECIFICATION</u>	<u>MAX. GROSS WT.</u>
Fiberboard (Type I, Class 2)	PPP-B-636	Table VI
Nailed Wood (Style 4, Class 2)	PPP-B-621	200 lbs.
Wirebound (Style 2 or 3, Class 2)	PPP-B-585	200 lbs.
Wood Cleated Fiberboard (Overseas)	PPP-B-591	200 lbs.
Wood Cleated Plywood (Overseas)	PPP-B-601	200 lbs.
Wood Cleated, Veneer, Paper Overlaid (Overseas)	MIL-B-10377	200 lbs.

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5.2.2 Level B.-

<u>BOX SPECIFICATION</u>		<u>MAX. GROSS WT.</u>
Fiberboard (Type I, Class 1)	PPP-B-636	Table I
Nailed Wood (Style 4, Class 1)	PPP-B-621	200 lbs.
Wirebound (Style 3, Class 1)	PPP-B-585	200 lbs.
Wood Cleated Fiberboard (Domestic)	PPP-B-591	200 lbs.
Wood Cleated Plywood (Domestic)	PPP-B-601	200 lbs.
Wood Cleated, Veneer, Paper Overlaid (Overseas)	MIL-B-10377	200 lbs.

5.2.3 Level C.- The connectors shall be packed in shipping containers of the type, size and kind commonly used for the purpose in a manner that will insure acceptance by common carrier and safe delivery at destination. Shipping containers shall comply with the rules or regulations of the common carrier, applicable to the mode of transportation.

5.2.4 Pilot pack.- When Level "A" packaging and packing is specified above, one acceptable model of the connectors will be pilot packed in a manner that will pass the preproduction tests prescribed in Specification MIL-P-116. Illustrations of the packaging and packing procedure, together with Bills of Material, will be prepared and furnished in accordance with the provisions of Signal Corps Drawing No. SC-A-362100.

5.3 Marking.- In addition to any special marking required by the contract or order, interior packages and exterior shipping containers shall be marked in accordance with the applicable provisions of Standard MIL-STD-129.

## 6. NOTES

6.1 Intended use.- The electrical connectors covered by this specification are intended primarily for ground or shore use.

6.2 Ordering data.- Procurement documents should specify the following:

(a) Title, number, and date of this specification and any amendment thereto.

(b) Title, number, and date of the applicable detail specification, and the complete type designation.

(c) Level of packaging and level of packing required for shipment. (Level A, level B, or level C).

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(d) The specific paragraphs of section 5 which are applicable to the particular procurement.

(e) Preproduction pack(s) as follows:

Makeup of pack(s).  
Number of each kind of pack to be submitted.  
Inspection to be performed thereon.

(f) Marking and shipping of samples.

(g) Place of final inspection.

6.4 Group C inspection.- Approval to ship may be withheld, at the discretion of the Government, pending the decision from the contracting officer on the adequacy of corrective action. (See 4.5.3.2).

6.5 Definitions.- For the purpose of this specification, the following definitions shall apply:

6.5.1 Connector.- Connector is a term used to denote an electrical plug or receptacle.

6.5.2 Plug.- A plug is an electrical fitting with male, female, or male and female contacts, constructed to be affixed to the end of cable, conduit, coaxial line, cord, or wire for convenience in joining with another electrical connector(s), and not designed to be mounted on a bulkhead, chassis, or panel.

6.5.3 Receptacle.- A receptacle is an electrical fitting with male, female, or male and female contacts, constructed to be electrically connected to a cable, coaxial line, cord, or wire to join with another electrical connector(s), and is designed to be mounted on a bulkhead, wall, chassis, or panel.

6.5.4 Contacts.- Contacts are current-carrying parts of a connector which connect and disconnect a circuit.

6.5.5 Inserts.- Inserts are the insulated parts of a connector in which the contacts are arranged.



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6.5.6 Shell.- The shell is that part of a connector which houses the threaded mating parts and the insert and contact assembly.

6.5.7 Polarization.- Polarization is the physical means of properly aligning the contacts of both the plug and the receptacle for correct engagement. A connector may be polarized by the use of a key on the receptacle shell with a corresponding slot in the plug shell.

6.6 Verification inspection.- Verification by the Government will be limited to the amount deemed necessary to determine compliance with the contract and will be limited in severity to the definitive quality assurance provisions established in this specification and the contract. The amount of verification inspection by the Government will be adjusted to make maximum utilization of the contractor's quality control system and the quality history of the product.

6.7 Cross index of type designation.- Table VIII is a cross index of type designations covered by this specification corresponding to the type designations of superseded Specification MIL-C-12520A(SigC).

Table VIII - Cross index of type designations

Specification MIL-C-12520A (SigC)				Specifications MIL-C-12520B		
CS-1220	(1)	(S)	(.450)	UW-1220	FA	15
CS-1220	(1)	(P)	(.450)	UW-1220	MA	15
CS-1220	(2)	(S)	(.500)	UW-1220	FB	17
CS-1220	(2)	(P)	(.500)	UW-1220	MB	17
U-113						
CS-1220	(1)	(P)	(.525)	UW-1220	MA	17
U-115						
CS-1220	(2)	(P)	(.550)	UW-1220	MB	19
CS-1226	(1)	(S)	(.550)	UW-1226	FC	19

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Table VIII - Cross index of type designations (Cont'd)

Specification MIL-C-12520A (SigC)				Specifications MIL-C-12520B		
CS-1226	(1)	(P)	(.550)	UW-1226	MC	19
CS-1226	(2)	(S)	(.700)	UW-1226	FD	25
CS-1226	(2)	(P)	(.700)	UW-1226	MD	25
CS-1320	(1)	(S)	(.450)	UW-1226	FA	15
CS-1320	(1)	(P)	(.450)	UW-1320	MA	15
CS-1320	(2)	(S)	(.500)	UW-1320	FB	17
CS-1320	(1)	(P)	(.540)	UW-1320	MA	17
CS-1320	(2)	(P)	(.500)	UW-1320	MB	17
CS-1320	(2)	(P)	(.550)	UW-1320	MB	19
CS-1326	(1)	(S)	(.550)	UW-1326	FC	19
CS-1326	(1)	(P)	(.550)	UW-1326	MC	19
CS-1326	(2)	(S)	(.700)	UW-1326	FD	25
CS-1326	(2)	(P)	(.700)	UW-1326	MD	25
CS-2020	(1)	(S)		UW-2020	FA	00
CS-2020	(2)	(S)		UW-2020	FB	00
CS-2026	(1)	(S)		UW-2026	FC	00

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SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No. 119-R004
<u>INSTRUCTIONS</u>		
<p>This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity.</p>		
SPECIFICATION		
ORGANIZATION		CITY AND STATE
CONTRACT NO	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT
MATERIAL PROCURED UNDER A		
<input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPH NUMBER AND WORDING		
B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES		
2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3. IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO      IF "YES", IN WHAT WAY?		
4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED BY (Printed or typed name and activity)		DATE