

INCH-POUND

MIL-C-55449C(CR)

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SUPERSEDING

MIL-C-55449B(EL)

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MILITARY SPECIFICATION

CONNECTOR, PLUG, ELECTRICAL U-237()/G
CONNECTOR, RECEPTACLE, ELECTRICAL U-238()/G

This specification is approved for use by the Communications-Electronics Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers two types of electrical power connectors designated as Connector, Plug, Electrical U-237()/G and Connector, Receptacle, Electrical U-238()/G. They are used to supply electrical power to area-type communications systems (see 6.4).

1.2 Classification. The connectors are type-classified as four (4) pin contact, hermaphroditic, waterproof, power connectors.

2. APPLICABLE DOCUMENTS

2.1. Government documents.

2.1.1. Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Communications-Electronics Command, ATTN: AMSEL-ED-TD, Fort Monmouth, NJ 07703-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5935

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SPECIFICATIONS

MILITARY

MIL-M-13231 - Marking of Electronic Items
 MIL-F-14072 - Finishes for Ground Signal Equipment

STANDARDS

MILITARY

MIL-STD-202 - Test Methods for Electronic and Electric
 Component Parts
 MIL-STD-810 - Environmental Test Methods and
 Engineering Guidelines

(Unless otherwise indicated, copies of the federal and military specifications, standards, and handbooks are available from: Standardization Documents Order Desk, Bldg 4D, 700 Robbins Avenue, Philadelphia, PA 1911-5094.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DRAWINGS

ELECTRONICS COMMAND

SC-DL-162362 Connector, Plug, Electrical U-237()/G
 SC-DL-162391 Connector, Receptacle, Electrical U-238()/G
 SC-GL-323058 Connector, Plug, Electrical U-237()/G
 SC-GL-323121 Connector, Receptacle, Electrical U-238()/G
 SM-D-352157 Cable Assembly, Power, Electrical CX-7705()/U

(Copies of specifications, standards, handbooks, drawings, publications, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1. Materials. The connectors shall be constructed in accordance with the requirements of this specification and the following Drawing and Data List, using materials as specified therein:

Connector, Plug, Electrical U-237()/G, SC-DL-162362
Connector, Receptacle, Electrical U-238()/G, SC-DL-162391

3.2 Cast and molded parts.

3.2.1 Casting. Castings shall be of uniform quality and conditions, 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, parting lines, porous areas, fins, ridges, modules, raised metal, and scale. All castings shall be completely cleaned prior to presentation for inspection. Castings shall not be plugged or welded, nor shall imperfections be filled in.

3.2.2 Molded parts. Molded parts shall be uniform in quality, condition, and color. The molded parts shall be clean, smooth, free from porous areas, foreign materials, weak sections, bubbles, flash and any other injurious defects.

3.3 Cleaning. After assembly, the equipment shall be cleaned thoroughly and shall be free from foreign material.

3.4 Finish, protective. Equipment shall be given protective finish in accordance with MIL-F-14072 and the equipment drawings (see 4.3).

3.5 Marking. Marking shall conform to MIL-M-13231 (see 4.3).

3.6 Electrical requirements.

3.6.1 Continuity. The path between each male contact and its corresponding female contact in the connector shall be continuous electrically. In addition, the resistance between each male contact and the corresponding female contact of mated connectors shall not exceed 0.01 ohm (see 4.7.1).

3.6.2 Dielectric strength. There shall be no evidence of a voltage drop when tested in accordance with 4.7.2.

3.6.3 Insulation resistance. When tested in accordance with 4.7.3, the insulation resistance shall be not less than 5,000 megohms except that it shall be not less than 1,000 megohms during the Moisture resistance test 4.9.4 and the High humidity and high temperature test 4.9.4.

3.6.4 Contact resistance. When tested in accordance with 4.7.4, the voltage drop across each mated pair of contacts shall not exceed 1.8 millivolts.

3.7 Mechanical requirements.

3.7.1 Immersion. After being subjected to the tests specified in 4.8.1, the connector shall meet the requirements of Dielectric strength 3.6.2 and Insulation resistance 3.6.3, and there shall be no evidence of water in the connector housings or test fixture.

3.7.2 Air leakage. There shall be no evidence of air leakage when tested in accordance with 4.8.2.

3.7.3 Durability. Following the durability test of 4.8.3, contact resistance measurements shall be within 10% of the measurements taken prior to durability. The connector shall meet the electrical requirements of 3.6 and Air leakage 3.7.2. There shall be no distorted or broken components or binding of the coupler on Connector U-237()/G.

3.7.4 Pull. While being subjected to the test specified in 4.8.4, the assemblies shall show no straining of individual conductors or penetration of the grip through the cable jacket and shall meet the requirements of Continuity 3.6.1, Dielectric strength 3.6.2 and Insulation resistance 3.6.3. Upon completion of the pull test, the equipment shall be subjected to the Immersion test specified in 4.8.1 and meet the requirements of 3.7.1.

3.7.5 Interchangeability. Like units, assemblies and sub-assemblies shall be physically and functionally interchangeable, without modification of such items or of the connector (see 4.8.5). Individual items shall not be hand-picked for fit. Reliance shall not be placed on any unspecified dimension, characteristic, etc.

3.8 Service conditions.

3.8.1 Shock drop. After being subjected to the test specified in 4.9.1, the connectors shall be mechanically operable and any physical damage shall be minor. The equipment shall meet the electrical requirements of 3.6 and Air leakage 3.7.2.

3.8.2 Temperature cycling. During the test specified in 4.9.2, the connector shall meet the requirements of Continuity 3.6.1, Dielectric strength 3.6.2 and Insulation resistance 3.6.3 and shall show no evidence of deterioration.

3.8.3 Mating at high and low temperature extremes. The connector shall be capable of being mated and unmated without difficulty when tested in accordance with 4.9.3.

3.8.4 High humidity and high temperature. When subjected to the test specified in 4.9.4, the connector shall meet the requirements of Insulation resistance 3.6.3, and there shall be no evidence of deterioration.

3.9 Workmanship. The connector shall be manufactured and assembled in accordance with the applicable portions of the following paragraphs herein (see 4.10):

3.2 Cast and molded parts

3.3 Cleaning

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the

performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Inspection covered by subsidiary documents (see 4.3).
- b. Quality conformance inspection of equipment before packaging (see 4.4).

4.3 Inspection covered by subsidiary documents. The following shall be inspected under the applicable subsidiary documents as part of the inspection before preparation for delivery:

<u>Item</u>	<u>Where required</u>
Finish	3.4
Marking	3.5

4.4 Quality conformance inspection of equipment before packaging. The contractor, to demonstrate compliance with specified requirements, shall perform the inspection specified in 4.3 and 4.4.1 through 4.4.4. 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. 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. Test equipment for Government verification inspection shall be made available by the contractor.

4.4.1 Group A inspection. Each unit (100%) of each lot of equipment shall be inspected for conformance to all the inspection and test requirements of table I. Group A inspection shall be performed in any order which is satisfactory to the Government.

TABLE I. Group A inspection.

Inspection	Required paragraph	Inspection paragraph
Visual and Mechanical	3.9	4.10
Electrical:		
Continuity	3.6.1	4.7.1
Dielectric strength	3.6.2	4.7.2
Insulation resistance	3.6.3	4.7.3
Air leakage	3.7.2	4.8.2

4.4.2 Group B inspection. This inspection, including sampling, shall conform to table II. 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. Each lot shall be subjected to sampling inspection in accordance with Table III. If any defects are found, the entire lot shall be rejected.

TABLE II. Group B inspection.

Inspection	Required paragraph	Inspection paragraph
Immersion	3.7.1	4.8.1
Interchangeability	3.7.5	4.8.5

Table III. Sampling plan.

Lot size	Sample sizes	
	Immersion	Sample size
2 to 8	*	3
9 to 15	8	3
16 to 25	8	3
26 to 50	8	5
51 to 90	8	6
91 to 150	12	7
151 to 280	19	10
281 to 500	21	11

Table III. Sampling plan. - Continued

Lot size	Sample sizes	
	Immersion	Sample size
501 to 1200	27	15
1201 to 3200	35	18
3201 to 10,000	38	22
35,001 to 150,000	56	29
10,000 to 35,000	64	29
500,001 and over	64	29

Note:

- * Indicates entire lot must be inspected.
- Acceptance levels in all cases is zero.

4.4.3 Group C inspection. This inspection shall consist of the tests specified in tables IV, V and VI and shall be performed on samples that have been subjected to and met group A and group B inspection. Sample units shall be selected at random without regard to their quality except that the samples selected at the start of production shall be selected from the first units produced.

4.4.3.1 Group C-1 inspection. This inspection shall consist of the tests specified in table IV and shall be performed every month or every 1,000 units, whichever comes first.

TABLE IV. Group C-1 inspection.

Inspection	Required paragraph	Inspection paragraph	Sampling
Contact resistance	3.6.4	4.7.4	2 units
Durability*	3.7.3	4.8.3	2 units
Pull	3.7.4	4.8.4	2 units

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

4.4.3.2 Group C-2 inspection. This inspection shall consist of the tests specified in table V and shall be performed every 3 months or every 3,000 units, whichever comes first.

TABLE V. Group C-2 inspection.

Inspection	paragraph	paragraph	Sampling
Shock drop	3.8.1	4.9.1	3 units
High humidity and high temperature	3.8.4	4.9.4	4 units

4.4.3.3 Group C-3 inspection. This inspection shall consist of the tests specified in table VI and shall be performed once each year or every 12,000 units, whichever comes first. The 4 units shall be subjected to all of the tests listed and in the order stated below.

TABLE VI. Group C-3 inspection.

Inspection	Required paragraph	Inspection paragraph	Sampling
Temperature cycling	3.8.2	4.9.2	4 units
Mating at high and low temperature extremes	3.8.3	4.9.3	4 units
High humidity and high temperature	3.8.4	4.9.4	4 units

4.4.3.4 Noncompliance. The contractor shall immediately report, in writing, each group C failure occurrence, including details of the failure and characteristics affected. The contractor shall immediately investigate the cause of failure and further report the results of investigation and details of the proposed corrective action on (i) the process and materials, as applicable, and (ii) all units of product which were manufactured under the same conditions and which the Government considers subject to the same failure. Reports shall be forwarded to the responsible technical activity designated in the contract through the Quality Assurance Representative. After corrective action has been taken, additional sample units shall be subjected to group C inspection (all inspection, or the inspections which the sample failed, at the option of the Government) and groups A and B inspection may be reinstated; however, final acceptance and shipment will be withheld until the group C reinspection results have shown that the corrective action was effective.

4.4.4 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.

4.5 Test conditions.

4.5.1 Procurement of connector U-238()/G. When connector, receptacle U-238()/G is being procured separately, the contractor will furnish sufficient Connector, Plug U-237()/G housings to accomplish the tests where mating of connectors is required. (see 4.7.1, 4.7.4, 4.8.1, 4.8.3, 4.9.2, 4.9.3, and 4.9.4). The contact assembly, including contacts (male and female), spacers, O-rings, insert, back plate and gasket assembled within the contractor-furnished U-237()/G housing(s) shall be from the production of U-238()/G being tested. The connectors(s) shall be wired as indicated in 4.5.2(a).

4.5.2 Preparation of samples. The contractor shall prepare samples of each connector on contract for quality conformance inspection in the following manner:

a. Connector U-237()/G.

(1) Samples selected for Immersion 4.8.1 and Pull 4.8.4 shall be wired to Cable WT-26()/U in accordance with SM-D-352157.

(2) Samples selected for Temperature cycling 4.9.2, Moisture resistance 4.9.4 and high humidity and high temperature 4.9.4 shall be wired to a four conductor cable which is capable of withstanding the conditions of the required tests.

(3) Samples selected for Air leakage 4.8.2 shall have air injected through a plug which is inserted into the cable entrance of the connector. The plug shall have a major maximum diameter of 0.980 and a minor maximum diameter of 0.530.

b. Connector U-238()/G.

(1) Samples selected for Immersion 4.8.1, Air leakage 4.8.2, Temperature cycling 4.9.2, Moisture resistance 4.9.4 and High humidity and high temperature 4.9.4 shall be mounted on a sealed metal box(s). The metal box(s) shall have a valve through which air is injected and in addition provisions for a four conductor cable to be wired to the terminals of the connectors under test. The cable shall be capable of withstanding the conditions of the required tests.

(2) Samples selected for Durability 4.8.3 shall be mated with Connector U-237()/G.

4.5.3 Contractor-furnished supplies. Contractor shall furnish supplies as required in paragraphs 4.5.1 and 4.5.2 and in sufficient quantity to accomplish the tests required.

4.6 Preconditioning. The contractor shall be permitted to precondition the equipments prior to performing any electrical tests. The preconditioning shall consist of removing surface moisture from the equipment by wiping, drying, or blowing. The application heat shall be limited to 3 minutes or less. For those equipments subjected to tests specified in Immersion 4.8.1, Moisture resistance 4.9.4 and High humidity and high temperature 4.9.4, unmated and without protective covers, a 24-hour waiting period in an ambient room temperature is permitted. However, if the contractor exercises this option of preconditioning, the contractor shall precondition all samples selected by Quality Assurance Representatives immediately prior to testing.

4.7 Electrical tests.

4.7.1 Continuity. The connector shall be tested to determine compliance with the requirements specified in 3.6.1 (see 4.5).

4.7.2 Dielectric strength. The connector shall be tested in accordance with Method 301 of MIL-STD-202 to determine compliance with the requirements of 3.6.2. The potential, 3,500 volts rms (4,950 volts dc) shall be applied between each terminal in turn and the remaining terminals connected together to the housing ground.

4.7.3 Insulation resistance. The connector shall be tested in accordance with Method 302, Condition B of MIL-STD-202 to determine compliance with the requirements of 3.6.3. The insulation resistance shall be measured between each terminal in turn and the remaining terminals connected together to the housing ground. The measurement shall be made after 1 minute electrification.

4.7.4 Contact resistance. Connectors shall be mated and the voltage drop between each terminal and its corresponding terminal shall be measured to determine compliance with the requirements of 3.6.4. The test current shall be 3 ampere dc (see 4.5).

4.8 Mechanical tests.

4.8.1 Immersion. The connector prepared in accordance with 4.5 shall be immersed to a depth of 3 feet of water for 16 hours to determine compliance with 3.7.1. Fifty percent shall be mated, twenty-five percent shall be with protective cover in place and the remainder shall be without protective covers (minimum 4 connectors).

4.8.2 Air leakage. The connector prepared in accordance with 4.5 shall be submerged in water not deeper than 6 inches. Air at 2.5 psi shall then be applied internally to the equipment. After stabilization, the equipment shall be observed for a minimum of 30 seconds and meet the requirements of 3.7.2. This test shall then be repeated using air at 15 psi.

NOTE: Air leakage performed in any other manner must have Government approval.

4.8.3 Durability. Two connectors shall be tested for compliance with 4.7.4. Contact resistance measurements shall be recorded. The connectors shall then be subjected to 200 cycles of mating and unmating. A cycle shall consist of mating, locking and unlocking of the couplers and a complete separation of the connectors. The equipment shall meet the requirements of 3.7.3 (see 4.5).

4.8.4 Pull. Two mated Connectors, Plug, Electrical U-237()/G assembled as specified in 4.5 shall be subjected to a static load of 425 pounds for a sufficient duration to permit electrical measurements specified in 3.7.4. A minimum of 2-1/2 feet of Cable WT-26()/U connected to each connector shall be subjected to the load.

4.8.5 Inspection for interchangeability. The connector shall be gaged, using the appropriate gages listed below, to determine conformance to the physical and functional interchangeability requirement of 3.7.5. When a mechanical value is not within specified or design limits, it shall be considered a major defect.

<u>Gage List</u>	<u>Connector</u>
SC-GL-323058	Connector, Plug, Electrical U-237()/G
SC-GL-323121	Connector, Receptacle, Electrical U-238()/G

4.9 Service tests.

4.9.1 Shock drop. One connector shall be dropped a distance of 36 inches at random for a total of 12 drops. Six drops shall be made with the protective cover on, the remaining 6 drops shall be made with the protective cover off. In addition, when Connectors U-237()/G are being procured, a pair of mated connectors shall be dropped at random 12 times from a distance of 36 inches. The floor or barrier receiving the impact shall be 2 inch fir backed by concrete or a rigid steel frame. Connectors shall meet the requirements of 3.8.1.

4.9.2 Temperature cycling. Four connectors, mated, unmated with protective cover in place and unmated without protective cover assembled as specified in 4.5 shall be subjected to the test of MIL-STD-810, Method 503, Procedure I. The low temperature extreme for Step 1 shall be -54°C (-65.2°F). For Step 2, the high temperature environment shall be $+68.3^{\circ}\text{C}$ ($+155^{\circ}\text{F}$). The diurnal cycle shall be the Hot Dry Induced temperature category of Table 503-I. Measurements shall be taken on steps 3, 4, and 5 of the procedure, and shall meet the requirements of 3.8.2.

4.9.3 Mating at high and low temperatures extremes. Four connectors, assembled as specified in 4.5, 2 mated and 2 unmated, shall be placed in a temperature chamber and conditioned at $-65^{\circ}\text{F} \pm 2^{\circ}$ for 24 hours. While still at $-65^{\circ}\text{F} \pm 2^{\circ}$, the connectors shall be tested to determine compliance with the requirements of 3.8.3. The above shall be repeated at $+150^{\circ}\text{F} \pm 2^{\circ}$.

4.9.4 High humidity and high temperature. Four connectors assembled as specified in 4.5, mated, unmated with protective cover in place and unmated without protective cover shall be placed in a chamber at $86^{\circ}\text{F} \pm 5^{\circ}$ and a relative humidity of 92 to 98 percent. The temperature and humidity shall be maintained continuously for 5 days. While still at these conditions, the insulation resistance shall be measured using Method 302, Condition A, of MIL-STD-202. The connectors shall meet the requirements of 3.8.4.

4.10 Visual and mechanical inspection. The connectors shall be examined for the defects listed in table VII (see 3.9).

TABLE VII. Classification of visual and mechanical defects.

Classification	Defect
Major	101 - Locking threads chipped or broken.
	102 - Threads stripped
	103 - Sharp edges on metal parts
	104 - Coupler not operating freely
	105 - Metal parts chipped or broken
	106 - Contacts missing, broken or bent
	107 - Contact assembly parts chipped or broken
	108 - Any foreign objects or material preventing the mating of connectors
	109 - Cuts or abrasions on rubber parts

TABLE VII. Classification of visual and mechanical defects. -
Continued.

Classification	Defect
Minor	110 - Scratches, cuts, abrasions, etc., with exposure of bare metal
	201 - Screws missing
	202 - Finish not as specified
	203 - Marking incorrect
	204 - Scratches, cuts, abrasions, etc., without exposure of bare metal
	205 - Finish adhesion-flaking, peeling or chipping
	206 - Wire grip missing
	207 - Scratches, cuts, abrasions, etc., of contact assembly
	208 - Gasket not properly bonded to contact assembly

5. PACKAGING

5.1 Packaging requirements. The packaging requirements for the desired level(s) of protection shall be as specified by the acquisition activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

This specification is certified to be in compliance with Army Material Command (AMC) policy for the elimination of AQLs/LTPDs (Acceptable Quality Levels/Lot Tolerance Percent Defective) from military specifications.

6.1 Intended use. The connectors covered by this specification are used to supply electrical power to communication systems. They are quick connect and disconnect hermaphrodite waterproof power connectors (see 1.1).

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Type required.

c. Issue of DQDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).

6.3 Subject term (key word) listing.

Contact resistance
Four (4) pin contact
Hermaphroditic, waterproof, power connectors
Quick connect and disconnect

6.4 Nomenclature. The parentheses in the nomenclature will be deleted or replaced by a letter identifying the particular design; for example, Connector, Plug, Electrical U-237E/G. As soon as possible after the award of the contract, the contractor should apply for nomenclature in accordance with the applicable clause in the contract (see 1.1).

6.5 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodian:
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Preparing activity:
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