

INCH-POUND

MIL-DTL-83502D
 10 February 2004
 SUPERSEDING
 MIL-PRF-83502C
 7 April 1997

DETAIL SPECIFICATION

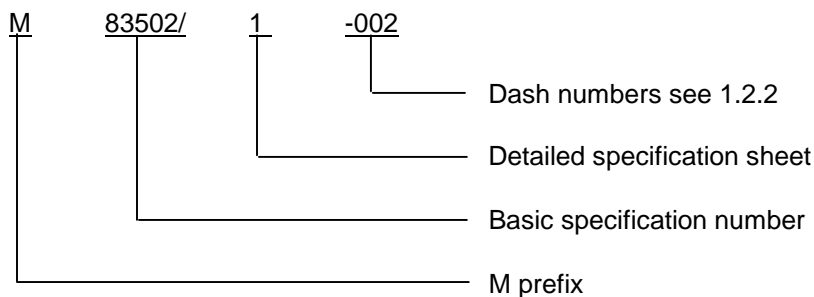
SOCKETS, PLUG-IN ELECTRONIC COMPONENTS, ROUND STYLE,
 GENERAL SPECIFICATION FOR

This specification is approved for use by all Departments
 and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers round, plug-in electronic component sockets for use on panel boards, printed circuit boards, and microelectronic components (see 6.1).

1.2.1 Part or Identifying Number (PIN). The PIN consists of the letter M (see 3.8), the basic specification number, a forward slash, a detail specification number, a dash, and a number for the socket arrangement shown in the following example:



1.2.2

A number assigned in a specific specification sheet.

Comments, suggestions, or questions on this document should be addressed to:
 Commander, Defense Supply Center Columbus, Attn: VAI, 3990 East Broad Street,
 Columbus, Ohio, 43216-5000 or emailed to RectangularConnector@dla.mil. Since
 contact information can change, you may want to verify the currency of this address
 information using the ASSIST Online database at <http://www.dodssp.daps.mil.daps.mil>.

MIL-DTL-83502D

1.2.3 Classification. Sockets covered by this specification are of the following types as specified (see 3.1). For the purpose of clarification in this document and the references cited herein the socket's mounting types are defined as follows.

- a. Type I - Wrappost (see figure 1).
- b. Type II - Printed circuit terminals (see figure 1).
- c. Type III - Wire turret terminals (see figure 1).
- d. Type IV - Solder-cup terminals (see figure 1).

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4 or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4 or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 cited in the solicitation or contract.

DEPARTMENT OF DEFENSE STANDARDS

- MIL-STD-202 - Tests Methods for Electronic and Electrical Component Parts.
- MIL-STD-810 - Environmental Test Methods.
- MIL-STD-1285 - Marking of Electrical and Electronic Parts.

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://www.dodssp.daps.mil.daps.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, issues of these documents are those cited in the solicitation or contract.

AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)

- ANSI/NCSL Z540-1 - Calibration Laboratories and Measuring and Test Equipment, General Requirements.

(Copies of these documents are available from <http://www.ansi.org/> or American National Standards Institute, 11 West 42nd Street, New York, NY 10036.)

MIL-DTL-83502D

ASTM INTERNATIONAL

- ASTM B16 - Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines.
- ASTM B139 - Rod, Phosphor Bronze, Bar, and Shapes.
- ASTM B194 - Plate, Copper Beryllium Alloy, Sheet, Strip, and Rolled Bar.
- ASTM B196 - Rod and Bar, Copper Beryllium Alloy.
- ASTM D1710 - Tubing, Extruded and Compression Molded Polytetrafluoroethylene (PTFE) Rod and Heavy-Walled.
- ASTM D4066 - Standard Specification for Nylon Injection and Extrusion Materials (PA).
- ASTM D5948 - Standard Specification for Molding Compounds, Thermosetting.

(Copies of these documents are available from <http://www.astm.org/> or ASTM International, P.O. Box C700, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

COPPER DEVELOPMENT ASSOCIATION, INC.

- Copper alloy No. CA725.
- Copper alloy No. CA770.

(Copies of these documents are available from <http://www.copper.org/> or Copper Development Association, 260 Madison Avenue, New York, NY 10016.)

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

- ISO-10012-1 - Measurement management systems - Requirements for Measurement Processes and Measuring Equipment.

(Copies of these documents are available from <http://www.iso.ch/> or International Organization for Standardization, 1, rue de Varembé, Case postale 56, CH-1211 Geneva 20, Switzerland.)

ELECTRONIC INDUSTRY ALLIANCE (EIA)

- EIA-J-STD-004 - Soldering Fluxes Requirements For.
- EIA-J-STD-006 - Electronic Grade Solder Alloys and Fluxed and Non-Fluxed Solid Solders for Electronic Soldering Applications Requirements For.
- EIA-364 - Electrical Connector/Socket Test Procedures Including Environmental Classifications.

(Copies of these documents are available from <http://global.ihs.com> or Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112).

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

- SAE-AMS-P-81728 - Plating, Tin-Lead (Electrodeposited).
- SAE-AMS-QQ-N-290 - Nickel Plating (Electrodeposited).

(Copies of these documents are available from <http://www.sae.org/> or SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001).

MIL-DTL-83502D

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), 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 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet. In the event of any conflict between the requirements of this specification and the specification sheet, the latter shall govern.

3.2 Qualification. Sockets furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.4 and 6.3).

3.3 Materials. Example reference materials are identified herein. However, when an example reference material is not identified, a material shall be used which will enable the sockets and accessories to meet the performance requirements of this specification. Acceptance or approval of a constituent material shall not be construed as a guaranty of acceptance of the finished product.

3.3.1 Reference critical interface, materials, plating, and processes. The identified reference material, plating, and processes have been established to provide assurances that sockets manufactured to this specification will properly interface to similar industry standard or government specified connector systems without problems of electrochemical contamination of critical electrical or mechanical interfaces or generation of incompatible mechanical interface surface wear products. The manufacturer of sockets supplied to this specification is allowed to use alternate recognized industry standard materials, plating, and processes from those identified in 3.3 of this specification. Alternate materials, plating and processes used must be coordinated with the qualifying activity as part of the qualification process. Use of alternates to those referenced guidance items by the supplier must not result in inferior short or long term performance or reliability of supplied sockets as compared with sockets manufactured using the referenced materials, plating, or processes. Short or long term failures or reliability problems due to use of these alternates shall be the responsibility of the supplier.

3.3.1.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle cost.

3.3.1.2 Pure tin. The use of pure tin is prohibited (see 6.4). The maximum amount of pure tin is 97 percent and the alloy material shall inhibit the growth of tin whiskers.

3.3.2 Body. The socket insulator body (and removable insulator, when applicable), shall be manufactured with polytetrafluoroethylene in accordance with ASTM D1710, type I, grade 1, class D or diallyl phthalate in accordance with ASTM D5948, type SDG-F, glass filled polyamide (nylon) in accordance with ASTM D4066 type PA110 and as specified (see 3.1).

3.3.3 Socket spring contact and socket sleeve. The socket spring contact member shall be beryllium copper in accordance ASTM B139, ASTM B194, or ASTM B196. The socket sleeve shall be brass in accordance with ASTM B16.

MIL-DTL-83502D

3.3.4 Contact finish. The contact finish shall be gold applied overall or localized. When contacts are provided in strip form, the absence of plating in the area where the contact was removed from the strip is acceptable, provided it is a non-functional area and any corrosion formed as a result of salt spray testing does not creep into the contact engaging area.

3.3.4.1 Overall finish. Contacts shall be gold plated in accordance with ASTM B488, type I, code C, class 0.76 (30 microinches) minimum over a nickel underplate in accordance with SAE-AMS-QQ-N-290, class 2, 30 microinches (0.76 μm) to 150 microinches (3.81 μm) thick. Silver shall not be used as an underplate (see 3.3.1).

3.3.4.2 Localized finish. Socket contacts shall be overall nickel plated in accordance with SAE-AMS-QQ-N-290, class 2, 30 microinches (0.76 μm) to 150 microinches (3.81 μm) thick. Localized gold plating applied over the nickel by means of selective plating, inlay, welded dot, or other similar localization systems is permitted in lieu of overall plating, provided the conditions specified herein are met.

3.3.4.3 Contact mating area. The contact mating area shall be gold in accordance with ASTM B488, type II, code C, class 0.76 (30 microinches) minimum, over a nickel underplate in accordance with SAE-AMS-QQ-N-290, class 2, 50 microinches (1.25 μm) to 150 microinches (3.81 μm) thick. Silver shall not be used as an underplate (see 3.3.1).

3.3.4.4 Terminations. Terminations shall be plated with gold in accordance with ASTM B488, type II, code C, class 0.51 (20 microinches) minimum tin-lead in accordance with SAE-AMS-P-81728, .001 inch (25.4 μm) minimum, over nickel (see 3.3.1). The following conditions shall apply:

- a. Type II termination: Tin-lead shall be 50 to 70 percent tin.
- b. Type III and IV termination: Tin-lead shall be 50 to 95 percent tin.

3.3.4.5 Tinning solder cups. Where pretinned solder cups are required, the interior surface of solder cups shall be completely tinned over 100 percent of the full circle portion and for at least 50 percent of the remainder of the solder well area with solder conforming to composition Sn60 of EIA-J-STD-006. Only fluxes meeting EIA-J-STD-004, shall be used, any excess of which shall be removed. Solder cup terminals shall be so constructed that liquid solder cannot leak through to the front of the socket and prevent insertion of the pin. No excess solder shall be on the exterior of the solder cup.

3.4. Fungus. Materials used in the construction of these sockets shall be fungus inert and shall be capable of meeting the fungus resistant testing of MIL-STD-810, method 508.

3.5 Interface and physical construction. Sockets shall be of the interface and physical construction specified (see 3.1). The socket assembly consists of the socket insulator body, a socket spring contact member, and a socket sleeve. The entry to the socket contact shall be beveled, chamfered, or tapered to facilitate the engagement of the component lead into the socket. The sleeve shall be machined one-piece construction. The socket termination shall be part of the sleeve member. Part or Identifying Number (PIN) applicable to tin/lead finished sleeves shall have a temperature rating of -40°C to $+105^{\circ}\text{C}$. PIN's applicable to gold finished spring contacts and gold finished sleeves shall have a temperature rating of -55°C to $+125^{\circ}\text{C}$.

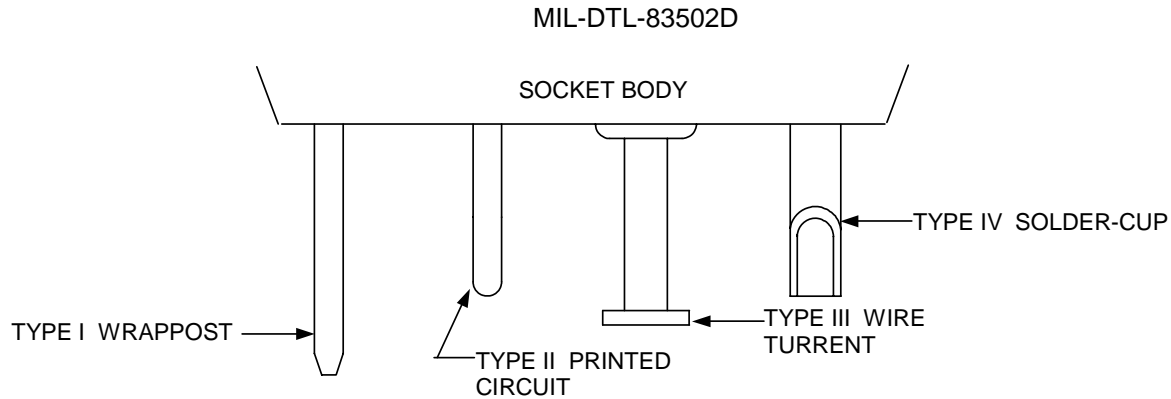


FIGURE 1. Terminal type configurations.

3.5.1 Wire termination's. The form factor and dimensions of wire termination's shall be as specified (see 3.1 and figure 1).

3.5.2 Body. The body shall be constructed with proper sections and radii so that it will not crack, chip, or break in assembly or in normal service. Depressions, when used to achieve longer creepage paths, shall not cause structural weakness, or moisture entrapment.

3.5.3 Polarization. A polarization feature (mechanical or visual) shall be incorporated in each socket and shall be so designed that the mating lead is guided into the contact opening.

3.5.4 Alignment. The socket shall be so designed that the mating lead is guided into the contact opening.

3.5.5 Mounting. When applicable, sockets shall be mounted as specified (see 3.1).

3.5.6 Contact wire wrap post. Unless otherwise specified, (see 3.1), the wire wrap post shall be:

- a. Square 0.0225 inch (0.572 mm) minimum.
- b. Cross-section diagonal: 0.0325 inch (0.826 mm) minimum.
0.0355 inch (0.902 mm) maximum.
- c. Edge radius shall not exceed 0.003 inch (0.08 mm).
- d. Edge burrs 0.0015 inch (0.038 mm), maximum.
- e. Parallel within 0.002 inch (0.05 mm).
- f. Straight within 0.005 inch (0.13 mm).
- g. Minimum wrappable length of 0.465 inch (11.81 mm) shall be maintained after allowing for insertion into a size 2 (.054-0.070 inch (1.37-1.78 mm)) circuit board, (where applicable).
- h. Tip of wire wrap post shall terminate in a radius, bevel, or chamfer to facilitate insertion into the wire wrapping tool.

3.6 Mating force. When sockets are tested as specified in 4.8.3 the maximum mating force shall be 4 pound (17.8 N) max.

3.7 Contact withdrawal force. When sockets are tested as specified in 4.8.4, the withdrawal force shall be not less than .5 ounce (0.14 N).

3.8 Contact retention. When unmated sockets are tested as specified in 4.8.5, there shall be no damage or loosening of the contacts.

MIL-DTL-83502D

3.9 Insulation resistance. When unmated sockets are tested as specified in 4.8.6, the initial insulation resistance shall be not less than 5,000 megohms.

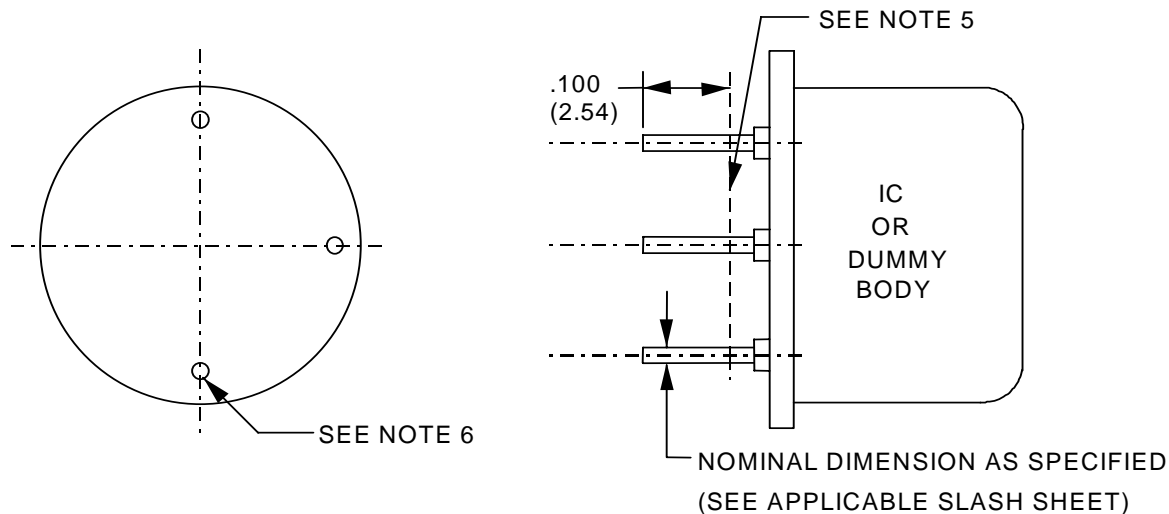
3.10 Dielectric withstanding voltage. When sockets are tested as specified in 4.8.7, there shall be no evidence of breakdown of insulation or flashover.

3.11 Contact resistance. When sockets are tested as specified in 4.8.8, the initial contact resistance shall not exceed 20 milliohms, and after the durability and corrosive atmosphere tests, the contact resistance shall not exceed the initial value by more than 10 milliohms.

3.12 Capacitance. When sockets are tested as specified in 4.8.9, the capacitance shall not exceed 2 picofarads.

3.13 Vibration. When sockets are tested as specified in 4.8.10 there shall be no physical or mechanical damage to the socket body contacts. During vibration, there shall be no interruption in continuity greater than 1 microsecond of the test circuit, which incorporates mated contacts. After the test, the mounting hardware shall show no signs of loosening, fracture, or other deterioration, and the sockets shall meet the contact resistance and contact withdrawal force requirements of 3.8 and 3.7, respectively.

3.14 Shock (specified pulse). When sockets are tested as specified in 4.8.11, there shall be no physical damage to the socket. During the test there shall be no interruption in continuity greater than 1 microsecond of the test circuit, which incorporates mated contacts.



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Contacts shall be plated gold or tin/lead the same as the contacts of the socket under test.
4. Modifications to the leads such as attaching wires are allowable as long as the area of the lead engaging the socket is unmodified.
5. Minimum engagement length.
6. For pin configuration see individual specification sheets.

FIGURE 2. Mating test plug.

MIL-DTL-83502D

3.15 Durability. When sockets are tested as specified in 4.8.12, there shall be no evidence of cracking or breaking. The sockets shall meet the contact resistance and contact withdrawal force requirements of 3.11 and 3.7, respectively.

3.16 Thermal shock. When a socket with a suitable test plug (see figure 2) is tested as specified in 4.8.13, there shall be no evidence of cracking or crazing of the body or other physical damage to the socket. The socket component shall be capable of mating and unmating without damage to either component.

3.17 Humidity. When sockets are tested as specified in 4.8.14, insulation resistance shall be no less than 300 megohms.

3.18 Low-signal level contact resistance. When tested in accordance with 4.8.15, the socket mated with a suitable test plug (see figure 2) shall show no electrical discontinuity and the contact resistance requirement of 3.11 shall not be exceeded.

3.19 Corrosive atmosphere (see 6.5.1). When sockets are tested as specified in 4.8.16, there shall be no evidence of porous plating or exposure of base metal on the contacting surfaces and the contact resistance requirement of 3.11 shall not be exceeded.

3.20 Solderability. When sockets are tested as specified in 4.8.17, terminations shall withstand the test without damage.

3.21 Resistance to soldering heat (except type I terminals). When sockets are tested as specified in 4.8.18, there shall be no damage.

3.22 Marking. Sockets should be marked in accordance with method I of MIL-STD-1285, and include the military PIN, the manufacturer's name or code symbol, and the date code, unless otherwise specified (see 3.1).

3.23 Workmanship. Sockets shall be processed in such a manner as to be uniform in quality and shall be free from burrs, crazing, cracks, voids, pimples, chips, blisters, pinholes, sharp cutting edges, and other defects that will adversely affect life, serviceability, or appearance.

4. VERIFICATION

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

- a. Qualification inspection (see 4.2).
- b. Conformance inspection (see 4.7).
- c. Verification of qualification (see 4.6).

4.2 Qualification inspection. Qualification inspection shall be performed at a laboratory acceptable to the Government (see 6.3) on sample units produced with equipment and procedures normally used in production. Use of alternate materials, plating, and processes (see 3.3.1) shall be identified for inclusion in the product test documentation.

4.3 Inspection conditions. Unless otherwise wished specified herein, all inspections shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of EIA-364 and MIL-STD-202.

MIL-DTL-83502D

4.3.1 Verification testing. The following identified tests and test methods assure connector integrity within typical operating conditions and applications. The use of alternate commercial industry standard test methods is allowed, however when an alternate method is used, the alternate method must be coordinated with the qualifying activity prior to performance of the test. The test methods described herein are proven methods and shall be the referee method in cases of dispute.

4.3.1.1 Test equipment and inspection facilities. Test and measuring equipment and inspection facilities of sufficient accuracy qualify and quantity to permit performance of the required inspection shall be established and maintained by the contractor. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment (i.e. ANSI/NCSS Z540.1, or ISO 10012-1 part 1) shall be required.

4.4 Materials inspection. Materials inspection shall consist of certification supported by verifying data that the materials, as specified in table I, and on the specification sheets (see 3.1), used in fabricating of sockets are in accordance with the applicable specifications or performance requirements prior to such fabrication (see 3.5, 4.8.2, and 6.2).

TABLE I. Materials inspection.

Material	Specification	Paragraph
Beryllium copper	ASTM B139, ASTM B194, or ASTM B196	3.3.3
Brass	ASTM B16	3.3.3
Diallyl phthalate	ASTM D5948	3.3.2
Fluxes	EIA-J-STD-004	3.3.4.5
Glass filled polyamide (nylon)	ASTM D4066	3.3.2
Gold	ASTM B488	3.3.4.1, 3.3.4.3, 3.3.4.4
Nickel	SAE-AMS-QQ-N-290	3.3.4.1, 3.3.4.2, 3.3.4.3
Polytetrafluoroethylene	ASTM D1710	3.3.2
Solder	EIA-J-STD-006	3.3.4.5
Tin-lead	SAE-AMS-P-81728	3.3.4.4

4.5 Sample size.

4.5.1 Group submission. For each specification sheet, ten samples shall be selected of the socket having the largest number of contacts, which shall qualify sockets with a lesser number of contacts of the same design, construction and materials. Two samples of each socket with the lesser number of contacts shall be submitted to visual and mechanical inspection, dimensions and withstanding voltage. Alternate terminal types specified by a single specification sheet may be qualified by submitting two samples of each type of groups I and II of table II. When different termination finishes are being qualified simultaneously sample sockets of each finish shall be selected so that there are equal, groups of each finish.

Where there is a low profile socket at the same design, to the same specification sheet, it may be qualified at the same time by submitting two samples of the largest number of contacts to groups I and II of table II.

4.5.2 Inspection routine. The sample shall be subjected to the inspections specified in table II, in the order shown. All sample units shall be subjected to the inspections of group I. The sample shall be divided into five groups of two units each and subjected to the inspections for their particular group.

MIL-DTL-83502D

TABLE II. Qualification inspection. 1/

Inspection	Requirement paragraph	Method paragraph
<u>Major group</u> (All samples)		
Visual and mechanical	3.1, 3.3, 3.5, 3.23, and 3.24	4.8.2
Withstanding voltage (sea level)	3.10	4.8.7
Insulation resistance	3.9	4.8.6
Low signal level contact resistance	3.18	4.8.15
Contact retention <u>2/</u>	3.8	4.8.5
<u>Group I</u> (2 sample units)		
Visual and mechanical	3.1, 3.3, 3.5, 3.23, and 3.24	4.8.2
Mating force	3.6	4.8.3
Contact resistance	3.11	4.8.8
Durability	3.15	4.8.12
Contact withdrawal force	3.7	4.8.4
Contact resistance	3.11	4.8.8
Thermal shock	3.16	4.8.13
Contact resistance	3.11	4.8.8
Humidity	3.17	4.8.14
Insulation resistance	3.18	4.8.15
Contact resistance	3.11	4.8.8
<u>Group II</u> (2 sample units)		
Contact resistance	3.11	4.8.8
Shock (specified pulse)	3.14	4.8.11
Vibration	3.13	4.8.10
Contact resistance	3.11	4.8.8
Contact withdrawal force	3.7	4.8.4
<u>Group III</u> (2 sample units)		
Withstanding voltage (sea level)	3.10	4.8.7
Insulation resistance	3.9	4.8.6
Thermal shock	3.16	4.8.13
Insulation resistance		
Withstanding voltage (sea level)		
<u>Group IV</u> (2 sample units)		
Contact resistance	3.11	4.8.8
Corrosive atmosphere	3.19	4.8.16
Contact resistance	3.11	4.8.8
<u>Group V</u> (2 sample units)		
Solderability	3.20	4.8.17
Visual and mechanical inspection	3.1, 3.3, 3.5, 3.23, and 3.24	4.8.2
<u>Group VI</u> (2 sample units)		
Capacitance	3.12	4.8.9
Resistance to soldering heat	3.21	4.8.18
Visual and mechanical inspection	3.1, 3.3, 3.5, 3.23, and 3.24	4.8.2
<u>Group VII</u> (4 sample units)		
Marking	3.22	---

1/ Sockets with inserted terminals shall not be considered the same design as those with the terminals molded in place.

2/ Not applicable to molded socket contacts.

MIL-DTL-83502D

4.5.3 Failures. One or more failures shall be cause for refusal to grant qualification approval.

4.6 Verification of qualification. To retain qualification, the contractor shall verify in coordination with the qualifying activity the capability of manufacturing products, which meet the performance requirements of this specification. Refer to the qualifying activity for the guidelines necessary to retain qualification to this particular specification. The contractor shall immediately notify the qualifying activity at any time that the inspection data indicates failure of the qualified product to meet the performance requirements of this specification.

4.7 Conformance inspection.

4.7.1 Acceptance inspection. Acceptance inspection shall consist of group A inspections.

4.7.1.1 Inspection lot. An inspection lot shall consist of all sockets produced under essentially the same conditions, and offered for inspection at one time.

4.7.1.2 Group A inspection. Group A inspection shall consist of the inspections specified in table III, on the same set of sample units in the order shown.

TABLE III. Group A inspection.

Inspection	Requirement paragraph	Method paragraph
Visual and mechanical inspection	3.1, 3.3, 3.4, 3.22, and 3.23	4.8.2
Mating force	3.6	4.8.3
Contact withdrawal force	3.7	4.8.4

4.7.1.2.1 Sampling plan (group A). Table III tests shall be performed on a production run basis. Samples shall be selected in accordance with table IV. If one or more defects are found, the lot shall be screened for that particular defect and defects removed. A new sample of parts shall be selected in accordance with table IV and all group A tests again performed. If one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification.

TABLE IV. Lot and sample size.

Lot size	Sample size
2 to 5	100 percent
6 to 50	5
51 to 90	7
91 to 150	11
151 to 280	13
281 to 500	16
501 to 1200	19
1201 to 3200	23
3201 to 10000	29
10001 to	35

MIL-DTL-83502D

4.7.1.2.2 Rejected lots. If an inspection lot is rejected, the manufacturer may rework it to correct the defects, or screen out the defective units, and resubmit for reinspection. Resubmitted lots shall be inspected using the next higher lot size specified in table IV and shall not thereafter be tendered for acceptance unless the former rejection or requirement of correction is disclosed. Such lots shall be separate from new lots and shall be clearly identified as reinspected lots.

4.7.1.2.3 Disposition of sample units. Sample units which have passed all the group A inspections may be delivered on the contract if the lot is accepted and the sample units are still within the specification tolerances.

4.7.2 Periodic inspection. Periodic inspection shall consist of group B. Except where the results of these inspections show noncompliance with the applicable requirements (see 4.7.2.1.2), delivery of products, which have passed group A inspection, shall not be delayed pending the results of these periodic inspections.

4.7.2.1 Group B inspection. Group B inspection shall consist of the tests specified in table II, in the order shown. Group B inspection shall be made on sample units selected from inspection lots, which have passed the group A inspection.

4.7.2.1.1 Sampling plan. Ten sample sockets of the largest size for which the manufacturer is qualified and which have been produced on a continuous basis shall be selected at random every 36 months. The sample units shall be divided into five groups of two units each and subjected to the inspections for their particular group.

4.7.2.1.2 Noncompliance. If a sample fails to pass group B inspection, the contractor shall take corrective action on the materials or processes, or both, as warranted, and on all units of product which can be corrected and which were manufactured under essentially the same conditions, with essentially the same materials, processes, etc., and which are considered subject to the same failure. Acceptance of the product shall be discontinued until corrective action, acceptable to the Government, has been taken. After the corrective action has been taken, group B inspection shall be repeated on additional sample units (all inspection, or the inspection which the original sample failed, at the option of the Government). Group A inspections may be reinstated; however, final acceptance shall be withheld until the group B reinspection has shown that the corrective action was successful. In the event of failure after reinspection, information concerning the failure and corrective action shall be made available to the cognizant inspection activity and to the qualifying activity.

4.8 Methods of inspection.

4.8.1 Test methods. The following identified tests and test method assures socket integrity within typical operating conditions and applications. Alternate commercial industry stand test method are allowed, however when an alternate method is used, the qualifying activity must be notified prior to performance of the test. The test methods described herein are proven methods and shall be the referee method in cases of dispute.

4.8.2 Visual and mechanical inspection. Sockets shall be examined to verify that the dimensions, materials, design construction, marking, and workmanship are in accordance with the applicable requirements (see 3.1, 3.3, 3.5, 3.22, and 3.23).

MIL-DTL-83502D

4.8.3 Mating force (see 3.6). The initial force required to fully insert the test gage (see figure 3) shall be measured. The measuring equipment shall conform to the following:

- a. The vertical axis of the test gage shall coincide with the vertical axis of the socket.
- b. The test gage shall travel along the vertical axis of the socket.
- c. The speed of insertion of the test gage into the socket contacts shall not exceed 2 inches (51 mm) per minute for consistent-speed machines, or the rate of loading shall not exceed 80 pounds (36.29 kg) per minute for contact-rate-of-force machines.
- d. Scale mechanism shall have no dashpots or other damping devices.
- e. Scales shall be calibrated in .125 pound (56.7 grams) steps or less, and shall be accurate to within ± 5 percent.

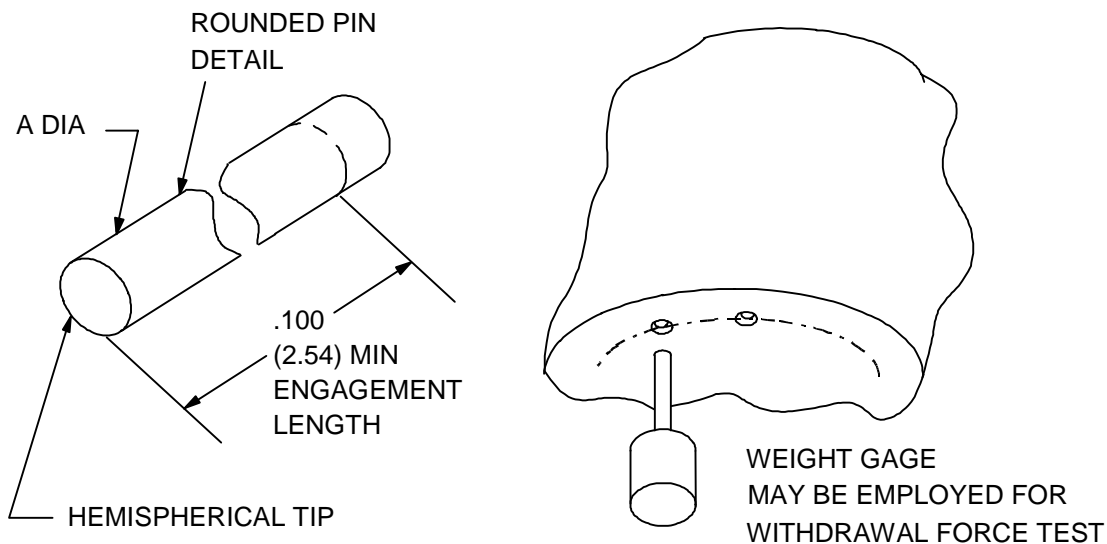
4.8.4 Contact withdrawal force (see 3.7). After two unmonitored insertions and withdrawals of the maximum mating test gage (see figure 3), the individual withdrawal force shall be measured using the minimum thickness single blade pin (see figure 3). Test pin shall be inserted to a depth of .100 inch (2.54 mm) minimum and the withdrawal force shall be measured.

4.8.5 Contact retention (see 3.8). With the socket mounted to an appropriate fixture, the following details and exceptions shall apply:

- a. Solderless wrap: 7.5 pound (3.40 kg) axial load shall be applied in both directions, to terminals similar to that applied by the wrapping tool.
- b. Solder cup: .75 pound (0.34 kg) axial load shall be applied in both directions to terminals.

4.8.6 Insulation resistance (see 3.9). Unmated sockets shall be tested in accordance with test procedure 21 of EIA-364.

MIL-DTL-83502D



Contacts to accept mating leads		Max min gage	A dia	
Inch	mm		Inch	mm
.017 +.003 -.001	0.43 +.08 -.03	Max	.0200 +.0000 -.0002	0.501 +.000 -.005
		Min	.0160 +.0002 -.0002	0.406 +.005 -.003
.030 ±.005	0.76 ±.13	Max	.0350 +.0000 -.0002	0.889 +.000 -.005
		Min	.250 +.0020 -.0020	.0635 +.051 -.000
.040 ±.005	1.02 ±.13	Max	.0450 +.0002 -.0020	1.143 +.005 -.051
		Min	.0350 +.0002 -.0000	0.889 +.005 -.000

NOTES:

1. Dimensions are in inches. Metric equivalents are in parentheses.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified tolerance is $\pm .0005$ inch (0.013 mm).
4. Material: All pins carbon steel, finish 4 microinch (0.10 μm) maximum.

FIGURE 3. Insertion and withdrawal gages.

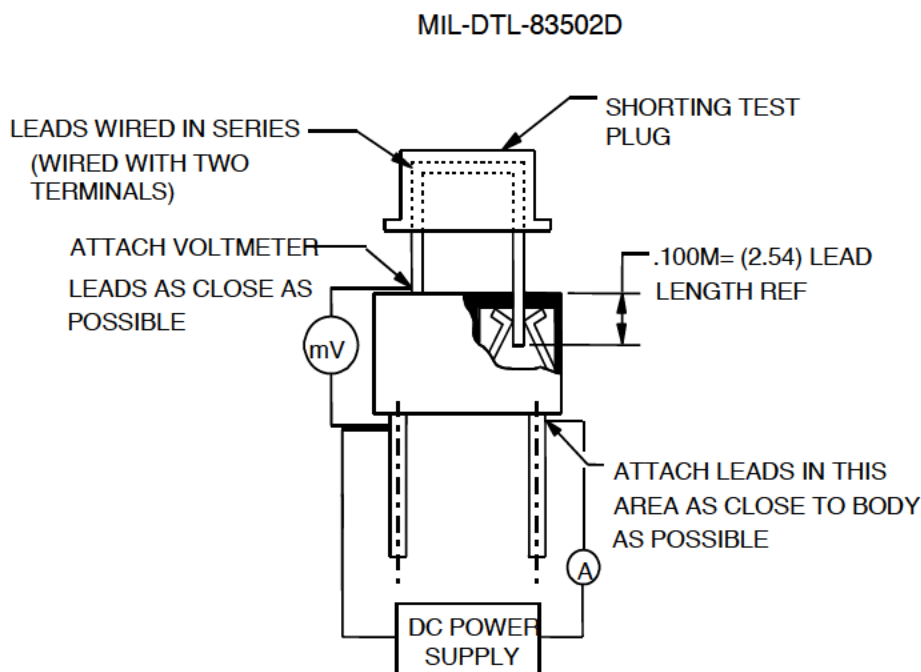
MIL-DTL-83502D

4.8.7 Dielectric withstanding voltage (see 3.10). Sockets shall be tested in accordance with test procedure 20 of EIA-364. The following details and exceptions shall apply:

- a. Preparation - Mated with suitable test plug (see figure 2) but not mounted on a printed circuit board.
- b. Magnitude of test voltage - 600 volts, unless otherwise specified (see 3.1).
- c. Nature of potential - AC (rms).
- d. Barometric pressure - Sea level.
- d. Points of application of test voltage - The test voltage shall be applied between all odd-numbered contacts connected together and all even-numbered contacts and all other metallic parts connected together, unless otherwise specified (see 3.1).
- e. Method of connection of test voltage to specimen - Affix test probes to terminations described in 4.8.7d, by clips or solder.

4.8.8 Contact resistance (see 3.11). The contact resistance shall be measured as specified on figure 4. A minimum of three contacts shall be measured on each test specimen in accordance with test procedure 06 of EIA-364. The following shall apply:

- a. Single contact.
- b. Brass or copper base alloy gage.
- c. Plating to be the same generic materials.
- d. Final measurements. Durability (see 4.8.12) and corrosive atmosphere (see 4.8.16) shall be measured followed by contact resistance (see 4.8.8).



NOTES:

1. Dimensions are in inches. Metric equivalents are in parentheses.
2. Metric equivalents are given for general information only.
3. The measured resistance includes a portion of the terminal and test socket leads as well as the voltmeter test leads. These resistances are to be subtracted from the total resistance to obtain the contact resistance.
4. A shorting wire may be soldered between leads in lieu of use of a special shorting plug.

FIGURE 4. Contact resistance (low-level and rated current) test setup.

4.8.9 Capacitance (see 3.12). The socket shall be tested in accordance with test procedure 30 of EIA 364. The following details shall apply:

- a. Test frequency - 1 kHz.
- b. Test voltage: The alternating-current (ac) voltage actually impressed across the specimen shall be as low as possible.
- c. Polarization - Not applicable.
- d. Unmounted.
- e. Adjacent pins.
- f. Seven readings.

MIL-DTL-83502D

4.8.10 Vibration (see 3.13). Sockets shall be tested in accordance with test procedure 28 of EIA 364. The following details shall apply:

- a. Test condition - III.
- b. Preparation - Mated with test plugs (see figure 2). See figure 5 for further details.
- c. Following the test, contact resistance and contact withdrawal force shall be measured in accordance with 4.8.8 and 4.8.4, respectively.

4.8.11 Shock (specified pulse) (see 3.14). The socket shall be tested in accordance with test procedure 27 of EIA 364. The following details shall apply:

- a. Mounting method and detection circuit - Mounted by normal means monitoring equipment used shall be capable of detecting circuit interruptions greater than 1 microsecond.
- b. Preparation - Mated with a test plug see figure 2.
- c. Test setup: See figure 5.
- d. Acceleration requirements - Test condition G.
- e. Number of blows - One blow in both directions along each of three mutually perpendicular axes for a total of six shocks.

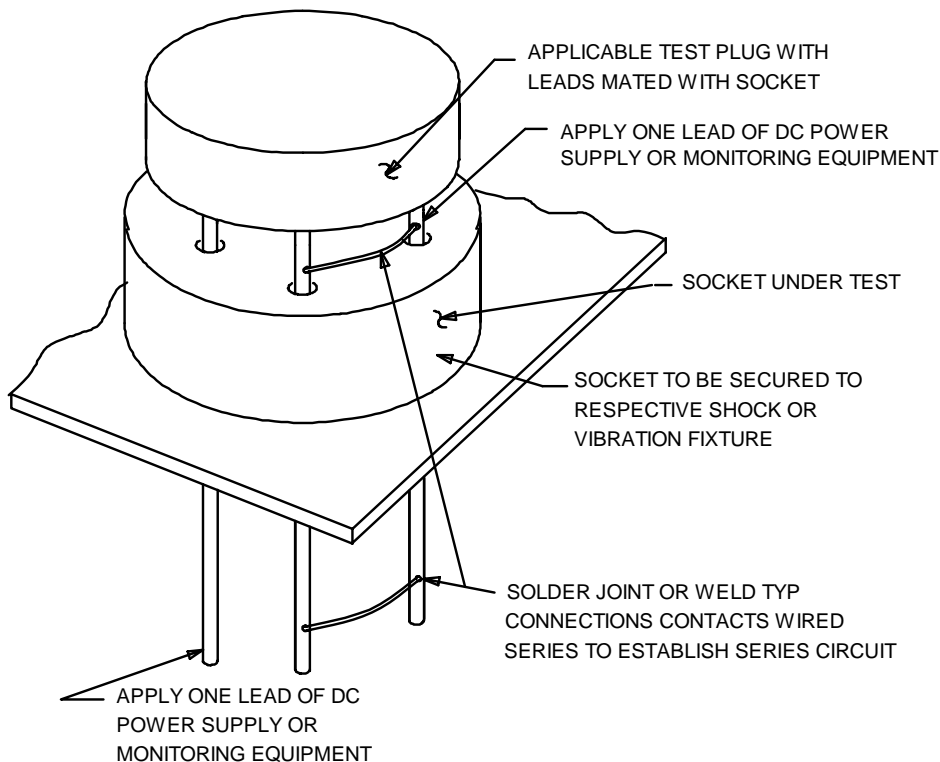


FIGURE 5. Vibration and shock test setup.

MIL-DTL-83502D

4.8.12 Durability (see 3.15). Each unit shall be subjected to 50 mating and unmating cycles using the test plug (see figure 2). Following the test, contact resistance and contact withdrawal force shall be measured in accordance with 4.8.8 and 4.8.4 respectively.

4.8.13 Thermal shock (see 3.16). Sockets shall be tested in accordance with test procedure 32 of EIA 364. The following details shall apply:

- a. Test condition letter: A.
- b. Test measurement: The sockets shall be capable of mating and unmating at the temperature extremes (force shall be unmonitored) during the fifth cycle without damage to either component.

4.8.14 Humidity (see 3.17). Sockets shall be tested in accordance with test procedure 31, method IV of EIA 364. Unmounted sockets shall be connected as specified in 4.8.6. Insulation resistance shall be measured in accordance with 4.8.6, within 5 minutes of completion of step 6 of final cycle.

4.8.15 Low-signal level contact resistance (see 3.18). The low-level circuit shall be tested in accordance with test procedure 23 of EIA 364.

- a. Environmental conditioning not required.
- b. Seven readings.
- c. Final measurements - Contact resistance (see 3.11).

4.8.16 Corrosive atmosphere (see 3.19 and 6.5.1). Mated sockets shall be exposed to a concentrated sulphur atmosphere. The following details shall apply:

- a. Sockets that have been mated with a suitable test gage and preconditioned by being subjected to two unmonitored insertions of the insertion force gage (see figure 3) shall be exposed to a 10-25 PPM atmosphere of ammonium polysulfide at a relative humidity of 60 percent or higher at room temperature for 4 hours in an enclosed chamber.
- b. At the conclusion of the sulphur atmosphere exposure, the contact resistance of the undisturbed mated socket shall be measured in accordance with 4.8.8.

4.8.17 Solderability (see 3.20). Each terminal shall be subjected to method 208 of MIL-STD-202.

4.8.18 Resistance to soldering heat (see 3.21). Sockets shall be tested in accordance with method 210 of MIL-STD-202, condition B. Sockets may be mounted on a glass epoxy wiring board.

5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's System Commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

MIL-DTL-83502D

6. NOTES

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

6.1 Intended use. The sockets covered by this specification are intended for use on a printed circuit board or mounting into chassis. Terminals may be soldered to the printed circuit board unless otherwise noted (see 3.1). Only plug-in component leads with similar finishes to the mating socket contacts should be mated, reference MIL-HDBK-454, General Guidelines for Electronic Equipment.

6.1.1 Military unique rationale: The sockets covered by this specification are military unique because they must be able to operate satisfactorily under shock 100 g's and vibration 10 g's. Gold plated sockets are able to operate at temperatures ranging from -55°C to $+125^{\circ}\text{C}$. Commercial sockets are not designed to withstand such extreme environmental conditions and would experience catastrophic failure.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of the specification.
- b. Title, number, and date of the applicable specification sheet, and the complete PIN (see 3.1).
- c. Certificate of compliance covering materials, when required.
- d. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1 and 2.2).
- e. Packaging requirement (see 5.1)

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL No. 83502 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from the Defense Supply Center Columbus, ATTN: DSCC-VQ, 3990 East Broad Street, Columbus, Ohio 43216-5000. Application procedures should conform to the "Provisions Governing Qualification" (see 6.3.1).

6.3.1 Provisions governing qualification. Copies of "Provisions Governing Qualification" may be obtained upon application to Standardization Document Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

6.4 Tin whisker growth. The use of pure tin may exhibit tin whisker growth problems (days to months to years) after manufacture. Tin whiskers can develop under typical operating conditions on any product type that uses lead-free pure tin coatings. Conformal coatings applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead have shown to inhibit the growth of tin whiskers.

MIL-DTL-83502D

6.5 Definition.

6.5.1 Corrosive atmosphere. The corrosive atmosphere test is intended to reveal imperfections in the plated contacting surfaces such as pores, scratches, or incomplete plating coverage. It will also reveal defects such as low contact pressure. However, it is not intended to correlate directly with long term atmospheric contamination.

6.6 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs. Table V lists the Environmental Protection Agency (EPA) top seventeen hazardous materials targeted for major usage reduction. If any of these hazardous materials are required, it is recommended that it be used only when other materials cannot meet performance requirements.

TABLE V. EPA top seventeen hazardous materials.

Benzene	Dichloromethane	Tetrachloroethylene
Cadmium and compounds	Lead and compounds	Toluene
Carbon Tetrachloride	Mercury and compounds	1,1,1 - Trichloroethane
Chloroform	Methyl Ethyl compounds	Trichloroethylene
Chromium and compounds	Methyl Isobutyl Ketone	Xylenes
Cyanide and compounds	Nickel and compounds	

6.7 Subject term (keyword listing).

Beryllium
 Contacts
 Current
 Dielectric
 Finish
 Heat
 Humidity
 Inspection
 Lead
 Materials
 Mounting
 Mating force
 Nickel
 Polarization
 Qualification
 Sampling
 Solder
 Terminals
 Turrent
 Wrappost

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

MIL-DTL-83502D

CONCLUDING MATERIAL

Custodians:

Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

(Project 5935-4578-000)

Review activities:

Army - AT, AV, MI
Navy - AS, MC, SH
Air Force - 19, 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online data at <http://www.dodssp.daps.mil.daps.mil>.