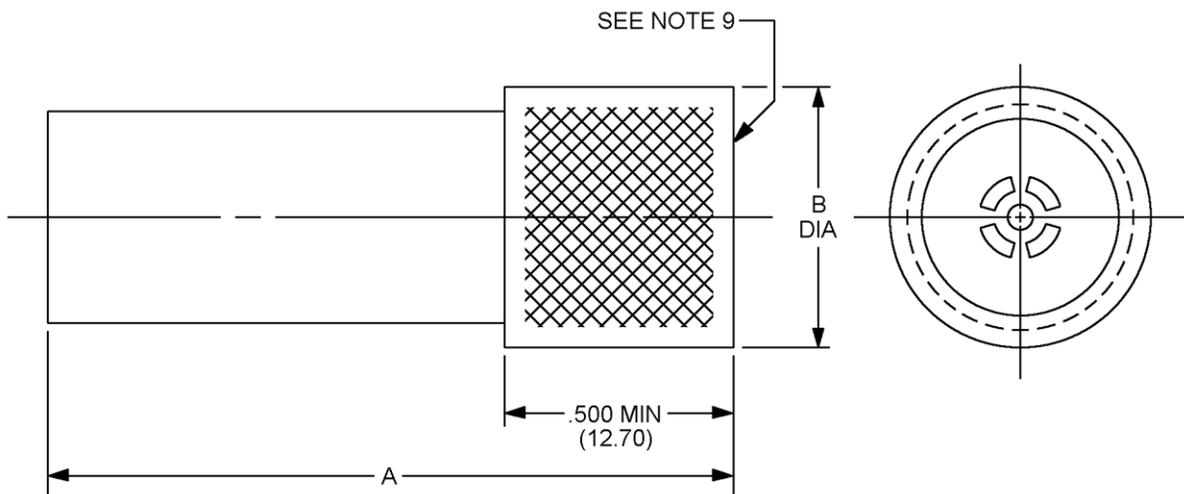


PERFORMANCE SPECIFICATION SHEET

CONNECTORS, PLUG, ELECTRICAL, COAXIAL, RADIO FREQUENCY,  
(SERIES N (CABLED), PIN CONTACT, CLASS 2)

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

The requirements for acquiring the product described herein shall consist of  
this specification sheet and MIL-PRF-39012.



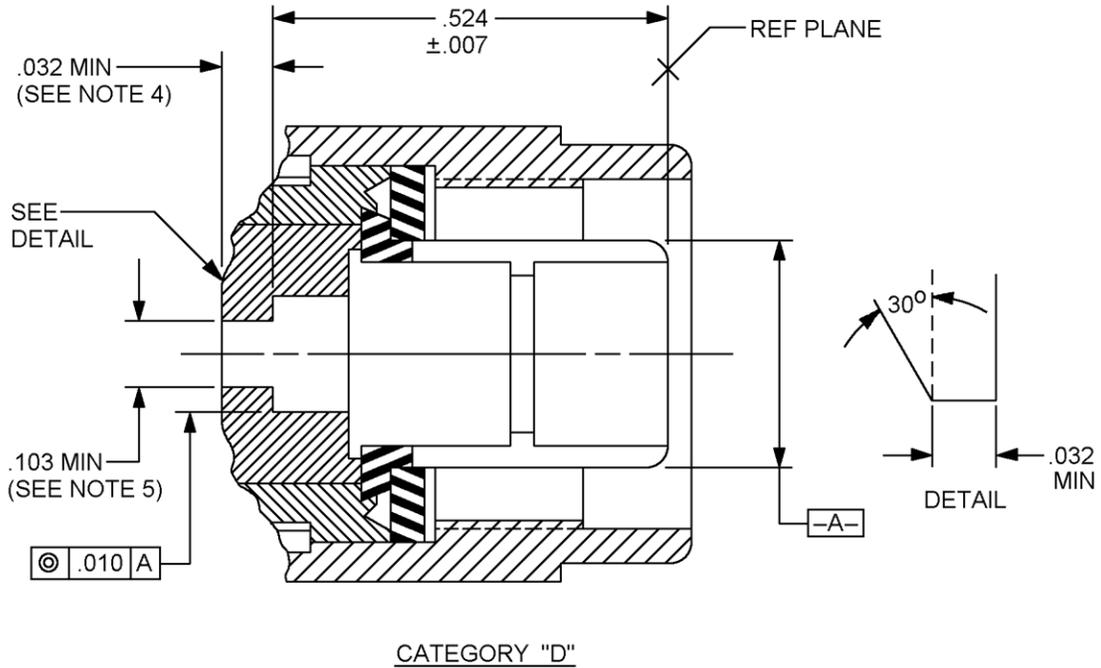
NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for information only.
3. For dimensions A and B, see tables I and III.
4. Dimensions A and B are the largest overall dimensions of the connector.
5. Wrench flats are to accommodate standard wrench opening in accordance with FED-STD-H28, appendix 10.
6. All undimensioned pictorial representations are for reference purposes only.
7. Dimension A defines the maximum length of the connector when assembled to the appropriate cable.
8. Three holes .027 inch (0.69 mm) minimum diameter, equally spaced, are required for safety wiring after mating. Location on the coupling nut is optional.
9. Series N, pin contact interface, in accordance with MIL-STD-348.

FIGURE 1. General configuration.



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Inches	mm
.007	0.18
.010	0.25
.032	0.81
.103	2.62
.524	13.31

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for information only.
3. Three holes  $.027$  inch ( $0.69$  mm) minimum diameter, equally spaced, are required for safety wiring after mating. Location on the coupling nut is optional.
4. Chamfer is optional, if chamfer is used put chamfer on a  $30^\circ$  maximum.
5. Dimension shall meet connector performance requirements.

FIGURE 2. Category D captivation detail.

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TABLE I. Dash numbers, cross-reference, and dimensions.

Part or Identifying Number (PIN) M39012/01- <u>1/</u>	Applicable cable M17/ <u>2/</u>	Dimensions	Inches (millimeters) maximum #
Category A – Field serviceable (no special tools required) <u>3/ 4/</u>			
X101	Cable group VIII 112-RG304 <u>5/</u>	A B	1.875 (47.63) .827 (21.01)
X104	Cable group XIV 79-RG218 <u>5/</u>	A B	2.500 (63.50) 1.343(34.11)
X005	Cable group X 86-00001 <u>6/</u> 127-RG393 <u>5/</u>	A B	1.875 (47.63) .827 (21.01)
X015	Cable group XII 78-RG217 <u>5/</u>	A B	1.875 (47.63) .906 (23.07)
X125	Cable group XI 74-RG215 <u>5/ 7/</u> 189-00002 <u>7/</u>	A B	2.500 (63.50) .827 (21.01)
X030	220-00001	A	2.500 (63.50)
X130	220-00002 <u>7/</u>		
X031	221-00001		
X131	221-00002 <u>7/</u>		
X032	222-00001		
X132	222-00002 <u>7/</u>		
X033	223-00001		
X133	223-00002 <u>7/</u>		
X034	224-00001		
X134	224-00002 <u>7/</u>		
X035	225-00001		
X135	225-00002 <u>7/</u>		
X036	226-00001		
X136	226-00002 <u>7/</u>		
X037	227-00001		
X137	227-00002 <u>7/</u>		
X038	228-00001		
X138	228-00002 <u>7/</u>		

See notes at end of table.

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TABLE I. Dash numbers, cross-reference, and dimensions – Continued.

PIN M39012/01- <u>1</u> /	Applicable cable M17/ <u>2</u> /	Dimensions	Inches (millimeters) maximum #
Category C – Field replaceable (MIL-DTL-22520 crimp tool) See note next to applicable cable group for crimp die <u>3</u> / <u>4</u> / <u>8</u> /			
X016	Cable group VIII <u>9</u> / 112-RG304 <u>5</u> /	A B	2.000 (63.50) .827 (21.01)
X017	Cable group XA <u>10</u> / 65-RG165 <u>5</u> / <u>6</u> /		
X018	Cable group XB <u>10</u> / 75-RG214		
X023	Cable group XC <u>10</u> / 62-RG144 <u>4</u> / <u>5</u> / <u>6</u> /		
X024	Cable group XD <u>10</u> / 77-RG216 <u>4</u> / <u>5</u> / <u>6</u> /		

See notes at end of table.

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TABLE I. Dash numbers, cross-reference, and dimensions – Continued.

PIN M39012/01- <u>1/</u>	Applicable cable M17/ <u>2/</u>	Dimensions	Inches (millimeters) maximum #
Category D – Field replaceable – Defined piece part <u>3/ 4/ 8/ 11/ 12/</u>			
X501	Cable group XB 127-RG393 <u>5/</u>	A B	1.593 (40.48) .827 (21.01)
X502	Cable group XA 65-RG165 <u>5/</u>		
X503	Cable group VIB 60-RG142 <u>6/</u> 128-RG400 <u>5/</u>	A B	1.516 (38.50) .827 (21.01)
X504	Cable group VIA 111-RG303 <u>5/</u>		

1/ For cross-reference of dash number to superseded Part or Identifying Part Number (PIN) or type designation, see table IV.

2/ The latest version of each cable shall be applied.

3/ These connectors have captivated center contacts.

4/ Some of the cables in some cable groups are not 50 ohms; therefore, when attached to the specified connectors, VSWR, RF leakage and insertion loss are not applicable. Refer to MIL-PRF-39012 appendix for cable groupings.

5/ Cable to be used when performing tests requiring cable except as in 4/ and 6/.

6/ Cable to be used for the +200°C temperature cycling tests.

7/ Armored cable.

8/ These connectors are assembled using the applicable crimp tool, to the specified cables stripped as shown on figure 4.

9/ M22520/5-35 closure A or M22520/5-55 closure A.

10/ M22520/5-61.

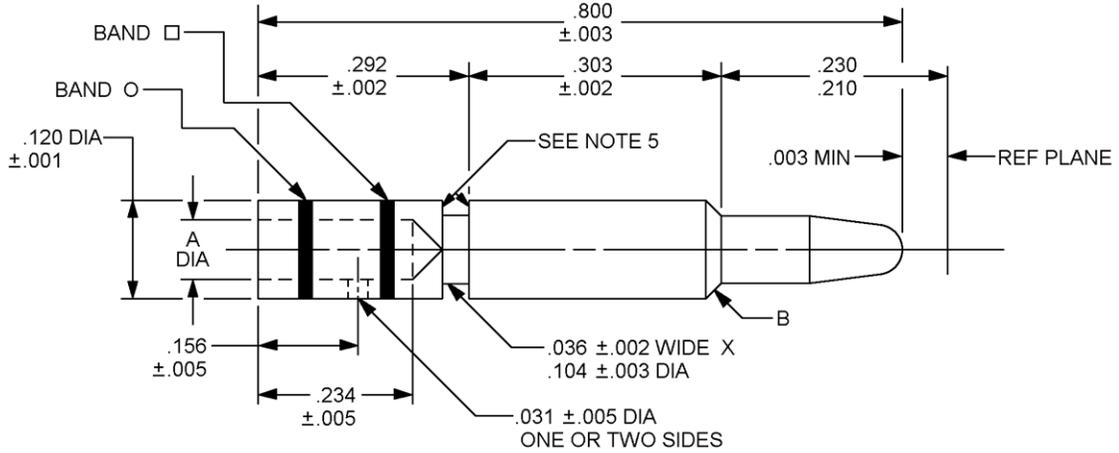
11/ Complete connector assembly shall consist of a body, center contact, ferrule and assembly instructions.

12/ Not to be used in army equipment.

# Dimensions are in inches. Metric equivalents are given for information only.

X Denotes connector body plating material option. The only plating options allowable are Silver or Nickel over brass in accordance with MIL-PRF-39012. Only connectors of the same materials shall be mated to avoid dissimilar metal problems. **CAUTION: A NICKEL PLATED BODY IS NOT FOR USE IN APPLICATIONS WHERE PASSIVE INTERMODULATION GENERATION (PIM) MAY BE A CONCERN.** Silver is the preferred plating option.

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CENTER CONTACT

Inches	mm	Inches	mm
.001	0.03	.210	5.33
.002	0.05	.220	5.59
.003	0.08	.230	5.84
.005	0.13	.234	5.94
.008	0.20	.245	6.22
.015	0.38	.250	6.35
.031	0.79	.292	7.42
.036	0.91	.303	7.70
.043	1.09	.418	10.62
.098	2.49	.438	11.13
.104	2.64	.492	12.50
.120	3.05	.500	12.70
.156	3.96	.600	15.24
.206	5.23	.800	20.32

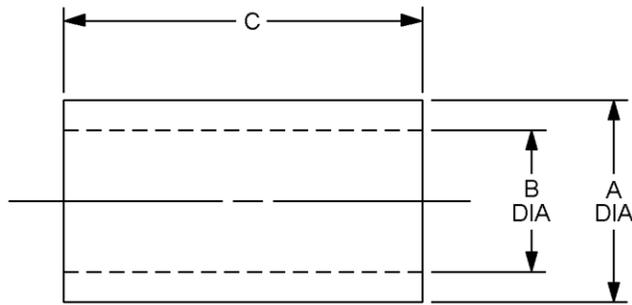
Dash number	Contact number <sup>1/</sup>	A	B	Basic crimp tool <sup>2/</sup>	Crimp die or positioner	Crimp tensile minimum, pounds (N)	Color band □	Color band ○
X501 X502	1-10	.098 ± .002	.008 ± .002	M22520/1- 01	M22520/1- 13	60 lbs. (266.90)	Red	Black
X503 X504	1-11	.043 + .001 - .002	x 30° ± 5°	M22520/5- 01	M22520/5- 25 Closure B	20 lbs (88.96)	Blue	

<sup>1/</sup> Contact numbers are for identification only.

<sup>2/</sup> Class 2 tool may be used by OEM (see MIL-DTL-22520).

FIGURE 3. Contact and ferrule dimensions for category D only.

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CRIMP FERRULE

Dash no.	Ferrule no. 1/	A	B	C	Basic crimp tool 2/ M22520/5	Crimp die or positioner M22520/5-
X501	1-50	$.492 \pm .003$	$.438 \pm .003$	$.600 \pm .015$	-01	61 or 25 Closure A
X502	1-51		$.418 \pm .003$			
X503	1-52	$.250 \pm .003$	$.220 \pm .003$	$.500 \pm .015$		05, 11, 57 Closure A or 19 Closure B
X504	1-53	$.245 \pm .003$	$.206 \pm .003$			

1/ Ferrule numbers are for identification only.

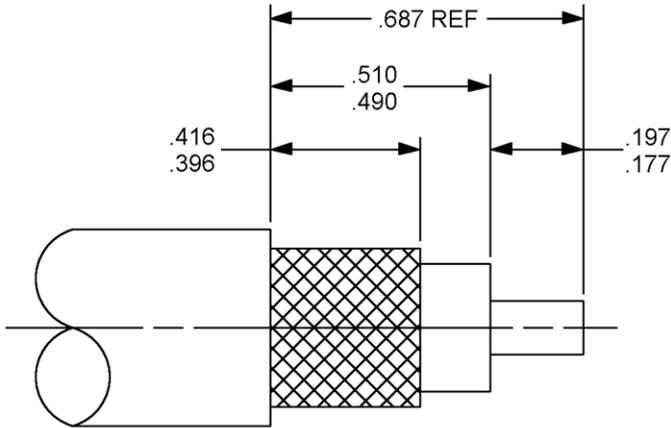
2/ Class 2 tools may be used by OEM (see MIL-DTL-22520).

NOTES:

1. Dimensions are in inches.
2. Metric equivalent are given for information only.
3. Crimp tensile test shall be in accordance with SAE-AS39029.
4. Copyright notice: All information disclosed in these specification sheets which is or may be copyrighted is reproduced herein with the express permission of the copyright owner.
5. Maximum break .003 inch (0.08 mm).
6. Color bands shall be positioned so that no coloring material enters the inspection hole.

FIGURE 3. Contact and ferrule dimensions for category D only – Continued.

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Inches	mm
.177	4.50
.197	5.00
.396	10.06
.416	10.57
.490	12.45
.510	12.95
.687	17.45

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for information only.

FIGURE 4. Cable stripping dimensions for field replaceable connectors.

ENGINEERING DATA:

Nominal impedance: 50 ohms.

Frequency range: 0 to 11 GHz.

Voltage rating:

- 1,000 volts rms maximum working voltage at sea level.
- 250 volts rms maximum at 70,000 feet (4.437 kPa).

Temperature rating: -65°C to +165°C.

REQUIREMENTS:

Design and configuration: See figures 1, 2, 3, and 4.

Force to engage and disengage:

- Longitudinal force: Not applicable.
- Torque: 6 inch-pounds (.68 Nm) maximum.

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Coupling proof torque: 15 inch-pounds (1.69 Nm) minimum.

Inspection conditions: Coupling torque: 6 to 10 inch-pounds (.68 to 1.13 Nm).

Mating characteristics: In accordance with MIL-STD-348 and figure 2.

Outer contact:

Test ring ID: .316 inch (8.03 mm) maximum, 16 microinch (0.406  $\mu$ m) finish.

Insertion force: 25 pounds (111.20 N) maximum when inserted a minimum of .093 inch (2.36 mm).

Contacts with slotted members: Shall contact a .324 inch (8.23 mm) minimum diameter ring within .031 inch (0.79 mm) of their tip ends.

Hermetic seal: Not applicable.

Leakage (pressurized connectors): Not applicable.

Insulation resistance: Method 302 of MIL-STD-202, test condition B. 5,000 megohms minimum.

Center contact retention: (Applicable to captivated-center-contact connectors only.) 15 pounds (66.72 N) minimum axial force for all cables except RG400 and RG142; 6 pounds (26.69 N) minimum for RG400 and RG142.

Corrosion (salt spray): Method 101 of MIL-STD-202, test condition B.

Voltage standing wave ratio (VSWR): From .5 to 11 GHz, or approximately 80 percent of upper cutoff frequency of the cable, whichever is lower; 1.30 maximum (1.45 maximum at 11 GHz for -X503 and -X504).

Swept frequency VSWR test setup:

Item 6: VSWR shall be less than  $1.008 + .002 F$  (F in GHz).

Item 16: VSWR shall be less than  $1.008 + .002 F$  (F in GHz).

Second step of VSWR checkout procedure: VSWR shall be less than  $1.012 + .004 F$  (F in GHz).

Group B inspection: VSWR shall be less than  $1.024 + .007 F$  (F in GHz).

Qualification and group C inspection – VSWR shall not exceed 1.08.

Connector durability: 500 cycles minimum at 12 cycles/minute maximum. The connector shall meet the mating characteristics and force to engage and disengage requirements.

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Contact resistance: In milliohms maximum.

	<u>Initial</u>	<u>After environment</u>
Center contact	1.0	1.5
Outer contact (silver)	.2	Not applicable
Outer contact (nickel)	.4	Not applicable
Braid to body	.05	Not applicable

Dielectric withstanding voltage: Method 301 of MIL-STD-202. 2,500 volts rms minimum at sea level for connectors using other than RG400 and RG142; 1,500 volts rms minimum for connectors using RG400 and RG142.

Vibration, high frequency: Method 204 of MIL-STD-202, test condition B.

Shock: Method 213 of MIL-STD-202, test condition I.

Thermal shock: Method 107 of MIL-STD-202, test condition B, except test high temperature shall be +85°C. High temperature shall be +200°C for connectors using +200°C cables (see table I and III).

Moisture resistance: Method 106 of MIL-STD-202. No measurements at high humidity. Insulation resistance shall be at least 200 megohms within 5 minutes after removal from humidity.

Corona level:

Voltage: 500 volts rms minimum.

Altitude: 70,000 feet (4.437 kPa).

RF high potential withstanding voltage:

Voltage and frequency: 1,500 volts rms tested at a frequency from 5 to 7.5 MHz.

Leakage current: Not applicable.

Cable retention force:

Non-crimp assemblies: 75 pounds (333.62 N) minimum.

Crimp assemblies:

- 50 lbs minimum for cables .155 - .189 inch (3.94 mm – 4.80 mm) OD.
- 60 lbs minimum for cables .190 - .229 inch (4.83 mm – 5.82 mm) OD.
- 75 lbs minimum for cables .230 - .249 inch (5.84 mm – 6.32 mm) OD.
- 90 lbs minimum for cables .250 inch (6.35 mm) OD and larger.

Coupling mechanism retention force: 100 pounds (444.82 N) minimum.

RF leakage: -90 dB minimum, tested at a frequency between 2 and 3 GHz.

Insertion loss: .15 dB maximum at 9 GHz.

PIN: M39012/01- (dash number in table I or "B" number in table III).

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Group qualification. See table II.

TABLE II. Group qualification. 1/

Group	Submission and qualification of any of the following connectors <u>2/</u> M39012/01	Qualifies the following connectors M39012/01
I	-X101 -X104 -X125	-X101 -X104 -X125
II	-X005 -X015	-X005 -X015
III	B0006 B0007 B0008 B0011 B0012	B0006 B0007 B0008 B0011 B0012
IV	-X016 -X017 -X018	B0006 B0007 B0008 B0011 B0012 B0013 B0014 -X016 -X017 -X018 -X023 -X024
V	B0013 B0014	B0013 B0014
VI	-X023 -X024	B0013 B0014 -X023 -X024
VII	B0026	B0026
VIII	-X501 -X502	-X501 -X502 -X503
IX	-X503	-X503
X	-X504	-X504

See notes at end of table.

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TABLE II. Group qualification – Continued. 1/

- 1/ If a connector manufacturer produces a connector which meets all the requirements for two or more connector PIN's (within the same series), the manufacturer may receive qualification approval for two or more connector PIN's by qualifying the one connector. It is not necessary that such connectors be in the same group. Each connector, however, must be marked with its own appropriate PIN. For group qualification, the connectors must be of similar design and be of the same materials and plating.
- 2/ For qualification retention, where more than one part is listed in a group in this column, data may be supplied on any of those parts in order to retain qualification for those parts in the corresponding right-hand column. The part does not necessarily have to be the part initially qualified.

TABLE III. CATEGORY B – NONFIELD REPLACEABLE (SPECIAL TOOLS MAY BE REQUIRED). 1/

NOT FOR ARMY, NAVY OR AIR FORCE USE. FOR OEM USE ONLY

PIN <u>2/</u> M39012/01B	Applicable cable <u>3/</u> M17/	Dimensions	Inches (millimeters) Maximum <u>9/</u>
0006 <u>4/</u>	73-RG212 <u>5/</u> 162-00001	A B	2.000(50.80) .827 (21.01)
0007 <u>4/</u>	74-RG213 <u>5/</u>		
0008 <u>4/</u>	75-RG214 <u>5/</u>		
0011 <u>4/</u>	65-RG165 <u>5/ 6/</u>		
0012 <u>4/</u>	86-00001		
0013 <u>4/</u>	6-RG11 <u>7/</u> 62-RG144 <u>5/ 6/ 7/</u>		
0014 <u>4/</u>	77-RG216 <u>5/ 7/</u>		
0026 <u>8/</u>	2-RG6 <u>6/ 7/</u>		

- 1/ For maintenance replacements for category B, see table V.
- 2/ For cross-reference of dash number to superseded PIN or type designation, see table IV.
- 3/ The latest version of each cable shall be applicable.
- 4/ Inactive for new design.
- 5/ Cable to be used when performing tests requiring cable except as in 6/ and 7/
- 6/ Cable to be used for the +200°C temperature cycling tests.
- 7/ These are not 50-ohm cables; therefore, when attached to the specified connectors, VSWR, RF leakage, and insertion loss are not applicable.
- 8/ These connectors have captivated center contacts.
- 9/ Dimensions are in inches. Metric equivalents are given for information only.

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TABLE IV. Supersession data. 1/ 2/

Preferred PIN M39012/01 (except as otherwise specified in tables I or III)	Superseded PIN's or superseded type designation
-0005	MS91236-21G, UG-21/U, M39012/01-0002, MS90534-1185A, UG-1185A/U
-0015	MS91238-204D, UG-204/U, M39012/01-0003; UG-1487A/U
-0016	M39012/01-0020, M39012/40-0009, M39012/40- 0032, M39012/01-0027
-0017	M39012/01-0021
-0018	M39012/01-0022
-0023	-----
-0024	-----
-0101	MS91231-18E, UG-18/U, M39012/01-0001
-0104	MS91239-167F, UG-167/U, M39012/01-0004
-0125	M39012/40-0007, M39012/40-0030, MS90293-941C, UG-941, M39012/01-0025
B0006	M39012/01-0010, UG-1680, UG-1684, M23329/2-01, M39012/01-0006, M23329/2-06
B0007	M23329/2-02, UG-1681, M39012/01-0007
B0008	M23329/2-03, UG-1682, M39012/01-0008
B0011	M23329/2-07, UG-1685, M39012/01-0011
B0012	M23329/2-08, UG-1695, M39012/01-0012
B0013	M23329/2-09, UG-1817, M39012/01-0013
B0014	UG-1817/U, M39012/01-0014
B0026	M39012/40-0008, M39012/40-0031, M39012/01-0026
-0501	M39012/40-0012, M39012/40-0033
-0502	M39012/40-0013, M39012/40-0034
-0503	M39012/40-0035
-0504	UG-536/U

1/ The listed superseded PIN or type designations are for information and cross-reference only. Where a superseded PIN or type designation is not given, none was assigned or will be assigned. The PIN M39012/01-XXXX shall be used in all cases for marking and identifying the connector.

2/ The basic type designation includes all letter versions of the specified number, e.g., UG-18/U includes UG-18A/U, UG-18B/U, etc.

TABLE V. Maintenance replacements for category B.

Category B number <sup>1/</sup>	Category C dash number	Category A dash number	Category D dash number
B0006	0016	0101	--
B0007	0017	0005	0502
B0008	0018	0005	0501
B0011	--	0005	--
B0012	--	0005	0501
B0013	0023	0005	--
B0014	0024	0005	--
B0026	--	0101	--

<sup>1/</sup> Category B connectors are for original installation only. They will not be stocked or procured by the Government.

Revision notations. The margins of this specification are marked with vertical lines to indicate modifications generated by this revision. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

Referenced documents. In addition to MIL-PRF-39012, this document references the following:

MIL-STD-202-101	MIL-STD-202-302
MIL-STD-202-106	MIL-STD-348
MIL-STD-202-107	FED-STD-H28
MIL-STD-202-204	MIL-DTL-22520
MIL-STD-202-213	SAE-AS39029
MIL-STD-202-301	

#### CONCLUDING MATERIAL

Custodians:  
 Army – CR  
 Navy – EC  
 Air Force – 85  
 NASA – NA  
 DLA - CC

Preparing activity:  
 DLA – CC  
 (Project 5935-2016-028)

Review activities:  
 Army – AR, AT, EA, MI  
 Navy – AS, MC, OS, 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 database at <https://assist.dla.mil>.