

INCH-POUND

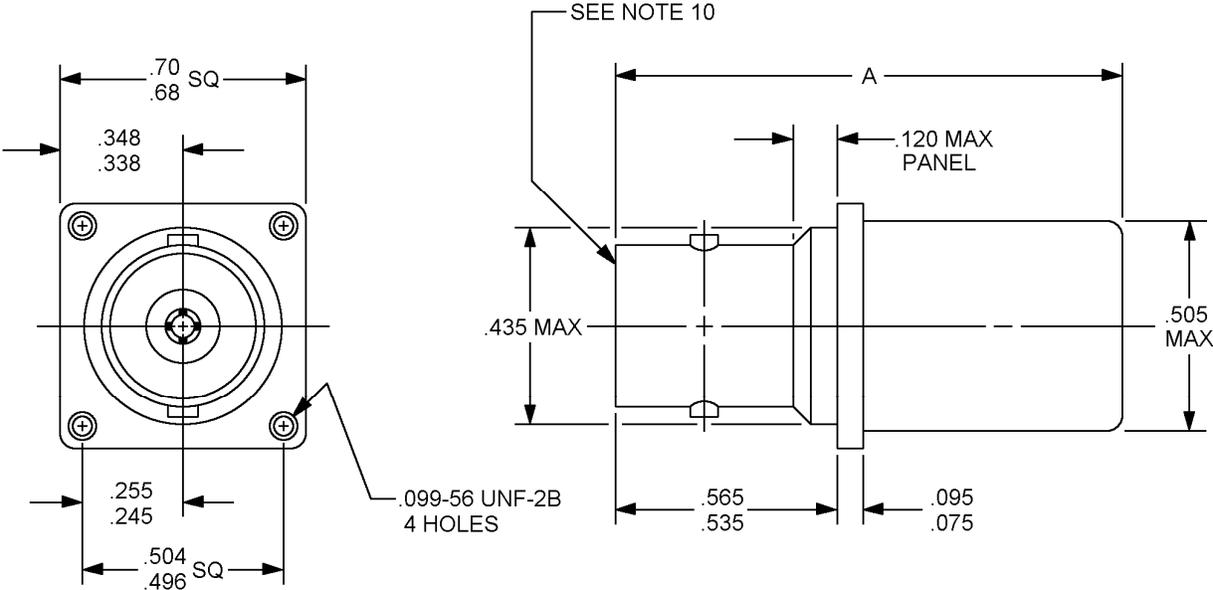
MIL-PRF-39012/18H
 w/AMENDMENT 1
 20 April 2009
 SUPERSEDING
 MIL-PRF-39012/18H
 16 November 2006

PERFORMANCE SPECIFICATION SHEET

CONNECTORS, RECEPTACLE, ELECTRICAL, COAXIAL, RADIO FREQUENCY,
 (SERIES BNC, (CABLED), SOCKET CONTACT, FLANGE MOUNTED, 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.



Inches	mm	Inches	mm	Inches	mm
.075	1.91	.338	8.59	.535	13.59
.095	2.41	.348	8.84	.565	14.35
.099	2.51	.436	11.07	.680	17.30
.120	3.05	.496	12.60	.700	17.80
.245	6.22	.504	12.80		
.255	6.48	.505	12.83		

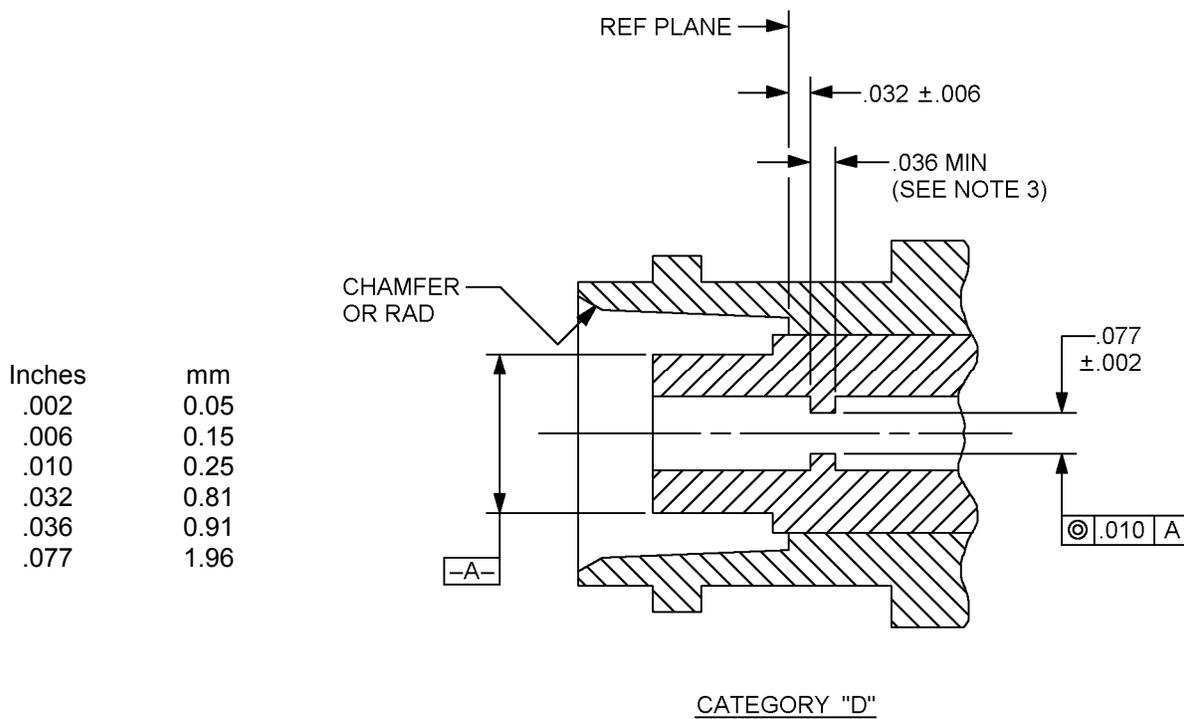
FIGURE 1. General configuration.

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NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for Information only.
3. For dimension A, see tables I and III.
4. Dimension .505 inch (12.83 mm) is the largest overall diameter of the connector.
5. Wrench flats (if required for assembly) are to accommodate standard wrench opening in accordance with FED-STD-H28, appendix 10.
6. Receptacles not recommended for use on panels with greater than .078 inch (1.98 mm) maximum thickness.
7. All undimensioned pictorial representations are for reference purposes only.
8. Bayonet studs and edges of flange shall be within 3° of the orientation shown.
9. Dimension A, defines the maximum length of the connector when assembled to the appropriate cable.
10. Series BNC, socket contact interface in accordance with MIL-STD-348.

FIGURE 1. General configuration – Continued.



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for information only.
3. Chamfer is optional.
4. Concave depression .100 inch (2.54 mm) x .005 inch (0.13 mm) deep between studs permissible.

FIGURE 2. Category D captivation detail.

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

Part or Identifying Number (PIN) <u>1/</u> M39012/18-	Applicable cable <u>2/</u> M17/	Dimensions	Inch (millimeters) maximum #
Category A – Field serviceable (no special tools required) <u>3/</u>			
X102 (Superseding –0111 <u>4/</u>)	Cable group VI 60-RG142 <u>5/</u> 128-RG400 <u>6/</u>	A	1.250 (31.75)
X101 (Superseding –0118 <u>4/</u>)	Cable group VII 110-RG302 <u>5/ 6/ 7/</u>		
X103	Cable group IV 54-RG122 <u>6/</u>		
X220	Cable group II 113-RG316 <u>5/ 6/</u>		
X225	Cable group X 127-RG393 <u>5/ 6/</u>		
Category C – field replaceable (MIL-DTL-22520 crimp tool) See note next to applicable cable for crimp die <u>3/ 8/</u>			
X013	Cable group VIA <u>9/</u> 111-RG303 <u>5/ 6/</u>	A	1.500 (38.10)
X014	Cable group VIB <u>9/</u> 60-RG142 <u>5/</u> 128-RG400 <u>6/</u>		

See notes at end of table.

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

PIN <u>1</u> / M39012/18-	Applicable cable <u>2</u> / M17/	Dimensions	Inch (millimeters) maximum #
Category C – field replaceable (MIL-DTL-22520 crimp tool) See note next to applicable cable for crimp die <u>3</u> / <u>8</u> /			
X015 (Superseding –X010 <u>4</u> /)	Cable group VIIA <u>10</u> / 110-RG302 <u>7</u> /	A	1.500 (38.10)
X016	Cable group IV <u>11</u> / 54-RG122 <u>6</u> /		
X017	Cable group VIIB <u>10</u> / 90-RG71 <u>6</u> / <u>7</u> /		
X221	Cable group IIA <u>12</u> / 113-RG316 <u>5</u> / <u>6</u> /		
Category D – Field replaceable – Defined piece part <u>3</u> / <u>8</u> / <u>13</u> / <u>14</u> /			
X501	Cable group IV 54-RG122 <u>6</u> /	A	1.234 (31.34)
X502	Cable group V 95-RG180 <u>5</u> / <u>6</u> / <u>7</u> /		
X503	Cable group VIB 60-RG142 <u>5</u> / 128-00001 <u>6</u> /		
X504	Cable group VIA 111-RG303 <u>5</u> / <u>6</u> /		

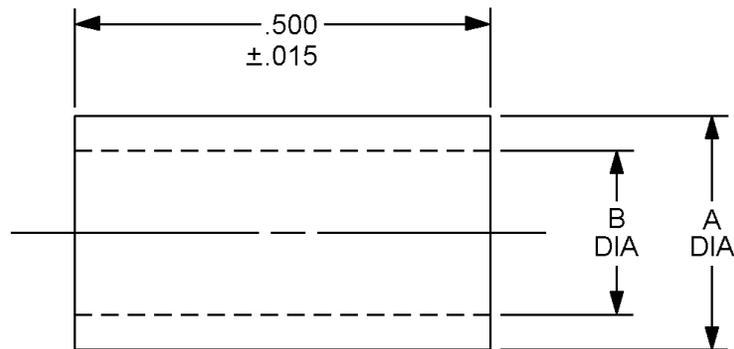
See notes at end of table.

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

- 1/ For cross-reference of PIN to superseded PIN or designation, see table IV.
- 2/ The latest version of cash cable shall be applicable.
- 3/ These connectors have captivated center contacts.
- 4/ The superseded PIN is **NOT** acceptable for Government use.
- 5/ Cable to be used for the +200°C temperature cycling tests. This cable can be used for tests with the approval of the Qualifying Activity.
- 6/ Cable to be used when performing test requiring cable except as in 5/ and 7/.
- 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 are assembled using the applicable crimp tool, to the specified cables stripped as shown on figure 4.
- 9/ M22520/5-19 closure B or M22520/5-05 closure A.
M22520/5-11 closure A.
M22520/5-57 closure A.
- 10/ M22520/5-19 closure A or 822520/5-07 closure A.
M22520/5-13 closure A.
M22520/5-59 closure A.
- 11/ M22520/5-41 closure B or M22520/5-05 closure B.
M22520/5-09 closure A.
- 12/ M22520/5-35 closure B or M22520/5-03 closure A.
- 13/ Complete connector assembly shall consist of a body, center contact, ferrule and assembly instructions.
- 14/ 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 (<http://amphenolrf.com/simple/PIM%20Paper.pdf>)**. Silver is the preferred plating option.

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CRIMP FERRULE

Dash number	Ferrule number ^{1/}	A ± 0.003	B ± 0.003	Basic crimp tool ^{2/}	Crimp die or Positioner M22520/5
X501 X502	18-50	0.212	0.175	M22520/5-01	-9 Closure A or -5, -41 Closure B
X503	18-51	0.250	0.220		-5, -11 Closure A or -19, -57 Closure B
X504	18-52	0.245	0.206		

^{1/} Contact numbers and ferrule numbers are for identification only.
^{2/} Class 2 tool may be used by OEM (see MIL-DTL-22520).

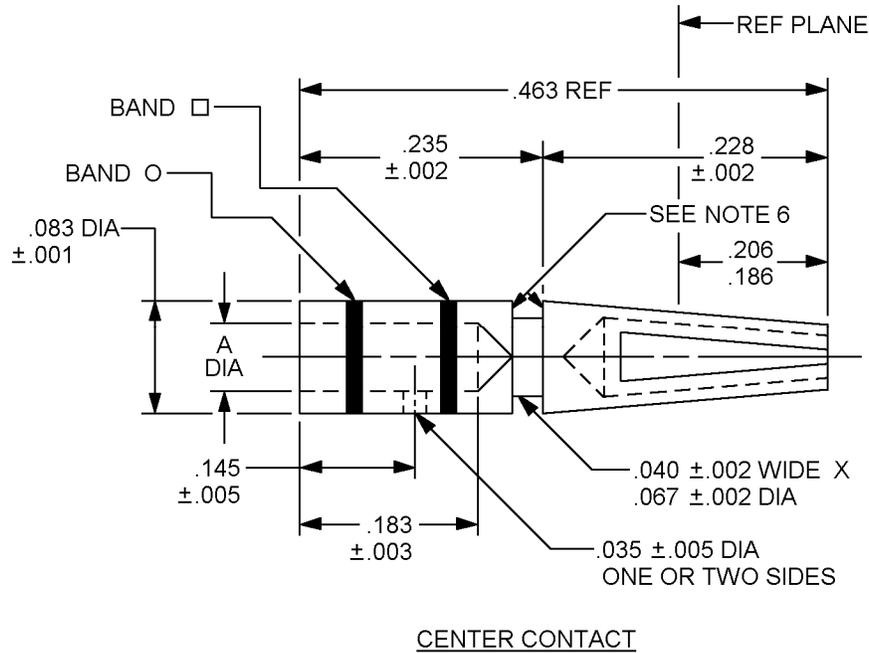
Inches	mm	Inches	mm	Inches	mm	Inches	mm
.001	0.03	.033	0.84	.145	3.68	.220	5.59
.002	0.05	.035	0.89	.175	4.45	.230	5.84
.003	0.08	.040	1.02	.183	4.65	.235	5.97
.005	0.13	.043	1.09	.206	5.23	.250	6.35
.015	0.38	.067	1.70	.210	5.33	.478	12.14
.017	0.43	.083	2.11	.212	5.38	.500	12.70

NOTES:

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

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

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Dash no.	Contact no. <u>1/</u>	A +0.001 -0.002	Basic crimp tool <u>2/</u>	Crimp die or positioner	Crimp tensile, pounds min. (N)	Color band □	Color band ○
X501	18-12	0.033	M22520/1-01	M22520/1-12	10 lbs. (44.28)	Orn	Green
X502	18-11	0.017			6 lbs. (26.69)	Blue	
X503 X504	18-10	0.043	M22520/1-01	M22520/1-12	20 lbs. (88.96)	Red	

1/ Contact numbers and ferrule numbers are for identification only.

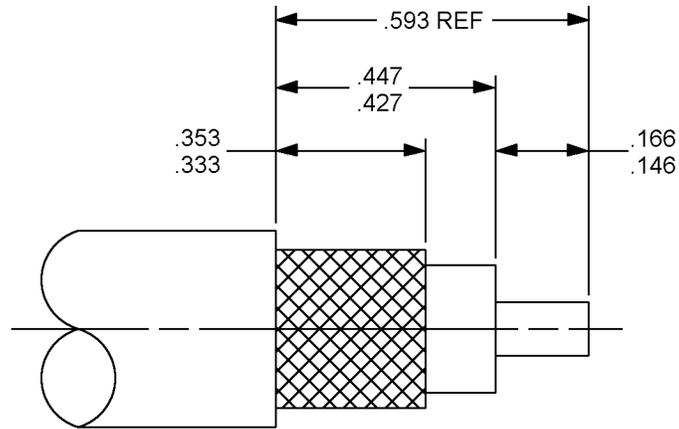
2/ Class 2 tool may be used by OEM (see MIL-DTL-22520).

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for information only.
3. Contact material shall be copper beryllium. Connectors supplied with phosphor bronze contacts are no longer acceptable for Government use.
4. Crimp tensile test shall be in accordance with SAE-AS39029.
5. Copyright notice: All information disclosed in these specification sheets which is or may be copyright is reproduced herein with the express permission of the copyright owner.
6. .003 inch maximum break.
7. 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
.146	3.71
.166	4.22
.333	8.46
.353	8.97
.427	10.85
.447	11.35
.593	15.06

NOTES:

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

FIGURE 4. Recommended cable stripping dimensions for category C connectors.

ENGINEERING DATA:

Nominal impedance: 50 ohms.

Frequency range: 0 to 4 GHz.

Voltage rating:

500 volts rms, maximum working voltage at sea level.

125 volts rms, maximum at 70,000 feet (4.437 kPa).

Temperature rating: - 65°C to + 165°C.

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REQUIREMENTS:

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

Force to engage and disengage:

Longitudinal force - 3 pounds (13.34 N), maximum.

Torque – 2.5 inch-pounds (.28 Nm), maximum.

Coupling proof torque: Not applicable.

Inspection conditions: Coupling torque not applicable.

Mating characteristics:

In accordance with MIL-STD-348 and figures 2 and 3 for dimensions.

Center contact (socket):

Oversize test pin: .057 inch (1.45 mm) diameter minimum (nonclosed entry contacts only).

Insertion depth: .125 inch (3.17 mm), minimum.

Number of insertions: 1.

Insertion force test: Steel test pin diameter .054 inch (1.37 mm), minimum.

Test pin finish: 16 microinches (0.406 μm).

Insertion force: 2 pounds (8.90 N), maximum.

Withdrawal force test: Steel test pin diameter .052 inch (1.32 mm) maximum.

Withdrawal force: 2 ounces (.56 N), minimum.

Test pin finish: 16 microinches (0.406 μm).

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: 6 pounds (26.69 N), minimum axial force. Applicable to captivated-center-contact connectors only.

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

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Voltage standing wave ratio (VSWR): From 500 to 4 GHz, or approximately 80 percent of upper cutoff frequency of the cable, whichever is lower; 1.30 maximum.

Swept frequency VSWR test setup:

Item 6 - VSWR shall be Less than $1.015 + .005 F$ (F in GHz).

Item 16- VSWR shall be Less than $1.015 + .005 F$ (F in GHz).

Second step of VSWR checkout procedure - VSWR shall be less then $1.045 + .019 F$ (F in GHz).

Group B inspection - VSWR shall be less than $1.1 + .01 F$ (F in GHz).

Qualification and group C inspection - VSWR shall not exceed 1.15.

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

Contact resistance: In milliohms maximum:

	<u>Initial</u>	<u>After environment</u>
Center contact	1.5	2.0
Outer contact (silver)	.2	Not applicable
Outer contact (nickel)	.4	Not applicable
Braid to body	.1	Not applicable

Dielectric withstanding voltage: Method 301 of MIL-STD-202. 1,500 volts rms minimum at sea level.

Vibration, high frequency: Method 204 of MIL-STD-202, test condition B. No discontinuity permitted.

Shock: Method 213 of MIL-STD-202, test condition G. No discontinuity permitted.

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° cables (see tables 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 - 375 volts rms, minimum.

Altitude - 70,000 feet.

RF high potential withstanding voltage:

Voltage and frequency: 1,000 volts rms at a frequency from 5 to 7.5 MHz.

Leakage current: Not applicable.

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Cable retention force:

Noncrimp assemblies: 40 pounds (177.93 N) minimum.

Crimp assemblies:

10 pounds (44.48 N), minimum for cables .155 - .189 inch (3.94 mm – 4.80 mm) OD.

20 pounds (88.96 N), minimum for cables .190 -.229 inch (4.82 mm – 5.82 mm) OD.

30 pounds (133.45 N), minimum for cables .230 -.249 inch (5.84 mm – 6.32 mm) OD.

40 pounds (177.93 N), minimum for cables .250 inch (6.35 mm) OD and Larger.

Coupling mechanism retention force: Not applicable.

RF Leakage: -55 dB minimum, tested at a frequency between 2 and 3 GHz.

Insertion loss: .2 dB maximum tested at 3 GHz.

PIN: M39012/18 - (dash number from table I or "B" number from table III).

Group qualification: See table II.

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TABLE II. Group qualification. 1/

Group	Submission and qualification of any of the following connectors <u>2/ 3/</u>	Qualifies the following connectors
I	M39012/ 17-X101 17-X103 17-X111 17-X118 18-X102 18-X103 18-X111 18-X118 19-X101 19-X110 19-X111 19-X118 18-X220	M39012/ 17-X101 17-X102 17-X103 17-X111 17-X118 18-X101 18-X102 18-X103 18-X111 18-X118 19-X101 19-X110 19-X111 19-X118 18-X220
II	17-X102 18-X101 19-X102	17-X102 18-X101 19-X102
III	17B0004 17B0005 17B0006 17B0007 17B0009 17B0019 18B0004 18B0005 18B0006 18B0007 18B0009 18B0019 19B0003 19B0004 19B0005 19B0006 19B0008 19B0019	17B0004 17B0005 17B0006 17B0007 17B0008 17B0009 17B0012 17B0019 18B0004 18B0005 18B0006 18B0007 18B0008 18B0009 18B0012 18B0019 19B0003 19B0004 19B0005 19B0006 19B0007 19B0008 19B0012 19B0019

See notes at end of table.

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TABLE II. Group qualification - Continued. 1/

Group	Submission and qualification of any of the following connectors <u>2/ 3/</u>	Qualifies the following connectors
IV	M39012/ 17B0008 17B0012 18B0008 18B0012 19B0007 19B0012	M39012/ 17B0008 17B0012 18B0008 18B0012 19B0007 19B0012
V	17-X013 17-X014 17-X016 17-X020 18-X013 18-X014 18-X016 18-X020 19-X013 19-X014 19-X016 19-X020 18-X221	17-X013 17-X014 17-X015 17-X016 17-X017 17-X020 18-X013 18-X014 18-X015 18-X016 18-X017 18-X020 19-X013 19-X014 19-X015 19-X016 19-X017 19-X020 19-X221
VI	17-X015 17-X017 18-X015 18-X017 19-X015 19-X017	17-X015 17-X017 18-X015 18-X017 19-X015 19-X017
VII	18-X501 18-X503 18-X504	18-X501 18-X502 18-X503 18-X504
VIII	18-X502	18-X502

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 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.

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TABLE II. Group qualification - Continued. 1/

- 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.
- 3/ Qualification by similarity may be given for the like styles of currently qualified TNC series connectors with the approval of the qualifying and preparing activity. Similarity will include, cable accommodation, materials and plating, assembly procedures and crimp tools/dies, as a minimum.

TABLE III. Category B - Nonfield replaceable (special tools may be required). 1/

Not for Air Force, Army, or Navy use. For OEM use only.

Dash number 1/ 2/ 3/	Applicable Cable M17/ 4/	Dimensions	Inches (millimeters) maximum #
M39012/18B0004	28-RG058*	A	1.500 (2810)
M39012/18B0005	84-RG223*		
M39012/18B0006	111-RG303*		
M39012/18B0007	60-RG142*@		
M39012/18B0008	29-RG59*Δ 30-RG062 Δ 97-RG210Δ		
M39012/18B0009	54-RG122*		
M39012/18B0012	90-RG71*Δ		
M39012/18B0019	110-RG302*Δ		

- 1/ For maintenance replacements for category B, see table V.
- 2/ For cross-reference of PIN to superseded PIN or type designation, see table IV.
- 3/ Inactive for new design.
- 4/ The latest version of each cable shall, be applicable.
- # Dimensions are in inches. Metric equivalents are given for information only.
- * Cable to be used when performing tests requiring cable except as in @ and Δ.
- @ Cable to be used for the +200°C temperature cycling tests. This cable can be used for tests with the approval of the Qualifying Activity.
- Δ These are not 50 ohm cables, therefore, when attached to the specified connectors, VSWR, RF leakage, and insertion loss are not applicable.

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TABLE IV. Cross-reference of PIN's.

Preferred PIN M39012/18	Substitute for PIN or type designation <u>1/</u> <u>2/</u>
-0101	UG-262/U, M39012/18-0001
-0102	UG-291/U, M39012/18-0002
-0103	UG-1055/U, M39012/18-0003
B0004	UG-1802/U, M38012/18-0004
B0005	UG-1803/U, M39012/18-0005
B0006	UG-1814/U, M39012/18-0006
B0007	UG-1811/U, M39012/18-0007
B0008	UG-1801/U, M39012/18-0008
B0009	UG-1793/U, M39012/18-0009
-0111	M39012/18-0011
B0012	M39012/18-0012
-0013	
-0014	
-0015	
-0016	
-0017	
-0018	M39012/18-0018
B0019	M39012/18-0019
-0020	
-0501	
-0502	
-0503	
-0504	

1/ The superseded PIN or the type designation I for cross-reference only. Where a superseded PIN or type designation is not given, none was assigned or will be assigned. The PIN M39012/18-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-18 A/U, UG-18B/U, etc.

TABLE V. Maintenance replacements for category B.

Category B no.* Inactive for new design	Category C dash no.	Category A dash no.	Category D dash no.
B0004	0013	0102	0504
B0005	0014	0102	---
B0006	0013	0112	---
B0007	0014	0102	0503
B0008	0015	0101	---
B0009	0016	0103	0501
B0012	0017	0101	---
B0019	0020	0118	---

* Category B connectors are for original installation only.
They will not be stocked or acquired by the Government.

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Amendment notations. The margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. 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:

FED-STD-H28
MIL-STD-202
MIL-STD-348
MIL-DTL-22520
SAE-AS39029

CONCLUDING MATERIAL

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

Preparing activity:
DLA - CC

(Project 5935-2008-189)

Review activities:
Army – AR, AT, EA, MI
Navy - AS, MC, OS, SH
Air Force - 19, 99

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