INCH-POUND

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

PERFORMANCE SPECIFICATION SHEET

CONNECTORS, PLUG, ELECTRICAL, COAXIAL, RADIO FREQUENCY,
(SERIES BNC (CABLED), PIN CONTACT, RIGHT ANGLE, CLASS 2)

This specification is approved for use by all Depart-
ments 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.

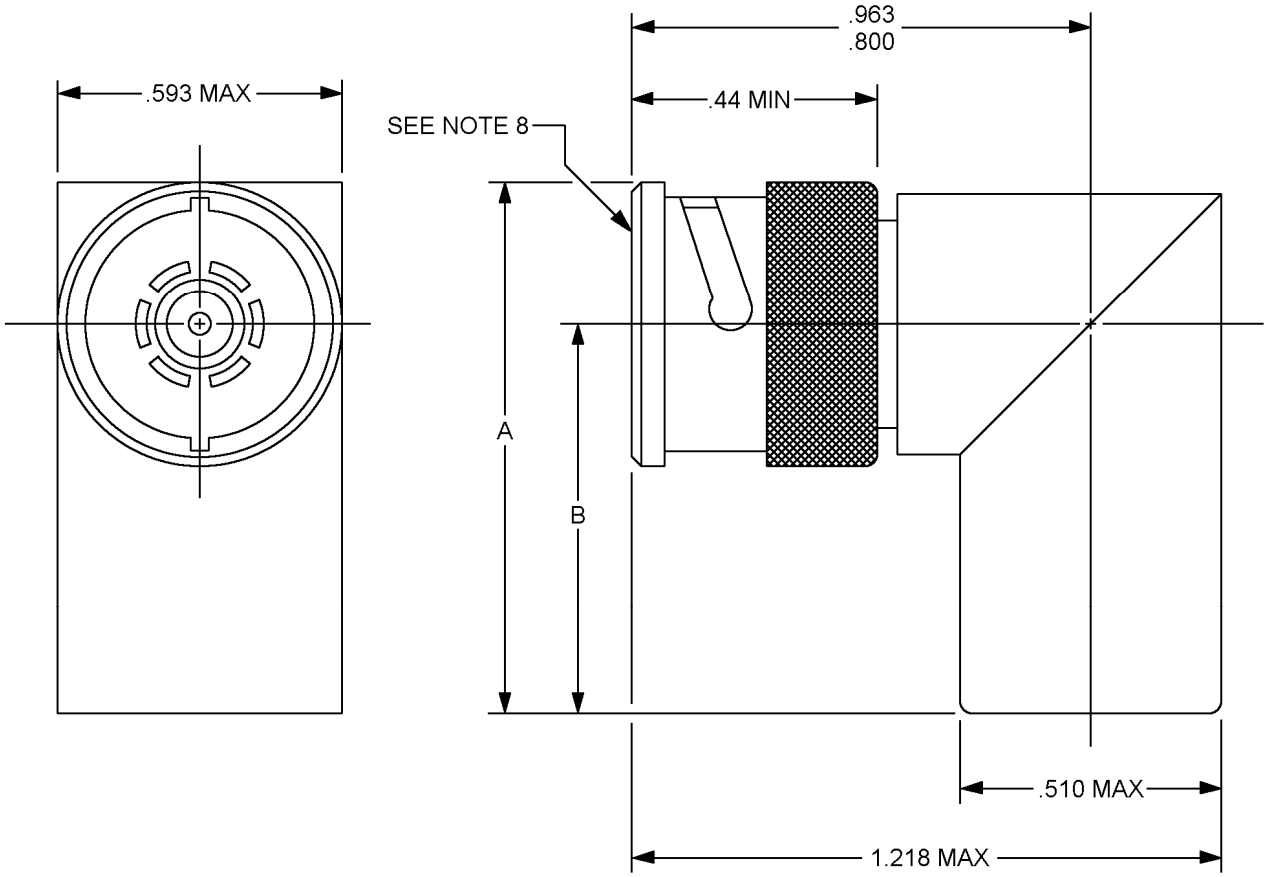


FIGURE 1. General configuration.

AMSC N/A

FSC 5935

Inches	mm
.44	11.18
.510	12.95
.593	15.06
.800	20.32
.963	24.46
1.218	30.94

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. Dimension A, 1.218 inch and .593 inch are the largest overall diameter of the connector.
5. Wrench flats are to accommodate standard wrench 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. Series BNC, pin contact interface in accordance with MIL-STD-348.

FIGURE 1. General configuration – Continued.

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

Part or Identifying Number (PIN) 1/ M39012/20-	Applicable cable 2/ M17/	Dimensions	Inches (millimeters) maximum #
Category A – Field serviceable (no special tools required) 3/			
X101	Cable group VI 60-RG142 5/ 128-RG400 6/	A	1.750 (44.45)
X102 (Superseding –0108 4/)	Cable group VII 110-RG302 5/ 6/ 7/		
X103	Cable group IV 54-RG122 6/		
X220	Cable group II 113-RG316 5/ 6/		
X225	Cable group X 127-RG393 5/ 6/		

See notes at end of table.

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

PIN 1/ M39012/20-	Applicable cable 2/ M17/	Dimensions	Inches (millimeters) maximum #
Category C – Field replaceable (MIL-DTL-22520 crimp tool) See note next to applicable cable group for crimp die 3/ 8/			
X006	Cable group VIA 9/ 111-RG303 5/ 6/	A	2.000 (50.80)
X007	Cable group VIB 9/ 60-RG142 5/ 128-RG400 6/		
X011 (Superseding –0010 4/)	Cable group VIIA 10/ 110-RG302 5/ 6/ 7/		
X016	Cable group IV 11/ 54-RG122 6/		
X017	Cable group VIIB 10/ 90-RG71 6/ 7/		
X222	Cable group IIA 12/ 113-RG316 5/ 6/		

See notes at end of table.

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

PIN 1/ M39012/20-	Applicable cable 2/ M17/	Dimensions	Inches (millimeters) maximum #
Category D – Field replaceable – Defined piece part 3/ 8/ 13/ 14/			
X501	Cable group IV 54-RG122 6/		
X502	Cable group V 95-RG180 5/ 6/ 7/	A B	1.828 (46.43) 1.578 (40.08)
X503	Cable group VIB 60-RG142 5/ 128-RG400 6/		
X504 Cable group VIA	Cable group VIA 111-RG303 5/ 6/		

1/ For cross-reference of dash number to superseded PIN or designation, see table IV.

2/ The latest version of each 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 may 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 acceptable.

8/ These connectors are assembled using the applicable crimp tool, to the specified cables stripped as shown on figure 3.

9/ M22520/5-19 closure B or M22520/5-05 closure A.
M22520/5-11 closure A.
M22520/5-57 closure A.

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

10/ M22520/5-19 closure A or M22520/5-07 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

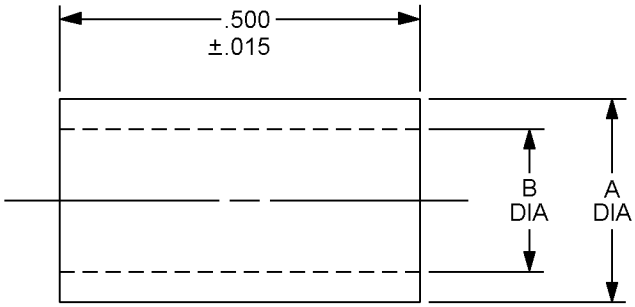
12/ M22520/5-35 closure B or M22520/5-03 closure A.

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.

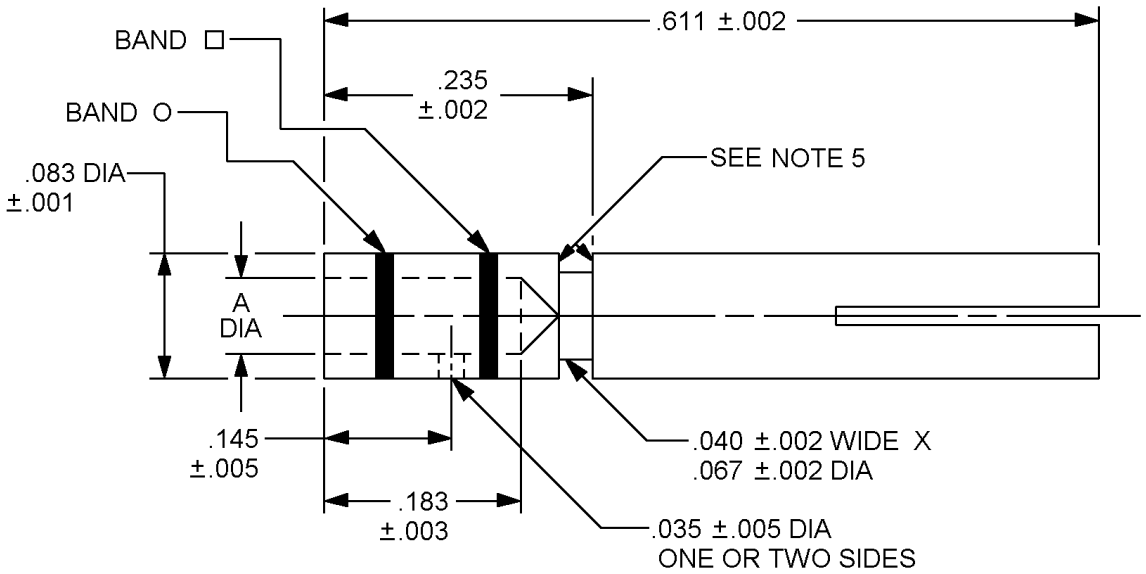


CRIMP FERRULE

Dash number	Ferrule number 1/	A ± 0.003	B ± 0.003	Basic crimp tool 2/	Crimp die or positioner M22520/5
X501 X502	20-50	0.212	0.175	M22520/5-01	05, 41 Closure B or 9 Closure A
X503	20-51	0.250	0.220		5, 11, 57 Closure A or 19 Closure B
X504	20-52	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).

FIGURE 2. Contact and ferrule dimensions for category D only.



CENTER CONTACT

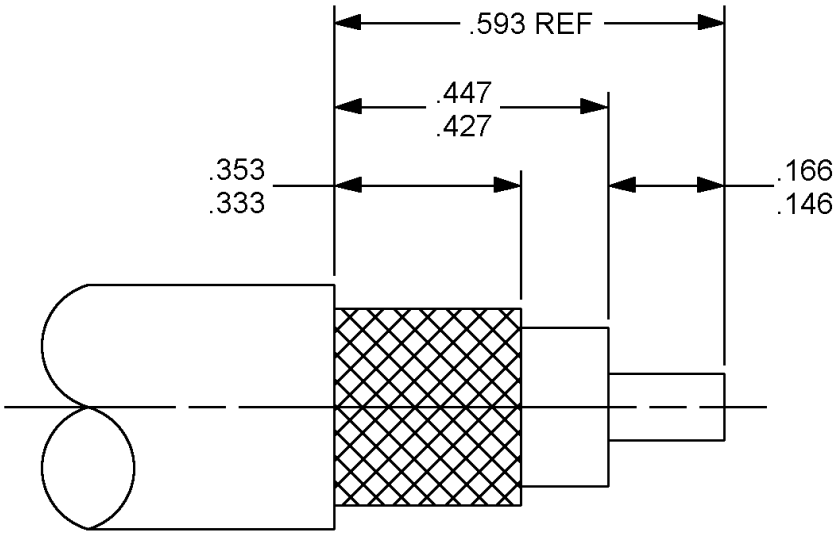
Inches	mm	Inches	mm	Inches	mm	Inches	mm
.001	0.03	.035	0.89	.175	4.45	.245	6.22
,002	0.05	.040	1.02	.183	4.65	.250	6.35
.005	0.13	.043	1.09	.206	5.23	.500	12.70
.015	0.38	.067	1.70	.212	5.38	.611	15.52
.017	0.43	.083	2.11	220	5.59		
.033	0.84	.145	3.68	.235	5.97		

Dash no.	Contact no. 1/	A +0.001 -0.002	Basic crimp tool 2/	Crimp die or positioner	Crimp Tensile, pounds min. (N)	Color band □	Color band O
X501	20-12	0.033	M22520/1-01	M22520/1-12	10 lbs (44.48)	Orn.	Violet
X502	20-11	0.017			6 lbs (26.69)	Blue	
X503 X504	20-10	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. Crimp tensile test shall be in accordance with SAE-AS39029.
4. Contact numbers and ferrule numbers are for identification only.
5. .003 inch (0.08 mm) maximum break.
6. Color bands shall be positioned so that no coloring material enters the inspection hole.

FIGURE 2. Contact and ferrule dimensions for category D only – Continued.



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 3. Cable stripping dimensions for field replaceable 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.

REQUIREMENTS

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

Force to engage and disengage:

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

Torque: 2.5 inch-pounds (0.28 Nm), maximum.

Coupling proof torque: Not applicable.

Inspection conditions: Coupling torque not applicable.

Mating characteristics:

In accordance with MIL-STD-348.

Outer contact:

Test ring ID: .319 inch (8.10 mm) maximum, 16 microinch (0.406 µm) finish.

Insertion force: 5 pounds (22.24 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 with .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: 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.

Voltage standing wave ratio (VSWR): From .5 to 4 GHz, or approximately 80 percent of upper cutoff frequency of the cable, whichever is lower; 1.35, 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 than 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 per minute, maximum. The connector shall meet the mating characteristics and force to engage and disengage requirements.

Initial: 5 pounds (22.24 N), maximum.

Final: 5 pounds, (22.24 N) maximum; 1 pound (4.45 N), minimum.

Contact resistance: In milliohms, maximum:

	Initial	After environment
Center contact	2.0	2.5
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°C 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 (4.437 kPa).

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.

Cable retention force:

Noncrimp assemblies: 40 pounds (177.93 N), minimum.

Crimp assemblies:

50 pounds (222.41 N), minimum for cables .155 - .189 inch (3.94 mm – 4.80 mm) OD.

60 pounds (266.90 N), minimum for cables .190 - .229 inch (4.83 mm – 5.82 mm) OD.

75 pounds (333.62 N), minimum for cables .230 - .249 inch (5.84 mm – 6.32 mm) OD.

90 pounds (400.34 N), minimum for cables .250 inch (6.35 mm) OD and larger.

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

RF leakage: -55 dB minimum, tested at a frequency between 2 and 3 GHz. This requirement may be met by meeting the RF leakage requirement on the MIL-PRF-39012/16 connector which has the same mating end design and which is intended for the same cable.

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

PIN: M39012/20 (dash number from table I or “B” number from table III).

Group qualification: See table II.

TABLE II. Group qualification. 1/

Group	Submission and qualification or any of the following connectors 2/ 3/	Qualifies the following connectors
I	M39012/20 -X101 -X108	M39012/20 -X101 -X108 X102
II	BX002 BX003	BX002 BX003
III	-X006 -X007 -X010	-X006 -X007 -X010
IV	-X501 -X503 -X504	-X501 -X502 -X503 -X504
V	-X502	-X502

See notes at end of table.

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 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.

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 – Non-field replaceable (special tools may be required).

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

PIN 1/ 2/ 3/	Applicable cable M17/ 4/	Dimensions	Inches (millimeters) maximum #
M39012/20B0002	028-RG058*	A	2.000 (50.80)
M39012/20B0003	084-RB223*		

1/ For cross-reference of PIN to superseded PIN or type designation, see table IV.

2/ For maintenance replacements for category B, see table V.

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.

TABLE IV. Cross-reference of PIN's.

Preferred PIN M39012/20	Substitute for PIN or type designation 1/ 2/
-0101	UG-913/U, M39012/20-0001
B0002	UG-1812/U, M39012/20-0002
B0003	UG1813/U, M39012/20-0003
-0006	M39012/20-0004
-0007	
-0108	M39012/20-0008
-0010	M39012/20-0009
-0501	
-0502	
-0503	M39012/20-0005
-0504	

1/ The superseded PIN or the type designation is for cross-reference only. Where a superseded PIN or type designation is not given, none was assigned or will be assigned. The PIN M39012/20-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 number* Inactive for new design	Category C dash number	Category A dash number	Category D dash number
B0002	0006	0101	0504
B0003	0007	0101	--

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

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-PRF-39012/16
MIL-DTL-22520
SAE-AS39029

CONCLUDING MATERIAL

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

Preparing activity:
DLA – CC

(Project 5935-2008-191)

Review activities:
Army – AT, AV, 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 http://assist.daps.dla.mil.