

INCH-POUND

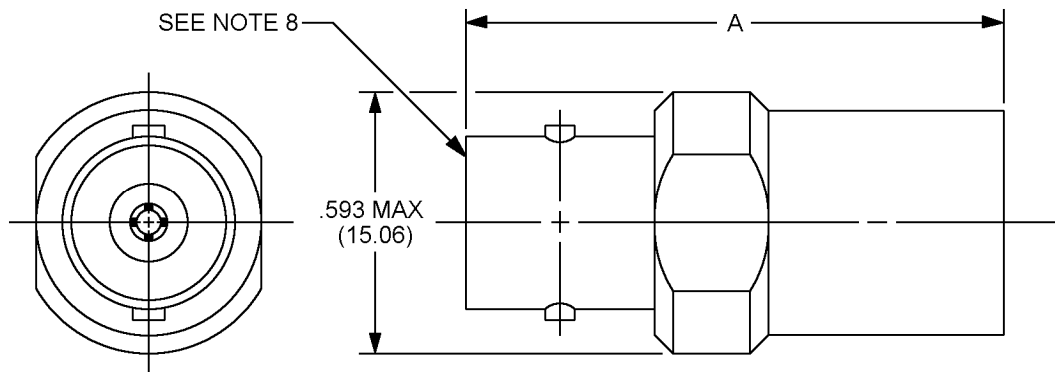
MIL-PRF-39012/17H
w/AMENDMENT 1
20 April 2009
SUPERSEDING
MIL-PRF-39012/17H
16 November 2006

PERFORMANCE SPECIFICATION SHEET

CONNECTORS, PLUGS, ELECTRICAL, COAXIAL, RADIO FREQUENCY,
(SERIES BNC, (CABLED), SOCKET 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:

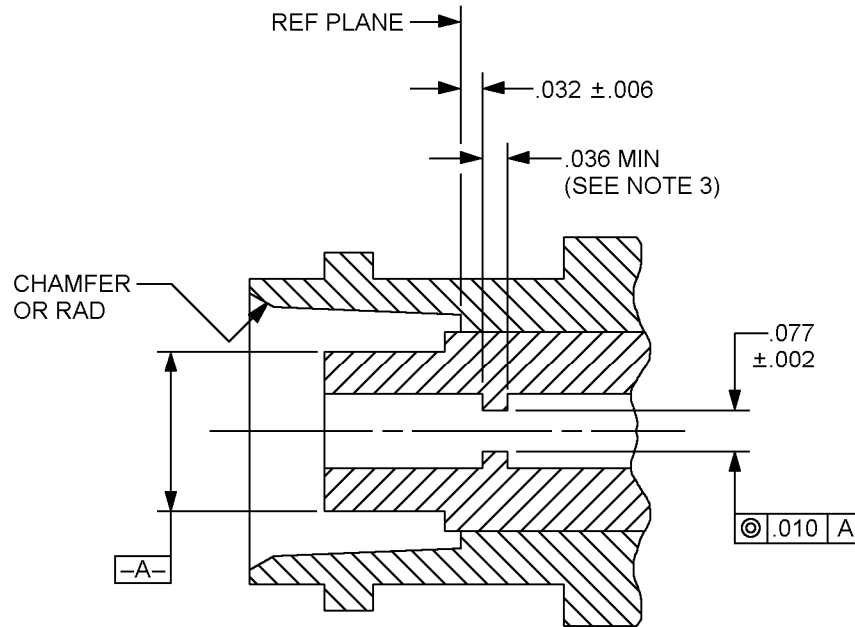
1. Dimensions are in inches.
2. Metric equivalents are given for information only.
3. For dimension A, see tables I and III.
4. Dimension .593 inch (15.06 mm) is the largest overall diameter of the connector.
5. Wrench flats (if required for assembly) are to accommodate standard wrench opening in accordance with FED-STD-H28, appendix 10.
6. 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, socket contact interface in accordance with MIL-STD-348.

FIGURE 1. General configuration.

AMSC N/A

FSC 5935

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CATEGORY "D"

Inches	mm
.002	0.05
.006	0.15
.010	0.25
.032	0.81
.036	0.91
.077	1.96

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. Mating dimension for socket terminations.

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

Part or Identifying Number (PIN) <u>1</u> / M39012/17-	Applicable cable <u>2</u> / M17/	Dimensions	Inch (millimeters) maximum #
Category A – Field serviceable (no special tools required) <u>3</u> /			
X101 (Superseding –0111 <u>4</u> /)	Cable group VI 60-RG142 <u>5</u> / 128-RG400 <u>6</u> /	A	1.250 (31.75)
X102 (Superseding –0118 <u>4</u> /)	Cable group VII 110-RG302 <u>5</u> / <u>6</u> /		
X103	Cable group IV 54-RG122 <u>6</u> /		
X220	Cable group II 113-RG316 <u>5</u> / <u>6</u> /		
X225	Cable group X 127-RG393 <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 <u>1</u> / M39012/17-	Applicable cable <u>2</u> / M17/	Dimensions	Inches (millimeters) maximum #
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/ 9/</u> 128-RG400 <u>6/ 9/</u>		
X015 (Superseding –0020 <u>4/</u>)	Cable group VIIA <u>10</u> / 110-RG302		
X016 Cable group IV	Cable group IV <u>11</u> / 54-RG122 <u>6/</u>		
X017	Cable group VIIB <u>10</u> / 90-RG71 <u>6/ 7/</u>		
X222	Cable group IIA <u>12</u> / 113-RG316 <u>5/ 6/</u>		
Category D – Field replaceable – Defined piece part <u>3/ 8/ 13/ 14/</u>			
X501	Cable group IV 54-RG122 <u>6/</u>	A	1.234 (31.34)

See notes at end of table.

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

PIN <u>1</u> / M39012/17-	Applicable cable <u>2</u> / M17/	Dimensions	Inches (millimeters) maximum #
Category D – Field replaceable – Defined piece part <u>3</u> / <u>8</u> / <u>13</u> / <u>14</u> /			
X502	Cable group V 95-RG180 <u>5</u> / <u>6</u> / <u>7</u> /	A	1.234 (31.34)
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> /		

1/ For cross-reference of PIN 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 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 M22520/5-07 closure A.
M22520/5-13 closure A.
M22520/5-59 closure A.

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

11/ M22520/5-41 closure B or M22520/5-05 closure B.
M22520/5-09 closure A.

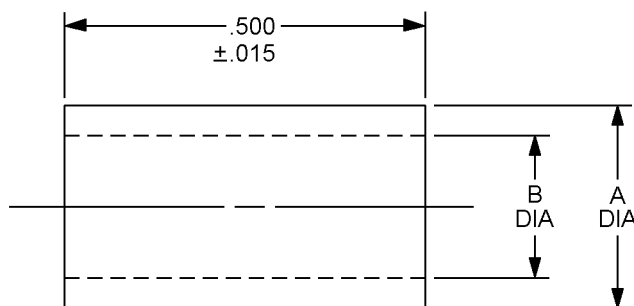
12/ M22520/5-35 closure B or M22520/5-03 closure A.

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

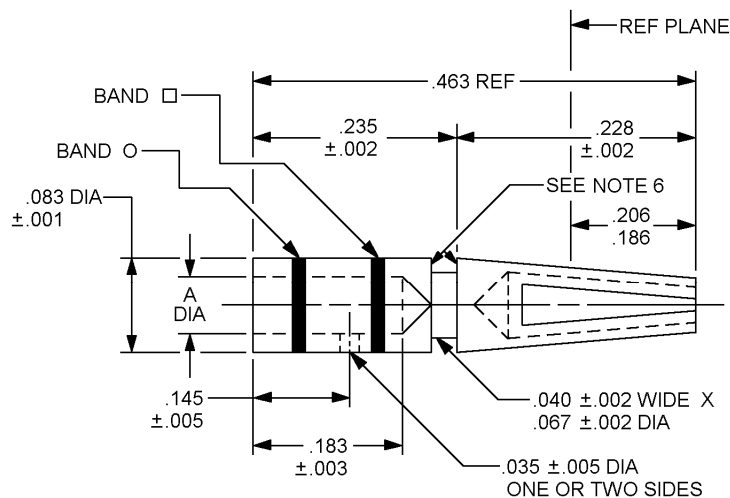
Dash number	Ferrule number <u>1/</u>	A ± 0.003	B ± 0.003	Basic crimp tool <u>2/</u>	Crimp die or positioner M22520/5
X501 X502	17-50	0.212	0.175	M22520/5-01	05, 41 Closure B or 9 Closure A
X503	17-51	0.250	0.220		5, 11, 57 Closure A or 19 closure B
X504	17-52	0.245	0.206		

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

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

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

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CENTER CONTACT

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

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	17-12	0.033	M22520/1-01	M22520/1-12	10 lbs. (44.48)	Orn	Green
X502	17-11	0.017			6 lbs. (26.69)	Blue	
X503 X504	17-10	0.043	M22520/1-01	M22520/1-12	20 lbs. (88.96)	Red	

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

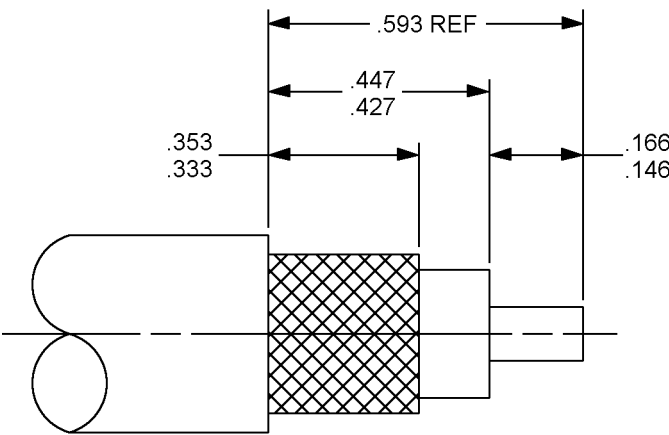
2/ Class 2 tool may be used by OEM (see MIL-DTL-22520).

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. 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

Designs and configurations: 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 figure 2 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 (4.437 kPa).

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 μ m).

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 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/minute maximum. The connector shall meet the mating characteristics and force to engage and 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 (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.

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Cable retention force:

Noncrimp assemblies: 40 pounds (177.92 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 (4.83 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 (177.92 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: M39012/17 - (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 <u>2/</u> any of the following connectors	Qualifies the following connectors
I	M39012/	M39012/
	17-X101	17-X101
	17-X103	17-X102
	17-X111	17-X103
	17-X118	17-X111
	18-X102	17-X118
	18-X103	18-X101
	18-X111	18-X102
	18-X118	18-X103
	19-X101	18-X111
	19-X110	18-X118
	19-X111	19-X101
	19-X118	19-X102
		19-X110
		19-X111
		19-X118
II	17-X102	17-X102
	18-X101	18-X101
	19-X102	19-X102
III	17B0004	17B0004
	17B0005	17B0005
	17B0006	17B0006
	17B0007	17B0007
	17B0009	17B0008
	17B0019	17B0009
	18B0004	17B0012
	18B0005	17B0019
	18B0006	18B0004
	18B0007	18B0005
	18B0009	18B0006
	18B0019	18B0007
	19B0003	18B0008
	19B0004	18B0009
	19B0005	18B0012
	19B0006	18B0019

See notes at end of table.

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TABLE II. Group qualification - Continued. 1/

Group	Submission and qualification of <u>2/</u> any of the following connectors	Qualifies the following connectors
III	M39012/ 19B0008 19B0019	M39012/ 19B0003 19B0004 19B0005 19B0007 19B0008 19B0012 19B0019
IV	17B0008 17B0012 18B0008 18B0012 19B0007 19B0012	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	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
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	17-X501 17-X503 17-X504	17-X501 17-X502 17-X503 17-X504
VIII	17-X502	17-X502

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 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 - Nonfield replaceable (special tools may be required). 1/

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

PIN <u>2/</u> <u>3/</u> M39012/17B	Applicable Cable M17/ <u>4/</u>	Dimensions	Inches (millimeters) maximum #
0004	28-RG058 <u>5/</u>	A	1.500 (38.10)
0005	84-RG223 <u>5/</u>		
0006	111-RG303 <u>5/</u>		
0007	60-RG142 <u>5/</u> <u>6/</u>		
0008	29-RG59 <u>5/</u> <u>6/</u> 30-RG062 <u>6/</u> 97-RG210 <u>6/</u>		
0009	54-RG122 <u>5/</u>		
0012	90-RG71 <u>5/</u> <u>6/</u>		
0019	110-RG302 <u>5/</u> <u>6/</u> <u>7/</u>		
0221	113-RG316 <u>5/</u> <u>7/</u> 119-RG174		

- 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.
- 5/ Cable to be used when performing tests requiring cable except as in 6/ and 7/.
- 6/ These are not 50 ohm cables; therefore, when attached to the specified connectors, VSWR, RF leakage, and insertion loss are not applicable.
- 7/ 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.
- # Dimensions are in inches. Metric equivalents are given for information only.

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TABLE IV. Cross-reference of PIN's.

Preferred PIN M39012/17	Substitute for PIN or type designation <u>1/</u> <u>2/</u>
-0101	UG-89/U, M39012/17-0001
-0102	UG-261/U, M39012/17-0002
-0103	UG-1056/U, M39012/17-0003
B0004	M23329/3-08, M39012/17-0004
B0005	M23329/3-09, M39012/17-0005
B0006	M23329/3-10, M39012/17-0006
B0007	M23329/3-11, M39012/17-0007
B0008	M23320/3-12, M39012/17-0008
B0009	M23329/3-13, M39012/17-0009
-0111	M39012/17-0001
B0012	M39012/17-0012
-0013	
-0014	
-0015	
-0016	
-0017	
-0018	
B0019	M39012/17-019
-0020	
-0501	
-0502	
-0503	
-0504	
B0221	M39012/17-0221

- 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 M39012/17-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. <u>1/</u>	Category C dash no.	Category A dash no.	Category D dash no.
B0004	0013	0101	0504
B0005	0014	0101	---
B0006	0013	0111	---
B0007	0014	0101	0503
B0008	0015	0102	---
B0009	0016	0103	0501
B0012	0017	0102	---
B0019	0020	0118	---
B0221	0222	0220	---

- 1/ 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 5935-2008-188)

Review activities:

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

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