INCH-POUND

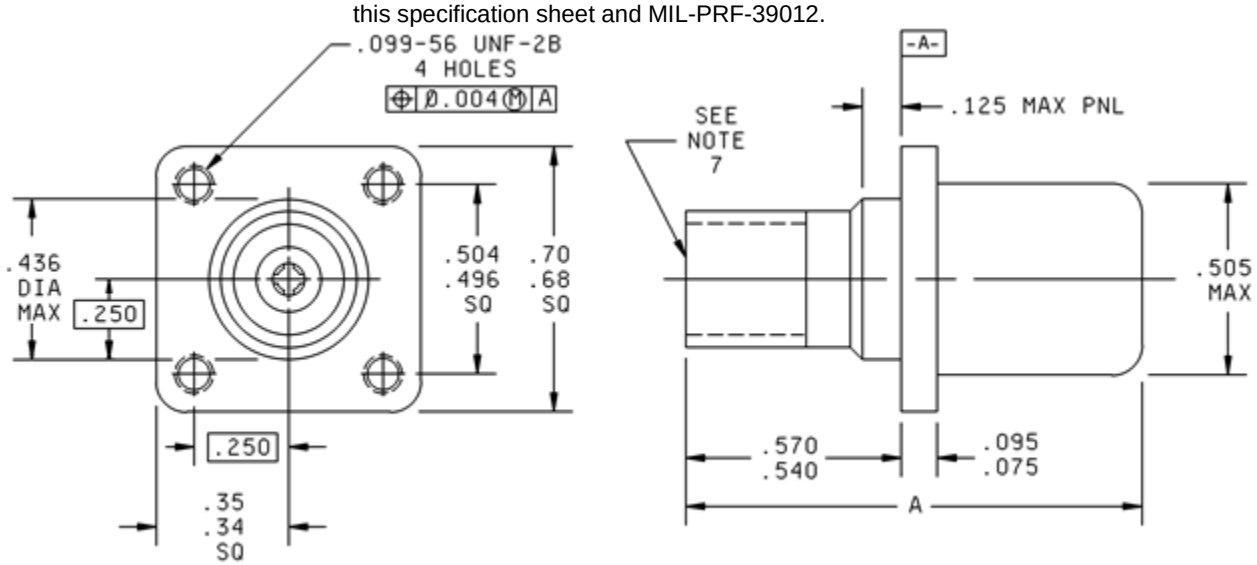
MIL-PRF-39012/29H
w/AMENDMENT 2
21 November 2016
SUPERSEDING
MIL-PRF-39012/29H
w/AMENDMENT 1
1 March 2011

PERFORMANCE SPECIFICATION SHEET

CONNECTORS, RECEPTACLE, ELECTRICAL, COAXIAL, RADIO FREQUENCY, (SERIES TNC, (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.

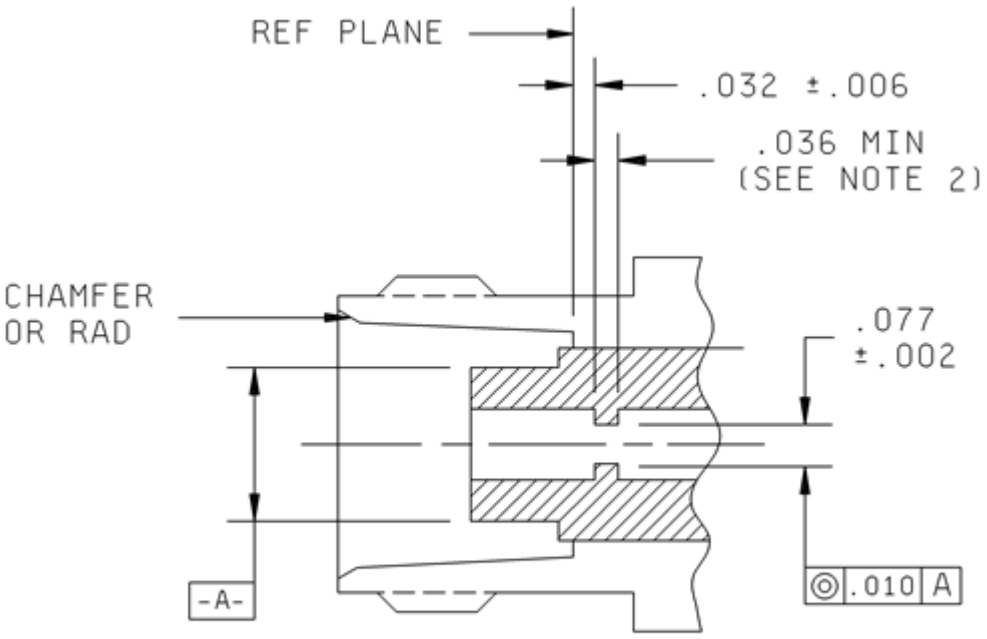


Inches	mm	Inches	mm	Inches	mm
.004	0.10	.34	8.64	.540	13.72
.075	1.90	.35	8.89	.570	14.48
.095	2.41	.436	11.07	.68	17.27
.099	2.51	.496	12.60	.70	17.78
.125	3.18	.504	12.80		
.250	6.35	.505	12.83		

NOTES:

1. Dimensions are in inches. Metric equivalents are given for information only.
2. For dimension A, see tables I and III.
3. Wrench flats (if required for assembly) are to accommodate standard wrench opening in accordance with FED-STD-H28.
4. All undimensioned pictorial representations are for reference purposes only.
5. Receptacle not recommended for use on panels with greater than .078 (1.98 mm) maximum thickness.
6. Series TNC, socket contact interface in accordance with MIL-STD-348.
7. Dimension A defines the maximum length of the connector when assembled to the appropriate cable.

FIGURE 1. General configuration.



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. Metric equivalents are given for information only.
2. Chamfer is optional.
3. All undimensioned pictorial configurations are for reference purposes only.
4. Interface in accordance with MIL-STD-348 series TNC, socket contact.

FIGURE 2. Category D captivation detail.

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

Part or Identifying Number (PIN) 1/ M39012/29-	Applicable cable 2/ M17/	Dimensions	Inch (millimeters) maximum #
Category A – Field serviceable (no special tools required) 3/			
X101	Cable group VI 6/ 60-RG142 4/ 128-RG400 5/	A	1.250 (31.75)
X102	Cable group VII 6/ 110-RG302 4/ 5/		
X103	Cable group IV 6/ 54-RG122 5/		
X018	Cable group II 6/ 113-RG316 4/ 5/		
X225	Cable group X 6/ 127-RG393 4/ 5/		
0030	220-00001		
0130	220-00002 13/		
0031	221-00001		
0131	221-00002 13/		
0032	222-00001		
0132	222-00002 13/		
0033	223-00001		
0133	223-00002 13/		
0034	224-00001		
0134	224-00002 13/		
0035	225-00001		
0135	225-00002 13/		

See notes at end of table.

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

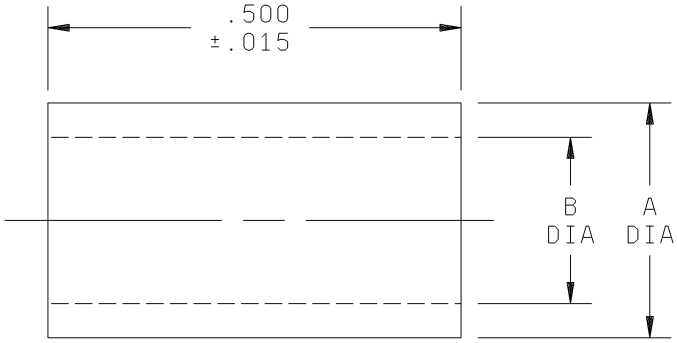
PIN 1/ M39012/29-	Applicable cable 2/ M17/	Dimensions	Inches (millimeters) maximum #
Category C – field replaceable (MIL-DTL-22520 crimp tool) See note next to applicable cable for crimp die 3/ 7/			
X010	Cable group VIA 6/ 8/ 111-RG303 4/ 5/	A	1.500 (38.10)
X011	Cable group VIB 6/ 8/ 60-RG142 4/ 128-RG400 5/		
X012	Cable group VIIA 6/ 9/ 110-RG302 4/ 5/		
X013	Cable group IV 6/ 10/ 54-RG122 5/		
X014	Cable group VIIB 6/ 9/ 90-RG71 5/		
X022	Cable group IIA 6/ 11/ 113-RG316 4/ 5/		
X023	Cable group V 6/ 10/ 95-RG180 5/		
Category D – Field replaceable – Defined piece part 3/ 7/ 12/			
X501	Cable group IV 6/ 54-RG122 5/	A	1.468 (37.31)

See notes at end of table.

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

PIN 1/ M39012/29-	Applicable cable 2/ M17/	Dimensions	Inches (millimeters) maximum #
Category D – Field replaceable – Defined piece part 3/ 7/ 12/			
X502	Cable group V 6/ 95-RG180 4/ 5/	A	1.234 (31.35)
X503	Cable group VIB 6/ 60-RG142 4/ 128-00001 5/		
X504	Cable group VIA 6/ 111-RG303 4/ 5/		

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/ 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.
5/ Cable to be used when performing test requiring cable except as in 5/ and 7/.
6/ Cables that are not 50-ohm cables in this cable group, when attached to the specified connectors, VSWR, RF leakage and insertion loss are not applicable.
7/ These connectors are assembled using the applicable crimp tool, to the specified cables stripped as shown on figure 4.
8/ M22520/5-19 closure B or M22520/5-05 closure A. M22520/5-11 closure A. M22520/5-57 closure A.
9/ M22520/5-19 closure A or M22520/5-07 closure A. M22520/5-13 closure A. M22520/5-59 closure A.
10/ M22520/5-41 closure B or M22520/5-05 closure B. M22520/5-09 closure A.
11/ M22520/5-35 closure B or M22520/5-03 closure A.
12/ Complete connector assembly shall consist of a body, center contact, ferrule and assembly instructions.
13/ Armored cable.
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.

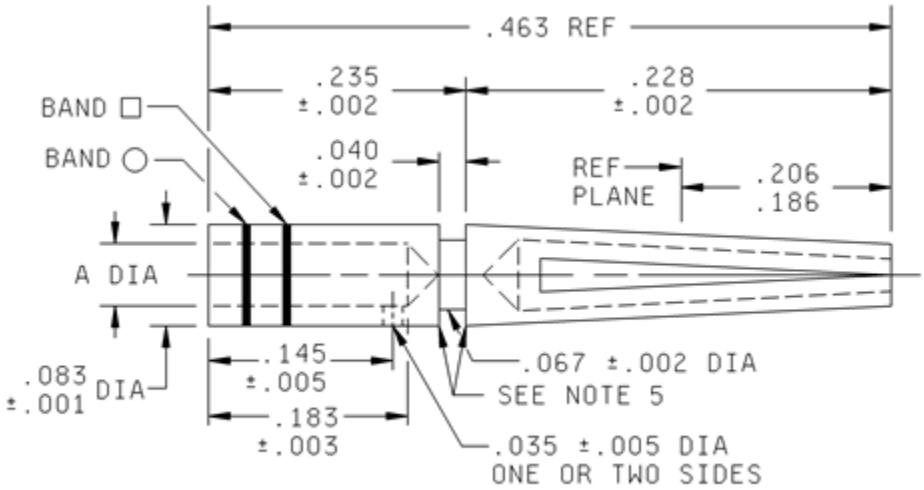


CRIMP FERRULE

Dash number	Ferrule number 1/	A ± 0.003	B ± 0.003	Basic crimp tool 2/	Crimp die or positioner M22520/5
X501 X502	29-50	0.212	0.175	M22520/5-01	05, 41 Closure B or 9 Closure A
X503	29-51	0.250	0.220		05, 11, 57 Closure A or 19 closure B
X504	29-52	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 and ferrule dimensions for category D only.



CENTER CONTACT

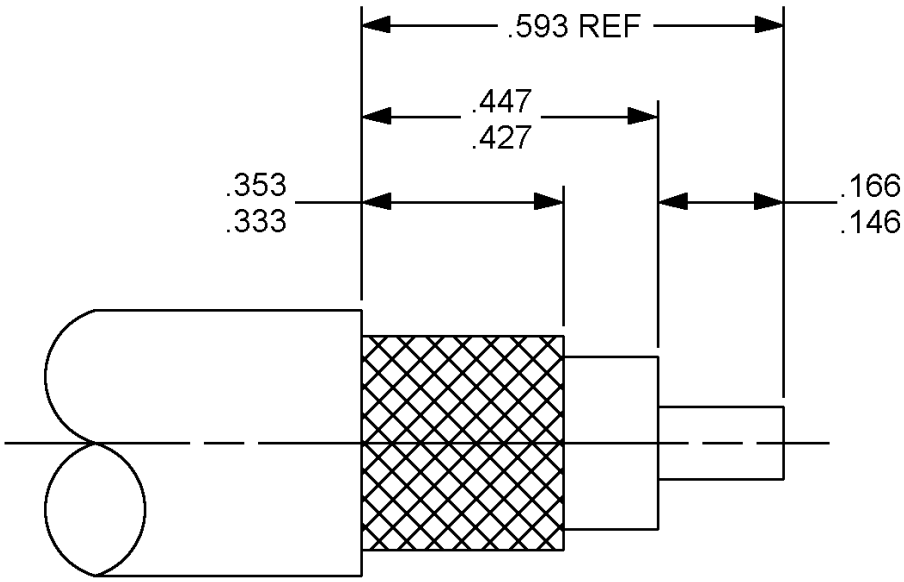
Inches	mm	Inches	mm	Inches	mm
.001	0.03	.033	0.84	.145	3.68
,002	0.05	.035	0.89	.175	4.45
.003	0.08	.040	1.02	.183	4.65
.005	0.13	.043	1.09	.206	5.23
.015	0.38	.067	1.70	.228	5.79
.017	0.43	.083	2.11	.235	5.97
				.463	11.76

Dash No.	Contact No. 1/	A +0.001 -0.002	Basic crimp tool 2/	Crimp die or positioner	Crimp Tensile min. (N)	Color band □	Color band ○
X501	29-12	0.033	M22520/1-01	M22520/1-12	10 lbs. (44.48)	Orn	Green
X502	29-11	0.017			6 lbs. (26.69)	Blue	
X503 X504	29-10	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. Metric equivalents are given for information only.
2. Contact material shall be copper beryllium. Connectors supplied with phosphor bronze contacts are no longer acceptable for Government use.
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 copyright is reproduced herein with the express permission of the copyright owner.
5. .003 inch maximum break.
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.



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. 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:

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: Not applicable.

Torque – 2 inch-pounds (.22 Nm), maximum.

Coupling proof torque: Not applicable.

Inspection conditions:

Coupling torque: 4 – 6 inch-pounds ((0.51 Nm to 0.67 Nm).

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 µm).

Hermetic seal: Not applicable.

Leakage: Not applicable.

Air pressure: 30 Lbf/in^2.

Duration: 30 seconds, minimum.

Insulation resistance: MIL-STD-202-302, 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): MIL-STD-202-101, test condition B.

Voltage standing wave ratio (VSWR): From 500 to 11 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 1.02 + .003 F (F in GHz).

Item 16- VSWR shall be less than 1.02 + .003 F (F in GHz).

Second step of VSWR checkout procedure - VSWR shall be less then 1.06 + .007 F (F in GHz).

Group B inspection - VSWR shall be less than 1.05 + .005 F (F in GHz).

Qualification and group C inspection - VSWR shall not exceed 1.10.

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:

	Initial	After environment
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: MIL-STD-202-301, 1,500 volts rms minimum at sea level.

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

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

Thermal shock: MIL-STD-202-107, 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: MIL-STD-202-106. No measurements at high humidity. Insulation resistance shall be at least 200 megaohms 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 (177.92 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: -60 dB minimum, tested at a frequency between 2 and 3 GHz.

Insertion loss: .18 dB maximum tested at 9 GHz.

$\sqrt{.06 \quad F\ (GHz)}$ dB max tested at 3 GHZ to 6 GHz.

PIN: M39012/29 - (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 of 2/ any of the following connectors	Qualifies the following connectors
I	M39012/ 27-X101 27-X103 27-X018 28-X101 28-X103 28-X018 29-X101 29-X103 29-X018	M39012/ 27-X101 27-X002 27-X103 27-X117 27-X018 28-X101 28-X102 28-X103 28-X117 28-X018 29-X101 29-X102 29-X103 29-X117 29-X018
II	27-X002 28-X102 29-X102	27-X002 28-X102 29-X102
III	27B0005 27B0006 27B0008 27B0015 27B0016 27B0020 28B0005 28B0006 28B0008 28B0015 28B0016 28B0020 29B0005 29B0006 29B0008 29B0015 29B0016 29B0020	27B0005 27B0006 27B0007 27B0008 27B0009 27B0015 27B0016 27B0019 27B0020 28B0005 28B0006 28B0007 28B0008 28B0009 28B0015 28B0016 28B0019 28B0020

See notes at end of table.

TABLE II. Group qualification – Continued. 1/

Group	Submission and qualification of 2/ any of the following connectors	Qualifies the following connectors
III		29B0005 29B0006 29B0007 29B0008 29B0009 29B0015 29B0016 29B0019 29B0020
IV	27B0007 27B0009 27B0019 28B0007 28B0009 28B0019 29B0007 29B0009 29B0019	27B0007 27B0009 27B0019 28B0007 28B0009 28B0019 29B0007 29B0009 29B0019
V	27-X010 27-X011 27-X013 27-X022 28-X010 28-X011 28-X013 28-X022 29-X010 29-X011 29-X013 29-X022	27-X010 27-X011 27-X012 27-X013 27-X014 27-X022 28-X010 28-X011 28-X012 28-X013 28-X014 28-X022 29-X010 29-X011 29-X012 29-X013 29-X014 29-X022

See notes at end of table.

TABLE II. Group qualification – Continued. 1/

Group	Submission and qualification of any of the following connectors 2/	Qualifies the following connectors
VI	27-X012 27-X014 27-X021 28-X012 28-X014 29-X012 29-X014	27-X012 27-X014 28-X012 28-X014 29-X012 29-X014
VII	29-X501 29-X503 29-X504	29-X501 29-X502 29-X503 2-X504
VIII	29-X502	29-X502

1/ If a connector manufacturer produces a connector which meets all the requirements for two or more connector PINs (within the same series), the manufacturer may receive qualification approval for two or more connector PINs qualifying the one connecter. 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 – non-field replaceable (special tools may be required). 1/

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

PIN 2/ 3/ M39012/29B	Applicable Cable M17/ 4/	Dimensions	Inches (millimeters) maximum #
0005	28-RG058 5/	A	1.500 (38.10)
0006	060-RG142 5/ 7/ 128-RG400		
0007	29-RG59 5/ 6/ 030-RG062 97-RG210		
0008	54-RG122 5/		
0009	90-RG71 5/ 6/		
0015	111-RG303 5/ 7/		
0016	084-RG223 5/		
0019	110-RG302 5/ 6/ 7/		
0020	113-RG316 5/ 7/ 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.

TABLE IV. Supersession data. 1/ 2/

Preferred PIN M39012/29	Superseded PINs or superseded type designation
-0012	M39012/29-0021
-0101	M39012/29-0001 - M39012/29-0004, M39012/29-0104
-0102	M39012/29-0002 - M39012/29-0017, M39012/29-0117
-0103	M39012/29-0003
B0005	M39012/29-0005
B0006	M39012/29-0006
B0007	M39012/29-0007
B0008	M39012/29-0008
B0009	M39012/29-0009
B0015	M39012/29-0015
B0016	M39012/29-0016
B0019	M39012/29-0019
B0020	M39012/29-0020

1/ The superseded PIN or the type designation is for reference only. Where a superseded PIN or type designation is not given, none was assigned or will be assigned. The PIN M39012/29-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 1/	Category C dash number	Category A dash number	Category D dash number
B0005	0010	0101	0504
B0006	0011	0101	0503
B0007	0012	0102	---
B0008	0013	0103	0501
B0009	0014	0102	---
B0015	0010	0101	---
B0016	0011	0101	---
B0019	0012	0102	---
B0020	0022	0018	---

1/ 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-202-101
MIL-STD-202-106
MIL-STD-202-107
MIL-STD-202-204
MIL-STD-202-213
MIL-STD-202-301
MIL-STD-202-302
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 5935-2016-206)

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

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