INCH-POUND

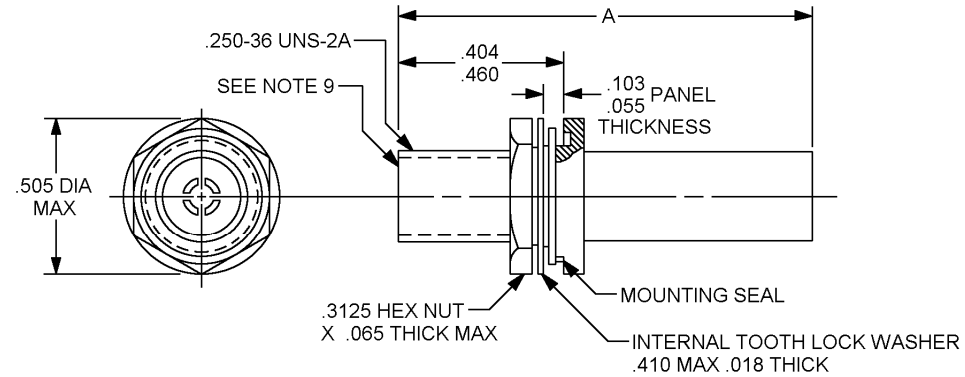
MIL-PRF-39012/59G
9 August 2006
SUPERSEDING
MIL-PRF-39012/59F
27 January 1992

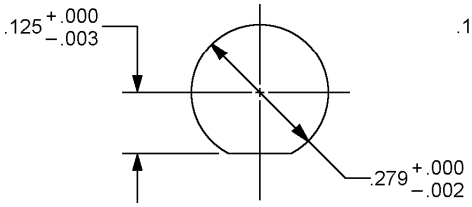
PERFORMANCE SPECIFICATION SHEET

CONNECTORS, RECEPTACLES, ELECTRICAL, COAXIAL, RADIO FREQUENCY, (SERIES SMA (CABLED) – SOCKET CONTACT, JAM NUT MOUNTED CLASS 2)

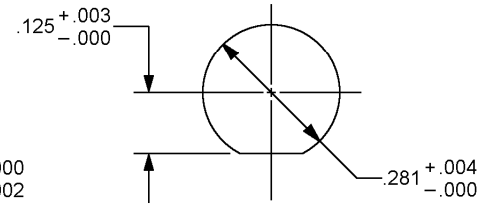
This specification is approved for use by all Departments and Agencies of the Department of Defense.

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





BODY "D"
MOUNTING SURFACE



RECOMMENDED
MOUNTING HOLE

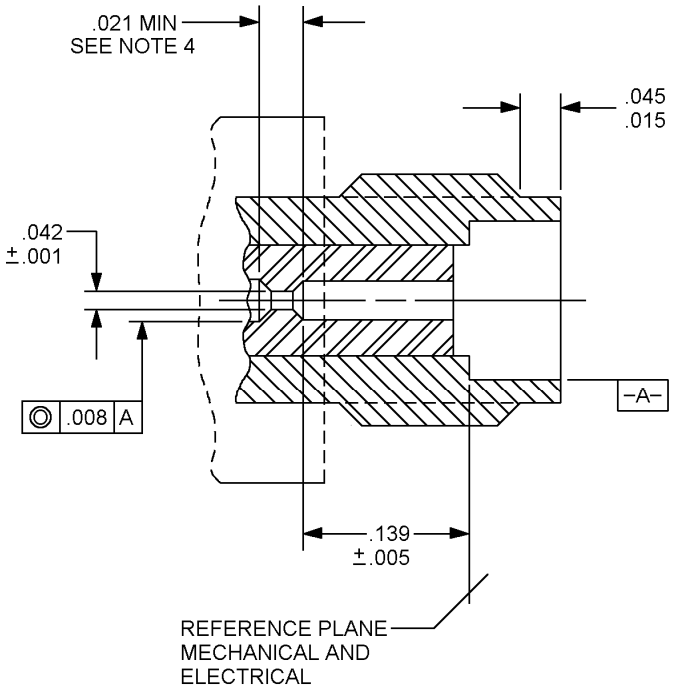
MARKING IMPLEMENTATION DATE, CATEGORY B, SEE TABLE VII

Inches	mm	Inches	mm
.002	0.05	.250	6.35
.003	0.08	.279	7.09
.004	0.10	.281	7.14
.018	0.46	.3125	7.94
.055	1.40	.404	10.41
.065	1.65	.410	11.68
.103	2.62	.505	12.83
.125	3.18		

FIGURE 1. General configuration.

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for information only.
3. For dimension A, see tables I and V.
4. Dimension .505 inch (12.83 mm) is the largest overall diameter of the connector.
5. Wrench flats are to accommodate standard wrench opening in accordance with FED-STD-H28, appendix 10.
6. Dimension A defines the overall length of the connector when assembled to the cable.
7. All undimensioned pictorial configurations are for reference purposes only.
8. Unless otherwise specified, tolerance is ±.005 inch (0.13 mm).
9. Series SMA, socket contact interface, in accordance with MIL-STD-348.

FIGURE 1. General configuration – Continued.



CATEGORY D

Inches	mm	Inches	mm
.001	0.03	.021	0.53
.005	0.13	.042	1.07
.008	0.20	.045	1.14
.015	0.38	.139	3.53

NOTES:
1. Dimensions are in inches. Metric equivalents are given for information only.
2. Slitting of inner contact optional.
3. Metric equivalents are given for general information only.
4. Chamfer is optional, if chamfer is used put on a 30° maximum.

FIGURE 2. Mating dimensions for socket termination, category D only.

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

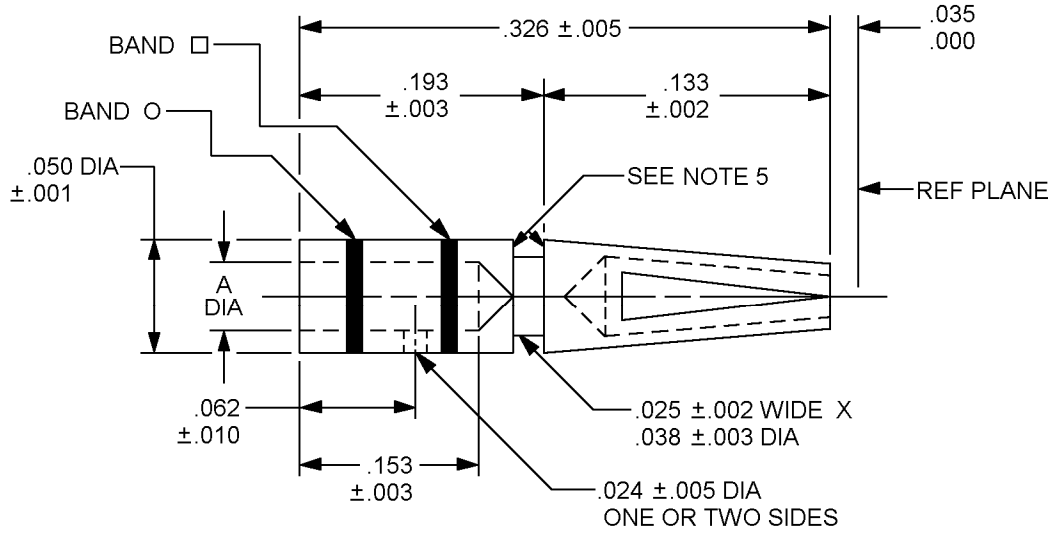
Dash No. 1/ @	# Applicable cable group from MIL-PRF-39012, appendix B	Dimensions	Inches 2/ (millimeters) Maximum
CATEGORY A – FIELD SERVICEABLE (NO SPECIAL TOOLS REQUIRED) 3/			
3006 4006	Cable group I M17/93-RG178 4/ 5/	A	.960 (24.38)
3007 4007	Cable group II M17/113-RG316 4/ 5/		
3008 4008	Cable group IV M17/54-RG122 4/ 5/		
3009 4009	Cable group VI M17/84-RG223 4/ M17/128-RG400 5/ M17/60-RG142 6/		
3010 * 4010 *	Cable group VI M17/111-RG303 4/ 5/		
3030 4030	Cable group III M17/152-00001 4/ 5/		

See notes at end of table.

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

Dash No. 1/ @	# Applicable cable group from MIL-PRF-39012, appendix B	Dimensions	Inches 2/ (millimeters) Maximum
CATEGORY C – FIELD REPLACEABLE (MIL-C-22520/5 CRIMP TOOL) SEE NOTE NEXT TO APPLICABLE CABLE GROUP FOR CRIMP DIE 7/			
3025 4025	Cable group I 8/ M17/93-RG178 4/ 5/	A	1.125 (28.58)
3026 4026	Cable group IIa 9/ M17/113-RG316 4/ 5/		
3027 4027	Cable group IV 10/ M17/54-RG122 4/ 5/		
3028 4028	Cable group VIb 11/ M17/84-RG223 4/ M17/128-RG400 5/ M17/60-RG142 6/		
3029 4029	Cable group VIa 11/ M17/28-RG058 4/ M17/111-RG303 5/		
CATEGORY D – FIELD REPLACEABLE – DEFINED PIECE PARTS 4/ 12/ 13/			
3502 4502	Cable group VIb M17/60-RG142 4/ 6/ M17/128-RG400 5/	A	1.265 (32.13)

1/ These connectors have captivated center contacts.
2/ Dimensions are in inches. Metric equivalents are given for information only.
3/ All corrosion resistant steel bodied connectors which are designed to be assembled to the outer conductor using solder shall be gold plated in accordance with ASTM B488, type II, code C, class 1.27.
4/ Cable to be used when performing tests except as in note 6/.
5/ Preferred cable.
6/ Cable to be used for +200°C temperature cycling test.
7/ These connectors are assembled, using the applicable crimp tool, to the specified cables stripped as shown on figures 3 and 4.
8/ Preferred die M22520/5-33 closure B, alternate die M22520/5-03 closure B.
9/ Preferred die M22520/5-35 closure B, alternate die M22520/5-03 closure A.
10/ Preferred die M22520/5-41 closure B, alternate die M22520/5-05 closure B or -09 closure A.
11/ Preferred die M22520/5-19 closure B, alternate die M22520/5/-05 closure A or -11, 57 closure A.
12/ Complete connector assembly shall consist of a body, center contact, ferrule and assembly instructions.
13/ Not for use in Army equipment.
The latest version of each cable shall be applicable.
* These parts are inactive for new design, new designs should procure to dash numbers X009 and X109. These dash numbers use the same cable group (VI).
@ Connectors mate with connectors of the same material; i.e., “3XXX” series dash numbers mate only with other “3XXX” series connectors and “4XXX” series connectors with other “4XXX” series connectors.



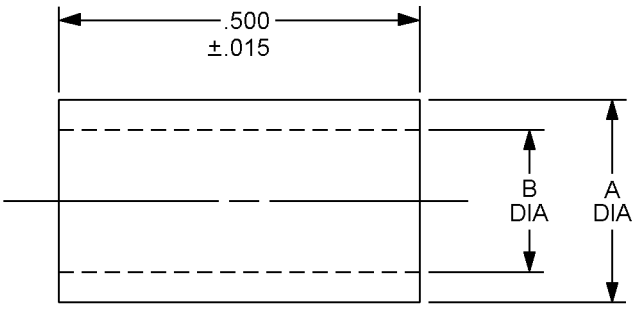
CENTER CONTACT

Inches	mm	Inches	mm	Inches	mm
.001	0.03	.035	0.89	.193	4.90
.002	0.05	.038	0.97	.220	5.59
.003	0.08	.041	1.04	.250	6.35
.005	0.13	.050	1.27	.326	8.28
.010	0.25	.062	1.57	.500	12.70
.015	0.38	.133	3.38		
.024	0.61	.153	3.89		

Dash No.	Contact No. 1/	A (inches)	Basic crimp tool 2/	Crimp die or positioner	Crimp tensile minimum	Color band □	Color band 0
3502 4502	59-10	.041 ±.001	M22520/1-01	Solder or M22520/1-15	4 pounds (17.79 N)	Red	Maroon

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

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



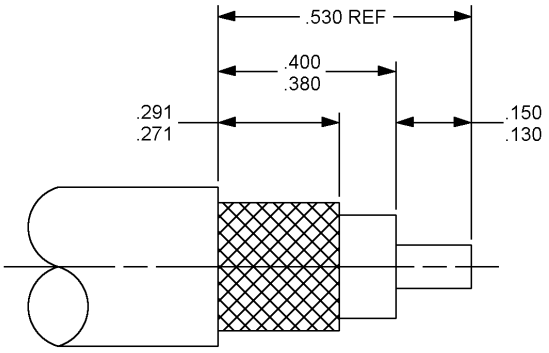
CRIMP FERRULE

Dash No.	Ferrule No. 1/	A	B	Basic crimp tool 2/	Crimp die or positioner M22520/5-
3502 4502	59-50	.250 ±.003	.220 ±.003	M22520/5-01	-11, -05, -57 closure A and -19 closure B

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 equivalents are given for information only.
3. Crimp tensile test shall be in accordance with SAE-AS39029.
4. Copyright notice: All information disclosed in this specification sheet which is or may be copyrighted is reproduced herein with the express permission of the copyright owner.
5. .003 inch maximum break.
6. Color bands shall be positioned such that no coloring material enters the inspection hole.

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



Inches	mm
.130	3.30
.150	3.81
.271	6.88
.291	7.39
.380	9.65
.400	10.16
.530	13.46

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 12.4 GHz.

Voltage rating: The voltage rating shall be as specified in table II.

TABLE II. Voltage rating.

Cables	Voltage max. (sea level) V rms	Voltage max. at 70,000 ft (4.437 kPa) V rms
Cable group I	170	45
Cable group II, IIa, III, IV	250	65
Cable group VI, VIa, VIb	335	85

Temperature rating: -65°C to +165°C.

REQUIREMENTS:

Dimensions and configuration: See figure 1 and MIL-STD-348.

Force to engage and disengage:

Longitudinal force: Not applicable.

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

Coupling proof torque: Not applicable.

Inspection conditions: For each test of threaded coupling connector where the test is performed on mated pairs, the pairs shall be torqued to 7 to 10 inch-pounds (9.49 to 13.56 N).

Mating characteristics: See MIL-STD-348 and figure 2 for dimensions.

Center contact (socket): Test pin see figure 5.

Oversize test pin: .0375 +.0001 inch (0.952 + 0.002 mm).

Test pin finish: 16 microinches (0.406 µm).

Insertion depth: .030/.045 inch (0.76/1.14 mm).

Number of insertions: 3

Insertion force test:

Steel test pin diameter: .0370 +.0001 inch (0.940 + 0.002 mm).

Insertion depth: .050/.075 inch (1.27/1.90 mm).

Test pin finish: 16 microinches (0.406 µm).

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

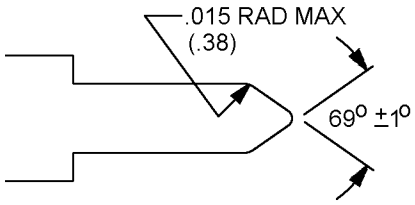
Withdrawal force test:

Steel test pin diameter: .0355 -.0001 inch (0.902 - 0.002 mm).

Insertion depth: .050/.075 inch (1.27/1.90 mm).

Test pin finish: 16 microinches (0.406 µm).

Withdrawal force: 1 ounce (.28 N), minimum.



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

FIGURE 5. Test pin dimensions.

Hermetic seal: Not applicable.

Leakage (pressurized connectors): Not applicable.

Insulation resistance: In accordance with MIL-STD-202, method 302, test condition B, 5,000 megohms minimum.

Center contact retention:

Axial force: 6 pounds (26.69 N), minimum axial force. Applicable to captivated center contacts only.

Radial torque: Not applicable.

Corrosion (salt spray): In accordance with MIL-STD-202 method 101, test condition B.

Voltage standing wave ratio (VSWR): From 500 MHz to 12.4 GHz, or approximately 80 percent of the upper cutoff frequency of the cable, whichever is lower.

Cable group	VSWR
I	1.20 + 0.025 (F) GHz
II, IIa, III, IV	1.15 + 0.02 (F) GHz
VI, VIa, VIb	1.15 + 0.01 (F) GHz

Swept frequency VSWR test setup:

Item 6: VSWR shall be less than 1.025 +.002F (F in GHz).

Item 16: VSWR shall be less than 1.025 +.002F (F in GHz).

Second step of VSWR checkout procedure – VSWR shall be less than 1.080 +.005F (F in GHz).

Group B inspection: Use step 5, long cable method.

Qualification and group C inspection: Use step 5, long cable method.

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

Contact resistance: In milliohms, maximum.

	Initial	After environment
Center contact:	3.0	4.0
Outer contact:	2.0	Not applicable
Braid to body:	.5	Not applicable

NOTE: Five milliohms are permissible on passivated steel bodied connectors.

Dielectric withstanding voltage at sea level: In accordance with MIL-STD-202, method 301.

Cable group	V rms
I	500
II, IIa, III, IV	750
VI, VIa, VIb	1,000

Vibration, high frequency: In accordance with MIL-STD-202, method 204, test condition D. No discontinuity permitted.

Shock: In accordance with MIL-STD-202, method 213, test condition I. No discontinuity permitted..

Thermal shock: In accordance with MIL-STD-202, method 107, 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 V).

Moisture resistance: In accordance with MIL-STD-202, method 106. No measurements at high humidity. Insulation resistance shall be at least 200 megohms within 5 minutes after removal from humidity.

Corona level:

Altitude: 70,000 feet (4.437 kPa).

Cable group	Volts, min.
I	125
II, IIa, III, IV	190
VI, VIa, VIb	250

RF high potential withstanding voltage:

Voltage and frequency: Tested at a frequency from 5 to 7.5 MHz.

Leakage current: Not applicable.

Cable group	Volts, min.
I	335
II, IIa, III, IV	500
VI, VIa, VIb	670

Cable retention force: The cable retention force shall be in accordance with table III.

TABLE III. Cable retention force. 1/ 2/

Cable dielectric Outer diameter	Pounds, min. (N)	
	Single braid	Double braid
Inches, max. (mm)		
.036 (0.91)	10 (44.48)	N/A
.067 (1.70)	20 (88.96)	N/A
.110 (2.79)	30 (133.45)	N/A
.122 (3.10)	40 (177.93)	45 (200.17)

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

Coupling mechanism retention force: Not applicable.

RF leakage: -60 dB minimum, tested at frequency between 2 and 3 GHz.

RF insertion loss: .06 $\sqrt{F\ (GHz)}$ dB maximum tested at 3 and 6 GHz.

Group qualification: See table IV.

Part or Identifying Number (PIN): M39012/59 (dash number from table I or "B" number from table V).

TABLE IV. Group qualification and retention testing. 1/

Group	Submission and qualification of any of the following connectors 2/ M39012/	Qualifies the following connectors M39012/
I	57-X009 58-X009 59-X009	57-X006 X007 X008 X009 X010 X030 58-X006 X007 X008 X009 X010 X030 59-X006 X007 X008 X009 X010 X030

See notes at end of table.

TABLE IV. Group qualification and retention testing - Continued. 1/

Group	Submission and qualification of any of the following connectors 2/ M39012/	Qualifies the following connectors M39012/
II	57BX015 58BX015 59BX015	57BX011 BX012 BX013 BX014 BX015 BX016 BX017 58BX011 BX012 BX013 BX014 BX015 BX016 BX017 59BX011 BX012 BX013 BX014 BX015 BX016 BX017
III	57BX022 58BX022 59BX022	57BX018 BX019 BX020 BX021 BX022 BX023 BX024 58BX018 BX019 BX020 BX021 BX022 BX023 BX024 59BX018 BX019 BX020 BX021 BX022 BX023 BX024

See notes at end of table.

TABLE IV. Group qualification and retention testing - Continued. 1/

Group	Submission and qualification of any of the following connectors 2/ M39012/	Qualifies the following connectors M39012/
IV	57-X028 58-X028 59-X028	57-X025 -X026 -X027 -X028 -X029 58-X025 -X026 -X027 -X028 -X029 59-X025 -X026 -X027 -X028 -X029
V	57-X502 58-X502 59-X502	57-X502 58-X502 59-X502

1/ Individual connectors other than listed are self qualifying only.

2/ Qualification of connectors qualifies connectors of the same body material and finish only.

X Denotes material.

NOTES:

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.

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 V. Category B – Non-Field replaceable (special tools may be required). 1/

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

PIN 2/ 3/ M39012/59B	Applicable cable # M17/	Dimensions	Inches (millimeters) 7/ Maximum
3011 4/ 5/ 4011 4/ 5/	93-RG178 * 169-00001 %	A	1.265 (32.13)
3012 4/ 5/ 4012 4/ 5/	119-RG174 173-00001 % 113-RG316 * 173-00001 %		
3013 4/ 5/ 4013 4/ 5/	54-RG122 * 157-00001 %		
3014 4/ 5/ 4014 4/ 5/	28-RG058 * 155-00001 %		
3015 4/ 5/ 4015 4/ 5/	60-RG142 * @ 158-00001 %		
3016 4/ 5/ 4016 4/ 5/	84-RG223 * 167-00001 %		
3017 4/ 5/ 4017 4/ 5/	111-RG303 * 170-00001 %		
3018 6/ 4018 6/	93-RG178 * 169-00001 %		
3019 6/ 4019 6/	119-RG174 173-00001 % 113-RG316 * 173-00001 %		
3020 6/ 4020 6/	54-RG122 * 157-00001 %		
3021 6/ 4021 6/	28-RG058 * 155-00001 %		
3022 6/ 4022 6/	60-RG142 * @ 158-00001 %		
3023 6/ 4023 6/	84-RG223 * 167-00001 %		
3024 6/ 4024 6/	111-RG303 * 170-00001 %		

See notes at end of table.

TABLE V. Category B – Non-Field replaceable (special tools may be required) – Continued. 1/

1/ For maintenance replacements for category B, see table VI.
2/ For cross-reference of dash number to superseded PIN or type designation, see table VII.
3/ All corrosion resistant steel bodied connectors which are designed to be assembled to the outer conductor using solder shall be gold plated in accordance with ASTM B488, type II, code C, class 1.27.
4/ These connectors will be furnished with non-captive center contacts by 1 January 1985.
5/ Inactive for new design.
6/ These connectors have captive center contacts.
7/ Dimensions are in inches. Metric equivalents are given for information only.
The latest version of each cable shall be applicable.
* Cable to be used when performing tests requiring cable except as in note @.
@ Cable to be used for the +200°C thermal shock tests.
% Caution is directed to the application of this cable above 400 MHz. Attenuation is tested only at 400 MHz. SRL and power handling capabilities are not stipulated herein.

NOTE: Connectors mate with connectors of the same material only; Example: M39012/59-3001 mates with M39012/55-3001, and M39012/59-4001 mates with M39012/55-4001.

TABLE VI. Maintenance replacements for category B.

Category B number *	Category C dash number	Category A dash number	Category D dash number
BX011	X025	X006	--------
BX012	X026	X007	--------
BX013	X027	X008	--------
BX014	X029	X009	--------
BX015	X028	X009	X502
BX016	X028	X009	--------
BX017	X029	X010	--------
BX018	X025	X006	--------
BX019	X026	X007	--------
BX020	X027	X008	--------
BX021	X029	X009	--------
BX022	X028	X009	X502
BX023	X028	X009	--------
BX024	X029	X010	--------

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

X Denotes material.

The material of the item shall be the same material as the item being replaced. Example: 55-3011 (corrosion resistant steel) replaces 55-3025.

TABLE VII. Cross reference of PIN.

PIN M39012/59B 1/	Superseded PIN M39012/59-
BX011	X011
BX012	X012
BX013	X013
BX014	X014
BX015	X015
BX016	X016
BX017	X017
BX018	X018
BX019	X019
BX020	X020
BX021	X021
BX022	X022
BX023	X023
BX024	X024

1/ The 'B' PIN is required marking for connectors manufactured after 3 April 1987. The connectors that are in stock or distribution that were previously qualified and marked with the old PIN shall also be considered acceptable for Government use until stock is purged. (Applies to category 'B' PIN changes only; M39012/XXBXXXX).

The material of the item shall be the same material as the item being replaced. Example: 55-3011 (corrosion resistant steel) replaces 55-3025.

Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

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

MIL-STD-348
MIL-DTL-22520
SAE-AS39029
MIL-STD-202
FED-STD-H28
ASTM B488
MIL-C-22520/5

CONCLUDING MATERIAL

Custodians:
Army - CR
Navy - EC
Air Force - 11
NASA - NA
DLA - CC

Preparing activity:
DLA - CC

(Project 5935-2006-005)

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

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