

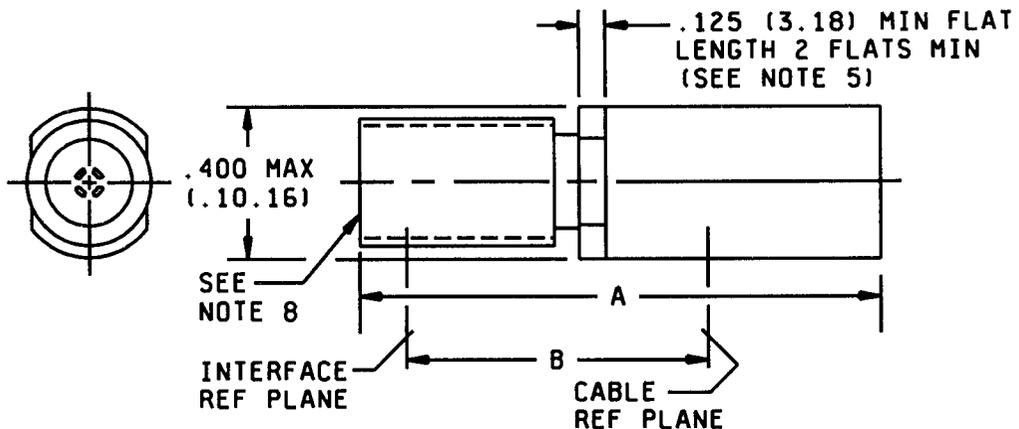
NOTE: The document identifier and heading has been changed on this page to reflect that this is a performance specification. There are no other changes to this document. The document identifier on subsequent pages has not been changed, but will be changed the next time this document is revised.

PERFORMANCE SPECIFICATION

CONNECTORS, PLUG, ELECTRICAL, COAXIAL, RADIO FREQUENCY, SERIES SMA (CABLED, SOCKET, CLASS 2, SEMIRIGID CABLE)

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 the issue of the following specification listed in that issue of the Department of Defense Index of Specifications and Standards (DODISS) specified in the solicitation: MIL-PRF-39012.



NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Metric equivalents are in parentheses.
4. Receptacle recommended for component part use and for use on panels with a .080 (2.03 mm) maximum thickness.
5. Wrench flats to accommodate standard wrench in accordance with FED-STD-H28, appendix 10.
6. All undimensioned pictorial configurations are for reference purposes only.
7. Dimension A defines the length of connector when assembled to the cable.
8. Series SMA, socket contact interface in accordance with MIL-STD-348.
9. All threads shall conform to FED-STD-H28.

FIGURE 1. General configuration.

TABLE I. Dash number and applicable cable.

Dash number M39012/81-	Applicable cable <u>1/</u>	Dimension A		Dimension B
		Before assembly	After assembly	
CATEGORY A - FIELD SERVICEABLE <u>2/</u> (NO SPECIAL TOOLS REQUIRED)				
3009 4009	M17/133-RG405* M17/133-00001 through M17/133-00011	.518 (13.16 mm) maximum	.505 (12.83 mm) maximum	Not applicable
3010 4010	M17/130-RG402* M17/130-00001 through M17/130-00007	.518 (13.16 mm) maximum	.505 (12.83 mm) maximum	Not applicable
CATEGORY E - FIELD REPLACEABLE <u>3/ 4/</u> (STANDARD ASSEMBLY TOOL KIT)				
3005 <u>5/</u>	M17/133-RG405* M17/133-00001 through M17/133-00011	Not applicable	.850 (21.59 mm) maximum	Not applicable <u>6/</u>
3006 <u>5/</u>	M17/130-RG402* M17/130-00001 through M17/130-00007	Not applicable	.850 (21.59 mm) maximum	Not applicable <u>6/</u>
3007 <u>2/</u> 4007 <u>2/</u>	M17/133-RG405* M17/133-00001 through M17/133-00011	Not applicable	.850 (21.59 mm) maximum	Not applicable <u>6/</u>
3008 <u>2/</u> 4008 <u>2/</u>	M17/130-RG402* M17/130-00001 through M17/130-00007	Not applicable	.850 (21.59 mm) maximum	Not applicable <u>6/</u>
3011 <u>2/</u> 4011 <u>2/</u>	M17/133-RG405* M17/133-00001 through M17/133-00011	Not applicable	.550 (13.97 mm) maximum	.275 ±.010
3012 <u>2/</u> 4012 <u>2/</u>	M17/130-RG402* M17/130-00001 through M17/130-00007	Not applicable	.550 (13.97 mm) maximum	.275 ±.010

See footnotes at end of table.

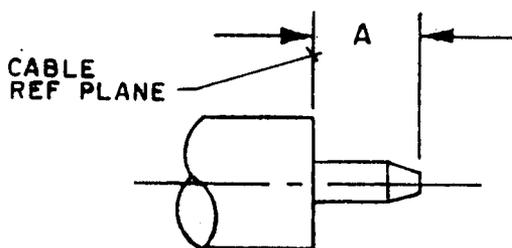
TABLE I. Dash number and applicable cable - Continued.

Dash number	Applicable cable	Tool number	Positioning dies	Locator pins	Crimp dies	Dimension A		Dimension B
						8/ Before crimping	After crimping	
M39012/81-	1/			7/	M22520/5			
CATEGORY F - FIELD REPLACEABLE (MIL-C-22520 CRIMP TOOL)						2/		
3207 7/ 9/ 4207 7/ 9/	M17/133-RG405* through M17/133-00011	M22520/36-01	M22520/36-02	M22520/36-05 or M22520/36-17 or M22520/36-22	---	.750 (19.05 mm) maximum	.620 (15.7 mm) maximum	Not applicable 6/
3208 9/ 4208 9/	M17/130-RG402* through M17/130-00007		M22520/36-03					
3210 4210	M17/130-RG402* through M17/130-00007	M22520/5-01	---	---	-05 or -41 cavity B	.691 (17.55 mm) maximum	.691 (17.55 mm) maximum	Not applicable 6/
3211 9/ 4211 9/	M17/133-RG405* through M17/133-00011	M22520/36-01	M22520/36-02	M22520/36-05 or M22520/36-17 or M22520/36-22	---	.583 (14.81 mm) maximum	.505 (12.82 mm) maximum	To be determined
3212 9/ 4212 9/	M17/130-RG402* through M17/130-00007		M22520/36-03					
3213 4213	M17/133-RG405* through M17/133-00011	M22520/5-01	---	---	-05 or -41 cavity B	.511 (12.98 mm) maximum	.511 (12.98 mm) maximum	Not applicable 6/

See footnotes at end of table.

TABLE I. Dash number and applicable cable - Continued.

- * Cable to be used when performing tests requiring cable.
- 1/ MIL-C-17 cables are specified by the basic number. The latest version of each cable shall be applicable.
- 2/ These connectors have captivated center contacts.
- 3/ Kit number - Omni Spectra T-200, Amphenol 901-2500, or equivalent.
- 4/ All corrosion-resistant steel-bodied connectors shall be gold-plated in accordance with MIL-G-45204, type II, class 1, at least in the area of solder attachment.
- 5/ Inactive for new design. Not for Air Force or Navy use.
- 6/ This dimension is furnished in manufacturers assembly instruction.
- 7/ The locators required shall be indicated in the assembly instructions.
- 8/ The dimension A before crimping determines the closeness of a bend in the cable to the rear of the connector.
- 9/ Not for Army use. For OEM use only.



Cable	Dimension "A"	
	Min	Max
M17/130-RG402 M17/130-00001 through M17/130-00007	.080 (2.03 mm)	.090 (2.29 mm)
M17/133-RG405 M17/133-00001 through M17/133-00011	.065 (1.65 mm)	.075 (1.91 mm)

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Tapering of center conductor is optional.

FIGURE 2. Cable stripping dimensions for category E and category F connectors.

ENGINEERING DATA:

Nominal impedance: 50 ohms.

Frequency range: 0 to 18 GHz.

Voltage rating: The voltage rating shall be in accordance with table II.

TABLE II. Voltage rating.

Cable	Voltage maximum (at sea level)	Voltage maximum (70,000 feet)
	<u>V rms</u>	<u>V rms</u>
M17/133-RG405 M17/133-00001 through M17/133-00011	335	85
M17/130-RG402 M17/130-00001 through M17/130-00007	500	125

Temperature rating: -65°C to +165°C.

Category F: Connectors using semirigid cables with standard stripping dimensions and using standard military assembly tools. The method of assembly of the connector to the cable shall be solderless.

REQUIREMENTS:

Dimensions and configuration: See figure 1.

Force to engage and disengage:

Longitudinal force: Not applicable.

Torque: 2 inch-pounds 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.

Mating characteristics: See MIL-STD-348 and figure 3.

Center contact (socket):

Oversize test pin: .0375 +.0001.

Test pin finish: 16 microinches.

Insertion depth: .030/.045.

Number of insertions: 3.

Insertion force test: Steel test pin diameter .0370 +.0001.

Insertion depth: .050/.075.

Test pin finish: 16 microinches.

Insertion force: 2 pounds maximum.

Withdrawal force test: Steel test pin diameter .0355 -.0001.

Insertion depth: .050/.075.

Withdrawal force: 1 ounce minimum.

Test pin finish: 16 microinches.

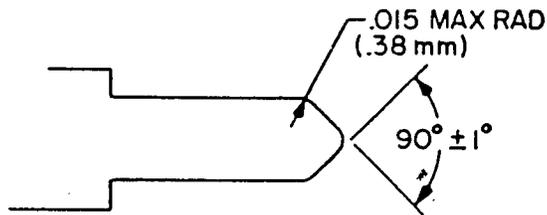


FIGURE 3. Test pin data.

Hermetic seal: Not applicable.

Leakage (pressurized connectors): Not applicable.

Insulation resistance: Method 302, test condition B, MIL-STD-202; 5,000 megohms minimum.

Center contact retention: 6 pounds minimum axial force.

Radial torque: Not applicable.

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

Voltage standing wave ratio (VSWR): From 0.5 to 18 GHz, or approximately 80 percent of upper cutoff frequency of the cable, whichever is lower.

<u>Cables</u>	<u>VSWR</u>	
	<u>Captive</u>	<u>Non-captive</u>
M17/133-RG405 M17/133-00001 through M17/133-00011	1.07 +0.01 F (GHz)	1.07 +0.008 F (GHz)
M17/130-RG402 M17/130-00001 through M17/130-00007	1.05 +0.01 F (GHz)	1.05 +0.008 F (GHz)

Swept frequency VSWR test setup:

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

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

Second step of VSWR checkout procedure: VSWR shall be less than $1.080 + .005 F$ (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:

Insertion and withdrawal force:

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):

	<u>Initial</u>	<u>After environment</u>
Center contact:	3.0	4.0
Outer contact:	2.0	Not applicable [*]
Outer cable conductor to body:	0.5 <u>1/</u>	Not applicable

Dielectric withstanding voltage at sea level: Method 301 of MIL-STD-202.

<u>Cables</u>	<u>V rms</u>
M17/133-RG405 M17/133-00001 through M17/133-00011	1,000
M17/130-RG402 M17/130-00001 through M17/130-00007	1,500

Vibration, high frequency: Method 204, test condition D, MIL-STD-202, except the method of mounting shall be approved by the qualifying activity. No discontinuity permitted.

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

Thermal shock: Method 107, test condition B, MIL-STD-202, except test high temperature shall be $+115^{\circ}\text{C}$.

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.

1/ Five milliohms is permissible for passivated steel bodied connectors only.

Corona level:

Altitude: 70,000 feet.

<u>Cables</u>	<u>Volts (minimum)</u>
M17/133-RG405	250
M17/133-00001 through M17/133-00011	
M17/130-RG402	
M17/130-00001 through M17/130-00007	375

RF high potential withstanding voltage:

Frequency: 5 MHz to 7.5 MHz

Leakage current: Not applicable.

<u>Cables</u>	<u>V rms</u>
M17/133-RG405	670
M17/133-00001 through M17/133-00011	
M17/130-RG402	
M17/130-00001 through M17/130-00007	1,000

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

TABLE III. Cable retention force.

<u>Cable</u>	<u>Pounds (minimum)</u>	<u>Torque ^{1/} inch-ounce</u>
M17/133-RG405 M17/133-00001 through M17/133-00011	30	16
M17/130-RG402 M17/130-00001 through M17-130-00007	60	55

^{1/} Torque to be applied 4 inches maximum from the end of the connector. Reverse bend not applicable.

Coupling mechanism retention force: Not applicable.

RF leakage: -90 dB minimum tested at a frequency between 2 and 3 GHz.

RF insertion loss: dB maximum = $.03 \times \sqrt{\text{freq GHz}}$. Test frequency at 9 to 12.4 GHz.

Supplemental test requirements for qualification and group C inspection for category F connectors.

Six additional connectors shall be selected from the production lot and terminated to produce three cable leads, twelve inches minimum, sixteen inches maximum. The three assemblies shall be subjected to the following tests in sequence: VSWR, thermal shock, VSWR, and cable retention.

The following exceptions to the requirements apply to this supplemental test only:

Voltage standing wave ratio (VSWR) of the cable assembly: From 0.5 to 18 GHz.

<u>Test cable assemblies</u>	<u>VSWR (initial)</u>	<u>VSWR (after thermal shock)</u>
M17/133-RG405 M17/133-00001 through M17/133-00011	1.15 +.023 F (GHz)	1.15 +.028 F (GHz)
M17/130-RG402 M17/130-00001 through M17/130-00007	1.10 +.023 F (GHz)	1.10 +.025 F (GHz)

Thermal shock: 10 cycles.

Group qualification: See table IV.

Part number: M39012/81 (dash number from table I or "B" number from table V).

Part number cross-reference: See table VI.

TABLE IV. Group qualification.

Group	Submission and qualification of any of the following dash numbers <u>1/ 2/</u>	Qualifies the following dash numbers
I	*02	*01 *02
II	*04	*03 *04
III	*06	*05 *06
IV	*08	*07 *08 *11 *12

See footnotes at end of table.

TABLE IV. Group qualification - Continued.

Group	Submission and qualification of any of the following dash numbers <u>1/</u> <u>2/</u>	Qualifies the following dash numbers
V	*10	*09 *10
VI	*208	*207 *208 *211 *212
VII	*210	*210 *215

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

2/ Qualification of connectors qualifies connectors of the same material only.

* Body material and connector requirement.

NOTE: If a connector manufacturer produces a connector that meets all the requirements for two or more connector part numbers (within the same series), the manufacturer may receive qualification approval for two or more connector part numbers 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 part number. For group qualification, the connectors must be of similar design.

TABLE V. Category B-nonfield replaceable (special tools may be required). 1/

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

M39012/81B <u>2/</u>	Applicable cable <u>3/</u>	Dimension A (maximum)
3001 <u>4/</u>	M17/133-RG405* M17/133-00001 through M17/133-00011	.850 (21.59 mm)
3002 <u>4/</u>	M17/130-RG402* M17/130-00001 through M17/130-00007	
3003 <u>5/</u> 4003 <u>5/</u>	M17/133-RG405* M17/133-00001 through M17/133-00011	
3004 <u>5/</u> 4004 <u>5/</u>	M17/130-RG402* M17/130-00001 through M17/130-00007	

See footnotes at end of table.

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

* Cable to be used when performing tests requiring cable.

- 1/ Dimension B shown on figure 1 is not applicable to these connectors.
- 2/ 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 MIL-G-45204, type II, class 1.
- 3/ MIL-C-17 cables are specified by the basic number. The latest version of each cable shall be applicable.
- 4/ Inactive for new design.
- 5/ These connectors have captivated center contacts.

TABLE VI. Cross-reference of part numbers.

Replacement part number M39012/81 1/	Substitute for part number or type designation
B3001	M39012/81-3001
B3002	M39012/81-3002
B3003	M39012/81-3801, -3803, -3003
B3004	M39012/81-3802, -3804, -3004
B4003	M39012/81-4801, -4803, -4001, -4003
B4004	M39012/81-4802, -4804, -4002, -4004
-3007	M39012/81-3805, -3807
-3008	M39012/81-3806, -3808
-4007	M39012/81-4805, -4807
-4008	M39012/81-4806, -4808

- 1/ The connectors that are in stock or distribution that were previously qualified and marked with the old part number shall also be considered acceptable for Government use until connector stock is purged. Applies to category B part number change only. (i.e., M39012/81-3001 to M39012/81B3001).

Revision letters are not used to denote changes due to the extensiveness of the changes.

CONCLUDING MATERIAL

Custodians:

Army - CR
Navy - EC
Air Force - 85

Preparing activity:

Army - CR

Agent:

DLA - ES

Review activities:

Army - MI
Navy - SH
Air Force - 11, 17, 19
NASA - NA

(Project 5935-3769-03)

User activities:

Army - AM, AT, ME
Navy - AS, MC, OS
Air Force - 19