PRODUCT SPECIFICATION

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1. SCOPE

This specification contains performance requirements and qualification test procedures and production testing for AMP* Commercial, TNC Series Dual Crimp Coaxial Connectors.

2. APPLICABLE DOCUMENTS

The following documents constitute a part of this specification to the extent specified herein. In the event of conflict between requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. Military Documents

A. MIL-C-17: Cable, Coaxial, Radio Frequency
B. MIL-C-39012: Connectors, Coaxial, Radio Frequency, General Specification for
C. MIL-C-45662: Calibration of Standards
D. MIL-I-17214: Indicator, Permeability, Low-Mu
E. MIL-STD-105: Sampling Procedures and Tables for Inspection by Attributes
F. MIL-STD-202: Test Methods for Electrical and Electronic Component Parts

3. REQUIREMENTS

3.1. Definitions

For the purpose of this specification, the following definitions shall apply:

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LTR	REVISION RECORD	APP	DATE
A	Revise per ECN AJ-2686	fk	4/6/88

DR D. Benfer 5-15-80
CHK R. Prescott 5-15-80
APP D. Smith 5-15-80

AMP | AMP INCORPORATED Harrisburg, Pa. 17105

NO 108-12046 | REV A | LOC B

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TITLE COMMERCIAL TNC SERIES COAXIAL CONNECTORS

A. Connector Assembly

A connector assembly consists of a mated plug and jack terminated to their respective cable.

B. Connector

A connector may be either a plug or a jack, as described below:

(1) Plug

The plug contains the male inner contact and a rotating outer collar for locking purposes.

(2) Jack

The jack contains the female inner contact and may be either cable or panel mount type.

3.2. Design and Construction

Plugs shall be of the captive contact design. Construction and physical dimensions shall be as specified on the applicable product drawing.

3.3. Materials

Materials utilized in the manufacture of this product shall be in accordance with the applicable product drawing.

3.4. Functional Characteristics

A. Nominal impedance: 50 ohms
B. Frequency range: 0 to 7 GHz
C. Operating voltage @ sea level: 500 volts rms
D. Operating temperature: -55°C to +85°C

4. QUALITY ASSURANCE PROVISIONS

4.1. General Provisions

The quality provisions specified herein shall be employed in the manufacturing and testing of this product to ensure that normal production units continue to meet the performance requirements of this specification.

4.2. Classification of Test

A. Qualification Inspection, see Para 5.
B. Quality Conformance Inspection, see Para 6.

4.3. Test Conditions

A. Measurements

Measurements shall be made with instruments that have been calibrated and are certified in accordance with MIL-STD-45662.

B. Laboratory Conditions

Unless otherwise specified herein, normal laboratory temperature, humidity, and atmospheric pressure shall be considered acceptable for test purposes.

C. Coaxial Cable

Coaxial cable used for testing shall be RG-58 C/U in accordance with MIL-C-17.

5. QUALIFICATION INSPECTION

5.1. Sample Selection

Connectors selected for test purpose shall be representative of current production. Only connectors containing gold plated center contacts are required to meet the performance criteria of this specification.

5.2. Test Procedure

Qualification Inspection shall be conducted in accordance with Figure 1 with each test group consisting of 3 connector assemblies. Each test group shall consist of 3 connector pairs.

5.3. Sample Preparation

After Quality Conformance Inspection, preparation of test samples shall be conducted in accordance with the appropriate Instruction Sheet.

A. Test Group 1

Connectors shall remain uncabled and unmated.

B. Test Groups 2, 4, and 5

Connectors shall be prepared by laboratory performing R.F. testing.

C. Test Groups 3 and 6

A 21 inch length of cable shall be cut for each connector pair. Current equalizers shall be attached to the center conductor 20 inches apart and on the shield, 19 inches apart. Conductor resistance shall be measured on both the center conductor and shield in accordance with Method 307 of MIL-STD-202 using a test current of 1 ampere DC. Measurements shall be recorded, cables cut in half and connector pairs installed. Connector pairs shall be numbered so that measurements can be correlated with connectors.

5.4. Acceptance

All test specimens shall meet the requirements specified in the Performance Section of this specification, Para 5.5.

5.5. Performance Requirements and Test Methods

Connectors shall be designed to meet the performance requirements specified herein. To verify compliance to this specification, production items shall be tested and shall meet the requirements of this specification. Tests shall be conducted in the order specified in Figure 1.

Qualification Inspection

Test or Examination	Test Group and Sequence					
	1	2	3	4	5	6
Examination of Product	1	1	1	1	1	1
Mating Characteristics	2	2,7	2	2	2	2
Permeability	3	3	3	3	3	3
Insulation Resistance	4	4	4,15	4	4	4
Contact Resistance			5*,8*,10*,13*			5
Dielectric Withstanding Voltage			6,12,16			
Voltage Standing Wave Ratio		5				
R.F. High Potential			18			
Coupling Mechanism Retention			20			
Cable Retention			19			
Corona Level			17			
Thermal Shock			11			
Moisture Resistance			14			
Contact Durability		6				
Salt Spray Corrosion	5					
Vibration			7			
Physical Shock			9			
R.F. Leakage				5		
R.F. Insertion Loss					5	

*Center contact only

Figure 1

A. Examination of Product

When test specimens are examined as specified, there shall be no evidence of physical damage or any other defect that could render the specimen unsuitable for test.

B. Mating Characteristics

(1) Outer Contacts - Plug Only

When tested as specified, the insertion force of the minimum jack outer contact shall not exceed 6 pounds. When inserted into a .324 inch minimum I.D. test ring, a minimum of 2 slotted spring members shall contact the ring within .031 inch of their tip ends.

(2) Inner Contact - Jack Only

After one insertion of a polished steel test pin having a minimum diameter of .057 inch to a depth of .125 inch minimum, the insertion and withdrawal forces shall be as follows:

(a) Insertion Force

2 pounds maximum with a .054 inch minimum diameter steel test pin.

(b) Withdrawal Force

2 ounces minimum with a .052 inch maximum diameter steel test pin.

Test Method

(1) Outer Contacts - Plugs Only

The connector plug shall be held rigidly in a suitable fixture. A test ring gage No. 953884 (simulates a minimum size jack outer contact) attached to a force indicating device shall be aligned to within a .004 inch T.I.R. of any plane passing through the axis of the contact under test. While engaging the test ring to a depth of .300 inch from the top of the outer contact springs, the total force shall be measured. Also, a .324 inch I.D. test ring shall be inserted and verified to contact a minimum of 2 slotted spring members within .031 inch of their tip ends.

(2) Center Contact

The connector jack containing the female center contact shall be rigidly held in a fixture assuring proper alignment with the test pin. Three test pins shall be utilized for this test. An oversize pin having a diameter of .057 inch shall be inserted into the center contact one time as a preconditioning step. The maximum test pin (.054 inch diameter) shall then be inserted into the contact while recording the insertion force. Finally, the minimum test pin (.052 inch diameter) shall be inserted into the contact and the force required to withdraw the pin shall be recorded. Insertion depth of all pins shall be .125 inch, excluding the lead-in length.

C. Permeability

When tested as specified, the magnetic properties of the connector shall be less than 2 mu.

Test Method

Each connector shall be measured with a permeability indicator conforming to MIL-I-17214.

D. Insulation Resistance

When tested as specified at 500 vdc, the insulation resistance between the inner contact and the body of the connector shall be 5000 megohms or greater.

Test Method

Cabled connectors shall be tested in accordance with MIL-STD-202, Method 302, test cond B. The measurement shall be taken between the inner contact and the outer shell of the assembly.

E. Contact Resistance

When tested as specified, the contact resistance of mated contacts shall not exceed the following values:

Contact Resistance - Milliohms		
Contact	Initial	After Environment
Center Contact	2.0	3.0
Outer Contact	.3	N/A
Braid to Body	.2	N/A

Test Method

Contact resistance measurements shall be conducted in accordance with MIL-STD-202, Method 307, using a test current of 1 ampere D.C. Measurements shall be taken from wire equalizer to equalizer on center conductor and outer shield.

F. Dielectric Withstanding Voltage

When tested, as specified, at 1500 volts rms, there shall be no evidence of dielectric breakdown or flashover.

Test Method

Cabled connectors shall be tested in accordance with MIL-STD-202, Method 301, Condition I. A test potential of 1500 volts rms, 60 Hz, shall be instantaneously applied between the center contact and outer shell and held for a period of 1 minute.

G. Voltage Standing Wave Ratio

When tested as specified, the VSWR of a connector shall not exceed 1.35 at frequencies to 4.0 GHz or 1.40 to 6.0 GHz.

Test Method

Measurement of connector VSWR shall be conducted in accordance with the method stated in specification MIL-C-39012 or using an Automatic Network Analyzer (discrete frequency point), as applicable. Tests shall be conducted through a frequency range of 0.5 to 6.0 GHz.

H. R.F. High Potential

When tested, as specified, at 1000 volts rms, 5 MHz, connector assemblies shall show no evidence of dielectric breakdown or flashover.

Test Method

Testing shall be conducted with the connectors mated and attached to approximately 2 inches of cable. An R.F. potential of 1000 volts rms, 5 MHz, shall be instantaneously applied between the center contact and the body of the connectors and held for a duration of 1 minute. The R.F. voltage source shall be frequency stabilized and have an approximate pure sine wave output with minimum harmonic content. Test equipment shall contain provisions for detection of disruptive discharge.

I. Coupling Mechanism Retention

When tested as specified, at 60 pounds minimum, the coupling nut shall not be damaged or dislodged from the connector body.

Test Method

The body and coupling mechanism of the plug shall be secured to the lower and upper jaws, respectively, of a tensile testing machine. An axial force applied at a rate of 100 pounds per minute shall be held for 1 minute at a value of 60 pounds.

J. Cable Retention

When tested as specified, using an axial force of 60 pounds, there shall be no evidence of mechanical failure, breaking, or loosening of parts, or electrical discontinuity.

Test Method

The connector shall be rigidly held in the jaws of a tensile machine with a suitable fixture. An axial force of 60 pounds shall be applied to the cable in a direction away from the connector in such a manner that the cable remains unbent and untwisted. The force shall be held for 30 seconds minimum, the removed, and the connector examined for mechanical failure, loosening or breaking of parts, and tested for electrical continuity using a simple low voltage lamp circuit. With the connector still in the fixed position, the cable shall be held at a point 10 times the cable diameter from the connector and bent to an angle of 90° from the axis of the connector, then reversed 180°. This procedure shall be repeated 4 times and the connector re-examined and tested for continuity as described above.

K. Altitude Corona

When tested, as specified at a simulated altitude of 70,000 feet, mated connectors shall show no evidence of sustained corona discharge in excess of 5 picocoulombs with 375 volts rms, 60 Hz applied.

Test Method

Connector assemblies shall be subjected to a simulated altitude of 70,000 feet. The test circuit used shall be corona free to the extent that a discharge of 5 picocoulombs or less can be measured at the simulated altitude. Connector assemblies shall be tested as follows:

Samples shall be placed in a vacuum chamber and subjected to a simulated altitude of 70,000 feet for 10 minutes. (Note: Exposed cable ends shall be immersed in oil.) At the end of this period, and while still at 70,000 feet (simulated), a 60-Hz test voltage shall be increased until the detector, having a sensitivity of 5 picocoulombs, indicates a sustained corona discharge. The test voltage shall then be immediately reduced until the discharge stabilizes at 5 picocoulombs or less. This final voltage is the corona extinguishing level of the connector.

L. Thermal Shock

Upon completion of testing, as specified, at 85°C and -55°C, for 5 cycles, connectors shall show no evidence of physical damage.

Test Method

Unmated, cabled connectors shall be subjected to temperature cycling in accordance with MIL-STD-202, Method 107, Test Condition A.

M. Moisture Resistance

After the moisture resistance test as specified, connectors shall show no evidence of physical damage. Within 5 minutes after removal from humidity, samples shall be subjected to the Insulation Resistance test as specified in Para 5.5.E. and shall display a resistance of 200 megohms or greater. The Dielectric Withstanding Voltage requirements of Para 5.5.F. shall also be met after a 24 hour drying period at ambient conditions.

Test Method

Mated connector assemblies shall be subjected to 240 hours of Moisture Resistance in accordance with MIL-STD-202, Method 106, Type II. Within 5 minutes after removal from the chamber, the connectors shall be tested for Insulation Resistance.

N. Contact Durability

After 500 cycles of mating and unmating as specified, connectors shall meet the requirements for all subsequent testing.

Test Method

Cabled connectors shall be completely mated and unmated a total of 500 times at a maximum rate of 12 cycles per minute.

O. Salt Spray

After being subjected to a 5% salt spray environment for 48 hours as specified, there shall be no base metal exposed on the interface or mating surface of the connectors.

Test Method

Mated connector assemblies shall be subjected to salt spray corrosion test in accordance with MIL-STD-202, Method 101, Test Condition B, using a 5% salt solution concentration. After 48 hours exposure to the salt fog environment, connectors shall be taken from the test chamber, washed in distilled water, brushed, and then air dried for a period of 24 hours at 40°C.

P. Vibration

During the vibration test as specified at 10 to 2000 Hz for 12 hours, there shall be no electrical discontinuities exceeding 1 microsecond duration. Upon completion of testing, there shall be no evidence of physical damage.

Test Method

Mated connectors assembled to appropriate cables and mounted as illustrated in Figure 2 shall be subjected to vibration in accordance with MIL-STD-202, Method 204, Test Condition B. During the test, center and outer contacts shall be wired in series and a D.C. current of 0.1 ampere shall be applied. Instrumentation shall be incorporated to detect electrical discontinuities as short as 1 microsecond.

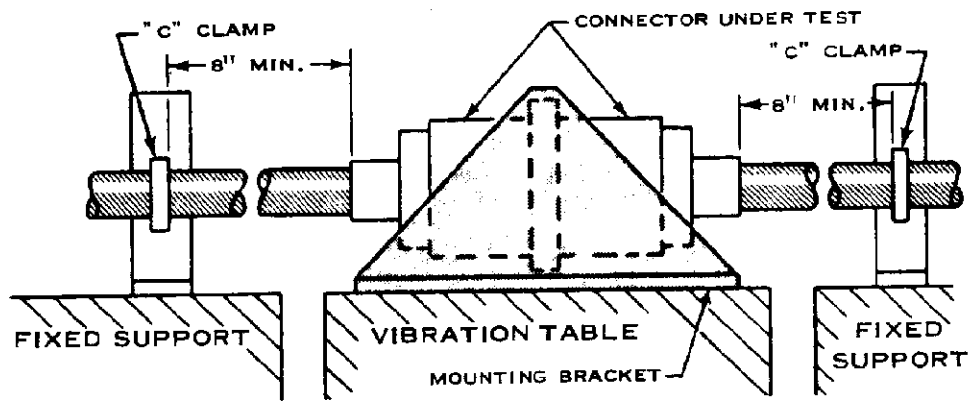

Figure 2

Q. Physical Shock

During the shock test as specified (18 shock pulses at 100 G's), there shall be no electrical discontinuities exceeding 1 microsecond duration. Upon completion of testing, there shall be no evidence of physical damage.

Test Method

Mated connectors shall be mounted as illustrated in Figure 2 and subjected to physical shock in accordance with MIL-STD-202, Method 212, Condition I. They shall withstand a total of 18 shock pulses at 100 G's.

R. R.F. Leakage

When tested at a frequency between 2 and 3 GHz as specified, the total leakage, cable-to-cable, shall not exceed -55 dB minimum.

Test Method

Mated connector pairs shall be tested for R.F. Leakage in accordance with specification MIL-C-39012 at a frequency between 2 and 3 GHz.

S. Insertion Loss

When tested at 3 GHz as specified, the insertion loss of a connector shall not exceed .2 dB.

Test Method

Mated connector pairs shall be tested for R.F. Insertion Loss in accordance with specification MIL-C-38012 at a frequency of 3 GHz.

6. QUALITY CONFORMANCE INSPECTION

6.1. Sample Selection

Unless otherwise specified, sampling procedures shall be in accordance with MIL-STD-105. Sampling and Acceptable Quality Levels shall be as specified in the applicable AMP Quality Specification. Dimensional requirements shall be in accordance with the applicable product drawing.