AMP

QUALIFICATION TEST REPORT

Connector, Coaxial, N Series,
Semi-Rigid Cable

501-179 Rev. A

Product Specification:	108-12093
CTL No.:	CTL3317-103-119
Date:	August 10, 1992
Classification:	Unrestricted
Prepared By:	Steven L. Ludwig
Per EC:	0990-0062-94

Corporate Test Laboratory Harrisburg, Pennsylvania

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(R3317SL1)

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Qualification Test Report
Connector, Coaxial, N Series,
Semi-Rigid Cable

1. Introduction

1.1 Purpose

Testing was performed on AMP* Series N, Semi-Rigid Coaxial Cable Connector to determine its conformance to the requirements of AMP Product Specification 108-12093 Rev. O.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the Series N, Semi-Rigid Coaxial Cable Connector manufactured by the Signal Transmission Products Division of the Capitial Goods Business Group. The testing was performed between December 12, 1991 and July 16, 1992.

1.3 Conclusion

The Series N Semi-Rigid Cable Connector meets the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-12093 Rev. O.

* Trademark

1.4 Product Description

The N Series Semi-Rigid Coaxial Plug and Jack is designed for use with RG-402/U semi-rigid cable. Both the plug and jack contain gold plated center contacts. The connector bodies are nickel plated. Mated connectors maintain a constant impedance of 50 ohms and perform up to a frequency of 11 Gigahertz.

1.5 Test Samples

The test samples were randomly selected from normal current production lots, and the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1,2,3,4,5,6	3 each	228440-1	Plug
1,2,3,4,5,6	3 each	228658-1	Jack, Rear-Mounted

1.6 Qualification Test Sequence

	Test Groups					
Test or Examination	1	2	3	4	5	6
Examination of Product	1,10	1,5	1,5	1,9	1,5	1,4
Termination Resistance, Dry Circuit	3.7	2,4	2,4			
Dielectric Withstanding Voltage				3,8		
Insulation Resistance				2,7		
RF High Potential						3
RF Insertion Loss					2	
RF Leakage					3	
Voltage Standing Wave Ratio					4	
Permeability				4		
Corona/Altitude						2
Vibration	5					
Physical Shock	6					
Contact Engaging Force	2					
Contact Separating Force	8					
Coupling Nut Retention	9					
Durability	4					
Thermal Shock				5		
Humidity-Temperature Cycling				6		
Mixed Flowing Gas			3(#)			
Temperature Life		3				

(#) Precondition samples with 10 cycles of durability
The numbers indicate sequence in which tests were performed.

2. Summary of Testing

2.1 Examination of Product - All Groups

All samples submitted for testing were selected from normal current production lots. They were inspected and accepted by the Product Assurance Department of the Signal Transmission Products Division of the Capitial Goods Business Group.

2.2 Termination Resistance, Dry Circuit - Groups 1,2,3

All termination resistance measurements, taken at 100 milliamperes dc. and 50 millivolts open circuit voltage, were less than 1.5 milliohms initially and 2.0 milliohms finally.

Test Group	No. of Samples	Condition	Min.	Max.	Mean
1	3	Initial	1.08	1.42	1.283
		After Mechanical	0.97	1.29	1.137
2	3	Initial	1.16	1.39	1.283
		After Temp Life	1.12	1.32	1.233
3	3	Initial	1.20	1.33	1.260
		After MFG	1.17	1.21	1.240

All values in milliohms

2.3 Dielectric Withstanding Voltage - Group 4

No dielectric breakdown or flashover occurred when a test voltage was applied between the center contact and outer shell.

2.4 Insulation Resistance - Group 4

All insulation resistance measurements were greater than 5000 megohms initially and after test.

2.5 RF High Potential - Group 6

There was no breakdown or flashover between the center contact and outer shell when a test voltage was applied for one minute.

2.6 Insertion Loss - Group 5

All insertion loss results were less than 0.06 (f)GHz at 6.0 GHz.

2.7 RF Leakage - Group 5

There was less than -60 dBm of leakage between 2 and 3 GHz on all samples.

2.8 Voltage Standing Wave Ratio - Group 5

All voltage standing wave ratio measurements were less than the specification requirement of 1.35 between 0.5 and 15.0 GHz.

2.9 Permeability - Group 4

All permeability measurements were less then the specification requirement of 2.0 Mμ.

2.10 Corona/Altitude - Group 6

There was no corona discharge greater than 5.0 picocoulombs at a potential of 375 volts rms at an altitude of 70,000 feet.

2.11 Vibration - Group 1

No discontinuities of the contacts were detected during vibration. Following vibration, no cracks, breaks, or loose parts on the connector assemblies were visible.

2.12 Physical Shock - Group 1

No discontinuities of the contacts were detected during physical shock. Following physical shock testing, no cracks, breaks, or loose parts on the connector assemblies were visible.

2.13 Contact Engaging Force - Group 1

All engaging force measurements were less than 25 pounds maximum for the plugs and 3.5 pounds maximum for the jacks.

2.14 Contact Separating Force - Group 1

Contact separating force measurements were greater than 2 ounces minimum.

2.15 Coupling Nut Retention - Group 1

The coupling nut did not loosen or dislodge from the plug body as a result of applying a tensile load of 100 pounds between the coupling nut and plug body for 1 minute.

2.16 Durability - Group 1

No physical damage occurred to the samples as a result of mating and unmating each connector 500 times.

2.17 Thermal Shock - Group 4

No evidence of physical damage to either the contacts or the connector was visible as a result of thermal shock.

2.18 Humidity-Temperature Cycling - Group 4

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to humidity- temperature cycling.

2.19 Mixed Flowing Gas - Group 3

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to the pollutants of mixed flowing gas.

2.20 Temperature Life - Group 2

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to an elevated temperature.

3. Test Methods

3.1 Examination of Product

Product drawings and inspection plans were used to examine the samples. They were examined visually and functionally.

3.2 Termination Resistance, Low Level

Termination resistance measurements at low level current were made, using a four terminal measuring technique (Figure 1). The test current was maintained at 100 milliamperes dc, with an open circuit voltage of 50 millivolts dc.

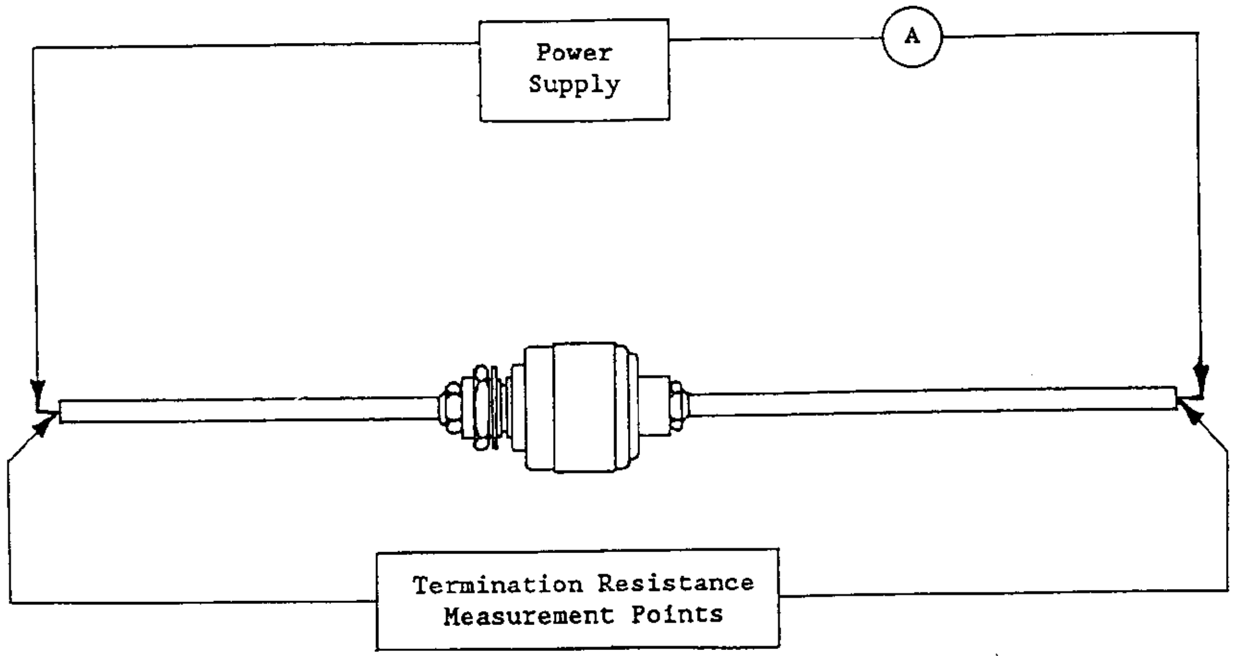

Figure 1
Typical Termination Resistance Measurement Points

2.18 Humidity-Temperature Cycling - Group 4

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to humidity- temperature cycling.

2.19 Mixed Flowing Gas - Group 3

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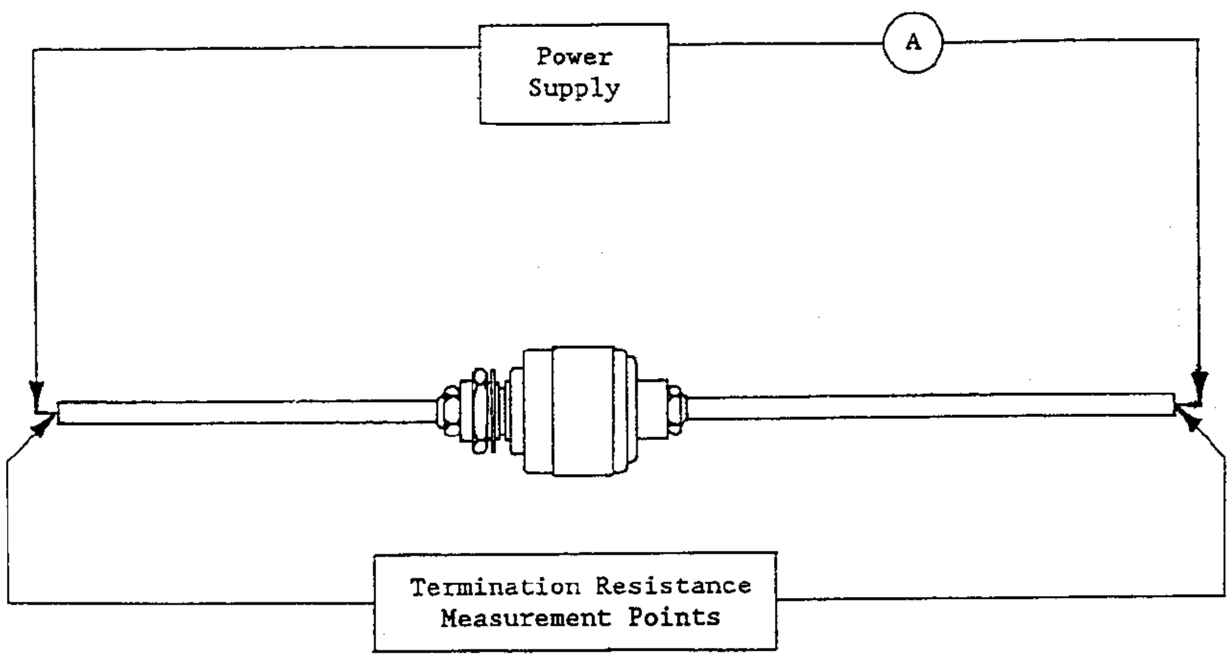

Figure 1
Typical Termination Resistance Measurement Points

3.3 Dielectric Withstanding Voltage

A test potential of 1500 vac was applied between the center contact and outer shell of unmated connector assemblies. This potential was applied for one minute and then returned to zero.

3.4 Insulation Resistance

Insulation resistance was measured between the center contact and outer shell of unmated connector assemblies, using a test voltage of 500 volts dc. This voltage was applied for one minute before the resistance was measured.

3.5 RF High Potential

An RF test potential of 1000 volts (rms) at 5 Megahertz was applied between the center contact and outer shell of the unmated connectors. This potential was applied for one minute and then returned to zero.

3.6 RF Insertion Loss

A full Two-Port Calibration was performed on a network analyzer and the insertion loss, (S_{21}) of three reference cables was measured. The cables were cut in half and the mated connectors installed. The cables with mated connectors were measured again and the difference between the reference cable and the installed connector pairs was recorded as the insertion loss.

3.7 RF Leakage

RF Leakage was measured on mated connectors using the Triaxial Cavity method. A 0 dBm signal at 2.5 GHz was applied to the connectors with a signal generator. RF Leakage was monitored with a spectrum analyzer.

3.8 Voltage Standing Wave Ratio

VSWR was measured on unmated samples using an HP8510B network analyzer. A wide sweep range of 0.045 to 26.5 GHz was used to eliminate effects of the cable.

3.9 Permeability

Magnetic permeability was measured on unmated samples using a 2.0 Mμ pellet in a permeability indicator.

3.10 Corona/Altitude

A test voltage of 375 v(rms) at a 5.0 picocoulombs maximum discharge was applied between the center contact and outer shell of the mated connectors. This test voltage was applied with a simulated altitude of 70,000 feet.

3.11 Vibration, Sine

Mated connectors were subjected to sinusoidal vibration, having a simple harmonic motion with an amplitude of 0.06 inch, double amplitude. The vibration frequency was varied logarithmically between the limits of 10 and 2000 Hz and returned to 10 Hz in 20 minutes. This cycle was performed 12 times in each of three mutually perpendicular planes, for a total vibration time of 12 hours. Connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.12 Physical Shock

Mated connectors were subjected to a physical shock test, having a sawtooth waveform of 100 gravity units (g peak) and a duration of 6.0milliseconds. Three shocks in each direction were applied along the three mutually perpendicular planes, for a total of 18 shocks. The connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.13 Contact Engaging Force

Engagement force of the plug outer contacts was measured using a 0.316" I.D. ring inserted to a minimum depth of 0.093"

All Jack center contacts were preconditioned by inserting a 0.074" diameter gage pin 1 time. A 0.066" gage pin was then inserted to a depth of 0.125" and engagement force of the center contacts measured.

3.14 Contact Separating Force

Separating force of the jacks' center contact was measured by inserting then extracting a 0.063" diameter gage pin. During extraction, the maximum force required to separate the gage pin from the center contacts was measured.

3.15 Coupling Nut Retention

A tensile load of 100 pounds was applied between the coupling nut and the plug body for a 1.0 minute hold period. During this hold period, The coupling nut was rotated for 2 revolutions in each direction.

3.16 Durability

Connectors were mated and unmated 500 times, by hand, at a rate not exceeding 600 cycles per hour.

4. Validation

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