BNC PCB Straight and Right Angle Connectors

1. INTRODUCTION

1.1. Purpose

Testing was performed on the AMP* BNC jack connector to determine its conformance to the requirements of AMP Product Specification 108-12078 Revision O.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the BNC jack connector manufactured by the Business Development Division of the Capital Goods Business Sector. Testing was performed between 17Jan90 and 25Sep90. The test file number for this testing is CTL 3347-049-035.

1.3. Conclusion

The BNC jack connector meets the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-12078 Revision O.

1.4. Product Description

The BNC connectors are designed for PCB and panel mount application. These connectors are designed for right angle or vertical mounting. The cup contact is phosphor bronze with tin-lead plating. The center contact is phosphor bronze, tin-lead, silver or gold over nickel plating. The housing material is polypropylene.

1.5. Test Samples

Test samples were representative of normal production lots. Samples identified with the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1,2,3,4,5	5 each	227161-1	Right angle jack, Sn
1,3	5 each	227161-5	Right angle jack, Ag
1,2,3,4	5 each	227222-3	Vertical jack, Au
1,2,3,4,5	5 each	225395-1	Plug (test purpose only)

Figure 1

* Trademark
I Indicates change

LOC B

1.6. Qualification Test Sequence

Test or Examination	Test Group (a)				
	1	2	3	4	5
	Test Sequence (b)				
Examination of product	1,10	1,5	1,5	1,8	1
Termination resistance	3,7	2,4	2,4		
Insulation resistance				2,6	
Dielectric withstanding voltage				3,7	
RF high potential					3
Permeability					2
Solderability					4
Vibration	5				
Physical shock	6				
Durability	4				
Contact engaging force	2(c)				
Contact separating force	8(c)				
Connector to board retention	9				
Thermal shock				4	
Humidity-temperature cycling				5	
Temperature life		3			
Mixed flowing gas			3		

NOTE
(a) See paragraph 1.5.
(b) Numbers indicate sequence in which tests are performed.
(c) Test applies to jacks only.

Figure 2

2. SUMMARY OF TESTING

2.1. Examination of Product - All Test 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 Capital Goods Business Sector.

2.2. Termination Resistance - Test Groups 1, 2 and 3

All termination resistance measurements, taken at 100 milliamperes DC and 50 millivolts open circuit voltage were less than 12 milliohms initial and 16 milliohms final for the center contact and 6 milliohms initial and 9 milliohms final for the outer contact.

Test Group	Number of Data Points	Condition	Max	Mean
1	15	Initial - Center	9.97	9.41
		Initial - Outer	4.09	1.79
		After mechanical - Center	13.28	10.62
		After mechanical - Outer	3.71	2.41
2	10	Initial - Center	9.30	8.94
		Initial - Outer	3.69	2.54
		After temperature life - Center	9.50	8.84
		After temperature life - Outer	6.14	3.61
3	15	Initial - Center	10.05	9.24
		Initial - Outer	3.55	2.80
		After mixed flowing gas - Center	15.06	9.97
		After mixed flowing gas - Outer	4.61	3.39

NOTE *All values in milliohms.*

Figure 3

2.3. Insulation Resistance - Test Group 4

All insulation resistance measurements were greater than 5000 megohms.

2.4. Dielectric Withstanding Voltage - Test Group 4

No dielectric breakdown or flashover occurred when a test voltage was applied between adjacent contacts.

2.5. RF High Potential - Test Group 5

No flashovers occurred when the test voltage was applied.

2.6. Permeability - Test Group 5

All permeability measurements were less than 2μ.

2.7. Solderability - Test Group 5

Contact leads had a minimum of 95% solder coverage.

2.8. Vibration - Test Group 1

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

2.9. Physical Shock - Test Group 1

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

2.10. Durability - Test Group 1

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

2.11. Contact Engaging Force - Test Group 1

All contact engaging forces were less than 56 ounces per contact.

2.12. Contact Separating Force - Test Group 1

All contact separating forces were greater than 1 ounce per contact.

2.13. Connector to Board Retention - Test Group 1

Jacks did not dislodge from test panels, no discontinuities were observed.

2.14. Thermal Shock - Test Group 4

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

2.15. Humidity-temperature Cycling - Test Group 4

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

2.16. Temperature Life - Test Group 2

No evidence of physical damage to either the contacts or the connector were visible as a result of temperature life testing.

2.17. Mixed Flowing Gas - Test Group 3

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

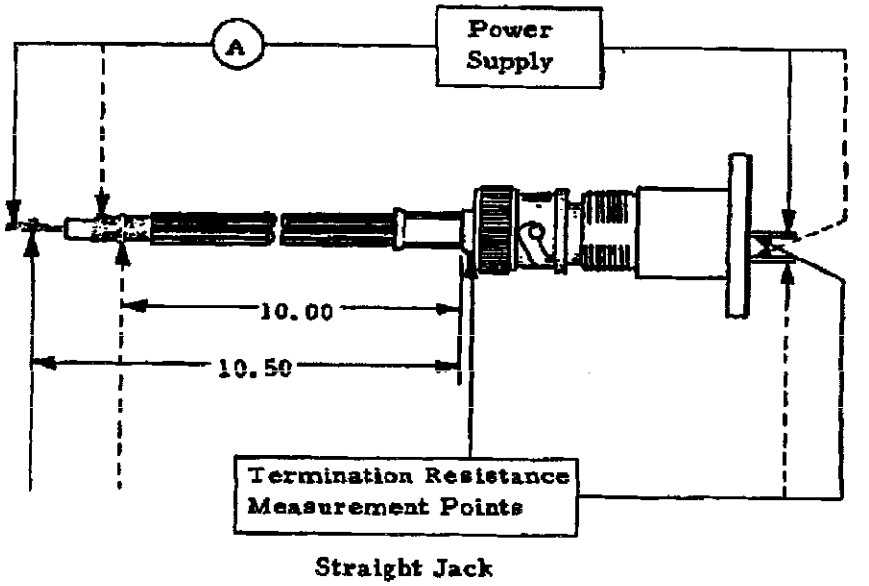
3. TEST METHODS

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

Termination resistance measurements at low level current were made using a 4 terminal measuring technique (Figure 4). The test current was maintained at 100 milliamperes DC a 50 millivolt pen circuit voltage.



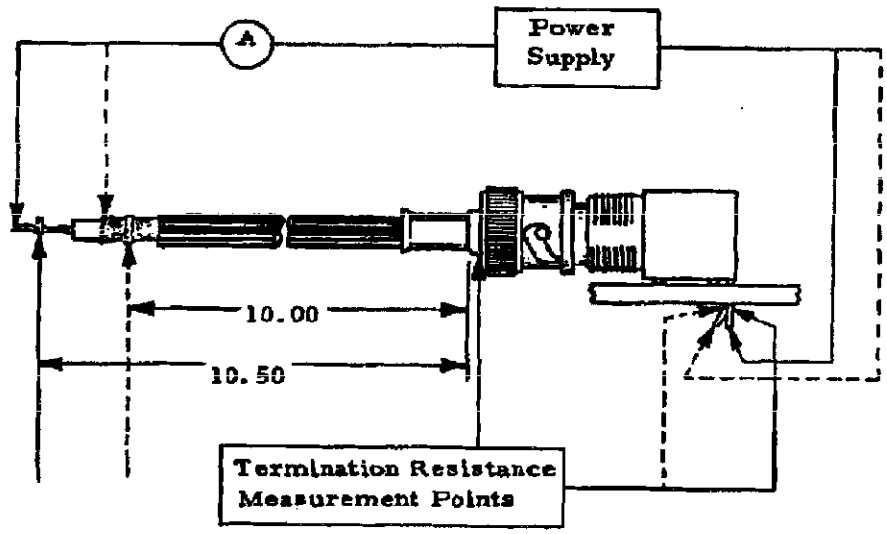


Figure 4
Typical Termination Resistance Measurement Points

3.3. Insulation Resistance

Insulation resistance was measured between the outer and center contacts using a test voltage of 500 volts DC. This voltage was applied for 2 minutes before the resistance was measured.

3.4. Dielectric Withstanding Voltage

A test potential of 1500 volts AC was applied between the outer and center contacts. This potential was applied for 1 minute and then returned to zero.

3.5. RF High Potential

A test voltage of 1000 volts AC was applied between the center contact and the body of the connector. This potential had a frequency of 0.5 MHz and was maintained for 1 minute.

3.6. Permeability

Magnetic permeability was checked using a 2μ magnet.

3.7. Solderability

Connector assembly solder tails were subjected to a solderability test by immersing them in a mildly activated flux for 5 to 10 seconds, allowed to drain for 10 to 60 seconds, and then held over molten solder without contact for 2 seconds. The solder tails were then immersed in the molten solder at a rate of approximately 1 inch per second, held for 3 to 5 seconds, then withdrawn. After cleaning in isopropyl alcohol, the samples were visually examined for solder coverage. The solder used for testing was 60/40 tin lead composition and was maintained at a temperature of 245°C.

3.8. Vibration, Sinusoidal

Mated samples were subjected to sinusoidal vibration, having a simple harmonic motion with an amplitude of 0.06 inch, double amplitude. The vibration frequency was varied uniformly between the limits of 10 and 55 Hz and returned to 10 Hz in 1 minute. This cycle was performed in each of 3 mutually perpendicular planes for a total vibration time of 6 hours. Samples were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.9. Physical Shock

Mated samples were subjected to a mechanical shock test, having a sawtooth waveform of 100 gravity units (g peak) and a duration of 6 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular planes, for a total of 18 shocks. Samples were monitored for discontinuities of 1 microsecond or greater, using a current of 100 milliamperes DC.

3.10. Durability

Samples were mated and unmated 500 times at rate not exceeding 720 times per hour.

3.11. Contact Engaging Force

Engaging forces were acquired by inserting a .054 inch gage into the socket.

3.12. Contact Separating Force

Separating forces were acquired by withdrawing a .052 inch gage from the socket.

3.13. Connector to Board Retention

An axial load of 30 pounds was applied to the jack in a direction away from the test board for 30 seconds. Continuity was monitored with a low voltage lamp circuit.

3.14. Thermal Shock

Mated samples were subjected to 5 cycles of temperature extremes with each cycle consisting of 30 minutes at each temperature. The temperature extremes were -55 and 85°C. The transition between temperatures was less than 1 minute.

3.15. Humidity-temperature Cycling

Mated samples were exposed to 10 cycles of humidity-temperature cycling. Each cycle lasted 24 hours and consisted of cycling the temperature between 25°C and 65°C twice while the relative humidity was held at 95%.

3.16. Temperature Life

Mated samples were exposed to a temperature of 55°C for 96 hours.

3.13. Mixed Flowing Gas, Class III

Mated samples were exposed for 20 days to a mixed flowing gas Class III exposure. Class III exposure is defined as a temperature of 30°C and a relative humidity of 75% with the pollutants of Cl_2 at 20 ppb, NO_2 at 200 ppb, and H_2S at 100 ppb.