AMPMODU* Mod 1/2 Wire to Board Standard Pressure Contact Interconnection System

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for AMPMODU* Mod IV 1/2 interconnection system. This miniature system consists of intermediate pressure receptacle contacts crimped onto either solid or stranded wire and then inserted into a Mod IV housing. It is designed to mate with AMPMODU Mod II .025 inch square posts or headers.

1.2. Qualification

When tests are performed on subject product line, procedures specified in AMP 109 series specifications shall be used. All inspections shall be performed using applicable inspection plan and product drawing.

2. APPLICABLE DOCUMENTS

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

2.1. AMP Documents

A. 109-1: General Requirements for Test Specifications
B. 109 Series: Test Specifications as indicated in Figure 1. (Comply with MIL-STD-202, MIL-STD-1344 and EIA RS-364)
C. Corporate Bulletin 401-76: Cross-reference between AMP Test Specifications and Military or Commercial Documents
D. 114-25003: Application Specification
E. 501- : Test Report

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of design, construction and physical dimensions specified on applicable product drawing.

3.2. Materials

A. Contact:
(1) Beryllium copper
(2) Copper-tin-phosphor-bronze
B. Housing: Flame retardant thermoplastic, UL 94V-0 rated.

3.3. Ratings

A. Voltage: 250 vac
B. Current: See Figure 2 for applicable current carrying capability
C. Temperature: -65 to 105°C

3.4. Performance and Test Description

Product is designed to meet electrical, mechanical and environmental performance requirements specified in Figure 1. All tests are performed at ambient temperature unless otherwise specified.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Examination of product.	Meets requirements of product drawing and AMP Spec 114-25003.	Visual, dimensional and functional per applicable quality inspection plan.
ELECTRICAL		
Termination resistance, dry circuit.	12 milliohms maximum for beryllium copper. 20 milliohms maximum for copper-tin-phosphor.	Subject mated contacts assembled in housing to 50 mv open circuit at 100 ma maximum. See Figure 5. AMP Spec 109-6-1.
Dielectric withstanding voltage.	Test Voltage (rms) Centerline .100 & .125 / .150 Altitude Feet 750 / 1000 — Sea Level 300 / 400 — 50000 275 / 275 — 70000 No breakdown or flashover.	Test between adjacent contacts of unmated connector assemblies. AMP Spec 109-29-1.
Insulation resistance.	5000 megohms minimum initial.	Test between adjacent contacts of unmated connector assemblies. AMP Spec 109-28-4.

Figure 1 (cont)

Test Description	Requirement	Procedure
Current cycling.	Termination resistance, dry circuit. Crimp resistance shall not exceed final requirement	Subject mated contacts to 50 cycles at 125% rated current for 30 minutes "ON" and 15 minutes "OFF". AMP Spec 109-51.
Temperature rise vs current.	30°C maximum temperature rise at specified current. See Figure 2.	Measure temperature rise vs current. AMP Spec 109-45-1.
Crimp resistance.	Wire Size AWG / Test Current amperes / Resistance milliohms maximum: Int, Final 20: 3.0 / 2.0 / 3.0 22: 3.0 / 3.0 / 5.0 24: 3.0 / 4.0 / 6.0 26: 2.0 / 4.5 / 6.5 28: 1.5 / 5.0 / 7.0 30: 1.0 / 11.0 / 13.0 32: 1.0 / 13.0 / 15.0	Measure potential drop of mated contacts after temperature of wire has stabilized. Calculate crimp resistance. See Figure 5.
MECHANICAL		
Vibration, sinusoidal, high frequency.	No discontinuities greater than 1 microsecond. See Note (a).	Subject mated connectors to 20 G's, between 10-2000 Hz traversed in 20 minutes. 4 hours in each of 3 mutually perpendicular planes. see Figure 7. AMP Spec 109-21-4.
Physical shock.	No discontinuities greater than 1 microsecond. See Note (a).	Subject mated connector to 100 G's sawtooth shock pulses of 6 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 shocks total. AMP Spec 109-26-9.
Mating force.	16 ounces maximum per contact.	Measure force necessary to mate connector assembly a distance of .230 inch from point of initial contact with housing face using free floating fixtures at rate of 1 inch per minute. Calculate force per contact. AMP Spec 109-42, Condition A.

Figure 1 (cont)

Test Description	Requirement	Procedure
Unmating force.	2 ounces minimum per contact.	Measure force necessary to unmate connector assembly at rate of 1 inch per minute. Calculate force per contact. AMP Spec 109-42, Condition A.
Contact retention.	Contacts shall not dislodge from normal locking position.	Apply axial load of 5 pounds to each contact wire at a rate of 1 inch per minute. AMP Spec 109-30.
Contact engaging force.	13 ounces maximum per contact.	Measure force using gage 1 at rate of 1 inch per minute. Engagement depth shall be .230 ± .005. See Figure 6. AMP Spec 109-35.
Contact separating force.	1.5 ounces minimum per contact.	Size 3 times using gage 1, insert gage 2 and measure force to separate at rate of 1 inch per minute. Separation depth shall be .230 ± .005. See Figure 6. AMP Spec 109-35.
Crimp tensile.	Wire Size AWG / Crimp Tensile pounds minimum: 20 — 17.5; 22 — 11.0; 24 — 7.0; 26 — 4.0; 28 — 2.7; 30 — 1.2; 32 — 1.0	Determine crimp tensile at rate of 1 inch per minute. AMP Spec 109-16.
Durability.	Mating/unmating force; termination resistance, dry circuit.	Mate and unmate connector assemblies for 150 cycles for 30 µin gold plating, 75 cycles for 15 µin gold plating and 75 cycles for 100 µin tin plating at maximum rate of 150 cycles per hour. AMP Spec 109-27.

Figure 1 (cont)

Test Description	Requirement	Procedure
ENVIRONMENTAL		
Thermal shock.	750 vac dielectric withstanding voltage; termination resistance, dry circuit. See Note (a).	Subject mated connectors to 5 cycles between -65 and 105°C. AMP Spec 109-22.
Humidity-temperature cycling.	1000 megohms final minimum insulation resistance; termination resistance, dry circuit.	Subject mated connectors 10 humidity-temperature cycles between 25 and 65°C at 95% RH. AMP Spec 109-23-3 except with cold shock at -10°C.
Mixed flowing gas.	Termination resistance, dry circuit.	Subject mated connectors with 15 µin gold plating to environmental class II for 10 days. AMP Spec 109-85-2. Subject mated connectors with 30 µin gold plating to environmental class III for 10 days. AMP Spec 109-85-3.
Temperature life.	Termination resistance, dry circuit.	Subject mated connectors to temperature life. AMP Spec 109-43, Test level 9, Duration I.

(a) Shall remain mated and show no evidence of damage, cracking or chipping.

Figure 1 (end)

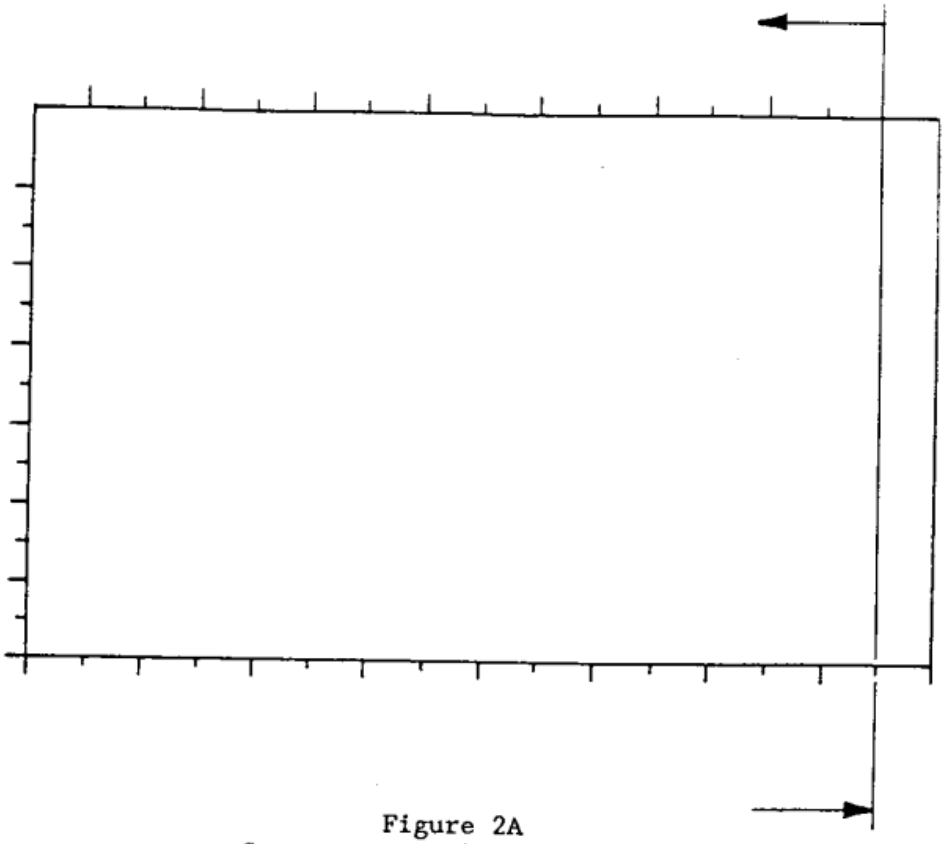
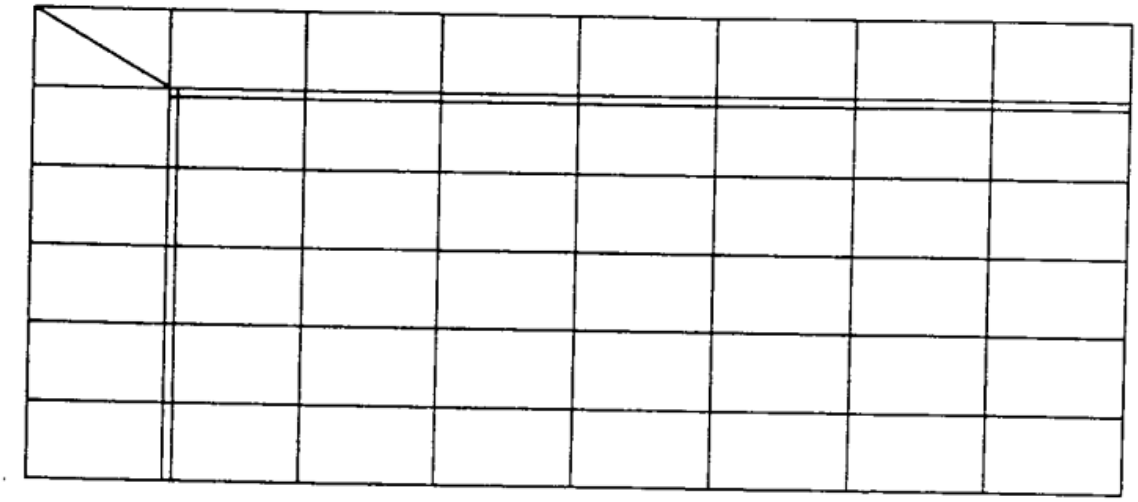


Figure 2A
Current Carrying Capability



Note: To determine acceptable current carrying capacity for the percentage connector loading and wire gage indicated, use Multiplication Factor (F) from above chart and multiply it times Base Rated Current for a single circuit at maximum ambient operating temperature as shown on Figure 2A.

Figure 2B
Current Rating

3.6. Product Qualification and Requalification Tests

Test or Examination	Test Group (a)(e)									
	1	2	3	4(b)	5	6	7	8	9	10
	Test Sequence (c)									
Examination of product	1,9	1,9	1,6	1,10	1,5	1,8	1,5	1,8	1,8	1,8
Termination resistance, dry circuit	3,7	2,7	2,5	2,8	2,4		2,4	2,5		3,7
Dielectric withstanding voltage						3,7			3,7	
Insulation resistance						2,6			2,6	
Temperature rise vs current				3,9						
Current cycling								4		
Crimp resistance								3,6		
Vibration	5			7						
Physical shock	6									
Mating force	2									2
Unmating force	8									6
Contact retention			7						9	
Contact engaging force		3								
Contact separating force		4,8								
Crimp tensile								7		
Durability	4	5	3	4						4
Thermal shock						4			4	
Thermal shock 500 cycle minimum							3			
Humidity-temperature cycling			4	5		5			5	5
Mixed flowing gas					3(f)					
Temperature life		6		6						

(a) See Para 4.1.A.
(b) Discontinuities shall not be measured for this test group.
(c) Numbers indicate sequence in which tests are performed.
(d) Does not apply to tin plated contacts.
(e) Test groups 9 and 10 are for retention of Qualification only.
(f) Precondition samples with 10 cycles durability.

Figure 3

Legend: Plating in contact area/under plate/ plating in crimp area

Test Group	Plating Configuration (Thickness in µin)	Base Material
1,2,4,7	100Sn/30Ni/100Sn	BeCu
	30Au/50Ni/100Sn	CuSn-PhBz
	15Au/50Ni/100Sn	CuSn-PhBz
	15Au/50Ni/AuFlash	BeCu
	30Au/50Ni/AuFlash	BeCu
3,8(a)	15Au/50Ni/AuFlash	BeCu
	100Sn/30Ni/100Sn	BeCu
	15Au/50Ni/100Sn	CuSn-PhBz
	30Au/50Ni/AuFlash	BeCu
5	15Au/50Ni/100Sn	CuSn-PhBz
	15Au/50Ni/AuFlash	BeCu & CuSn-PhBz
	15Au/50Ni/50Ni	BeCu
	30Au/50Ni/AuFlash	BeCu
6	Optional	Optional

(a) For test group 8 crimp resistance and tensile use only the following plating types.

Plating Configuration (Thickness in µin)	Base Material
100Sn/30Ni/100Sn	BeCu & CuSn-PhBz
15Au/50Ni/50Ni	BeCu
15Au/50Ni/AuFlash	BeCu & CuSn-PhBz

Figure 4

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Connector housings and contacts shall be prepared in accordance with applicable instruction sheets and shall be selected at random from current production. Test groups 1 through 4, and 7 shall consist of minimum of 2 connector assemblies loaded with minimum of 40 receptacles for each plating type and base material as indicated in Figure 4. Test group 5 shall consist of minimum of 2 connector assemblies loaded with minimum of 40 receptacles for each plating type and base material, except full tin plated receptacles. Test group 6 shall consist of 5 housings each fully loaded with receptacles. Test group 8 shall consist of 30 receptacles of each plating type, base material and wire size (AWG 20, 22, 24, 26, 28, 30, and 32). All contacts shall be crimped in accordance with AMP Specification 114-25003. Test measurements shall be performed on all receptacles.

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in Figure 3.

4.2. Retention of Qualification

If, in a 3 year period, no changes to product or process occur, product shall be subjected to test groups 9 and 10 of testing described in test sequence, see Figure 3. Justification for exceeding this time limit must be documented and approved by division manager.

4.3. Requalification Testing

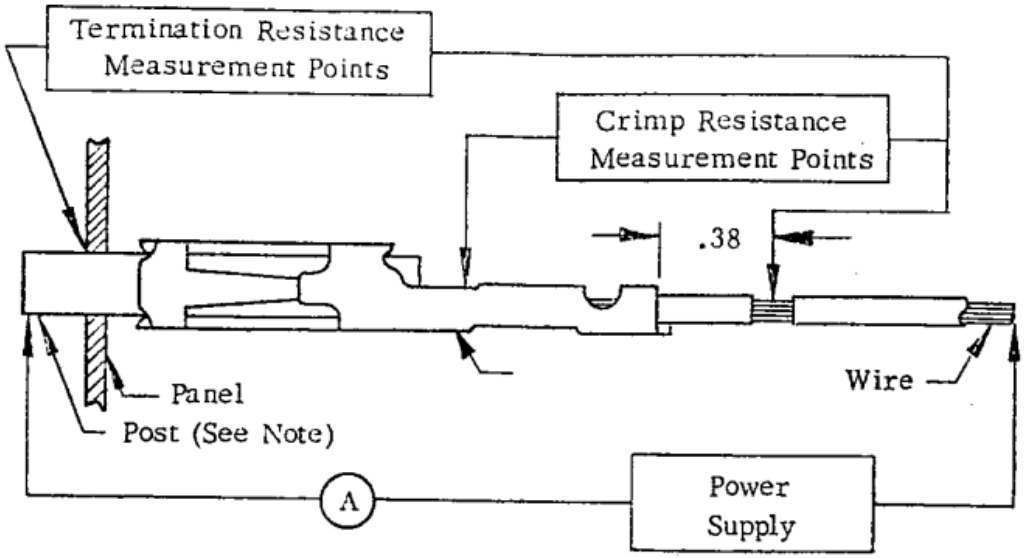
If changes significantly affecting form, fit or function are made to product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of original testing sequence as determined by development/product, quality and reliability engineering.

4.4. Acceptance

Acceptance is based on verification that product meets requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.5. Quality Conformance Inspection

Applicable AMP quality inspection plan will specify sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with applicable product drawing and this specification.



Note: Post plating shall be identical to receptacle plating when conducting tests, see Figure 4.

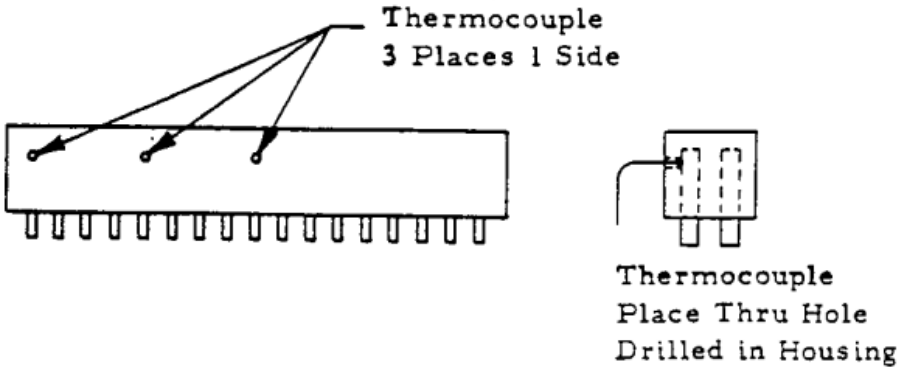
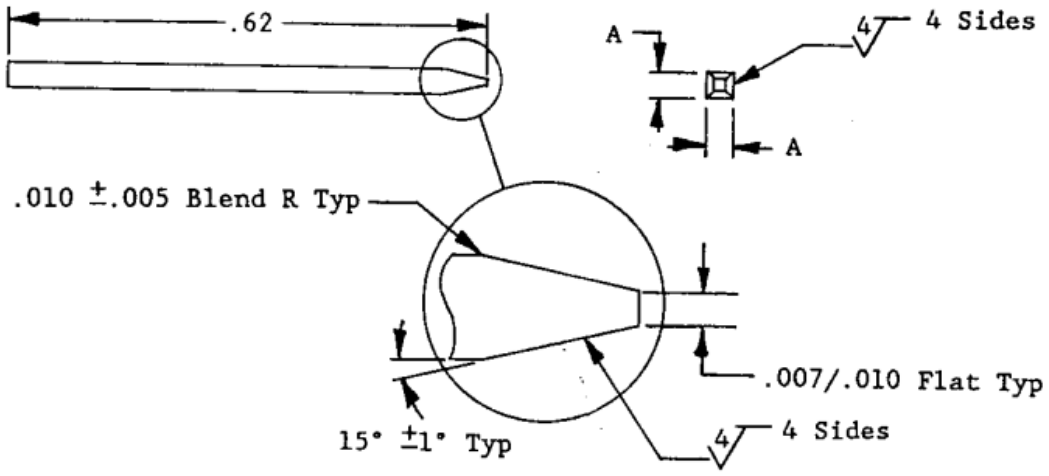


Figure 5
Resistance and Temperature Measurement Points

To be ground in lengthwise direction only



Note: 1. Tolerances shall be ± .005 or ± 2°C as applicable, unless otherwise specified.
2. Material shall be tool steel, AISI type O1 per AMP Specification 100-3.
3. Heat treat to Rockwell C60-62.
4. Gage surface shall be clean of contaminate or lubricants.

Gage Number	A Dimension
1	.0260 +.0000 -.0001
2	.0240 +.0001 -.0000

Figure 6
Engaging and Separating Gages

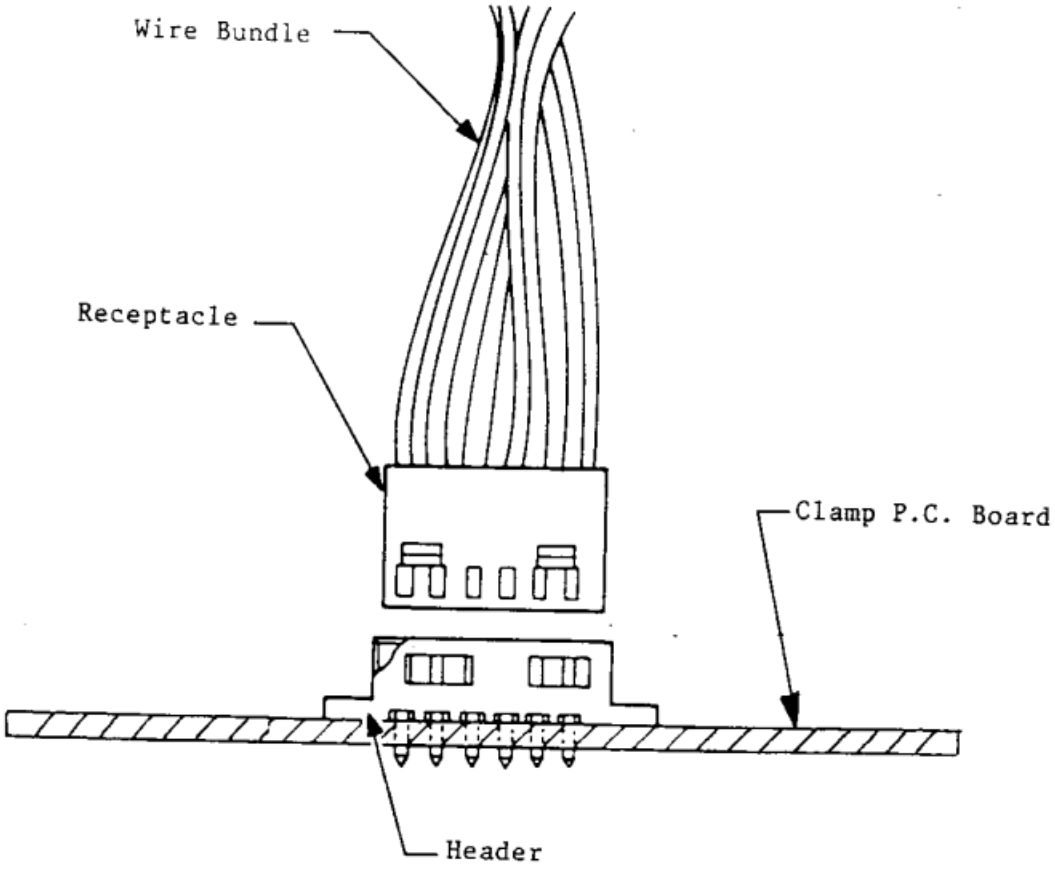


Figure 7
Mounting and Clamping Location for
Vibration and Physical Shock