

PRODUCT SPECIFICATION

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for AMPPOWER[®] Wave Crimp System 4 cable to cable interface. This interface consists of 2 self-aligning mating halves, a plug and a receptacle. The receptacle is available in 2 mounting styles, latching mount and floating mount. The latching mount is equipped with 2 latches which latch into the plug body when the 2 connector halves are fully engaged. The floating mount version is designed for bulkhead applications where tolerance to misalignment is desirable in obscured engagements. Both plug and receptacle are equipped with 4 pairs of power contacts. Each pair of power contacts terminates 1 insulated flat cable having 1 or 2 copper conductors in a 1 inch wide envelope. Both .010 and .020 thick conductors are available. When used with a split or 2 conductor cable, the connector interfaces 8 independent power channels. When used with solid or single conductor cable, the connector interfaces only 4 power channels. In addition to power channels, the connectors also provides 8 signal channels for sense and control functions. Both plug and receptacle are polarized to preserve circuit polarity.

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 the 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. 114-49005: Application Specification
- E. 501-221: Test Report

* Trademark

Product Code: 9983

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<p>CONTROLLED DOCUMENT This specification is a controlled document per AMP Specification 102-21. It is subject to change and Corporate Standards should be contacted for latest revision.</p>				<p>DR <i>Brent Beckley 2/24/93</i></p>	<p>AMP AMP Incorporated Harrisburg, PA 17105-3608</p>		
				<p>CHK <i>Tommy Bond 8-3-93</i></p>			
				<p>APP <i>R/S Gube 4/2/93</i></p>	<p>NO 108-1436</p>	<p>REV 0</p>	<p>LOC B</p>
0	Release per EC 93062306	<i>B/B</i>	<i>8/9/93</i>	PAGE	TITLE CONNECTOR, AMPPOWER, WAVE CRIMP, PLUG & RECEPTACLE, DRAWER		
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3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Material

A. Contacts:

- (1) Power contacts: Copper alloy, silver plating on contact surfaces, tin/lead plating on solder tails
- (2) Signal contacts: Phosphor bronze, gold over nickel plating on contact surfaces

B. Plug and receptacle housing: Polyester, black, glass filled, UL 94V-0

C. Strain relief and signal module housing: Nylon 6/6

3.3. Ratings

A. Voltage:

- (1) Power contacts: 250 vac (rms)
- (2) Signal contacts: 90 vac (rms)

B. Current: See Figure 2 for applicable current carrying

C. Temperature: -40 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 114-49005.	Visual, dimensional and functional per applicable quality inspection plan.
ELECTRICAL		
Termination resistance, dry circuit, power contacts.	2 milliohms maximum.	Subject mated contacts assembled in housing to 50 mv open circuit at 100 ma maximum. See Figure 6. AMP Spec 109-6-1.
Termination resistance, dry circuit, signal contacts.	18 milliohms maximum.	Subject mated contacts assembled in housing to 50 mv open circuit at 100 ma maximum. See Figure 6. AMP Spec 109-6-1.

Figure 1 (cont)

AMP AMP Incorporated Harrisburg, PA 17105-3608	PAGE	NO	REV	LOC
	2	108-1436	0	B

Test Description	Requirement	Procedure
Dielectric withstanding voltage.	Power contacts: 1500 vac (rms). 1 minute hold. No breakdown or flashover. Signal contacts: 1200 vac (rms). 1 minute hold. No breakdown or flashover.	Test mated connector assemblies as follows: (1) Between adjacent power contacts. (2) Between adjacent signal contacts. (3) Between shorted power conductors and metal foil wrapped around connector housing. (4) Between shorted signal leads and metal foil wrapped around connector housing. AMP Spec 109-29-1.
Insulation resistance.	1000 megohms minimum.	Test between closest adjacent contacts of mated connector assemblies and between shell and contacts. AMP Spec 109-28-4.
Temperature rise vs current.	30°C maximum temperature rise at specified current.	Measure temperature rise vs current as specified in Figure 2A. See Figures 2 and 7. AMP Spec 109-45-1.
MECHANICAL		
Vibration, sinusoidal, high frequency.	No discontinuities greater than 1 microsecond. See Note (a).	Subject mated connector to 10 G's, between 10-500-10 Hz traversed in 15 minutes 3 hours in each of 3 mutually perpendicular planes. See Figure 5. AMP Spec 109-21-2.
Physical shock.	No discontinuities greater than 1 microsecond. See Note (a).	Subject mated connector to 50 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 shocks total. See Figure 5. AMP Spec 109-26-1.

Figure 1 (cont)

AMP AMP Incorporated Harrisburg, PA 17105-3608	PAGE 3	NO 108-1436	REV 0	LOC B
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Test Description	Requirement	Procedure
Mating force.	25 pounds maximum.	Measure force necessary to mate connector assembly from point of initial contact to full engagement using free floating fixtures at maximum rate of 1 inch per minute. AMP Spec 109-42, Condition A.
Unmating force.	5 pounds minimum.	Measure force necessary to unmate connector assembly with latches inactive at maximum rate of 1 inch per minute. AMP Spec 109-42, Condition A.
Contact retention, plug, power contacts.	Cable strain relief integrity and function shall remain intact.	Apply axial load of 45 pounds to 2 layered cables by pulling on both cables simultaneously in unmating direction and releasing. AMP Spec 109-30.
Contact retention, plug, signal contacts.	Wire crimp, signal contact receptacle function and signal module latch integrity shall remain intact.	Apply axial load of 3 pounds to contact leads by pulling on each lead individually and releasing. AMP Spec 109-30.
Contact retention, receptacle, power contacts.	Cable strain relief integrity and function shall remain intact.	Apply axial load of 45 pounds to 2 layered cables by pulling on both cables simultaneously in unmating direction and releasing. AMP Spec 109-30.
Contact retention, receptacle, signal contacts.	Wire crimp, signal contact receptacle function and signal module latch integrity shall remain intact.	Apply axial load of 3 pounds to contact leads by pulling on each lead individually and releasing. AMP Spec 109-30.
Crimp tensile, plug and receptacle.	1/2 Width Cable Tensile .010 thick 30 lbs .020 thick 40 lbs	Determine crimp tensile at rate of 1 inch per minute. AMP Spec 109-16.
Durability.	See Note (a).	Mate and unmate connector halves for 100 cycles at maximum rate of 600 cycles per hour. AMP Spec 109-27.

Figure 1 (cont)

AMP AMP Incorporated Harrisburg, PA 17105-3608	PAGE	NO	REV	LOC
	4	108-1436	0	B

Test Description	Requirement	Procedure
Housing lock strength, latching mount.	60 pounds minimum.	Determine strength of latch mechanism by pulling on all 4 plug and receptacle cables of mated connector assembly at rate of .5 inch per minute attempting to disengage plug from receptacle. AMP Spec 109-50.
ENVIRONMENTAL		
Thermal shock.	See Note (a).	Subject mated connectors to 5 cycles between -40 and 105°C. AMP Spec 109-22.
Humidity-temperature cycling.	See Note (a).	Subject mated connectors to 10 humidity-temperature cycles between 25 and 65°C at 95% RH for 10 days. AMP Spec 109-23-3.
Mixed flowing gas.	See Note (a).	Subject mated connectors to environmental class III for 20 days. AMP Spec 109-85-3.
Temperature life.	See Note (a).	Subject mated connectors to temperature life at 140°C for 720 hours. AMP Spec 109-43.

(a) Shall meet visual requirements, show no physical damage and shall meet requirements of additional tests as specified in test sequence in Figure 3.

Figure 1 (end)

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AMP Incorporated
Harrisburg, PA 17105-3608

PAGE NO

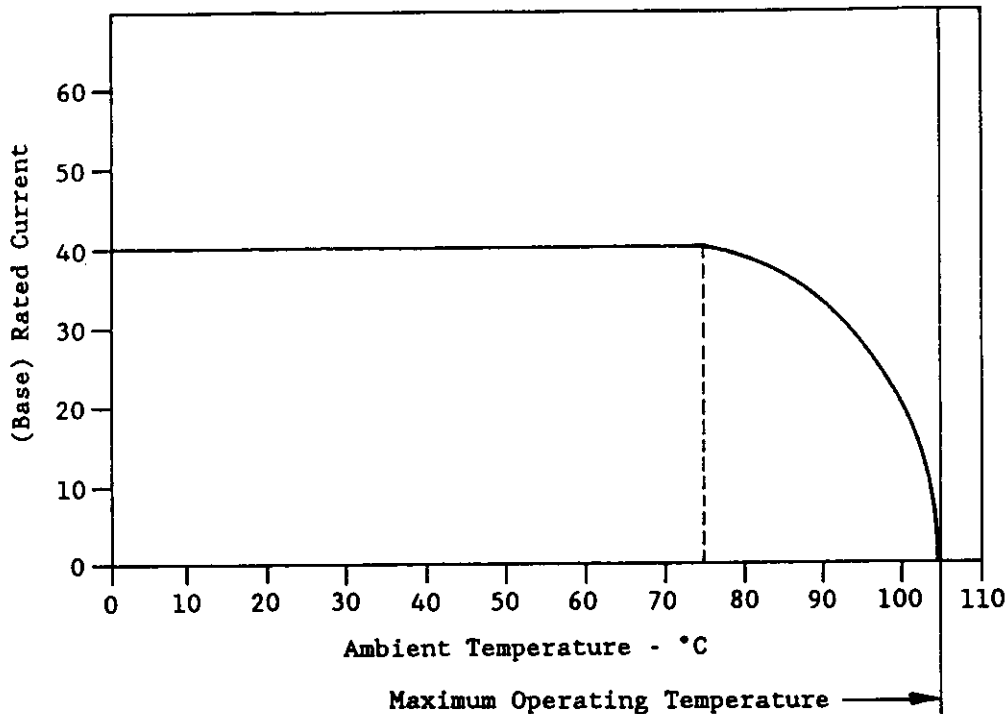
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108-1436

REV LOC

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Note: Connector rating is based on:

- (1) 1 row of power contacts (4 channels) energized at 1 time.
- (2) Signal contacts not energized.
- (3) Base current is for 1 .020 thick conductor of a 2 conductor cable with both conductors energized.
- (4) All 4 cables brought out of receptacle housing on 1 side in a layered configuration (2 bundles of 2 cables each).

Figure 2A
Current Carrying Capability

Cable Positions Energized	Cable			
	.020		.010	
	Solid	Split	Solid	Split
2 & 4 or 1 & 3 (1 row)	2.17	1.0	1.46	.80
2 & 4 and 1 & 3 (both rows)	1.71	.80	1.17	.63

Note: To determine acceptable current carrying capacity for cable configuration chosen, use Multiplication Factor (F) from above chart and multiply it times Base Rated Current as shown in Figure 2A. In Figure 2B, solid and split refer to 1 and 2 conductor cables. Ratings are per conductor. Positions are marked on connector housing.

Figure 2B
Current Rating

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)				
	1	2	3(d)	4	5
	Test Sequence (b)				
Examination of product	1,13	1,9	1,9	1,3	1,3
Termination resistance, dry circuit	3,7	2,7			
Dielectric withstanding voltage			3,7		
Insulation resistance			2,6		
Temperature rise vs current		3,8			
Vibration	5	6(c)			
Physical shock	6				
Mating force	2				
Unmating force	8				
Contact retention, plug, power	9				
Contact retention, plug, signal	10				
Contact retention, receptacle, power	11				
Contact retention, receptacle, signal	12				
Crimp tensile, plug				2	
Crimp tensile, receptacle					2
Durability	4				
Housing lock strength, latching mount			8		
Thermal shock			4		
Humidity-temperature cycling			5		
Mixed flowing gas		4(e)			
Temperature life		5			

- (a) See Para 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Discontinuities shall not be measured. Energize power contacts at 18°C level for 100% loading as determined in AMP Specification 109-151. Energize signal contacts at 1 ampere.
- (d) Group 3 applies only to product with an insulating system.
- (e) Precondition samples with 10 cycles durability.

Figure 3

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, 2 and 3 shall consist of unmated plug and receptacle assemblies with latching mount receptacles and signal line modules. Both plug and receptacles shall be fully equipped with power contacts terminated to short cables of specified length and thickness. Cables for test groups 1 and 2 shall be brought out of the receptacle housing through strain relief slots marked 2 and 4 in 2 layers of 2 cables each. Cables for test group 3 shall be brought out separately, 1 cable through each strain relief slot marked 1 through 4. Signal modules shall be fully populated with signal contacts terminated to 12 inch leads of .010 PVC wall 22 AWG 7 strand tinned copper wire rated at 600 volts at 105°C. Test groups 4 and 5 shall consist of plug and receptacle power contacts respectively terminated to short cables of specified length and thickness. Sample quantities and cable details for each test group are shown in Figure 4. All samples shall be prepared from split cables. Approximately 1/2 inch of insulation shall be removed from unterminated end of all cables and signal pigtails. After insulation has been removed, cables shall be notched and .17 diameter hole punched in each cable half next to the notch.

Test Group	Quantity	Conductor Thickness		Cable Length (Inch)
		.010	.020	
1	8	4	4	18
2	8	4	4	18
3	8		8	9
4	16	8	8	9
5	16	8	8	9

Figure 4

B. Test Sequence

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

4.2. 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.

AMP

AMP Incorporated
Harrisburg, PA 17105-3608

PAGE NO

8

108-1436

REV LOC

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B

4.3. 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.

4.4. 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.

4.5. Certification

This product has been recognized under Component Recognition Program of Underwriters Laboratories Inc., Electrical File Number

⚠ Cables to be clamped within 3 inches free length.

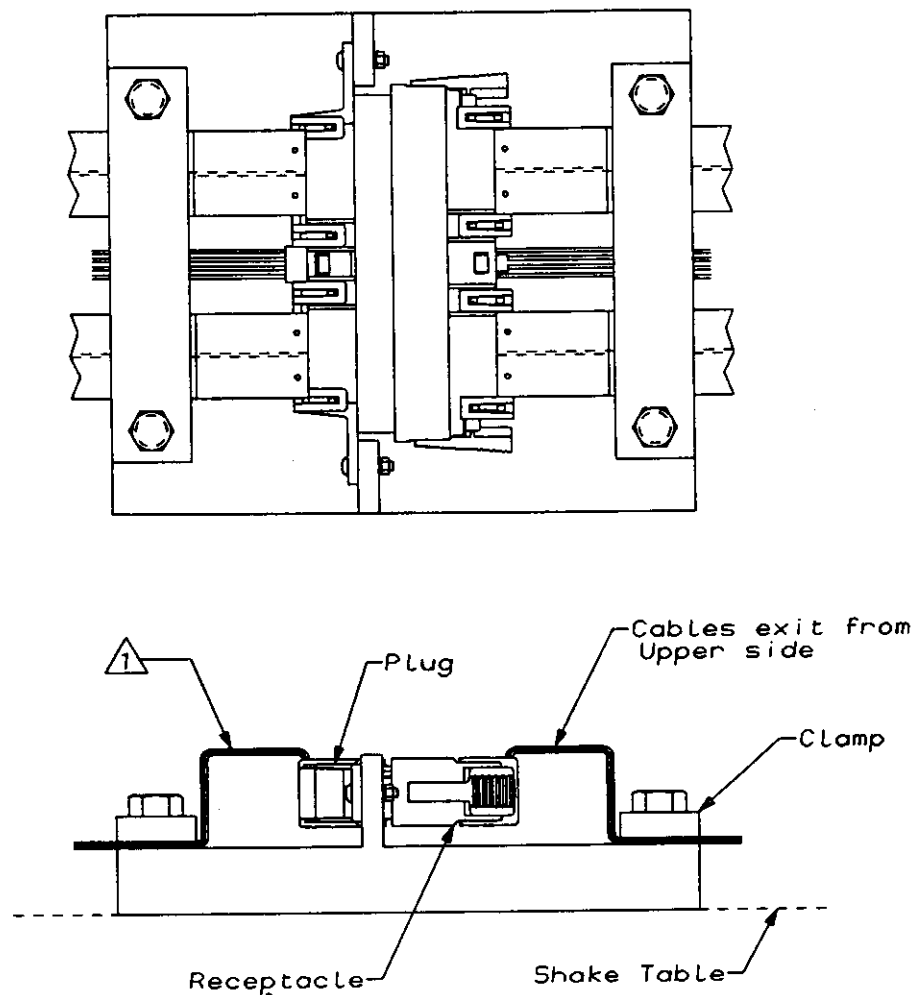


Figure 5
Vibration & Physical Shock Mounting

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PAGE NO

9

108-1436

REV

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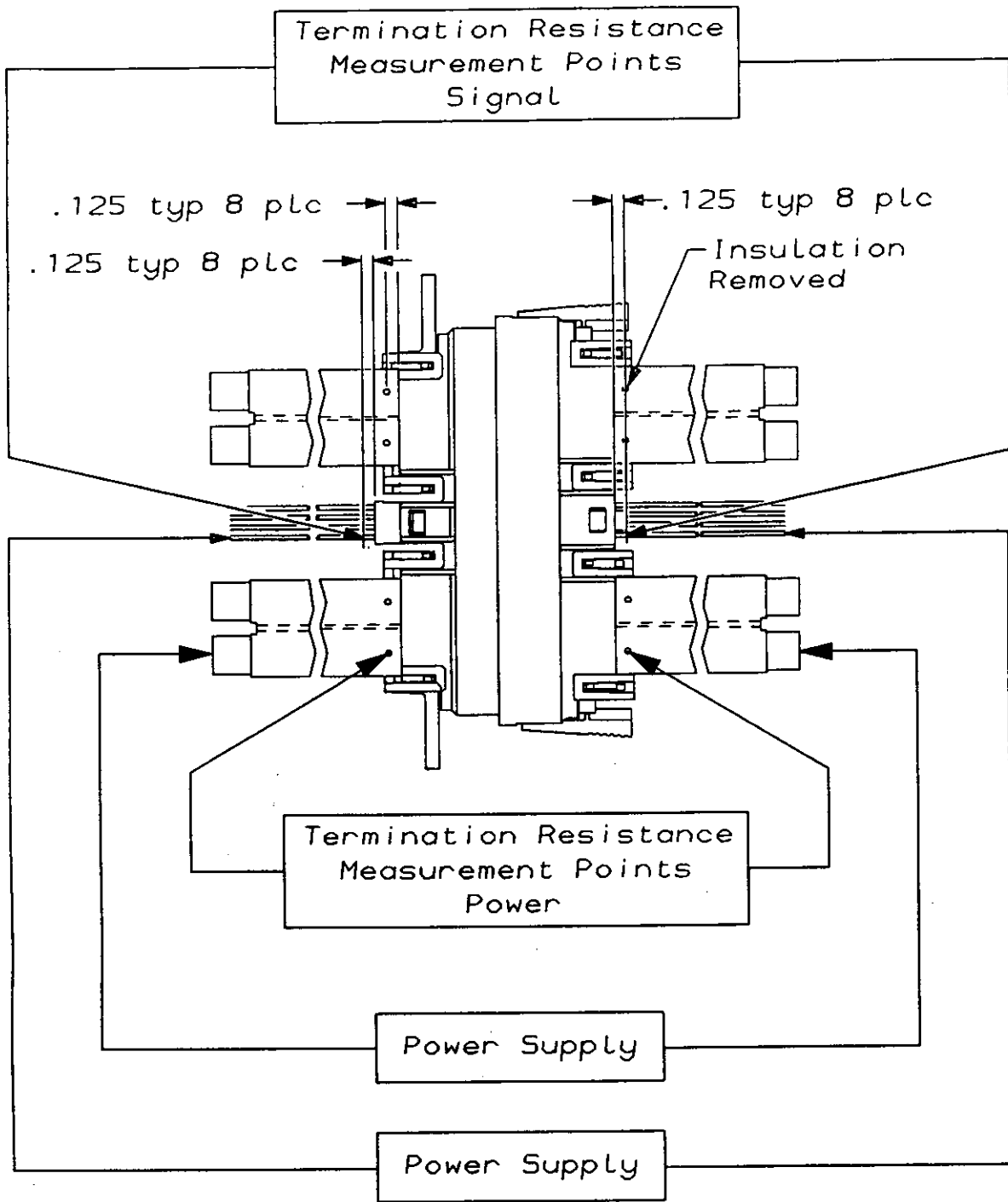
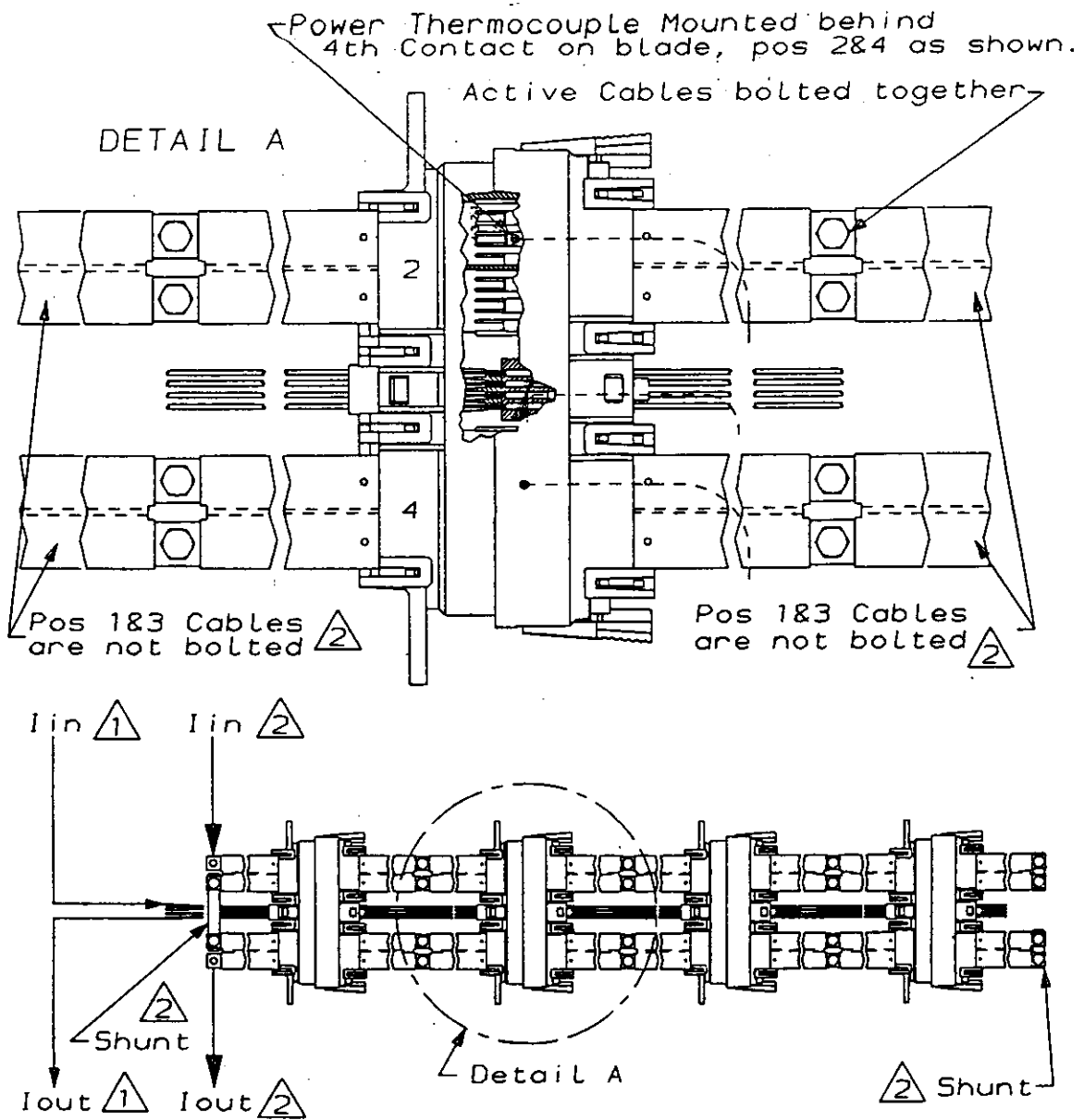


Figure 6
Termination Resistance Measurement Points



- $\triangle 1$ Note: Signal Contact Leads are connected Such That ALL Signal Contacts Are In Series
- $\triangle 2$ Note: Power Cables in Positions 2 and 4 are shunted Such That Position 2 and 4 Power Contacts Are In Series; Position 1 and 3 Power Contacts Are Not Energized

Figure 7
Temperature Rise