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**Connector System, MTA 156 Quad**

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**1. SCOPE**

## 1.1. Content

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) MTA-156 Quad Contact connector system. This connector system can be mass or single wire terminated utilizing insulation displacement technology on .156 inch centerlines and mates with .045 inch square posts. This system provides a reliable interconnection between wires and posts mounted on printed circuit boards. Quad connector is available in 2 through 12 positions. This connector system is designed to be terminated to 18, 20 and 22 AWG wire, solid, stranded and prefused or overcoated wire, tin plated, UL style 1007, 1061 or wire which specifies PVC insulation with temperature rating compatible with specified operating temperatures, see Figure 4A. Wire shall be applied per application requirements specified in Application Specification 114-1048. Wire insulation diameter shall be .070 inch maximum OD for mass terminated wire and .095 inch maximum OD for single terminated wire.

## 1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

**2. APPLICABLE DOCUMENTS**

The following Tyco Electronics documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

- 109-1: General Requirements for Test Specifications
- 109 Series: Test Specifications as indicated in Figure 1
- 114-1048: Application Specification
- 501-247: Test Report

**3. REQUIREMENTS**

## 3.1. Design and Construction

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

## 3.2. Materials

- Contact: Copper alloy, bright tin-lead plated, lubricated
- Headers: Thermoplastic polyester, UL94V-0
- Header post: Brass, .045 inch square, tin plated
- Housing: Nylon 6/6, black, UL94V-0

3.3. Ratings

- Voltage: 600 volts AC
- Current: See Figure 4 for applicable current carrying capability
- Temperature: -55 to 105°C

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. All tests are performed at ambient environmental conditions per Test Specification 109-1 unless otherwise specified.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure								
Examination of product.	Meets requirements of product drawing and Application Specification 114-1048.	Visual, dimensional and functional per applicable quality inspection plan.								
<b>ELECTRICAL</b>										
Termination resistance, dry circuit.	3 milliohms maximum initial. $\Delta R$ 3 milliohms maximum.	TE Spec 109-6-1. Subject mated contacts assembled in housing to 50 mv open circuit at 100 ma maximum. See Figure 3.								
Insulation resistance.	5000 megohms minimum initial.	TE Spec 109-28-4. Test between adjacent contacts of unmated connector assemblies.								
Dielectric withstanding voltage.	2.2 kvac dielectric withstanding voltage. 1 minute hold.	TE Spec 109-29-1. Test between adjacent contacts of unmated connector assemblies.								
Temperature rise vs current.	30°C maximum temperature rise at specified current.	TE Spec 109-45. Measure temperature rise vs current. See Figure 4.								
Current cycling.	See Note.	TE Spec 109-51. Subject mated contacts to 500 cycles at 125% rated current for 15 minutes ON and 15 minutes OFF. 6 circuit fully loaded.								
<b>MECHANICAL</b>										
Tensile, straight.	<table border="1" style="display: inline-table; border-collapse: collapse;"> <thead> <tr> <th>Wire Size AWG</th> <th>Slot Tensile Lbs Minimum</th> </tr> </thead> <tbody> <tr> <td>18</td> <td>26.5</td> </tr> <tr> <td>20</td> <td>17.0</td> </tr> <tr> <td>22</td> <td>12.0</td> </tr> </tbody> </table>	Wire Size AWG	Slot Tensile Lbs Minimum	18	26.5	20	17.0	22	12.0	TE Spec 109-16. Determine slot tensile at rate of 1 inch per minute. Apply force parallel to axis of wire.
Wire Size AWG	Slot Tensile Lbs Minimum									
18	26.5									
20	17.0									
22	12.0									

Figure 1 (continued)

Test Description	Requirement		Procedure
Tensile, perpendicular, slot/wire.	Wire Size AWG 18 20 22	Slot Tensile Lbs Minimum 4.5 4.0 3.4	TE Spec 109-16. Determine slot tensile at rate of 1 inch per minute. Apply force perpendicular to axis of wire on samples without dust covers, strain relief covers or housing strain reliefs.
Vibration, sinusoidal low frequency.	No discontinuities greater than 1 microsecond. See Note.		TE Spec 109-21-1. Subject mated connectors to 10-55-10 Hz traversed in 1 minute at 0.06 inch total excursion. 2 hours in each of 3 mutually perpendicular planes. See Figure 5 or 6.
Physical shock.	No discontinuities greater than 1 microsecond. See Note.		TE Spec 109-26-1. Subject mated connectors to 50 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. See Figure 5.
Durability.	See Note.		TE Spec 109-27. Mate and unmate connector assemblies for 25 cycles. Mount plain flat header in fixture and manually mate.
Contact retention.	5 pounds minimum.		TE Spec 109-30. Pull on contacts using special housing cut away to expose contact top for gripping.
Mating force.	Connector Size 2 position 6 position 10 position 12 position	Lbs Maximum Initial 4.7 14.5 26.5 35.0	TE Spec 109-42, Condition A. Measure force necessary to mate connector assemblies with tin plated plain flat header a distance of 0.20 inch from point of initial contact using free floating fixtures at rate of 0.5 inch per minute.
Unmating force.	Connector Size 2 position 6 position 10 position 12 position	Lbs Minimum Final 0.5 1.0 3.0 5.0	TE Spec 109-42, Condition A. Measure force necessary to unmate connector assemblies at rate of 0.5 inch per minute.
ENVIRONMENTAL			
Thermal shock.	See Note.		TE Spec 109-22. Subject mated connectors to 25 cycles between -55 and 85°C.

Figure 1 (continued)

Test Description	Requirement	Procedure
Humidity-temperature cycling.	See Note.	TE Spec 109-23-5, Condition B. Subject mated connectors to 10 humidity-temperature cycles between 25 and 65°C at 95% RH.
Temperature life.	See Note.	TE Spec 109-43. Subject mated connectors to temperature life at 105°C for 792 hours.

**NOTE** *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)

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)								
	1	2	3	4	5	6	7	8	9
	Test Sequence (b)								
Examination of product	1,9	1,6	1,6	1,9	1,8	1,5	1,5	1	1,5
Termination resistance, dry circuit	3,6	2,5	2,5	2,8		2,4	2,4		2,4
Insulation resistance					2,6				
Dielectric withstanding voltage					3,7				
Temperature rise vs current				3,7					
Current cycling							3		
Tensile, straight & perpendicular	8(d)								
Vibration	5			6(c)					
Physical shock									3
Durability	4	3	3						
Contact retention								2	
Mating force	2								
Unmating force	7								
Thermal shock					4	3			
Humidity-temperature cycling			4	4(e)	5				
Temperature life		4		5					

**NOTE** (a) *See paragraph 4.1.A.*  
 (b) *Numbers indicate sequence in which tests are performed.*  
 (c) *Discontinuities shall not be measured. Energize at 18 °C level for 100% loading as determined in Test Specification 109-151.*  
 (d) *One half samples shall be subjected to straight slot test with remaining half subjected to perpendicular tensile test.*  
 (e) *Precondition samples by manually mating and unmating 10 times.*

Figure 3

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#### 4. QUALITY ASSURANCE PROVISIONS

##### 4.1. Qualification Testing

###### A. Sample Selection

Connector assemblies shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. Test group 1 shall consist of 30 connector assemblies of 2, 6 and 10 position sizes. Test groups 2, 3, 5, 6, 7, 8 and 9 shall each consist of 5 connector assemblies (6 position each) per group per wire size. Test group 4 shall consist of minimum of 30 contacts from minimum of 3 connectors for maximum wire size. Test groups 1 and 9 shall be mounted per Figure 5. Test groups 2, 3 and 6 shall be mounted per Figure 4. Test groups 4 and 7 shall be mounted per Figure 6. All wires shall be applied per AMP Specification 114-1048.

###### B. Test Sequence

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

##### 4.2. Requalification Testing

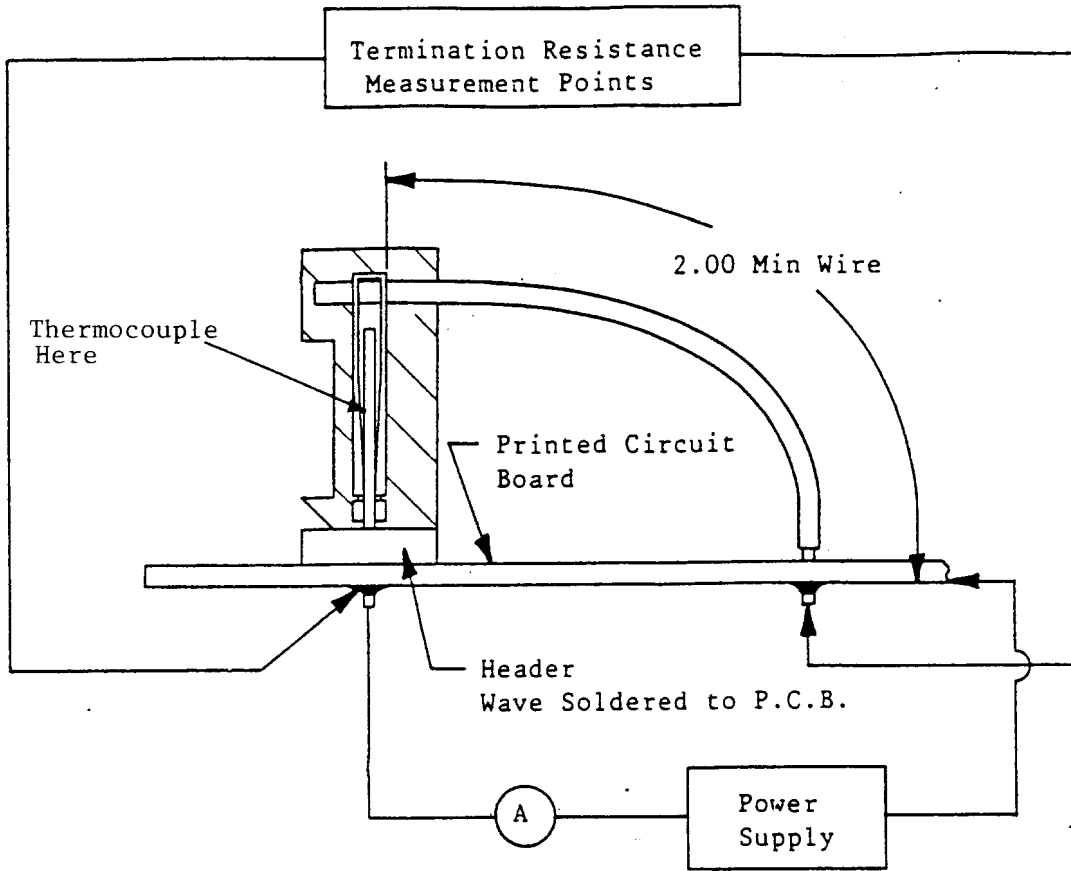
If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

##### 4.3. Acceptance

Acceptance is based on verification that the product meets requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the 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

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

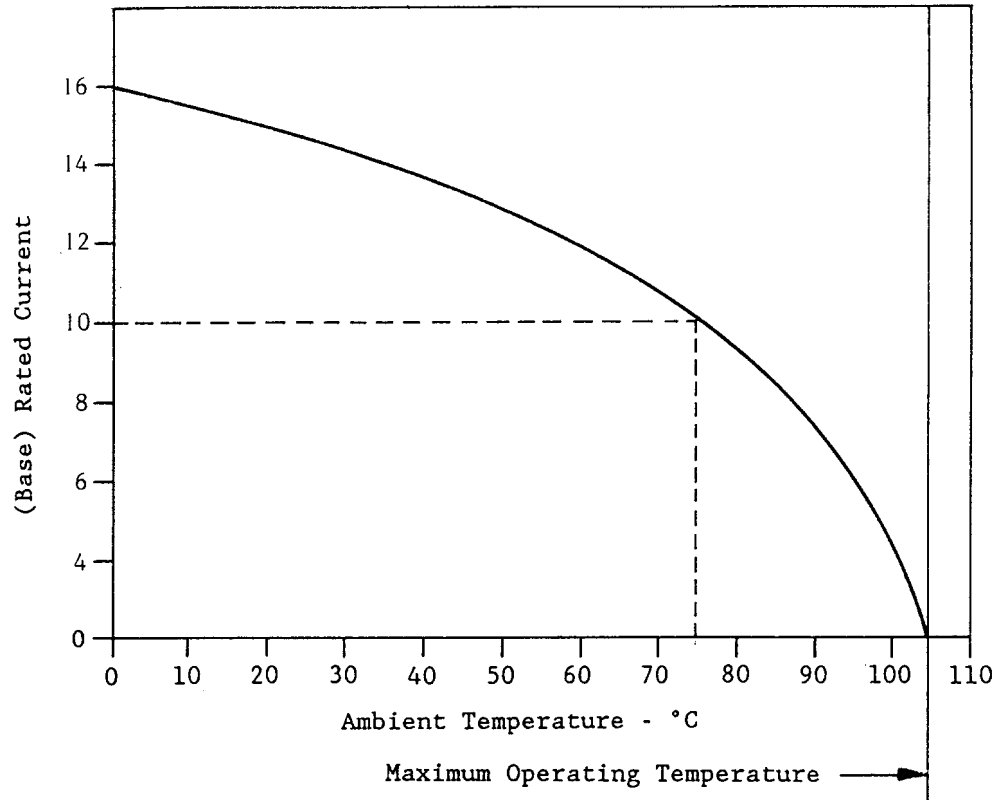


**NOTE**

1. *Termination resistance equals millivolts drop divided by test current less resistance of total length of wire.*
2. *After wave soldering, board and posts shall be cleaned to remove all flux and contaminates.*

Figure 3  
Resistance & Temperature Measurement Points  
PCB 93-660164

Single Circuit,  $I_{RMS}$  or  $I_{DC}$ , 18 AWG, Continuous Operating  
(95% Probability and 99% Reliability)



**NOTE**

Operating temperature is defined as ambient temperature plus current produced temperature rise in contact system. Operating temperature in above graph is area under curve.

Figure 4A  
Current Carrying Capability

% Connector Loading Uniformly Distributed	Multiplication Factor (F)			
	Wire Size AWG			Connector Assembly Position Size
	22	20	18	
Single contact	0.73	0.85	1	
25 to 35	0.69	0.80	0.94	12
	0.71	0.83	0.97	6
	0.73	0.85	1.00	2
50	0.60	0.69	0.82	12
	0.66	0.79	0.93	6
	0.73	0.85	1.00	2
65 to 75	0.50	0.57	0.65	12
	0.56	0.68	0.82	6
	0.73	0.85	1.00	2
100	0.40	0.45	0.53	12
	0.49	0.61	0.66	6
	0.69	0.85	0.85	2

**NOTE**

1. To determine acceptable current carrying capacity for 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 shown in Figure 2A.
2. For rating factors of other connector position sizes, contact Tyco Electronics Product Engineering.
3. Current rating chart represents series circuit loaded connectors. For parallel loaded circuits, contact Tyco Electronics Product Engineering.

Example: For a 6 position connector on 20 AWG wire with 50% current loading density operating at 75°C.

- From current carrying capability curve (Figure 2A), base current rating at 75°C is 10 amperes.
- From rating factors table (Figure 2B) for 20 AWG wire, rating factor at 50% loading is 0.79.
- Multiply base rating by rating factor: 10.0 X 0.79 = 7.9 amperes
- Each of 3 equally distributed contacts can carry 7.9 amperes maximum.

Figure 4B  
Current Rating



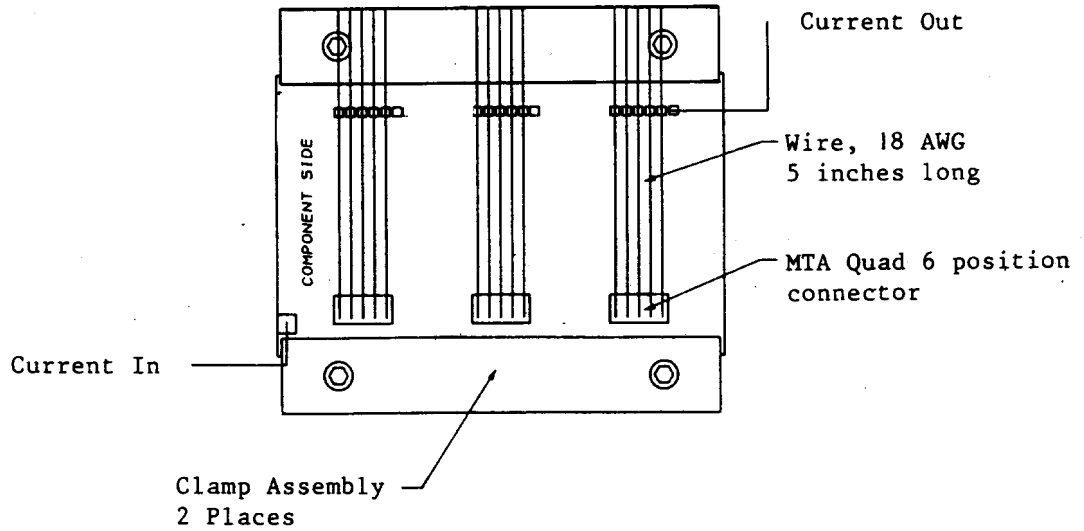
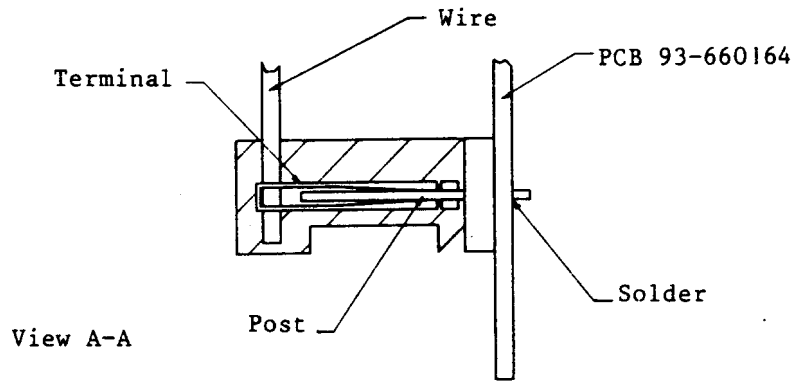
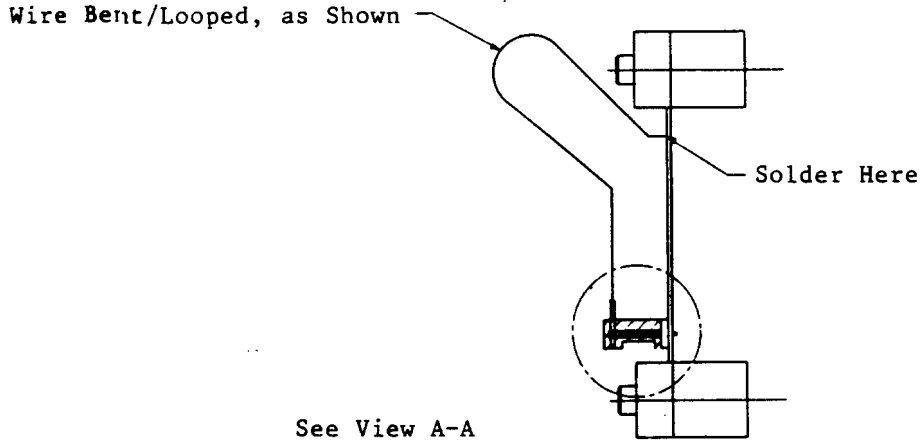


Figure 5  
Vibration & Physical Shock  
PCB 93-660164

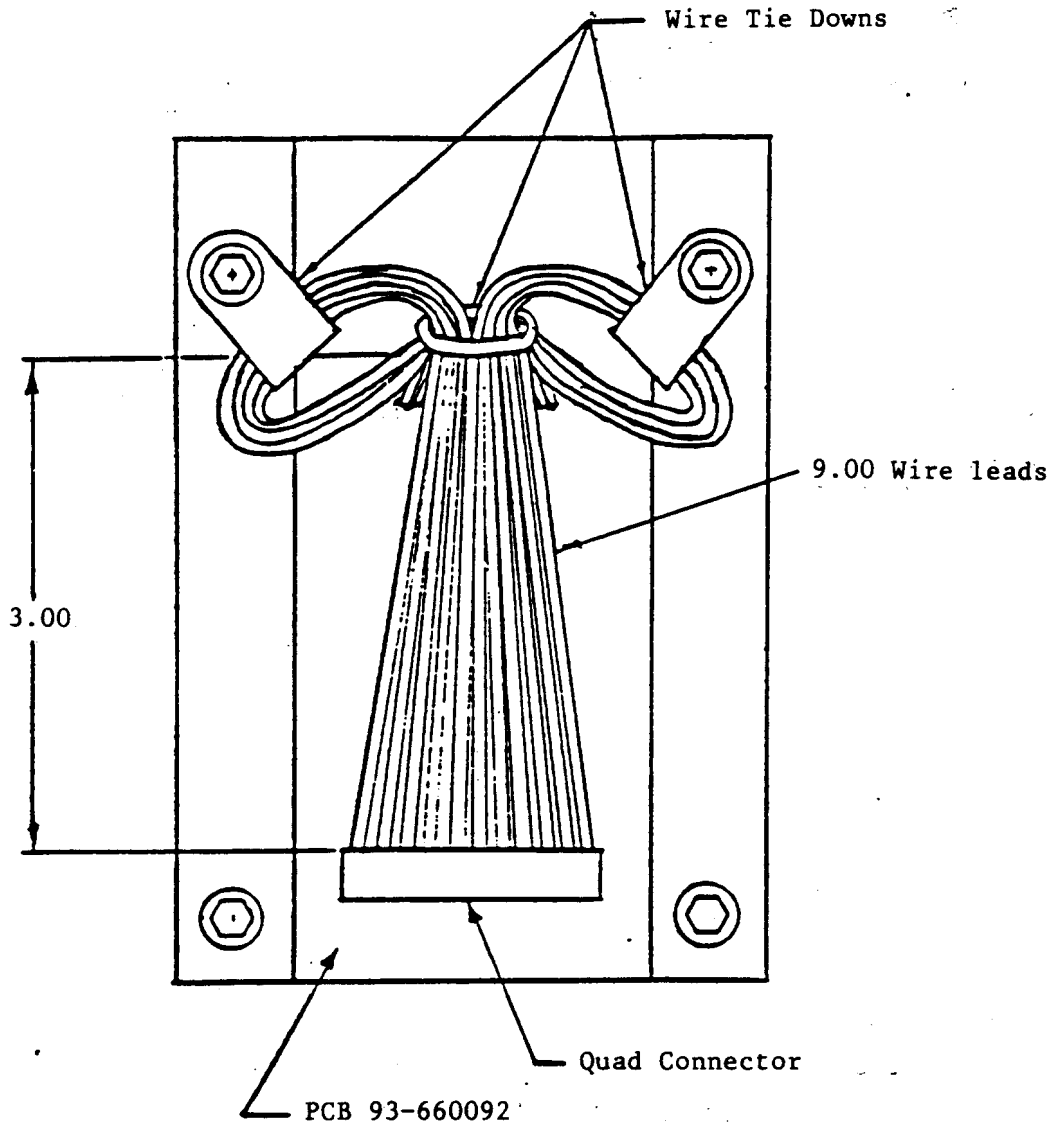


Figure 6  
Vibration & Current Cycling  
PCB 93-660092-1