

# IPC-TM-650 TEST METHODS MANUAL

**1 Scope** The purpose of this test method is to determine the susceptibility of non-noble metal contact interfaces to the phenomena of fretting corrosion. Fretting corrosion is an accelerated oxidation of contact surfaces brought about by small amplitude cyclic relative motions between mating contacts. In this test, a driving motion is imposed, which tends to cause relative motion at the contact surfaces. From contact resistance measurements, one determines whether the resulting contact motion, if any, generates significant or detrimental films in the contact interface.

**2 Applicable Documents** None

### 3 Test Specimens

**3.1** Any pre-production or production connectors

### 4 Equipment/Apparatus

**4.1** Clamping fixture for test connector(s) and test boards to mate with test connectors or, in the case of post receptacles, postheaders

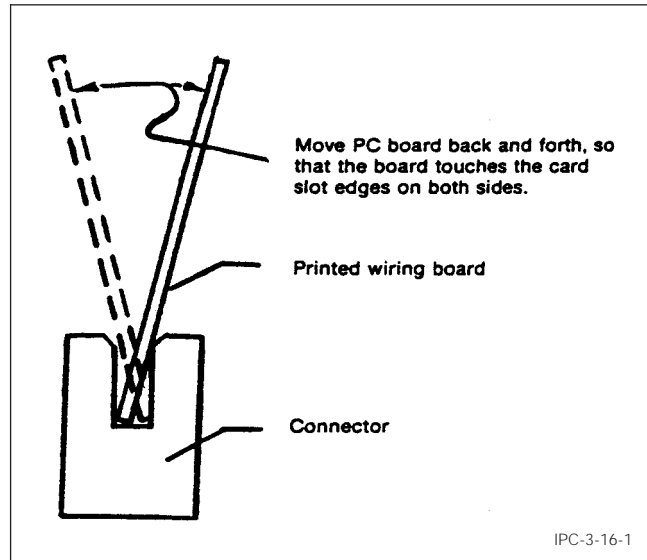
**4.2** A motorized cam, crank, or other mechanism, with appropriate linkage, must be provided to physically attach to the movable connector, test board, or post and rock this half back and forth as illustrated in Figure 1. The rocking motion shall be approximately 10 cycles per minute, but no faster than 30 cycles per minute.

**4.3** The mechanism must be adjustable so as to restrict the amplitude of motion to one, which, in the case of a PCB system, just lets the board touch the card slot in the connector on each side.

**4.4** A counter to record the number of rocking cycles should be provided.

**4.5** A means of measuring contact resistance must be provided. Dry circuit measuring conditions are to be maintained, with open-circuit voltages of 50mv or less and test currents of 100 ma or less. A Keithley Model 503 milliohmmeter or its equivalent may be used.

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**Figure 1 Fretting Motion to be Applied to PCB Connectors**

### 5 Procedure

#### 5.1 Test

**5.1.1** Contacts are to be assembled in their housings as in normal intended usage.

**5.1.2** New test connectors, boards, or posts are to be used in each test.

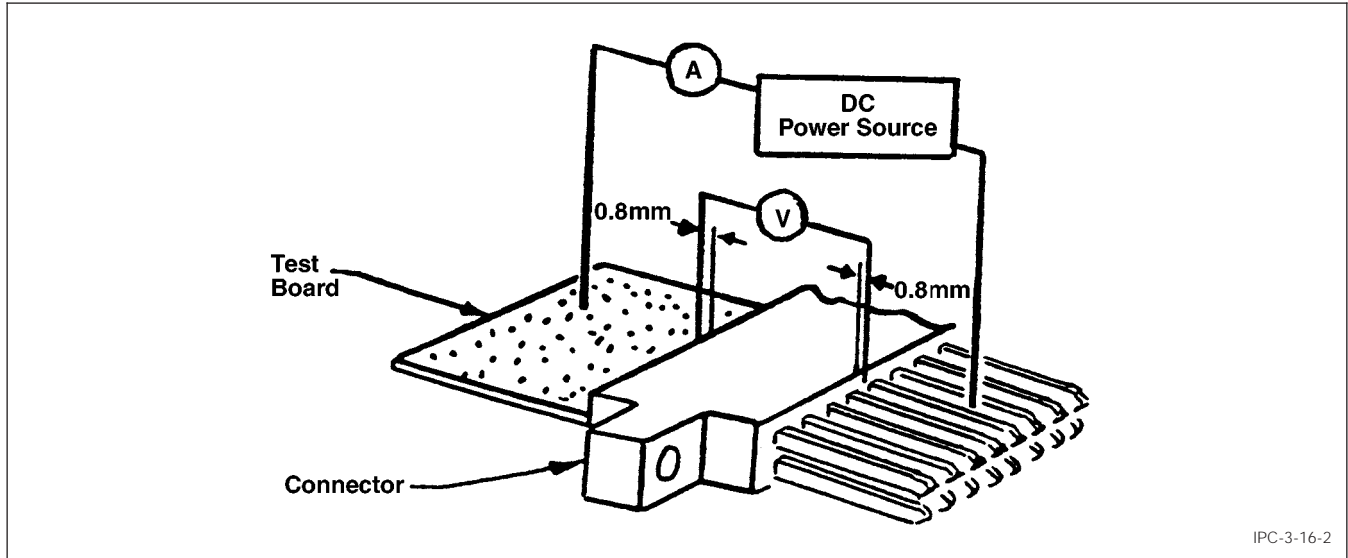
**5.1.3** Measure and record initial resistance after inserting test connector(s), board(s), or post(s).

**5.1.4** Attach and adjust rocking mechanism, then begin rocking cycles.

**5.1.5** Stop the rocking motion and measure contact resistance after 10, 20, 50, 100, 200, 300, 400, and 500 cycles. Individual contacts are to be measured separately (see Figure 2).

**Note:** A milliohmmeter having separate current and voltage leads may be used instead, with leads positioned as shown in Figure 2.

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**Figure 2 Method of Making Contact Resistance Measurements**

## 5.2 Evaluation

**5.2.1** Record and report resistance vs. number of rocking cycles.

## 6 Notes

**6.1** Keithley Model 503 Milliohmmeter may be purchased from:

KEITHLEY INSTRUMENTS, INC.  
 28775 Aurora Road  
 Cleveland, Ohio 44139  
 (216) 248-0400