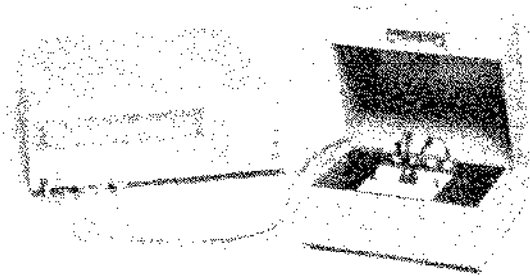
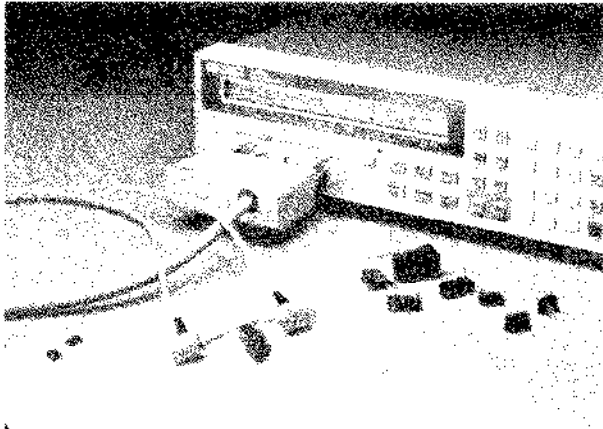


Contact Resistance and Insulation Resistance Measurements of Electro-mechanical Components

- HP 4338A Milliohmmeter -
- HP 4339A High Resistance Meter -



INTRODUCTION

With increased requirements for size reduction and higher reliability design standards, it has become necessary to evaluate the Contact Resistance and Insulation Resistance of electro-mechanical components such as relays, switches, and connectors, employed in electronic equipment. We will discuss the solutions offered by the HP 4338A Milliohmmeter and the HP 4339A High Resistance Meter which let these measurement requirements be realized.

CONTACT RESISTANCE MEASUREMENT

► CURRENT PROBLEM

- (1) It is troublesome to determine the proper measurement range for a device whose value is unknown.
- (2) The device can't be evaluated at its actual working level (ex. $1\mu\text{A}$) because the test signal level is a function of

the measurement range selected.

- (3) It's impossible to measure high valued contact resistance (ex. 500Ω of the rubber key).

- (4) Total throughput isn't improved due to the slow measurement speed, and inadequate control interfacing to available Auto-Handlers.

- (5) Existing test fixtures can't be used to measure small and large diameter lead components.

► HP 4338A SOLUTION

(1) Auto Measurement Function

HP 4338A has an Auto Measurement Function which allows you to automatically select the range and test current. So you can obtain measurement results just by pressing the "Auto Meas" key, even if a device's resistance value is unknown. In addition, this function gives measurement results which are compatible with the

measurement results obtained using an HP 4328A, so consistent measurement results are realized.

(2) 5 Selectable Test Currents

The HP 4338A can be set to one of five selectable test signal levels ($1\mu\text{A}$, $10\mu\text{A}$, $100\mu\text{A}$, 1mA , 10mA) independent of the measurement range selected. ^{<note 1>} So you can measure a device under its actual operating conditions.

(3) Wide Measurement Range

HP 4338A has a wide measurement range from $10\mu\Omega$ to $100\text{k}\Omega$, and it can evaluate from the ultra low resistance typical of a connector to the high valued contact resistance typical of rubber key.

(4) Higher Throughput

HP 4338A's measurement speed is 34 ms (in the SHORT integration time mode). In addition, the HP 4338A has a built-in comparator function (HI/IN/LO), and a handler interface which makes for easy



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system integration, and effectively realizes higher throughput.

(5) Various Types of Test Fixtures Available

There are various types of test fixtures available for the HP 4338A, as listed in Table 1. Especially important for the increasingly used narrow pitch components, connectors, and micro switches, the HP 16005C/D IC clip leads offers the measurement solution.

Table 1. HP 4338A Fixtures

HP 16338A	Test Lead Set
HP 16143B	Mating Cable
HP 16005B	Kelvin Clip
HP 16005C/D	Kelvin IC Clip
HP 16006A	Pin Probe
HP 16007A/B	Alligator Clip

INSULATION RESISTANCE MEASUREMENT

► **CURRENT PROBLEM**

(1) The DC charge time for a device must be measured using a clock, and the time measurement accuracy is dependent on the operator.

(2) The measurement result is unstable and can easily be affected by external noise.

(3) There are no test fixtures available for measuring the insulation resistance of small components.

► **HP 4339A SOLUTION**

(1) Test Sequence Program

The HP 4339A has a test

sequence program which allows you to automatically perform the required sequential measurement steps, charge/measure/discharge, by entering the measurement requirements for each step.

(2) Stable Measurement

The HP 4339A's triaxial input terminal configuration offers stable measurement by minimizing the influence of external noise. More stable measurement results can be obtained using the averaging function (averaging factors of 1 through 256).

(3) Variety of Test Fixture Available

There are new test fixtures for the HP 4339A as listed in Table 2.

Table 2. HP 4339A Fixtures

HP 16339A	Component Test Fixture (SMD, Axial, Discrete Comp.)
HP 16117B	Low Noise Test Leads (Alligator)
HP 16117C	Low Noise Test Leads (Handmade)

CONCLUSION

The combined use or solitary use of the HP 4338A Milliohm-meter and the HP 4339A High Resistance Meter offer you the further improvements in measurement and testing reliability and efficiency for electro-mechanical component evaluation.

<note 1>: The measurement range for each level has limitations.