

# accuprobe

## PROBITY

Volume 4, Issue 1

June 2005

### Inside this issue:

<b>Probing Physical Devices</b>	<b>1</b>
<b>New Style Z-Adjustable Probe</b>	<b>2</b>
<b>Printed Circuit Board Design</b>	<b>2</b>
<b>Probe Card Analyzer</b>	<b>2</b>
<b>Chip Resistor Probe Cards</b>	<b>3</b>
<b>Cable Assemblies</b>	<b>3</b>
<b>Multi-Shelf Probe Cards</b>	<b>3</b>
<b>Probe Card Equipment</b>	<b>4</b>

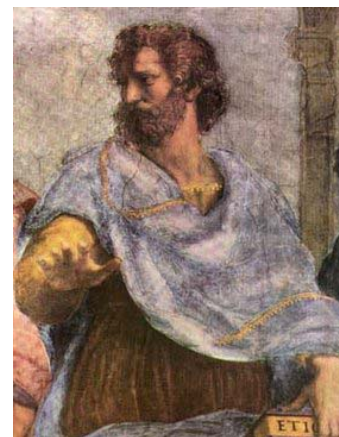
### Probing Physical Devices

Aristotle was one of the three great Greek philosophers, along with Plato and Socrates. The thinking of these ancient giants transformed civilization and their contributions live with us today. Aristotle studied nearly every subject possible and his works are a compendium of Greek understanding of the time. He placed significant value on knowledge gained from the senses which he classified as sight, hearing, touch, smell and taste.

Sight is the ability to detect electromagnetic energy within the visible frequency spectrum, while hearing is sound detected in the frequency range of about 20 to 20,000 hertz. Other attributes of these types of physical energy include brightness for light and loudness for sound.

Most applications of probing entail making contact with pads of the device under test and measuring the electrical characteristics of the device. The electrical signals are carried through the probe card to external test instruments and attributes such as resistance, capacitance, and voltage are measured and compared with known good values to determine device acceptance or rejection. Probe cards are optimized for this task with a small hole at the probe card center of rotation and probes extending from perimeter pads of the device.

This traditional structure is often not suitable for testing devices designed to emit or manipulate physical energy such as light and sound. Physical energy cannot be transmitted using traditional probe card structures and physical energy sensors need to be used in conjunction with traditional probes that stimulate the device electrically. One of the main difficulties of these hybrid probe cards relates to positioning the physical energy sensors close enough to the device to increase the signal to noise



Aristotle Defined the Senses

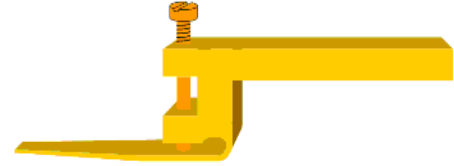
ratio such that accurate measurements can be made. Light emitting diodes or LEDs, for example, typically use integrating spheres to capture light from the device under test and then use an optical detector to measure characteristics of the LED such as dominant wavelength and correlated color temperature. Audible devices such as a loudspeaker would need to locate a microphone close to the DUT to test appropriate characteristics of the sound.

Custom probe cards are generally needed to facilitate the placement of physical energy sensors alongside traditional probes in some of these new devices. It is common to have exposed probe needles connected to a device on one side and then the appropriate physical energy detectors on the other side of the device.

Aristotle would have been interested and excited about the possibilities for the integration of electronics and the physical world. New and creative probing techniques are required to verify the electrical and physical correctness of such hybrid devices.

## Z-Adjustable Probes

Accuprobe's widely used z-adjustable probe has recently been enhanced to suit a new manufacturing process for the base metal part of the probe. The new probe disposes of the old lever arm driving the z-adjustable pin, to directly couple the adjustment screw to the pin. The enhanced z-adjustable probe is also machined so that the body has improved planarity over the older style, allowing the probe to be more easily placed and aligned on the probe card. All z-adjustable probe types are available in the new style, including the popular Kelvin probe, with both side-by-side and in-line probe needles. Z-adjustable probes continue to be the model of choice for laser trimming and hybrid probing applications, as well as for systems requiring high-quality resistance measurements in sensor, optical and solar applications, for example. The enhanced z-adjustable probe is being introduced as stocks of the older style probes become depleted.



New Style Z-Adjustable Probe

## Printed Circuit Board Design

Apart from the approximately one hundred standard probe card types available ex-stock from Accuprobe, we also offer a fast and economical printed circuit board design service for custom probe cards, burn in boards and motherboards. Simple 2-layer through multi-layer impedance matched PCBs are regularly produced and manufactured in as short as two weeks using automated design and verification tools.

The boards can be manufactured using standard FR4 or advanced circuit board materials for high-temperature and low leakage applications. Motherboards for round probe cards from 60 through 240-pins are a specialty and in-house equipment is used to produce the motherboard spacers holding hypertac sockets for efficiently coupling the probe card to the motherboard.

Accuprobe can supply bare printed boards for customer assembly, or fully assembled cards with probes and components used to customize the board for specific test applications.



Custom Probe Cards

## Probe Card Analyzer

Automated probe card analysis is increasingly being called on to verify the accuracy of more complicated probe cards. Accuprobe employs an ITC PB1000 probe card analyzer to test and assure more complicated probe cards to meet customers requirements.

The Probilt PB1000 probe card analyzer is a semi automated solution for building and repairing of blade- and epoxy-type probe cards. Combining precision mechanics and ergonomically physical layout with effective software, the PB1000 is an effective probe card builder and analyzer for non-automated probe card repairing and testing. The PB1000 system has a 512-channel test capability for planarity, resistance and leakage and is able resolve planarity with an accuracy of  $\pm 3\mu\text{m}$ . Accuprobe can interface and test a number of probe card types using the PB1000 analyzer, including cards using the increasingly popular 160-pin high density connector technology as well as HP4071 parametric test cards.



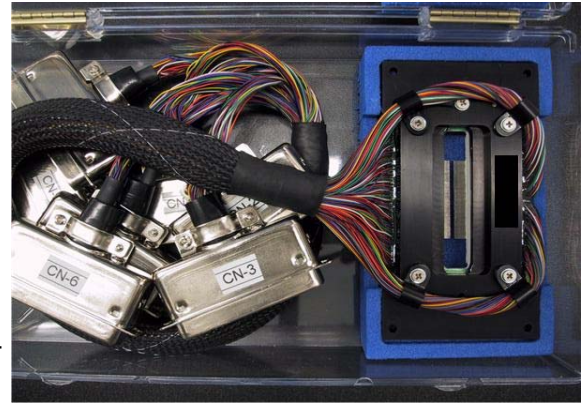
PB1000 Probe Card Analyzer

## Chip Resistor Probe Cards

Chip resistor sizes continue to shrink and challenge probe and interface capabilities where parallel row or column testing is required for enhanced production throughput. Accuprobe has supplied chip resistor probe cards for all major laser trimmer manufacturers for many years and has a commanding position in the chip resistor probe market.

Full Kelvin probing of the smaller 0603, 0402 and 0201 chip resistor sizes, require high density multi-tier probe cards and commensurately sized interface cables and connectors. Integrated probe cards and cable assemblies similar to that shown at right are a common solution to this application.

Accuprobe stocks a wide range of probe cards for a number of laser trimmers designed to test all standard resistor sizes and accuracy requirements as well as required stiffeners, cables and connectors. Contact Accuprobe for all your chip resistor probe card needs.



## Cable Assemblies

High probe count pin cards and specialty probe cards such as those used in laser trimmers often require cable assemblies and harnesses to couple the probe card to the test instruments. Accuprobe has long been a supplier of these types of cable assemblies. Twisted and bonded wire stocks as well as sheathing materials suitable for high density assemblies are held, as well as coaxial and triaxial cables and connectors.

To supplement internal test tools, Accuprobe employs a CableEye cable and harness tester which has a unique, patented graphic wiring display to visually pinpoint problems when wiring errors are detected, and offers one-second pass/fail testing for production environments. The CableEye system can quickly locate intermittent connections and identify their position in the cable ensuring the cables assembled at Accuprobe meet critical production requirements.



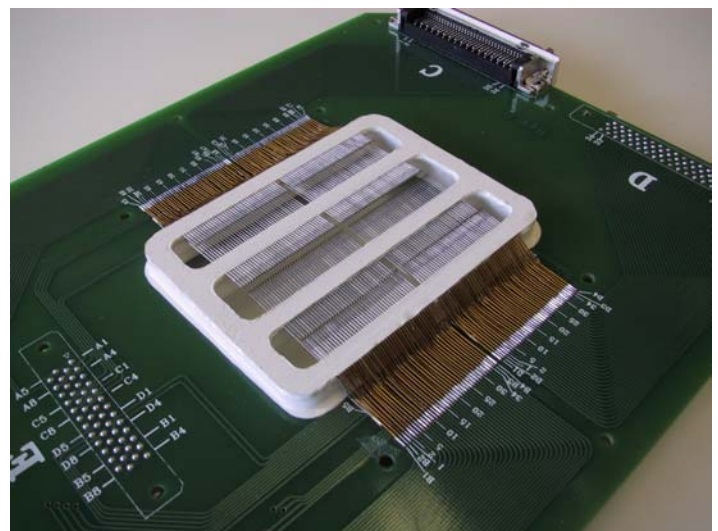
CableEye Cable Tester

## Multi-Shelf Probe Cards

Epoxy ring probe cards up to 500-needles are regularly produced at Accuprobe for a diverse range of devices from 1mm square up to 4" in length. A large number of standard ceramic bases suitable for typical devices are available ex-stock, and custom ceramics can be quickly produced to suit less regular device sizes and pad geometries.

More complicated multi-shelf probe cards are also available aimed at providing balanced contact force over disparate series of device pads or for multi-device probing. These cards typically require a custom ceramic ring design and often a custom probe card to suit the required pin-out.

Accuprobe custom processes probe needles to suit the desired configuration and assembles probe cards and connectors that interface to the device. Single or multi-tier needle configurations can be accommodated and a range of verification processes ensure accurate alignment and planarity.



Multi-Shelf Probe Cards

## Probe Card Assembly Equipment

Accuprobe's well accepted probe card assembly and planarization equipment is now available with short lead times to meet less anticipated internal requirements for probe card assembly and verification. Blade and epoxy ring assembly stations can be provided with microscopes and camera attachments to suit specific customer needs.

Contact Accuprobe for all your internal probe card assembly requirements.

35 Congress St  
Salem, MA 01970  
Phone: +1-978-745-7878  
Fax: +1-978-745-7922  
Email: [info@accuprobe.com](mailto:info@accuprobe.com)  
**[www.accuprobe.com](http://www.accuprobe.com)**

The logo for Accuprobe features the word "accuprobe" in a blue, sans-serif font. The letter "o" is replaced by a stylized sunburst or starburst icon with multiple rays extending outwards.

Accuprobe manufactures fixed pattern probe card assemblies for use by semiconductor producers. Probe cards are used for semiconductor wafer sort and Hybrid circuit laser trim applications. Accuprobe also manufactures probe card assembly and repair equipment which allow customers to assemble their own probe card assemblies using Accuprobe needles, tips, blank probe cards, edge sensors and other related components. Accuprobe offers Epoxy Ring, Z Adjustable, Metal Blade, Ceramic Blade and Blade Spring probes.

**For further information or subscription changes contact the Editor at [editor@accuprobe.com](mailto:editor@accuprobe.com)**

**Distributed By:**

--