Probe Card Interface Assembly (PCIA)

- **No Dependence on Wafer Size**
- **Connects Test Matrix to Probe Card**
- **Includes Cables & Blades on Two Cards**
- **Drop-in Probe Card Loading**
- **Lever Action Simplifies Connections**
- **Strain Relief Prevents Cable Damage**
- **Fits in Cutout for RC-2 Carrier Ring**
- **Two Slots for Theta Adjustment Lever**
- **Two Locations for Inkers or Sensors**
- **Completely Guarded Measurements**
- **Performance Guaranteed to Probe Tips**

Figure 1 - PCIA Without Cabling

The Reedholm Probe Card Interface Assembly (PCIA) is a robust mechanical interface used to connect standard crosspoint matrix, or low current picoammeter matrix, pins to custom Reedholm probe cards. At the upper right is a photograph of the PCIA (sans cable). It fits into the same opening as the 9.5" RC-2 carrier ring used by most prober manufacturers for rectangular probe cards.

Eliminates Need for Test Head

When used with Reedholm low current probe cards, the mass and shielding provided by the PCIA provides state-of-the-art dc current sensitivity normally associated with test heads. While acceptable with functional test systems, test heads are an unnecessary burden for parametric testing. Not only do they usually require a bulky, expensive test head manipulator, test heads turn probe card changing into a laborious process than requires considerable training.

Probe Card Removal and Loading

The blank probe card shown in Figure 1 is in the engaged position. Three guide posts assure proper orientation when installing cards. These posts also keep the cards from shifting when engaging and disengaging the edge connectors. Two plastic posts on each card (one can be seen) are provided as handles for easy removal without contaminating the surface of the card through handling.

By rotating the handles, the connectors at each end of the card would be pulled away from the card. Turning the handles also causes clamping plates to slide out and capture (or slide in and release) the edges of the probe card. Thus, cards are securely locked and supported on all four sides during probing.

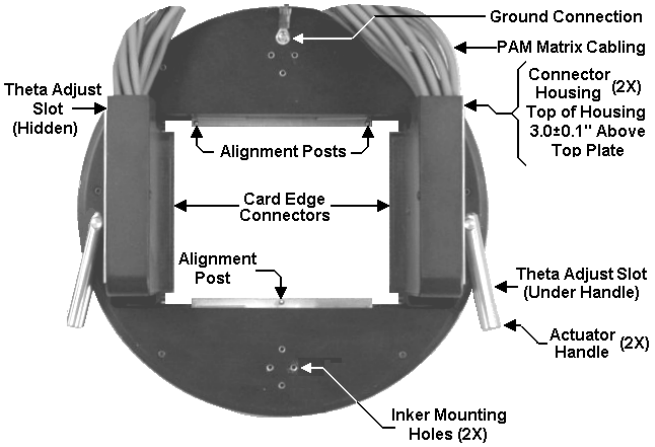

Figure 2 - View from Front of Prober (Without Probe Card)

Secure Analog Cable Attachment

Analog cables route to the probe card edge connectors through the two housings shown in Figure 2. Cables associated with odd numbered matrix pins go into one side and even numbers into the other. The card edge connectors are firmly attached to the housings, and the cables inside the housing are securely clamped with cushioned plates. Thus, flexing of the cables has no effect on the reliability of the card edge connections.

Reduction of Vibration Effects

Movement of a probe card fixture, or the prober analog cable, can easily generate noise currents large enough to mask picoampere level low-level device currents. Triboelectric currents are the result of electrons being rubbed off insulators by relative movement of shields or signal wires. Also, physically deforming insulators by bending, pinching, clamping, etc. generates a voltage, and thus current, called the piezoelectric effect.

Automatic probers generate movement because they vibrate, and that can cause excessive noise currents. Several PCIA features minimize effects of vibration and make it practical to measure into the femtoampere region in a production environment.

- The mass of the PCIA reduces noise generation by absorbing much of the prober vibration energy.
- Cushioned clamps inside the cable housings prevent cable movement without inducing piezoelectric current generation that rigid clamps cause.
- Low current cables used with the picoammeter matrix are built with impregnated insulators that prevent triboelectric action.

PCIA Probe Card Performance

Reedholm low current probe cards are four layer boards with guard traces that completely surround signal traces out to, and including, the pads for blade attachment. Since even the best through hole plating process can trap electrolytes inside the cards, through holes are not used. Low current signals are passed from one side of the card to the other with rigid Teflon insulated wires.

The net result is excellent dynamic performance, even in a production environment. The combination of the Reedholm picoammeter, analog cabling, and proprietary probe cards achieves leakage currents of <50fA/V within one second of the voltage step used to evaluate leakage.

In order to assure such performance, special software had to be written, and 100V bias voltages were needed. That software is used to qualify all Reedholm low leakage probe cards, and is part of the distribution software so that customers can assure performance in the field.

Inker/Sensor Mounting

As many Reedholm test systems are used in functional test applications, two opposed mounting locations are provided for inker or sensor installations. Each location has four tapped #6 holes. The hole pattern can be seen in Figure 2.

Theta Adjustment Slots

Some probers require manual theta, or rotational, adjustment of the probe card to achieve proper alignment between probe pins and test structures. For such adjustments, two identical slots, 0.5" long and 0.25" deep, are provided on opposite sides of the PCIA so that theta adjustments can be made regardless of the direction of cable breakout from the PCIA. As with the RC-2 clamps used to hold the PCIA securely in place, the slots accommodate the theta adjustment levers used with RC-2 ring carriers. In the photograph above, one of the slots can be seen in line with the edge of the nearest cable housing.

Physical Dimensions

The circular PCIA drops into a standard RC-2 carrier ring opening, and rests on a lip 0.5" below the top surface of the interface. A cutaway view of the PCIA including an installed probe card, is shown in Figure 3. Manufacturing tolerances were used to calculate worse case dimensions, so the information can be used in setting up a prober or in manufacturing a carrier ring if a standard RC-2 one is not available.

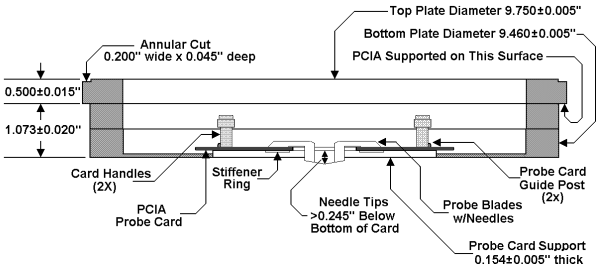

Figure 3 - Cut Away View of PCIA

Cabling Options

The system model used with the PCIA affects the actual PCIA part number style to be ordered. Both 24 and 48 pin versions are standard when used with a PAM matrix. For the CPM matrix, 48 pins is the standard size. The correct cabling is determined during the quoting process.

Probe Cards

Five probe cards, two with blades mounted, are delivered along with the assembly. These 4.5" by 5.125" cards have tooling holes that assure proper alignment in the PCIA.

Accessory Cards

A loop back test card for use with the Reedholm self-test software is provided for verification of system connections out to the card edge connectors in the PCIA. In addition, a device characterization card with two zero insertion force sockets for 0.300" and 0.600" DIP packages.