Automatic Cross-Sectioning and Monitoring System Locates Defects in Electronic Devices

The problem:
To devise a means of precisely locating fabrication defects such as shorts or resistive anomalies in integrated circuits. The data could be used in failure analyses to prevent future occurrences of this nature.

The solution:
An automatic cross-sectioning and monitoring system (see fig.) consisting of a motorized grinding and lapping apparatus, a sample holder, and an electronic control circuit. A monitor displays an output signal when the exact position of the circuit defect has been located.

How it’s done:
The device to be cross-sectioned is placed on a sample holder, and a small input voltage is applied to the defective circuit. An external control circuit, containing a tunnel diode which senses a change in the applied signal voltage, is coupled to the defective circuit. The device is then cross-sectioned with the grinding and lapping apparatus. When the grinding operation has reached the site of the flaw, a change in the input voltage occurs and is sensed by the tunnel diode in the control circuit. The diode signal is monitored and amplified to activate a relay which stops the grinding motor action. The device is examined with a low power microscope to pinpoint the exact location of the defect.

Note:
No additional documentation is available. Specific questions, however, may be directed to:
Technology Utilization Officer
Goddard Space Flight Center
Greenbelt, Maryland 20771
Reference: B71-10221

Patent status:
No patent action is contemplated by NASA.

Source: G. Jacobs and B. Slaughter of Sperry Rand under contract to Goddard Space Flight Center (GSC-11221)