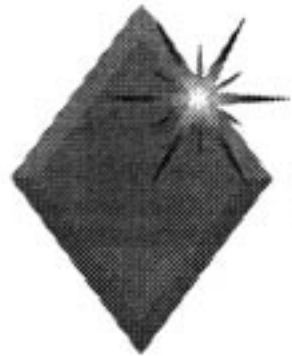


*TSK: Auto Probe Mark
Inspection*

1997 Southwest Test Workshop

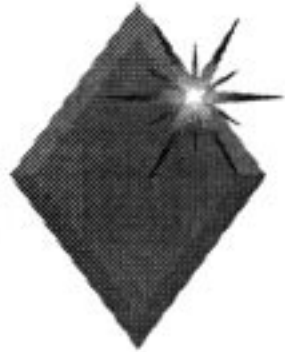
June 2, 1997

Presented by: Earl Eddy



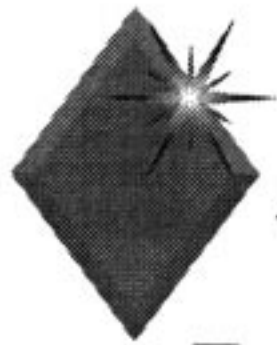
Contents

- ◆ Purpose of Probe Mark Inspection
- ◆ Function of Probe Mark Inspection
- ◆ Specification
- ◆ Result Evaluation
- ◆ Pad Registration, Including Unique Shapes
- ◆ Examples
- ◆ Conclusion



Why Probe Mark Inspect?

- ◆ To Verify Actual Contact Position by Probe Mark Prior to Probing
- ◆ To Verify That There Is No Problem With the Contact While Probing

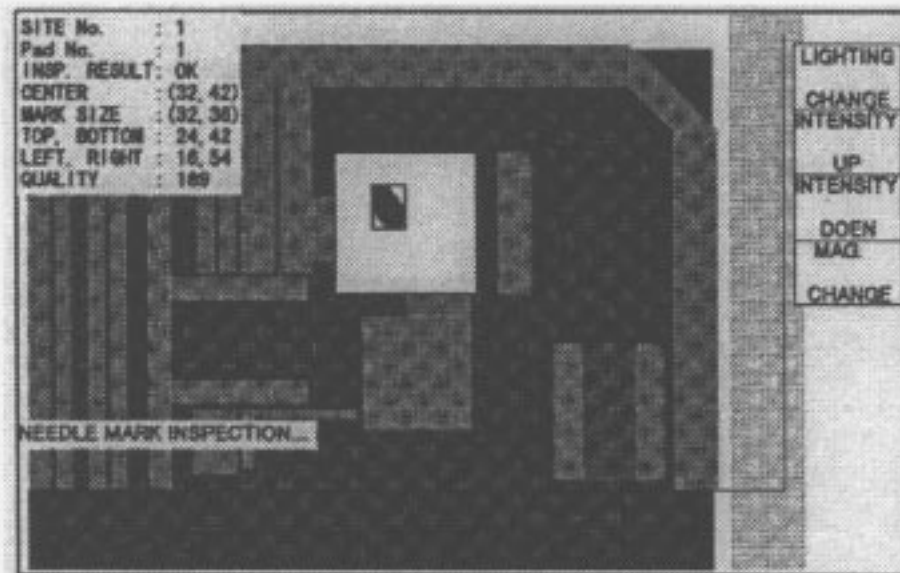


Probe Mark Inspect Function

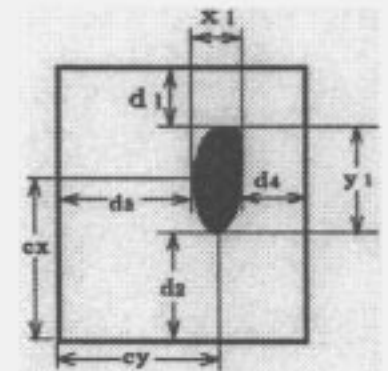
- ◆ To Analyze the Probe Mark Made on the Pad by High Magnification Alignment Camera.
 - ◆ Off-Position Judgment -- To Judge If Periphery Of Probe Mark Is Inside Selected Position
 - ◆ Size Judgment -- To Compare the Size of the Probe Mark to a Minimum and Maximum Value
- ◆ Result Output -- To Show Position and Measurement Data on Screen and Print Out



Data Output (Screen Display)



Site No.	: 1	Site Number of Multi-die Card
Pad No.	: 1	Pad Number
Insp Result	: OK	Result (OK or Rejected)
Center	: (32,42)	Center of Mark (cx,cy)
Mark Size	: (32,36)	Size of Mark (x1,y1)
Top, Bottom	: 24,42	Mark Distance to Edge (d1,d2)
Left, Right	: 16,54	Mark Distance to Edge (d3,d4)





Data Output (Printout)

```
**** Wafer Information ****
DEVICE          : TEST
Wafer ID        : T-12345678
Cassette No.    : 1
Slot No.        : 1
Wafer size      : 8.0 inch
Index size X    : 8895.00 um
Index size Y    : 8504.00 um
Flat/notch direction : 180 deg
Temperature Control : 1
Chuck Temperature : 88 deg
Multi Probing Setting : 2
Registered Pads : 10
```

*** Needle Mark Inspection Data ***

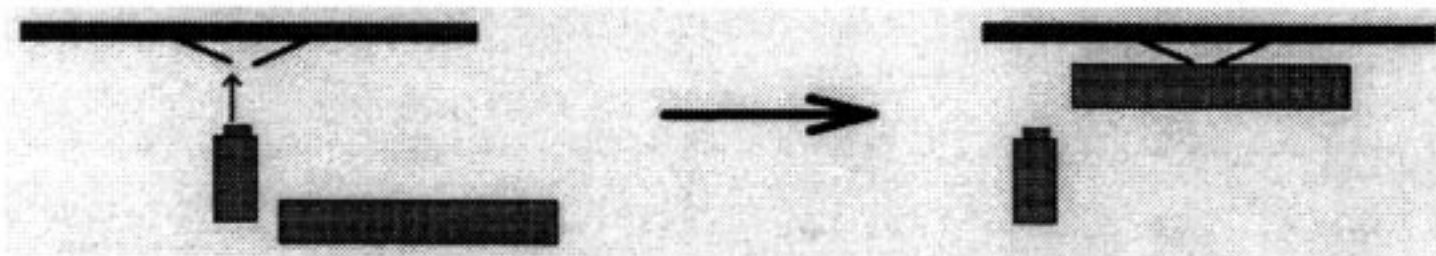
Site No. : 1 Site coordinator : X = 11 Y = 11

Pad	Center	Mark size	Top	Bottom	Left	Right	Res
1	48, 64	40, 40	44	13	28	29	OK
2	40, 58	40, 36	40	20	20	35	OK
3	42, 56	36, 40	36	20	24	37	OK
4	42, 48	52, 40	28	28	16	27	OK
5	38, 34	36, 60	4	33	20	41	NG
6	40, 34	32, 60	4	31	24	40	NG
7	38, 32	36, 56	4	37	20	39	NG
8	34, 36	36, 48	12	36	16	44	OK
9	44, 36	24, 48	12	36	20	39	OK
10	40				20	36	OK

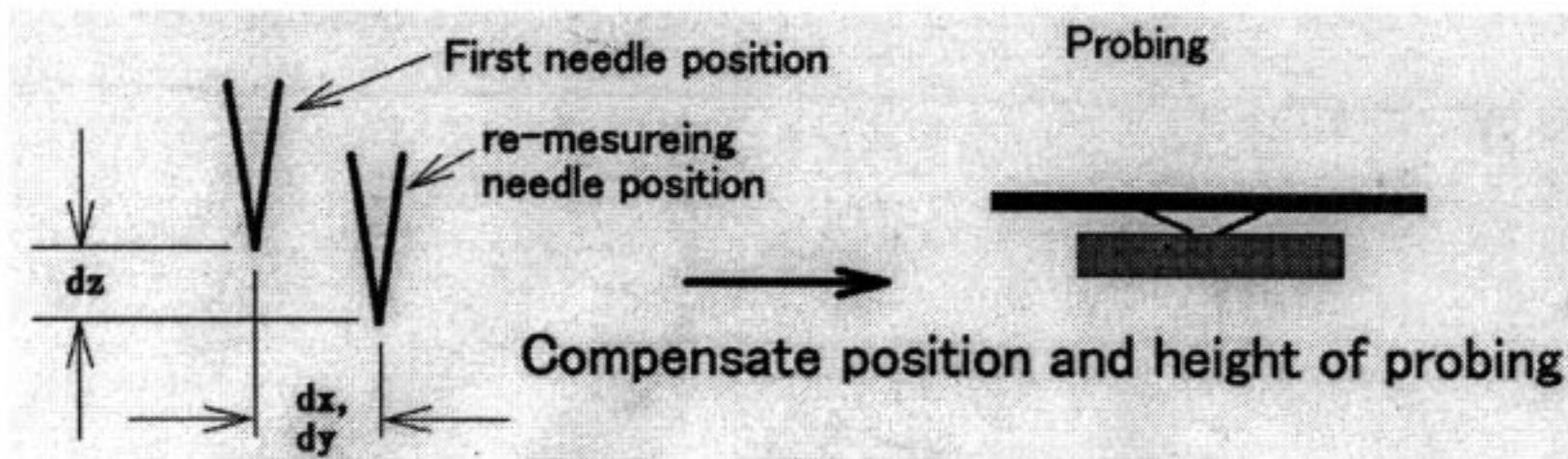


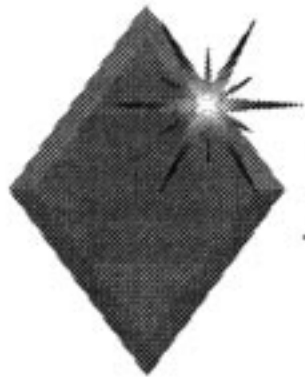
Probe Position Control

Automatic Needle Alignment



Remeasure Needle Position at Some Interval & Compensate





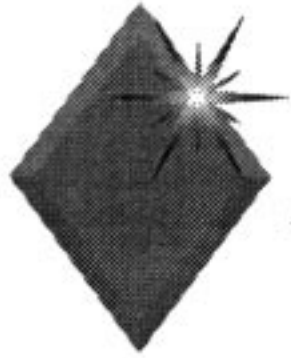
Inspection Timing

- ◆ Inspection Is Performed After Die Test
- ◆ Timing Parameters
 - ◆ Wafer Interval
 - ◆ Die Interval
 - ◆ Wafer Map Selection -- Can Target Specific Die to Inspect on the Wafer Map



Pad Inspection Selection

- ◆ All Pads
 - ◆ Inspect All Registered Pads
- ◆ Manual Select
 - ◆ Inspect User Selected Pads From the Set of Registered Pads
- ◆ Auto Select
 - ◆ Inspect All Registered Pads First. Prober Then Selects 4 or More Probe Marks Nearest to Pad Edge. Subsequent Inspections of Those Pads Only



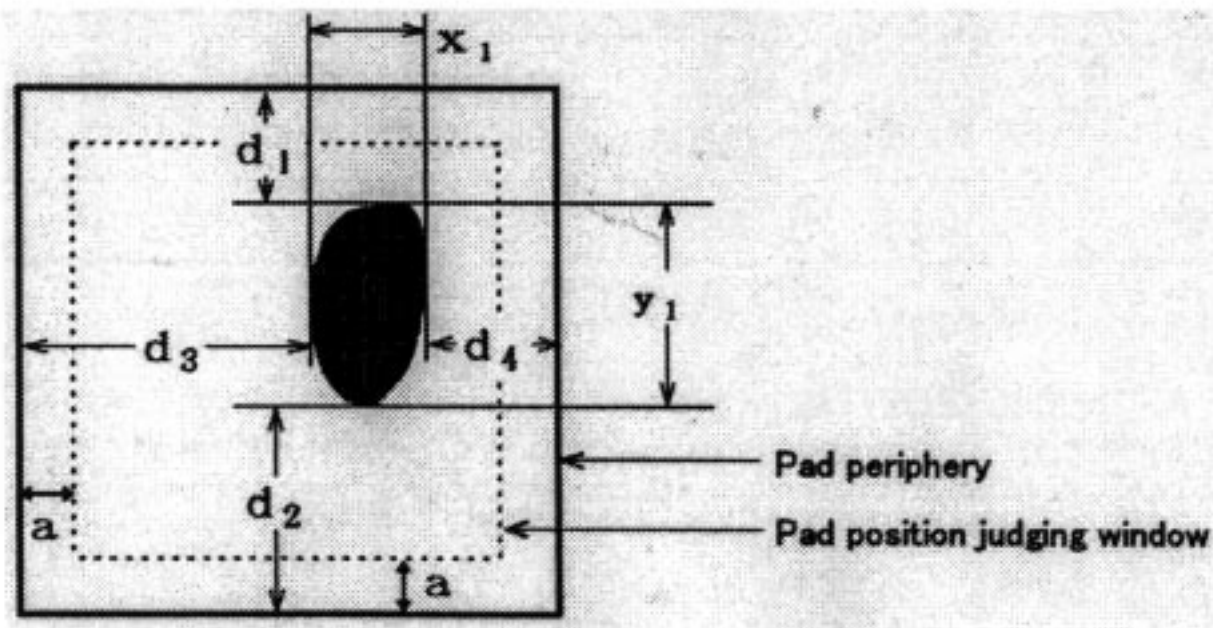
Specification

Max # Registered Pads	512 Pads
Pad Size	Max 400 X 350 μm Min 30 μm (Narrow Side)
Detectable Probe Mark	Max Within Pad Size Min 100 μm^2
Inspection Accuracy	2.0 μm
Processing Speed	~ 500 msec/Pad (100x100 μm Pad)



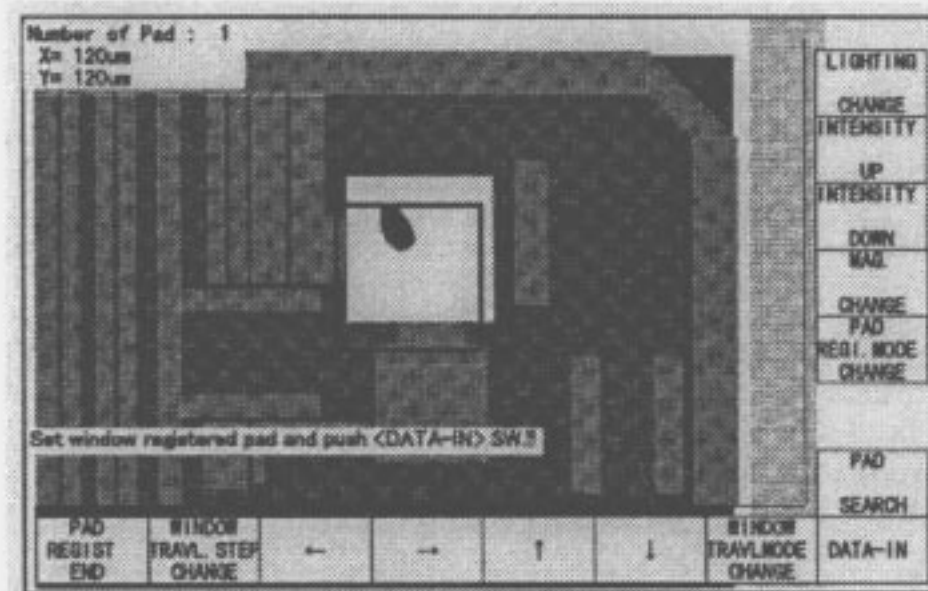
Judgment Results

- ◆ Off-Position Judgment: OK if $d_n \geq a$ ($n=1\sim 4$)
- ◆ Size Judgment: OK if $\text{Min} \leq x_1 \& y_1 \leq \text{Max}$
- ◆ Area Judgment: OK if $\text{Min} \leq \text{area} \leq \text{Max}$





Pad Registration



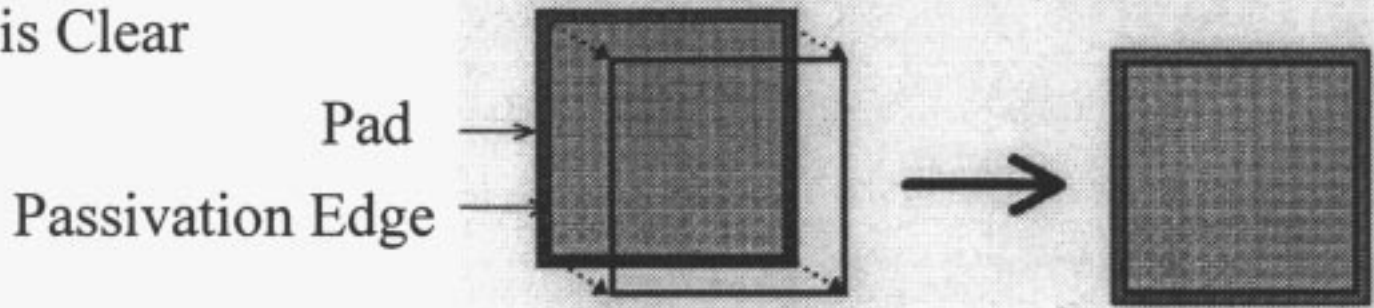
- ◆ Before Inspection, Pad Position And Size Must Be Registered
- ◆ Registration Process
 - ◆ Use The Arrows To Size the Registration Window Then "Data-In"
 - ◆ Position Pad Under Window and Press Pad Search



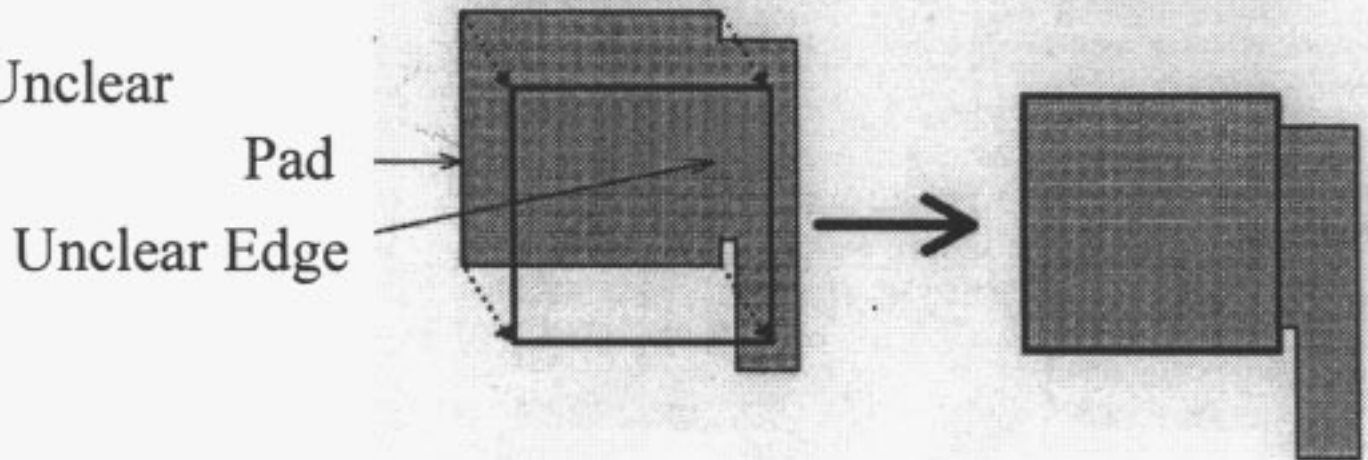
Pad Search

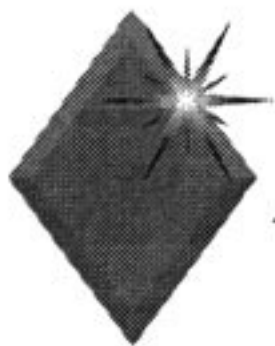
Determine Pad Size & Place Pad Under Registration Window

Border is Clear



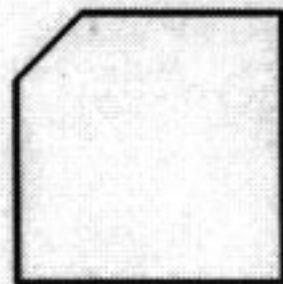
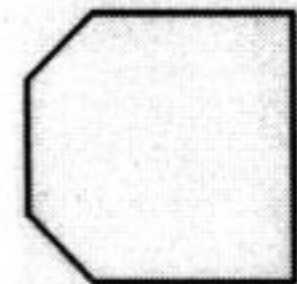
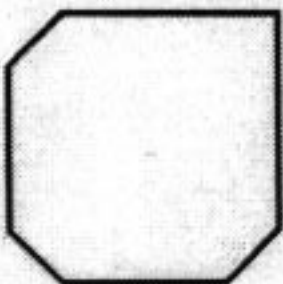
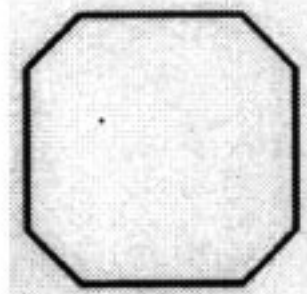
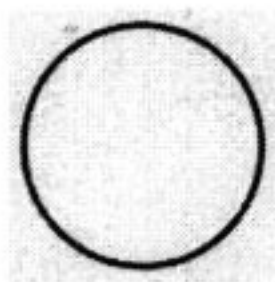
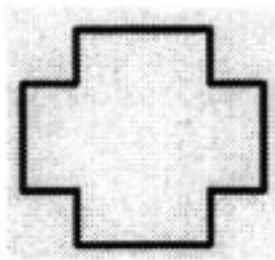
Border is Unclear





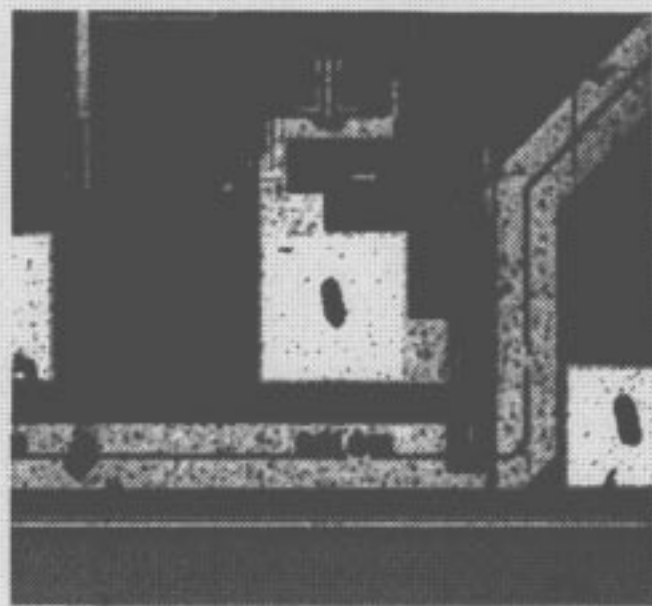
Inspection of Non-Square Pads

Examples of Acceptable Pad Shapes

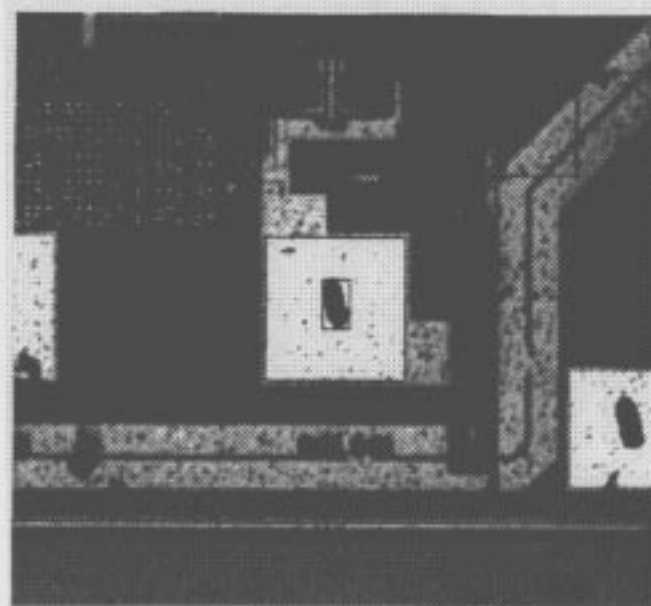




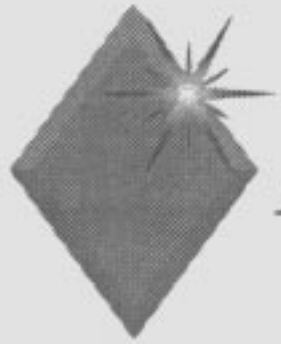
Inspection Example



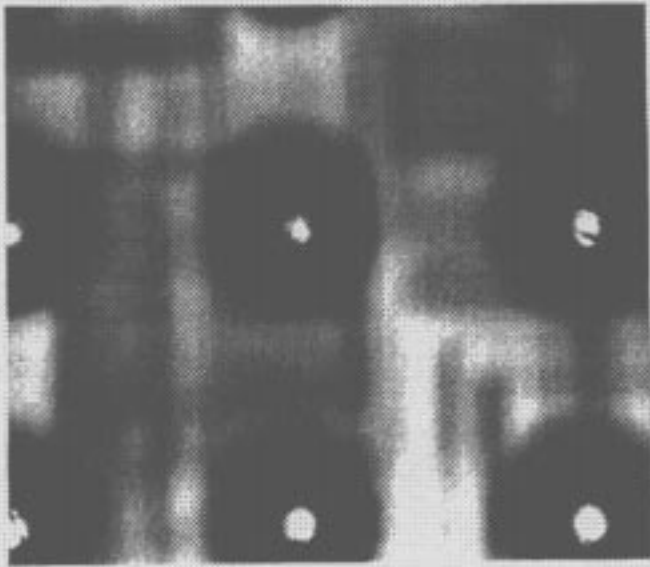
Before Inspection



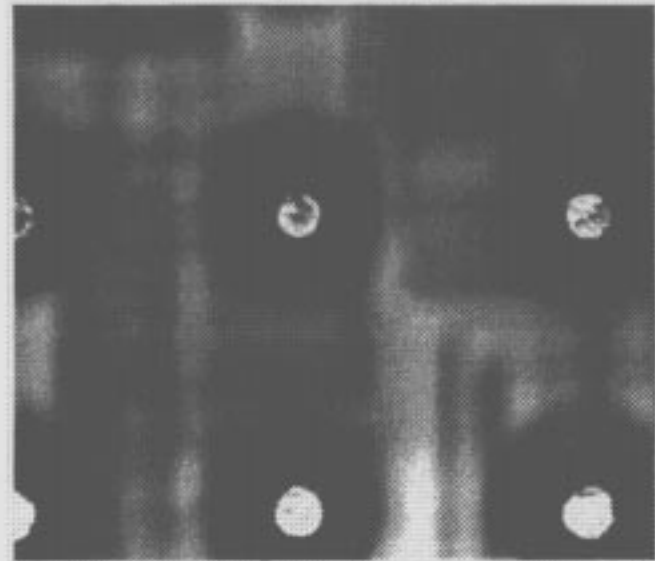
After Inspection
Results & Data Shown



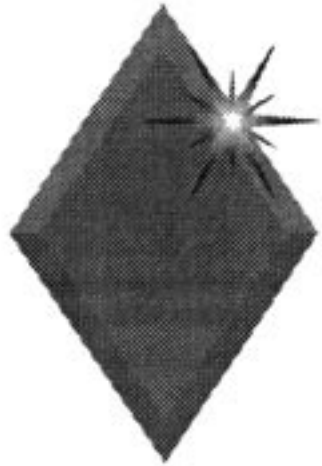
Inspection of Solder Bumps



Before Probe



After Probe



Conclusion

Any Questions?