

ENGINEERING REPORT

REPORT NO. 2376

DATE Dec. 11, 1978 PAGE 1 OF 8

The Bendix Corporation

Electrical Components Division

Sidney, New York

TITLE
EVALUATION OF DIELECTRIC PARTICLE
CONTAMINATION ON MOTHERBOARD/DAUGHTERBOARD
BRUSH CONTACT CONNECTORS

TYPE
Evaluation

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I. PURPOSE

The purpose of this evaluation was to determine the effect of a dielectric particle contamination on the contact resistance and mating forces of brush contact connectors.

II. CONCLUSION

Contamination of the brush contacts in the motherboard and mating daughterboard connectors had no adverse effect on the contact resistance and mating forces of brush contact connectors.

III. TEST REPORT

A. Sample Preparation

The following components were submitted for assembly and evaluation:

3 pcs MS2-D20P Motherboard Connector
3 pcs DB2-D20P Daughterboard Connector
6 pcs Printed Circuit Board

A printed circuit board was soldered to the contact tails of each sample connector.

B. Test Procedure

1) Contact Resistance

Contact resistance measurements were performed on each mating pair of contacts in the three mating connectors. Measurements were made using a Keithley Model 503 Milliohmmeter in conjunction with a voltage divider and digital voltmeter having a punch tape recorder.

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DATE 12-12-78	DATE 12-13-78	DATE	DATE

Initial contact resistance measurements were made on all samples. Subsequent measurements on all samples were made immediately after the application of dust to Samples 2 & 3, and then after 10, 100, 250, 500, and 1000 cycles of durability.

A summary of the contact resistance measurements is illustrated in Table I.

2) Unmating and Mating Forces

Unmating and mating forces were measured using the Instron Model 1122 force testing machine. The motherboard connectors were attached to a ballbearing table fixtured to the load cell. Unmating and mating of the connectors was accomplished by hand with the forces being exerted through the PCB card to correspond with service application. Initial unmatng and mating force measurements were made on all samples and subsequent measurements were made immediately after dust application and again after 10, 100, 250, 500, and 1000 cycles of durability.

Three unmatng and mating force measurements were made on each sample at each test interval.

Forces required to fully unmate and mate the respective connector pairs are illustrated in Table II.

3) Dust Application

A 15% glass filled, thermoplastic polyester material that was pulverized and passed through a No. 80 sieve was applied with an artist's brush to the mating surface of the motherboard connector and the mating ends of the daughterboard contacts of Samples 2 and 3. Application was such that a quantity of dust fell into the brush area of each contact. After dusting, the mating connector face was turned downward and the back of the connector was lightly tapped five times to remove excess dust. No dust was applied to Sample 1 which was used as the control sample. An additional connector pair was dusted and photographed to illustrate the appearance of the test samples after dust application. (See Figure 1)

4) Durability

Each pair of connectors was subjected to 1000 cycles of durability. Samples 1 and 2 were unmated and mated in the vertical plane with the motherboard connector facing up. Sample 3 was unmated and mated in the horizontal plane with the B row of contacts on top.

5) Visual Examination

Visual examination at 12X magnification was made at each test interval throughout the durability test. There was no evidence of wear or damage to the contact bristles or connector moldings as documented by photographs, Figures 2, 3 and 4.

SUMMARY OF CONTACT RESISTANCE MEASUREMENTS (MILLIOHMS)
 (Mean Values, N = 10)

		<u>NUMBER OF DURABILITY CYCLES</u>						
		Initial	With Dust Applied	10	100	250	500	1000
SAMPLE #1		6.4	No Dust 6.5	6.3	6.3	6.2	6.1	6.1
	Row A #2	6.4	6.5	6.4	6.2	6.2	6.0	6.1
	#3	6.2	6.2	6.3	6.2	6.1	6.2	6.1
SAMPLE #1		7.6	No Dust 7.5	7.5	7.5	7.4	7.4	7.4
	Row B #2	7.6	7.7	7.5	7.5	7.4	7.4	7.4
	#3	7.5	7.5	7.5	7.5	7.4	7.5	7.3

Sample #1 - Control Sample - Durability, Vertical

Sample #2 - Valox Dust - Durability, Vertical

Sample #3 - Valox Dust - Durability, Horizontal

TABLE 1

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UNMATING & MATING FORCES
(pounds)
NUMBER OF DURABILITY CYCLES

	Cycle	Initial		After Dust Application		10		100		250		500		1000	
		Unmate	Mate	Unmate	Mate	Unmate	Mate	Unmate	Mate	Unmate	Mate	Unmate	Mate	Unmate	Mate
Sample #1	1	1.1	2.1	No Dust Applied		.8	1.5	.9	1.2	.8	1.2	.6	1.8	.8	1.1
	2	.9	1.7			.7	1.4	.6	1.0	.7	1.1	.5	1.4	.9	1.3
	3	1.0	1.4			.8	1.2	.7	1.1	.6	1.1	.4	1.5	.7	1.3
Sample #2	1	.8	2.3	.8	2.1	1.0	1.6	.8	1.4	.8	1.4	1.0	1.4	.8	1.5
	2	.8	2.0	.9	1.5	.6	1.5	.7	1.7	.6	1.3	.7	1.3	.6	1.6
	3	.9	1.9	.8	1.5	.5	1.4	.7	1.1	.7	1.1	.6	1.2	.6	1.5
Sample #3	1	.8	2.3	.8	1.6	.6	1.0	.7	1.1	.9	1.5	.6	1.4	.7	1.7
	2	.8	1.3	.8	1.5	.7	1.3	.4	1.0	.7	1.2	.5	1.2	.7	1.3
	3	.7	1.7	1.2	2.2	.7	1.3	.4	1.2	.5	1.2	.6	1.2	.6	1.5

TABLE II

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REPORT NO. 2376

PAGE 4

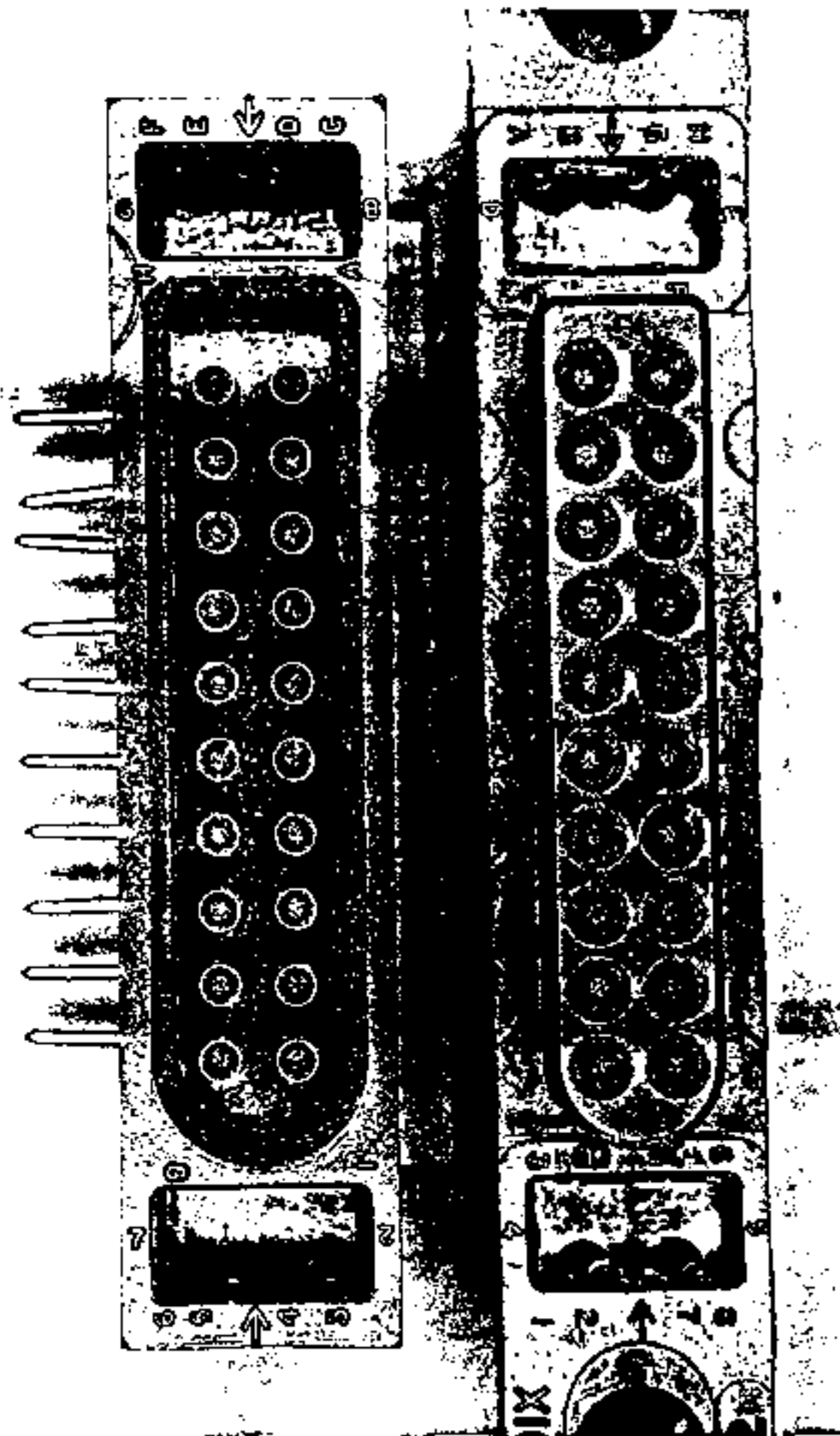
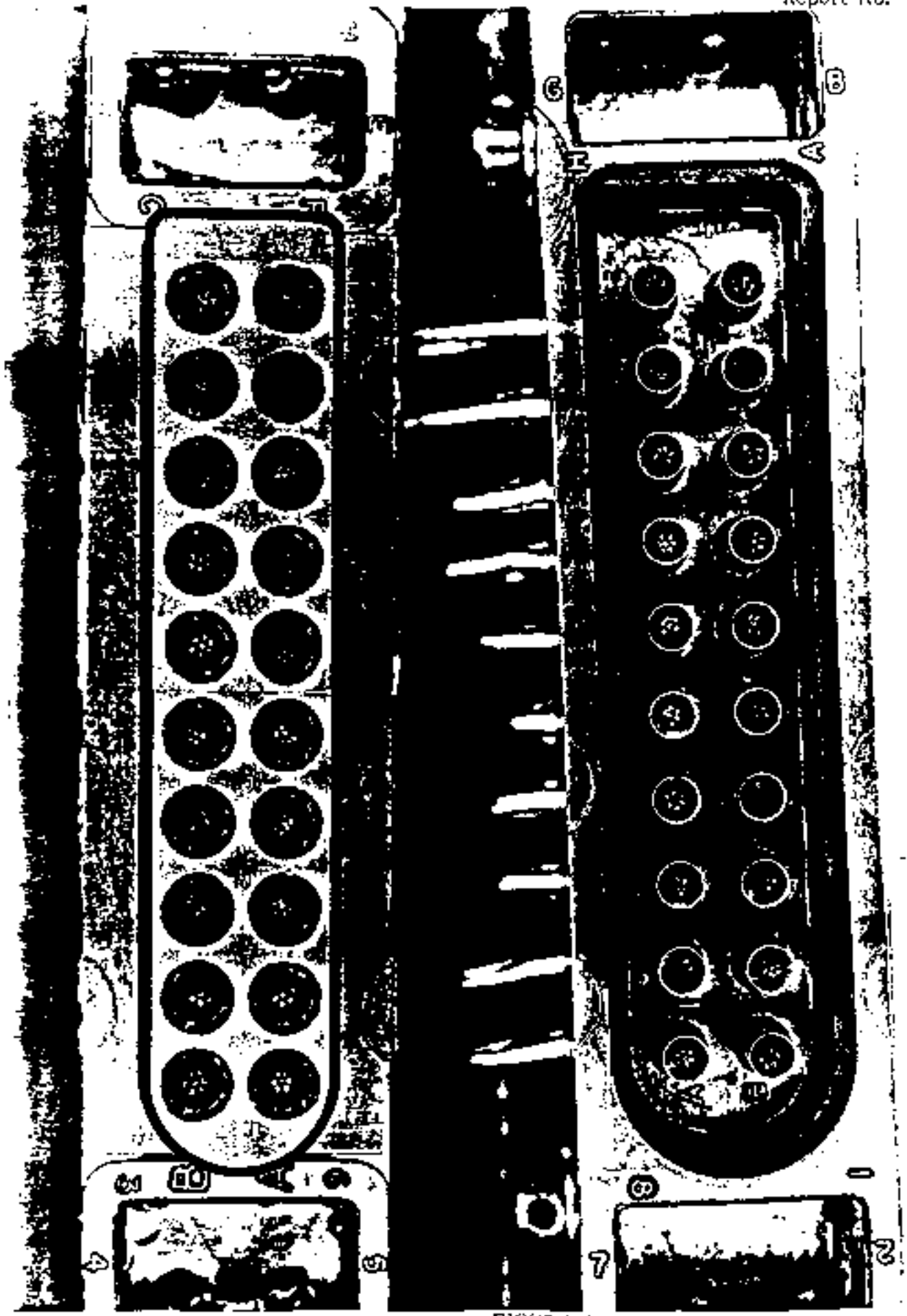
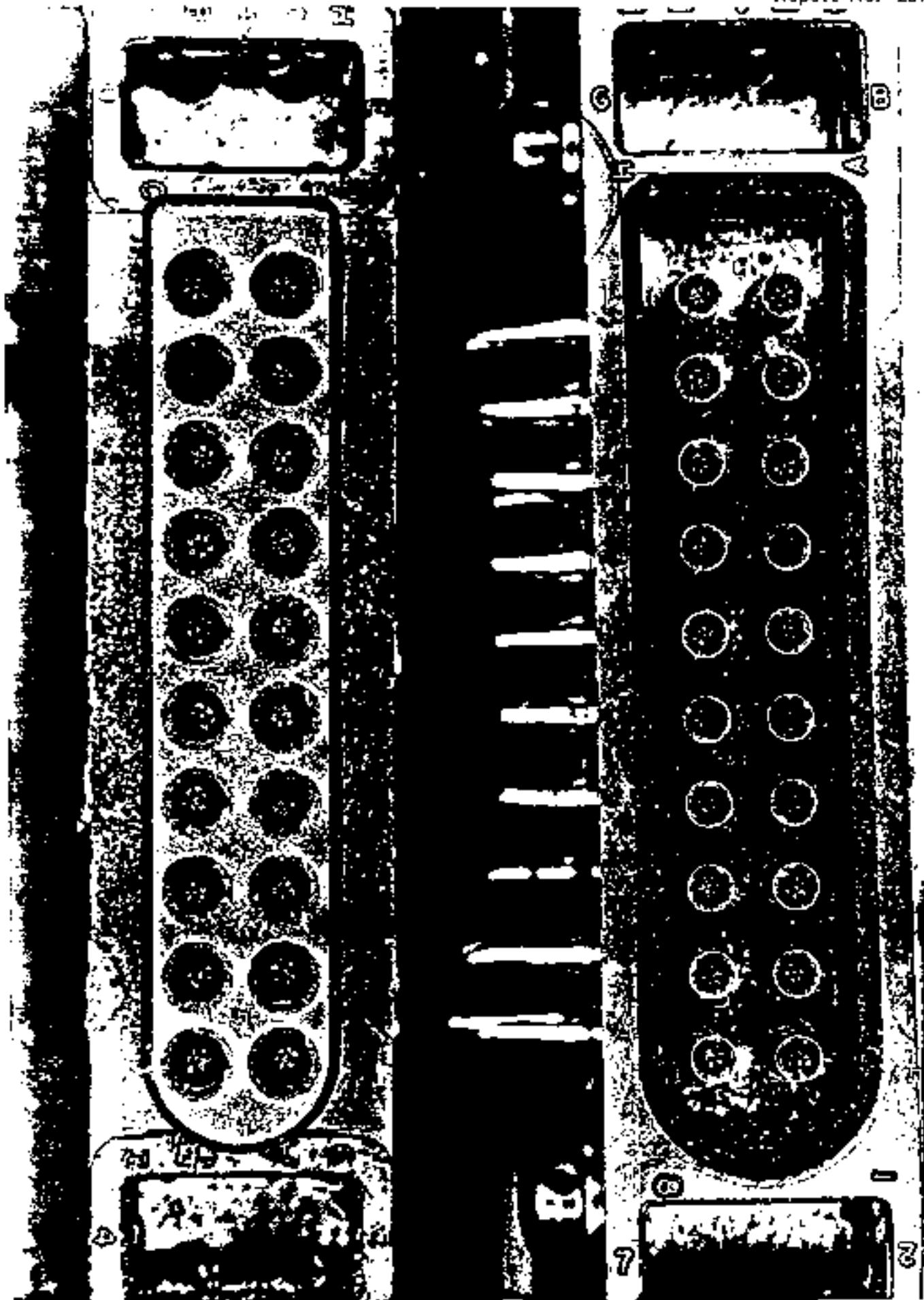


FIGURE 1



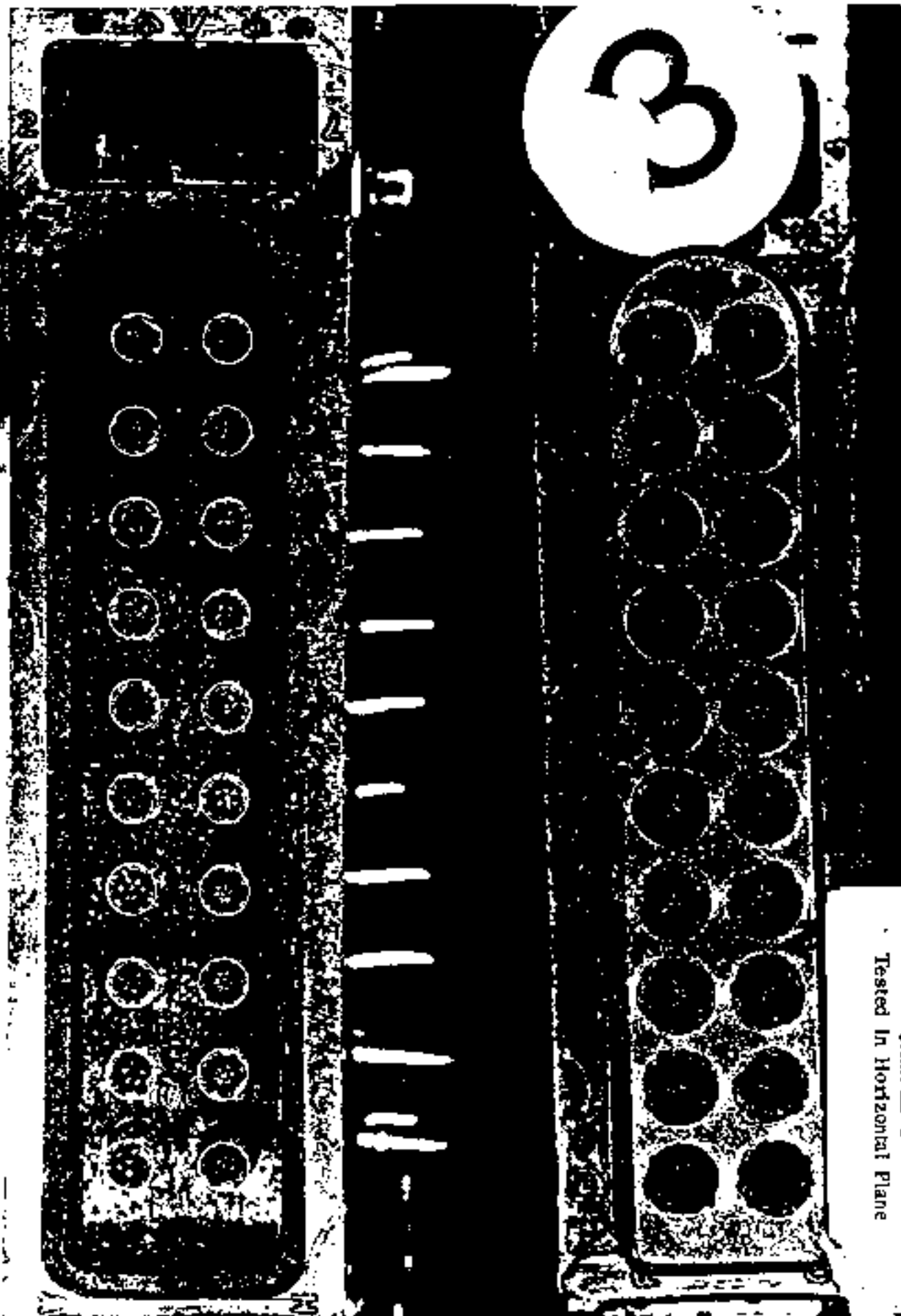
SAMPLE 1
NOT DUSTED

FIGURE 2



SAMPLE 2
Tested in Vertical Plane

FIGURE 3



SAMPLE 3
Tested In Horizontal Plane

FIGURE 4