AD-A125 423 ELECTRICAL RESISTANCE TESTING OF ANTISTATIC BENCH AND FLOOR SURFACE MATERIAL AFTER LAYING(U) MATERIALS RESEARCH LABS ASCOT VALE (AUSTRALIA) 1/1

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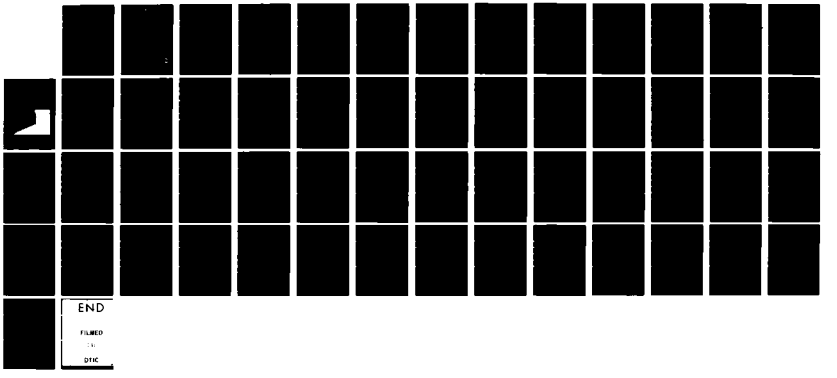

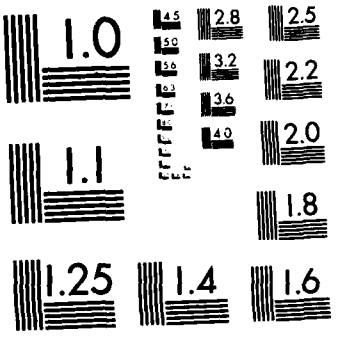

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MRL-TN-466

ELECTRICAL RESISTANCE TESTING OF ANTISTATIC BENCH AND FLOOR SURFACE MATERIAL AFTER LAYING

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Large areas of floors and benchtops in the laboratories of the Explosives and Ammunition Composite at Materials Research Laboratories are covered with an antistatic material. Electrical resistance testing of this material after laying is reported. Testing was carried out in accordance with BS 2050:1961 and BS 3398:1961.

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ABSTRACT

Large areas of floors and benchtops in the laboratories of the Explosives and Ammunition Composite at Materials Research Laboratories are covered with an antistatic material. Electrical resistance testing of this material after laying is reported. Testing was carried out in accordance with BS 2050:1961 and BS 3398:1961.

CONTENTS

ELECTRICAL RESISTANCE TESTING OF ANTISTATIC BENCH AND FLOOR SURFACE MATERIAL AFTER LAYING

1. INTRODUCTION

At MRL, within the Explosives and Ammunition (E&A) Composite, there is a large number of laboratories and workrooms where the floors and benchtops are covered with "Tarkett" PVC/carbon sheet antistatic material. It was noted in May 1979 by the E&A Composite Explosives Safety Committee during a routine inspection "that some of the benches with antistatic covering were not apparently earthed".

Upon further investigation it became apparent that testing of many floors and benchtops with antistatic covering had either never been performed or the results of any testing were not available. It was therefore decided that the earth resistance for all antistatic floors and benchtops in the E&A Composite be measured. It was also decided to include the measurement of earth resistance between some "explosive process" equipment mounted on antistatic floors or benchtops and the existing earth strap.

2. LOCATIONS

A list of buildings, bays and rooms, having benchtops and/or floors surfaced with antistatic material, was compiled in July 1979 (Appendix A). A photograph of a typical workroom is shown in Fig. 1.

3. TEST SPECIFICATIONS

Specifications for tests based on BS 2050:1961 [1], BS 3398:1961 [2] and AS 1020:1970 [3]. AS 1020:1970 refers to BS 2050:1961 for methods of determining the electrical resistance of conductive and antistatic articles.

4. TEST METHODS AND CRITERIA

4.1 Antistatic Bench and Floor Surface Material After Laying

(a) Tested between dry electrodes spaced 610 mm ± 13 mm apart on the antistatic surface. Requirements: Average resistance not greater than 2×10^6 Ω, no single result greater than 5×10^6 Ω.

(b) Tested between a wet electrode on the antistatic surface and the existing earth strap. Requirements: Average resistance not less than 5×10^4 Ω, no single result less than 2×10^4 Ω.

(c) Tested between a dry electrode on the antistatic surface and the existing earth strap. Requirements: No specific requirements as this test is not required by British Standard Specifications. However it was considered that this test would best represent actual conditions.

4.2 Equipment Mounted on Antistatic Surfaces

Tested between the existing earth strap and the "explosive process" equipment. Measurement points used on equipment were typically handles or surfaces which would come into contact with explosives or personnel.

5. TEST EQUIPMENT

5.1 Insulation Tester

The insulation tester used was a Record Minor (Ref. No. 5G/203). This instrument generates 500 to 1000 V AC into a 15×10^4 Ω load.

5.2 Electrodes and Conducting Solution

Electrodes were manufactured and a conducting solution prepared in accordance with BS 2050 and BS 3398:1961 [1,2].

6. MEASUREMENT PROCEDURE

Each bay or room was measured and a floor plan drawn, then resistance measuring points determined in accordance with BS 3398:1961 [2]. Two electrodes were placed 610 mm apart on the antistatic surface being tested and a resistance reading taken using the insulation tester.

Resistance measurements were also taken between the antistatic surface and the earth strap in the bay. In this case one electrode was placed on the antistatic surface while the other side of the insulation tester was connected through an alligator clip to the earth strap. Separate measurements were taken using both wet and dry electrodes. For the wet electrode the measurement point on the antistatic surface was wetted with a conducting solution (Ref. 5.2).

Results from all measuring points were tabulated and the average values of resistance for the floor and benchtops in each bay determined.

7. RESULTS

A visual check showed all floors and benchtops to be in apparently good condition except in Bldg. 670, Bay 6. Here, a weld on the east benchtop was faulty and the floor covering under the west bench was lifting.

The results of the resistance measurements are summarised in Tables 1 and 2. For details of floor plans, measuring points and resistance measurements see Appendix B.

7.1 Floors and Fixed Benches

All floors and benches covered with antistatic material were within the specification [2] except Bldg. 670, Bay 6, Explosives Casting Bay, where floors and benchtops had apparently been waxed. Preliminary measurements here gave values of resistance in excess of $10^7\ \Omega$.

The floors and benchtops in Bldg. 670, Bay 6 were subsequently machine scrubbed using "Ajax" and "Bon Ami". Further resistance testing gave improved results but they still failed to meet the specifications. Further hand cleaning of the measuring points using "Ajax" was required before satisfactory test results were obtained.

7.2 Free Standing Benches

The locations of free standing benches, covered with antistatic material, which were not earthed are listed below:

Bldg. 670/5

Bldg. 675/3 and 4

Bldg. 697/12

These bench tops gave readings of infinity when tested between the antistatic surface material and the earth strap.

7.3 Equipment

Several bays contained equipment, used in explosive processes, which had no direct connection to an earth point, but instead relied on conduction through the antistatic floor or benchtop material on which the particular equipment was standing. Table 3 lists this equipment along with locations and test results.

8. CONCLUSIONS AND RECOMMENDATIONS

1. Most antistatic floors and benchtops tested were well within the specification except those in Bldg. 670/6. In this bay further cleaning of the antistatic surfaces will be required before compliance with BS 3398:1961 [2] is achieved. Clearly, any special surface treatment such as waxing should be avoided. If any such treatment is contemplated then tests to determine the suitability of the treatment should be performed.

2. Results from floors and benchtops laid *circa* 1972 (eg. Bldgs. 613, 666 and 670) are comparable with results from those laid *circa* 1978 (eg. Bldgs. 675 and 697). This suggests that there has been negligible deterioration of the older antistatic material or in the bonding between it and the earthing straps.

3. Those free standing benches covered with antistatic material but not earthed should be connected to an earth strap and re-tested before they are used for explosives work.

4. If equipment standing on antistatic floors or benchtops is required to be earthed then a proper connection to the earth strap should be provided.

5. Although it is obviously desirable for periodic testing of all antistatic floors and benchtops to be performed it should be realised that testing in accordance with BS 3398:1961 [2] is very time consuming. The testing reported here is estimated to have taken two (2) man months, and since that time, with Bldgs. 505, 671 and 1078 having been completed, the area of antistatic surfaces in the E&A Composite has probably doubled. Therefore a system of spot checking may be more appropriate.

9. REFERENCES

1. British Standards Institution (1961). BS 2050:1961 "Specification for Electrical Resistance of Conductive and Anti-Static Products made from Flexible Polymeric Material".

2. British Standards Institution (1961). BS 3398:1961 "Specification for Anti-Static Rubber Flooring".

3. The Standards Association of Australia (1970). AS 1020:1970 "The Control of Undesirable Static Electricity" known as the SAA Static Electricity Code.

TABLE 1

SUMMARY OF SURFACE MEASUREMENTS

Location (Bldg/Bay)	Average Resistance (k Ω)	
	Floor	Bench Top
613	608	837
671/10	517	475
670/5	561	783
670/6 *	892	900
675/2	545	1088
675/3	594	313
675/4	670	860
675/5	575	790
675/6	550	500
675/7	579	590
675/9	660	575
697/1	500	-
697/2	644	688
697/4	537	783
697/6	469	750
697/8	410	660
697/12	430	733
666/15	587	425
914	683	775

* Results obtained after hand cleaning measuring points with "Ajax"

TABLE 2

SUMMARY OF SURFACE TO EARTH STRAP MEASUREMENTS

Location (Bldg/Bay)	Average Resistance (k Ω)			
	Dry		Wet	
	Floor	Benchtop	Floor	Benchtop
613	224	300	90	188
671/10	223	250	133	185
670/5	225	983	103	880
670/6 *	305	294	149	400
675/2	259	467	132	300
675/3	193	375	112	300
675/4	220	565	100	194
675/5	283	380	132	170
675/6	231	285	144	180
675/7	238	270	131	153
675/9	250	275	134	150
697/1	309	-	94	-
697/2	306	294	138	189
697/4	231	383	112	175
697/6	169	417	85	183
697/8	167	315	103	195
697/12	190	325	90	200
666/15	220	210	107	182
914	303	368	143	206

* Results obtained after hand cleaning measuring points with "Ajax"

TABLE 3

EQUIPMENT NOT DIRECTLY EARTHED

Location	Equipment Description	Earth Resistance (Ω)
Bld 675/6	Air operated lathe	10^5
Bld 675/7	Explosive magazine	4×10^4
Bld 675/4	Press against east wall	4×10^4
Bld 675/4	Press against north wall	7×10^4
Bld 675/4	Press against west wall	175×10^4
Bld 675/3	Cabinet against west wall on free standing bench	Infinity
Bld 675/2	Cabinet against west wall	35×10^3
Bld 675/2	Mixing and Pouring device	60×10^3
Bld 697/2B	Propellant grinder against north wall; earth strap provided but not connected	15×10^4
Bld 697/4	Rotter Impact Tester	10^4
Bld 697/4	Ignition Bath	Infinity

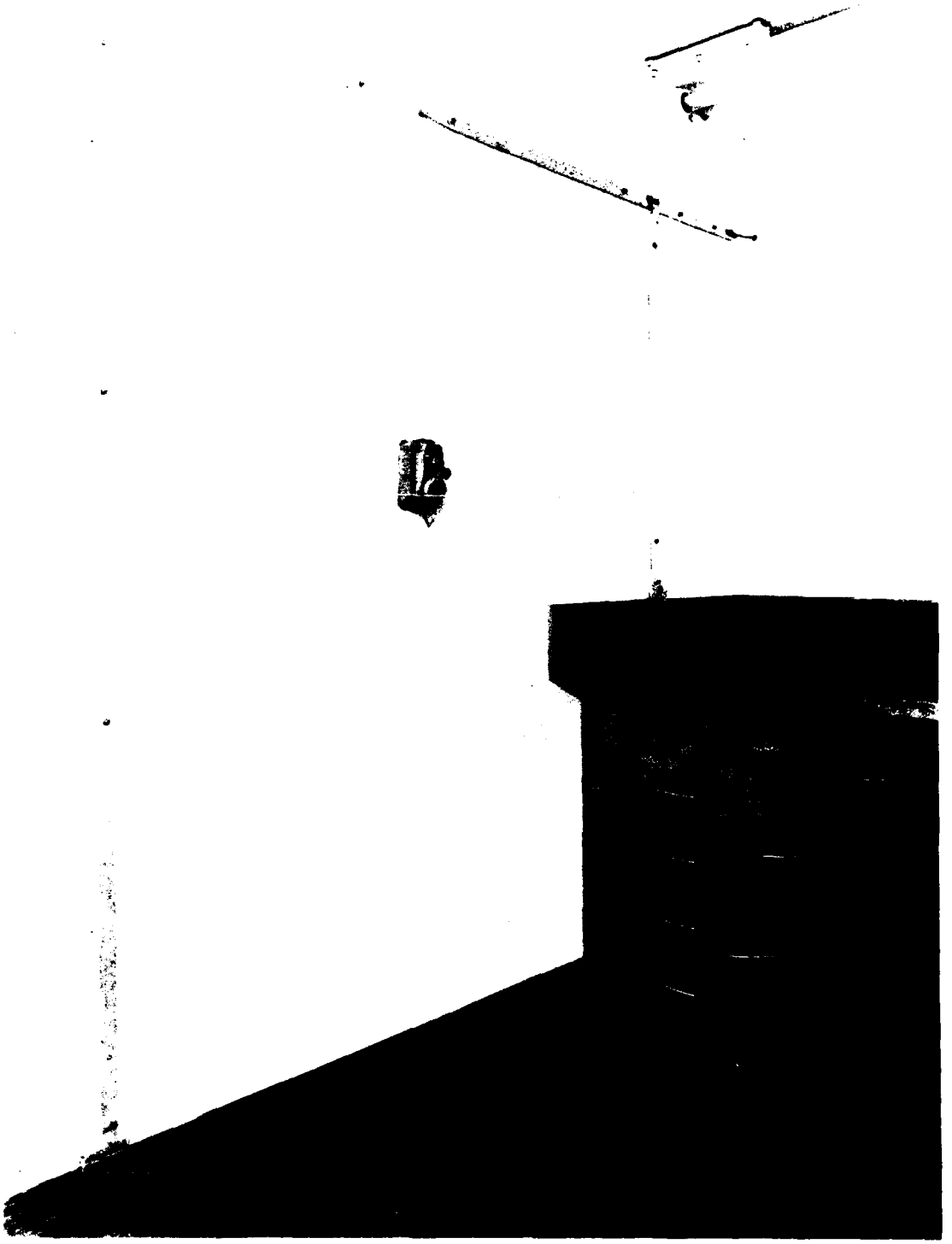


Fig. 1. Photograph of explosive charge preparation room showing antistatic floor and benchtop, with earthing straps on wall.

APPENDIX A

List of Buildings and Bays where resistance testing of floors and bench tops covered with antistatic material was carried out.

Bld 613	Charge Preparation Room
Bld 666/15	Gap Test Firing Area
Bld 670/5 and 6	
Bld 671/10	
Bld 675/2, 3, 4, 5, 6, 7 and 9	
Bld 697/1, 2, 4, 6, 8, 12	
Bld 914	

APPENDIX B

Details of floor plans, measuring points and tables of all resistance measurements.

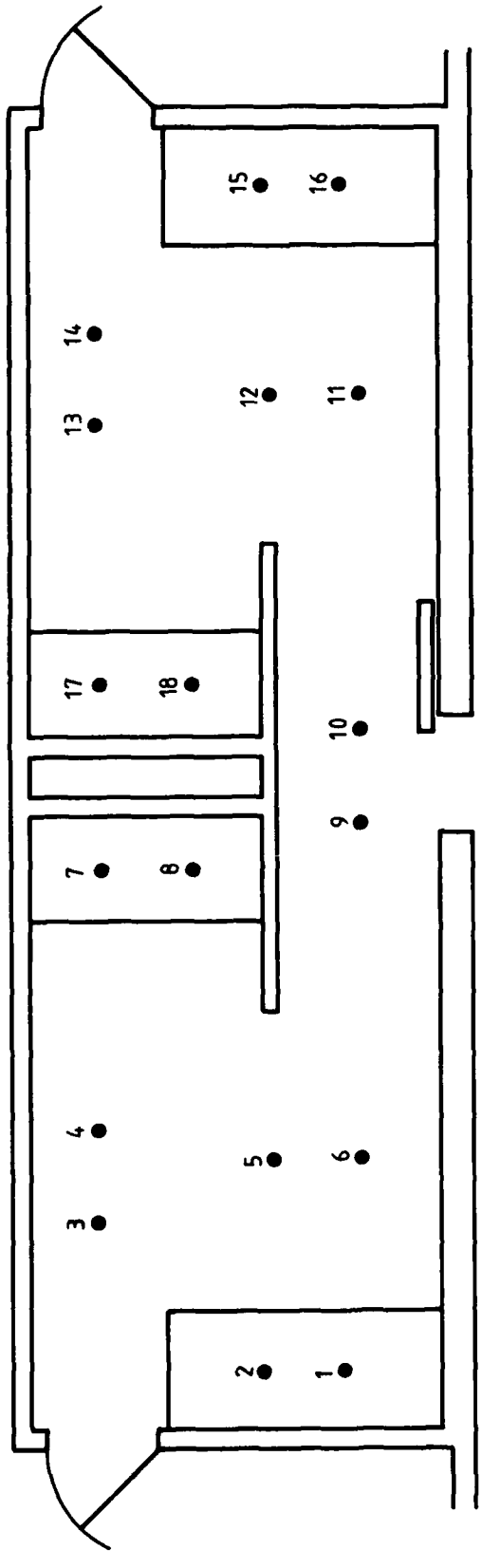
ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

SURFACE MEASUREMENTS			
MEASUREMENT POINTS (W = ACROSS WELD)		RESISTANCE (kΩ)	
		FLOOR	BENCHTOP
1	2		800
3	4	440	
5	6 W	400	
7	8		750
9	10	500	
11	12 W	800	
13	14	900	
15	16		800
17	18		1000
MEAN:		608	837

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2		340		190
4	160		80	
6	250		100	
8		320		170
10	150		70	
12	400		130	
14	160		70	
16		240		140
18		300		250
MEAN:	224	300	90	188

BLDG. 613 BAY/ Charge Prep. TESTER K. Lee DATE 16/4/80

BLDG. 613



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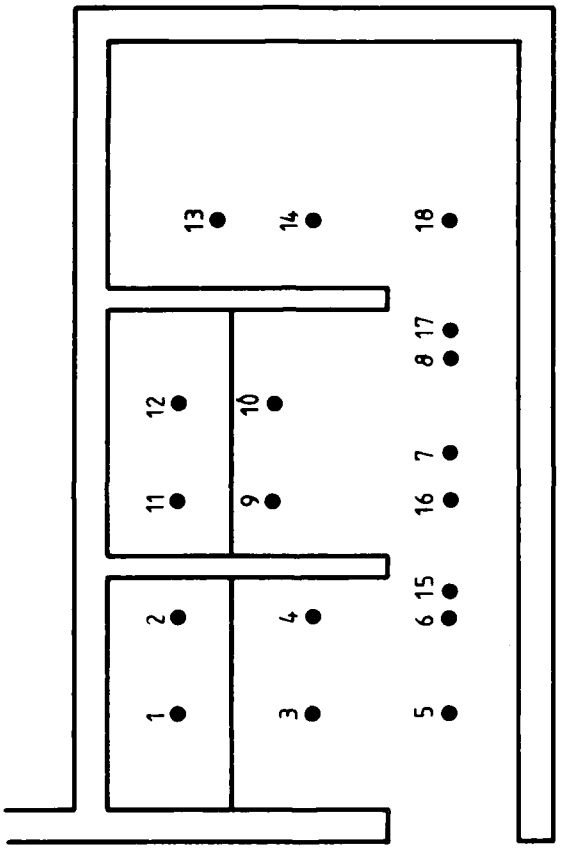
ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

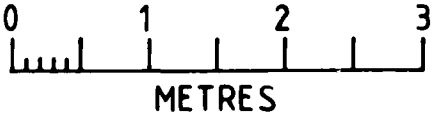
SURFACE MEASUREMENTS			
MEASUREMENT POINTS (W = ACROSS WELD)		RESISTANCE (kΩ)	
		FLOOR	BENCHTOP
1	2		350
3	4	500	
5	6	460	
7	8	400	
9	10	700	
11	12		500
13	14 W	1000	
15	16 W	450	
17	18 W	600	
MEAN:		587	425

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2		200		175
4	200		100	
6	160		100	
8	190		75	
10	170		100	
12		220	130	190
14	400		130	
16	120		70	
18	300		150	
MEAN:	220	210	107	182

BLDG. 666 BAY/15 Gap Test Area TESTER K. Lee DATE 18/1/80

BLDG. 666 BAY 15





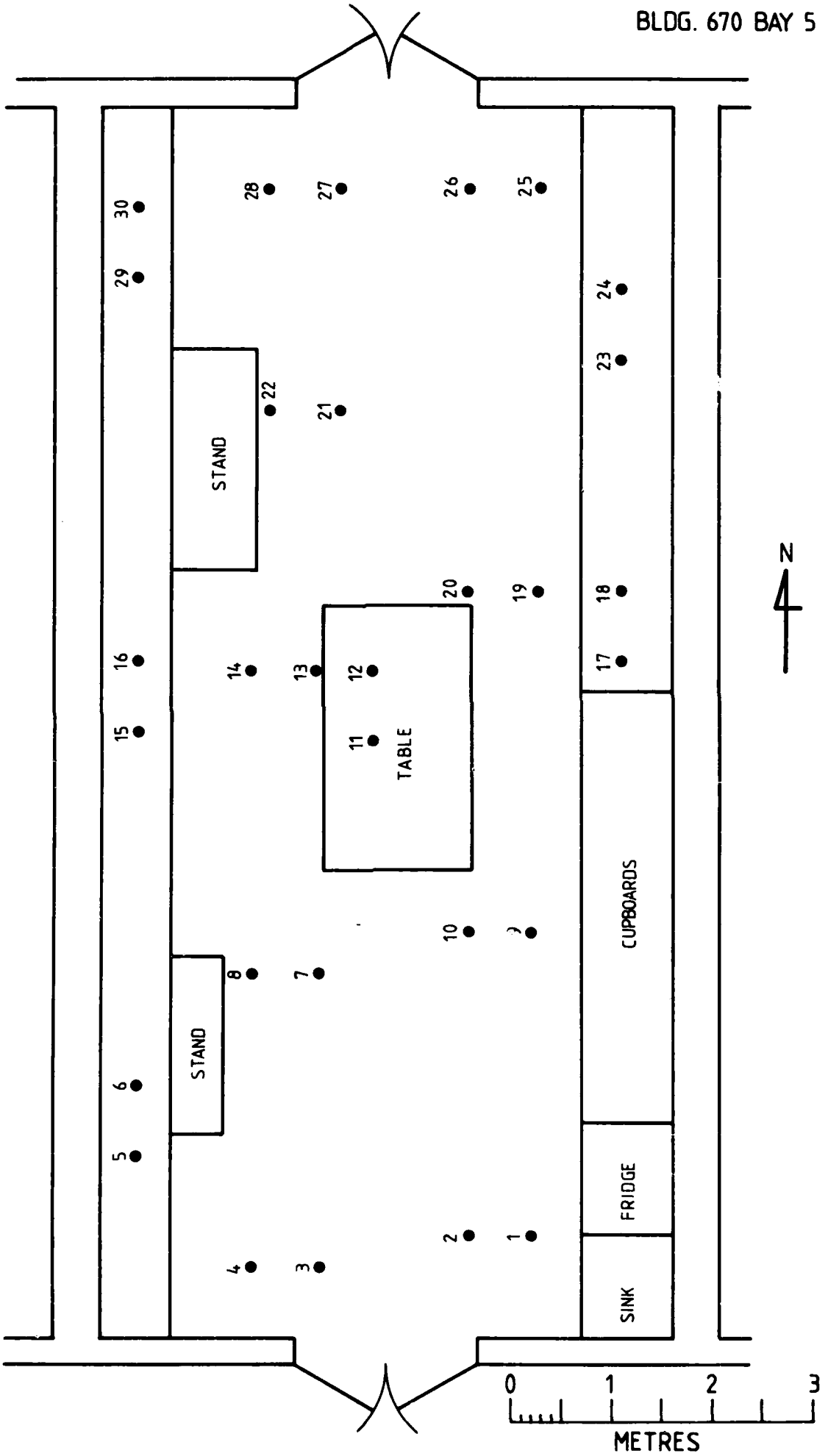
ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

SURFACE MEASUREMENTS				
MEASUREMENT POINTS (W = ACROSS WELD)			RESISTANCE (kΩ)	
			FLOOR	BENCHTOP
1	2	W	500	
3	4	W	500	
5	6	TROUGH		
7	8	W	500	
9	10	W	600	
11	12			850
13	14	W	600	
15	16	TROUGH		
17	18			700
19	20	W	500	
21	22	W	800	
23	24			800
25	26	W	700	
27	28	W	350	
MEAN:			561	783

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2	200		100	
4	200		120	
8	200		120	
10	150		90	
12		2500		2500
14	250		100	
18		200		60
20	200		80	
22	300		120	
24		250		80
26	400		100	
28	400		100	
MEAN:	255	983	103	880

BLDG. 670 BAY/5

TESTER Lee/Stewart/Irvine Date 1/4/80


BLDG. 670 BAY 5
STAND
STAND
TABLE
CUPBOARDS
FRIDGE
SINK
N
0
1
2
3
METRES

ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

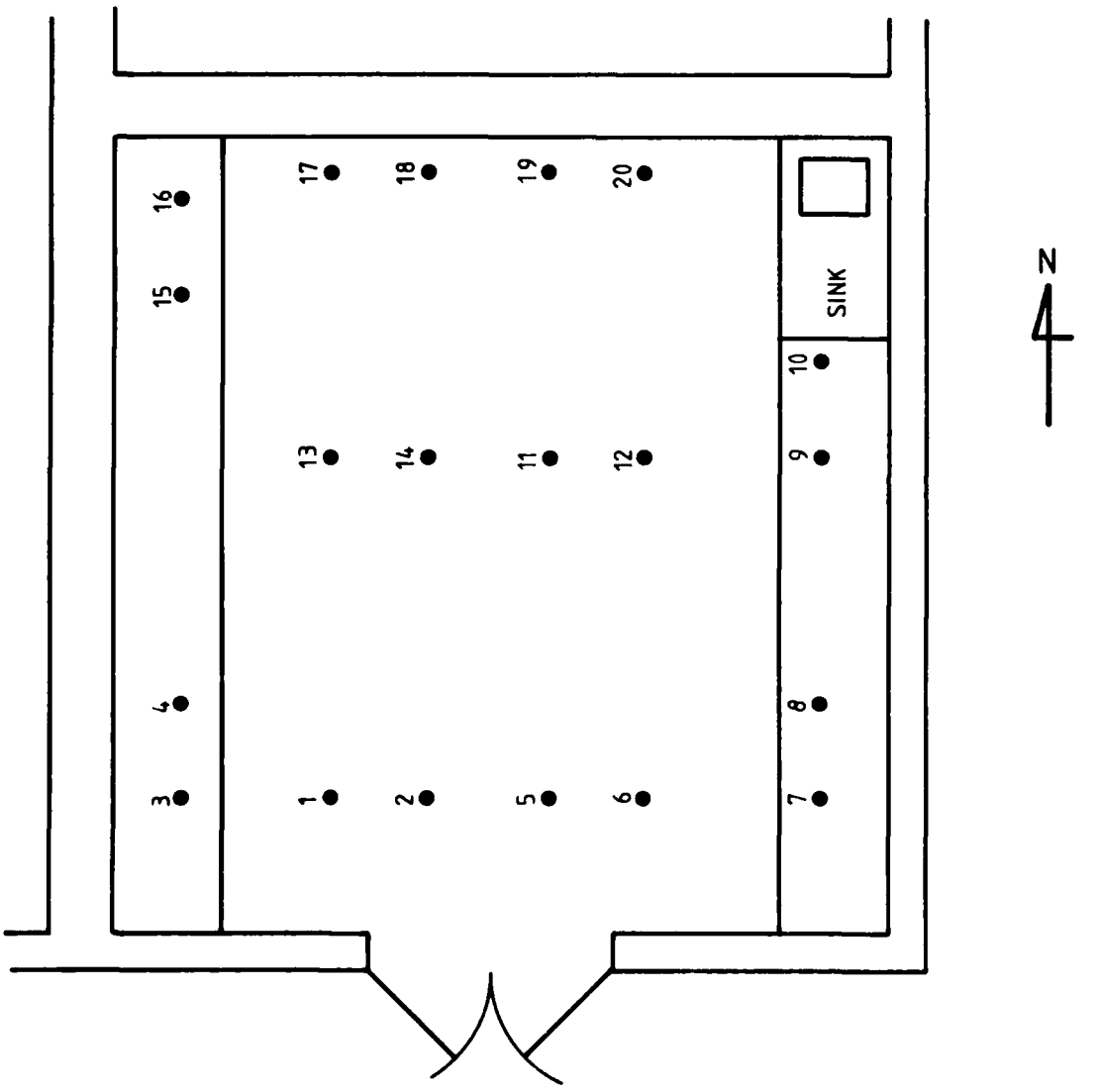
SURFACE MEASUREMENTS		
MEASUREMENT POINTS (W = ACROSS WELD)	RESISTANCE (kΩ)	
	FLOOR	BENCHTOP
1 2 W	350	
3 4 W		700
5 6 W	850	
7 8 FAULTY WELD		1000
9 10 W		1000
11 12 W	500	
13 14 W	650	
17 18 W	2000	
19 20	1000	
15 & 16 BENCH OBSTRUCTION		
MEAN:	892	900

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2	150		100	
4		300		250
6	500		150	
8		350		300
10		600		650
12	175		125	
14		200	70	
18	500		300	
20	200	20		
MEAN:	305	294	149	400

BLDG. 670 BAY/6

TESTER K. Lee DATE 1/4/80

BLDG. 670 BAY 6



ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

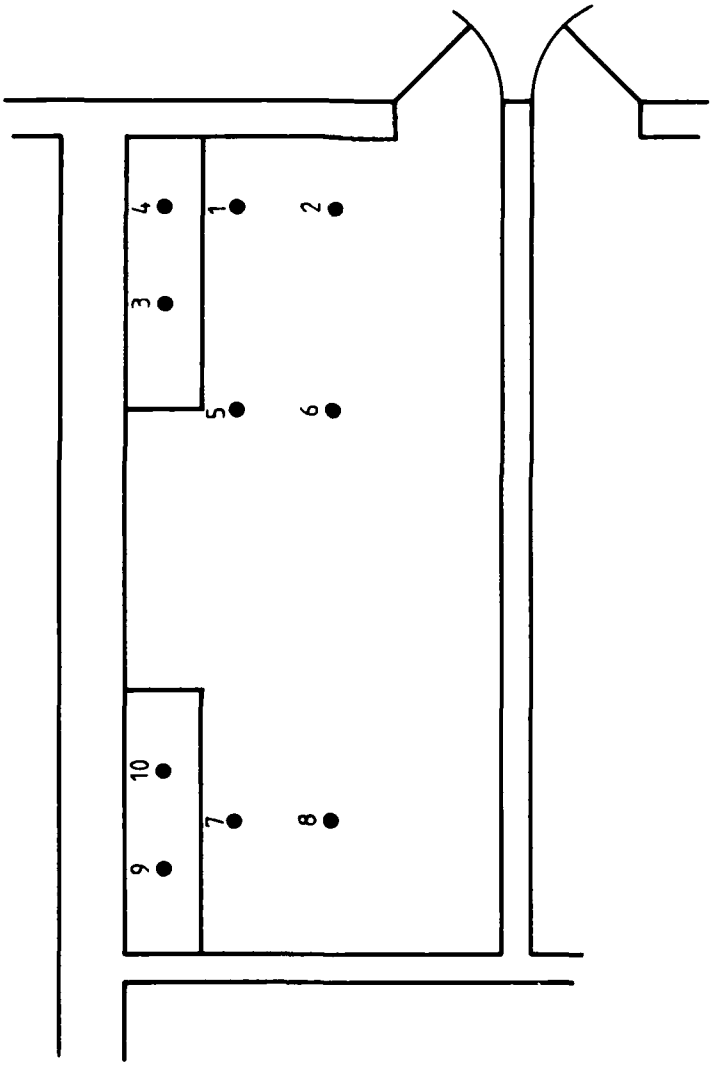
SURFACE MEASUREMENTS			
MEASUREMENT POINTS (W = ACROSS WELD)		RESISTANCE (kΩ)	
		FLOOR	BENCHTOP
1	2 W	800	500
3	4		
5	6 W x 2	400	
7	8 W	350	
9	10		450
MEAN:		517	475

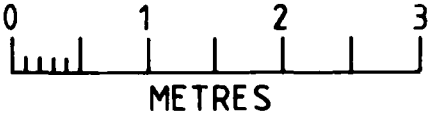
SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2	300		150	
4		300		200
6	170		100	
8	200		150	
10		200		170
MEAN:	223	250	133	185

BLDG. 671 BAY/10

TESTER K. Lee DATE 1/4/80

BLDG. 671 BAY 10





ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

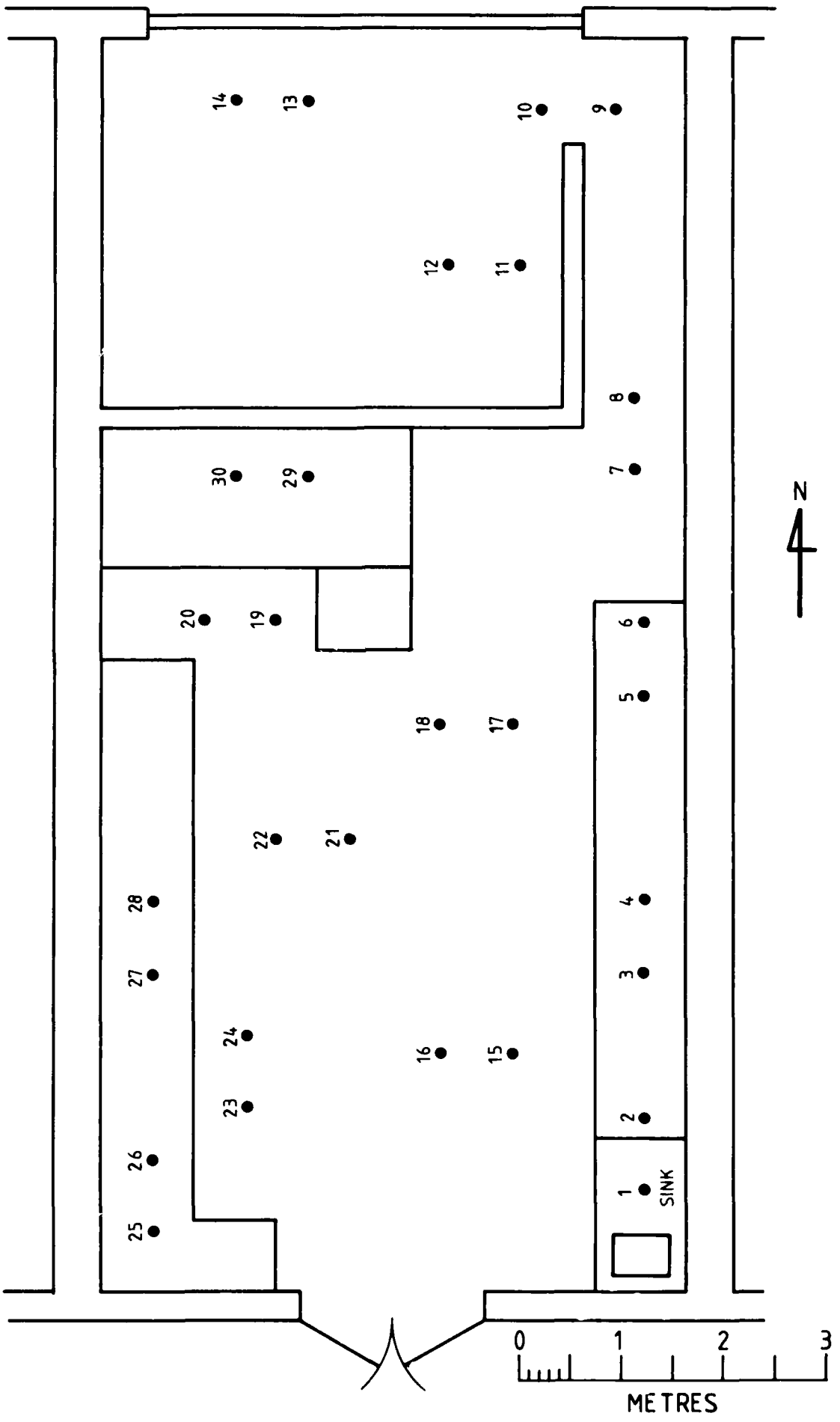
SURFACE MEASUREMENTS				
MEASUREMENT POINTS (W = ACROSS WELD)			RESISTANCE (kΩ)	
			FLOOR	BENCHTOP
1	2	Metal Sink		600
3	4			1000
5	6			1000
7	8	W	350	
9	10	W x 2	350	
11	12	W	700	
13	14	W	500	
15	16	W	350	
17	18	W	500	
19	20	W	700	
21	22	W	500	
23	24		1000	
25	26	W		1750
29	30		500	
27, 28 NO READING TAKEN DUE TO BENCH OBSTRUCTION				
MEAN:			545	1088

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2		600		300
4		600		250
6		200		350
8	250		100	
10	250		150	
12	175		100	
14	200		75	
16	100		70	
18	200		80	
20	200		100	
22	175		75	
24	300		100	
26	800		450	
30	200		150	
MEAN:	259	467	132	300

BLDG. 675 BAY/2

TESTER K. Lee DATE 3/3/80

BLDG. 675 BAY 2



ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

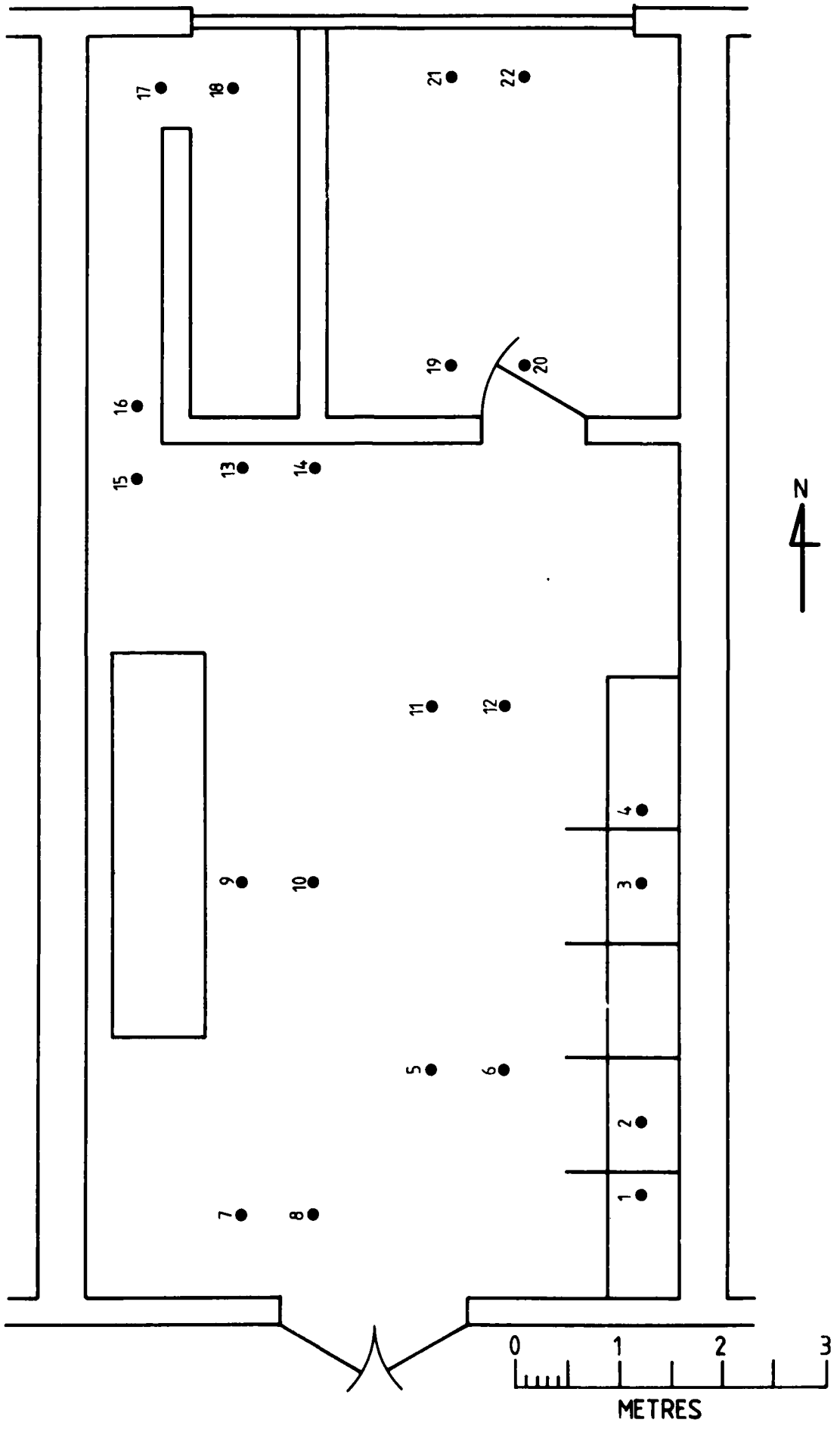
SURFACE MEASUREMENTS		
MEASUREMENT POINTS (W = ACROSS WELD)	RESISTANCE (kΩ)	
	FLOOR	BENCHTOP
1 2 W		275
3 4		350
5 6 W	700	
7 8 W	500	
9 10 W	500	
11 12 W	400	
13 14 W	500	
15 16 W	450	
17 18 W	700	
19 20 W	800	
21 22 W	800	
MEAN:	594	313

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2		275		
4		475		300
6	150		100	
8	150		90	
10	155		100	
12	100		100	
14	130		90	
16	150		100	
18	275		125	
20	250		150	
22	375		150	
MEAN:	193	375	112	300

BLDG. 675 BAY/3

TESTER K. Lee DATE 3/3/80

BLDG. 675 BAY 3



ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

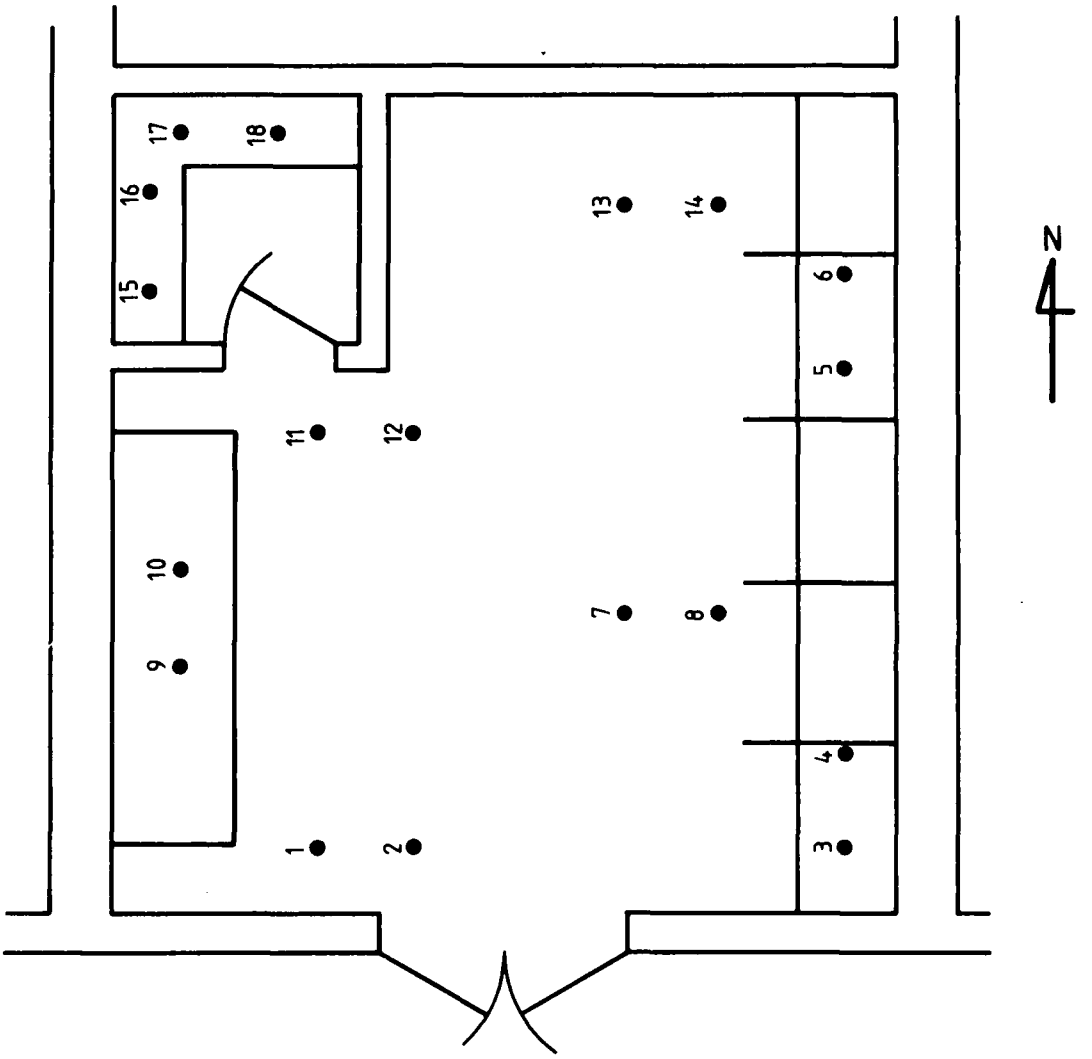
SURFACE MEASUREMENTS			
MEASUREMENT POINTS (W = ACROSS WELD)		RESISTANCE (kΩ)	
		FLOOR	BENCHTOP
1	2 W	1000	
3	4		800
5	6		900
7	8 W	600	
9	10		500
11	12 W	450	
13	14	500	
15	16		900
17	18		1200
19	20 W	800	
MEAN:		670	860

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2	175			100
4		400		200
6		375		175
8	200		100	
10		900		220
12	225		100	
14	300		100	
16		450		250
18		700		220
20	200		100	
MEAN:	220	565	100	194

BLDG. 675 BAY/4

TESTER K. Lee DATE 3/3/80

BLDG. 675 BAY 4



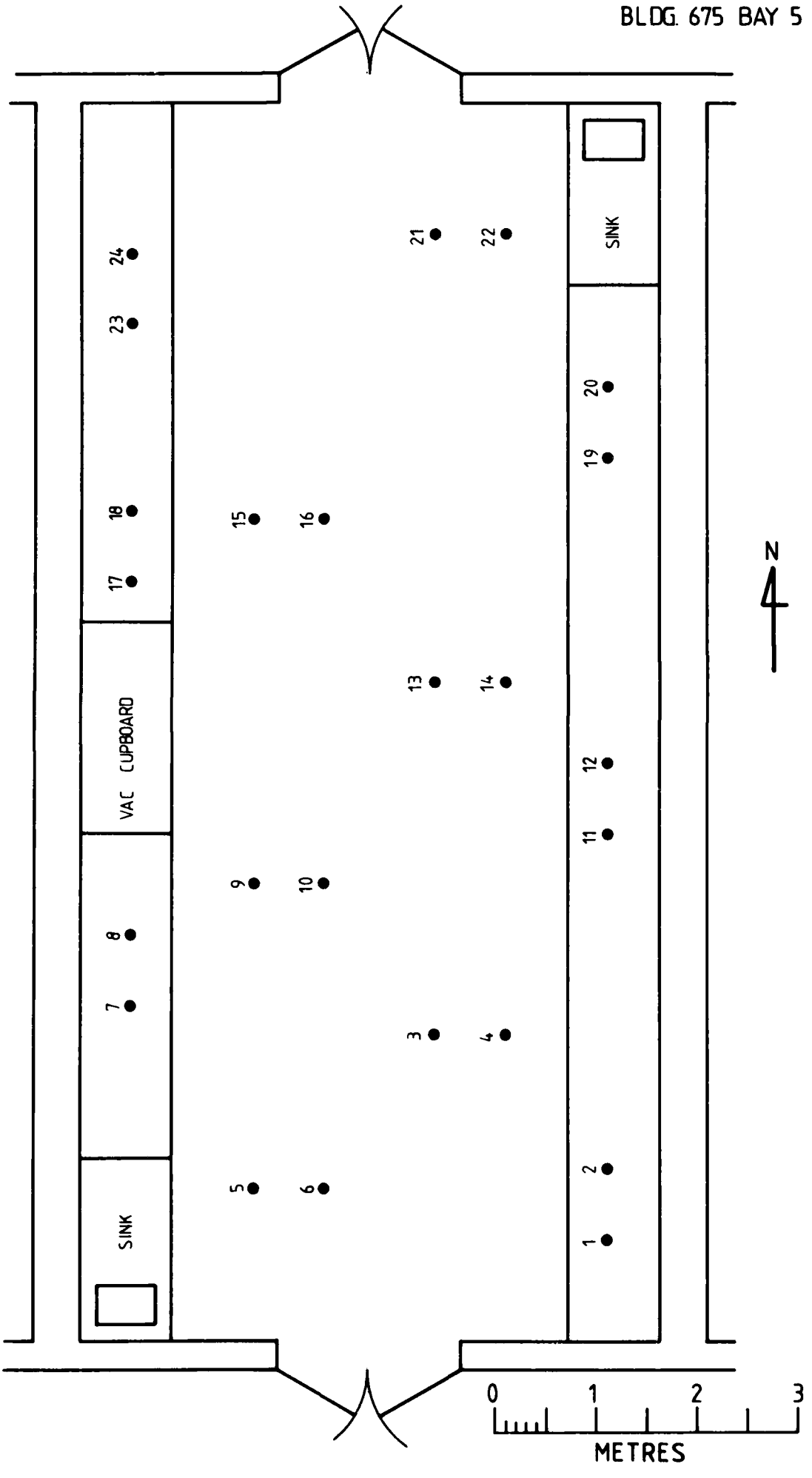
ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

SURFACE MEASUREMENTS		
MEASUREMENT POINTS (W = ACROSS WELD)	RESISTANCE (kΩ)	
	FLOOR	BENCHTOP
1 2		800
3 4 W	550	
5 6 W	550	
7 8		350
9 10 W	500	
11 12		1000
13 14 W	450	
15 16 W	500	
17 18 Cup. in way		
19 20		900
21 22 W	900	
23 24		900
MEAN:	575	790

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2		350		225
4	300		175	
6	200		125	
8		150		125
10	150		90	
12		500		175
14	300		150	
16	200		100	
20		450		175
22	550		150	
24		450		150
MEAN:	283	380	132	170

BLDG. 675 BAY/5

TESTER K. Lee DATE 3/3/80


BLDG. 675 BAY 5
SINK
VAC CUPBOARD
SINK
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METRES

ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

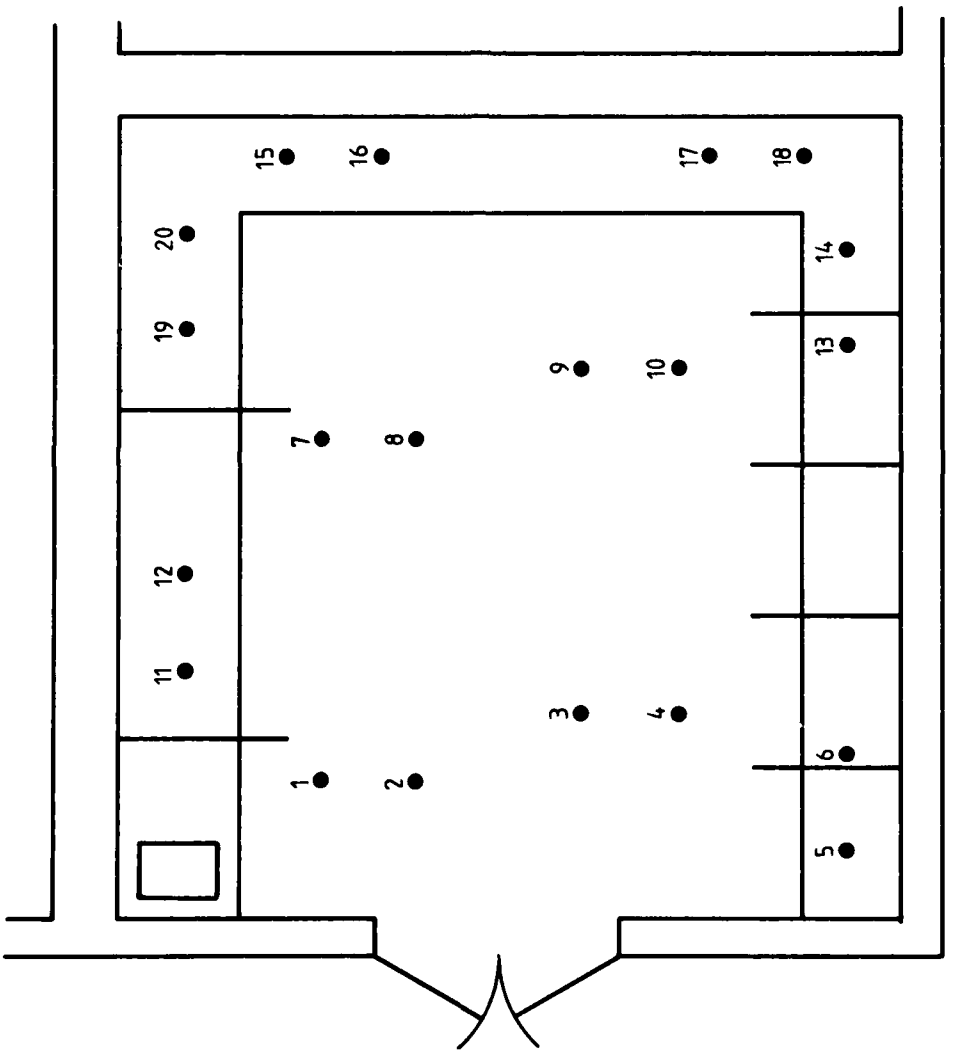
SURFACE MEASUREMENTS				
MEASUREMENT POINTS (W = ACROSS WELD)			RESISTANCE (kΩ)	
			FLOOR	BENCHTOP
1	2	W	500	
3	4	W	600	
5	6			500
7	8	W	600	
9	10	W	500	
11	12	Lathe in way		
13	14			650
15	16			350
17	18			750
19	20			250
MEAN:			550	500

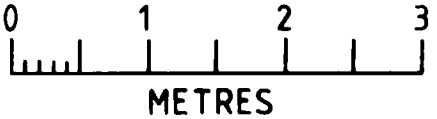
SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2	200		150	
4	175		150	
6		250		150
8	350		175	
10	200		100	
14		350		200
16		300		200
18		350		200
20		175		150
MEAN:	231	285	144	180

BLDG. 675 BAY/6

TESTER K. Lee DATE 3/3/80

BLDG. 675 BAY 6





ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

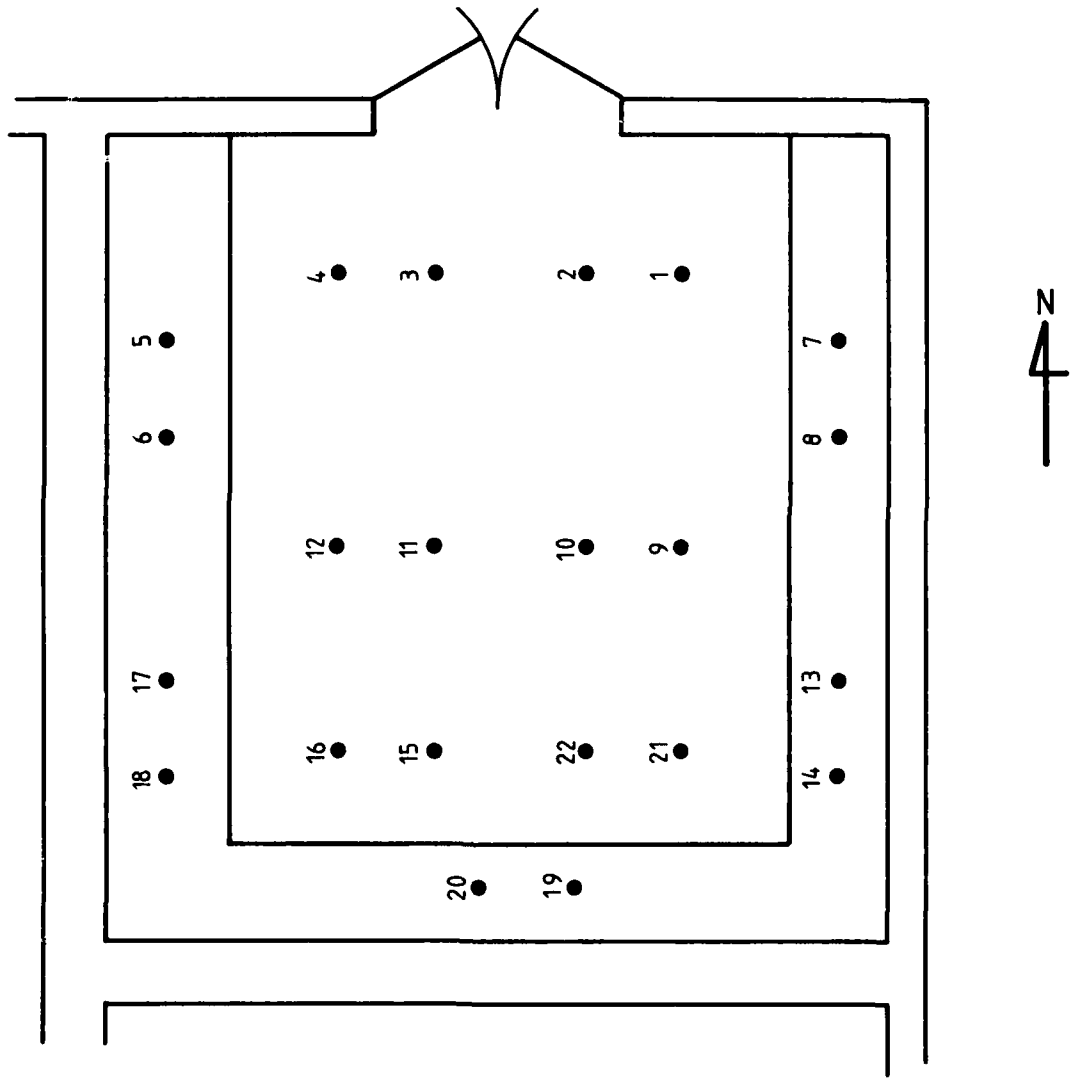
SURFACE MEASUREMENTS				
MEASUREMENT POINTS (W = ACROSS WELD)			RESISTANCE (kΩ)	
			FLOOR	BENCHTOP
1	2	W x 2	600	
3	4	W	600	
5	6			600
7	8			650
9	10	W	800	
11	12	W	400	
13	14			600
15	16	W	600	
17	18			600
19	20			500
21	22	W x 2	475	
MEAN:			579	590

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2	275		160	
4	225		100	
6		250		150
8		250		140
10	400		200	
12	175		115	
14		300		180
16	150		100	
18		300		150
20		250		145
22	200		110	
MEAN:	238	270	131	153

BLDG. 675 BAY/7

TESTER K. Lee DATE 3/3/80

BLDG. 675 BAY 7



ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

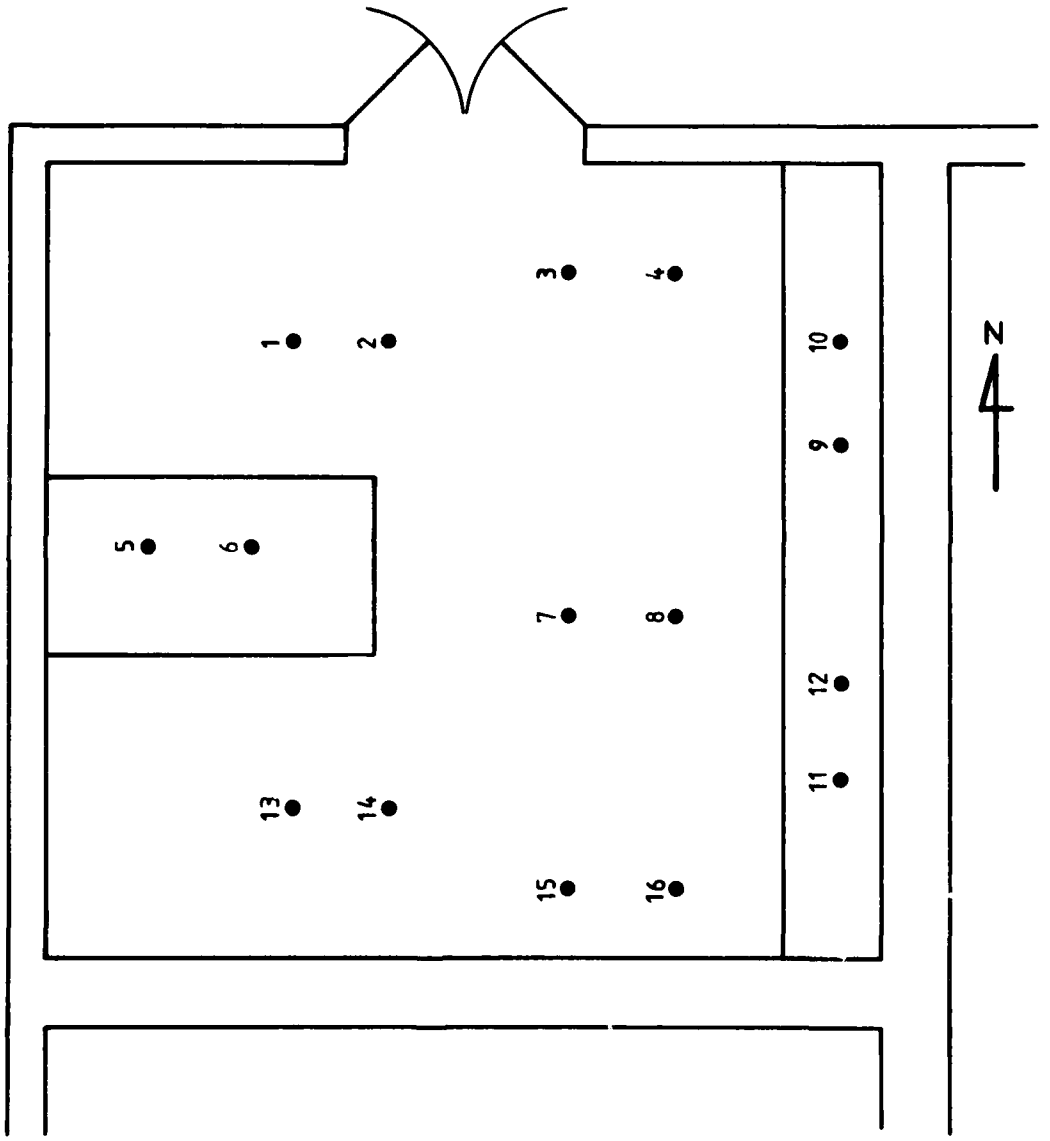
SURFACE MEASUREMENTS		
MEASUREMENT POINTS (W = ACROSS WELD)	RESISTANCE (kΩ)	
	FLOOR	BENCHTOP
1 2 W	600	
3 4 W	1000	
5 & 6 NON ANTI STATIC BENCH		
7 8	600	
9 10		600
11 12		550
13 14	600	
15 16	500	
MEAN:	660	575

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2	250		110	
4	350		200	
8	250		100	
10		250		150
12		300		150
14	200		110	
16	200		150	
MEAN:	250	275	134	150

BLDG. 675 BAY/9

TESTER K. Lee DATE 3/3/80

BLDG. 675 BAY 9



ANTISTATIC FLOOPS AND BENCHTOPS - RESISTANCE TESTS

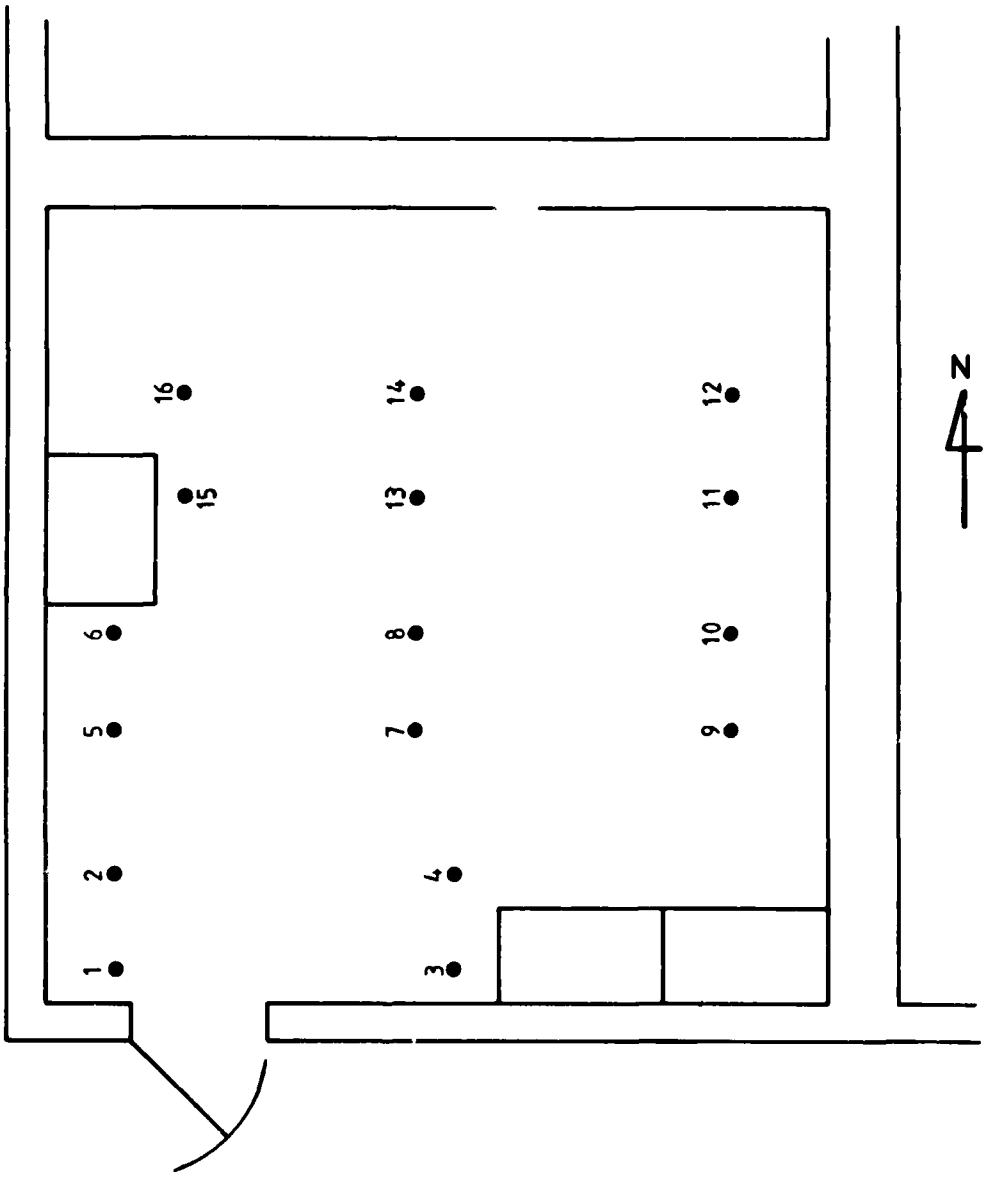
SURFACE MEASUREMENTS		
MEASUREMENT POINTS (W = ACROSS WELD)	RESISTANCE (kΩ)	
	FLOOR	BENCHTOP
1 2 W	450	
3 4 W	600	
5 6 W	500	
7 8 W	400	
9 10 W	500	
11 12 W	500	
13 14 W	450	
15 16 W	600	
MEAN:	500	

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2	275		100	
4	375		100	
6	120		80	
8	150		60	
10	175		80	
12	150		70	
14	175		70	
16	250		90	
Bench Top 17			200	
MEAN:	209		94	

BLDG. 697 BAY/1

TESTER K. Lee DATE 3/3/80

BLDG. 697 BAY 1



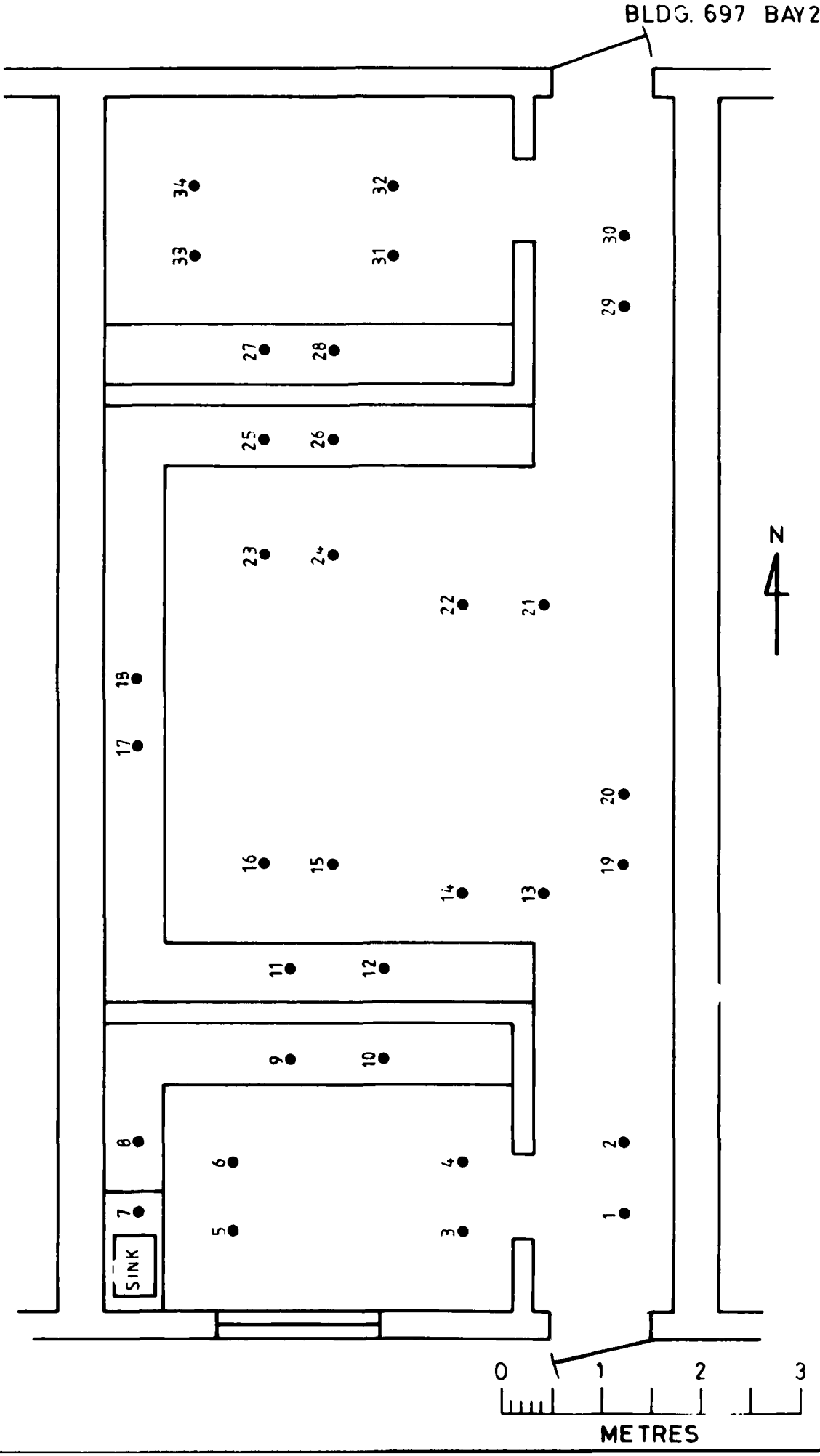
ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

SURFACE MEASUREMENTS		
MEASUREMENT POINTS (W = ACROSS WELD)	RESISTANCE (kΩ)	
	FLOOR	BENCHTOP
1 2	850	
3 4, 5 6, 7 8, 9 10		
NO ANTI-STATIC FLOOR		
11 12		700
13 14 W	750	
15 16 W	400	
17 18		650
19 20	800	
21 22 W	700	
23 24 W	750	
25 26		650
27 28		750
29 30	500	
31 32 W	700	
33 34 W	350	
MEAN:	644	688

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2	175		125	
12		275		170
14	450		175	
16	150		80	
18		300		200
20	400		125	
22	425		150	
24	325		185	
26		300		185
28		300		200
30	300		100	
32	275		180	
34	250		125	
MEAN:	306	294	138	189

BLDG. 697 BAY/2

TESTER K. Lee DATE 4/3/80


BLDG. 697 BAY2
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SINK
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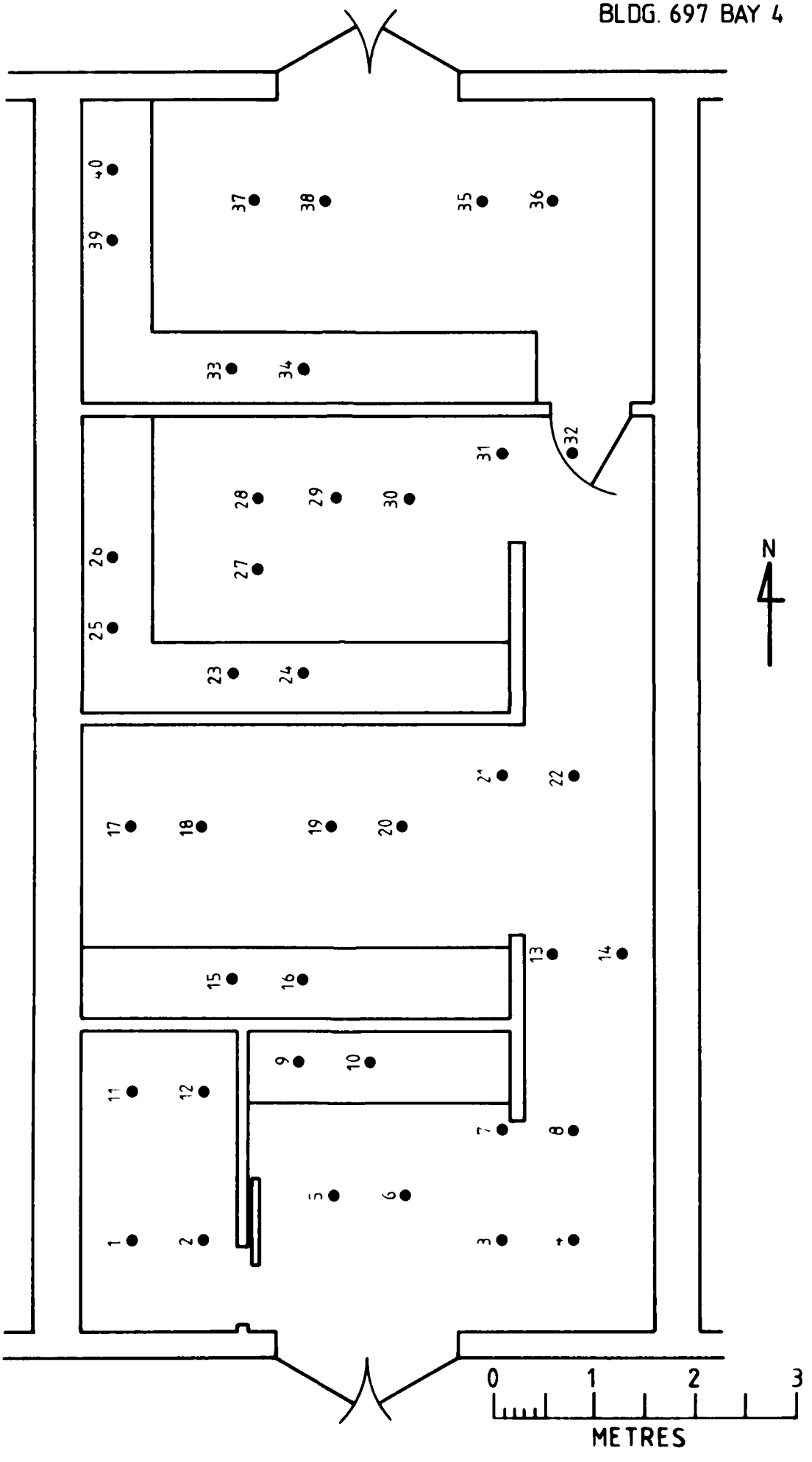
ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

SURFACE MEASUREMENTS				
MEASUREMENT POINTS (W = ACROSS WELD)			RESISTANCE (kΩ)	
			FLOOR	BENCHTOP
1	2	W	325	
3	4	W	400	
5	6		450	
7	8	Wall		
9	10			750
11	12	W	800	
13	14		500	
15	16			850
17	18	W	800	
19	20	W	700	
21	22	W	500	
23	24			600
25	26			800
27	28		450	
29	30	W	300	
31	32	W	450	
33	34			800
35	36	W	700	
37	38	W	600	
39	40			900
MEAN:			537	783

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2	200		125	
4	125		70	
6	150		80	
10		400		150
12	450		175	
14	150		70	
16		550		200
18	350		175	
20	250		150	
22	200		80	
24		300		200
26		350		200
28	200		100	
30	125		60	
32	150		70	
34		350		150
36	350		150	
38	300		150	
40		350		150
MEAN:	231	383	112	175

BLDG. 697 BAY/4

TESTER K. Lee DATE 3/3/80


BLDG. 697 BAY 4
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ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

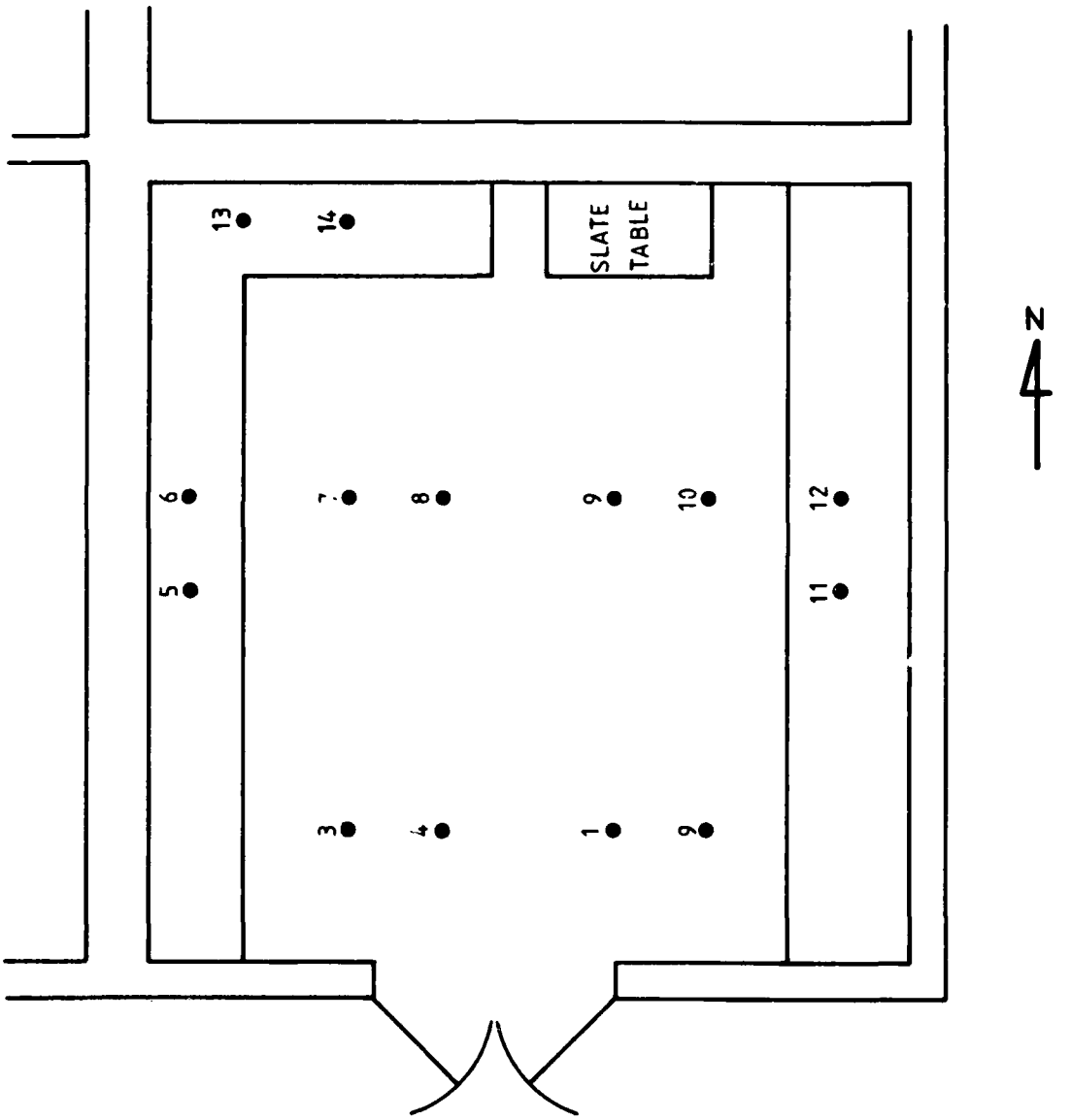
SURFACE MEASUREMENTS				
MEASUREMENT POINTS (W = ACROSS WELD)			RESISTANCE (kΩ)	
			FLOOR	BENCHTOP
1	2	W	500	
3	4	W	400	
5	6			1000
7	8	W	325	
9	10	W	650	
11	12			550
13	14			700
MEAN:			469	750

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2	125		70	
4	125		85	
6		500		150
8	125		60	
10	300		125	
12		350		150
14		400		250
MEAN:	169	417	85	183

BLDG. 697 BAY/6

TESTER K. Lee DATE 4/3/80

BLDG. 697 BAY 6



ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

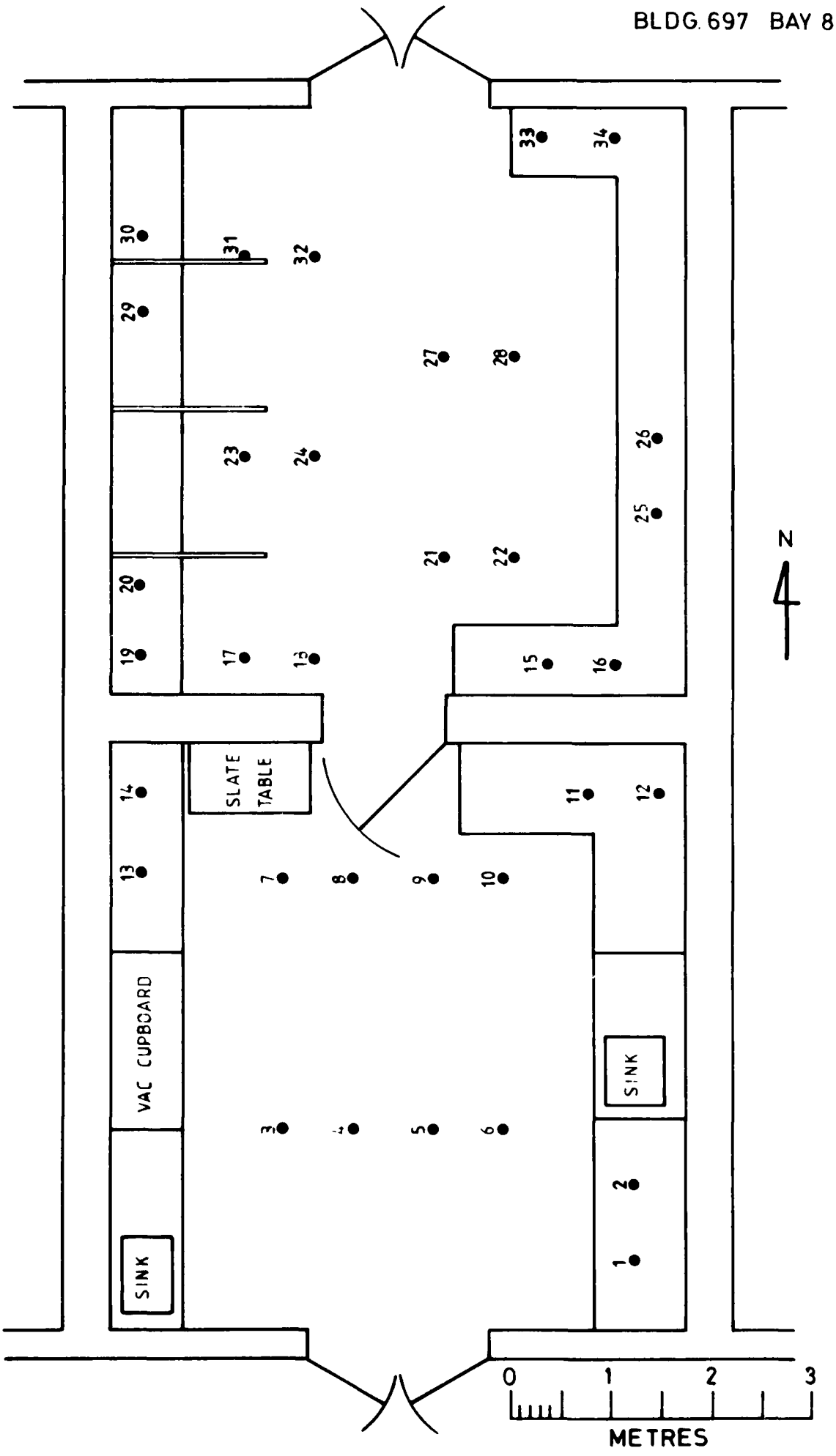
SURFACE MEASUREMENTS				
MEASUREMENT POINTS (W = ACROSS WELD)			RESISTANCE (kΩ)	
			FLOOR	BENCHTOP
15	16			650
17	18	W	300	
19	20			800
21	22	W	500	
23	24	W	350	
25	26			450
27	28	W	500	
29	30			700
31	32	W	400	
33	34			700
MEAN:			410	660

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
16		275		200
18	150		90	
22	200		125	
20		300		175
24	110		75	
26		250		175
28	177		125	
30		375		225
32	200		100	
34		375		200
MEAN:	167	315	103	195

BLDG. 697 BAY/8

TESTER K. Lee DATE 4/3/80

BLDG. 697 BAY 8



ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

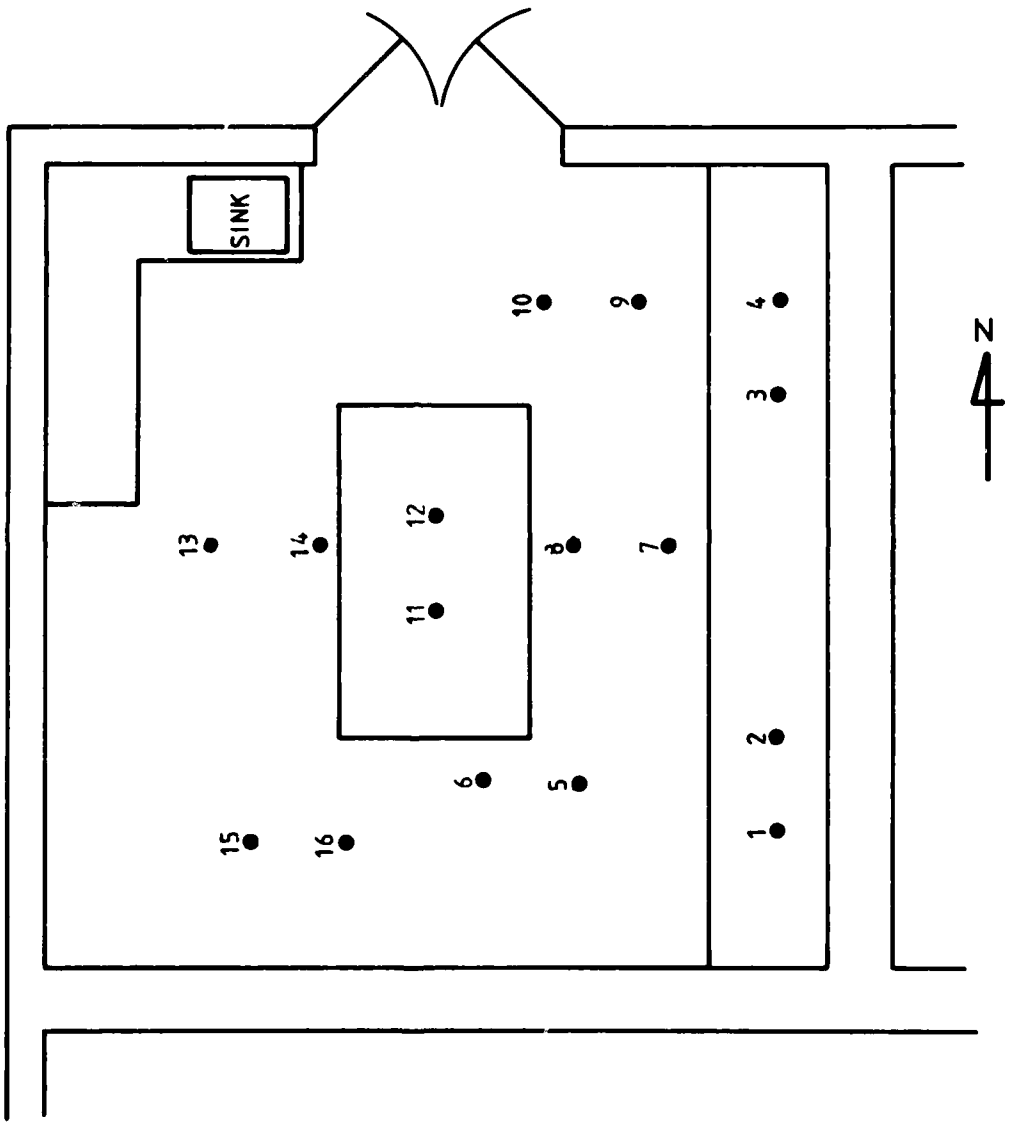
SURFACE MEASUREMENTS				
MEASUREMENT POINTS (W = ACROSS WELD)			RESISTANCE (kΩ)	
			FLOOR	BENCHTOP
1	2			600
3	4			1000
5	6	W	500	
7	8	W	400	
9	10	W	500	
11	12	TABLE		600
13	14	W	400	
15	16	W	350	
MEAN:			430	733

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2		300		225
4		350		175
6	200		100	
8	175		100	
10	225		80	
12	TABLE NOT EARTHED			
14	150		90	
16	200		80	
MEAN:	190	325	90	200

BLDG. 697 BAY/12

TESTER K. Lee DATE 4/3/80

BLDG. 697 BAY 12



ANTISTATIC FLOORS AND BENCHTOPS - RESISTANCE TESTS

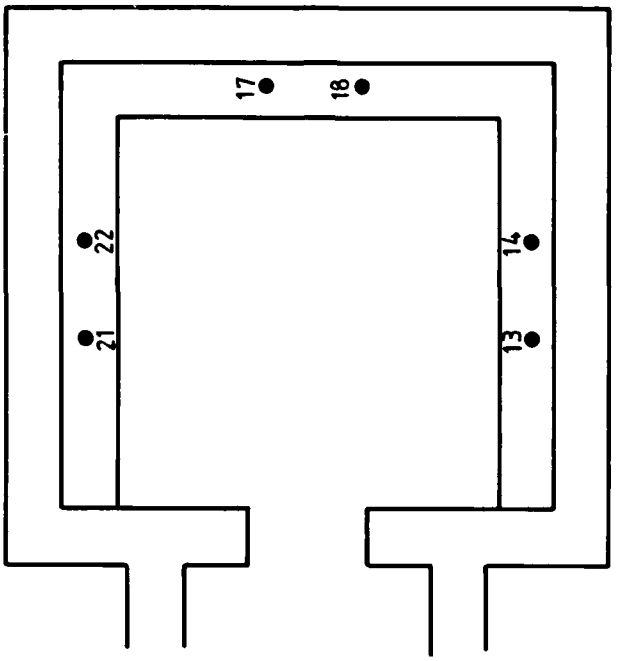
SURFACE MEASUREMENTS				
MEASUREMENT POINTS (W = ACROSS WELD)			RESISTANCE (kΩ)	
			FLOOR	BENCHTOP
1	2		250	
3	4	W x 2	850	
5	6		600	
7	8	W	900	
9	10	W	700	
11	12		800	
13	14			700
15	16			1200
17	18			350
19	20			850
21	22			700
23	24			850
MEAN:			683	775

SURFACE TO EARTH STRAP MEASUREMENTS				
SURFACE POINTS	RESISTANCE (kΩ)			
	DRY		WET	
	FLOOR	BENCHTOP	FLOOR	BENCHTOP
2	120		80	
4	450		200	
6	300		140	
8	400		160	
10	300		150	
12	250		130	
14		400		250
16		500		180
18		260		200
20		350		170
22		350		250
24		350		190
MEAN:	303	368	143	206

BLDG. 914 BAY/ROOM

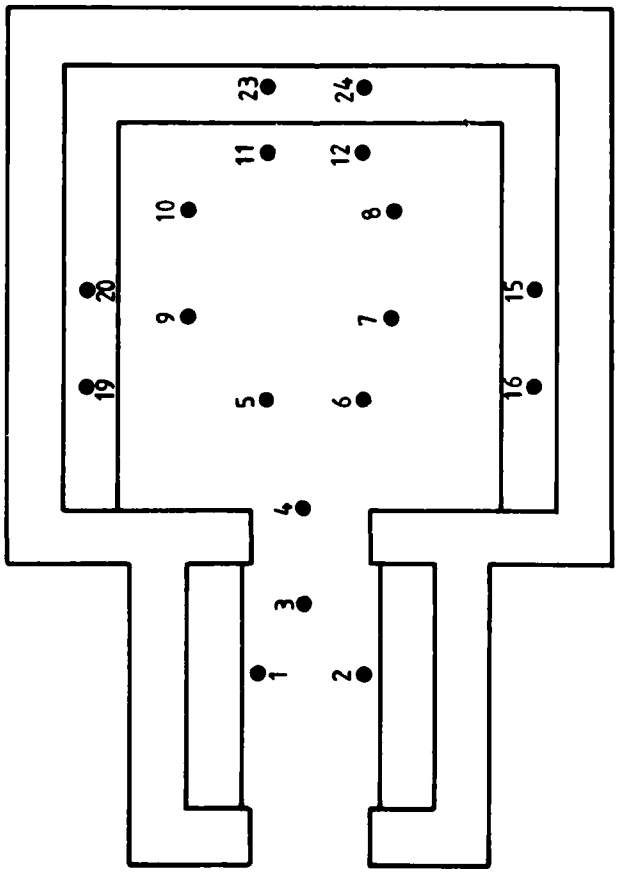
TESTER K. Lee DATE 15/4/80

MAGAZINE BLDG. 914



TOP BENCH

N



FLOOR & BOTTOM BENCH

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METRES

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