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REPORT ON HEALTH INSTRUMENTS

Model 263 - Victoreen Instrument Company, Cleveland, Ohio

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Instrumentation

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Report on Health Instruments

Model 263 - Victoreen Instrument Company, Cleveland, Ohio

Description

Instruments Covered by this Report:

Victoreen Portable Survey Meters, Model 263, Serial Numbers 26360, 26367, 263379, 263296, 263133, 26325, 1204, and 1221.

General Character and Use

This instrument is of the portable type intended to measure radioactivity in "R" units. As a portable instrument it is used both indoors and oudoors and should be capable of being used over a considerable temperature variation.

Construction Details

G-M tube, operated by high-voltage battery pack, working into two-stage integrator circuit. G-M tube is filled with an Argon-Alcohol mixture 90 percent and 10 percent respectively. Instrument is fully described in instruction manual for Model 263.

Marking

Output control has three ranges: 20 MR/H, 2 MR/H, and 0.2 MR/H. These ranges are calibrated in "R" units and read by a meter circuit. Calibration curves are attached to the side of the instrument.

Test Record

Condition of Instruments

All instruments were turned on to operating positions,

and their zero settings adjusted. The instruments were then turned to sensitivity position (2) and brought near a source of gamma particles. Thus their calibration at room temperature was checked. They were all within the specified limits.

Physical Set-up of Test

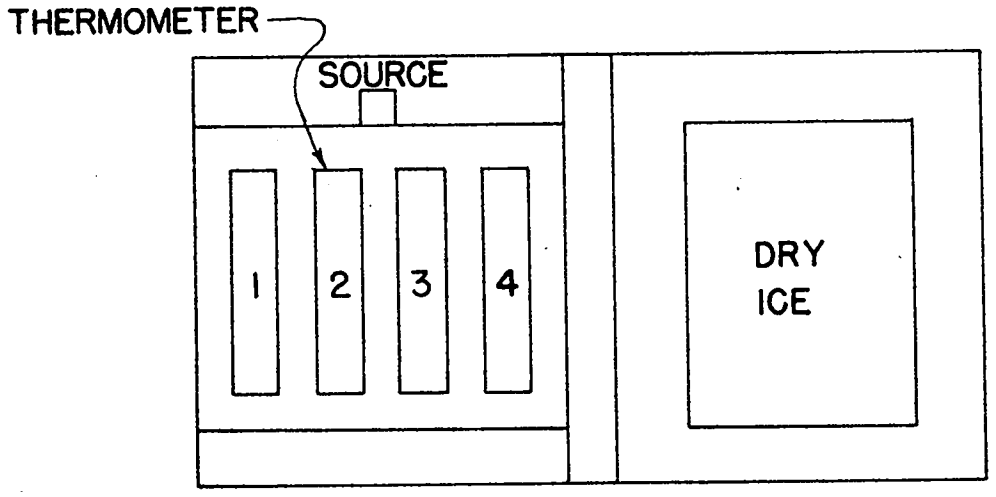

Fig. 1

Conditions for First Test

Number 1 instrument, serial number 26360, was set on number 3 scale position.

Number 2, serial number 26367; number 3, serial number 263379; and number 4, serial number 263296, instruments were set on number 2 scale position.

Data Taken on First Test (Refer to Graph)

Date	Time	Temp.	Meter Readings of Instruments #1	#2	#3	#4
12 -8-48	1:00P.M.	6°F.	2.0	7.5 to 9.0	4.5 to 5.0	6.0 to 8.0
	3:00P.M.	10°F.	1.5 to 2.0	7.0 to 7.5	4.0 to 4.5	4.0 to 9.5
	4:00P.M.	14°F.	1.5 to 2.0	7.0 to 8.0	4.0 to 4.5	4.0 to 9.5
	4:27P.M.	18°F.	1.5 to 2.5	8.0 to 9.0	4.0 to 4.5	4.0 to 9.5
12- 9-48	8:15A.M.	24°F.	.5	1.5	3.25	9.7
	11:50A.M.	28°F	2.25	1.5	5.0	8.4
	2:35P.M.	35.5°F.	4.25	2.0	2.3	4.1
12-10-48	8:10A.M.	58°F.	5.0	3.25 to 3.5	1.25 to 1.5	2.0 to 2.5
	10:00A.M.	51°F.	5.75	2.6	1.1 to 1.5	1.5 to 2.2
	11:00A.M.	47°F.	6.75	1.9	.75	1.8 to 2.2
	1:35P.M.	41°F.	8.5	.75	.2	6.9
	2:30P.M.	38°F.	8.75	.5	.9	9.4
	3:00P.M.	44°F.	8.75	.5	2.0	9.9
12-11-48	10:50A.M.	79°F.	3.2	3.5	2.5	2.0 to 2.5
12-13-48	1:15P.M.	75°F.	9.5	.25	3.0	5.6

Health instruments were removed from the heat box and source. The readings of the instruments were the same no matter what the distance from source, or to what scale the meter was adjusted.

Conditions for Second Test

The physical set-up was the same as for the first test.

All instruments were adjusted to scale number 2 sensitivity.

Serial numbers of instruments were as follows: number 1-263133, number 2-26325; number 3-1204; and number 4-1221.

Data Taken on Second Test (Refer to Graph)

Date	Time	Temp	Dial Reading Instruments #1	#2	#3	#4
12-21-48	9:30A.M.	56°F.	2.75	4.5	6.0	3.0
	10:30A.M.	30°F.	2.75	0.0	6.0	0.5
	11:30A.M.	17°F.	5.5 to 8.5	1.5	5 to 7.0	12 to 0.S
	1:00P.M.	6°F.	15 to 0.S	13.5 to 4.5	0.2	0.S
	4:00P.M.	0°F.	9.0 to 3.0	2.0 to 4.0	0.2	2.0 to 6.0
12-22-48	8:00A.M.	5°F.	2.0	2.0 to 6.0	0.2	0.8
	1:30P.M.	10°F.	1.0	2.0 to 3.0	15.0	7.8
	4:55P.M.	15°F.	0.5	2.0 to 5.0	11.5	1.0
12-23-48	9:30A.M.	42°F.	1.0	3.0 to 5.0	1.0	0.5

Conclusion

From the thermal curves it can be seen that the Model 263 Survey Meters are very unstable with temperature variations. It is recommended that the temperature ranges of operation be posted on the outside of the instrument.

Remarks

The heat box used for this test was not suited for the purpose. There was no way to maintain the temperature of the box steady for a period of time, so that the temperature gradient of the instruments could safely be said to be near zero. This would have allowed a much more exact thermal characteristic to be observed. It would appear, however, that the instruments might be improved by using a temperature independent filling in the G-M tube.

The reason for the failure of the instruments after the test is not known. To eliminate the battery source of trouble, the test described in the following pages was made.

Test on Thermal Characteristics of Hi-Voltage Batteries of Type Used in Model 263 Victoreen Portable Survey Meters

Description

Battery Covered by this Report

Eveready Mini-max Battery number X-591, made by National Carbon Company.

Construction Details

Battery has two output voltages, 960 volts and 840 volts. Shorting plug must be inserted in female socket on top of battery. to connect voltages to output connectors. Battery is sealed in a cardboard carton which has been wax impregnated.

Test Record

Condition of Battery

Battery was dated November 1948. Seal was broken and voltage measured at room temperature. It checked O.K. at 1030 volts.

Physical Set-up of Test

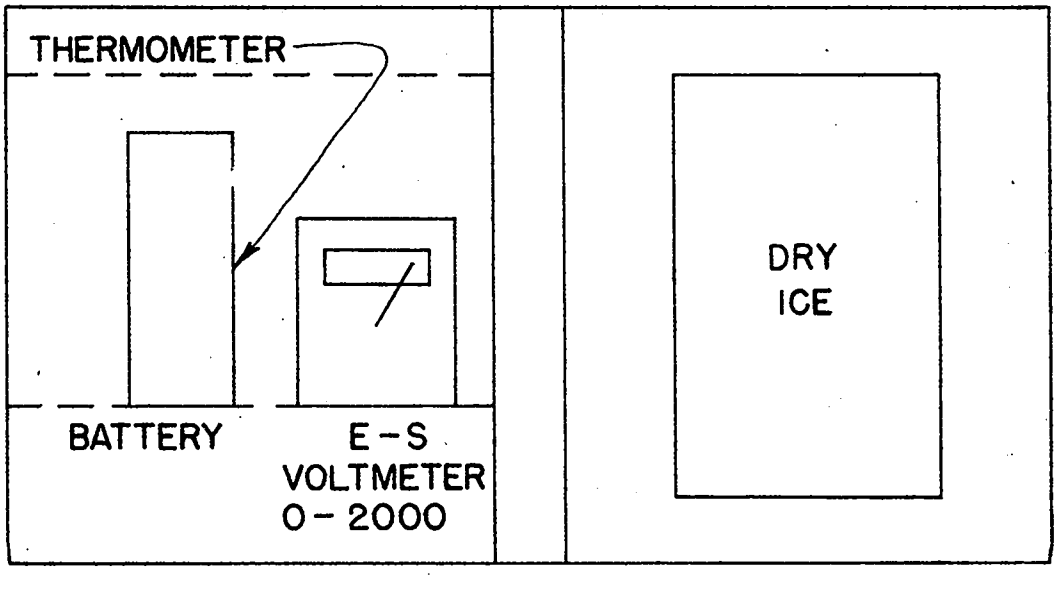

Fig. 2

Conditions for Test

Conditions of the test were made as near alike to those used previously on Model 263 Health Survey Meters. Thermometer was placed in direct contact with batter case at midpoint of battery.

Data (Refer to Graph)

Date	Time	Temperature	Voltage
1-10-49	11:00 A.M.	74°F.	1030
1-10-49	11:05 A.M.	60°F.	1030
1-10-49	11:10 A.M.	55°F.	1030
1-10-49	12:00 Noon	35°F.	1030
1-10-49	1:15 P.M.	22°F.	1020
1-10-49	2:20 P.M.	15°F.	1010
1-10-49	5:00 P.M.	5°F.	1000
1-11-49	3:00 P.M.	-8°F.	1000
1-11-49	4:30 P.M.	-20°F.	1000
1-12-49	8:00 A.M.	-6°F.	985
1-12-49	2:30 P.M.	-0°F.	1000
1-13-49	8:00 A.M.	25°F.	1010
1-13-49	2:00 P.M.	68°F.	1030

Conclusion

From the thermal curve it can be seen that the X-591 type of battery does vary somewhat with temperatures; however, this small variation would not affect the operation of the G-M tube. Therefore, the battery pack of the Model 263 Survey Meter

can be eliminated as a source of trouble in regard to temperature variations.

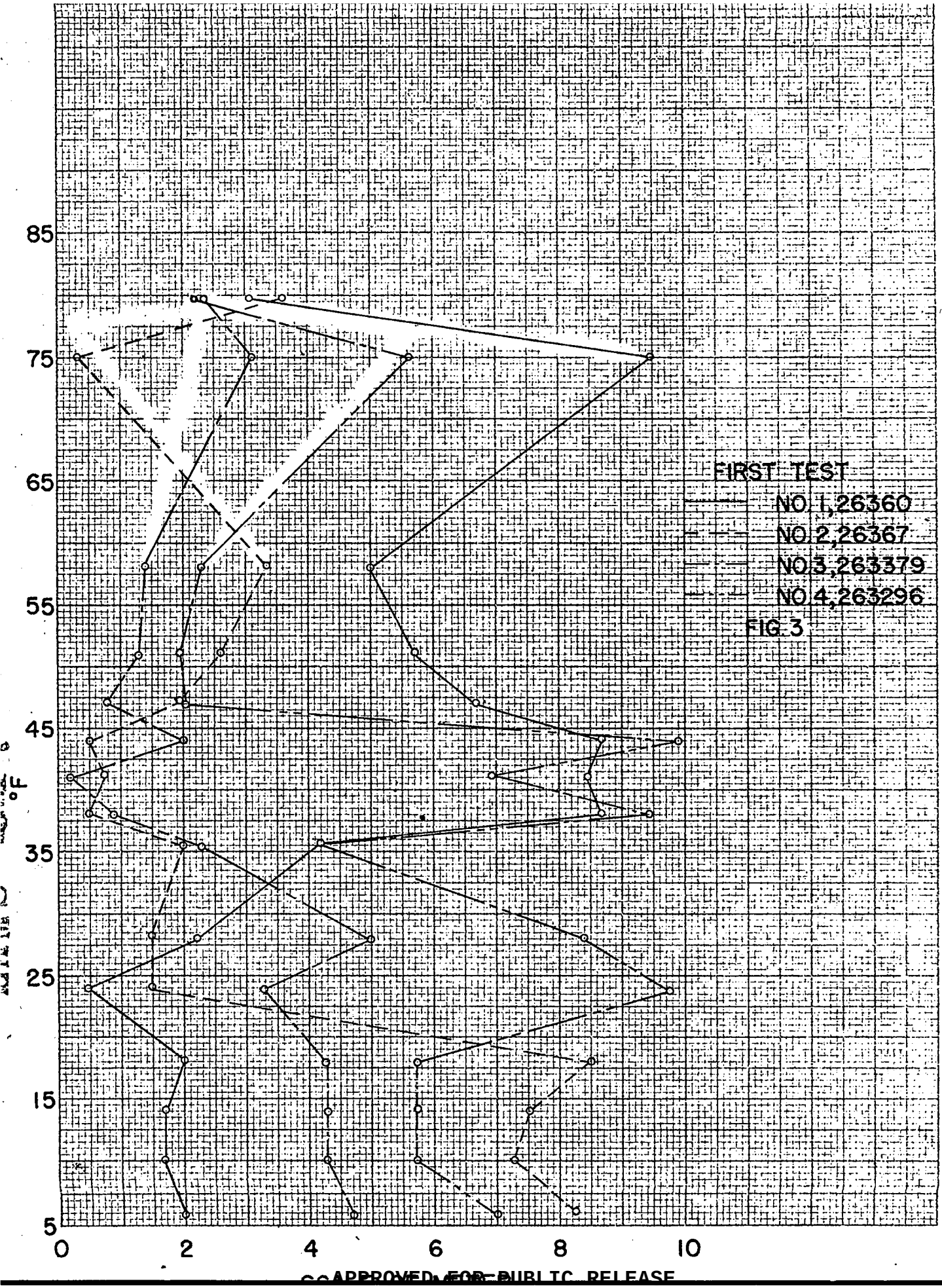

FIG.3

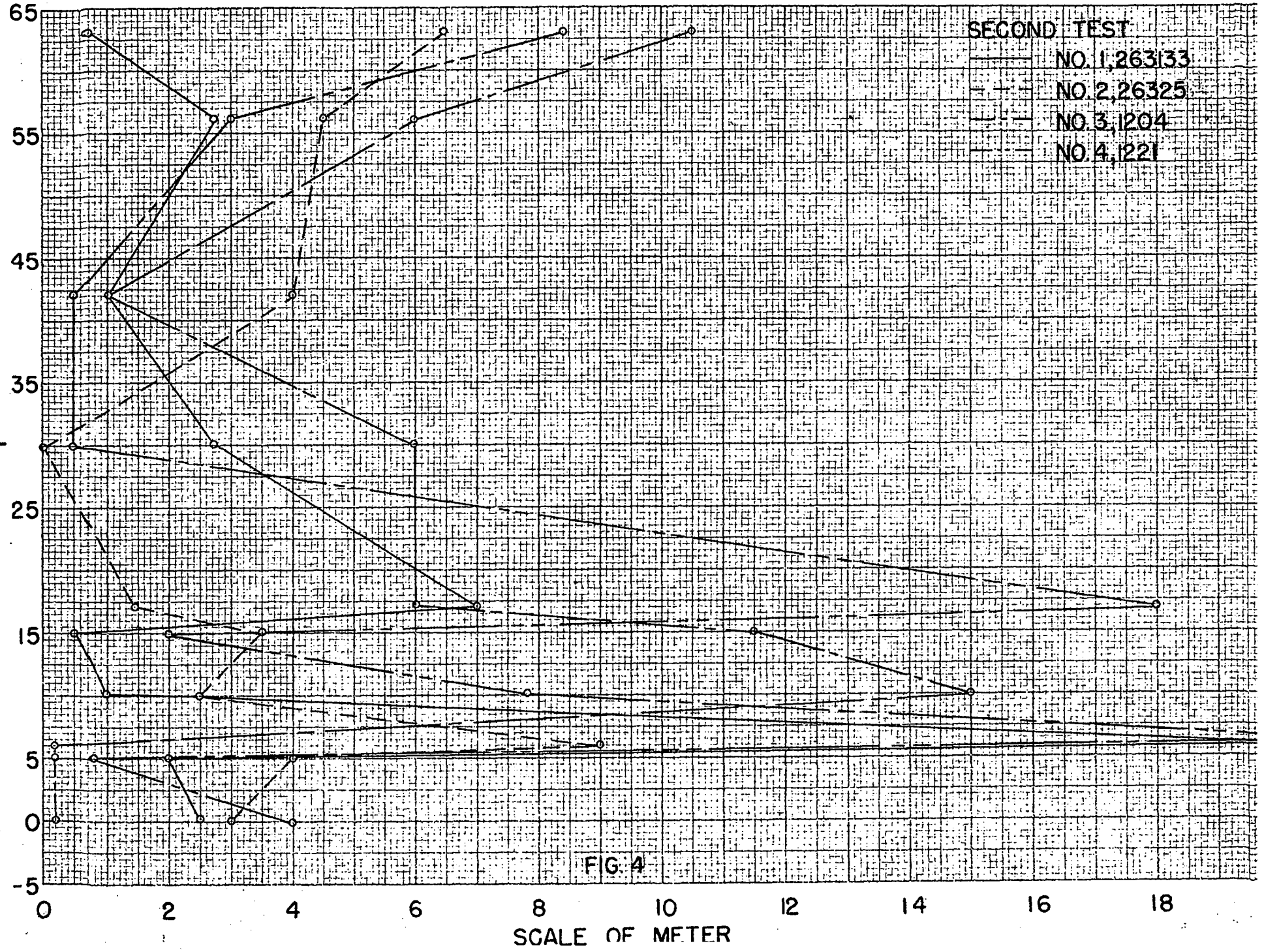

FIG. 4

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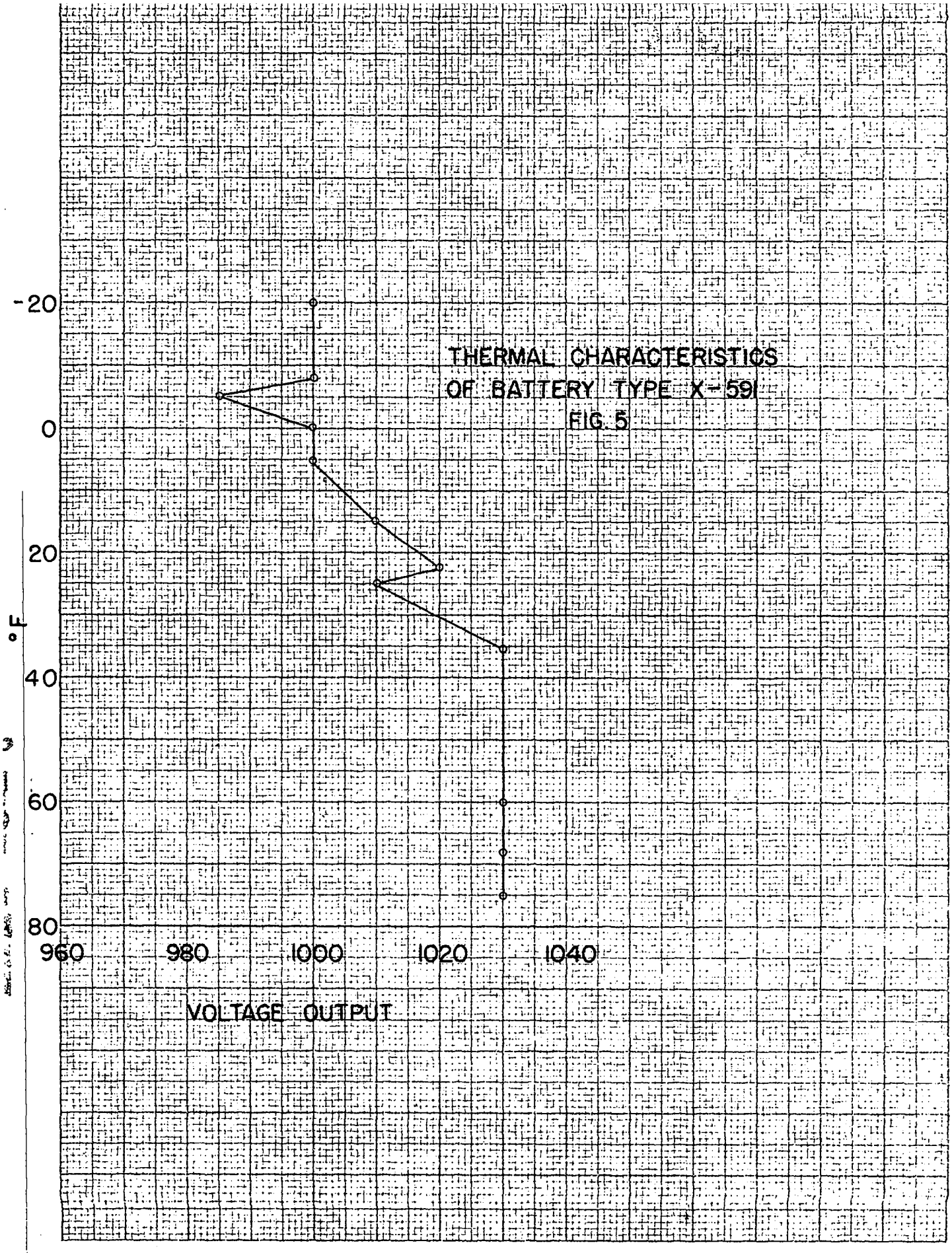

THERMAL CHARACTERISTICS
OF BATTERY TYPE X-591
FIG. 5

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