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### Selection and arrangement of proposed storage battery equipment for physics and electrical engineering laboratories

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SELECTION AND ARRANGEMENT OF PROPOSED STORAGE BATTERY EQUIPMENT  
FOR PHYSICS AND ELECTRICAL ENGINEERING LABORATORIES. <sup>1289</sup> 17

by

OTHO MELVIN WILSON.

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A

T H E S I S

submitted to the faculty of the  
SCHOOL OF MINES AND METALLURGY OF THE UNIVERSITY OF MISSOURI  
in partial fulfillment of the work required for the  
D E G R E E O F  
BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING.

Rolla, Mo.

1925

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Approved by:

*F. H. Frame*

Professor of Electrical Engineering.

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## LIST OF ILLUSTRATIONS.

- Plate No. 1.** Location of Battery, Switchboards, and Conduits.
- Plate No. 2.** Battery and Rear View of Charging Panel.
- Plate No. 3.** Charging Panel (Front).
- Plate No. 4.** Panel for Electrical Machinery Laboratory.
- Plate No. 5.** Panel for Physics Laboratory.
- Plate No. 6.** Panel for Electrical Measurement Laboratory.

The object of this Thesis is to select and arrange the equipment for a 110 volt storage battery system to be used in supplying a variation of voltage to the Electrical Machinery, Electrical Measurement, and Physics Laboratories, located in the basement of Norwood Hall.

#### DESCRIPTION OF STORAGE BATTERY.

The storage battery consists of 56 lead cells connected in series, Taps are brought out from each of the first five cells and then from every fifth cell. The number on these taps indicate the number of cells that are connected in series up to that point. The conductors from these taps enter a conduit above the battery, which leads them to the various distribution panels in the laboratories.

110-VOLT SEALED GLASS JAR BATTERIES.

Type and Size	NORMAL 8-HOUR RATINGS		56 CELLS	
	Charging Rate Amp.	Capacity 56 Cells Watt Hrs.	Net Wt. Lbs.	Price Each
WEG-225	28	24750	4350	\$854.00
WEG-405	50	44550	6400	1428.00

Type	RATINGS			SPECIFIC GRAVITY		
	8-HOUR Ampere Hours	Ampere Continuous Discharge.	INT. Amperes	INT. Ampere Hours.	Fully Charged	Dischrgd.
WEG-225	225	28.10	9.4	315	1250	1150
WEG-405	405	0.6	6.9	565	1250	1170

Type	Normal Charge Rate	No. of Plates
WEG-225	28.10	11
WEG-405	50.6	19

Type	SIZE OF PLATE THICKNESS				DIMENSION OUTSIDE OF JAR			Net Weight of Cells Complete in Pound
	Width	Height	Positive	Negative	Width	Length	Height	
WEG-225	7 $\frac{3}{4}$	7 $\frac{3}{4}$	7/32	5/32	10	5	13 $\frac{1}{4}$	60
WEG-405	7 $\frac{3}{4}$	7 $\frac{3}{4}$	7/32	5/32	9 $\frac{1}{4}$	8 $\frac{3}{4}$	13-3/8	87

DESCRIPTION OF CHARGING PANEL EQUIPMENT.

Type KDI Battery-Charging Switchboard.

Switchboard: for control of an incoming line for charging lead batteries.

List of Equipment.

One panel 1 by 20 by 25 inches.

One pilot lamp (L).

One ammeter (A) type CX complete with shunt.

One voltmeter (V) type CX, 150 volt scale.

One circuit-breaker (CB), non-automatic, with shunt-trip coil and one auxiliary switch.

One fused main switch (S), two pole single-throw.

One voltmeter switch (VS).

One amperehour meter (AHM) with zero contact.

One undercurrent relay (CR), circuit closing.

One drilling for charging resistance mounted on rear of panel.

Necessary copper connections and wiring on rear.

Cap. Amp.	Amm. and Shunt Style ampere	Style No.	List Price
30	75	389654	\$227.00
60	100	389655	235.00



DESCRIPTION OF PANEL FOR ELECTRICAL MACHINERY LABORATORY.

(SEE PLATE NO. 4.)

This panel which is 28" X 32" in dimension is owned by the Electrical Engineering Department and is already installed in the south side of the Electrical Machinery Laboratory. At present this panel is not in use, but it has been decided to make use of it for this project.

DESCRIPTION OF PANEL FOR PHYSICS LABORATORY.

(SEE PLATE NO. 5.)

This panel which is to be 12 by 28 inches in size will have to be purchased as the entire switchboard in the physics laboratory is in use at the present time.

DESCRIPTION OF PANEL IN ELECTRICAL MEASUREMENT LABORATORY.

(SEE PLATE NO. 6.)

This panel is 28 by 48 inches, and is now installed in the Electrical Measurement Laboratory. Six holes will have to be drilled in this panel to have the required number of terminals needed.

TOTAL COST OF EQUIPMENT FOR A STORAGE BATTERY WITH 28 AMPERE  
8 HOUR CHARGING RATE.

Battery, - - - - -		\$854.00
Charging Panel, - - - - -		227.00
Switchboard Panel, - - - - -		235.00
Conduit (200 ft. of 2 in. metal) - - - - -		74.00
Wire, (3600 ft. No.8 solid conductor, double braid, rubber insulated)- - - - -		<u>111.60</u>
	COST	\$1591.60
Labor, - - - - -		<u>48.00</u>
	<u>Total Cost</u>	<u>\$1549.60</u>

TOTAL COST OF EQUIPMENT FOR A STORAGE BATTERY WITH 50 AMPERE  
8 HOUR CHARGING RATE.

Battery, - - - - -		\$1428.00
Charging Panel,- - - - -		235.00
Switchboard Panel, - - - - -		100.00
Conduit, (200 ft. of 3 in. metal)- - - - -		153.00
Wire, (3600 ft. No.6 solid conductor, double braid, rubber insulated)- - - - -		<u>165.60</u>
	COST	\$2081.60
Labor, - - - - -		<u>48.00</u>
	TOTAL COST	<u>\$2129.60</u>

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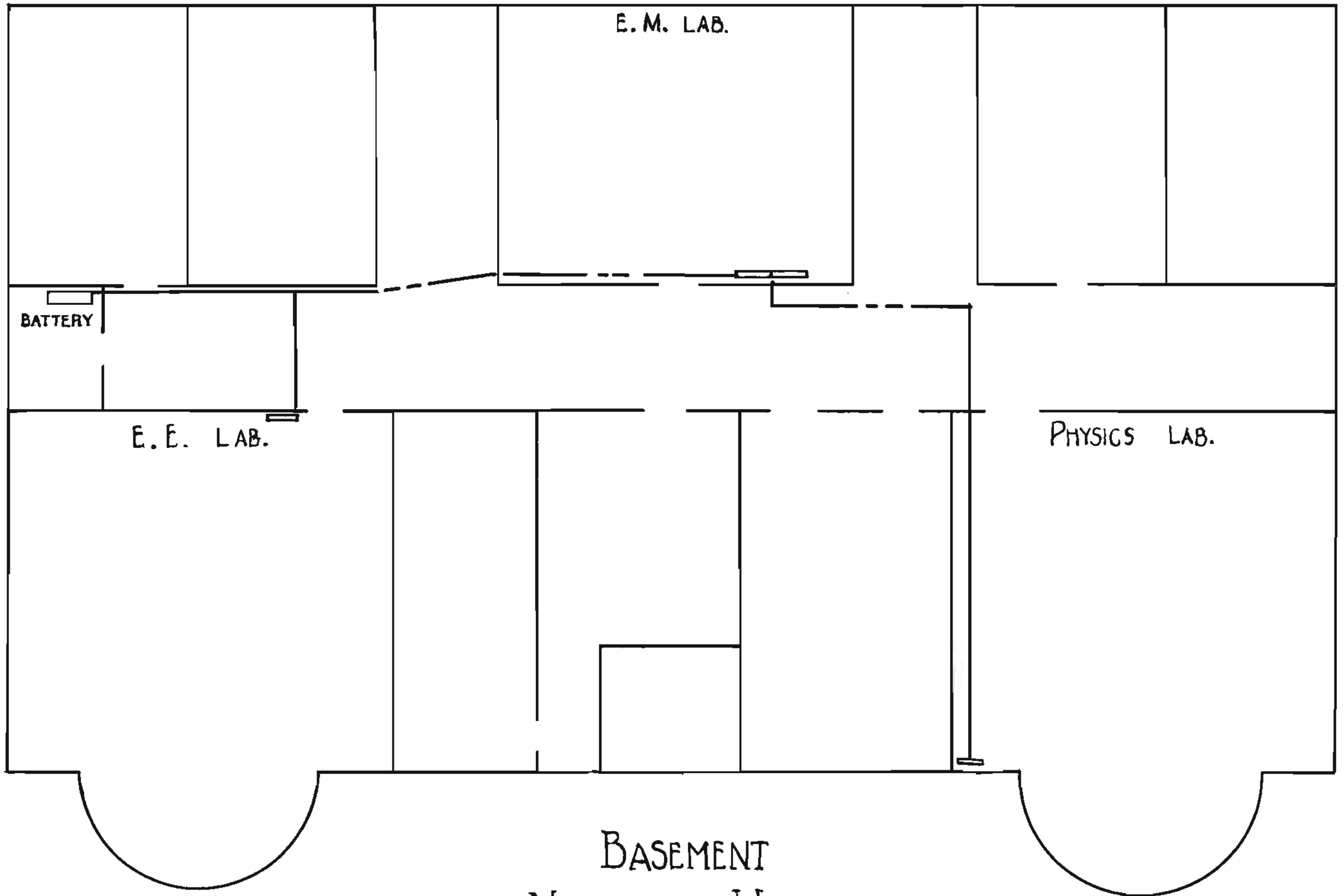
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BASEMENT  
NORWOOD HALL



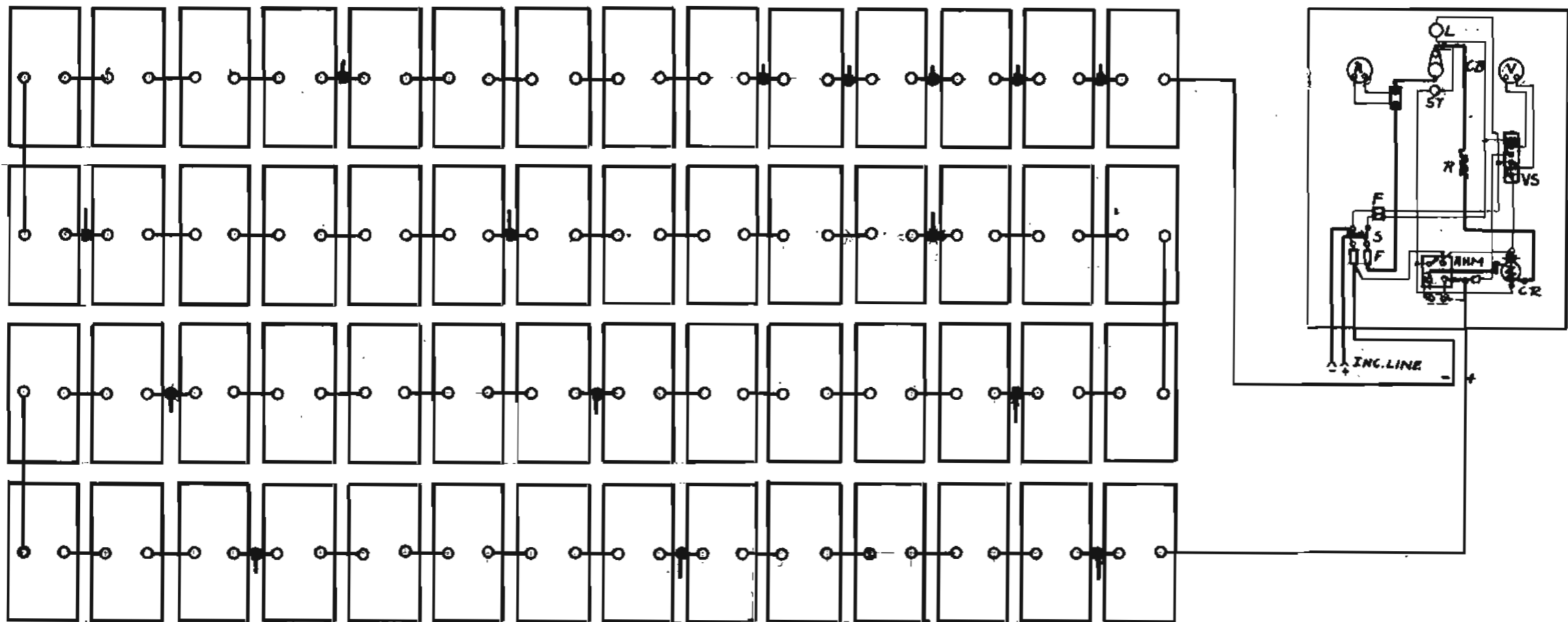


PLATE 2

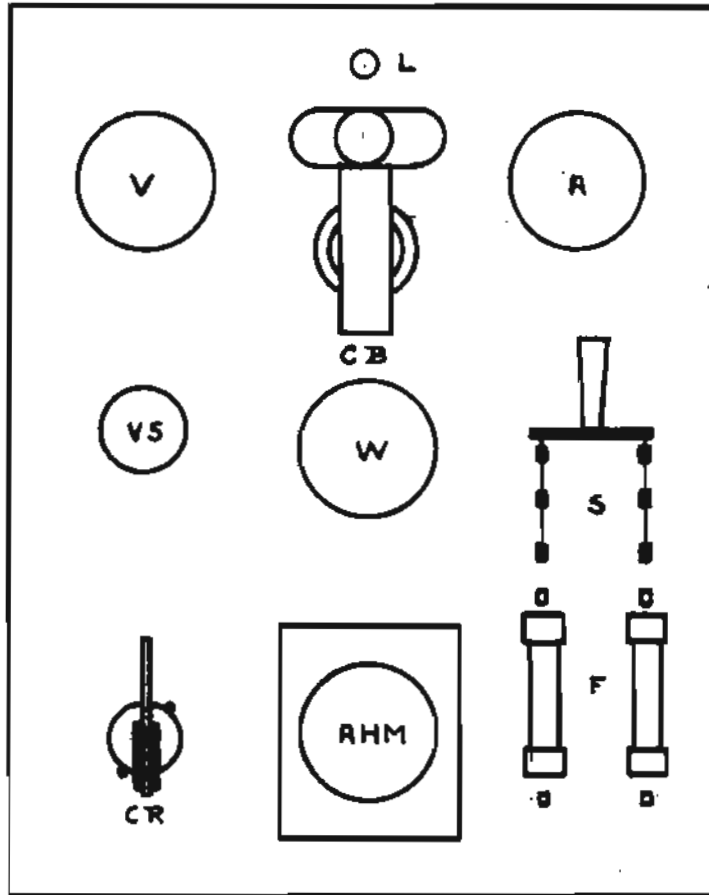
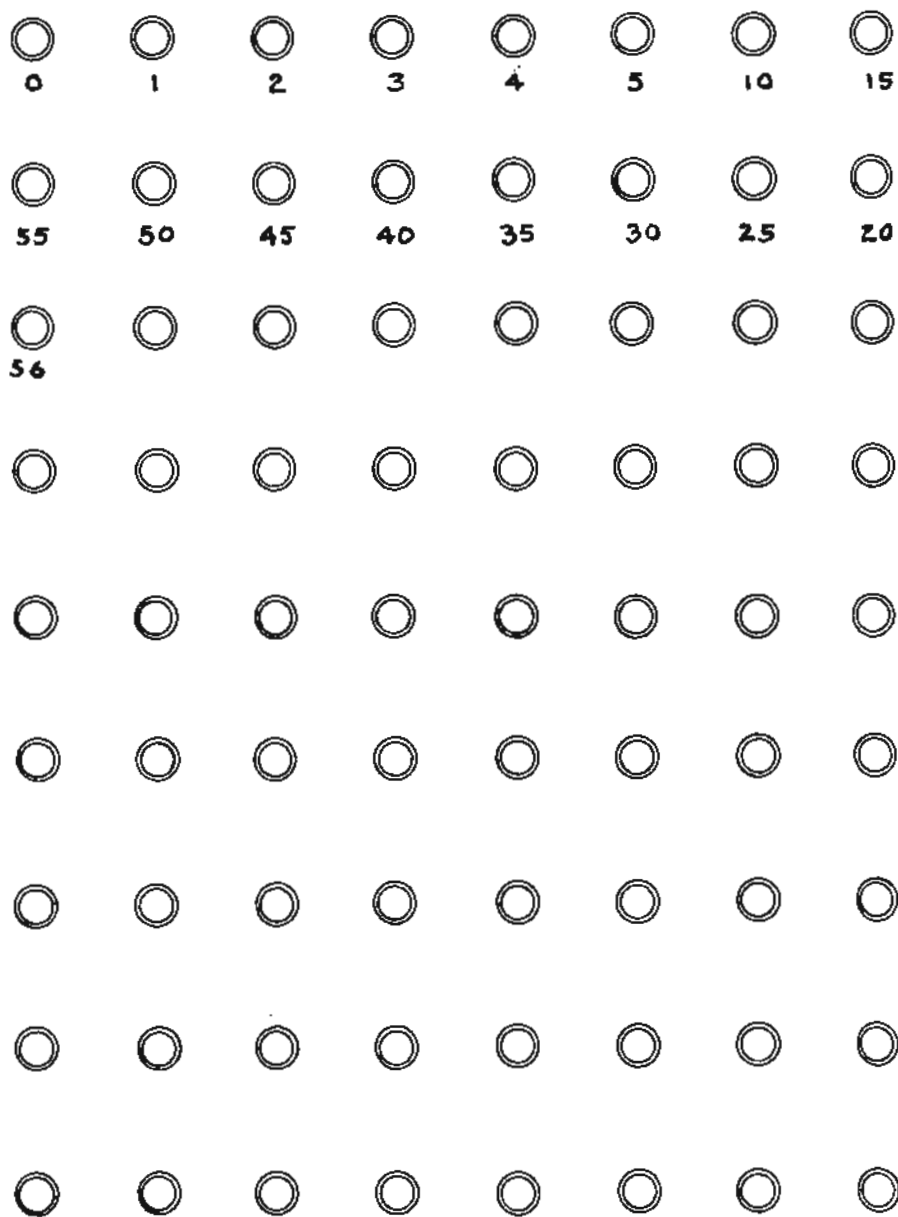
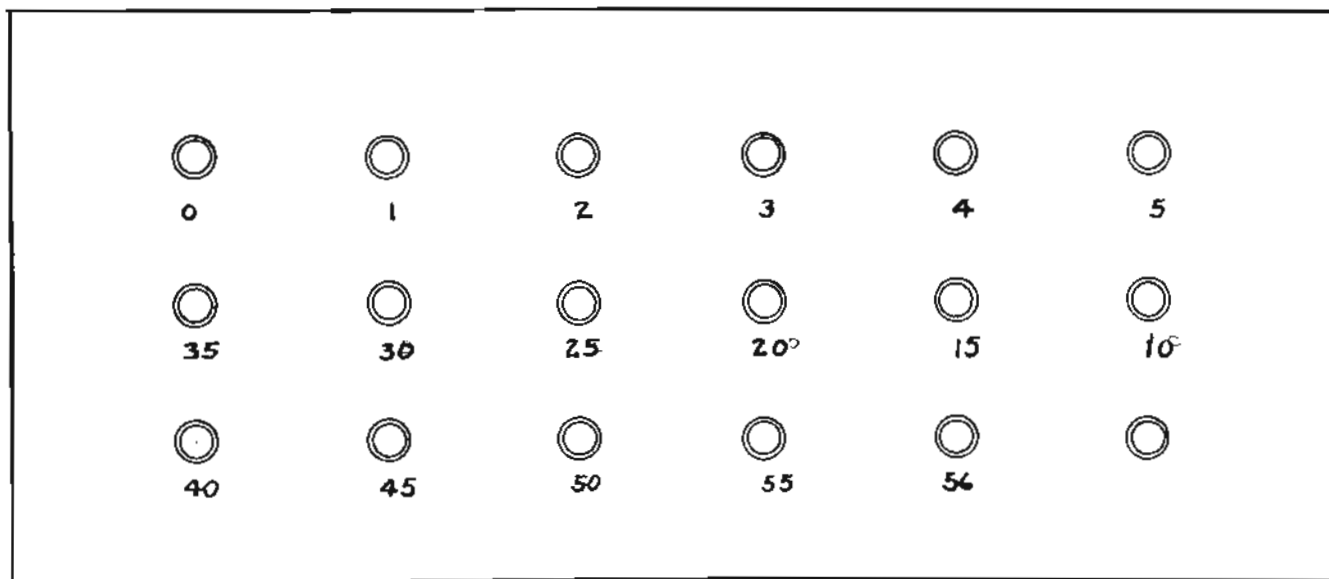


PLATE 3



SCALE  $\frac{1}{4}$  SIZE

PLATE 4



SCALE  $\frac{1}{4}$  SIZE

PLATE 5

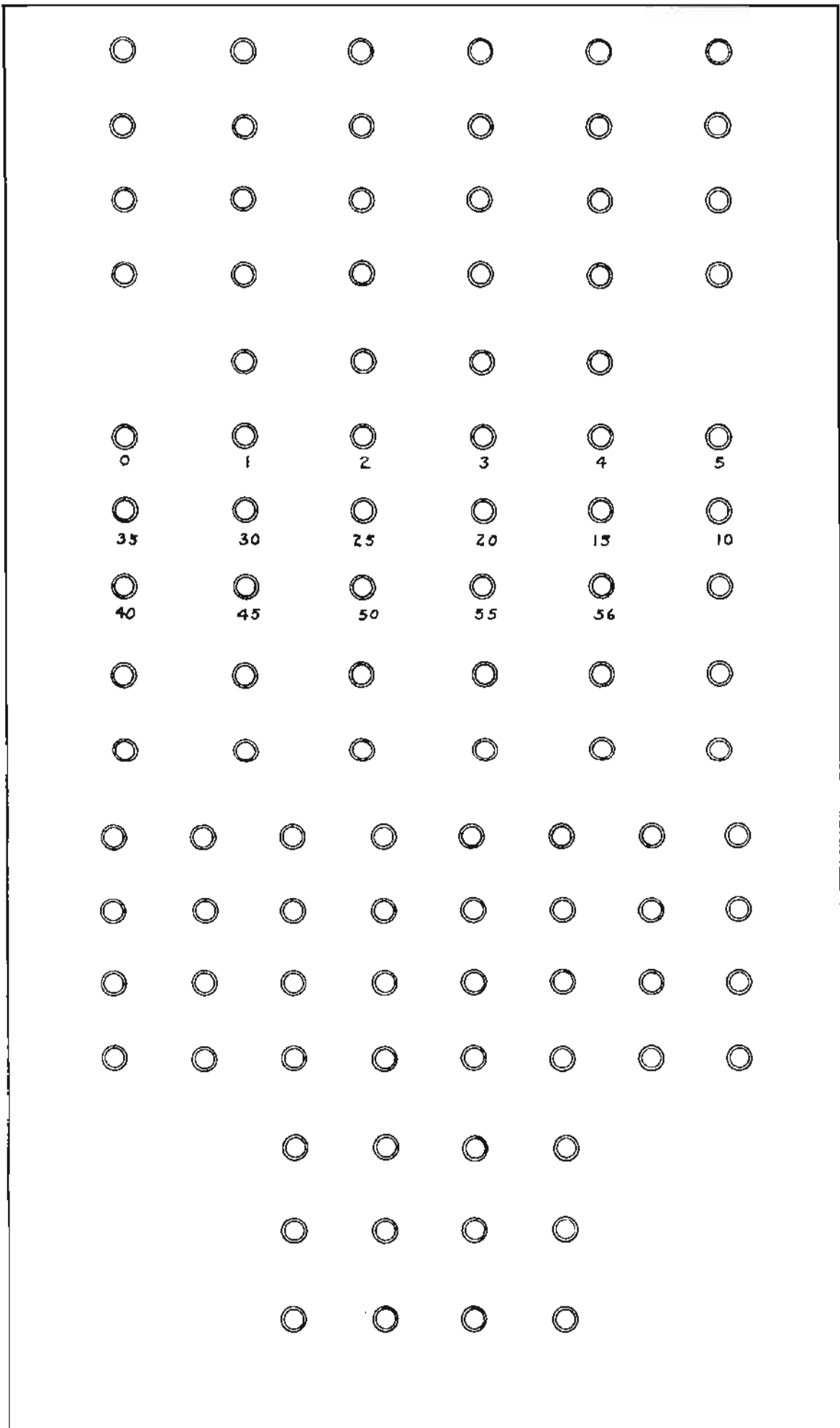


PLATE 6  
*Scale  $\frac{1}{4}$  Actual Size.*