

**This Folder contains valuable information  
for your files**



**TYPE P W R**

*for*

**OIL SWITCH CONTROL  
TELEPHONE  
AUXILIARY POWER**



*Preprinted from McGraw-Hill Electrical Engineering Catalog, 1928 Edition*

**Philadelphia Storage Battery Company**

**POWER DIVISION**

**Ontario and C Streets, Philadelphia, Penn.**

# PHILADELPHIA STORAGE BATTERY COMPANY

**PHILCO**  
DIAMOND  GRID  
BATTERIES

FACTORY, LABORATORIES AND MAIN OFFICE  
ONTARIO AND C STREETS.

**PHILCO**  
RADIO "A" AND "B"  
SOCKET POWERS

PHILADELPHIA, PA.

June 22nd, 1928.

Dear Sir:

Concise and helpful battery data is bound in the enclosed folder (built to fit your file).

Look it over carefully right now!

Then, you will want it for permanent reference.

For more than twenty-two years, Philco has been carefully building an organization of battery experts to provide for intelligent application and operation of power batteries.

There is an old saying to the effect that "two heads are better than one", and on that basis, we presume to offer you the services of the Philco organization in solving any battery problems that may arise in your work. Complete layout data and specifications to fit your problems together with prices will be furnished promptly on request and without obligation.

Another thing! PHILCO IN GLASS! The same good Philco Power Batteries are available in glass, and we want to give you complete information regarding structural improvements that you will recognize as important - you may call them sensational.

Just sign and return the enclosed post card for complete information on Philco in glass.

Yours very truly,

PHILADELPHIA STORAGE BATTERY COMPANY



SALES MANAGER

W.S. Cranmer:J

THIS SIDE OF CARD IS FOR ADDRESS



**Philadelphia Storage Battery Company,**  
**ONTARIO & "C" STREETS,**  
**PHILADELPHIA, PA.**

ATT. POWER DIVISION

# Philadelphia Storage Battery Co.

Gentlemen:

Please send complete information regarding  
**PHILCO POWER BATTERIES BUILT IN GLASS.**

Yours very truly,

COMPANY.....

NAME.....

ADDRESS.....

CITY.....STATE.....

# PHILADELPHIA STORAGE BATTERY CO.

Ontario and C Streets  
PHILADELPHIA, PA.

### Sales Offices

\*ATLANTA, GA., 665 Glenn St., S. W.  
Phone—West 2666  
\*BOSTON, MASS., 1123 Commonwealth Ave.  
Phone—Brighton 5741  
BUFFALO, N. Y., 1669 Main St.  
PHILADELPHIA STORAGE BATTERY CO. OF NEW YORK  
Phone—Fillmore 7793  
\*CHICAGO, ILL., 3335-45 W. 47th St.  
Phone—Virginia 1400  
CLEVELAND, OHIO, 510 Commercial Bank Building  
Phone—Cherry 2062  
CINCINNATI, OHIO, 212 East 8th St.  
Phone—Canal 9002  
FAIRMOUNT, W. VA., 226 Professional Bldg.  
Phone—Fairmount 2880

\*KANSAS CITY, MO., 2008-10 McGee St.  
Phone—Grand 0947  
LOS ANGELES, CALIF., 1149 Wall St.  
Phone—Westmore 8672  
\*MINNEAPOLIS, MINN., 216 3rd Ave., N.  
Phone—Main 3790  
NEW YORK, N. Y., 47 Christopher St.  
PHILADELPHIA STORAGE BATTERY CO. OF NEW YORK  
Phone—Spring 6485  
PITTSBURGH, PA., 5th Ave. and Smithfield St.  
Phone—Atlantic 4972  
\*PORTLAND, ORE., 54 N. 10th St.  
Phone—Broadway 8926

\*SAN FRANCISCO, CALIF., 218 Fremont St.  
Phone—Davenport 3140-41-42  
\*SEATTLE, WASH., 2024-26 Third Ave.  
Phone—Main 3354  
ST. LOUIS, MO., 423 Louderman Bldg., 11th and Locust Sts.  
Phone—Garfield 9034  
\*DALLAS, TEX., PHILADELPHIA STORAGE BATTERY CO. OF TEXAS, Shannon Bldg., 2403 S. Harwood St.  
Phone—4-6703  
KINGSTON, PA., 23 So. Bennett St.  
Phone—Kingston 8762J  
HUNTINGTON, W. VA., Hotel Huntington Bourse

\*Factory Branch Stock

## Philco Type PWR Batteries and Philco Battery Service

Philco research, engineering and manufacturing experience of more than twenty-two years has made possible a most compact, power packed, rugged assembly for oil switch control, telephone and auxiliary power battery applications.

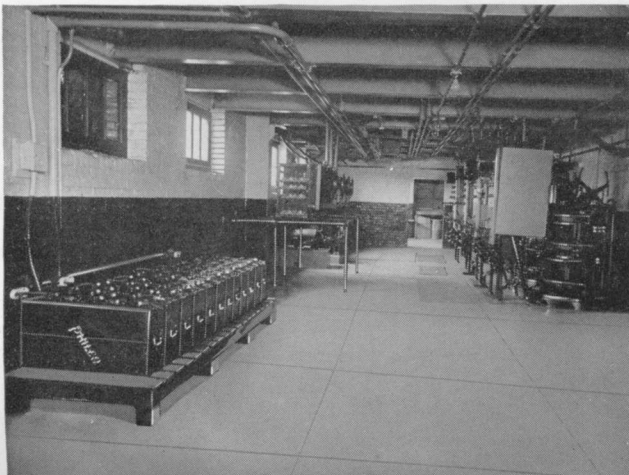
Philco Type PWR batteries are carefully designed and built to give uninterrupted trouble-free service for long periods. Balanced design means equal life of all component parts, so that partial renewals, sediment cleaning and separator replacements are eliminated from the scheme of operation. When the battery finally reaches the end of its

service life it is quickly and economically replaced in its entirety without interruption of service.

PWR batteries, as described on the following pages, are shipped in a fully charged condition ready for service immediately after they are connected to the circuit.

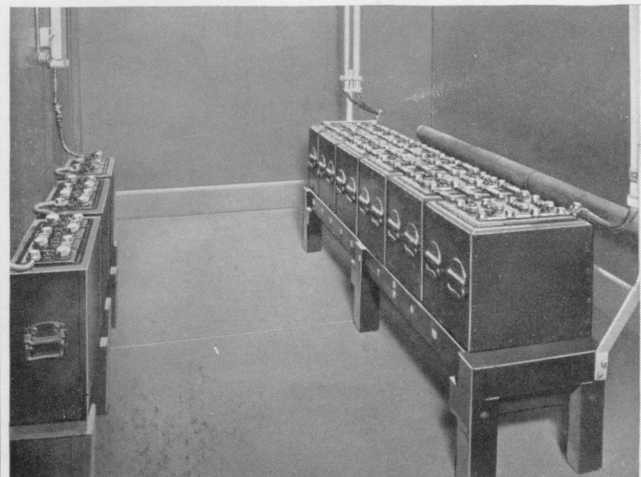
Philco engineering does not stop with the production of a fine advanced type of battery but follows through with application and maintenance service for the entire battery life.

If you have a power battery problem address the nearest Philco office—there is no obligation.



Typical Control Battery

Showing that no special battery room is needed for the Philco



Typical C-O Telephone Battery

Showing that the Philco is a great space economizer

**General Description of PWR Batteries**

The Philco Type PWR cell consists of a number of positive plates connected to each other, meshed with a number of negative plates similarly connected to each other. The plates are spaced by means of separators, so that positive and negative plates may not contact with each other. Two groups thus assembled constitute the element or active portion of the cell.

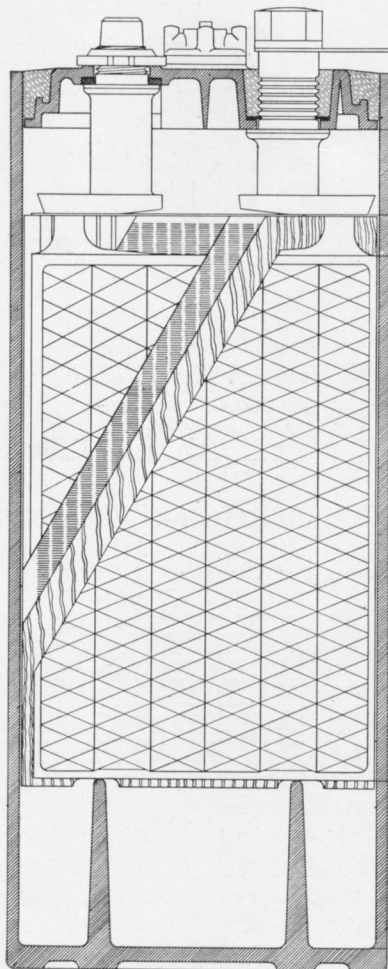
The element is placed in a *close-fitting jar* of tough hard rubber holding all component parts in rigid definite relation to each other. This compact mechanical assembly of each cell unit contributes to the long trouble-free life of PWR batteries. Terminal posts from positive and negative groups are brought through the tightly-sealed hard rubber covers for electrical connection to adjacent cells and to the circuit.

The completely assembled cell is filled with electrolyte through a convenient opening in the cover. This filler opening is closed while the battery is in service by an ingenious cap known as a bayonet catch filler cap. The filler cap contains a condensing chamber into which the gas normally evolved during charge must pass before reaching open air. Any electrolyte carried by the gas is here condensed and drips back into the cell, keeping cell gravities uniform.

PWR cells carry a large volume of electrolyte above the plates so that with scientific baffling in the filler caps

addition of water is necessary at less frequent intervals than in conventional types. Ample space is provided below the element to prevent possibility of sediment shorts for entire battery life.

Cells are grouped in convenient numbers, fitted into trays of hard wood impregnated with acidproof paint and supported on porcelain skid type insulators. Snug-fitting heavy trays protect the cells against accidental breakage and this form of assembly reduces the number of units making installation quick and economical.



Sectional View of PWR Cell

**NORMAL CHARGE RATES**

Size of PWR cell.....	7	9	11	13	15	17	19	21	25	29
Amperes....	4.5	6	7.5	9	10.5	12	13.5	15	18	21

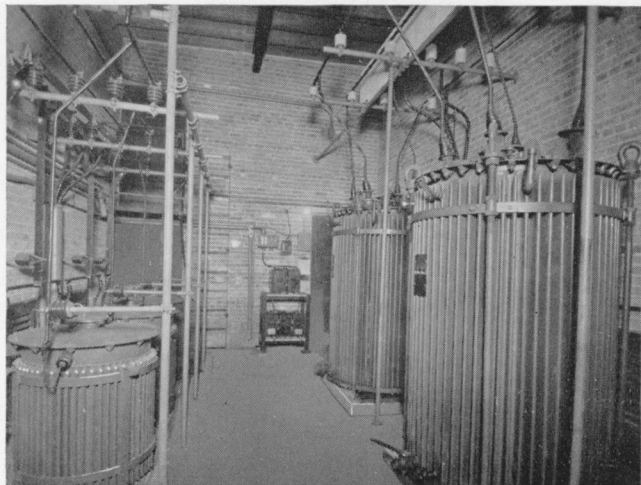
These rates should not be exceeded.

**Filler Cap Charge Tester**

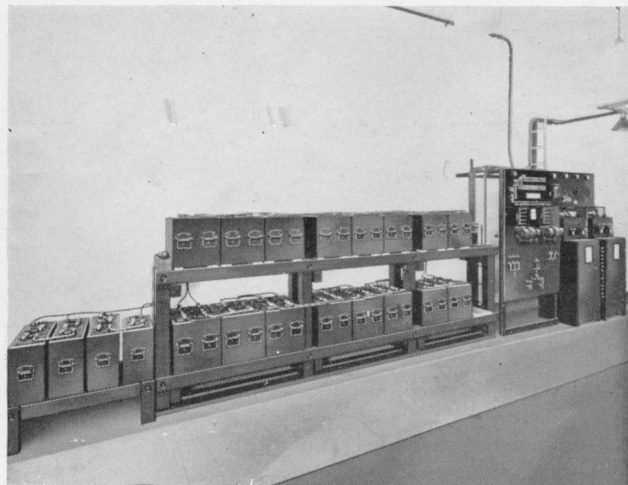
A filler cap charge tester comes with each PWR battery. It can be placed in one of the cells in the battery and will give an indication of the state of charge of the entire battery. Instructions for its use comes with the charge tester.

**Filler Cap Thermometer**

A filler cap thermometer, for checking the temperature of the electrolyte, is also provided with each PWR battery. It should be kept in the pilot cell at all times and the temperature of the electrolyte in this cell should be noted every time the specific gravity of the electrolyte is read.



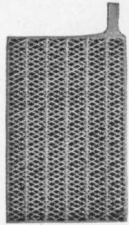
Automatic Unattended Industrial Substation



Large P-A-X 700-C Telephone Exchange

**Structural Features of PWR Batteries**

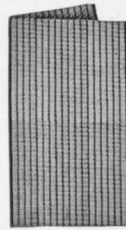
**Plates**—PWR Plates are made on extremely heavy diamond grids. This scientific design gives greatest structural strength and by virtue of crossing members on opposite plate surfaces locks the active material firmly in place.



Plate

The Philco process of plate manufacture insures absolute uniformity and, though the finished plates are unusually hard, they are extremely porous as well.

**Retainers**—These are thin sheets of hard rubber perforated with thousands of fine slots, enveloping and lying

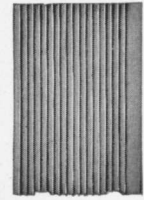


Retainer

flat against both surfaces of each positive plate.

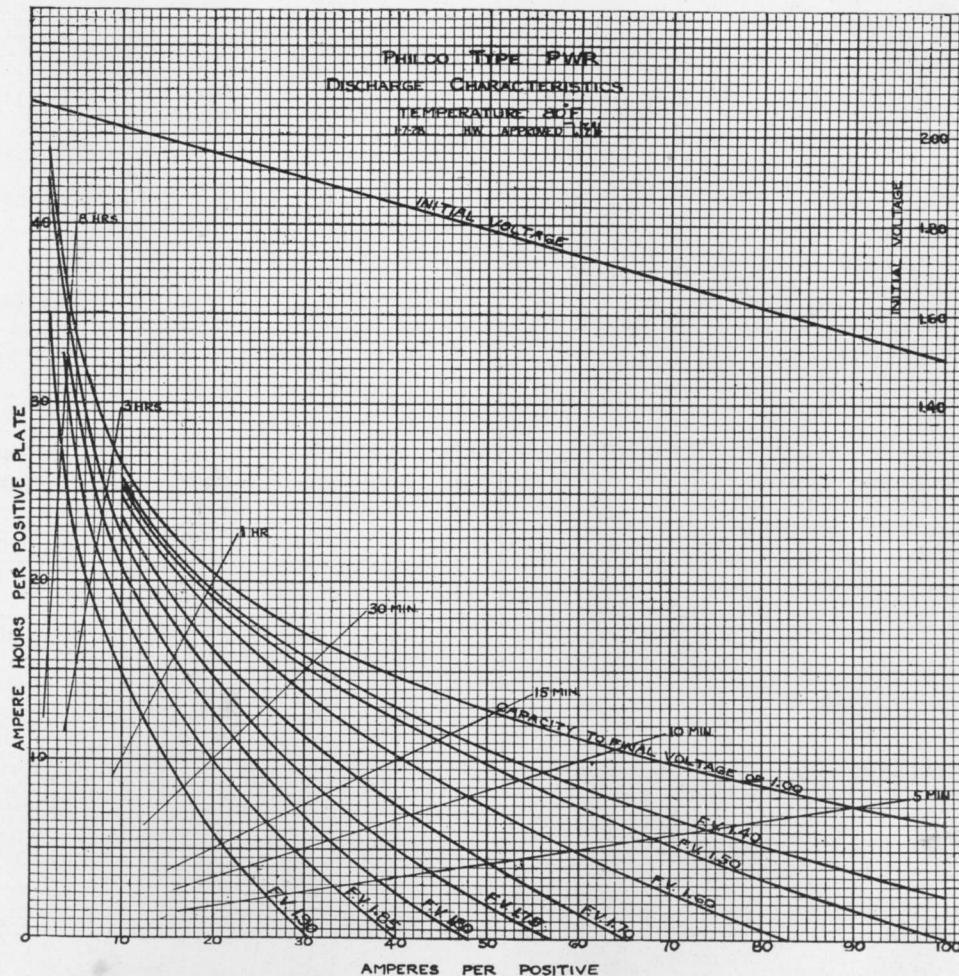
The retainer permits free passage of acid and current and supports the efficient surface material insuring long plate life.

**Wood Separators** — Philco separators are carefully quarter-sawed from hard, resinous wood (Douglas fir), presenting alternate layers of hard and soft wood to either plate surface.



Separator

The soft grain provides an easy path for acid and current while the resinous ribs permanently space the plates.



Discharge Characteristics of PWR Batteries

The curve above shows the capacity in ampere hours per positive plate available at all discharge rates between 0 and 100 amperes per positive to a number of different final voltages.

The scale of amperes and the scale of ampere hours is based on one positive plate so that the same curve can be used for all sizes of cells. A 100-ampere discharge will be 20 amperes per positive for an 11 PWR cell in which there are 5 positive plates, but it will be just 10 amperes per positive for a 21 PWR cell in which there are 10 positive plates. The ampere-hour figures ob-

tained from the curve must be multiplied by the number of positive plates in the cell to determine the ampere-hour capacity of the battery under consideration.

The capacity in ampere hours is shown to a number of different final voltages as it is often necessary to know how many ampere hours will be obtained under certain conditions down to a final voltage of 1.90, 1.80, 1.40, etc.

The diagonal time lines marked "8 HR," "3 HR," "1 HR," etc., show at what rate per positive the battery can be discharged for the given length of time to any final voltage.

# PHILADELPHIA STORAGE BATTERY CO.

## CAPACITIES OF PWR CELLS

Size of Cell	Ampere-Hour Capacity at 8-hour Rate to 1.75 Final Voltage	Watt-Hour Capacity at 8-hour Rate to 1.75 Final Voltage
7 PWR	102	198
9 PWR	136	254
11 PWR	170	330
13 PWR	204	396
15 PWR	238	463
17 PWR	272	528
19 PWR	306	595
21 PWR	340	662
25 PWR	408	793
29 PWR	476	925

## DISCHARGE RATE IN AMPERES

Size of Cell	10 hrs. to 1.75 volts per cell	8 hrs. to 1.75 volts per cell	1 hr. to 1.75 volts per cell	1 min. to 1.75 volts per cell	1 min. to 1.50 volts per cell	Normal Charge Rate, amp.
7 PWR	10.50	12.75	51.0	127.5	255.0	4.5
9 PWR	14.00	17.00	68.0	170.0	340.0	6.0
11 PWR	17.50	21.25	85.0	212.5	425.0	7.5
13 PWR	21.00	25.50	102.0	255.0	510.0	9.0
15 PWR	24.50	29.75	119.0	297.5	595.0	10.5
17 PWR	28.00	34.00	136.0	340.0	680.0	12.0
19 PWR	31.50	38.25	153.0	382.5	765.0	13.5
21 PWR	35.00	42.50	170.0	425.0	850.0	15.0
25 PWR	42.00	51.00	204.0	510.0	1020.0	18.0
29 PWR	49.00	59.50	238.0	595.0	1190.0	21.0

## STANDARD TRAY UNITS—DIMENSIONS & WEIGHT

Tray unit	Length, in.	Width, in.	Weight, lb.	Tray unit	Length, in.	Width, in.	Weight, lb.
4 Cell 7 PWR	*14 $\frac{1}{8}$	7 $\frac{3}{4}$	112	3 Cell 15 PWR	†22 $\frac{3}{4}$	7 $\frac{1}{8}$	180
5 Cell 7 PWR	*17 $\frac{1}{4}$	7 $\frac{3}{4}$	140	4 Cell 15 PWR	†29 $\frac{5}{8}$	7 $\frac{1}{8}$	240
6 Cell 7 PWR	*20 $\frac{1}{16}$	7 $\frac{3}{4}$	168	3 Cell 17 PWR	†20 $\frac{7}{8}$	9 $\frac{1}{16}$	204
8 Cell 7 PWR	*26 $\frac{3}{4}$	7 $\frac{3}{4}$	224	4 Cell 17 PWR	†27 $\frac{1}{8}$	9 $\frac{1}{16}$	272
3 Cell 9 PWR	*14 $\frac{3}{16}$	7 $\frac{3}{4}$	118	3 Cell 19 PWR	†20 $\frac{7}{8}$	9 $\frac{1}{16}$	228
4 Cell 9 PWR	*19 $\frac{1}{8}$	7 $\frac{3}{4}$	144	4 Cell 19 PWR	†27 $\frac{1}{8}$	9 $\frac{1}{16}$	304
5 Cell 9 PWR	*23 $\frac{3}{4}$	7 $\frac{3}{4}$	180	3 Cell 21 PWR	†20 $\frac{7}{8}$	10 $\frac{1}{16}$	252
3 Cell 11 PWR	*16 $\frac{1}{8}$	7 $\frac{3}{4}$	132	4 Cell 21 PWR	†27 $\frac{1}{8}$	10 $\frac{1}{16}$	336
4 Cell 11 PWR	*21 $\frac{5}{8}$	7 $\frac{3}{4}$	176	3 Cell 25 PWR	†20 $\frac{7}{8}$	12 $\frac{3}{16}$	300
5 Cell 11 PWR	*26 $\frac{9}{16}$	7 $\frac{3}{4}$	220	4 Cell 25 PWR	†27 $\frac{1}{8}$	12 $\frac{3}{16}$	400
3 Cell 13 PWR	*18 $\frac{9}{16}$	7 $\frac{3}{4}$	156	3 Cell 29 PWR	†20 $\frac{7}{8}$	14 $\frac{1}{16}$	348
4 Cell 13 PWR	*24 $\frac{3}{8}$	7 $\frac{3}{4}$	208	4 Cell 29 PWR	†27 $\frac{1}{8}$	14 $\frac{1}{16}$	464
5 Cell 13 PWR	*30	7 $\frac{3}{4}$	260				

Height overall including insulators, 17 $\frac{1}{2}$  in.  
 \*Add 1 in. for handles. †Add 1 $\frac{1}{4}$  in. for handles.

## RACK INFORMATION FOR 60 CELLS TYPE PWR

Listed below are the part numbers of rack sections used with dimensions and the number of rack sections required for the catalogued PWR tray units, assembled side to side to make up a 60 cell battery.

Tray Unit		Single Tier				Double Tier			
Cell	Plate	Rack No.	Length, In.	Width, In.	Rack Sections Required	Rack No.	Length, In.	Width, In.	Rack Sections Required
4	7	J-1520	131 $\frac{1}{4}$	15 $\frac{1}{8}$	1	J-1538	64	21 $\frac{5}{8}$	1
5	7	J-1513	105	18 $\frac{1}{4}$	1	J-1527	48	24 $\frac{3}{4}$	1
6	7	J-1507	87 $\frac{1}{2}$	21 $\frac{9}{16}$	1	J-1526	40	28	1
8	7	J-1501	70	27 $\frac{3}{4}$	1	J-1525	32	34 $\frac{1}{4}$	1
3	9	J-1505	87 $\frac{1}{2}$	15 $\frac{13}{16}$	2	J-1545	8	22 $\frac{3}{8}$	1
4	9	J-1521	131 $\frac{1}{4}$	20 $\frac{1}{8}$	1	J-1539	64	26 $\frac{5}{8}$	1
5	9	J-1514	105	24 $\frac{3}{4}$	1	J-1528	48	31 $\frac{1}{4}$	1
3	11	J-1504	87 $\frac{1}{2}$	17 $\frac{1}{2}$	2	J-1546	80	24	1
4	11	J-1522	131 $\frac{1}{4}$	22 $\frac{5}{8}$	1	J-1540	64	29 $\frac{1}{8}$	1
5	11	J-1515	105	27 $\frac{9}{16}$	1	J-1529	48	34	1
3	13	J-1506	87 $\frac{1}{2}$	19 $\frac{9}{16}$	2	J-1547	80	26	1
4	13	J-1523	131 $\frac{1}{4}$	25 $\frac{3}{8}$	1	J-1541	64	31 $\frac{7}{8}$	1
5	13	J-1516	105	31	1	J-1530	48	37 $\frac{1}{8}$	1
3	15	J-1508	87 $\frac{1}{2}$	23 $\frac{3}{4}$	2	J-1548	80	30 $\frac{1}{4}$	1
4	15	J-1524	131 $\frac{1}{4}$	30 $\frac{5}{8}$	1	J-1542	64	37 $\frac{1}{8}$	1
3	17	J-1512	101	21 $\frac{7}{8}$	2	J-1531	50 $\frac{1}{4}$	28 $\frac{3}{8}$	2
4	17	J-1503	83	28 $\frac{1}{8}$	2	J-1549	80 $\frac{1}{2}$	34 $\frac{5}{8}$	1
3	19	J-1517	107	21 $\frac{7}{8}$	2	J-1533	58	28 $\frac{3}{8}$	2
4	19	J-1502	80 $\frac{1}{2}$	28 $\frac{7}{8}$	2	J-1534	85 $\frac{1}{2}$	35 $\frac{3}{8}$	1
3	21	J-1519	120	21 $\frac{7}{8}$	2	J-1536	60	38 $\frac{3}{8}$	2
4	21	J-1510	90	28 $\frac{7}{8}$	2	J-1535	95 $\frac{1}{2}$	35 $\frac{3}{8}$	1
3	25	J-1509	88	21 $\frac{7}{8}$	3	J-1543	66	28 $\frac{3}{8}$	2
4	25	J-1511	99	28 $\frac{7}{8}$	2	J-1532	53	35 $\frac{3}{8}$	2
3	29	J-1512	101	21 $\frac{7}{8}$	3	J-1544	75 $\frac{1}{2}$	28 $\frac{3}{8}$	2
4	29	J-1518	113	28 $\frac{7}{8}$	2	J-1537	60	35 $\frac{3}{8}$	2

### Philco in Glass

Philco power batteries are also furnished built in glass—the result of years of careful research and engineering. Engineers everywhere appreciate the great convenience of these batteries which make possible constant, clear, visual inspection.

### Further Information and Prices

We want to give you prices in detail on our line of Philco power batteries, and particularly we want to send you the full story of "Philco in Glass." This information we will be glad to send at your request.



