



**Radio Installation  
and  
Service Manual  
1927-1928**



**PHILADELPHIA STORAGE BATTERY COMPANY**

Ontario and C Streets

PHILADELPHIA, PA., U. S. A.



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AND

# SERVICE MANUAL

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# Descriptive and Technical Information

The Philco Socket Power line for the 1927-1928 season is time-tested and complete. All units are free of experimental features and have had a thorough tryout in actual service. Philco Socket Powers have established themselves as the most successful, dependable and economical means of operating any standard radio set from the light socket.

Although the principle of operation has not been changed in any of the new Socket Powers, many important improvements have been made which will insure even more satisfactory service as well as greater convenience. Higher capacity units, both "A" and "B," have been developed to take care of the increases in tubes and the growing use of audio power tubes. Batteries capable of operating large radio sets for many hours each day are used in the higher capacity "A" and "AB" units. The trickle charging rate is ample to keep up the battery under all usual conditions of use and a high or "boost" rate is provided for emergencies.

The high operating "B" voltage available from Philco Socket Powers is obtained with a relatively low transformer voltage. This is made possible by the use of low resistance electrolytic rectifiers (Philcotrons) in place of the ordinary high resistance tube rectifiers. As a result, the filter condensers in Philco Socket Powers are not at any time subjected to excessive voltage strain.

The "AB" Socket Powers have on the front, readily accessible to the user, the new current Economizer which allows the user always to adjust his charging rate to the lowest point of current consumption which will keep the battery charged as shown by the charge indicator. This saves current bills, increases the life of the battery, reduces the frequency of adding water and increases the life of either the Philcotron or dry charger. Three charging rates for constant use, as well as a boost rate for emergency use, are provided. Philcotron life will, in many cases, easily be doubled because of the Economizer.

The design, arrangement and wiring of the parts inside the case have been improved and simplified. To prevent unnecessary tampering with the variable resistor, the knurled head has been removed and replaced with a slotted head which requires a screwdriver to turn. This will result in the Socket Powers staying in adjustment as set by the installer. The system of voltage control with one variable resistor as used in Philco Socket Powers has proven to be the most practical and best arrangement for adjusting the "B" voltage to the requirements of all makes of radio sets. It is simple, reliable and can easily be adjusted to suit any set without the use of meters.

The "B" Philcotron contact clips and panel have been improved so that good connections at the Philcotron terminals will be assured.

The new Socket Powers have the typewriter case construction. The top and sides are spot-welded together to form one piece. They are not fastened to the bottom. When the dealer is preparing a Socket Power for service and when the user has to add water, the housing is lifted off so that all the working parts are readily accessible and visible. This makes it very easy to fill the battery without spilling. When a Socket Power, except the 180-volt models with safety switches, is installed in a radio cabinet, the housing may be removed permanently, thus providing the greatest possible ventilation. The housings are interchangeable on Socket Powers of the same type. If a dealer has a closed model in stock and makes a sale of a cabinet model, he simply removes the housing, sells the bottom with the working parts, orders a cabinet model at its lower price, puts the housing on and he has again a closed model.

The Philco type UD batteries used in Socket Powers are described in another section in this Manual. The advantages of the thick plates, thick separators, spray-proof construction and built-in charge indicator incorporated in these batteries cannot be over-emphasized. These features are found only in the types UD-44; UD-86 and UD-96 batteries originated by Philco more than four years ago. Thick plates and separators give long life and freedom from internal short-circuiting. Spray-proof construction is absolutely necessary for the protection of adjacent parts of the radio set or Socket Power against corrosion.

Without the built-in Philco Charge Indicator the battery may run down without warning, perhaps in the middle of a concert, and then several days will be required to bring it up again with a trickle charger. The Charge Indicator gives warning if for any reason the battery is not being kept charged, guards against power failure and is the means of determining the correct trickle charge rate, thus saving current bills, reducing the care and increasing the life of the units.

In every detail Philco Socket Powers have been refined and improved so that while they have been copied extensively they are as far ahead of competition this season as ever.

### **Working Principle of Socket Power "A"**

Philco Socket Power "A" is a combination of a highly efficient transformer and rectifier with a battery especially designed for trickle charge use. The arrangement is such that the battery is recharged automatically when the radio set is out of use. The control may be by either manual switch or relay. Figure 1 shows the hook-up with the manual switch.

The charging circuit (switch OFF) is shown by dotted lines and the operating circuit (switch ON) by solid lines. When the switch is thrown to ON, the battery is connected to the filament circuit of the set while the house current is disconnected from the trickle charger and connected to the socket provided for connection to Socket Power "B." When the switch is thrown to OFF, the battery current is switched off the filaments while the house current is disconnected from the "B" socket and connected to the trickle charger which automatically recharges the battery.

Since the house current is entirely disconnected from the battery and charger during the periods of use of the radio set, all possible complications by which the alternating current in the charger might cause a hum to be heard are avoided. By trickle charging during the rela-

tively long off periods, the size of the charger and the heat generated by it are kept to a minimum. The low trickle charging rates cannot harm the battery even though continued for long periods after the battery is fully charged. In fact, the battery is charged in the best possible manner, without gassing or heating.

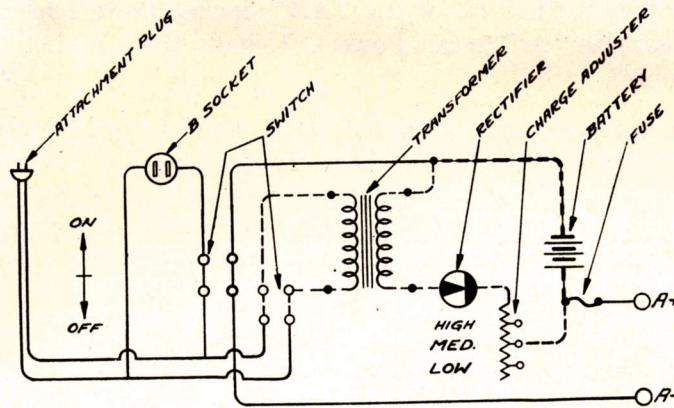


Figure 1  
Wiring Diagram of Philco Socket Power "A" with Manual Control Switch

**Battery Capacity**

Type UD-86 battery is used in all 6-volt Socket Powers for radio sets of one to six tubes.

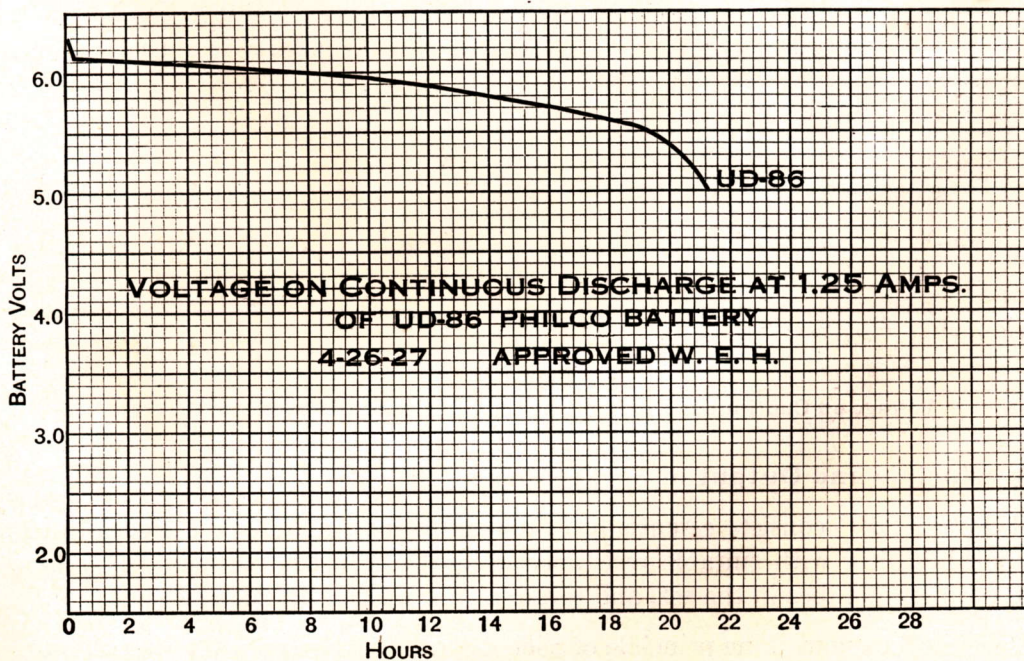


Figure 2  
Voltage on Continuous Discharge at 1.25 Amperes of UD-86 Philco Battery

The curve shown in Figure 2 gives the voltage on continuous discharge of a UD-86 battery; the discharge being at a rate of 1.25 amperes. It shows how much reserve capacity there is in this battery. There is very little drop in the battery voltage during the first 12 to 14 hours of the discharge.

The UD-96 battery is used in all of the "AB" Socket Powers having the 180-volt "B" supply and in the larger size "A" Socket Powers. Usually these Socket Powers will be used on sets of six tubes or more.

The curve shown in Figure 3 gives the voltage on continuous discharge of a UD-96 battery; the discharge being at a rate of 2.5 amperes. A discharge rate of 2.5 amperes is equivalent to the draw of a 9-tube set using a power tube. At this very high current rate the battery voltage drops very little, even on continuous discharge, for the first nine hours. When used intermittently, as is customary, or when discharged at lower rates, the voltage will hold up even better.

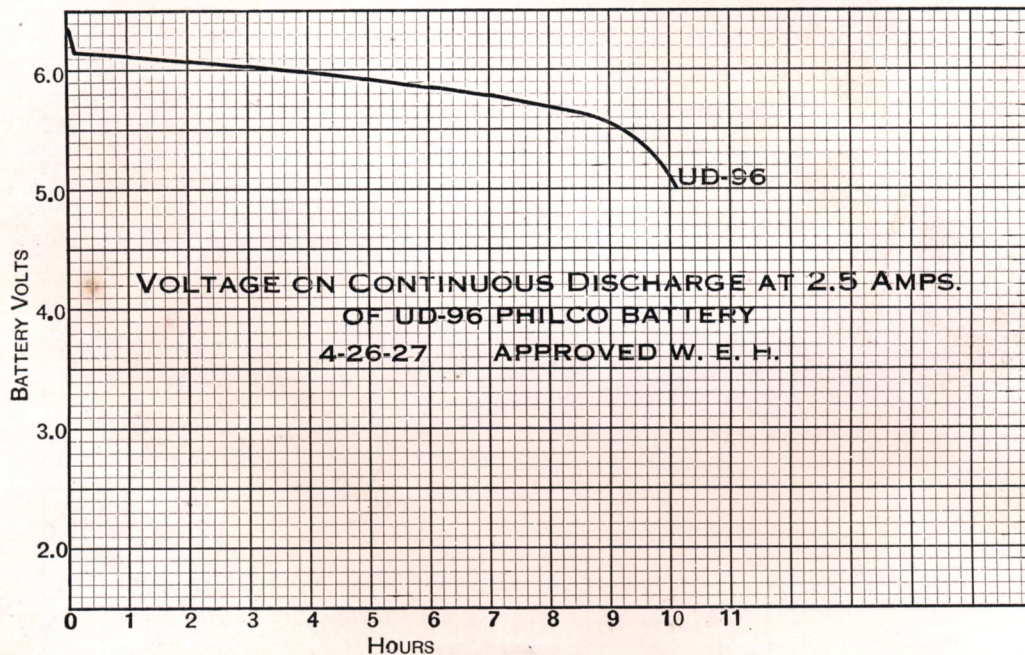


Figure 3  
Voltage on Continuous Discharge at 2.5 Amperes of UD-96 Philco Battery

### Working Principle and Output of Socket Power "B"

Socket Power "B" consists essentially of a transformer, a full-wave electrolytic rectifier and a smoothing filter with suitable resistance units for adjusting the output voltage to the needs of the different tubes in the set, and terminals for making the connections.

A general idea of the working principle of Socket Power "B" may be had from Figure 4. The ordinary current in the house wires is alternating current, that is, current which flows in surges, first in one direction, then in the other. Alternating current is usually represented by a wave

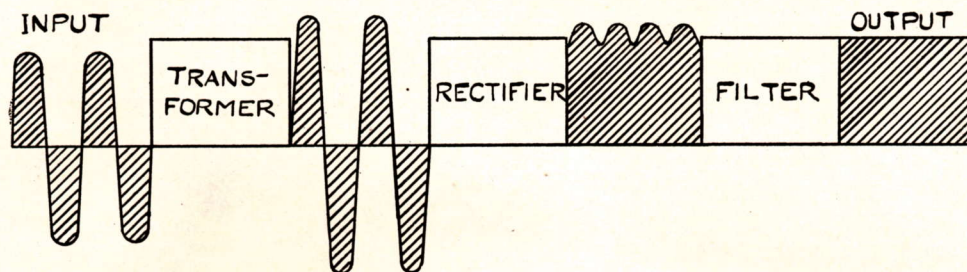


Figure 4  
Diagram Showing How Philco "B" Socket Power Adapts Alternating Current to Radio Use

form such as that shown at the left end of Figure 4. The horizontal line represents zero voltage and the waves above and below this line represent the electric waves or surges back and forth. The transformer steps up the voltage, or electric pressure, slightly but does not change the character of the current. It is still alternating current when it enters the rectifier. In the full-wave rectifier, however, the waves below the line are turned over so that they fill the gaps between the waves above the line, which changes the character of the current. It is now direct current, that is, current which continues to flow in one direction. It is not usable direct current however, because there is a fluctuation or ripple in it which would cause a bad hum in a radio set. The filter smooths out this ripple, making the current equivalent to battery current for radio use.

Figure 5 shows the hook-up for the 135-150-volt "B" Socket Power.

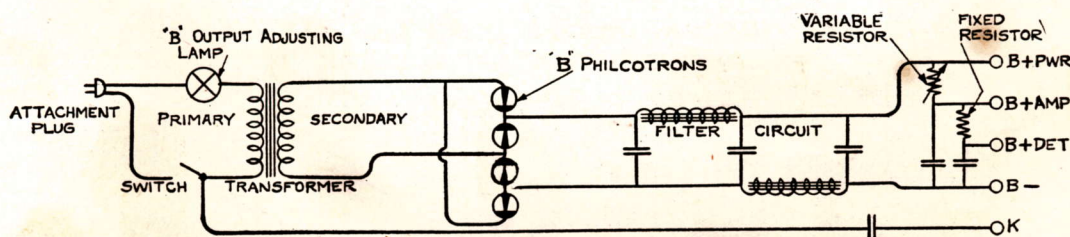


Figure 5  
Philco Socket Power Wiring Diagram, Types B-603, B-253

A lamp socket is provided in the transformer circuit to take a standard 115-volt Mazda lamp. This lamp, called the "B" output adjusting lamp, is used to regulate and adjust the output of the Socket Power at different line voltages to meet the requirements of different sets. The use of a low-wattage lamp will reduce the current output. A larger lamp will increase the current output or the voltage at a given current.

Figure 6 shows the output voltage obtained at any current load, using a 25, a 40 and a 50-watt Mazda lamp of the standard "A" type.

Figure 7 shows the hook-up for the 180-volt "B" Socket Power. This high-voltage "B" Socket Power employs two sets of Philcotron cells with the output of the two connected in series. Instead of a Mazda lamp for adjusting the output voltage, there are four taps on one of the transformer secondary coils. These taps are marked to correspond with the number of



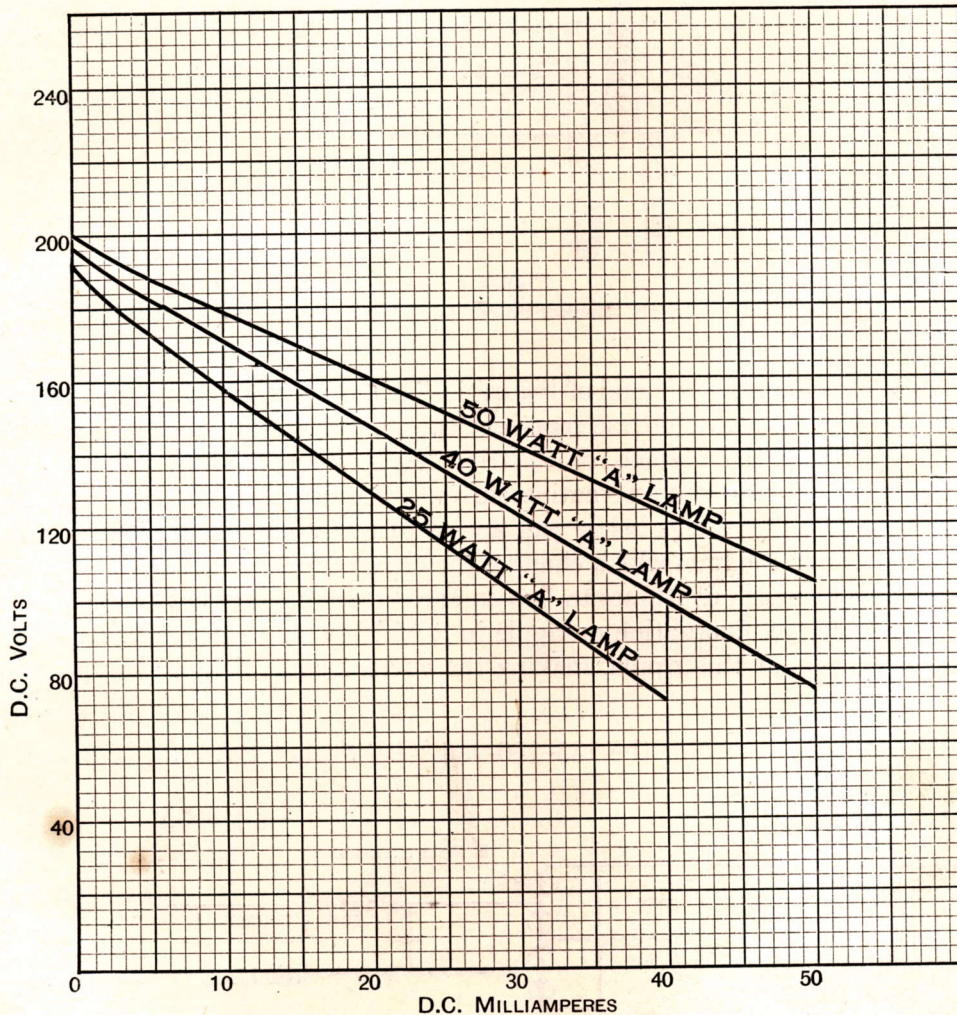


Figure 6  
 "B" Output Volts of Philco Socket Power B-603 at Various Loads with 25, 40 and 50-Watt Mazda Lamps

tubes in the radio set. At 110 to 115 line volts, under normal conditions, the "B" output adjusting plug will be put in the 5 to 7-tube position when operating a 6-tube set; the 6 to 8-tube position when operating a 7-tube set, etc. If the A.C. line voltage is high, a lower transformer tap can be used, while if the A.C. line voltage runs exceptionally low, a higher tap can be used.

The 8 to 10-tube setting of the "B" output adjuster will give 180 volts at a load of 60 milliamperes at average A.C. line voltage.

The larger the number of tubes and the greater the milliampere draw of the set the greater the advantage of using the 180-volt "B" Socket Power. For any one who wants the very best quality and volume this should be used for 5 or 6-tube sets equipped with type 171 or 371 power tubes, and practically always for sets with more than 6 tubes.

DESCRIPTIVE AND TECHNICAL INFORMATION

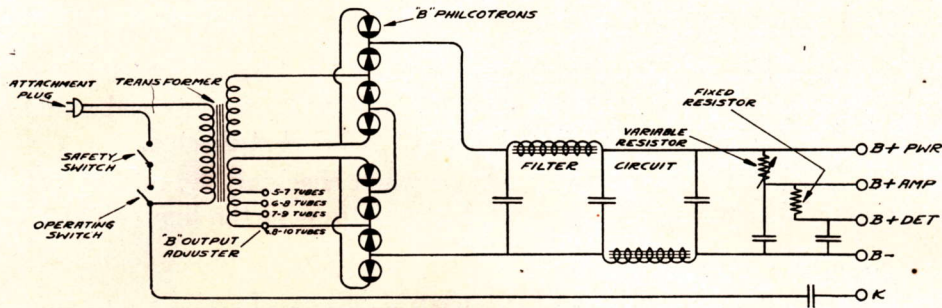


Figure 7  
Philco Socket Power Wiring Diagram, Type B-86.

Figure 8 gives the output voltage curves of the 180-volt "B" Philco Socket Power at 0 to 60 milliamperes load. This applies to all 180-volt "AB" as well as "B" units.

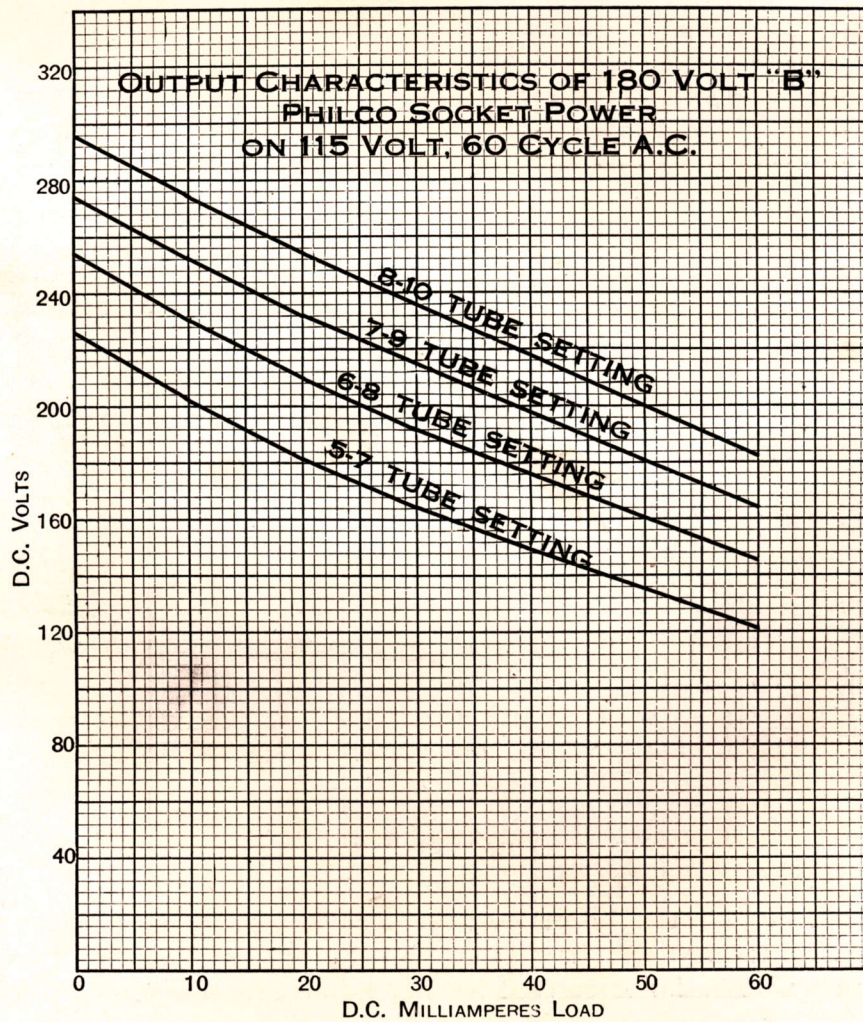


Figure 8  
Output Characteristics of 180-volt "B" Philco Socket Power

### Effect of Variations in A.C. Supply

Variations in the A.C. line voltage will affect the output voltage of all "B" Socket Powers. Figure 9 shows the average per cent of normal D.C. output volts obtained at different A.C. input volts from the "B" circuit of Philco "AB" and "B" Socket Powers.

When adjusting Socket Powers to radio sets or when checking the output voltage with a high resistance meter, allowance must be made for variations in the line voltage.

### "AB" Socket Powers

The "AB" types combine the "A" and the "B" power in one case. The individual "A" and "B" types are designed to be used either separately or together. When used together, the "B" plugged into the "A" and the "A" into the house socket, they operate like an "AB" unit. The attachment plug must be kept in a live house socket at all times as house current is used by the "B" Socket Power while the radio set is in use and by the "A" Socket Power to trickle charge the "A" battery while the set is turned off.

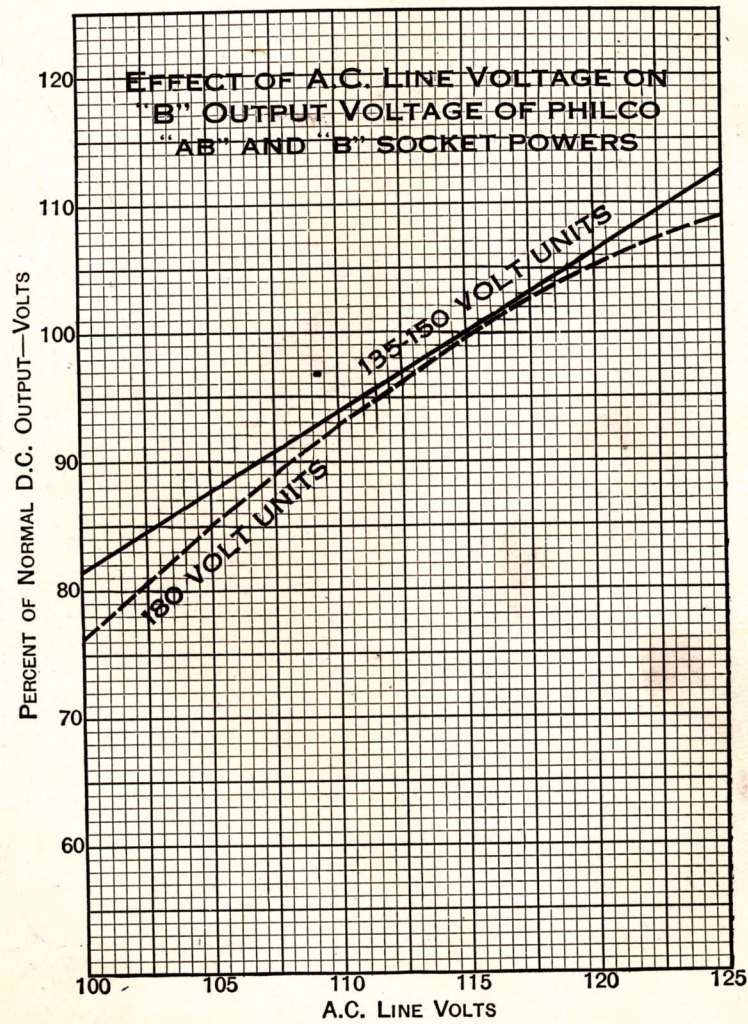


Figure 9

DESCRIPTIVE AND TECHNICAL INFORMATION

Figure 10 shows the hook-up for the AB-656 type Socket Power.

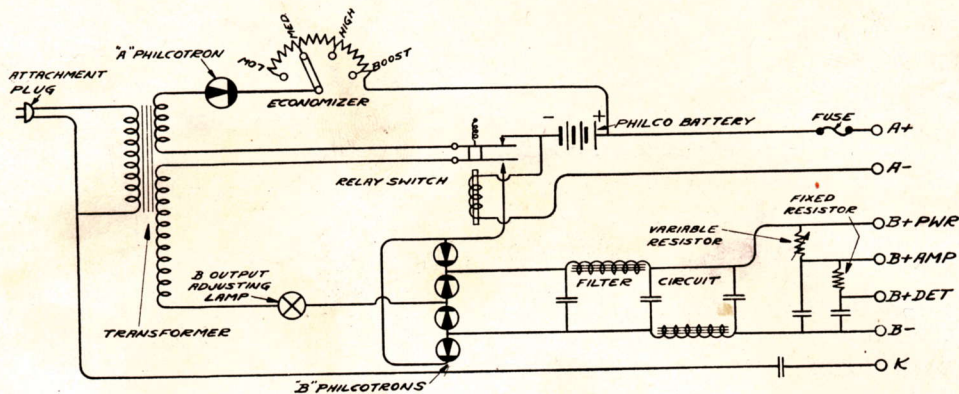


Figure 10  
Philco Socket Power Wiring Diagram, Types AB-656 and AB-652

Some of the types have a manual master control switch on the Socket Power that controls the "A" power, the "B" power and the radio set. When using these Socket Powers, the radio set switch must be kept "On" at all times. The switch on the Socket Power controls everything.

Other types of Socket Powers have an automatic relay switch built in. When using these, the switch on the radio set controls the Socket Power as well as the radio set. The radio set switch is turned "On" to operate the set and is turned "Off" to stop the radio. This automatically controls the "A" and "B" circuits of the Socket Power.

yellow + Red trace open contact on relay  
 either of the two yellow + Blue Solders to largest  
 Red wire with yellow tracer (tape up)  
 the other yellow + blue to top arm  
 Red + Black to large plain red  
 Small Black wire to top (closed contact) + a  
 jumper to relay coil - also one of wires on  
 -A Battery comes off and goes on other side of relay  
 coil - small red + yellow to lower arm of relay

## Philco Socket Power Specifications

### Type A-603

Supplies "A" power at 6 volts to light the filaments of one to six 5-volt storage battery tubes, including a power tube.

Current required: 50 or 60-cycle, 105-125-volt alternating.

Battery: Philco UD-86.

Rectifier: Type AA Philcotron.

Control switch: Manual.

	Low	Med.	High
Trickle charge rates, D.C. amps. . . . .	.2	.4	.8
Current consumption, A.C. watts . . . . .	15	25	45

Overall dimensions: Depth 12 $\frac{7}{8}$ " ; Width 9 $\frac{1}{2}$ " ; Height 7 $\frac{7}{8}$ ".

### Type A-253

Same as type A-603, except for use on 25, 30, 40, 50 or 60-cycle alternating current.

### Type A-36

Supplies "A" power at 6 volts to light the filaments of one to ten 5-volt storage battery tubes, including a power tube.

Current required: 50 or 60-cycle, 105-125-volt alternating.

Battery: Philco UD-96.

Rectifier: Dry type.

Control switch: Relay automatic.

	Low	Med.	High	Boost
Trickle charge rates, D.C. amps. . . . .	.25	.4	.65	1.0
Current consumption, A.C. watts . . . . .	23	27	32	40

Overall dimensions: Depth 12 $\frac{3}{8}$ " ; Width 9 $\frac{1}{2}$ " ; Height 7 $\frac{7}{8}$ ".

### Type DA-6

Similar to type A-603 for use on 105-125-volt direct current. Polarity indicator shows when it is plugged into socket the right way. Trickle charge rate is adjusted by means of a 115-volt Mazda lamp.

Battery: Philco type UD-86.

Control switch: Manual.

	Low	Med.	High
115-volt lamp size, watts . . . . .	25	40	75
Trickle charge rates, D.C. amps. . . . .	.22	.35	.63
Current consumption, D.C. watts . . . . .	25	40	72

Overall dimensions: Depth 12 $\frac{7}{8}$ " ; Width 9 $\frac{1}{2}$ " ; Height 7 $\frac{7}{8}$ ".

### Type B-603

Supplies "B" power for sets having one to six tubes, including a power tube.

Current required: 50 or 60-cycle, 105-125-volt alternating.

Rectifier: Full-wave Philco electrolytic.

Control switch: Manual.

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PHILCO SOCKET POWER SPECIFICATIONS

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Average voltage at amplifier terminals:

B+ PWR: 150 volts, 25 milliamperes load, 115 volts A.C.  
135 volts, 30 milliamperes load, 115 volts A.C.

B+ AMP: 50-100 volts, adjustable.

Maximum continuous "B" current rating: 50 milliamperes.

Average current consumption: 12 A.C. watts at 30 milliamperes load.

Overall dimensions: Depth 8½"; Width 8¼"; Height 7⅞".

#### **Type B-253**

Same as type B-603 except with special transformer and extra large filter, for use on 25, 30, 40, 50 or 60-cycle alternating current.

#### **Type B-86**

Supplies "B" power for sets having over five tubes, including a power tube.

Current required: 50 or 60-cycle, 105-125-volt alternating.

Rectifier: Full-wave Philco electrolytic.

Control switch: Manual.

Average voltage at amplifier terminals:

B+ PWR: 180 volts, 60 milliamperes load, 115 volts A.C.  
Adjustable for different size sets.

B+ AMP: 50-100 volts, adjustable.

Maximum continuous "B" current rating: 60 milliamperes.

Average current consumption: 24 A.C. watts at 60 milliamperes load.

Overall dimensions: Depth 12"; Width 7⅝"; Height 7⅞".

#### **Type B-82**

Same as type B-86, except with special transformer and extra large filter for use on 25, 30, 40, 50 or 60-cycle alternating current.

#### **Type DB**

Similar to type B-603 for use on 105-125-volt direct current.

Supplies "B" power at detector and two amplifier voltages for sets having one to ten tubes of any standard type.

Control switch: Manual.

Average voltage at amplifier terminals:

B+ PWR: Practically same as D.C. line voltage.

B+ AMP: 50-100 volts, adjustable.

Maximum continuous "B" current rating: 50 milliamperes.

Average current consumption: 8 D.C. watts at 20 milliamperes load.

Overall dimensions: Depth 8½"; Width 8¼"; Height 7⅞".

#### **Type AB-663**

Supplies "A" power at 6 volts and "B" power at detector and two amplifier voltages for receiving sets having from one to six 5-volt storage battery tubes including a power tube.

Current required: 50 or 60-cycle, 105-125-volt alternating.

"A" battery: Philco type UD-86.  
 "A" rectifier: Type AA Philcotron.  
 "B" rectifier: Full-wave Philco electrolytic.  
 Control switch: Manual.

	Low	Med.	High
"A" trickle charge rates, D.C. amps. . . . .	.2	.4	.8
"A" current consumption, A.C. watts . . . . .	15	25	45

Average "B" voltage at amplifier terminals:  
 B+ PWR: 150 volts, 25 milliamperes load, 115 volts A.C.  
           135 volts, 30 milliamperes load, 115 volts A.C.  
 B+ AMP: 50-100 volts, adjustable.  
 Maximum continuous "B" current rating: 50 milliamperes.  
 Average "B" current consumption: 12 A.C. watts at 30 milliamperes load.  
 Overall dimensions: Depth 12 $\frac{5}{8}$ " ; Width 13 $\frac{5}{8}$ " ; Height 8 $\frac{3}{8}$ ".

**Type AB-623**

Same as type AB-663 except with special transformer and extra large "B" current filter for use on 25, 30, 40, 50 or 60-cycle alternating current.

**Type AB-656 and AB-6561**

Supplies "A" power at 6 volts and "B" power at detector and two amplifier voltages for receiving sets having from one to six 5-volt storage battery tubes including a power tube.

Current required: 50 or 60-cycle, 105-125-volt alternating.

"A" battery: Philco type UD-86.  
 "A" rectifier: Type AA Philcotron.  
 "B" rectifier: Full-wave Philco electrolytic.  
 Control switch: Automatic relay.

	Low	Med.	High	Boost
"A" trickle charge rates, D.C. amps. . . . .	.2	.33	.5	.8
"A" current consumption, A.C. watts . . . . .	15	20	28	45

Average "B" voltage at amplifier terminals:  
 B+ PWR: 150 volts, 25 milliamperes load, 115 volts A.C.  
           135 volts, 30 milliamperes load, 115 volts A.C.  
 B+ AMP: 50-100 volts, adjustable.  
 Maximum continuous "B" current rating: 50 milliamperes.  
 Average "B" current consumption: 12 A.C. watts at 30 milliamperes load.  
 AB-656—Overall dimensions: Depth 12 $\frac{1}{8}$ " ; Width 13 $\frac{5}{8}$ " ; Height 8 $\frac{3}{8}$ ".  
 AB-6561—Overall dimensions: Depth 12 $\frac{1}{8}$ " ; Width 13 $\frac{5}{8}$ " ; Height 8".

**Type AB-652 and AB-6521**

Same as type AB-656 except with special transformer and extra large "B" current filter for use on 25, 30, 40, 50 or 60-cycle alternating current.

**Type AB-356 and AB-3561**

Supplies "A" power at 6 volts and "B" power at detector and two amplifier voltages for receiving sets having from one to six 5-volt storage battery tubes, including a power tube.

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PHILCO SOCKET POWER SPECIFICATIONS

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Current required: 50 or 60-cycle, 105-125-volt alternating.

"A" battery: Philco type UD-86.

"A" rectifier: Dry type.

"B" rectifier: Full-wave Philco electrolytic.

Control switch: Automatic relay.

	Low	Med.	High	Boost
"A" trickle charge rates, D.C. amps. . . . .	.2	.33	.5	.8
"A" current consumption, A.C. watts . . . . .	22	25	29	36

Average "B" voltage at amplifier terminals:

B+ PWR: 150 volts, 25 milliampere load, 115 volts A.C.

135 volts, 30 milliampere load, 115 volts A.C.

B+ AMP: 50-100 volts, adjustable.

Maximum continuous "B" current rating: 50 milliamperes.

Average "B" current consumption: 12 A.C. watts at 30 milliampere load.

AB-356—Overall dimensions: Depth 12 $\frac{1}{8}$ " ; Width 13 $\frac{5}{8}$ " ; Height 8 $\frac{3}{8}$ " .

AB-3561—Overall dimensions: Depth 12 $\frac{1}{8}$ " ; Width 13 $\frac{5}{8}$ " ; Height 8" .

**Type AB-686**

Supplies "A" power at 6 volts and "B" power at detector and two amplifier voltages for receiving sets having over five 5-volt storage battery tubes, including a power tube.

Current required: 50 or 60-cycle, 105-125-volt alternating.

"A" battery: Philco type UD-96.

"A" rectifier: Type AA Philcotron.

"B" rectifier: Full-wave Philco electrolytic.

Control switch: Automatic relay.

	Low	Med.	High	Boost
"A" trickle charge rates, D.C. amps. . . . .	.25	.4	.6	.8
"A" current consumption, A.C. watts . . . . .	18	25	29	45

Average "B" voltage at amplifier terminals:

B+ PWR: 180 volts, 60 milliampere load, 115 volts A.C.

Adjustable for different size sets.

B+ AMP: 50-100 volts, adjustable.

Maximum continuous "B" current rating: 60 milliamperes.

Average "B" current consumption: 24 A.C. watts at 60 milliampere load.

Overall dimensions: Depth 14" ; Width 13 $\frac{5}{8}$ " ; Height 8 $\frac{3}{8}$ " .

**Type AB-386**

Supplies "A" power at 6 volts and "B" power at detector and two amplifier voltages for receiving sets having over five 5-volt storage battery tubes, including a power tube.

Current required: 50 or 60-cycle, 105-125-volt alternating. Adjustable for different size sets.

"A" battery: Philco type UD-96.

"A" rectifier: Dry type.

"B" rectifier: Full-wave Philco electrolytic.

Control switch: Automatic relay.

	Low	Med.	High	Boost
"A" trickle charge rates, D.C. amps. . . . .	.25	.4	.65	1.0
"A" current consumption, A.C. watts . . . . .	23	27	32	40



Average "B" voltage at amplifier terminals:

B+ PWR: 180 volts, 60 milliampere load, 115 volts A.C.

B+ AMP: 50-100 volts, adjustable.

Maximum continuous "B" current rating: 60 milliamperes.

Average "B" current consumption: 24 A.C. watts at 60 milliampere load.

Overall dimensions: Depth 14"; Width 13<sup>5</sup>/<sub>8</sub>"; Height 8<sup>3</sup>/<sub>8</sub>".

**Type AB-382**

Same as type AB-386 except with special transformer and extra large "B" current filter for use on 25, 30, 40, 50 or 60-cycle alternating current.

**Types AB-463 and AB-4635**

Supplies "A" power at 4 volts and "B" power at detector and two amplifier voltages for sets having from one to ten 3-volt tubes, including Radiolas.

Current required: 50 or 60-cycle, 105-125-volt alternating.

"A" battery: Philco UD-44.

"A" rectifier: Type A Philcotron.

"B" rectifier: Full-wave Philco electrolytic.

Control switch, AB-463: Manual.

Control switch: AB-4635: Automatic relay.

	Low	Med.	High
"A" trickle charge rates, D.C. amps. . . . .	.075	.15	.3
"A" current consumption, A.C. watts . . . . .	9	12	18

Average "B" voltage at amplifier terminals:

B+ PWR: 135 volts, 20 milliampere load, 115 volts A.C.

B+ AMP: 50-90 volts, adjustable.

Maximum continuous "B" current rating: 50 milliamperes.

Average "B" current consumption: 10 A.C. watts at 20 milliampere load.

AB-463—Overall dimensions: Depth 12<sup>5</sup>/<sub>8</sub>"; Width 13<sup>5</sup>/<sub>8</sub>"; Height 8<sup>3</sup>/<sub>8</sub>".

AB-4635—Overall dimensions: Depth 6<sup>3</sup>/<sub>8</sub>"; Width 25"; Height 8".

**Types AB-423 and AB-4235**

Same as types AB-463 and AB-4635 except with special transformer and extra large "B" current filter for use on 25, 30, 40, 50 or 60-cycle alternating current.

**Type DAB-4**

Similar to type AB-463 for use on 105-125-volt direct current. Supplies "A" power at four volts and "B" power at detector and two amplifier voltages for sets having from one to ten 3-volt tubes, including Radiolas. Polarity indicator shows when plugged into socket the right way. Trickle charge rate is adjusted by means of a 115-volt Mazda lamp.

"A" battery: Philco type UD-44.

Control Switch: Manual.

	Low	Med.	High
115-volt lamp sizes, watts . . . . .	10	15	25
"A" trickle charge rates, D.C. amps. . . . .	.085	.125	.22
"A" current consumption, D.C. watts . . . . .	10	15	25

Average "B" voltage at amplifier terminals:

B+ PWR: Practically same as D.C. line voltage.

B+ AMP: 50-100 volts, adjustable.

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*PHILCO SOCKET POWER SPECIFICATIONS*

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Maximum continuous "B" current rating: 50 milliamperes.

Average "B" current consumption: 8 D.C. watts at 20 milliampere load.

Overall dimensions: Depth 12 $\frac{7}{8}$ " ; Width 9 $\frac{3}{8}$ " ; Height 7 $\frac{7}{8}$ " .

**Type TC-60**

For charging 6 or 4-volt batteries efficiently from 50 or 60-cycle, 105-125-volt alternating current. Has a socket connection for "B" Socket Power and built-in switch for controlling operation of radio set and "A" and "B" power.

"A" rectifier: Type A Philcotron.

	Low	Med.	High
6-volt trickle charge rates, D.C. amps. . . . .	.16	.33	.6
4-volt trickle charge rates, D.C. amps. . . . .	.18	.36	Do not use
Current consumption, A.C. watts . . . . .	12	20	32

Overall dimensions: Depth 5" ; Width 9" ; Height 8 $\frac{1}{4}$ " .

**Type TC-25 for 6 or 4-volt Batteries**

Same as type TC-60 except with special transformer for use on 25, 30, 40, 50 or 60-cycle alternating current.

**Special Trickle Charge "A" Batteries**

Spray-proof construction with unit pressed glass case. Designed for use with Philco or any other trickle charger. Philco visible built-in Charge Indicator has two balls which drop at 25 per cent discharge and 75 per cent discharge respectively, and rise on charge. Large solution space provides operation over long periods without the addition of water. Extra thick plates and wide separation insure longest life.

Type	Volts	Amp. Hours at Radio Rates	Overall Dimensions		
			Length Inches	Width Inches	Height Inches
UD-44 for all 3-volt tube sets . . . . .	4	15	7 $\frac{1}{16}$	2 $\frac{3}{16}$	6 $\frac{3}{4}$
UD-86 for 5-volt tube sets using 1 to 6 tubes . . . . .	6	30	10 $\frac{9}{16}$	4 $\frac{5}{8}$	6 $\frac{7}{8}$
UD-96 for 5-volt tube sets using 6 or more tubes . . . . .	6	30	10 $\frac{9}{16}$	4 $\frac{5}{8}$	7 $\frac{3}{4}$

## Filament or "A" Operating Capacity of Philco Socket Powers

The following formula may be used to calculate the average number of hours per day that a radio set with any number and kind of tubes can be operated with a given trickle charge rate:

$$\text{Hours use per day} = \frac{\text{Charge rate} \times 24}{(\text{Filament current} \times 1.1) + \text{charge rate}}$$

This formula applies in all cases where the battery is charged during the entire time the radio set is out of use. The filament current figure is multiplied by the factor 1.1 to take care of a certain amount of overcharging. Following are the figures on "A" operating capacity for different Philco Socket Powers:

Socket Power Types	Filament Current Amperes	Average number of hours per day each tap will operate the radio set, keeping the battery fully charged			
		Low	Med.	High	Boost
A-603	.75	4.7	7.9	11.8	
A-253	1.00	3.7	6.4	10.1	
AB-663	1.25	3.0	5.4	8.8	
AB-623	1.50	2.6	4.7	7.8	
	1.75	2.3	4.1	7.1	
	2.00	2.0	3.7	6.4	
A-36	1.00	4.4	6.4	8.9	11.4
AB-386	1.25	3.7	5.4	7.7	10.1
AB-382	1.50	3.2	4.7	6.8	9.1
	1.75	2.8	4.1	6.1	8.2
	2.00	2.4	3.7	5.5	7.5
	2.25	2.2	3.3	4.8	6.9
	2.50	2.0	3.0	4.5	6.4
	2.75	1.8	2.8	4.2	6.0
DA-6	.75	5.1	7.2	10.3	
	1.00	4.0	5.8	8.7	
	1.25	3.3	4.9	7.5	
	1.50	2.8	4.2	6.6	
	1.75	2.5	3.7	5.9	
	2.00	2.1	3.3	5.3	
	2.25	1.9	3.0	4.9	
AB-656	.75	4.7	6.9	9.8	11.8
AB-652	1.00	3.7	5.5	7.5	10.1
AB-6561	1.25	3.0	4.7	6.4	8.8
AB-6521	1.50	2.6	4.0	5.6	7.8
AB-356	1.75	2.3	3.7	4.9	7.1
AB-3561	2.00	2.0	3.2	4.4	6.4
AB-686	1.00	4.4	6.4	8.5	10.1
	1.25	3.7	5.4	7.3	8.8
	1.50	3.2	4.7	6.4	7.8
	1.75	2.8	4.1	5.7	7.1
	2.00	2.4	3.7	5.1	6.4
	2.25	2.2	3.3	4.7	5.9
	2.50	2.0	3.0	4.2	5.4
	2.75	1.8	2.8	3.9	5.0

FILAMENT OR "A" OPERATING CAPACITY

**Filament or "A" Operating Capacity of  
Philco Socket Powers**

(Continued)

Socket Power Types	Filament Current Amperes	Average number of hours per day each tap will operate the radio set, keeping the battery fully charged.		
		Low	Med.	High
AB-463 AB-423 AB-4635 AB-4235	.18	6.6	10.3	14.4
	.24	5.3	8.0	12.7
	.30	4.4	7.5	11.4
	.36	3.8	6.6	10.3
	.42	3.3	5.9	9.4
	.48	3.0	5.3	8.7
	.54	2.7	4.8	8.1
	.60	2.4	4.4	7.5
	.66	2.2	4.1	7.1
DAB-4	.18	7.1	9.2	12.6
	.24	5.8	7.7	10.9
	.30	4.9	6.6	9.6
	.36	4.2	5.8	8.6
	.42	3.7	5.1	7.7
	.48	3.1	4.6	7.1
	.54	3.0	4.2	6.5
	.60	2.7	3.8	6.0
TC-60 TC-25 Charging 6-volt Batteries	.75	3.9	6.9	10.1
	1.00	3.4	5.6	8.4
	1.25	2.5	5.0	7.3
	1.50	2.1	4.0	6.4
	1.75	1.8	3.6	5.7
	2.00	1.6	3.2	5.1
	2.25	1.5	2.9	4.7
TC-60 TC-25 Charging 4-volt Batteries	.18	11.4	15.8	<b>Do not use High tap with 4-volt batteries</b>
	.24	9.7	14.2	
	.30	8.5	12.8	
	.36	7.5	11.7	
	.42	6.8	10.8	
	.48	6.0	9.9	
	.54	5.6	9.6	
	.60	5.1	8.7	
	.66	4.8	7.9	

## Radio Receiver Data and Connection Diagrams

RADIO RECEIVER DATA		PHILCO SOCKET POWER DATA			SPECIAL NOTES
Make	Model	A Volts	B Volts	Connection Diagram	
A-C Dayton	1926-27	6	135 or 180	5 or 6	Change fixed resistor in radio set according to manufacturer's instructions. Connect as shown in Diagram 5 or 6, connecting both the RF and AF leads of the set to the B+ PWR terminal of the Socket Power. The B+ AMP terminal of the Socket Power is not used.
A-C Dayton	1925-26	6	135	1 or 2	
Adler Royal	All Models	6	135	1 or 2	
All-American	44, 55, 66	6	135 or 180	5 or 6	
Amplex	All Models	6	135	1 or 2	
Amrad	6 and 7-Tube, 1927-28	6	135 or 180	5 or 6	
Amrad	1925-26	6	135	1 or 2	
Amrad	S522, S522C, S522M	6	135 or 180	5 or 6	
Apex	1927-28	6	135 or 180	5 or 6	
Apex	All Other Models	6	135 or 180	5 or 6	
Arborphone	25 and 27 Series	6	135 or 180	5 or 6	
Astral	All Models	6	135 or 180	5 or 6	
Astrola	1926-27	6	135 or 180	5 or 6	
Astrola	1925-26	6	135	1 or 2	
Atwater Kent	50	6	135 or 180	5 or 6	
Atwater Kent	33	6	135 or 180	5 or 6	
Atwater Kent	30, 32 and 35 with Power Tube	6	135 or 180	5 or 6	
Atwater Kent	30, 32 and 35 without Power Tube	6	135	3 or 4	
Atwater Kent	20 Compact with 5-volt Tubes	6	135	3 or 4	
Atwater Kent	20 Compact with 3-volt Tubes	4	135	1 or 2	
Atwater Kent	9, 10, 12 and 19	6	135	1 or 2	
Audiola	All Models	6	135 or 180	5 or 6	
Blackstone	All Models	6	135	1 or 2	
Blair	All Models	6	135	1 or 2	
Bosch	57, 66, 76	6	135 or 180	5 or 6	
Bosch	Cruiser, Amborola, Amborada	6	135 or 180	5 or 6	
Bosworth	B-3	6	135	5 or 6	
Bremer Tully	Counterphase 8	6	135 or 180	5 or 6	
Browning Drake	1926-27	6	135 or 180	5 or 6	Connect as shown in Diagram 5 or 6, connecting the set lead marked 67½ on the B+ AMP terminal of the Socket Power and the set lead marked B+ on the B+ PWR terminal of the Socket Power. The B+ DET terminal of the Socket Power is not used.
Brunswick-Radiola	All Models but VI	4	135		See Philco Brunswick Dealer Manual.

# Radio Receiver Data and Connection Diagrams

(Continued)

RADIO RECEIVER DATA		PHILCO SOCKET POWER DATA			SPECIAL NOTES	
Make	Model	A Volts	B Volts	Connection Diagram		
Brunswick-Radiola	VI . . . . .	4	135	14	Change fixed resistor in Socket Power to one of 10,000 ohms resistance.	
Canadian-Victor	R50 . . . . .	6	135	5 or 6		
Case	60A, 61A, 61C, 90A, 90C . . . . .	6	135 or 180	5 or 6		
Chelsea	1927-28 . . . . .	6	135 or 180	5 or 6		
Chelsea	5-Tube . . . . .	6	135	1 or 2		
Chelsea	6-Tube . . . . .	6	135 or 180	5 or 6		
Claratone	All Models . . . . .	6	135	1 or 2		
Colonial	21 and 23 . . . . .	6	135	1 or 2		
Crosley	601 . . . . .	6	135 or 180	5 or 6		
Crosley	All Models with- out Power Tube . . . . .	6	135	1 or 2		
Crosley	6-60, 6-85, 5-50, 5-75, RFL90, RFL75, 5-38 . . . . .	6	135 or 180	5 or 6	Connect as shown in Diagram 5 or 6, connecting both the 67½-volt and the 90-volt leads of the set to the B+ AMP terminal of the Socket Power. The B+ DET terminal of the Socket Power is not used. Or connect 67½-volt lead to the B+ DET terminal and change the fixed resistor to one of 1500 ohms.	
Day Fan	6 . . . . .	6	135 or 180	5 or 6		
Day Fan	7 . . . . .	6	135 or 180	5 or 6		
Day Fan	All Other Models . . . . .	6	135	1 or 2		
De Forest	All Models . . . . .	6	135	1 or 2		
Diamond	All Models . . . . .	6	135 or 180	5 or 6		
Eagle	D, F and H . . . . .	6	135 or 180	5 or 6		
Eckharmonic	X . . . . .	6	135 or 180	5 or 6		
Erla	Circloid 5 . . . . .	6	135	1 or 2		
Erla	Mo-nod-ic and Super Six . . . . .	6	135 or 180	5 or 6		Connect as shown in Diagram 1 or 2, but change the fixed resistor of Socket Power to a 10,000-ohm Bradleyunit fixed resistor.
Fada	6 and 7-tube 1927-28 . . . . .	6	135 or 180	5 or 6		
Fada	8-tube 1927-28 . . . . .	6	180	5 or 6		
Fada	8-tube 1926-27 . . . . .	6	180	5 or 6		
Fada	6-tube 1926-27 . . . . .	6	135 or 180	5 or 6		
Fada	170A, 192A and 195A with Power Tube . . . . .	6	135 or 180	5 or 6		
Fada	6-tube 1926-27 . . . . .	6	135 or 180	5 or 6	Connect as shown in Diagram 5 or 6, connecting both the +B Rad. and +B Aud. set leads to the B+ AMP terminal of the Socket Power.	
Fada	6-tube 1926-27 . . . . .	6	135 or 180	5 or 6		
Fada	6-tube 1926-27 . . . . .	6	135 or 180	5 or 6	Connect as shown in Diagram 5 or 6, connecting both the +B Rad. and +B Aud. set leads to the B+ AMP terminal of the Socket Power.	
Fada	6-tube 1926-27 . . . . .	6	135 or 180	5 or 6		

## Radio Receiver Data and Connection Diagrams

(Continued)

RADIO RECEIVER DATA		PHILCO SOCKET POWER DATA			SPECIAL NOTES
Make	Model	A Volts	B Volts	Connection Diagram	
Fada	170A, 192A and 195A without Power Tube	6	135	1 or 2	Connect both the +90 V and +135 V set terminals to the B+ AMP terminal of Socket Power.
Federal	A, B, C, D, E, F.	6	135 or 180	5 or 6	
Federal	DX58, 59 and 140	6	135	1 or 2	
Ferguson	8	6	135	1 or 2	Connect a wire across the 45 V + and - set terminals at the extreme end, next to the antenna terminals. Connect Socket Power to the three set terminals next to the C battery terminals as follows: -DET (white) to B-; +DET (green) to B+ DET; +45 (red) to B+ AMP.
Ferguson	10	6	135 or 180	5 or 6	
Ferguson	12	6	135 or 180	5 or 6	
Freed-Eisemann	NR77, 800, 850	6	135 or 180	5 or 6	Connect a 10,000-ohm fixed resistor across B- and B+ AMP and also a 2 mfd. by-pass condenser.
Freed-Eisemann	10, 30, 40, 48, 50, NR7, NR8, NR9, NR66	6	135	5 or 6	
Freed-Eisemann	FE15, FE18, NR5, NR6, NR12 and NR20	6	135	1 or 2	
Freshman Masterpiece	A, B, C	6	135	1 or 2	If "motor-boating" occurs, see note on "motor-boating" on Page 50.
Freshman Masterpiece	E	6	135 or 180	5 or 6	
Fulton	6	6	135	1 or 2	
Garod	All Models	6	135	5 or 6	Connect as shown in Diagram 5 or 6, putting the set lead marked 68 V on the B+ AMP terminal of the Socket Power. The B+ DET terminal of the Socket Power is not used.
Gilfillan.	10	6	135 or 180	5 or 6	
Gilfillan.	GN1, GN2, GN4 and GN5	6	135	1 or 2	
Globe	1927-28	6	135 or 180	5 or 6	Connect as shown in Diagram 5 or 6, putting the set lead marked 68 V on the B+ AMP terminal of the Socket Power. The B+ DET terminal of the Socket Power is not used.
Grebe	Syncrophase 7-tube	6	135 or 180	5 or 6	
Grebe	1926-27	6	135 or 180	5 or 6	
Grebe	1925-26	6	135	1 or 2	Connect as shown in Diagram 5 or 6, putting the set lead marked 68 V on the B+ AMP terminal of the Socket Power. The B+ DET terminal of the Socket Power is not used.
Grimes	Viking and Baby Grand Duplex with Power Tube	6	135 or 180	5 or 6	

# Radio Receiver Data and Connection Diagrams

(Continued)

RADIO RECEIVER DATA		PHILCO SOCKET POWER DATA			SPECIAL NOTES	
Make	Model	A Volts	B Volts	Connection Diagram		
Grimes . . . . .	Baby Grand Duplex without Power Tube . . . . .	6	135	1 or 2	Connect both the +90 V and +135 V set terminals to the B+ AMP terminal of Socket Power.	
Grimes . . . . .	Inverse Duplex . . . . .	6	135	1 or 2	Connect both the +90 V and +135 V set terminals to the B+ AMP terminal of Socket Power.	
Hartman . . . . .	All Models . . . . .	6	135 or 180	5 or 6	Connect as shown in Diagram 5 or 6, connecting both the +B Rad. and +B Aud. set leads to the B+ AMP terminal of the Socket Power.	
Howard . . . . .	6-tube 1927-28 . . . . .	6	135 or 180	5 or 6	Use special fixed resistor in radio set according to manufacturer's instructions.	
Howard . . . . .	8-tube . . . . .	6	180	5 or 6		
Howard . . . . .	6 and 7-tube 1926-27 . . . . .	6	135 or 180	5 or 6	Use special fixed resistor in radio set according to manufacturer's instructions.	
Howard . . . . .	5-tube 1926-27 . . . . .	6	135 or 180	5 or 6	It is not necessary to use the special fixed resistor supplied with the radio set. (See Howard instructions.)	
Howard . . . . .	5-tube 1925-26 . . . . .	6	135	1 or 2	These models do not have a detector terminal. Connect as shown in Diagram 1 or 2, but use only the B- and B+ AMP terminals of Socket Power. Use special fixed resistor in radio set according to manufacturer's instructions.	
Howard . . . . .	6 and 7-tube 1925-26 . . . . .	6	135	1 or 2		
Hyatt . . . . .	Model A . . . . .	6	135 or 180	5 or 6		
Jones . . . . .	All Models . . . . .	6	135	1 or 2		
Kellogg . . . . .	507, 508 . . . . .	6	135 or 180	5 or 6		
Kelso . . . . .	All Models . . . . .	6	135 or 180	5 or 6		
Kennedy . . . . .	15, 16, 20 . . . . .	6	135	1 or 2		
Kennedy . . . . .	30 . . . . .	6	135 or 180	5 or 6		
Kentucky Cardinal . . . . .	20, 26 and 27 . . . . .	6	135 or 180	5 or 6		
Keystone . . . . .	All Models . . . . .	6	135 or 180	5 or 6		
King . . . . .	Baronet, Chevalier, Crusader, Viking and Commander . . . . .	6	135 or 180	5 or 6		
King . . . . .	71, 71H and 72H . . . . .	6	135 or 180	Special		
						B+ DET terminal is not used. Connect Maroon wire to B+ AMP terminal and Red wire to B+ PWR terminal.



## Radio Receiver Data and Connection Diagrams

(Continued)

RADIO RECEIVER DATA		PHILCO SOCKET POWER DATA			SPECIAL NOTES	
Make	Model	A Volts	B Volts	Connection Diagram		
King . . . . .	61 . . . . .	6	135 or 180	5 or 6	This model does not have a detector terminal. Connect as shown in Diagram 1 or 2, but use only the B- and B+ AMP terminals of Socket Power.	
King . . . . .	62 and 63 . . . . .	6	135 or 180	5 or 6		
King . . . . .	25 . . . . .	6	135	1 or 2		
King . . . . .	30 . . . . .	6	135	1 or 2		
Knight . . . . .	6-65 . . . . .	6	135 or 180	5 or 6	Connect as shown in Diagram 5 or 6, connecting both the 67½-volt and 90-volt lead of the set to the B+ AMP terminal of the Socket Power.	
Kodel . . . . .	C13 and C14 . . . . .	6	135	1 or 2		
Kolster . . . . .	6D, 6G and 6H . . . . .	6	135 or 180	5 or 6		
Kolster . . . . .	7A, 7B, 8A, 8B and 8C . . . . .	6	135 or 180	5 or 6	Connect as shown in Diagram 5 or 6, connecting both the R-90 and A-90 set leads to the B+ AMP terminal of the Socket Power.	
Kolster . . . . .	6A, 6B, 6C, 8B and 8C, 1925-26 . . . . .	6	135	3 or 4	This model does not have a detector terminal. Connect as shown in Diagram 1 or 2, but use only the B- and B+ AMP terminals of Socket Power.	
MacMillan . . . . .	5-tube . . . . .	6	135	1 or 2		
MacMillan . . . . .	6-tube . . . . .	6	135 or 180	5 or 6		
Magnavox . . . . .	1926-27 . . . . .	6	135 or 180	5 or 6		
Magnavox . . . . .	Earlier Models . . . . .	6	135	1 or 2		
Magnet . . . . .	1926-27 . . . . .	6	135 or 180	5 or 6		
Magnet . . . . .	All Other Models . . . . .	6	135	1 or 2		
Marconi . . . . .	VII . . . . .	5	135	5 or 6		
Marwol . . . . .	All Models . . . . .	6	135	1 or 2		
Mohawk . . . . .	All Models . . . . .	6	135 or 180	5 or 6		
Murad . . . . .	1927-28 . . . . .	6	135 or 180	5 or 6		
Murad . . . . .	1925-26 . . . . .	6	135	3 or 4		
Murdock . . . . .	125, 155, 175, 140 . . . . .	6	135 or 180	5 or 6		
Murdock . . . . .	E . . . . .	6	135	1 or 2		
Murdock . . . . .	A, B, C, D . . . . .	6	135	1 or 2		
Music Master . . . . .	1925-26 . . . . .	6	135	1 or 2		
Music Master Ware . . . . .	7-tube . . . . .	6	135 or 180	5 or 6		
Neutrowound . . . . .	1926-27-28 . . . . .	6	135 or 180	5 or 6		Connect as shown in Diagram 5 or 6, but change the fixed resistor of Socket Power to a 10,000-ohm fixed resistor.
Neutrowound . . . . .	1925-26 . . . . .	6	135	3 or 4		
Newsonic . . . . .	All Models . . . . .	6	135	1 or 2		
Nostrand . . . . .	All Models . . . . .	6	135	5 or 6		
Operadio . . . . .	1926-27 . . . . .	4	135	5 or 6		
Operadio . . . . .	1925-26 . . . . .	4	135	1 or 2		
Pfanstiehl . . . . .	30 and 32 . . . . .	6	135 or 180	5 or 6		
Pfanstiehl . . . . .	18 and 20 . . . . .	6	135 or 180	5 or 6		
Pfanstiehl . . . . .	7, 8, 8C, 10, 10C and 10S . . . . .	6	135	1 or 2		

# Radio Receiver Data and Connection Diagrams

(Continued)

RADIO RECEIVER DATA		PHILCO SOCKET POWER DATA			SPECIAL NOTES	
Make	Model	A Volts	B Volts	Connection Diagram		
Pooley-Atwater Kent	All Models	.....	.....	.....	See instructions above for the model Atwater Kent receiver used.	
Premier	1927-28	6	135 or 180	5 or 6		
Priess	8 and 9-tube	6	135 or 180	5 or 6		
Radiola	16	6	135 or 180	5 or 6		
Radiola	28	4	135	7		
Radiola	25	4	135	8		
Radiola	20	4	135	9		
Radiola	26	4	135	10		
Radiola	Semi-Portable	4	135	11		
Radiola	Super VIII	4	135	12		
Radiola	III A	4	135	13		
Radiotone	All Models	6	135	1 or 2		
Ramway	All Models	6	135	1 or 2		
Receptron	E and F	6	135 or 180	5 or 6		
Red Lion-Atwater Kent	All Models	.....	.....	.....	See instructions above for the model Atwater Kent receiver used.	
Richardson	4 and 5-tube	6	135	1 or 2		
Rochester	6D, 8D, 9D	6	135 or 180	5 or 6		
Shamrock	A, B and C	6	135 or 180	5 or 6		
Shamrock	All Models	6	135 or 180	5 or 6		
Silvertone	All Models	6	135	1 or 2		
Simplex	1926-27	6	135	3 or 4		
Slagle	A, B, C and D	6	135 or 180	5 or 6		
Sleeper	Scout and Serenader	6	135 or 180	5 or 6		
Sleeper	All Other Models	6	135	1 or 6		
Slocumb	Resonator— All Models	6	135 or 180	5 or 6		
Sonora	E850, E860, E865 and E870	6	135 or 180	5 or 6		B+ AMP terminal is not used. Put a jumper across A- and ground posts in the radio set.
Sonora	C	6	135	1 or 2		
Sonora	D	6	180	5 or 6	Connect B- and B+ AMP leads as shown in Diagram 1 or 2. Connect detector terminal of set to A+ terminal of A Socket Power or A battery. (See Sonora instructions.)	
Sparton	1927-28	6	135 or 180	5 or 6		
Splitdorf	RV695, RV580, 171	6	135 or 180	.....		
Splitdorf	RV560	6	135	1 or 2		
Standardyne	B-6 and S27	6	135 or 180	5 or 6		
Standardyne	All Models	6	135	1 or 2		
Stewart Warner	520, 525, 705, 710	6	135 or 180	5 or 6		
Stewart Warner	300, 305 with Front Panel Jacks; 310, 330, 335 and 340	6	135	1 or 2		

## Radio Receiver Data and Connection Diagrams

(Continued)

RADIO RECEIVER DATA		PHILCO SOCKET POWER DATA			SPECIAL NOTES		
Make	Model	A Volts	B Volts	Connection Diagram			
Stewart Warner	305, 315, 320	6	135	3 or 4	B+ DET terminal is not used.		
Stewart Warner	345, 350, 355, 360, 385, 390	6	135 or 180	5 or 6			
Stromberg-Carlson	601, 602	6	135 or 180	5 or 6			
Stromberg-Carlson	501-502	6	135 or 180	5 or 6			
Stromberg-Carlson	Earlier Models	6	135	1 or 2			
Sun De Luxe	All Models	6	135	1 or 2			
Superola	Six	6	135	1 or 2			
Supertone	All Models	6	135 or 180	5 or 6			
Supertone	All Models	6	135	1 or 2		Connect as shown in Diagram 1 or 2, but change the fixed resistor of Socket Power to a 10,000-ohm fixed resistor.	
Synchromonic	All Models	6	135 or 180	5 or 6			
Thermiodyne	1926-27	6	135 or 180	5 or 6			
Thermiodyne	1925-26	6	135	1 or 2			
Thorola	All Models	6	135 or 180	5 or 6			
Tone-A-Dyne	All Models	6	135	1 or 2			
Trinity	6-tube	6	135	1 or 2			
USL	DC6 and DC7	6	135 or 180	5 or 6			
Valleytone	52 and 71	6	135 or 180	5 or 6			
Victrola-Radiola	9-15	4	135	.....	See Philco Victor Dealer Manual.		
Victrola-Radiola	7-13	4	135	.....	See Philco Victor Dealer Manual.		
Victrola-Radiola	Alhambra I	4	135	.....	See Philco Victor Dealer Manual.		
Victrola-Radiola	Alhambra II	4	135	.....	See Philco Victor Dealer Manual.		
Victrola-Radiola	Florenza	4	135	.....	See Philco Victor Dealer Manual.		
Victrola-Radiola	Borgia I	4	135	.....	See Philco Victor Dealer Manual.		
Victrola-Radiola	R-20	4	135	.....	See Philco Victor Dealer Manual.		
Walbert	1927-28	6	135 or 180	5 or 6	Connect as shown in Diagram 5 or 6, connecting the set lead marked B AMP to the B+ PWR terminal of the Socket Power. The B+ AMP terminal of the Socket Power is not used.		
Ware	4-tube	4	135	3 or 4			
Workrite	17, 26, 37	6	135 or 180	5 or 6			
Workrite	1926-27	6	135 or 180	5 or 6			
Workrite	1925-26	6	135	1 or 2			
Wright-DeCoster	1927-28	6	135 or 180	5 or 6			
Zenith	10-tube	6	180	5 or 6			
Zenith	6-tube	6	135	1 or 2		All connections are made in the left-hand battery compartment, looking at the set from the front. Connect as shown in Diagram 1 or 2, using the set leads marked B-, B+ 22½ and B+ 90. Tape the end of the B+ 45 lead as it is not used. Tape all connections, and all wires in the right-hand compartment.	
Zenith	12	6	135 or 180	5 or 6			
Zenith	3R and 4R	6	135	1 or 2			Connect as shown in Diagram 1 or 2. Also connect brown lead marked either +1½ V or +2 V to A- terminal of Socket Power.

## Kit Sets

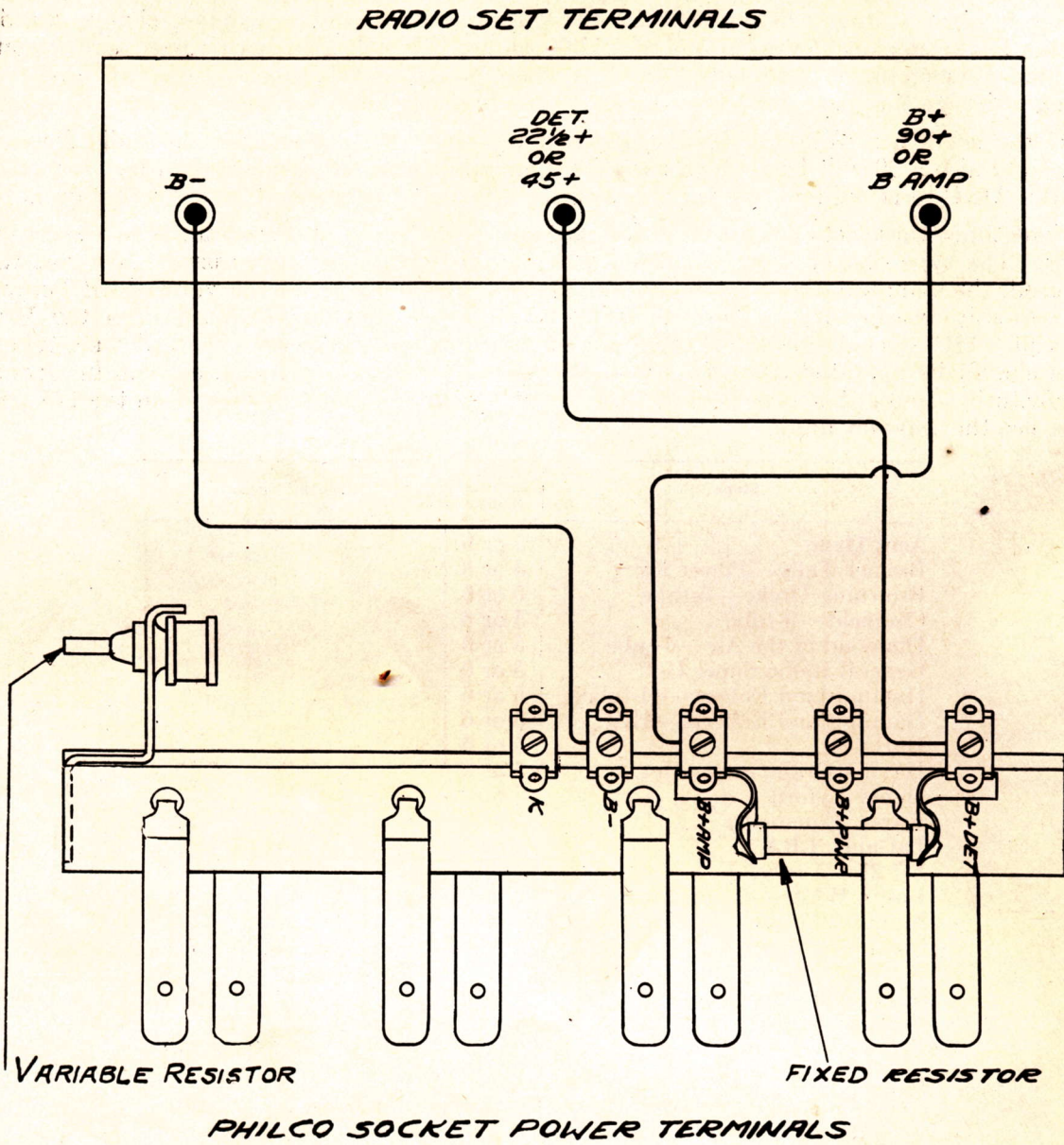
Many "kit sets," especially the Super-Heterodynes, have more than one tube operating at the detector voltage. When sets use two tubes at the detector voltage, change the fixed resistor in the Socket Power to one of 35,000 ohms; this will give both tubes approximately 30 volts. When a higher voltage is desired, or when more than two tubes are used at the detector voltage, change the fixed resistor to one of 10,000 ohms or lower.

If the set has a 67½-volt lead which supplies the "B" current for the radio frequency tubes and also a 90-volt lead which supplies the audio, these two leads should be connected to the B+ AMP terminal and the variable resistor adjusted to the point where reception is best.

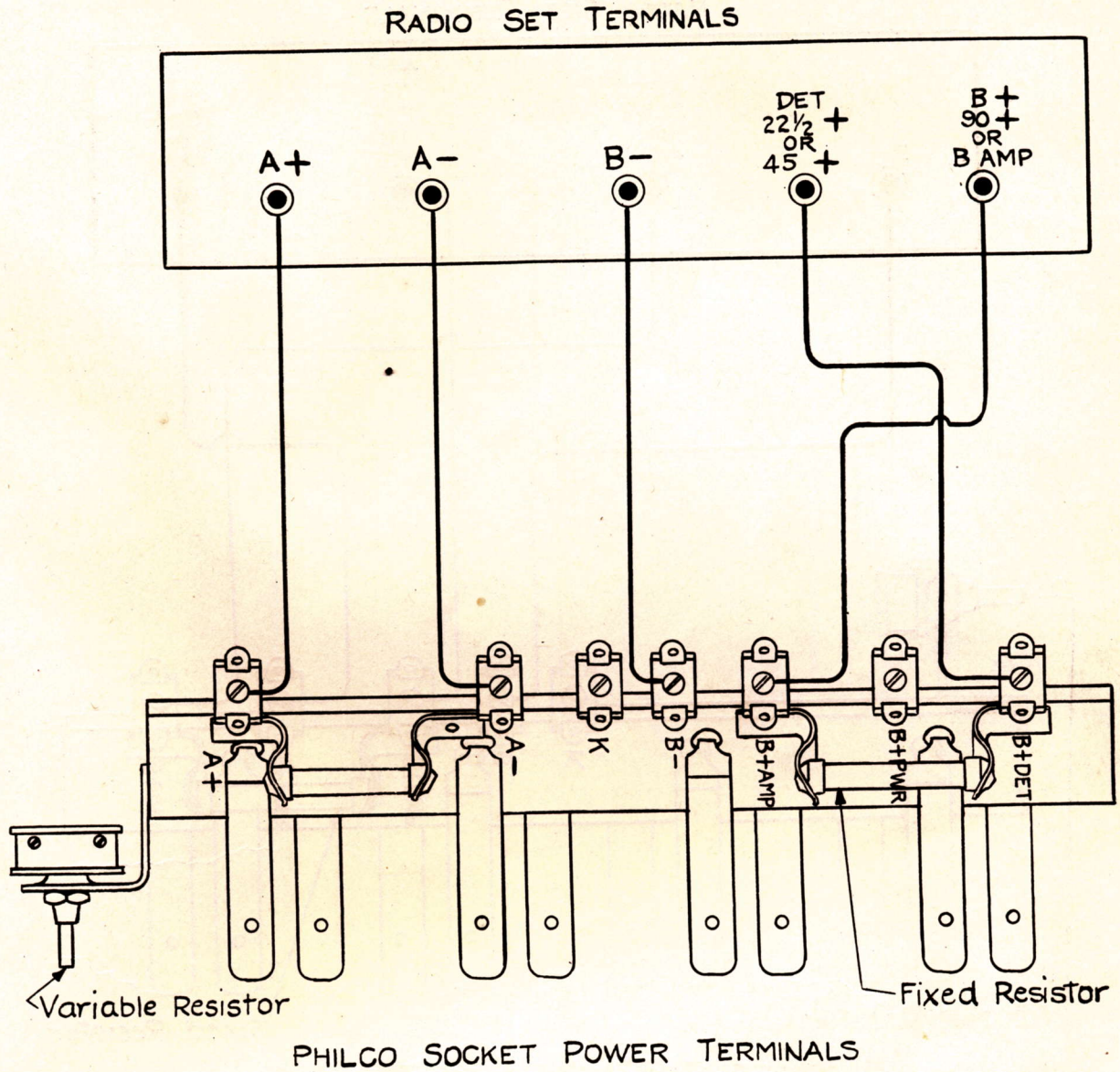
Sometimes these sets are assembled to use three-volt tubes and sometimes to use five-volt tubes. The type Socket Power required depends on the kind of tubes used. If 3-volt tubes are used, the standard 4-volt "AB" Socket Powers, supplying up to 135 volts of "B" current, are perfectly satisfactory. The sets using 5-volt tubes may be operated from the 135 to 150-volt "AB" Socket Powers, if there are six tubes or less in the set. Sets with six tubes or more should be operated from the 180-volt Socket Powers. A six-tube set can be operated satisfactorily from either type Socket Power, but for the maximum results from the 171 power tube, use the 180-volt units.

Make	Con- nection Diagram	Special Notes
Aero Dyne . . . . .	5 or 6	
Bremer Tully—Power Six . . . . .	5 or 6	
Browning Drake—5-tube . . . . .	5 or 6	
Camfield—9-tube . . . . .	5 or 6	
Diamond of the Air—5-tube. . . . .	5 or 6	
General Radio Super Het. . . . .	5 or 6	
Hammurland Roberts—4-tube . . . . .	5 or 6	
Hammurland Roberts—HiQ. . . . .	5 or 6	
Harkness . . . . .	5 or 6	
Haynes Griffin Super-Het. . . . .	5 or 6	
Henry Lyford . . . . .	5 or 6	
Karas, Equamatic . . . . .	5 or 6	
LaCault, LRA . . . . .	5 or 6	
LC 27—5-tube . . . . .	5 or 6	
Loftin White—5-tube . . . . .	5 or 6	
Madison Moore—8-tube . . . . .	5 or 6	
Melo Heald. . . . .	5 or 6	Change fixed resistor to one of 2500 ohms.
Microdyne—Apex . . . . .	5 or 6	
Premier . . . . .	5 or 6	
Remler-Best Super . . . . .	5 or 6	Change fixed resistor to one of 10,000 ohms.
Remler Infradyne—10-tube . . . . .	5 or 6	Connect a 6-ohm rheostat in series with the A+ lead to the Infradyne amplifier.
Samson, DeLuxe . . . . .	5 or 6	
Silver Marshall—Power Six . . . . .	5 or 6	
St. James . . . . .	5 or 6	
Ultradyn—8-tube . . . . .	5 or 6	
Ultradyn—9-tube LR 4 . . . . .	5 or 6	
Universal . . . . .	5 or 6	
Varion . . . . .	5 or 6	
Victoreen . . . . .	5 or 6	
World's Record Super—9-tube . . . . .	5 or 6	

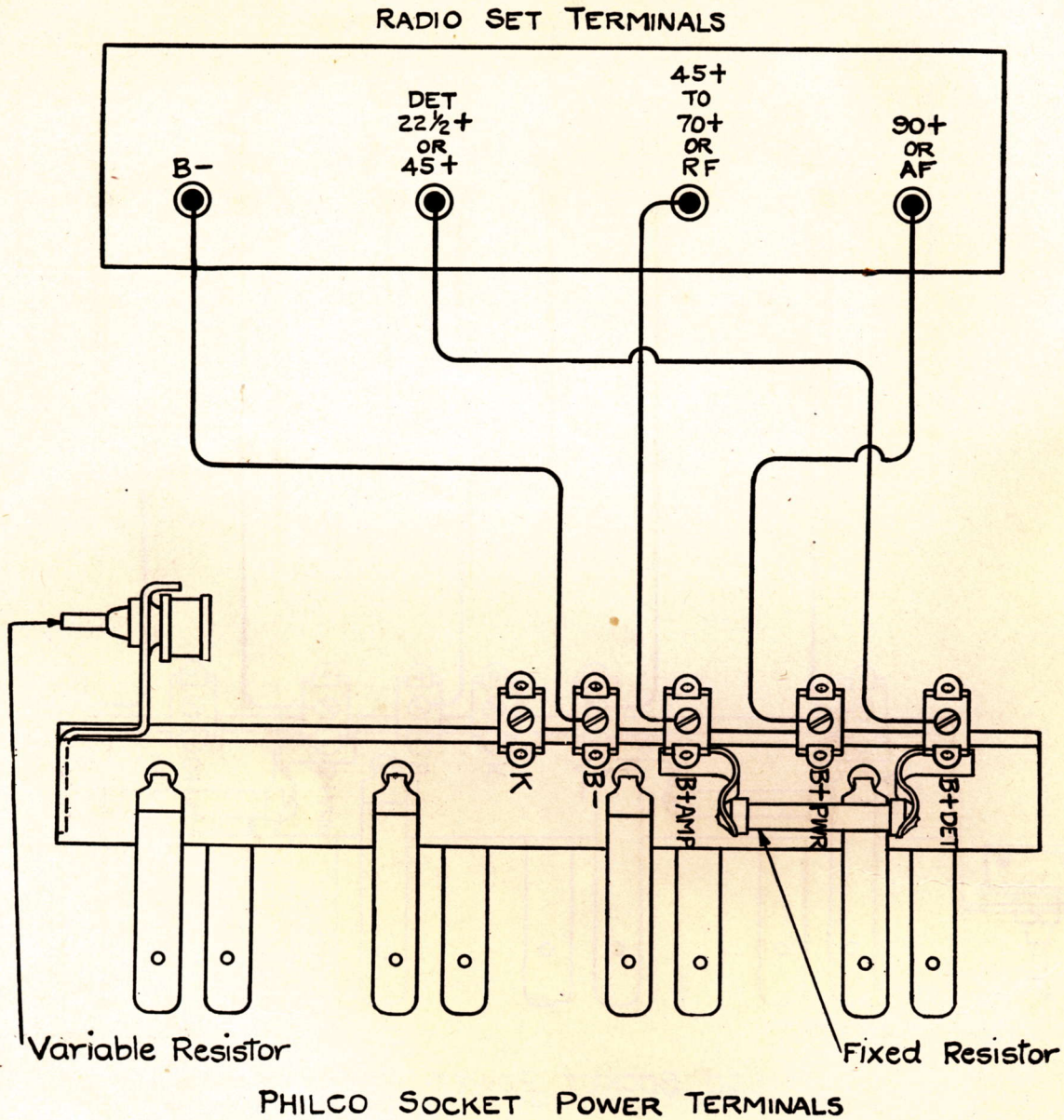
### Connection Diagram No. 1 for "B" Socket Powers



Connection Diagram No. 2 for "AB" Socket Powers

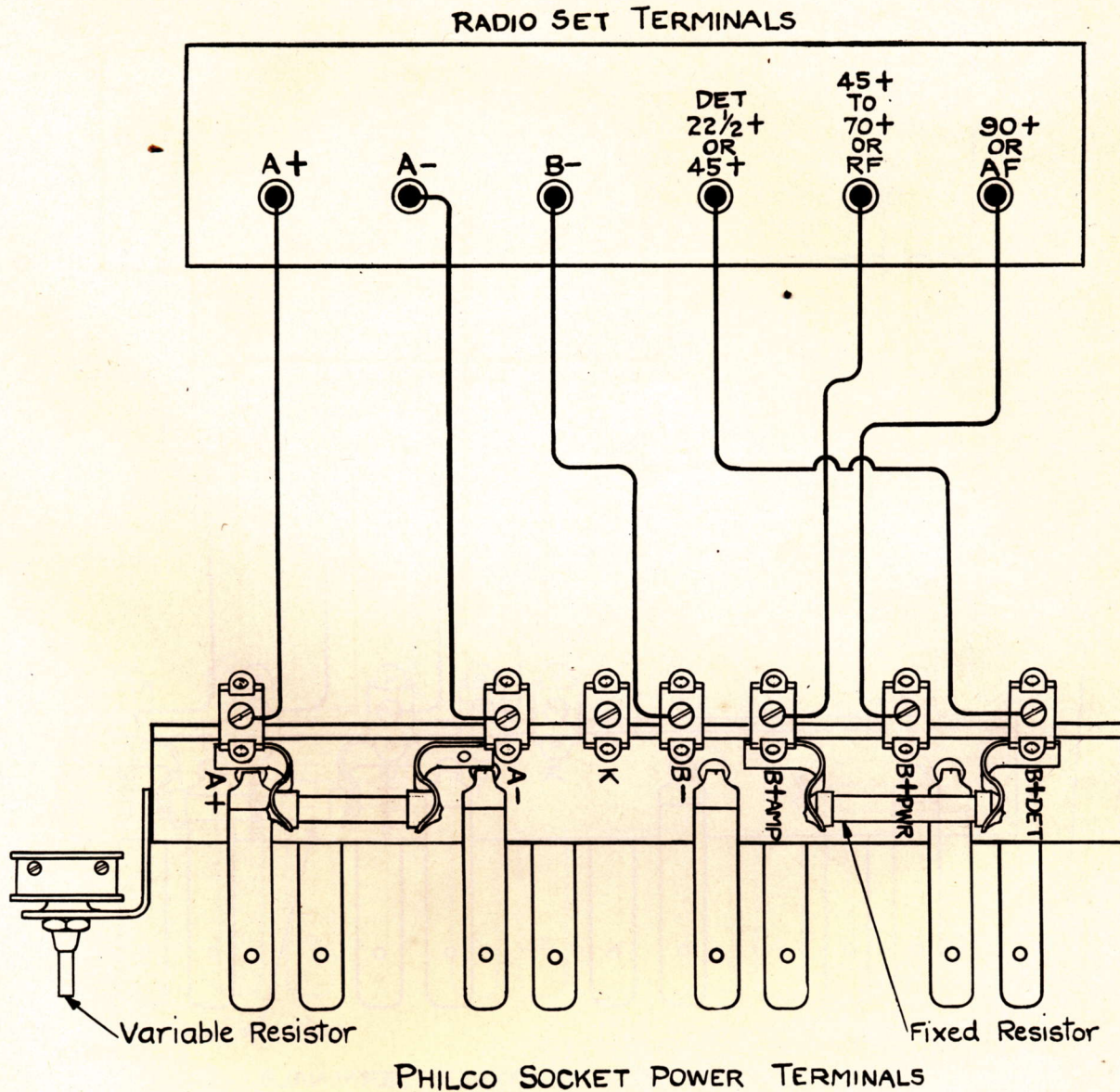


### Connection Diagram No. 3 for "B" Socket Powers



Use a 15-watt or 25-watt Mazda lamp in the Socket Power, whichever gives the best results, instead of the standard 50-watt lamp.

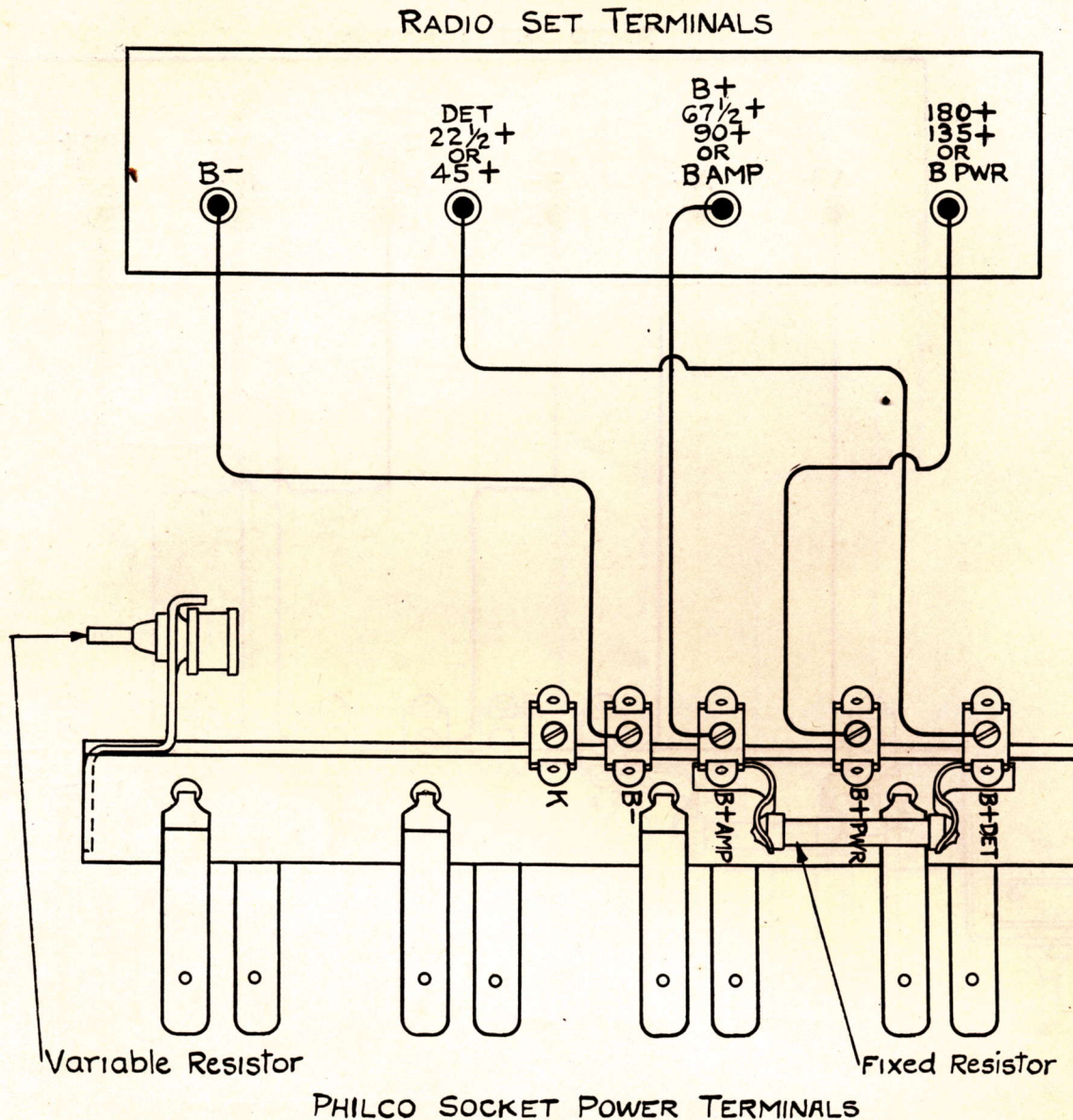
Connection Diagram No. 4 for "AB" Socket Powers



Use a 15-watt or 25-watt Mazda lamp in the Socket Power, whichever gives the best results, instead of the standard 50-watt lamp.



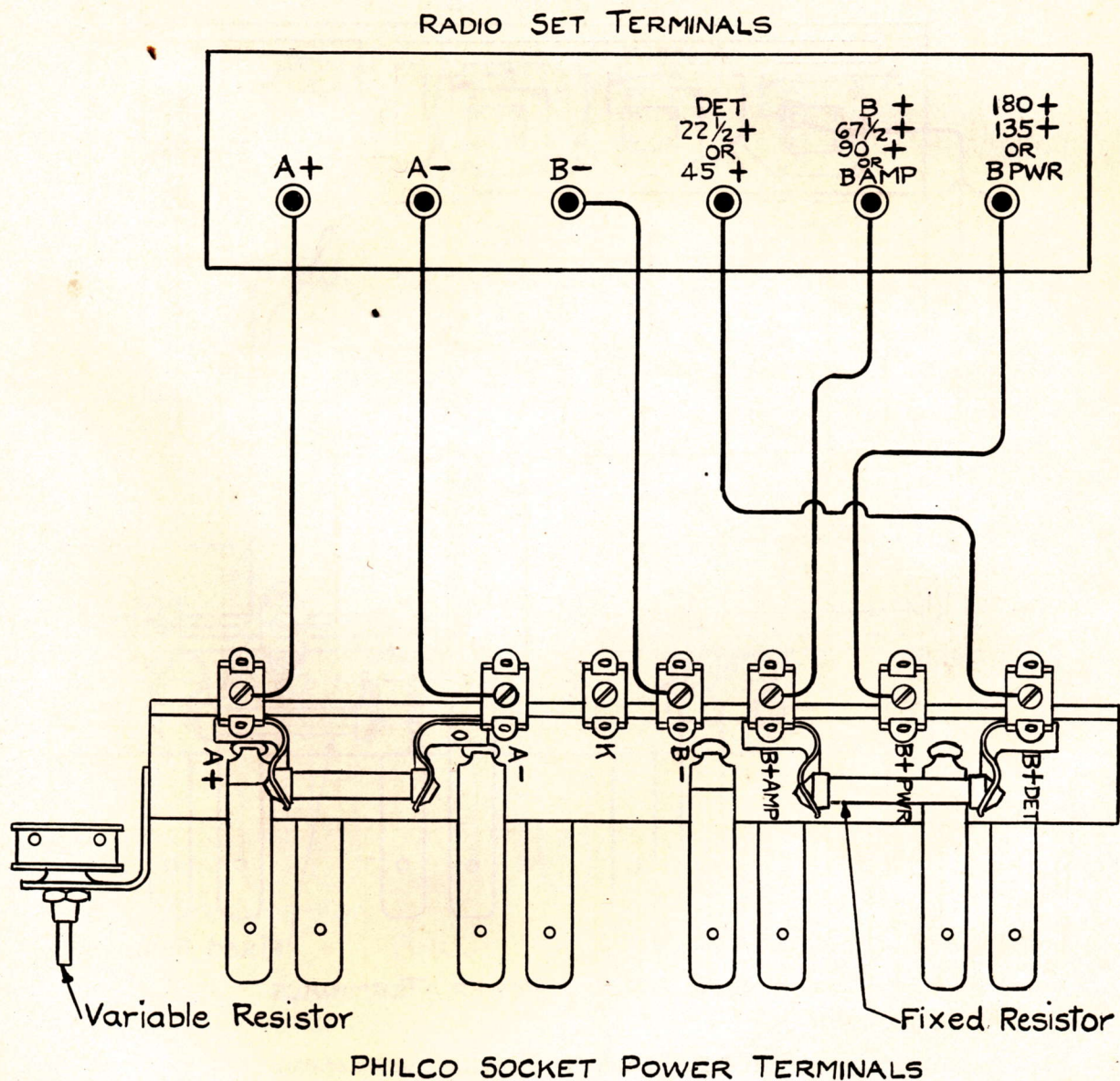
### Connection Diagram No. 5 for "B" Socket Powers



Use a 50-watt inside frosted Mazda lamp in Socker Powers provided with a lamp socket for 5-volt tube sets.

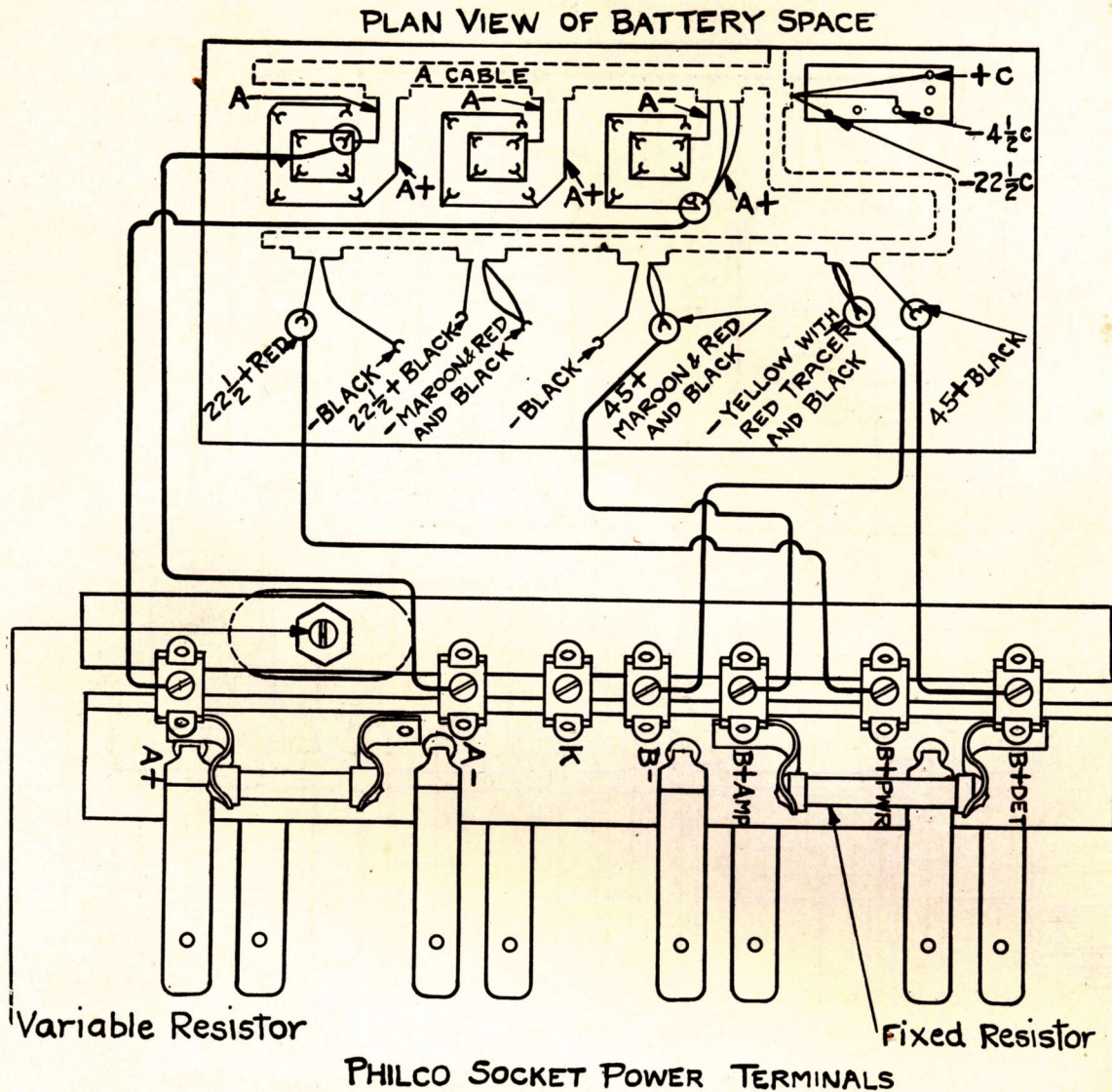
Use a 25-watt Mazda lamp in operating any radio set equipped with 3-volt tubes.

Connection Diagram No. 6 for "AB" Socket Powers



Use a 50-watt inside frosted Mazda lamp in Socket Powers provided with a lamp socket.

### Connection Diagram No. 7 for "AB" Socket Powers



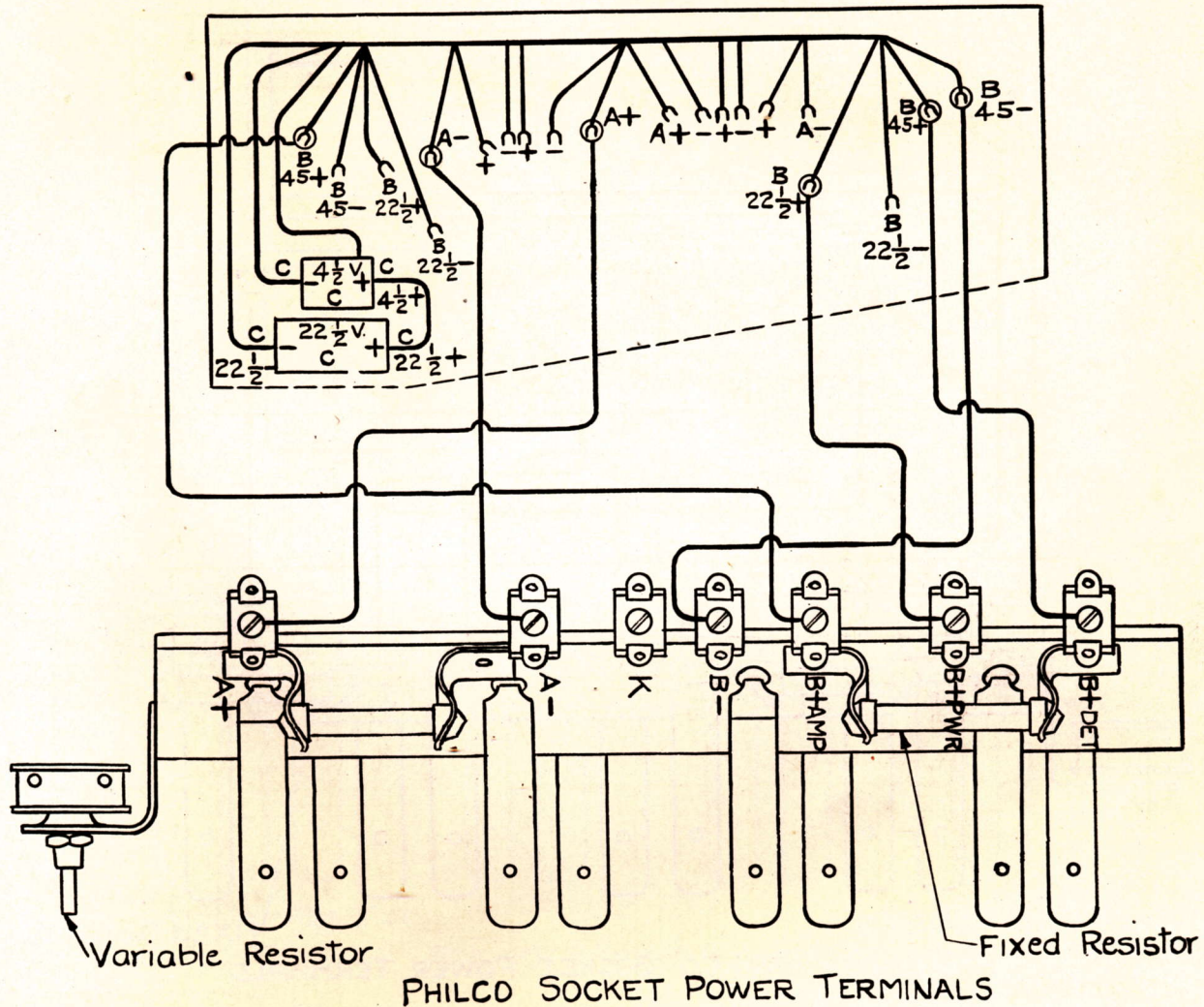
Tape all connections and all bare ends of unused wires. The four lugs on each A+ lead can be bunched together and taped at one time. Also the four lugs on each A- lead can be taped together. Tape all other wires separately.

Connect the outer ends of cable wires to binding posts of Socket Power AB in accordance with above diagram.

The "C" battery must be connected in the set as shown above.

Connection Diagram No. 8 for "AB" Socket Powers

PLAN VIEW OF BATTERY SPACE



1. Drill a 1/2-inch hole through bottom of radio set at a convenient point.

2. Run a cable having six wires (differently colored for identification) through this hole, and make soldered or bolted connections to terminals of the set wiring as shown above.

3. Tape up these connections as well as all unused terminals with insulating tape.

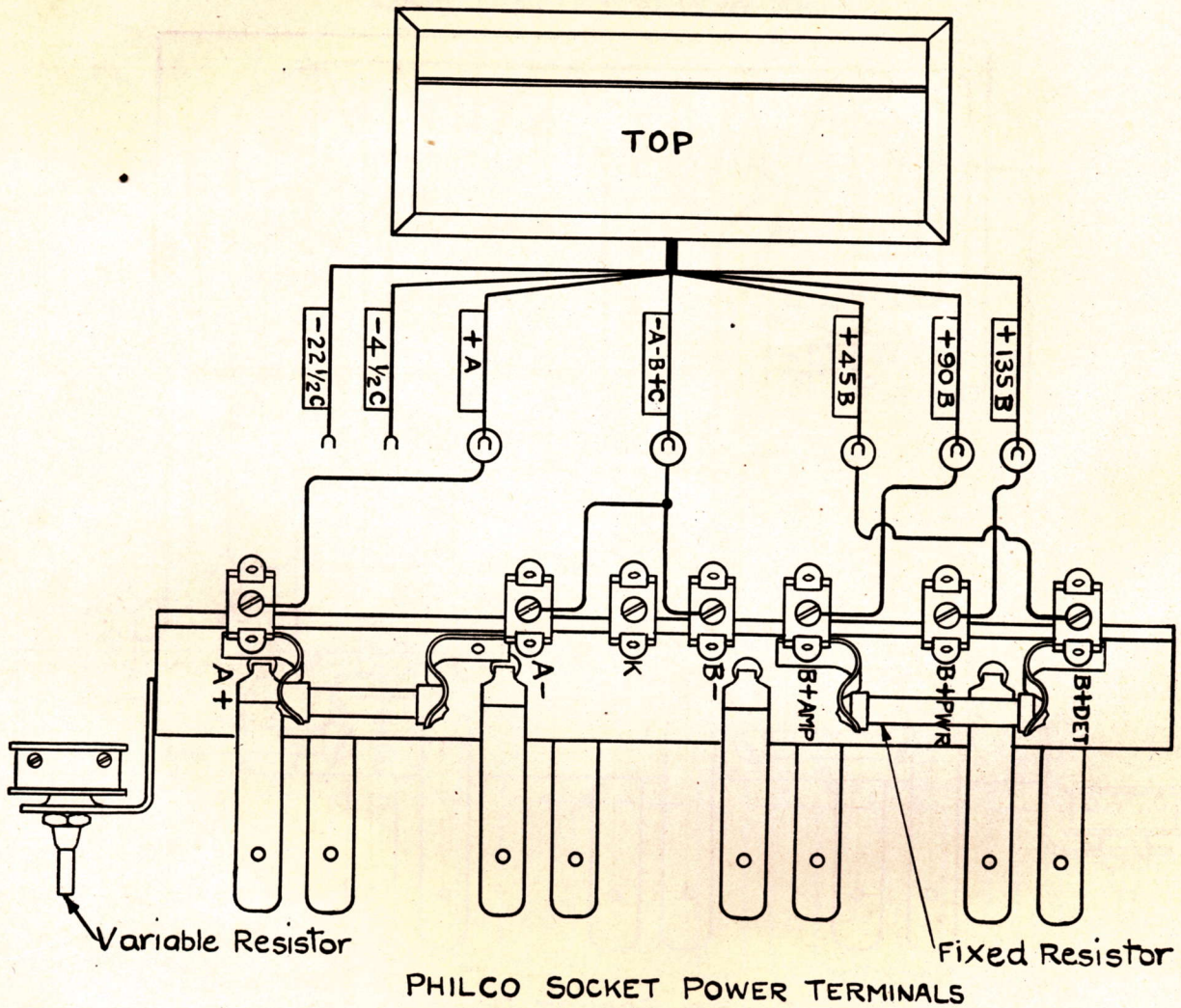
4. Connect outer ends of the cable

wires to binding posts of Socket Power "AB" in accordance with above diagram.

5. Dry "C" batteries must be connected up in set in accordance with R. C. A. instructions.

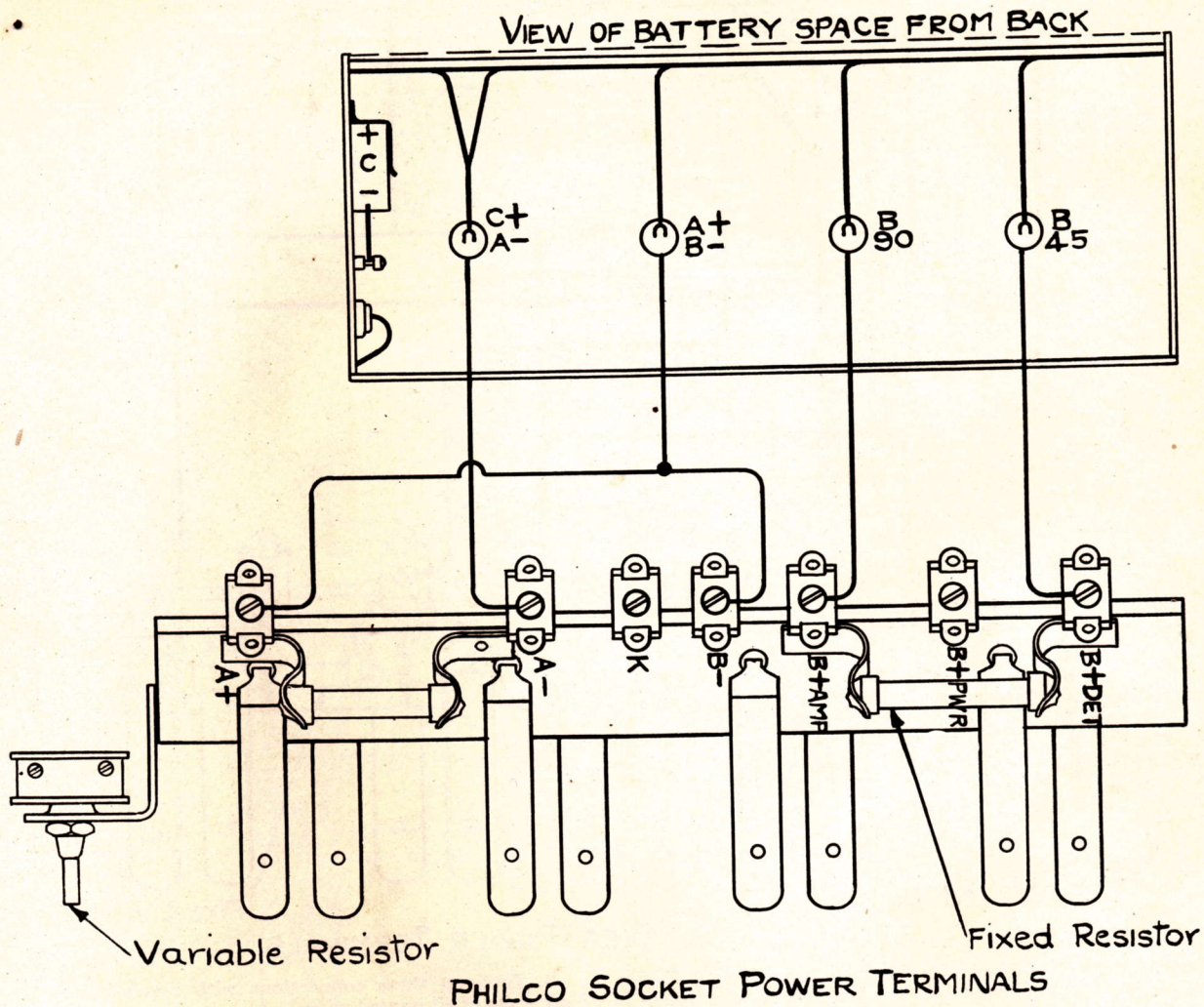
6. If desired, a five-wire instead of a six-wire cable may be used by leaving off the B- connection called for above and connecting together the B- and A+ posts of Socket Power "AB" by means of a short wire.

### Connection Diagram No. 9 for "AB" Socket Powers



1. This receiver comes equipped with a power cable tagged as shown.
2. Connect as indicated in sketch to Socket Power "AB" and to the 22½-volt "C" battery specified in R. C. A. instructions.

Connection Diagram No. 10 for "AB" Socket Powers



1. Saw a small triangle off of the upper right-hand corner of the battery compartment door of the receiver.

2. Run a five-wire cable through this opening and make soldered or bolted connections to terminals of the set wiring as shown herewith.

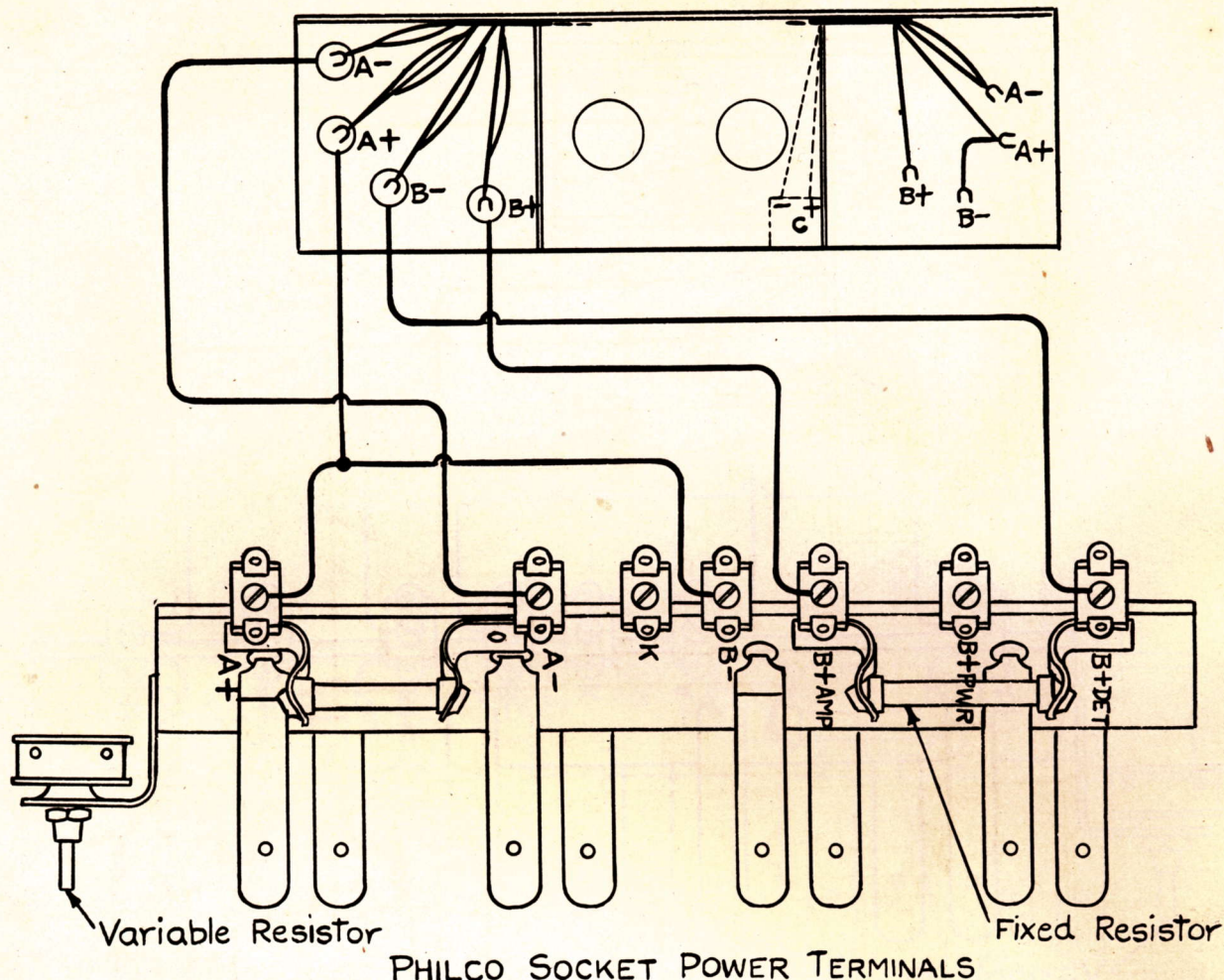
3. Tape up these connections with insulating tape.

4. Connect the outer end of the cable wires to binding post of Socket Power "AB" in accordance with the above diagram.

5. The dry "C" battery must be connected in set in accordance with R. C. A. instructions.

## Connection Diagram No. 11 for "AB" Socket Powers

VIEW OF BATTERY SPACE FROM FRONT



1. Run a five-wire cable through the external loop wire hole in the back of the set. Run it through the center compartment and over the top of the partition into the battery compartment in the left end of the set.

2. Make soldered or bolted connections to terminals of the set wiring as shown herewith.

3. Tape up these connections with insulating tape. Tape ends of all unused wires.

4. Connect the outer end of the cable wires to binding posts of Socket Power "AB" in accordance with the above diagram.

5. The dry "C" battery must be connected in set in accordance with R. C. A. instructions.

### Instructions for Connecting Power Tube Adapter

Make the regular Socket Power connections as shown in our wiring diagram for this model receiver. Then make the following additional connections:

1. Remove the control panel of the receiver and lay it face down.

2. Disconnect (either by cutting or by unsoldering) the black wire which is soldered to the bottom of the fifth terminal lug from the left end of the terminal strip at the back of the metal catacomb. The correct terminal lug can be determined by counting from the left end and also it has a red wire connected to the top. Do not disturb this red wire.

3. Connect an insulated extension wire to the wire removed from the lug and run it out of the hole in the

back of the radio cabinet. Connect the wire to Socket Power post marked 130 volts +. The extension wire should be soldered to the wire removed from the lug and the joint should be taped.

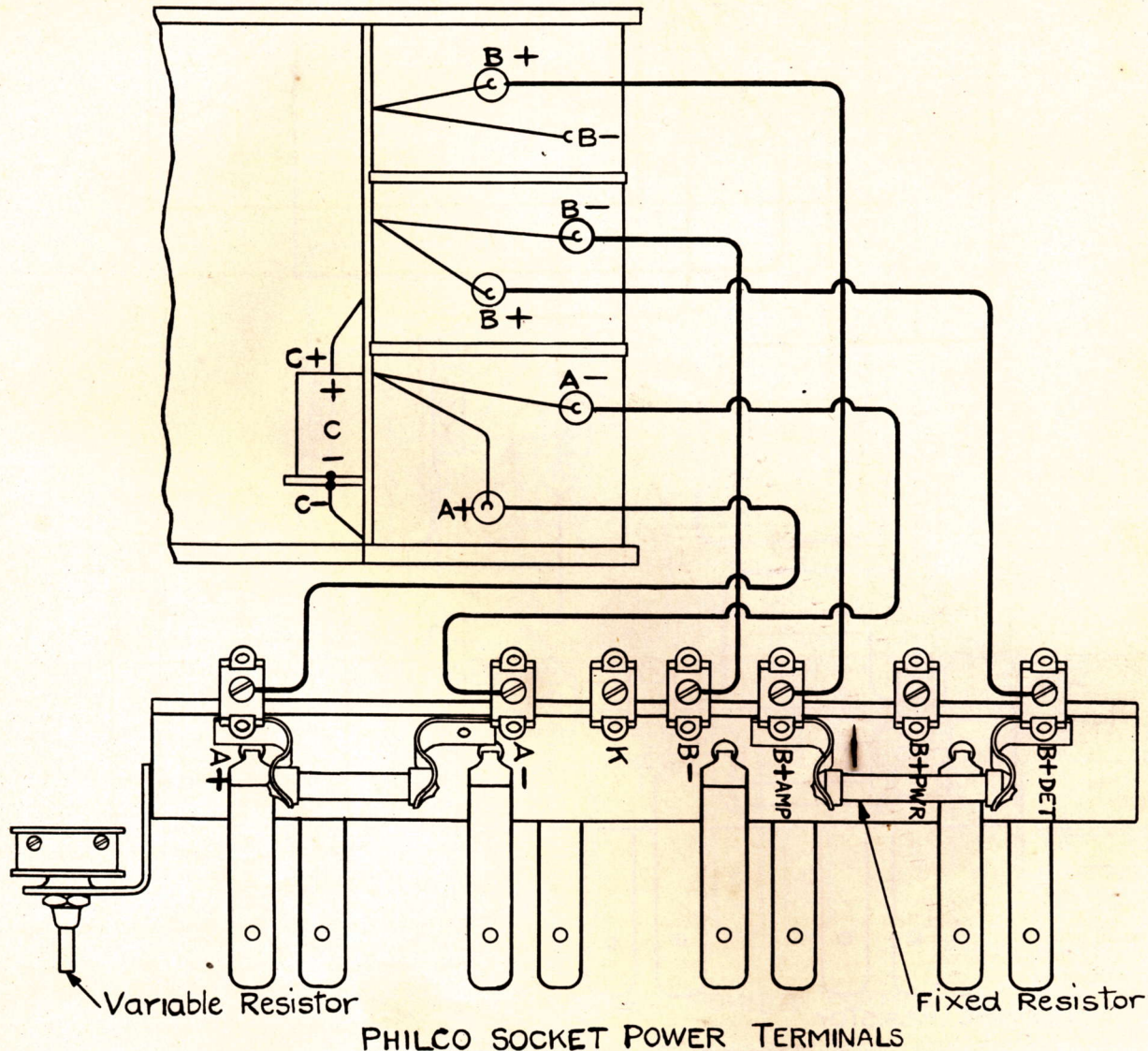
4. Connect a short wire directly across the adapter from the post marked 45+ to the post marked 45-.

5. Connect a 22½-volt "C" battery to the adapter posts marked 22½+ and 22½- as shown on the adapter instruction sheet.

6. When using Socket Power "AB" with the adapter, it is best not to use the "amplifier switch" of the Radiola. If the volume is too great it should be reduced by means of the "volume control" and "battery setting" knobs.

## Connection Diagram No. 12 for "AB" Socket Powers

VIEW OF BATTERY SPACE FROM BACK



PHILCO SOCKET POWER TERMINALS

1. Saw a small triangle off of the lower right-hand corner of the battery compartment door of the receiver.

2. Run a five-wire cable through this opening and make soldered or bolted connections to the terminals of the set as is shown herewith.

3. Tape up these connections with insulating tape. Tape ends of all unused wires.

4. Connect the outer end of the cable wires to binding posts of Socket Power "AB" in accordance with the above diagram.

5. The dry "C" battery must be connected in set in accordance with R. C. A. instructions.

### Instructions for Connecting Power Tube Adapter

Make the regular Socket Power connections as shown in our wiring diagram for this model receiver. Then make the following additional connections:

1. Disconnect the wire marked + from the binding post on the base of the loud speaker horn. In sets having two horns disconnect this wire from the lower horn. This wire is black with a brown tracer. Tape the end of this wire as it is not used hereafter.

2. Connect Socket Power Post marked 130 volts + to the loud speaker post from which the wire described above was removed.

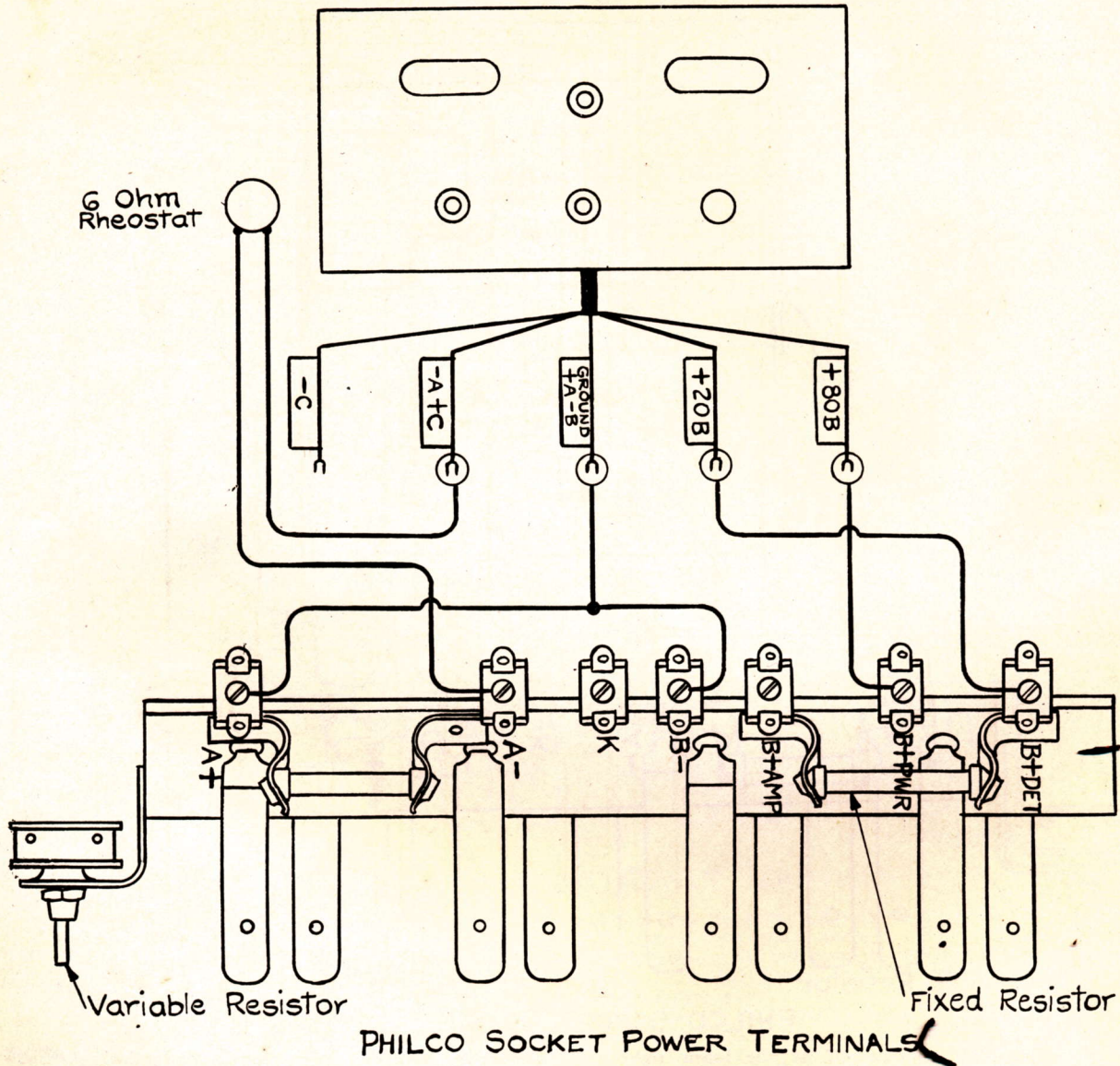
3. Connect a short wire across adapter from post marked 45+ to post marked 45-.

4. Connect a 22½-volt "C" battery to the adapter post marked 22½+ and 22½- as shown on the adapter instruction sheet.

5. When using Socket Power "AB" with the adapter, it is best not to use the "amplifier switch" of the Radiola. If the volume is too great it should be reduced by means of the "volume control" and "battery setting" knobs.



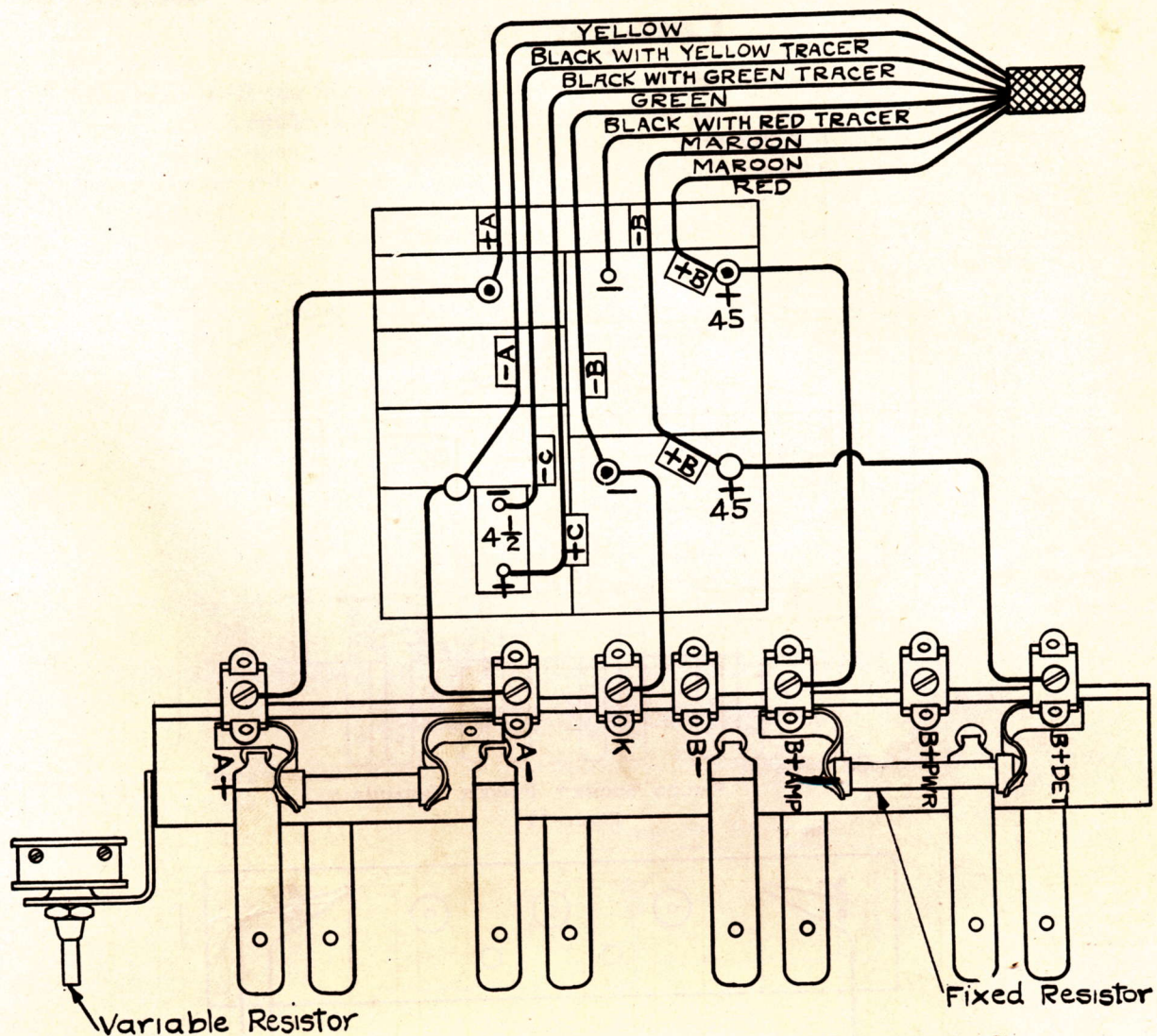
### Connection Diagram No. 13 for "AB" Socket Powers



When this set is equipped with 3-volt tubes, it is necessary to use a six-ohm rheostat connected in the battery circuit as shown above.

See "Radio Corporation of America Bulletin No. 6."

Connection Diagram No. 14 for "AB" Socket Powers



PHILCO SOCKET POWER TERMINALS

Make the regular Socket Power connections as shown in our wiring diagram for this model receiver. Then make the following additional connections:

1. Disconnect the wire marked + from the binding post on the base of the loud speaker horn. Tape the end of this wire as it is not used hereafter.

2. Connect Socket Power post marked 130 volts + to the loud speaker post from which the wire described above was removed.

3. Connect a short wire directly across the adapter from the post marked 45+ to the post marked 45-.

4. Connect a 22½-volt "C" battery to the adapter post marked 22½+ and 22½- as shown on the adapter instruction sheet.

5. When using Socket Power "AB" with the adapter, it is best not to use the "amplifier switch" of the Radiola. If the volume is too great it should be reduced by means of the "volume control" and "battery setting" knobs.

## Connections for Sets Having Two "B" Battery Compartments

Radio sets having two "B" battery compartments in most cases may be connected as shown in Figure 12. However, if Figure 12 does not give the correct results, use Figure 13.

There is a B- and a B+ lead in each

compartment. The one B- is connected to the B- terminal of the Socket Power, while the other is a continuation of the B+ lead from the other compartment that connects to the B+ Det. terminal and this B- lead should not be used.

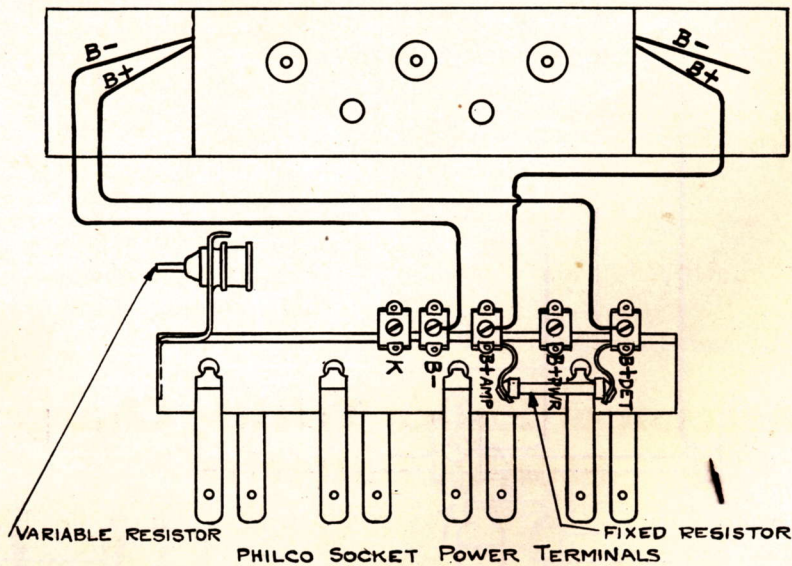


Figure 12

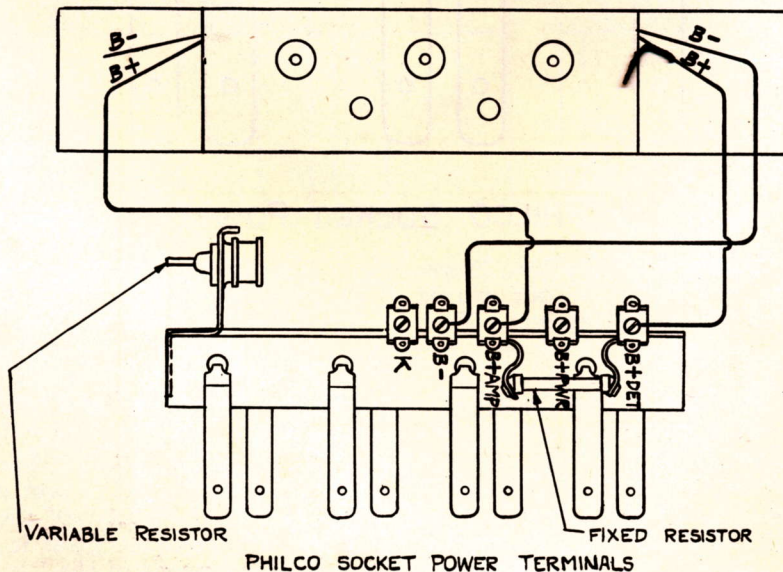


Figure 13

## "C" Battery Voltages

The Socket Power does not eliminate the "C" battery. "C" batteries must be connected according to the radio set manufacturer's instructions. "C" batteries which are not connected correctly or which are not of the correct voltage may cause a great decrease in volume of the set and will also give reception of very poor quality.

The following table gives suitable "C" battery voltages for power tubes when using a Socket Power.

Socket Power Type	UX120 CX220	UX112 CX112	UX171 CX371
B-603, B-253, AB-663, AB-623, AB-656, AB-652, AB-356, AB-6561, AB-6521, AB-3561		7½ to 9	25½ to 31½ 40½ to 45
B-86, B-82, AB-686, AB-386, AB-382	22½		
B-603, B-253, AB-463, AB-423, AB-4635, AB-4235	19½ to 21	6 to 7½	19½ to 22½
DB	19½ to 21		
DAB-4			

It is very important that the above table of "C" battery requirements be strictly adhered to. Quite a number of complaints of poor and distorted reception can be traced to either improper "C" battery connections or wrong "C" voltages.

## Connection of Philco Trickle Charger to Storage Batteries

The Philco Trickle Charger should be connected to the radio set and the "A" storage battery as illustrated in Figure 14.

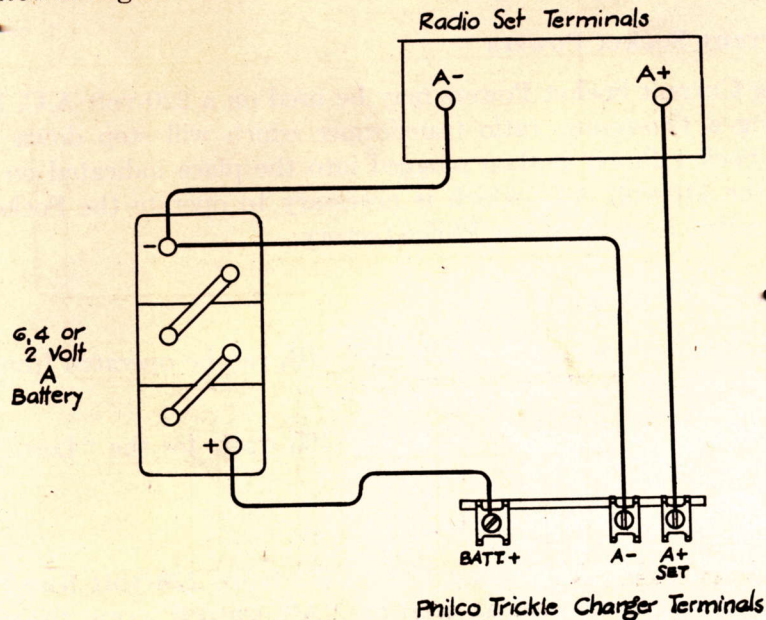


Figure 14

The "A-" of the set is connected to the "A-" terminal of the storage battery and this "A-" terminal of the storage battery is in turn connected to the "A-" terminal of the Trickle Charger. The "A+" lead from the radio set is connected to the terminal marked "A+ set" of the Trickle Charger. The "+" terminal of the battery is connected to the "BATT +" terminal of the Trickle Charger.

The different charge rates and also the number of hours per day this Trickle Charger will operate a radio set are given in the fore part of this Manual under the heading "Philco Socket Power Specifications."

When this charger is used on a 4-volt battery, the "High" charging tap must not be used.

The wire which is connected to the "A-" terminal of the radio set is practically a continuation of the wire which connects the negative terminal of the battery to the "A-" terminal of the Trickle Charger. Do not connect the "A+" terminal of the radio set to the positive terminal of the storage battery but connect it to the terminal marked "A+" in the Trickle Charger.

After the connections have been made as shown in Figure 14, the switch on the Trickle Charger will control the filaments of the set and the switch of the set should be turned on and left on.

When it is desired to use a "B" Socket Power, there is a socket in the Trickle Charger into which the plug of the "B" Socket Power can be inserted. The switch of the Trickle Charger will also control the "B" Socket Power, therefore leave the "B" Socket Power switch and the radio set switch on at all times. The switch on the Trickle Charger controls everything.

## **Operating Socket Powers from 220-Volt Supply**

### **Alternating Current Socket Powers**

All Alternating Current Socket Powers may be used on a 220-volt A.C. line of the correct frequency by using a two-to-one ratio transformer which will step down the voltage from 220 to 110. The Socket Power is then plugged into the place indicated on this transformer. This will supply the 110-volt A.C. which is necessary to operate the Socket Power. These transformers are carried in stock at the Philco factory.

### **Direct Current Socket Powers**

Direct Current Socket Powers, types DA6 and DB, can be operated from a 220-volt D.C. line by using 220-volt lamps in the Socket Powers.

In type DA6 use 220-volt lamps of 40, 75 and 100 watts for the "Low," "Medium" and "High" charge rates.

In type DB use 220-volt, 50-watt lamps.

**Caution.** When through operating the "DB" from 220-volt line the "B" Socket Power switch must be turned off as well as "A" switch even though the unit is plugged into the socket at the back of an "A" Socket Power.

### Radio Tube Data

TYPE	"A" Battery Volts (Supply)	Filament Terminal Volts	"A" Battery Current Amperes	Detector "B" Battery Volts	Amplifier "B" Battery Volts	Amplifier "C" Battery Volts	Amplifier Plate Current Milliamperes
199, 299	4	3	.06	22½ to 45	90	4.5	2.5
200	6	5	1.0	16½ to 22½			
200-A, 300-A	6	5	.25	22½ to 45			
201-A, 301-A	6	5	.25	22½ to 45	{ 90 135	4.5 9	2 2.5
X-12	2	1.1	.25	22½ to 45	90	4.5	2.5
120, 220	4	3	.125		135	22½	6.5
112	6	5	.5		{ 90 135 157½	6 9 10½	2.5 6 8
171, 371	6	5	.5		{ 90 135 180	16½ 27 40½	10 16 20

## Installation and Service Helps

### Precautions

Do not try to increase the charge rate in the Trickle Charger or in the "A" or "AB" Socket Powers by cutting out or shorting the resistance coil. This coil has been placed there to give the correct charge rates as given in another part of this Manual as well as to protect the transformer and rectifier.

Do not use a fuse in the lamp socket of a Socket Power instead of a Mazda lamp.

Under no circumstances change the electrodes or solution in the Philcotron cells. When these cells fail, do not put in a new electrode and change the solution, because proper results will not be obtained. Install a complete new cell.

Do not fill the Philcotron cells with a hydrometer that has been used to test a storage battery. The slightest trace of sulphuric acid in any of these cells will ruin them.

Avoid placing a Socket Power against a radiator or any kind of heating apparatus as it will cause excessive evaporation of the solution in the Philcotrons and battery and will shorten their life.

It is very important that the Economizer be kept on the LOWEST tap that will usually bring both of the charge indicator balls to the top of the holding cage over night. It is normal for one of the indicator balls to drop during a long evening's use of the radio set. If neither of the indicator balls drops at any time, try using a lower tap of the Economizer. Change to BOOST TEMPORARILY when both balls drop. This may be due to long hours' use of set on two or three successive days. After the indicator balls come up to the top of the holding cage, turn the Economizer to a lower charge rate.

A connecting cable between the radio set and the Socket Power that is more than 10 feet long or that has "A+" and "A-" wires smaller than No. 14 B & S gauge should not be used. Longer cables than this or small size "A" wires are apt to reduce the selectivity, cut down the effective filament voltage and otherwise affect the operation of the radio set.

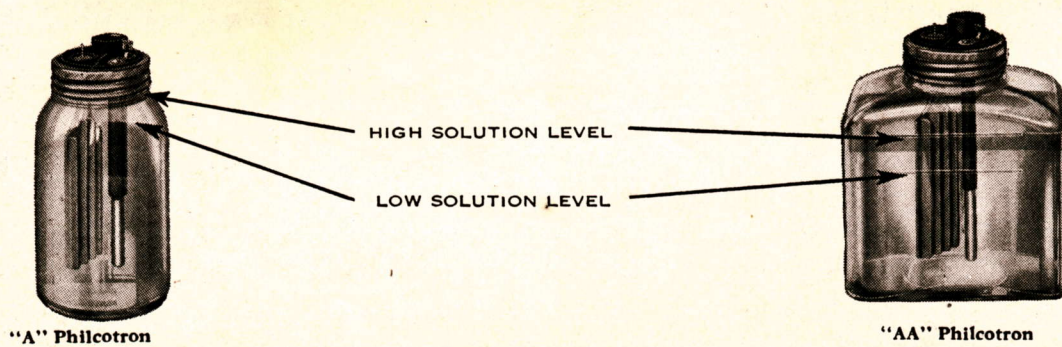
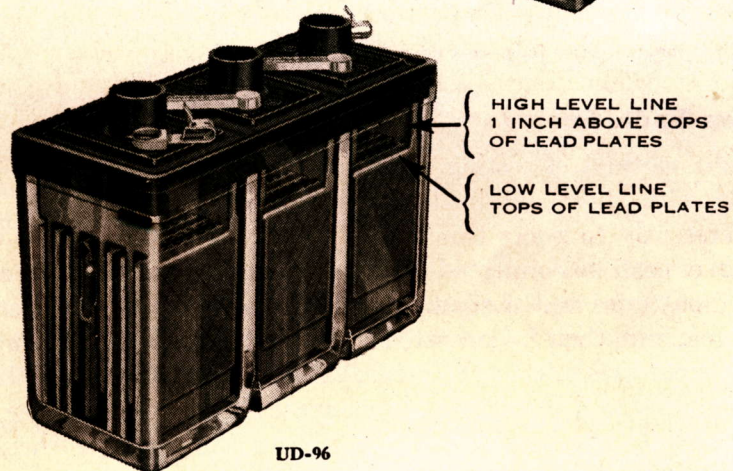
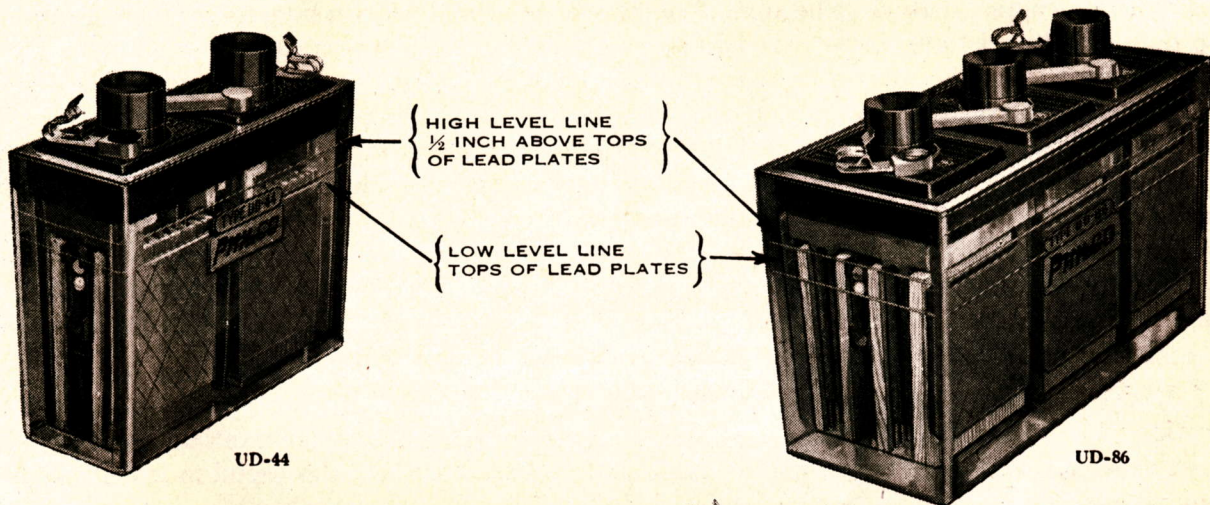
A Socket Power must not be placed inside a console or cabinet in which there is no ventilation. If necessary, drill six or more one-inch holes in the back to provide ventilation.

Do not attempt to improve the operation of the relay on any Philco Socket Power by adjusting or changing it in any way. Relays are adjusted correctly at the factory and should not be changed.

Do not adjust or change the acid of a battery in a Socket Power. If the battery is filled initially with the correct gravity acid it will never need adjusting.

## Battery and Philcotron Solution Levels

The following illustrations show the correct high and low solution level lines of UD batteries and Philcotrons:





### Testing with Meters

Most voltmeters in common use have a relatively low resistance. These meters may be accurate when used for all ordinary work, including the testing of storage or dry cell "B" batteries, but they will not show what voltage a "B" Socket Power unit is delivering to a radio set. A meter uses a certain amount of current to turn the needle just as a motor uses current to turn its armature. The amount of current used by the meter depends on its resistance, so that a high-resistance meter will require less current than a low-resistance one. In nearly all electrical work the amount of current used by the meter is so small compared with the current available that it has no appreciable effect on the voltage. The "B" Socket Power unit is designed to deliver the proper current to operate a radio set at the correct voltage. The current required for this is very small. In fact, many sets do not use as much "B" current as an ordinary voltmeter, so that the Socket Power is oftentimes overloaded by connecting a voltmeter to it. This is especially true of the "B+ DET" terminal of the Socket Power. This terminal is designed to supply the extremely low current required by the detector plate circuit and it is nearly always overloaded by a meter, so that the voltage reading will be between 5 and 15 instead of the actual working voltage supplied to the detector tube.

High-resistance voltmeters of 100,000 ohms total resistance or more are now made for testing "B" Socket Power units. Meters of this type are useful for demonstrating to customers that they can get the voltages they need for their radio. They are also useful in investigating complaints.

For complete meter test see page 64.

### Testing on Radio Set

The best method of testing a Socket Power is to connect it to a radio set and compare the results with those obtained when operating with batteries under the same conditions. The quickest way to make this test is to have a 4-pole, double-throw knife switch wired so that the levers can be connected to the "B" leads from the radio set; the jaws on one side to a set of "B" batteries and the jaws of the other side to the "B" terminals of the Socket Power. The radio set can then be operated either by battery or Socket Power current by throwing the switch from one side to the other. If a switch is not used the broadcasting may vary in the time required to disconnect and reconnect all the wires and the results would be misleading. In some cases it may be necessary to re-tune the set after changing over from one kind of power supply to the other but if the dial readings for each are noted this can be quickly done.

This test is very important and should be made whenever there is any question about the Socket Power.

### How to Locate Trouble

Testing a Socket Power with the right kind of a voltmeter will show if it is delivering the correct voltage.

Comparing the reception with that obtained when operating from batteries will show if the Socket Power is properly connected and adjusted to the set.

These two tests will show whether the trouble is in the radio set or in the Socket Power. The following will help to locate the cause of the trouble within the units:

### Poor Volume—No Distance

Examine connections to Socket Power, "C" battery, aerial and ground. If an adapter for a power tube is used, make sure that it is connected according to Philco instructions.

Test the tubes in the radio set by replacing them with others known to be good.

If a voltmeter is available, read the filament voltage right at a tube socket. If this is correct, the trouble is not in the "A" supply. If not correct, examine the "A" battery and the wiring in the "A" circuit.

Make sure that the "B" variable resistor is turned to the best position. See the connection diagrams in this Manual for right size Mazda lamp to use in the Socket Power.

### Fading

This is one of the most common of all troubles and in the majority of cases can be traced to a loose or poor connection.

A loose connection or contact in the set is a common cause, especially tubes which are making poor contact at the prongs. This can be easily discovered by moving the tubes to and fro while the set is turned on. If this is the trouble, reception will be normal when a tube or tubes are in a certain position. Poor contact in the rheostats of the set is another common cause.

If a separate "A" storage battery is used with a "B" Socket Power, fading might be caused by the battery being run down. In this case it would be well to check the voltage across the terminals and also check the specific gravity of the electrolyte.

If all the above things have been checked it will next be necessary to check the Socket Power. A loose contact on top of the "B" Philcotrons will be the first thing to check. If there is a loose contact, it can be remedied by removing the Philcotrons and bending down the clips.

A faulty variable resistor causing a fluctuation in voltage at the "B+ AMP" and "B+ DET" terminals will cause fading. This can be determined either by using a high-resistance voltmeter or else shorting the "B-" and "B+ AMP" terminals and then by tightening the variable resistor, the Mazda lamp should get brighter. If it "flickers," the variable resistor is faulty.

Poor contact in the Socket Power switch will cause either fading or intermittent reception. The switch should be inspected very thoroughly. If the prongs are making poor contact and are arcing, do not attempt to bend them in order to remedy this; rather install a new switch.

### Noisy

If this is an A.C. hum it can usually be removed by using the "K" terminal connection as explained in the instruction sheet packed with each Socket Power or by placing the Socket Power further away from the audio frequency end of the set.

Other noises will be heard when operating from either Socket Power or batteries and are caused by atmospheric disturbances, poor contacts or bad radio tubes.

If it is caused by atmospheric conditions, by disconnecting the aerial lead at the set it should stop. If it does not, the trouble is usually a loose connection in the set, Socket Power or

the leads to the set. If the "B" Philcotrons are arcing excessively at the bottom, they will cause a cracking noise in the loud speaker; replacing these with new ones will eliminate this trouble.

### **Low Detector Voltage**

Almost all cases of complaint on low detector voltage are found to be based on readings taken with low-resistance voltmeters. This is explained under "Testing with Meters." If the Socket Power detector circuit is open so that the meter does not show any reading on the detector terminal, try replacing the standard fixed detector resistor with a new one.

A number of home-made sets and also some few manufactured sets operate two or more tubes at the detector voltage. In this case the standard fixed detector resistor used in "B" and 6-volt "AB" Socket Powers will not supply sufficient voltage. If two tubes are operated at detector voltage, change this resistor to one of 35,000 ohms. If more than two tubes are used, change to a resistor of 10,000 ohms.

### **No Signal**

Check connections to Socket Power, "C" battery, aerial and ground. Test all radio tubes. If testing with batteries shows the trouble is in the Socket Power, try a new standard fixed resistor. Test Mazda lamps in another house socket to determine if they are good. See if the house socket used for the Socket Power is alive.

### **Distortion**

This may be caused by wrong or loose connections, defective radio tubes, wrong "B" or "C" voltages or poor adjustment of the loud speaker.

Check all connections from the Socket Power to the set and examine the Socket Power for a loose connection.

If possible, test the radio tubes. If the set is using a special detector tube, try another one or a 201-A type, as some special tubes are critical and have been known to be the cause of distortion in some cases.

Too high "B" voltages on the detector and radio frequency tubes will cause distortion in certain sets. This is generally caused by the customer having the variable resistor adjusted incorrectly.

If the loud speaker tips are reversed or the adjustment is wrong on the speaker, satisfactory results will not be obtained.

### **Motor-Boating**

This occurs in certain types of resistance-coupled and impedance-coupled audio amplifiers. In resistance-coupled sets the trouble can often be corrected by changing the resistors to ones of different values. Generally, a one megohm resistor in the plate circuit and a .25 megohm resistor in the grid circuit of the first stage will eliminate the trouble. However, it is not certain that this will correct the trouble; if it does not, it will be necessary to change around the different resistors until the correct combination is found.

In sets where the resistors are inaccessible, placing a 10,000-ohm fixed resistor and a 2 microfarad condenser across the "B-" and "B+ 90" terminals of the radio set will usually correct the trouble. This resistor must be heavy enough to carry two watts.

Do not get "motor-boating" confused with a hum which may resemble it. "Motor-boating" is always a distinct "put . . . put . . . put." If the noise heard is a loud hum, this should be eliminated by the proper use of the "K" terminal.

### **Variable Resistor Adjustment**

The instructions with each Socket Power, regarding the adjustment of the variable resistor, should be followed very carefully. As explained in these instructions, make this adjustment when the set is turned on full but tuned to a station that gives a fairly weak signal. If a distant station cannot be tuned in to give this result, the best plan is to disconnect the aerial from the set and make the adjustment when using a short indoor aerial. Eight or ten feet of wire lying across a room will be satisfactory.

It is advisable to adjust this resistor when the set is tuned to a station with a low wave length. With some receivers, the voltage supplied to the radio frequency tubes can be increased to above 100 and this may be satisfactory when tuned to a station of high wave length. When tuned to low wave length stations, this high voltage will sometimes cause the receivers to oscillate.

### **Fixed and Variable Resistor Values**

The fixed resistor in all 4-volt Socket Powers has a resistance of 35,000 ohms. This is known as Part Z-347. The fixed resistor in all 6-volt "AB" Socket Powers and the separate "B" Socket Powers has a resistance of 70,000 ohms. This is known as Part Z-129.

The variable resistor used in the 135-150-volt "B" and 6-volt "AB" Socket Powers, has a resistance of 1500 to 50,000 ohms and is known as Part Z-195. The variable resistor in the 180-volt "B," the high voltage "AB," and the 4-volt "AB" Socket Powers has a resistance of 4000 to 70,000 ohms and is known as Part Z-253.

### **Adjustment of Relay Switches**

The relay switches used on Philco Socket Powers are accurately adjusted before they leave the factory and only in a few cases will any other adjustment be required. However, when the relay fails to operate it may be due to the wrong tension on the spring. All relay switches should be adjusted to open and close with a load of four radio tubes. A one-ampere load obtained by means of resistance is not the same as a load of four 201-A tubes, because when the tubes are first turned on they draw a high surge of current on account of being cold and having a lower resistance. Turning the set screw in the relay clockwise lessens the tension on the spring, while turning it counter-clockwise increases the tension.

### **Wiring Diagrams of Philco Socket Powers**

Dealers who want them can obtain wiring diagrams of Philco Socket Powers by writing to Service Department, Philadelphia Storage Battery Company, Ontario and C Streets, Philadelphia, Pa., U. S. A.

## Philco Socket Power Testing

It is possible by a few simple tests to determine whether or not a Philco Socket Power is operating normally.

### “A” and “A” Part of “AB” Socket Powers All Alternating Current Types

#### Testing the Battery

If the Charge Indicator balls are up and the radio tubes fail to light, the trouble is with the fuse in the Socket Power, a loose or dirty connection, or the battery has been filled with high gravity acid.

With a short piece of copper wire, short-circuit momentarily each individual cell of the “A” battery. As each cell is shorted a spark should be obtained. If any cell in the battery is dead no spark will be obtained when that cell is shorted.

If a low scale voltmeter is available it can be used here to check the battery voltage. With the radio set turned on, the voltage at the battery terminals should be at least 5.5 for the 3-cell or 6-volt battery and 3.6 for the 2-cell or 4-volt battery.

If the battery voltage is less than this, read the voltage of the individual cells. All of the cells should read about the same—not less than 1.8 volts.

If one cell of the battery is low in voltage, examine the battery for high gravity acid, internal short circuit and loose plates.

To adjust the acid in a battery which has been filled with a higher gravity than called for, unscrew the vent tubes from the tops of the cells and, by using a hydrometer with a small rubber tube on the end, suck out as much of the acid as possible. After doing this bring the solution level up to the high mark by adding pure water. Have the Socket Power on charge while doing this adjusting and allow it to charge for several hours after adding water as described above, to allow the water to mix with the rest of the solution, then read the specific gravity. If it is still too high repeat the operation. In some cases it may be necessary to repeat this three or four times. DO NOT DROP ANY ACID ON THE TOP OF THE BATTERY.

#### Testing the Rectifier

If both of the Charge Indicator balls remain down, even after the Socket Power has been charging for 24 hours, the trouble is probably in the rectifier. The best way of checking this is to remove a wire running to the battery and insert a low-scale ammeter. The charge rates should correspond to the rates given in the fore part of this book.

Both the old and new Philcotron cells will gas when the switch is in the “OFF” position, so it is not possible to tell if they are charging by looking at them. If the rectifier does not charge when the Socket Power switch is “OFF,” examine the house socket to see that it is alive and inspect the attachment plug and cord and the Socket Power itself for an open circuit. If no trouble can be found with the wiring, it is evident the rectifier has ceased to function and by installing a new one the trouble will be remedied.

**"B" and "B" Part of "AB" Socket Powers  
135-, 150-Volt Alternating Current Types  
Except AB-663, AB-623, AB-463, AB-423**

**Important**

All Socket Powers, regardless of type, having a condenser block with the part number Z-406 stamped on the top should be tested as given here.

If there is no part number marked on top of the condenser block use the test given on page 55.

**Testing the Terminal Output**

Disconnect all wires running from the radio set to the Socket Power and snap the switch of the Socket Power to ON. Allow the protective lamp (Mazda lamp) in the Socket Power to get dim, then replace this protective lamp with a 15-watt or 25-watt Mazda lamp.

When the Socket Power is equipped with an automatic relay switch, it will be necessary to put a load of about 2 amperes across the "A-" and "A+" terminals, in order to operate the automatic relay switch. This may be accomplished by either connecting the "A" side of a Socket Power to a radio set in the usual manner or else connecting a six-volt, 21-candle-power automobile headlight lamp across the "A-" and "A+" terminals. This lamp will be equivalent to an average radio set.

Short-circuit the "B-" and "B+ PWR" terminals. If a hot spark is produced and the Mazda lamp lights, the "B+ PWR" terminal is O.K. If no spark is obtained or if the lamp does not light, follow the test outlined below under **NO VOLTAGE AT "B+ PWR" TERMINAL**.

Short-circuit "B-" and "B+ AMP" terminals and with this short on, gradually screw down the variable resistor and the Mazda lamp should gradually get brighter. Unscrewing the variable resistor should make the lamp dimmer.

If the lamp flickers or if it does not get brighter when the variable resistor is screwed down, either the variable resistor is faulty or else there is a loose connection between the "B+ PWR" terminal and the variable resistor or between the variable resistor and the "B+ AMP" terminal.

If the short circuit from the "B-" terminal to the "B+ AMP" terminal is removed and the Mazda lamp still varies in brightness as the variable resistor is turned the trouble is due to a faulty condenser.

Short-circuiting the "B-" and the "B+ DET" terminals should give a fairly hot spark. If no spark is obtained the trouble is probably in the fixed resistor unit. Replace this resistor with one known to be good.

If no spark is obtained even after changing the fixed resistor, remove the short-circuit from "B-" to "B+ DET" and place a short-circuit across from "B+ DET" to "B+ AMP" terminal. With this short left on, screw the variable resistor clear down. If the Mazda lamp lights the trouble is in the detector condenser.

### Testing the Rest of the Circuit

If all the above terminals test O.K., check for full voltage by short-circuiting Philcotron clips B and D (see Figure 15) which should light the Mazda lamp very bright. If the lamp lights only dim the transformer is faulty, otherwise the Socket Power is delivering full voltage.

Test the Philcotrons by short-circuiting each pair of Philcotron terminal clips. This should light the lamp nearly as bright as when the clips B and D are shorted.

If the Mazda lamp fails to light bright when (see Figure 15) A and B are shorted, there is a loose connection at C or D; when C and D are shorted, there is a loose connection at A or B; when E and F are shorted, there is a loose connection at G or H; when G and H are shorted, there is a loose connection at E or F.

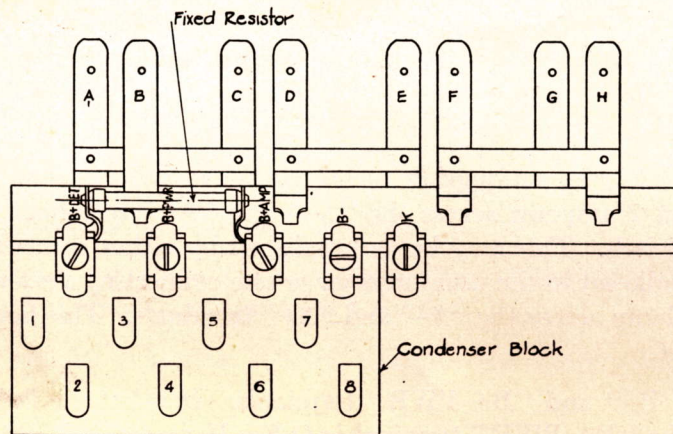


Figure 15  
Philcotron Rack, Terminal Strip and Condenser Block of  
Types B-603 and B-253 Socket Powers

### No Voltage at "B+ PWR" Terminal: Mazda Lamp Not Lit

Short circuiting terminals:

B and D Should light the lamp very bright. If no spark is obtained and the lamp does not light, the current is not on or else there is a faulty Mazda lamp, switch, transformer, A.C. cord or a loose connection.

3 and 7. Should give a hot spark and light the lamp bright. If no spark is obtained and the lamp does not light, there is a loose connection on the Philcotron rack.

2 and 3. Should give a hot spark and light the lamp dim. If no spark is obtained and the lamp does not light, there is a faulty choke coil or choke coil connection.

2 and 5. Should give a hot spark and light the lamp very dim. If no spark is obtained and the lamp does not light, there is a faulty choke coil or choke coil connection.

If a spark is obtained when terminals 2 and 5 are shorted, but there is no spark when "B-" and "B+ PWR" terminals are shorted, there is an open circuit either between terminal 2 and the "B+ PWR" terminal or terminal 5 and the "B-" terminal.

If a hot spark is not obtained at one of the above terminals but the lamp lights, there is an open condenser lead, an open condenser or a wrong connection on the condenser block. Check connections on condenser block with Figure 16.

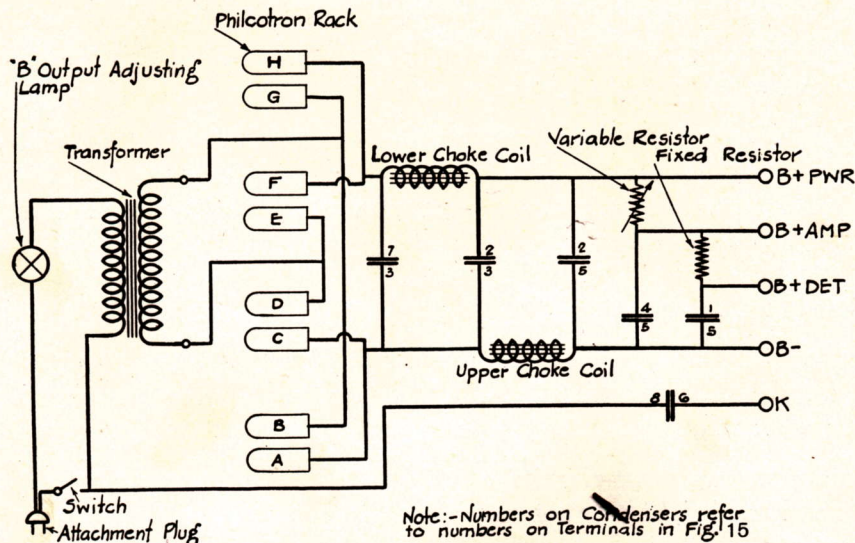


Figure 16

Schematic Wiring Diagram of Types B-603 and B-253 Socket Powers

### No Voltage at "B+ PWR" Terminal: Mazda Lamp Lit

Short circuit terminals:

B and D. If there is no change in the brilliancy of the lamp, there is a short circuit in the cable leading to the Philcotron rack, in the Philcotron rack or the Philcotron cells are worn out.

3 and 7. If there is no change in the brilliancy of the lamp, the condenser block is faulty.

2 and 3. If there is no change in the brilliancy of the lamp, the condenser block is faulty.

2 and 5. If there is no change in the brilliancy of the lamp, the condenser block is faulty.

### "B" Part of Alternating Current Types AB-663, AB-623, AB-463, AB-423

#### Testing the Terminal Output

Short-circuit the "B-" and "B+ PWR" terminals. If a hot spark is produced and the Mazda lamp lights, the "B+ PWR" terminal is O.K. If no spark is obtained or if the lamp does not light, follow the tests outlined below under "No Voltage at "B+ PWR" Terminal."

Short-circuit "B-" and "B+ AMP" terminals and with this short on, gradually screw down the variable resistor and the Mazda lamp should gradually get brighter. Unscrewing the variable resistor should make the lamp dimmer.

If the lamp flickers or if it does not get brighter when the variable resistor is screwed down, either the variable resistor is faulty or else there is a loose connection between the "B+ PWR" terminal and the variable resistor, or between the variable resistor and the "B+ AMP" terminal.



If the short-circuit from the "B-" terminal to the "B+ AMP" terminal is removed and the Mazda lamp still varies in brightness as the variable resistor is turned, the trouble is due to a faulty condenser.

Short-circuiting the "B-" and the "B+ DET" terminals should give a fairly hot spark. If no spark is obtained the trouble is probably in the fixed resistor unit. Replace this resistor with one known to be good.

If no spark is obtained even after changing the fixed resistor, remove the short-circuit from "B-" to "B+ DET" and place a short-circuit across from "B+ DET" to "B+ AMP" terminal. With this short left on, screw the variable resistor clear down. If the Mazda lamp lights the trouble is in the condenser.

### Testing the Rest of the Circuit

If all the above terminals test O.K., check for full voltage by short-circuiting Philcotron clips F and H (see Figure 17) which should light the Mazda lamp very bright. If the lamp lights only dim the transformer is faulty, otherwise the Socket Power is delivering full voltage.

Test the Philcotrons by short-circuiting each pair of Philcotron terminal clips. This should light the lamp nearly as bright as when the clips F and H are shorted.

If the Mazda lamp fails to light bright when (see Figure 17) A and B are shorted, there is a loose connection at C or D; when C and D are shorted, there is a loose connection at A or B; when E and F are shorted, there is a loose connection at G or H; when G and H are shorted, there is a loose connection at E or F.

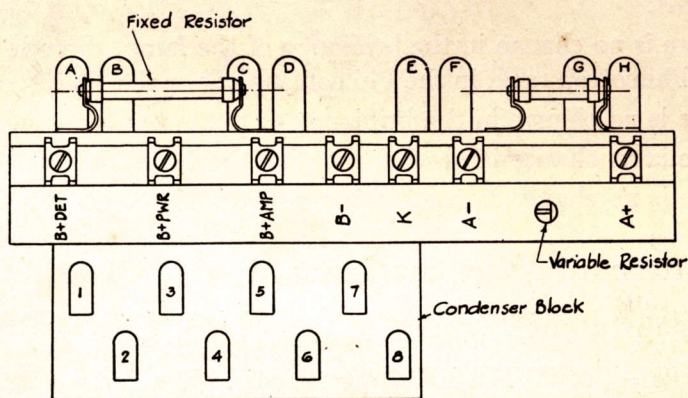


Figure 17

Philcotron Rack, Terminal Strip and Condenser Block of AB-663, AB-623, AB-463 and AB-423 Socket Powers

### No Voltage at "B+ PWR" Terminal: Mazda Lamp Not Lit

Short-circuiting terminals:

F and H. Should light the lamp very bright. If no spark is obtained and the lamp does not light, the current is not on or else there is a faulty Mazda lamp, switch, transformer, A.C. cord or a loose connection.

## PHILCO SOCKET POWER TESTING

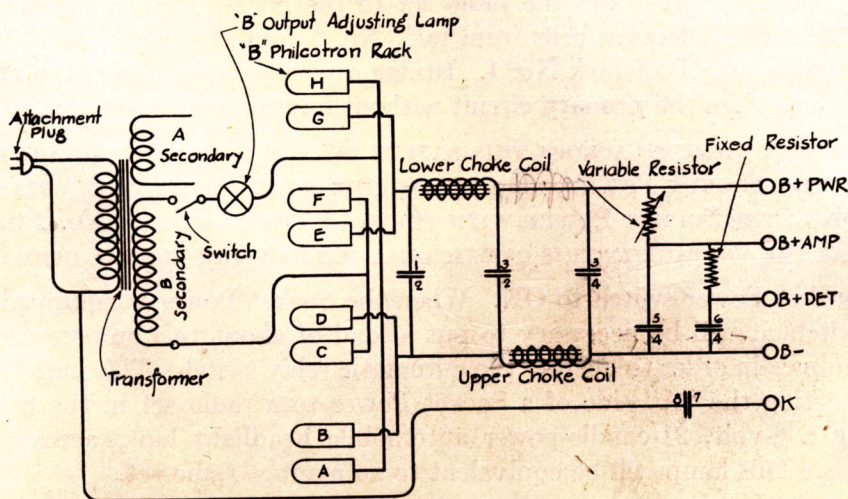
1 and 2. Should give a hot spark and light the lamp bright. If no spark is obtained and the lamp does not light, there is a loose connection on the Philcotron rack.

2 and 3. Should give a hot spark and light the lamp dim. If no spark is obtained and the lamp does not light, there is a faulty choke coil or choke coil connection.

3 and 4. Should give a hot spark and light the lamp very dim. If no spark is obtained and the lamp does not light, there is a faulty choke coil or choke coil connection.

If a spark is obtained when terminals 3 and 4 are shorted, but there is no spark when "B-" and "B+ PWR" terminals are shorted, there is an open circuit either between terminal 3 and the "B+ PWR" terminal or terminal 4 and the "B-" terminal.

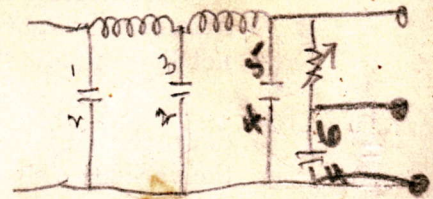
If a hot spark is not obtained at one of the above terminals but the lamp lights, there is an open condenser lead, an open condenser or a wrong connection on the condenser block. Check connections on condenser block with Figure 18.



Note:-Numbers on Condensers refer to Terminal Markings on Fig. 17

Figure 18

Schematic Wiring Diagram of Types AB-663, AB-623, AB-463, AB-423 Socket Powers



### No Voltage at "B+ PWR" Terminal: Mazda Lamp Lit

Short-circuit terminals:

F and H. If there is no change in the brilliancy of the lamp, there is a short-circuit in the cable leading to the Philcotron rack, in the Philcotron rack, or the Philcotron cells are worn out.

1 and 2. If there is no change in the brilliancy of the lamp, the condenser block is faulty.

2 and 3. If there is no change in the brilliancy of the lamp, the condenser block is faulty.

3 and 4. If there is no change in the brilliancy of the lamp, the condenser block is faulty.

## **“B” and “B” Part of “AB” Socket Powers 180-Volt Types**

### **Testing the Terminal Output**

The 180-volt “B” and “AB” Socket Powers do not have an Output Adjusting Lamp. The output voltage is controlled by means of different taps on the secondary of the transformer. When the following test is used a Mazda lamp must be inserted in series with the A.C. input of the Socket Power. A convenient method is shown in Figure 19, by using two porcelain sockets and attaching the Socket Power in one socket and a lamp in the other. There are series sockets on the market which have a socket for a lamp and a receptacle on the side for an attachment plug. The lamp is connected in series with the receptacle, inside. These can be used instead of the lamp board shown.

Either the lamp board or a series socket should be mounted conveniently on the Socket Power test bench.

Disconnect all “B” wires from the radio set to the Socket Power. Remove the housing and take out the four Philcotron cells from rack No. 1 (see Figure 20) and bridge a piece of wire across the clips C to F of rack No. 1. Bridge a piece of wire across the two terminals of the safety switch to close the primary circuit without having the housing on.

DO NOT ATTEMPT TO JUMP ACROSS THIS SAFETY SWITCH WHILE THERE ARE EIGHT PHILCOTRON CELLS IN THE SOCKET POWER. BY TAKING THE FOUR PHILCOTRON CELLS OUT OF RACK NO. 1 AND TESTING THE SOCKET POWER WITH THE FOUR CELLS OF RACK NO. 2 IN PLACE, THERE IS NO DANGER AS THE VOLTAGE IN THIS CASE IS ONLY HALF OF THE NORMAL OPERATING VOLTAGE.

Snap the Socket Power switch to ON. When the Socket Power is equipped with an automatic relay switch, it will be necessary to put a load of about two amperes across the “A-” and “A+” terminals in order to operate the automatic relay switch. This may be accomplished by either connecting the “A” side of a Socket Power to a radio set in the usual manner, or else connecting a 6-volt, 21-candle-power automobile headlight lamp across the “A-” and “A+” terminals. This lamp will be equivalent to an average radio set.

Short-circuit the “B-” and “B+ PWR” terminals. If a hot spark is produced and the Mazda lamp lights, the “B+ PWR” terminal is O.K. If no spark is obtained or the lamp does not light, follow the tests outlined below under NO VOLTAGE AT “B+ PWR” TERMINAL.

Short-circuit “B-” and “B+ AMP” terminals and with this short on, gradually screw down the variable resistor and the Mazda lamp should gradually get brighter. Unscrewing the variable resistor should make the lamp dimmer.

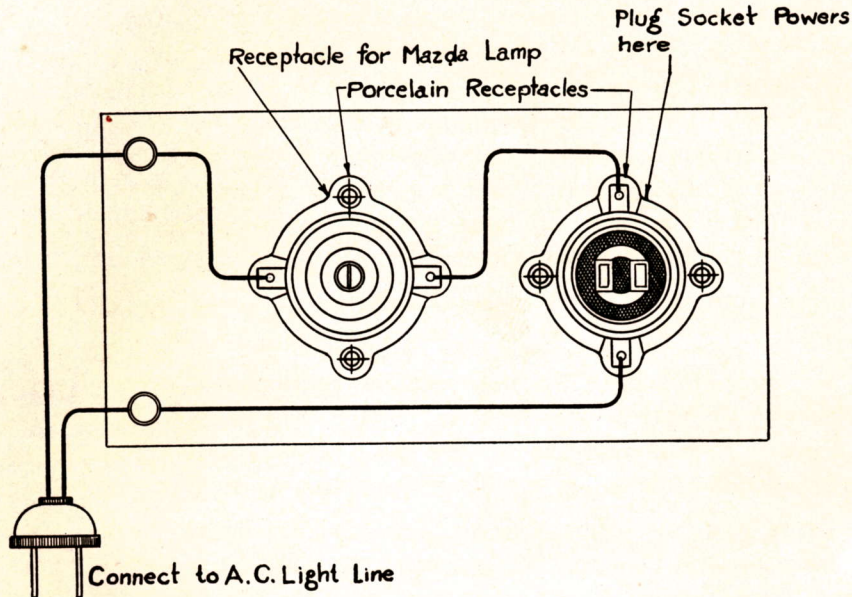
If the lamp flickers or if it does not get brighter when the variable resistor is screwed down, either the variable resistor is faulty or else there is a loose connection between the “B+ PWR” terminal and the variable resistor, or between the variable resistor and the “B+ AMP” terminal.

If the short-circuit from the “B-” terminal to the “B+ AMP” terminal is removed and the Mazda lamp still varies in brightness as the variable resistor is turned, the trouble is due to a faulty condenser.

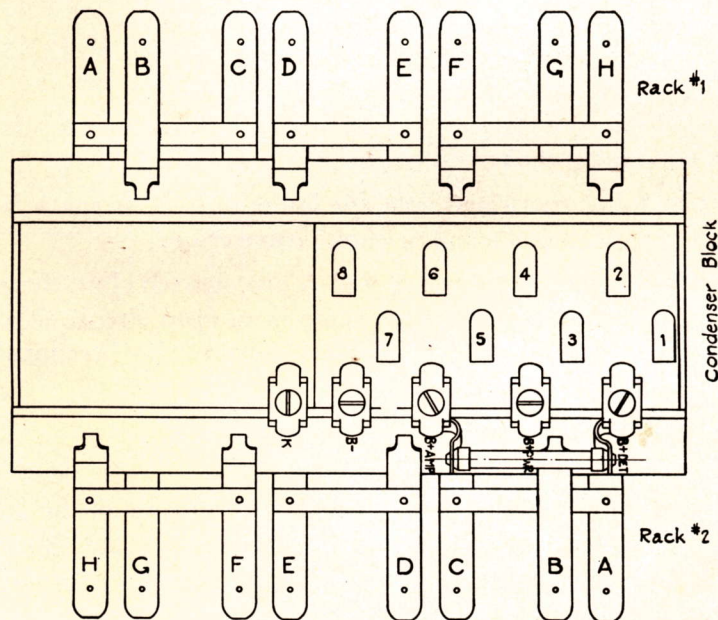
Short-circuiting the “B-” and the “B+ DET” terminals should give a fairly hot spark. If no spark is obtained, the trouble is probably in the fixed resistor unit. Replace this resistor

**PHILCO SOCKET POWER TESTING**

with one known to be good. If no spark is obtained, even after changing the fixed resistor, remove the short-circuit from "B-" to B+ DET" and place a short-circuit across from "B+ DET" to "B+ AMP" terminal. With this short left on, screw the variable resistor clear down. If the Mazda lamp lights, the trouble is in the condenser.



**Figure 19**  
Testing Lamp Bank for 180-Volt "B" and 180-Volt "AB" Socket Powers



**Figure 20**  
Philcotron Racks and Condenser Lugs Marked for Testing for 180-Volt "B" and "B" Part of 180-Volt "AB" Socket Powers

### Testing the Rest of the Circuit

If all the above terminals test O.K., check for full voltage by short-circuiting Philcotron clips B and D (see Figure 20) of rack No. 2 which should light the Mazda lamp very bright. If the lamp lights only dim, the transformer is faulty, otherwise the Socket Power is delivering full voltage.

Test the Philcotrons in rack No. 2 by short-circuiting each pair of Philcotron terminal clips of rack No. 2. This should light the lamp nearly as bright as when the clips B and D are shorted. Replace these Philcotrons with those originally in rack No. 1 and repeat this test.

If the Mazda lamp fails to light bright when (see Figure 20) A and B are shorted, there is a loose connection at G or H; G and H are shorted, there is a loose connection at E or F.

Loose connections or short circuits in rack No. 1 can be found by visual examination. Check wiring with diagram in Figure 21.

### No Voltage at "B+ PWR" Terminal: Mazda Lamp Not Lit

If it is impossible to get at the condenser lugs after the Philcotrons have been removed from rack No. 1, remove the four screws which hold this rack to the supports. Two of these screws are at the ends of the terminal strip of rack No. 1, while the other two are in the center of the terminal strip of rack No. 2. This will allow it to be turned down and will make the condenser lugs easily accessible.

Short-circuit terminals:

B and D of rack No. 2 should light the lamp very bright. If the lamp does not light, the current is not on or else there is a faulty switch, transformer, A.C. cord or a loose connection.

3 and 7. Should give a hot spark and light the lamp bright. If no spark is obtained and the lamp does not light, there is a loose connection on Philcotron rack No. 2.

2 and 3. Should give a hot spark and light the lamp dim. If no spark is obtained and lamp does not light, there is a faulty choke coil or choke connection.

2 and 5. Should give a hot spark and light the lamp dim. If no spark is obtained and lamp does not light, there is a faulty choke coil or choke connection.

If a spark is obtained when terminals 2 and 5 are shorted, but there is no spark when "B-" and "B+ PWR" terminals are shorted, there is an open circuit either between terminal "2" and the "B+ PWR" terminal or terminal "5" and the "B-" terminal.

### No Voltage at "B+ PWR" Terminal: Mazda Lamp Lit

Short-circuit terminals:

B and D of rack No. 2. If there is no change in the brilliancy of the lamp, there is a short in the cable leading to the Philcotron rack No. 2, in Philcotron rack No. 2, or the Philcotron cells are worn out.

3 and 7. If there is no change in the brilliancy of the lamp, the condenser block is faulty.

2 and 3. If there is no change in the brilliancy of the lamp, the condenser block is faulty.

2 and 5. If there is no change in the brilliancy of the lamp, the condenser block is faulty.

PHILCO SOCKET POWER TESTING

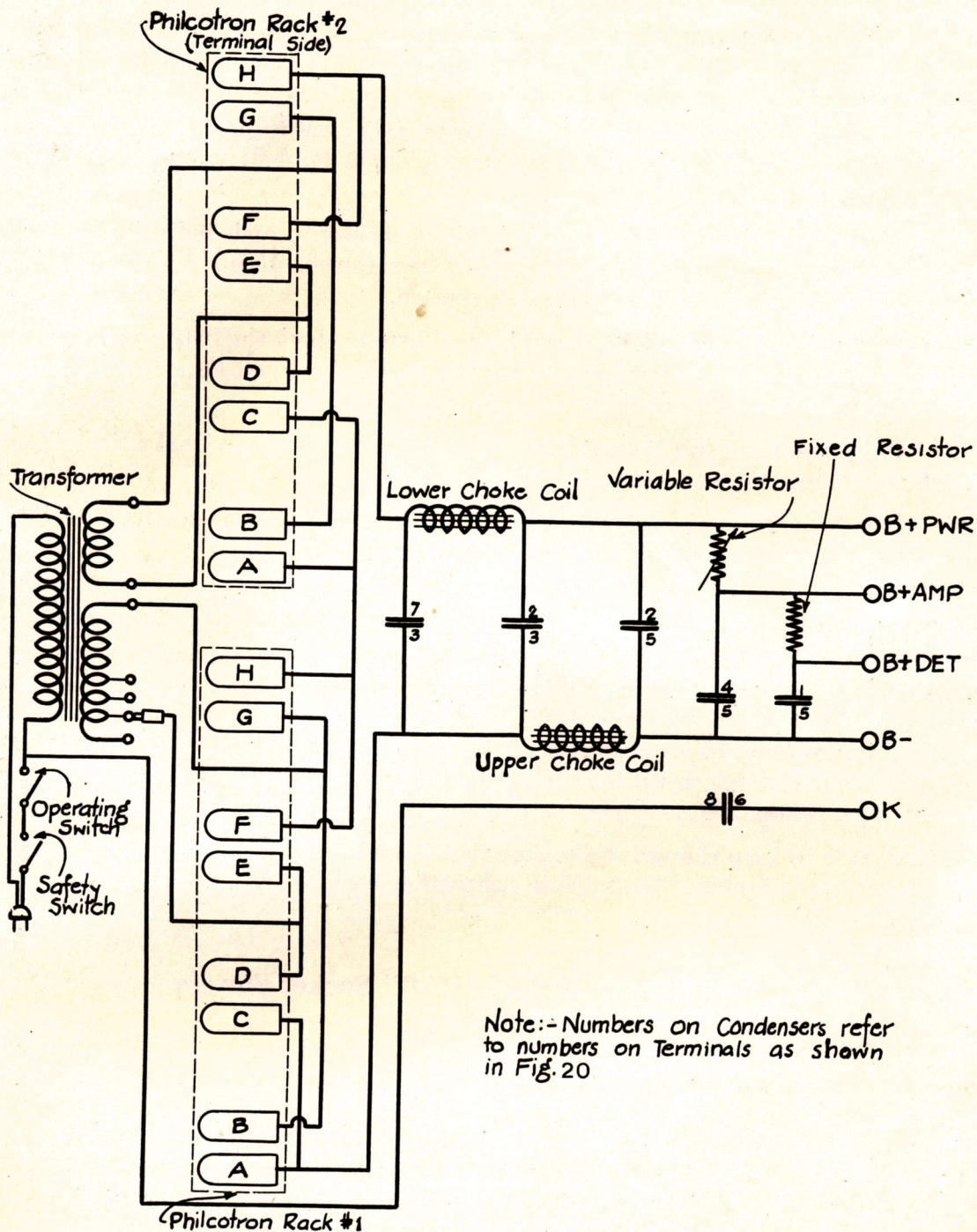


Figure 21  
Schematic Wiring Diagram of 180-Volt "B" and "B" Part of 180-Volt "AB" Socket Powers

### All Direct Current Types "DA" and "A" Part of "DAB" Socket Powers

#### Testing the Battery

If the Charge Indicator balls are up and the radio tubes fail to light, the trouble is with the fuse in the Socket Power, a loose or dirty connection, or the battery has been filled with high gravity acid.

With a short piece of copper wire short-circuit momentarily each individual cell of the "A" battery. As each cell is shorted a spark should be obtained. If any cell in the battery is dead, no spark will be obtained when that cell is shorted.

If a low scale voltmeter is available it can be used here to check the battery voltage. With the radio set turned on, the voltage at the battery terminals should be at least 5.5 for the 3-cell or 6-volt battery and 3.6 for the 2-cell or 4-volt battery.

If the battery voltage is less than this, read the voltage of the individual cells. All of the cells should read about the same—not less than 1.8 volts

If one cell of the battery is low in voltage, examine the battery for high gravity acid, internal short-circuit and loose plates.

To adjust the acid in a battery which has been filled to a higher gravity than called for, unscrew the vent tubes from the tops of the cells and, by using a hydrometer with a small rubber tube on the end, suck out as much of the acid as possible. After doing this bring the solution level up to the high mark by adding pure water. Have the Socket Power on charge while doing this adjusting and allow it to charge for several hours after adding water as described above, to allow the water to mix with the rest of the solution, then read the specific gravity. If it is still too high repeat the operation. In some cases it may be necessary to repeat this three or four times. DO NOT DROP ANY ACID ON THE TOP OF THE BATTERY.

If battery fails to keep charged, make sure that house socket is alive and that the charge adjusting lamp is not broken. See table in instruction book for proper size Mazda lamp to use in charge adjusting socket.

### "DB" and "B" Part of "DAB" Socket Powers

#### Testing the Terminal Output

Disconnect all wires running from the radio set to the Socket Power and snap the switch of the Socket Power to ON. Replace the two 50-watt lamps with two 15-watt or 25-watt Mazda lamps. Short-circuit the "B-" and "B+ PWR" terminals. If a hot spark is produced and the Mazda lamps light, the "B+ PWR" terminal is O.K. If no spark is obtained or if the lamps do not light, follow the tests outlined below under NO VOLTAGE AT "B+ PWR" TERMINAL.

Short-circuit "B-" and "B+ AMP" terminals and with this short on, gradually screw down the variable resistor and the Mazda lamps should gradually get brighter. Unscrewing the variable resistor should make the lamps dimmer.

## PHILCO SOCKET POWER TESTING

If the lamps flicker or if they do not get brighter when the variable resistor is screwed down, either the variable resistor is faulty or else there is a loose connection between the "B+ PWR" terminal and the variable resistor or between the variable resistor and the "B+ AMP" terminal.

If the short-circuit from the "B-" terminal to the "B+ AMP" terminal is removed and the Mazda lamps still vary in brightness as the variable resistor is turned, the trouble is due to a faulty condenser.

Short-circuiting the "B-" and the "B+ DET" terminals should give a fairly hot spark. If no spark is obtained the trouble is probably in the fixed resistor unit. Replace this resistor with one known to be good.

If no spark is obtained even after changing the fixed resistor, remove the short-circuit from "B-" to "B+ DET" and place a short-circuit across from "B+ DET" to B+ AMP" terminal. With this short left on, screw the variable resistor clear down. If the Mazda lamps light the trouble is in the condenser.

### No Voltage at "B+ PWR" Terminal: Mazda Lamps Not Lit

Short-circuiting terminals (Figure 22):

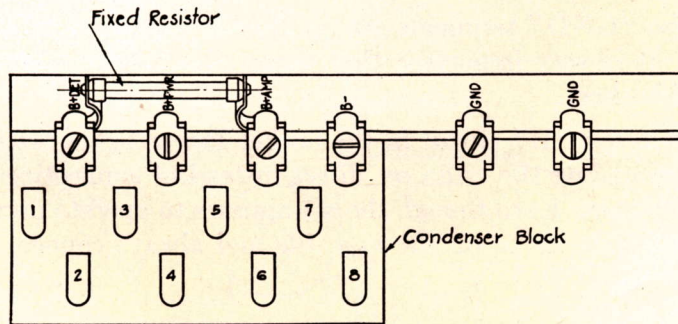


Figure 22  
Terminal Strip and Condenser Block of "DB" and "DAB"  
Socket Powers

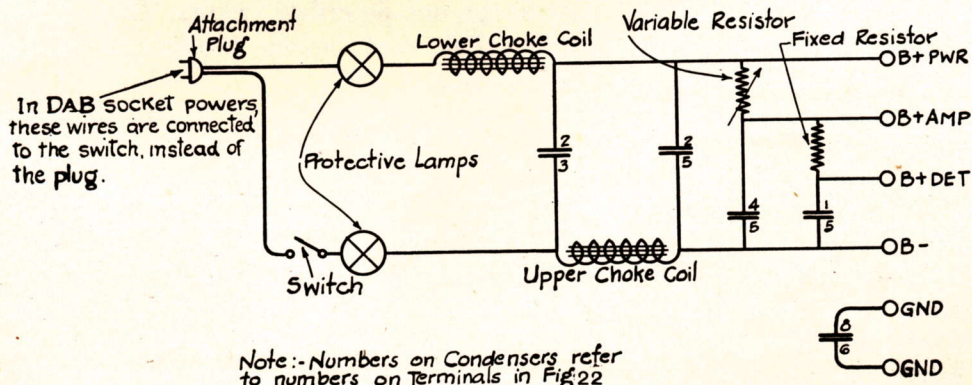


Figure 23  
Wiring Diagram of "DB" and "B" Part of "DAB" Socket Powers



2 and 3. Should give a hot spark and light the lamps dim. If no spark is obtained and the lamps do not light, there is a faulty choke coil or choke connection.

2 and 5. Should give a hot spark and light the lamps very dim. If no spark is obtained and the lamps do not light, there is a faulty choke coil or choke connection.

If no spark is obtained at one of the above terminals, but the lamps light there is an open condenser lead, an open condenser or a wrong connection on condenser block. Check connections on condenser block with Figure 23.

If a spark is obtained when terminals 2 and 5 are shorted but there is no spark when "B-" and "B+ PWR" terminals are shorted, there is an open circuit either between terminal "2" and the "B+ PWR" terminal or terminal "5" and the "B-" terminal.

#### **No Voltage at "B+ PWR" Terminal: Mazda Lamps Lit**

Short-circuit terminals:

2 and 3. If there is no change in the brilliancy of the lamps, the condenser block is faulty.

2 and 5. If there is no change in the brilliancy of the lamps, the condenser block is faulty.

#### **Caution**

Be sure that the two "GND" terminals are used when connecting a direct current Socket Power to a radio set. It is very important that these terminals be used as explained in the Socket Power instruction sheet.

If one of the lamps in the "B" circuit in the Socket Power lights brighter than the other, it is probably due to grounding the radio set direct instead of connecting the ground wire to one of the "GND" terminals. Even though the set appears to operate normally without using these two terminals, it is best to be on the safe side and always connect the ground wire as explained in the instructions.

## **Meter Test for Socket Powers**

If it is desired to make complete tests of Socket Powers with meters, it can be done very easily by using a special test board similar to the one described below. This complete board can be assembled in a few hours' time at very slight cost, beyond the cost of the meters, and it will be found very useful for Socket Power work.

The A.C. attachment plug of the test set is connected to an A.C. light line. The Socket Power to be tested is then plugged into the receptacle on the test board marked No. 4.

When it is desired to read the output voltage of any Socket Power, have the small switch in the receptacle circuit closed. When this switch is open it puts the 15-watt Mazda lamp in lamp socket No. 3 in series in the A.C. side of the Socket Power. The only time that this switch is to be open is when testing the 180-volt "B" or "AB" Socket Powers. Keep the switch closed when reading the voltage of these Socket Powers so that there will not be any drop in the lamp, but when testing, by short-circuiting the various terminals as explained under "Testing of Philco Socket Powers," in another part of this Manual, the switch must be open making the current go through the Mazda lamp, which is then used as a test indicator lamp.

## PHILCO SOCKET POWER TESTING

The milliampere consumption of a radio set may be checked by disconnecting the radio set "B-" lead from the Socket Power and connecting to No. 2+ binding post. The No. 1- binding post is connected to the "B-" terminal of the Socket Power. This will put the milliammeter in series with the "B-" lead and give the total milliampere load.

The voltages at the "B+ DET", "B+ AMP" and "B+ PWR" terminals of the Socket Power can be checked by connecting these terminals with the corresponding terminals on the test set. The voltages at the different terminals can be read by turning the three-point switch (No. 6) to the correct tap. These voltages can be read open circuit, or by tightening the variable resistor (No. 7) any desired load can be put on any of the terminals. The voltmeter is wired in series with the milliammeter so that the milliammeter will indicate the current consumed by the voltmeter.

The "A-" and "A+" terminals of the Socket Power are connected to the "A-" and "A+" binding posts. The voltmeter will register the voltage of the battery. A 6-volt, 21-candle-power automobile headlight lamp is mounted at the top of the board and is used to close the relay switch on Socket Powers so equipped and to put a lead on the "A" battery while reading voltages.

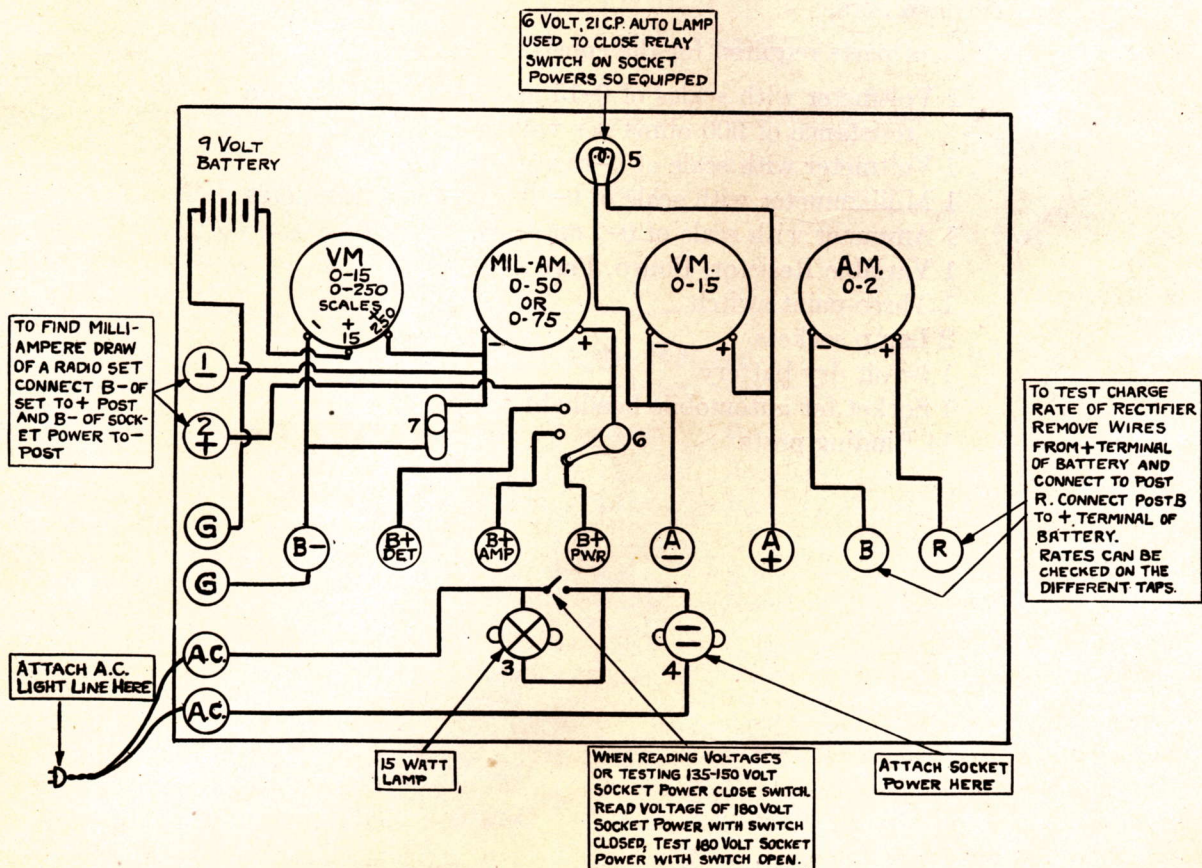


Figure 24

Test Board for Philco Socket Powers

When it is desired to check the charge rates and also the rectifier, disconnect the two wires going to the positive terminal of the battery. Connect these wires to post "R" of the test board and connect the "B" post of the test board to the positive terminal of the battery. The charge rates of the various taps can then be checked.

The two terminals marked "G" are to be used when testing for a ground or an open circuit. One of these terminals goes directly to the "-" of the voltmeter and the other terminal passes through a 9-volt battery and then to the 15-volt terminal of the voltmeter.

When testing for a ground do not have the Socket Power attached to the light line or the test board. To check the secondary circuit for a ground, put one of the prods on the "B-" terminal of the Socket Power and with the other prod touch the metal base of the Socket Power. If there is any ground in the secondary circuit, you will see a deflection of the voltmeter needle.

To check for a ground in the primary circuit, put one of the prods on to one of the attachment plug prongs at the end of the Socket Power cord. Touch the metal base of the Socket Power with the other prod and if grounded a reading will be obtained on the voltmeter.

Quite a number of combinations for connecting and testing may be used. Only the essential tests have been outlined here.

Following is a list of parts required for the construction of this test set:

- 1 Voltmeter with scales of 0-15 and 0-250 volts with a resistance of 600 ohms per volt or more
- 1 Voltmeter with scale of 0-15 volts
- 1 Milliammeter with scale of 0-50 or 0-75 milliamperes
- 1 Ammeter with scale of 0-2 amperes.
- 1 Variable Resistor, Philco, Part Z-195
- 1 Three-point switch
- 2 Lamp sockets
- 1 9-volt dry battery
- 1 Socket for automobile headlight lamp
- 14 Binding posts

PARTS LIST

Parts List

Following is a parts list for all types of Socket Powers.

When ordering any parts always use the part numbers given in this table.

If any parts other than Philco are used in Philco Socket Powers the operation of the units cannot be guaranteed.

Socket Power Type Names

Name of Part	A-36	A-603	A-253	B-603 (For Units Numbered 500,000 Up)	B-603 (For Units Numbered Under 500,000)	B-253 (For Units Numbered 500,000 Up)	B-253 (For Units Numbered Under 500,000)	B-86
Transformer	Z-401*	Z-235	Z-236	Z-237	Z-237	Z-230	Z-230	
Transformer with "B" Output Adjuster				Z-406	Z-200	Z-405	Z-249	Z-430-A
Condenser				Z-224	Z-224	Z-224	Z-224	Z-354
Choke Coil								Z-224
Res. Coil Assembly	Z-94-R	Z-94-C	Z-94-C					
Variable Resistor				Z-195	Z-195	Z-195	Z-195	Z-253
Fixed Resistor				Z-129	Z-129	Z-129	Z-129	Z-129
ON and OFF Switch		L-732	L-732	L-733	L-733	L-733	L-733	L-733
Safety Switch								L-866
Relay Switch	Z-411		L-845					
Inside Cable	L-901	L-845	L-845					
"B" Panel with Terminals				Z-428-A	Z-217-A	Z-428-A	Z-217-A	Z-428-A
"B" Panel without Terminals								Z-386-A
Bottom Assembly	J-1401-A	J-1335-A	J-1335-A	J-1404-A	J-1328-B	J-1404-A	J-1328-B	J-1407-A
Container Lids		J-1336-A	J-1336-A		J-1329-A		J-1329-A	
Container Bodies		J-1337-A	J-1337-A		J-1330-A		J-1330-A	
Body and Lid Assembly	J-1403-A			J-1406-A		J-1406-A		J-1409-A
A.C. Attachment Cord with Plug	L-907	L-907	L-907	L-907	L-907	L-907	L-907	L-907
"A" Rectifier	Z-401*	K-463	K-463					
"B" Philcotron				K-457	K-457	K-457	K-457	K-457

Socket Power Type Names

Name of Part	B-82	AB-663	AB-623	AB-656	AB-652	AB-356-R	AB-686	AB-386
Transformer		Z-242	Z-243	Z-429	Z-243	Z-399*		Z-392*
Transformer with "B" Output Adjuster	Z-431-A						Z-432-A	
Condenser	Z-381	Z-200	Z-249	Z-406	Z-405	Z-406	Z-354	Z-354
Choke Coil	Z-224	Z-224	Z-224	Z-224	Z-224	Z-224	Z-224	Z-224
Res. Coil Assembly		Z-94-F	Z-94-F	Z-94-N	Z-94-N	Z-94-P	Z-94-Q	Z-94-R
Variable Resistor	Z-253	Z-195	Z-195	Z-195	Z-195	Z-195	Z-253	Z-253
Fixed Resistor	Z-129	Z-129	Z-129	Z-129	Z-129	Z-129	Z-129	Z-129
ON and OFF Switch	L-733	L-732	L-732					
Safety Switch	L-866						L-866	L-866
Relay Switch				Z-412	Z-412	Z-412	Z-413	Z-413
Inside Cable		L-722	L-722	L-847	L-847	L-899	L-897	L-898
"B" Panel with Terminals	Z-428-A	Z-217-C	Z-217-C	Z-387-A	Z-387-A	Z-387-A	Z-387-A	Z-387-A
"B" Panel without Terminals	Z-386-A						Z-386-A	Z-386-A
Bottom Assembly	J-1407-A	J-1331-B	J-1331-B	J-1410-A	J-1410-A	J-1410-B	J-1413-A	J-1413-B
Container Lids		J-1332-A	J-1332-A					
Container Bodies		J-1333-A	J-1333-A					
Body and Lid Assembly	J-1409-A			J-1412-A	J-1412-A	J-1412-A	J-1415-A	J-1415-A
A.C. Attachment Cord with Plug	L-907	L-907	L-907	L-907	L-907	L-907	L-907	L-907
"A" Rectifier		K-463	K-463	K-463	K-463	Z-399*	K-463	Z-392*
"B" Philcotron	K-457	K-457	K-457	K-457	K-457	K-457	K-457	K-457

\* This part number is for a complete unit, that is—transformer and rectifier.

## Parts List

(Continued)

Following is a parts list for all types of Socket Powers.

When ordering any parts always use the part numbers given in this table.

If any parts other than Philco are used in Philco Socket Powers the operation of the units cannot be guaranteed.

### Socket Power Type Names

Name of Part	AB-382	AB-463	AB-423	AB-4635 (For Units Numbered 500,000 Up)	AB-4635 (For Units Numbered Under 500,000)	AB-4235 (For Units Numbered 500,000 Up)	AB-4235 (For Units Numbered Under 500,000)	DB (For Units Numbered 500,000 Up)
Transformer . . . . .	Z-434	Z-240	Z-241	Z-240	Z-240	Z-241	Z-241	
Transformer with "B" Output Adjuster . . . . .								
Condenser . . . . .	Z-381	Z-200	Z-249	Z-406	Z-200	Z-405	Z-249	Z-406
Choke Coil . . . . .	Z-224	Z-224	Z-224	Z-224	Z-224	Z-224	Z-224	Z-224
Res. Coil Assembly . . . . .	Z-94-S	Z-94-D	Z-94-E	Z-94-D	Z-94-D	Z-94-E	Z-94-E	
Variable Resistor . . . . .	Z-253	Z-253	Z-253	Z-253	Z-253	Z-253	Z-253	Z-195
Fixed Resistor . . . . .	Z-129	Z-347	Z-347	Z-347	Z-347	Z-347	Z-347	Z-129
ON and OFF Switch . . . . .		L-732	L-732					L-733
Safety Switch . . . . .	L-866							
Relay Switch . . . . .	Z-413			Z-414	Z-414	Z-414	Z-414	
Inside Cable . . . . .	L-903	L-729	L-729	L-855	L-855	L-855	L-855	
"B" Panel with Terminals . . . . .	Z-387-A	Z-217-C	Z-217-C	Z-387-A	Z-387-A	Z-387-A	Z-387-A	Z-456-A
"B" Panel without Terminals . . . . .	Z-386-A							
Bottom Assembly . . . . .	J-1413-B	J-1331-D	J-1331-D	J-1365-A	J-1365-A	J-1365-A	J-1365-A	J-1404-A
Container Lids . . . . .		J-1332-A	J-1332-A					
Container Bodies . . . . .		J-1333-A	J-1333-A					
Body and Lid Assembly . . . . .	J-1415-A							J-1406-A
A.C. Attachment Cord with Plug . . . . .	L-907	L-907	L-907	L-907	L-907	L-907	L-907	L-907
"A" Rectifier . . . . .	Z-457	K-458	K-458	K-458	K-458	K-458	K-458	
"B" Philcotron . . . . .	K-457	K-457	K-457	K-457	K-457	K-457	K-457	

### Socket Power Type Names

Name of Part	DB (For Units Numbered Under 500,000)	DA-6 (For Units Numbered 500,000 Up)	DA-6 (For Units Numbered Under 500,000)	DAB-4 (For Units Numbered 500,000 Up)	DAB-4 (For Units Numbered Under 500,000)	TC-60	TC-25
Transformer . . . . .						Z-244	Z-245
Transformer with "B" Output Adjuster . . . . .							
Condenser . . . . .	Z-200			Z-406	Z-200		
Choke Coil . . . . .	Z-224			Z-224	Z-224		
Res. Coil Assembly . . . . .						Z-94-G	Z-94-H
Variable Resistor . . . . .	Z-195			Z-195	Z-195		
Fixed Resistor . . . . .	Z-129			Z-347	Z-347		
ON and OFF Switch . . . . .	L-733	L-732	L-732	L-732	L-732	L-732	L-732
Safety Switch . . . . .							
Relay Switch . . . . .		L-863	L-863			L-902	L-902
Inside Cable . . . . .							
"B" Panel with Terminals . . . . .	Z-456-A			Z-387-A	Z-387-A		
"B" Panel without Terminals . . . . .							
Bottom Assembly . . . . .	J-1328-B	J-1401-B	J-1371-A	J-1401-C	J-1371-C	J-1338-A	J-1338-A
Container Lids . . . . .	J-1329-A		J-1336-A		J-1336-A	J-1339-A	J-1339-A
Container Bodies . . . . .	J-1330-A		J-1370-A		J-1370-A	J-1340-A	J-1340-A
Body and Lid Assembly . . . . .		J-1403-A		J-1403-A			
A.C. Attachment Cord with Plug . . . . .	L-907	L-907	L-907	L-907	L-907	L-907	L-907
"A" Rectifier . . . . .						K-458	K-458
"B" Philcotron . . . . .							

\* This part number is for a complete unit, that is—transformer and rectifier.

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*PARTS LIST*

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**Philcotron Parts**

Parts for Philcotron cells will not be sold to dealers for repair work. Do not attempt to replace either of the electrodes or the solution in Philcotron cells. The solution and aluminum electrode will wear out together and the anode will become covered with an insulating coating at about the same time.

New Philcotrons that are spilled, or broken before the Socket Power is put into service should be returned to the jobber from whom purchased for repair.

Philcotrons that are received with broken covers or broken electrodes should also be returned to the jobber for complete replacement.

Never return spilled cells for replacement if they have already been used in service. Only new Philcotrons from which solution has been spilled or that have been damaged by breakage will be replaced.

## Use and Care of Philco Radio Batteries

### UD Batteries Used in Socket Powers

#### Putting Into Service

It has been proven that the UD glass case batteries, when properly filled and charged, will remain absolutely dry and free of any terminal corrosion on the outside. It is very important that great care be used in the original filling of these batteries.

Unscrew and remove the vent tubes from the battery and fill very carefully through a funnel just to the high level line. When moving the funnel from one cell to another do not allow a single drop of acid to get on top of the battery. If any acid is spilled on the battery, clean it off very carefully with a rag wet with ammonia or soda solution. Acid does not come out of the vent tube while these batteries are charging in a Socket Power, so any corrosion that takes place on the battery terminals must be due to acid being spilled while the battery is first being filled.

#### Specific Gravity of Electrolyte

Because of the large amount of acid above the tops of the plates in the UD-96 battery, it is necessary to fill this type with a lower gravity acid so that when the solution level drops to the low level line the gravity will not increase so much as to do damage.

Philco electrolyte furnished with Socket Powers is of the following gravities:

Philco electrolyte for type UD-44 battery—1.280 specific gravity

Philco electrolyte for type UD-86 battery—1.280 specific gravity

Philco electrolyte for type UD-96 battery—1.240 specific gravity

#### Charge Indicator

The Charge Indicator balls in all the batteries show that when both balls are up the battery is approximately 75 per cent or more charged. When one ball is up and one is down the battery is between 25 per cent and 75 per cent of full charge. When both balls are down the battery is less than 25 per cent charged.

#### Solution Level

The Charge Indicator balls also serve as an electrolyte level indicator. Add water to the battery when the solution level falls so much that the upper indicator ball floats at a level lower than the top of the indicator ball cage.

A closer check on the electrolyte level in UD batteries is as follows:

The high level line in the UD-44 and the UD-86 batteries is  $\frac{1}{2}$  inch above the top of the lead plates. The low level line is the top of the lead plates.

The high level line in the UD-96 battery is 1 inch above the top of the lead plates. The low level line is the top of the lead plates.

The correct filling levels are shown in the cuts on page 47.

Emphasize to everyone the importance of not allowing the solution levels to drop below the low level line. If the solution level drops so low that the top half of the plates are out of the solution, the remaining acid is of such a high gravity, due to the evaporation of so much water, that the plates will probably be ruined. This condition also will make the wood separators quite black and weak.

## “A” and “B” Batteries

### Putting Into Service

Philco radio batteries are shipped from the factory in a drydynamic condition, which means that they are charged but absolutely dry. It is only necessary to fill them with electrolyte to prepare them for use.

In order to have the same specific gravity electrolyte in all cells it is very important that all are filled initially to the proper level. If less solution is put into one cell than in the others and later this level is corrected with distilled water, the gravity of the electrolyte will always be lower in this one cell.

### Drydynamic or Initial Discharge

Philco radio batteries will deliver over 50 per cent of their rated capacity on this discharge. Because they are not 100 per cent charged, one of the ball charge indicators will probably sink as soon as the battery is filled. It will remain down until the battery has had a full charge.

If more capacity is desired on the first discharge, it can be had by charging the battery for about one-half the usual charging time before using it.

### Charging

**Trickle Charging of “A” Batteries:** Use the lowest charge rate that will usually bring both charge indicator balls to the top of the holding cage over night. Water must be added more frequently if higher rates are used. If the Philco Trickle Charger type TC-60 or TC-25 is used follow instructions accompanying Trickle Charger.

**Periodic Charging of “A” and “B” Batteries:** The battery should be recharged as soon as convenient after the first charge indicator ball has dropped to the bottom of the holding cage and not later than when the second ball has dropped. Frequent charging at low rates is better than less frequent charging at high rates. Never use rates higher than given in table below.

Charge until both indicator balls are up, that is, floating at the top of the cage, then continue to charge 4 to 8 hours more to complete the charge. When more than 24 hours' charge is needed it may be given in successive installments, broken by an evening's use of the battery if desired. If the charge is stopped just at the time when the second ball rises, the battery will not be fully charged and one ball will drop very soon after the battery is put into use.

The Philco “B” charger and “B” charging panel make the charging of “B” batteries very convenient and safe. Full connection instructions are packed with these units.

TYPE	Ampere Hour Capacity at Radio Rates	Charge Rate
UD-44 . . . . .	15 . . . . .	0.5
UD-86 . . . . .	30 . . . . .	1
UD-96 . . . . .	30 . . . . .	1
56-R. . . . .	65 . . . . .	2
76-R. . . . .	100 . . . . .	3
96-R. . . . .	130 . . . . .	4
116-R . . . . .	160 . . . . .	5
136-RW. . . . .	190 . . . . .	6



TYPE	Ampere Hour Capacity at Radio Rates	Charge Rate
74-RW . . . . .	100 . . . . .	3
132-RW . . . . .	190 . . . . .	6
83-X . . . . .	3 . . . . .	.15
86-H . . . . .	6 . . . . .	.25
248-DXO . . . . .	3 . . . . .	.15
248-DX . . . . .	3 . . . . .	.15
248-DHO . . . . .	6 . . . . .	.25
272-DXO . . . . .	3 . . . . .	.15

**Philco Charge Indicator**

These Indicators are built in all Philco glass-jar batteries and can be procured in a different form, known as a Charge Tester, for use in wood or rubber case batteries. The action of the indicator is as follows:

When the battery is fully charged, both of the indicator balls will float.

After 25 per cent of the capacity has been used, one of the indicator balls will sink.

After discharging the battery until 75 per cent of the capacity has been used, the second indicator ball will sink.

The battery should not be discharged much beyond this point.

While the battery is charging, the upper indicator ball will float after 25 per cent of the capacity has been put back. After 75 per cent of the charge has been put back, the lower indicator ball will float. To put back 100 per cent of the capacity the charge must be continued for several hours after both of the indicator balls float.

Never add any acid to radio batteries after the initial filling unless it is known that some acid spilled. Do not try to make the Charge Indicator balls float by adding acid to the cells.

Keep the solution level to the proper height by adding distilled water regularly.

Keep the battery clean and dry on top.

Any information desired regarding the charging of Radio "A" or "B" batteries can be obtained by writing to the Service Department, Philadelphia Storage Battery Company, Ontario and C Streets, Philadelphia, Pa.