November 13, 1931

WEEKLY SERVICE BULLETIN #1
(Printed in the interest of the Radio Dealer)

We are planning to issue a Service Bulletin each week covering problems encountered in the servicing of PHILCO receivers. We hope that these letters will be given to the Service Manager in order that they may have first-hand information.

PHILCO NEWS.
We would like to call your attention to the Philco News. This is a news bulletin issued by the Philadelphia Storage Battery Company and mailed directly from Philadelphia to your store. This bulletin contains a wealth of information on a service page which is located on the last page. For instance, in the November issue of the Philco News there are a number of questions and answers about radio, particularly about Philco. Customers have possibly asked you many of these questions and you have wondered yourself about many others. Read them all carefully for they will help you do a better selling job.

PENTODE TUBES.
A number of tubes, particularly the Pentode, are being returned to us marked "Gassy". Investigation shows that these tubes are not gaseous. In fact, they are extremely good and when placed in a radio set will give excellent performance. A violet glow around the inside of the glass is mistaken for a gaseous glow between the filament and plate, which characterizes a gassy tube.

SERVICE MANUAL.
We have endeavored to supply all service departments with a sufficient number of all types of service manuals in order to assist in tracing trouble. If the Service Manager will send a post card to this office telling us of any manual or information he may require, we will be glad to send it to him.

CHASSIS CUTTING OUT.
A number of chassis have been returned to us marked "Cutting out". In ninety per cent of the cases we have found this trouble to be in the tubes. The way this defect can be determined is for you to take a regular PHILCO Balancing wrench and tap all the tubes. However, it is best for you to wait until the tubes are all hot and then tap each one separately. When you strike the correct tube it will make a scratchy noise in the speaker proving that this tube has loose elements which cause the set to cut out.

Please cooperate with us by filing this bulletin for future reference.

GOODLIN RADIO CO. INC.
L. Young, Service Manager

December 3, 1931

WEEKLY SERVICE BULLETIN #2
(Printed in the interest of the Radio Dealer)

PHILCO MODEL 35 AND 35B BATTERY RECEIVERS.

It is important that our dealers understand the difference between the Model 35 and 35B.

The Model 35 comes to you complete with tubes, B and C batteries and a Philco two-volt storage battery.

The Model 35B includes a standard Philco battery chassis complete with tubes, B and C batteries, but does not include any A battery. There is no pilot light in this model 35B. A special resistor Philco part #5792 is supplied with this model. The model 35B is for use with an aircell battery. It is essential for you to use this special model when operating from an aircell battery.

AUDIO HOWL IN MODEL #70
A few cases of audio howl in the Model #70 have been called to our attention. If the shipping screws have been loosened so that the chassis is floating on its rubber support the howl will be eliminated. However, in some cases if this howl continues, the condition can usually be eliminated by placing a metal sheet shield over the detector tubes, or tightening the screws that hold the speaker in the cabinet.

We would like to have you bear in mind that it is necessary to loosen the chassis screws on all of the Philco radio sets.

INSULATING FILTER CHOKE WIRE IN MODELS #70 and #90.
A few reports have been received from certain territories where damp weather prevails of electrolysis action on the installation of the wire between the filter choke and one of the electrolitic condensers in the models 70 and 90. The action which takes place causes the installation to break down. It does not produce a direct short circuit, but does cause sufficient leakage to produce abnormally low operating voltages in the receiver. In the cases where this condition is found the wire should be unsoldered, and covered with spaghetti installation, part #7167, and reconnected. All model 70 and 90 receivers now being shipped from the factory have a heavy rubber insulating wire on this connection.

GOODLIN RADIO CO. INC.
L. Young, Service Manager

L. Young

C. Jane

December 15, 1931

WEEKLY SERVICE BULLETIN #3
(Printed in the interest of the Radio Dealer)

MODEL 570 GRANDFATHER CLOCK.

The model 570 takes the same radio equipment as the model 70. It contains in addition, the electric clock, connected to the double outlet receptacle at the back of the cabinet.

The electric clock should never require any attention providing it is permanently connected to a live current outlet of 115 volt sixty cycle. The clock will stop if the current is interrupted at any time, and must then be started and set again by hand.

If for any reason the clock does not operate correctly, do not attempt to repair the operating unit, but replace it with another unit, and return the defective one to us. The unit is fastened to a mounting board, and the entire assembly is then fastened to the face and cabinet with large mounting screws. To remove the unit, first remove the assembly including the clock plate. Remove the second hand by means of a standard clock hand puller, which can be obtained from any Jewelry store. Do not attempt to remove the second hand by prying with a screw driver as this will ruin the hand. Unscrew the nut which holds the hour and the minute hand in place, and lift these from their shaft. Remove the wood screws which hold the operating unit to the mounting board, and lift the unit from the board.

When reassembling the new unit, first place the hour hand on its shaft, replace the minute hand and tighten with the nut. Insert a rod through the center hold in the back of the clock until it touches the end of the rotor shaft. Resting the rod on a solid surface, gently tap the second hand in place.

LOSS OF VOLUME ON 70 AND 90.

Sometimes the fixed condenser that shunts the trimmer assembly for the Low frequency will open and not give enough capacity. This trimmer is #42 on service bulletin #56 and #37 on service bulletin #85, and #10 on bulletin #57. The capacity is .0007 in each case. Replacement of this condenser will repair set providing that the trimmer has not been turned. Otherwise it will have to be rebalanced.

LOCATING OPEN CONDENSER AND RESISTOR.

If the service man will build up a .01 condenser and 250.000 resistor with a switch and test leads so that either can be used and follow through the set, substituting the parts in the set with the condenser or resistor across the test leads, it will help greatly in locating the defective part. Of course the set must be hooked up complete and volume on. If more capacity and resistor values are at hand, a very neat testing set can be arranged.

GOODLIN RADIO CO. INC.
L. Young, Service Manager

LY:TD

January 21, 1932

WEEKLY SERVICE BULLETIN #4
(Printed in the interest of the Radio Dealer)

ADJUSTMENT OF MODEL 4 SHORT WAVE CONVERTER.

The short wave converter is accurately adjusted at the factory prior to the shipment. Under no circumstances are the compensating condensers to be adjusted in the field. The adjustment is extremely critical, and requires special oscillator equipment which we have here at our store. If the receiver requires adjustment, it should be returned to us.

NOISE IN SET WHEN TAPPED.

Sometimes the shield that covers the R.F. coils, and the R.F. coils will become loose on the chassis, and not make good ground. If this is the case, and the set is tapped or jarred, the set will chatter in the speaker. This trouble is easily overcome by bending the shield or twisting it slightly so that a good ground is made.

INSTALLING HEAD PHONES ON MAGNETIC SPEAKER OR ON PHILCO SETS.

Ordinary head phones can be installed across the voice coils on all Philco sets, and if necessary to turn the regular speaker off when the phones are used a switch can be installed in the voice coil and stop the speaker.

When more volume is desired for a Magnetic speaker, it can be installed on the other side of the output transformer, that is the other side from the voice coil. The first thing necessary is to remove the speaker cone, which is removed by taking out all the screws that hold the output side rim on the shell, and also the screws in the center of the cone. Be careful in removing the cone, as it is very easily damaged. The two wires that go to the voice coil must be unsoldered before the cone will be free. While the speaker is torn down, solder a wire about four inches long on each post of the transformer, so that you may connect a capacity of about 01 to 05 in each side on the outside after you have assembled the speaker again. Run the other side of the condenser to the magnetic speaker.

There has been a few complaints of speaker rattle, which can be easily overcome by using some fast drying glue on the joints that attach the voice coil to the cone. All that is necessary is to remove the cone from the speaker filling these cracks and joints and then assembling the speaker. In nine cases out of ten, we have found that this trouble can be corrected in this manner.

GOODLIN RADIO CO. INC.
L. Young, Service Manager

LY:TD

L Young

January 28, 1932

WEEKLY SERVUCE BULLETIN #5
(Printed in the interest of the Radio Dealer)

NO REPLACEMENT ON 1930 TUBES.
Effective January 1st, 1932 tubes bearing a 1930 code date will not be eligible for replacement. Over fourteen months have elapsed since tubes bearing 1930 code dates were manufactured, and over twelve months have elapsed since we have shipped any of these tubes to Philco dealers. If you have been keeping your tube stock moving, so that the old tubes are always shipped first, there is no possibility of any 1930 tubes still being within Philadelphia Storage Battery Company's ninety day replacement guarantee.

CAPACITY BOX NOW FURNISHED BY PHILCO.
A short time back we gave you instructions in regard to how to make a capacity box for substituting the value of the condenser in the set, while it is turned on. We are pleased to announce now, that the Philadelphia Storage Battery Company has a capacity box which carries the model #092 and lists at a price of $7.50. The standard discount to apply. We feel that no service department would be complete without the capacity box of some type, as this will enable the service man to save hours of time in locating faulty condensers. As in most cases, a condenser cannot be checked in a set, but would have to be removed from the circuit as other resistance or parts in the set might be causing this condenser to look like to was totally shorted.

SCREEN GRID CLIP ON 112 CHASSIS SHORTING.
We have found in a number of cases, due to shipping an vibration, that the upper screen grid connection on the R.F. tube of the 112 chassis will rub on the shield until it has cut through the instulation of the lead and ground the upper connection on the tube. This will cause noise and distortion on the set, and sometimes cause the set to be dead entirely. This information may help you in future service work.

RETURNING DEFECTIVE PARTS.
In returning defective parts to our office, we will please ask that you enclose or furnish us with the serial and model number of the machine on which the defective parts were removed, as we must have this information for the factory, before we will receive replacement.

HIGH FREQUENCY TRIMMER CONDENSER SHORTING.
On the model 51, 70 and 90 chassis on the high frequency condenser trimmer you will find sometimes that there is a metal washer above the fiber washer of the trimmer. This metal washer in some instances may get grounded to the tongue that sticks up from the plate of the trimmer. If this is the case, it will short the entire condenser circuit, and removal of this metal washer will correct the trouble, and not do any damage.

MICROPHONIC HUM IN 35 CHASSIS.
We have had a few complaints in regard to the model 35 Battery Set having a microphonic hum when the set is either turned entirely off or clear on, that is the volume control. If the lead shield that is to be placed over the detector tube in this set is not placed on the detector tube, it will cause this sort of a hum. We suggest that this shield be checked, and see that it is in its proper position. However, if this does not correct the trouble, we have also found that condenser #22 on the service bulletin for the 35 may be shunted with a 100,000 ohm resistance or Philco part #4411, and in all instances this has corrected this trouble.

January 28, 1932

WEEKLY SERVICE BULLETIN #6
(Printed in the interest of the Radio Dealer)

ALIGNMENT OF MODEL 51 CHASSIS.
The alignment of this chassis is practically the same as in all other cases of Philco sets, and requires an intermediate frequency oscillator of 175 kilocycles. For those of you who have oscillators of this type, there are three trimmers in a group in the back of the chassis which represents the intermediate frequency trimmers. One of these however, is way to the front of this chassis, but an investigation with a flashlight you will find it without any trouble. There is another trimmer however, in the back of this chassis which is the low frequency trimmer. There are three trimmers up on the condenser gang, the back one represents the high frequency condenser and the two front ones are the antenna trimmers. The proceedure in aligning this set, is the same as in the 70,90 or 112 chassis.

TONE QUALITY OF 112X.
It is very essential that the chassis screwa be loosened on this model, because if they are left in the tight condition in which the set is shipped, they will ruin the tone. Also the set must be in proper balance before the proper tone quality can be had, and as this set is sold more so for tone quality than anything else we think that is a very important object.

LOOSE ELIMENTS IN 24 AND 27 TYPE TUBES.
In shipping of sets with tubes in them, we have found that in some instances, the eliments of this tube will become loose internally, and although they may test good on any type of tube tester, the trouble will not show up, but about the only way to satisfactorly tell, will be a substitution of another tube in the set while the set is in operation. The tube can usually be located very easily by just tapping the set, or the tubes individually.

TABLES FOR MIDGET MODEL RADIO SETS.
We are pleased to advise that we are now carrying in stock, three numbers in Philco tables, which are as follows:

The model #88 table used with the 90 Baby Grand lists at $4.00, dealers price $2.40.
The model #45 table used with the 70 Baby Grand lists at $4.00, dealers price $2.40.
The model #33 table used with the 50 Baby Grand lists at $4.00, dealers price $2.40.

GOODLIN RADIO CO. INC.
L.B. Young, Service Manager.

February 16, 1932

WEEKLY SERVICE BULLETIN # 7
(Printed in the interest of the Radio Dealer)

PHILCO NOW BUILDING AN INTERMEDIATE FREQUENCY OSCILLATOR.
The Philadelphia Storage Battery Company have just announced that they are now capable of furnishing intermediate frequency oscillator that will align all Philco sets in use today. This oscillator uses one 33 pentode tube and requires two four and one half volt c batteries. One battery being used as a filament supply and the other being used as a plate supply. It has a switch that can be thrown one way for the 175 Kilocycles and in the opposite direction for 260 kilocycles, used in our model 70. This oscillator comes finished up in a rugged aluminum case with a Weston output meter with plug and cable to make connection with a speaker socket when the output reading is used, eliminating any necessity of making connections on the voice coil of the speaker. With this equipment, it will be unnecessary for a dealer to have any other further equipment in aligning any of the Philco receivers. The list price of this oscillator complete with the output meter is $47.50 and dealers will be given a good discount. As a superheterodyne set is very critical in balancing, and a large amount get out of balance in shipping, we feel that most all dealers should have an oscillator of this type.

A BURNED RESISTOR IN MODEL 51 SUPERHETERODYNES.
We have found a few resistances of the one thousand ohms burned up in the model 50 chassis due to the fact that the intermediate frequency transformer that mounts with the trimmer condenser in the back has grounded. In most cases in disassembling the intermediate frequency transformer, you will find the ground without any trouble. After the short has been found and corrected, installing a new one thousand ohm resistor in place of the old, will repair this in fine shape.

REDUCING INTERFERENCE.
We have found in a number of cases that installation has been made on Philco receivers and just a ground wire was used and no aerial at all. Of course a superheterodyne set is sensitive enough that they can be used with only a ground wire, but in many cases where interference is bothering it will be found that an aerial up above this interference or up in the air and also the use of shielded leadin can reduce this interference and also in some cases a lot of fading. In a great number of cases, where interference was so bad, that a sale was also lost, we have used a shielded leadin wire and reduced this interference far enough that the sale was made. We think that an investigation on each case of interference this way will in a great many cases save a sale. It is also possible when the interference is thought to be in the very house that the set is installed to loosen one fuse at a time in the fuse box for the house until you find which circuit it is that is causing the trouble. That is loosening one fuse that is not connected to the radio at a time until the interference stops, and if necessary change the radio into another outlet and loosen the fuse that the radio was plugged into. This will absolutely eliminate any possibility of there being an interference in that home.

PRICE OF .093 CAPACITY BOX AND CORRECTION.
The price of the .093 capacity box with 15 different capacities from .00025 to 2 mf. is $12.00 list and net to the dealer at $7.80, and we feel that any dealer that has any amount of service work will find it very useful. The model .093 box is used in making connection of the magnetic speaker on any Philco set using speaker plug. List $7.50.

GOODLIN RADIO CO. INC.

Y:TO

L. Young, Service Manager

April 6, 1932.

PHILCO SERVICE BULLETIN NO. 8
(Printed in the Interest of the Radio Dealers)

RETURN OF SETS WHICH CUT OFF.

In returning sets that cut off, be sure that the trouble is in the set as we have had sets returned for cutting off and later found that the trouble was in the aerial or ground or the station that was tuned in. When a set cuts off, tune another station quickly and see if the set is really dead or if the station has had some interruption.

In returning sets for repair, if the packing slip is enclosed stating what the complaint is, we will be able to give better and faster service. In some cases a set has been returned that will cut off after playing several hours and, of course, it will check O.K. and if we would have had some information as to what the complaint was, the trouble would have been found accordingly.

GLASS BROKEN IN MODEL A CLOCK.

We have had a few cases where the Model A Clock has been shipped and the glass was broken. This glass can easily be obtained and cut to size from any ordinary picture store or glass company at a very small expense and need not be returned to us for that reason. However, we have a glass in stock here in case you cannot obtain same locally.

NOISE FROM ELECTRICAL APPLIANCE.

When you have a complaint from noise in the radio set which has developed from the use of an oil burner or other electrical appliance, it can easily be reduced to a minimum by the use of two 2 M.F. condensers connected into the line as close as possible to the motor. The proper way to hook these condensers into the line is to hook one terminal of each condenser to each side of the line; then adjoining the other side of each condenser together and running from this contact a wire to the nearest ground. Also be sure that the motor frame is grounded. We would suggest that you put a small fuse from about six to 10 amperes in series with both connections on the line and also in series with the ground connection so that in event that the condenser might short it would not ground the line or short it.

ALIGNMENT OF THE NEW NO. 7 TRANSITONE.

This set is balanced up in much the same order as all other Philco receivers and uses an intermediate frequency of 175 kilocylces and the oscillator should be connected to the top of the center tube

in opening when shield is off. The bottom shield must be removed from the set in order to balance the set and the intermediate frequency trimmers will be found directly underneath the intermediate frequency transformers. Also one intermediate frequency trimmer is located just back of the detector oscillator socket when looking from underneath the set.

The other trimmer condenser underneath the set is the low frequency trimmer and is located at approximately the middle of the chassis. The high frequency compensator and the padding condensers are about the same location on the condenser gang as in the Model 70. The padding condensers should be adjusted after the installation has been completed.

THE ALIGNMENT OF THE MODEL 90X CHASSIS.

The alignment of the Model 90X chassis is done with an intermediate frequency of 260 kilocycles and the oscillator should be connected as in the case of the #7 Transitone on the top of the screen grid tube that is the detector oscillator tube and is found under the tube shield and is the center tube. The intermediate frequency trimmers are located as follows: one at the rear corner of the tuning condenser gang, one very close to the speaker plug, one about the middle of the tuning condenser gang on the side next to the shields that cover the R.F. and I.F. coils.

The high frequency trimmer is the one to the rear on the condenser gang, the detector condenser in the middle and the R.F. condenser to the front. If the proper procedure in adjusting Philco sets is understood, we believe these instructions will be very helpful.

SPECIAL INSTRUCTIONS ON NO. 7 TRANSITONE.

We would like to warn you about installing the #7 Transitone. This set is four times as sensitive as the #3 and it will be a good practice to always shield the aerial lead wire which is best done by using a covering like used on the B Cable first and using the shielding on the outside of this, run it completely to the set and bond it on the set. This will give a lot more volume because of the greater distance between the aerial wire and the grounded shielding.

GOODLIN RADIO COMPANY, INC.

L. B. Young

L. B. Young,
Service Manager.

LBY:FP

Factory

PHILCO

Radio Service Bulletin—No. 13

Models 77 and 77-A Receivers

Model 77 Receivers are for operation on 100-130 volt, 50-60 cycle AC lines
Model 77A Receivers are for operation on 100-130 volt, 25-60 cycle AC lines

Table 1—Tube Socket Readings Taken with AC Set Tester AC Line—115 volts

TUBE		FILAMENT VOLTS	PLATE VOLTS	SCREEN GRID VOLTS	CONTROL GRID VOLTS	CATHODE VOLTS	PLATE MILLI-AMPERES
TYPE	CIRCUIT						
24	1st R. F.	2.3	145	90	3	13	3.5
24	2d R. F.	2.3	145	90	3	13	3.5
24	Detector	2.3	36*	30†	1.4	12	0
27	1st A. F.	2.3	140		1	10	3
45	2d A. F.	2.2	230		46		30
45	2d A. F.	2.2	230		46		30
80	Rectifier	4.5					50/Plate

All readings taken with antenna disconnected and ground on. Volume control on full.
*Read with a 250,000-ohm voltmeter. †Read with a 100,000-ohm voltmeter.

Table 2—Power Transformer Voltages

TERMINALS	A.C. VOLTS	
1–2		Primary
3		Center Tap for 80 Plate
4		Center Tap for 45 Tubes
5–6	2.67	Heaters of 24 and 27 Tubes
7–8	2.68	Filaments of 45 Tubes
10–11	5.00	Filament of 80 Tube
9–12	750	Plate of 80 Tube
Rubber Covered Lead		Center Tap for 24 and 27 Tubes

Table 3—RESISTOR DATA

No. on Figs. 3 and 4	Terminal	Resistance	Color
㉚	1–2	1,400	Long Tubular
	2–3	1,500	
	3–4	2,000	
㉖	1–2	250	Short Tubular
	3–4	800	
⑫ ⑱		100,000	Silver Gray
⑮		250,000	White
⑰ ⑳		500,000	Battleship Gray
㉙		85	Flatwire wound

Table 4—CONDENSER DATA

(Other Than Filter Block)

No. on Figs. 3 and 4	Capacity MFD	Volts D.C. With Receiver Turned On
⑦	.25	95 on Screen Grid Cond.
		15 on Cathode Cond.
⑪	.05	150
⑬	.5	12
⑭	.25	95 Plate Resistor Cond.
		40 Screen Grid Cond.
⑯	.00025	
⑲	.01	25

Model 77 Condenser Block Part No. 3870

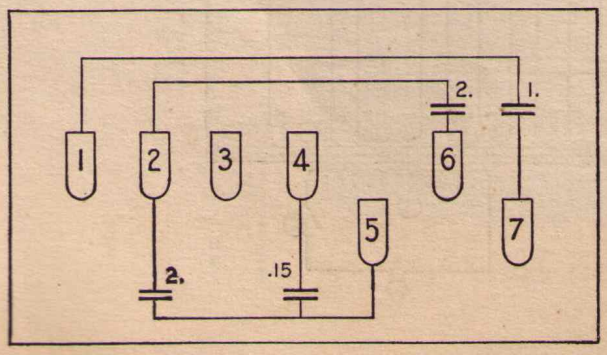

Fig. 1

Model 77A Condenser Block Part No. 3871

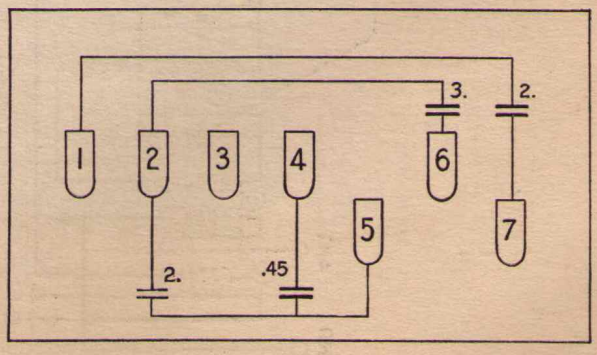

Fig. 2

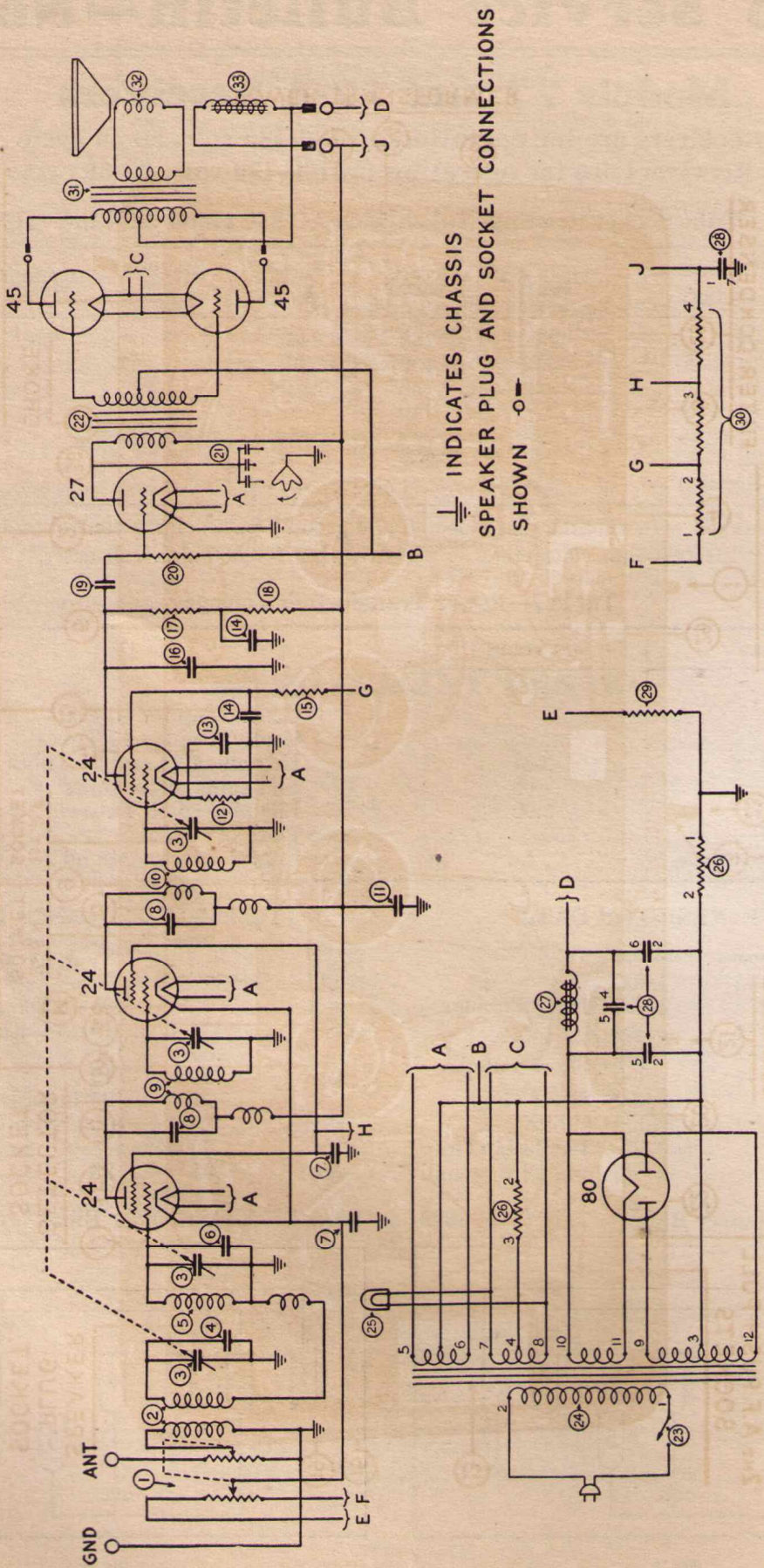
INDICATES CHASSIS
SPEAKER PLUG AND SOCKET CONNECTIONS
SHOWN
ANT
GND
45
45
27
24
24
24
80
A
B
C
D
E
F
G
H
J

Fig. 3

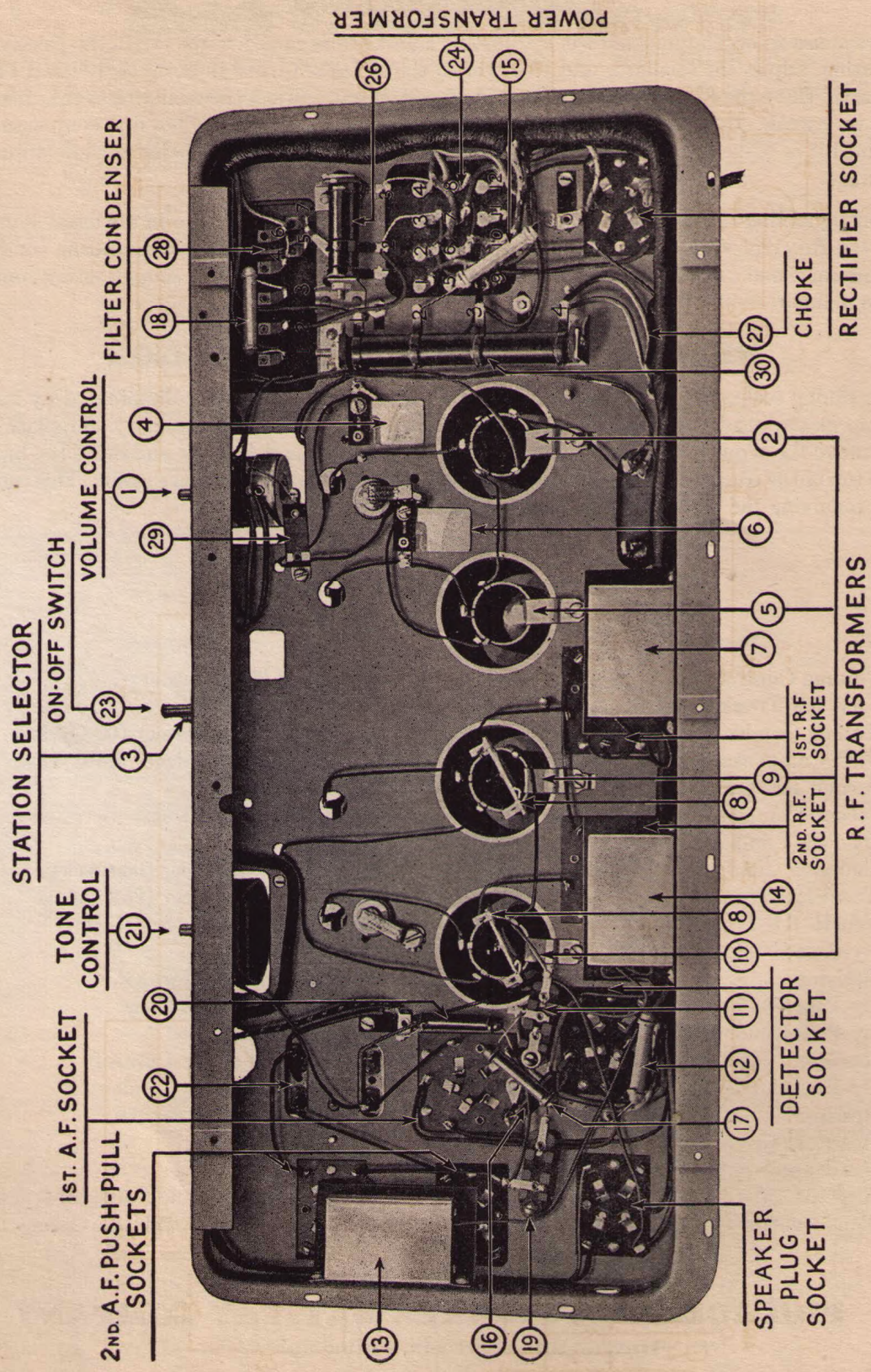
POWER TRANSFORMER
FILTER CONDENSER
VOLUME CONTROL
ON-OFF SWITCH
STATION SELECTOR
TONE CONTROL
1ST. A.F. SOCKET
2ND. A.F. PUSH-PULL SOCKETS
SPEAKER PLUG SOCKET
DETECTOR SOCKET
2ND. R.F. SOCKET
1ST. R.F. SOCKET
R. F. TRANSFORMERS
CHOKE
RECTIFIER SOCKET

Fig. 4

COMPENSATING

Always use an oscillator signal when adjusting compensating condensers. With the Receiver set up for operation, adjust the oscillator and Receiver so the signal is turned in between 120 and 140 on the tuning scale. Have the Receiver volume control turned on full. Adjust the oscillator so that the received signal is very weak. Using a fibre wrench turn down on the adjusting nut of the first compensating condenser until it is quite tight. This purposely throws the first stage out of balance while adjusting the second stage.

After tightening this first adjusting nut compensate the second condenser in the usual manner, that is, tune the Receiver very carefully to the oscillator signal and adjust the compensating condenser for the maximum signal. After this adjustment has been made, adjust the first compensating condenser in the same manner.

NEW TUNING SCALE ILLUMINATION

The tuning scale used in the Models 77 and 77-A is translucent and is illuminated by means of a pilot lamp placed inside the drum of the tuning condenser. In case it is necessary to replace the pilot lamp, remove the screw fastening the lamp bracket to the condenser housing and bring the bracket out over the top of the condenser. Replace the lamp and fasten the bracket in place again. This can be done without removing the chassis from the cabinet.

REPLACEMENT PARTS

No. on Figs. 3 and 4	Description	Part No.
①	Volume Control	4094
②	First RF Transformer	3884-A
③	Tuning Condenser	4000-B
④	First Compensating Condenser	3968-A
⑤	Second RF Transformer	3884-B
⑥	Second Compensating Condenser	3772-A
⑦	By-Pass Condenser	3557
⑧	Coupling Condenser	3892-A
⑨	Third RF Transformer	3884-C
⑩	Fourth RF Transformer	3884-C
⑪	By-Pass Condenser	3615-D
⑫	Resistor	3767
⑬	By-Pass Condenser	3583
⑭	By-Pass Condenser	3557
⑮	Resistor	3768
⑯	By-Pass Condenser	3082
⑰	Resistor	3769
⑱	Resistor	3767
⑲	Condenser	3903-F
⑳	Resistor	3769
㉑	Tone Control	4037-A
㉒	Input Transformer	3872
㉓	On-Off Switch	4095
㉔	Power Transformer (60 Cycles)	3868
	Power Transformer (25 Cycles)	3869
㉕	Pilot Lamp	3463
㉖	BC Resistor	3864
㉗	Choke	3422
㉘	Filter Condenser (60 Cycles)	3870
	Filter Condenser (25 Cycles)	3871
㉙	C Resistor	4121
㉚	BC Resistor	3865
㉛	Output Transformer	2848
㉜	Voice Coil and Cone	2794-B
㉝	Field Coil	2850
	Knob (Volume Control)	3579-A
	Knob (Tuning Condenser)	3580-A
	Knob (On-Off Switch)	3676-A
	Dial Indicator	4006
	Scale	4118
	Speaker Plug and Cable (Short)	L-1101-A
	Speaker Plug and Cable (Long)	L-1102-A

PHILADELPHIA STORAGE BATTERY COMPANY
Ontario and C Streets, Philadelphia, Pa.

October, 1930 Form No. 2320 Printed in U. S. A

PHILCO

Factory

Radio Service Bulletin—No. 14

Models 96 and 96 A Receivers

Model 96 Receivers are for operation on 110-120 volt, 50-60 cycle AC lines
Model 96 A Receivers are for operation on 110-120 volt, 25-60 cycle AC lines

Table 1—Tube Socket Readings Taken with AC Set Tester AC Line—115 volts

TUBE		FILAMENT VOLTS	PLATE VOLTS	SCREEN GRID VOLTS	CONTROL GRID VOLTS	CATHODE VOLTS	PLATE MILLI-AMPERES
TYPE	CIRCUIT						
24	1st R. F.	2.15	155	95	0	5.3	4
24	2d R. F.	2.15	155	95	0	5.3	4
24	3d R. F.	2.15	155	95	0	5.3	4
27	Det.	2.15	0		−.5	.7	0
27	Det. Amp.	2.15	27		−.5	5.5	0
27	1st A. F.	2.15	85		−2.0*	5.5	2.5
45	2d A. F.	2.2	250		41		28
45	2d A. F.	2.2	250		41		28
80	Rectifier	4.5					43/Plate

*This is read with Volume Control off.
NOTE: Do not allow receiver to oscillate while taking readings. Keep R. F. shield on and tune to eliminate oscillation. Have antenna and ground connected.

Table 2—POWER TRANSFORMER VOLTAGES

TERMINALS	A.C. VOLTS	
1—2		Primary
3		Center Tap 80 Tube
4		Center Tap 45 Tubes
5—6	2.67	Heaters for 24 and 27 Tubes
7—8	2.68	Filaments for 45 Tubes
9—12	750.	Plates 80 Tube
10—11	5.0	Filament 80 Tube
Rubber Covered Lead		Center Tap for 24 and 27 Tubes

Table 3—RESISTOR DATA

No. on Figs. 3 and 4	Resistance	Color
①	5,000	Golden Yellow
⑭—㊱	13,000	Belgium Blue
㊲	25,000	Auto Buff
⑥—㉝—㉟	70,000	Jade Green
⑳—㉑—㉓	100,000	Silver Gray
㉔—㉜	250,000	White
⑲—㉕—㉙	500,000	Battleship Gray
㊺	8,300	Long Tubular
㊶	800	Short Tubular
㊹	70	Flat Wire Wound

Table 4—CONDENSER DATA (Other Than Filter Block)

No. on Figs. 3 and 4	Capacity MFD	Volts D.C. With Receiver Turned On
⑤—⑪—⑬	.05	...
⑨—⑯	.05 with 250 ohm Resistor	160
⑧—⑰	.05 with 250 ohm Resistor	110
⑱	.00005	...
㉒	.50	...
㉖	.00025	...
㉗	.00025	30
㉘	.015	30
㉛	.05	66
㊿	.015	...

MODEL 96 CONDENSER BLOCK PART No. 3754

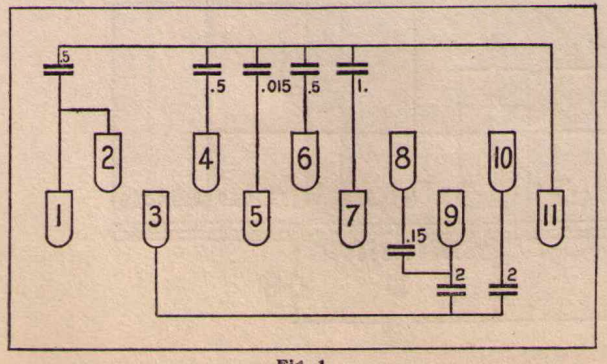

Fig. 1

MODEL 96-A CONDENSER BLOCK PART No. 3755

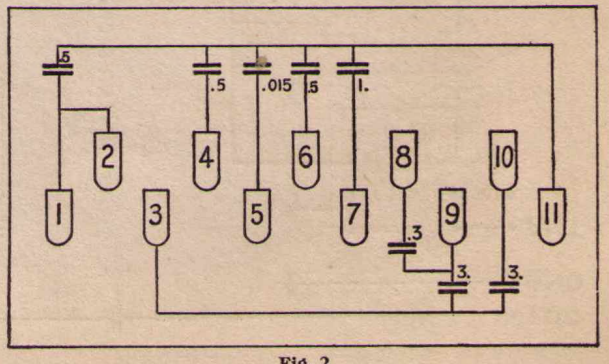

Fig. 2

NOTE: Filter Condensers—Parts No. 3754 and 3755—formerly had 1 mfd. capacity between terminals 1-11 and 6-11. The old and new condensers are interchangeable.

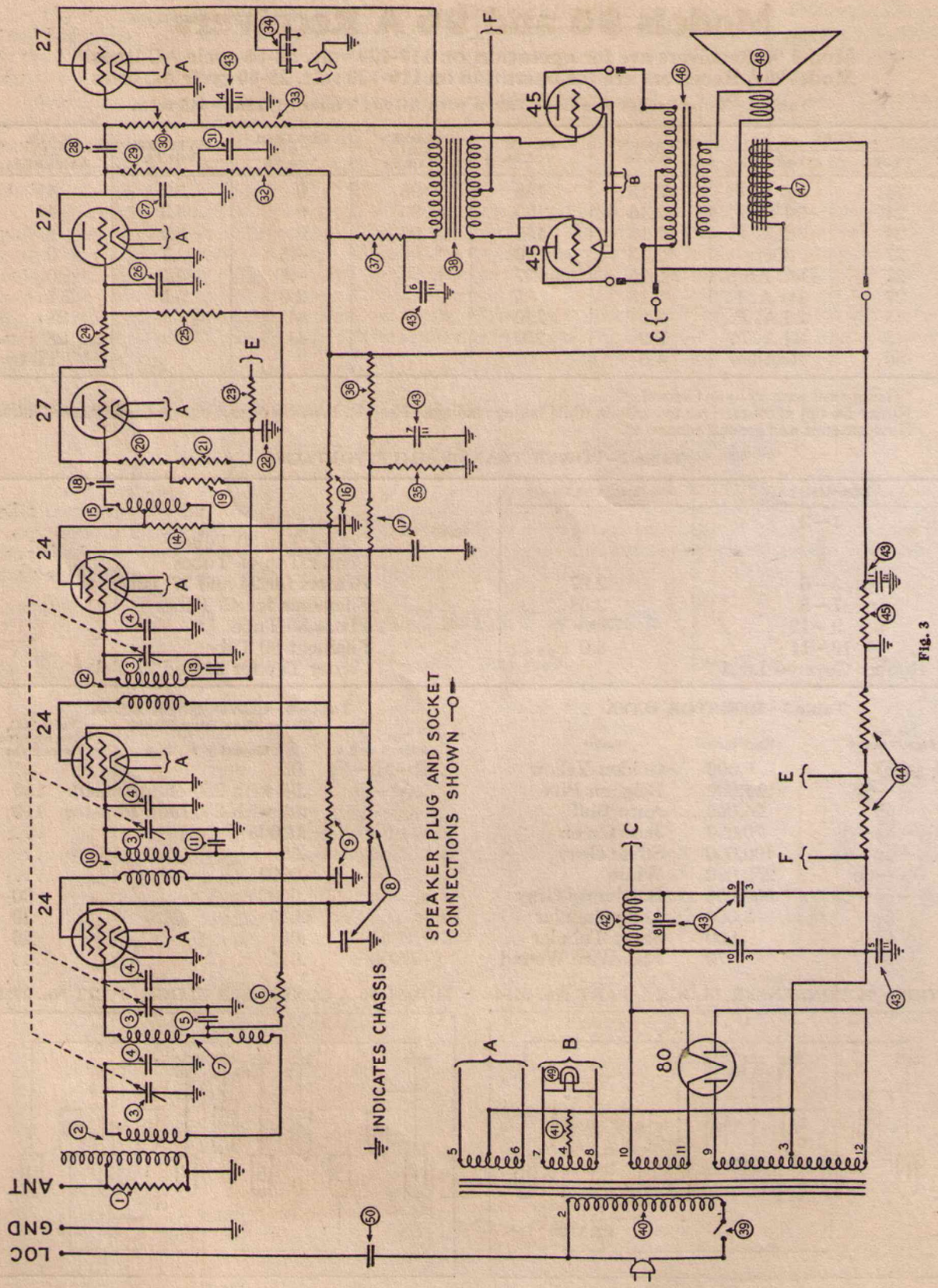
ANT
GND
LOC
INDICATES CHASSIS
SPEAKER PLUG AND SOCKET CONNECTIONS SHOWN
27
24
45
80
A
B
C
E
F

Fig. 3

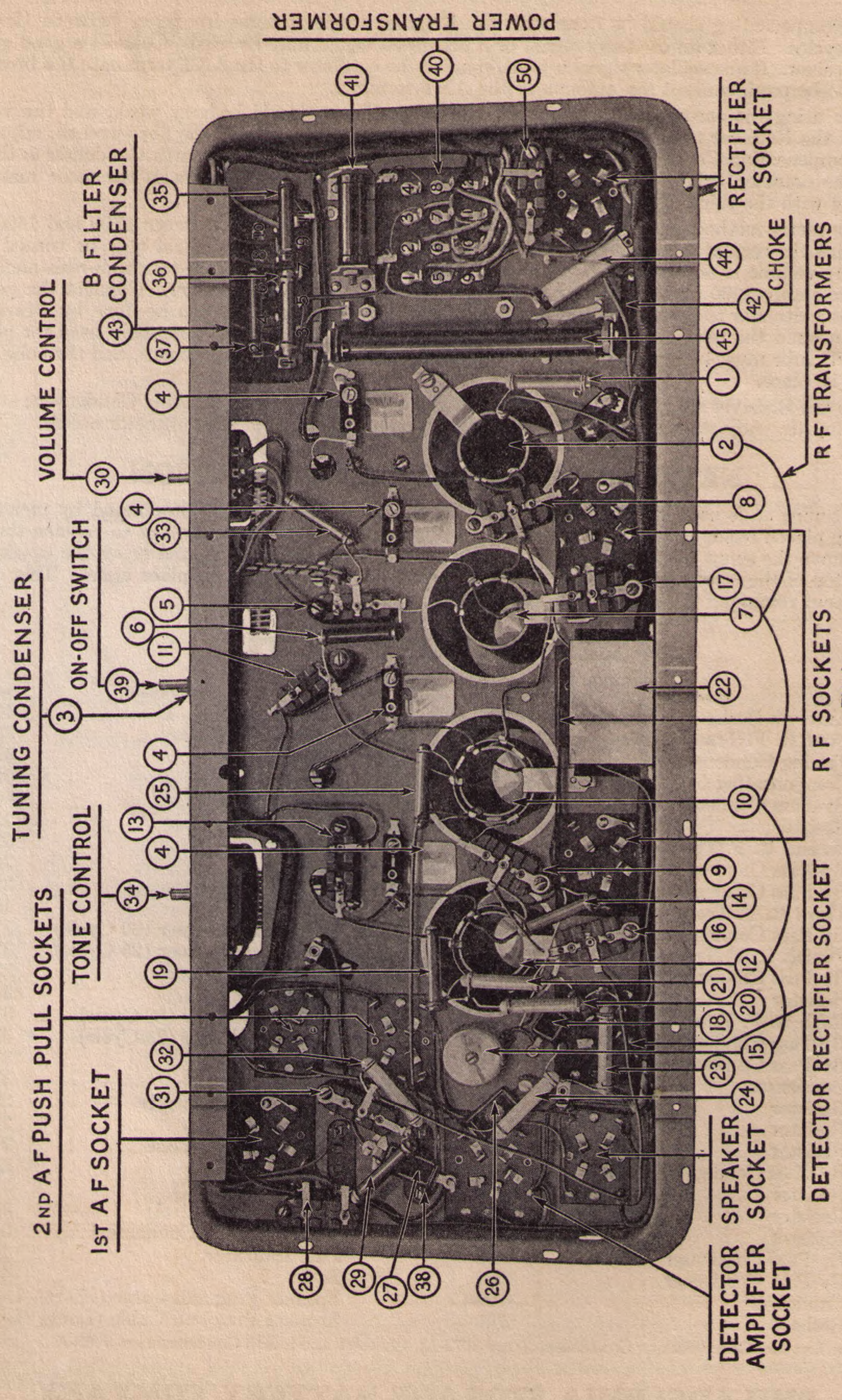
POWER TRANSFORMER
RECTIFIER SOCKET
CHOKE
R F TRANSFORMERS
R F SOCKETS
DETECTOR RECTIFIER SOCKET
SPEAKER SOCKET
DETECTOR AMPLIFIER SOCKET
B FILTER CONDENSER
VOLUME CONTROL
ON-OFF SWITCH
TUNING CONDENSER
TONE CONTROL
2ND A F PUSH PULL SOCKETS
1ST A F SOCKET

Fig. 4

ADJUSTING COMPENSATING CONDENSERS

The compensating should be done with the Receiver tuned to some frequency between 1200 and 1400 kilocycles. Either an oscillator signal or a broadcast signal may be used. Connect a good ground to the Receiver. If an oscillator signal is used, connect the oscillator to the ANT terminal. If a broadcast signal is to be used, connect the antenna to the ANT terminal.

When using the ear-method, the signal from the oscillator should be very weak, and the volume control of the Receiver turned on full. Tune the Receiver sharply. Using the fibre-wrench, adjust the fourth Compensating Condenser until maximum volume is obtained. The fourth Condenser is the one nearest the detector tube. Then adjust the other Compensating Condensers in the same manner—proceeding with the third, then the second, and then the first.

If the meter-method is to be used, tune in a strong broadcast signal between 1200 and 1400 kilocycles, using the regular antenna connected to the Receiver. The volume control may be turned down so that the volume is not annoying. Connect the negative terminal of a 250-volt high-resistance voltmeter (preferably 1000 ohms per volt) to the ground terminal of the Receiver. Connect the positive lead of the voltmeter to the screen-grid terminal of the third 24 tube. This can be done by wrapping a fine wire around the prong of the tube, or by using an adaptor such as is commonly used for pick-up work. This tube must be in the socket and operating when making the adjustment, and the tube shield put back in place.

Tune the Receiver sharply. Then check the adjustments of the Compensating Condensers, starting with the fourth. Adjust each one to the point of maximum deflection of the voltmeter needle.

NEW TUNING SCALE ILLUMINATION

The tuning scale used in the Models 77 and 77-A is translucent and is illuminated by means of a pilot lamp placed inside the drum of the tuning condenser. In case it is necessary to replace the pilot lamp, remove the screw fastening the lamp bracket to the condenser housing and bring the bracket out over the top of the condenser. Replace the lamp and fasten the bracket in place again. This can be done without removing the chassis from the cabinet.

REPLACEMENT PARTS

No. on Figs. 3 and 4	Description	Part No.
①	Antenna Resistor	3526
②	First R. F. Transformer	3744-A
③	Tuning Condenser	4000-D
④	Compensating Condenser	3772-A
⑤	By-Pass Condenser	3615-F
⑥	Resistor	3542
⑦	Second R. F. Transformer	3744-B
⑧	By-Pass Condenser and Resistor	3615-C
⑨	By-Pass Condenser and Resistor	3615-B
⑩	Third R. F. Transformer	3744-C
⑪	By-Pass Condenser	3615-E
⑫	Fourth R. F. Transformer	3744-C
⑬	By-Pass Condenser	3615-E
⑭	Resistor	3766
⑮	Fifth R. F. Transformer	3775-B
⑯	By-Pass Condenser and Resistor	3615-B
⑰	By-Pass Condenser and Resistor	3615-C
⑱	Condenser	3774
⑲	Resistor	3769
⑳	Resistor	3767
㉑	Resistor	3767
㉒	By-Pass Condenser	3583
㉓	Resistor	3767
㉔	Resistor	3768
㉕	Resistor	3769
㉖	By-Pass Condenser	3082
㉗	By-Pass Condenser	3082
㉘	Condenser	3793-C
㉙	Resistor	3769
㉚	Volume Control	4093
㉛	By-Pass Condenser	3615-D
㉜	Resistor	3768
㉝	Resistor	3542
㉞	Tone Control	4037-A
㉟	Resistor	3542
㊱	Resistor	3766
㊲	Resistor	3656
㊳	Input Transformer	3537
㊴	On-Off Switch	4095
㊵	Power Transformer (60 Cycle)	3752
㊵	Power Transformer (25 Cycle)	3753
㊶	C Resistor	3763
㊷	Choke	3422
㊸	Filter Condenser (60 Cycle)	3754
㊸	Filter Condenser (25 Cycle)	3755
㊹	Resistor	3764
㊺	B Resistor	3762
㊻	Out-Put Transformer	2848
㊼	Field Coil	2850
㊽	Voice Coil and Cone	2794-B
㊾	Pilot Lamp	3463
㊿	Condenser (LOC)	3793-B
	Knob (Vol. Control)	3579
	Knob (Tuning Condenser)	3580
	Dial Indicator	4006
	Scale	4118
	Speaker Plug and Cable (Short)	L-1101-A
	Speaker Plug and Cable (Long)	L-1102-A

NOTE: The first two Compensating Condensers ④ are 3772-A; the third and fourth Condensers are 3968-A.

PHILADELPHIA STORAGE BATTERY COMPANY
Ontario and C Streets, Philadelphia, Pa.

May, 1930 Form 2321 Printed in U. S. A.

PHILCO

Radio Service Bulletin—No. 16

Model 41 Receiver

The Model 41 Receiver is for use on 100–130 volts Direct Current only

Table 1—TUBE SOCKET READINGS
Line Voltage 115

Tube	Circuit	Filament	Plate	Screen Grid	Control Grid	Plate Mils
24	1 R. F.	2.1	100	75	.4	2.7
24	2 R. F.	2.1	100	75	.4	2.7
24	Detector	2.1	45	15	1.8	...
27	1 A. F.	2.4	87	..	.2	2.7
71-A	2 A. F.	5	85	..	13	15
71-A	2 A. F.	5	85	..	13	15

Readings must be taken with volume control on full.

Always use high-resistance voltmeter, preferably 1000 ohms per volt, when checking voltages in the Receiver. For reading plate and screen voltages, use a 250- or 300-volt scale. Voltage readings taken with meters having less than 250,000 ohms resistance will be lower than voltages given in the table.

Table 2—RESISTOR VALUES

No. on Figs. 2 and 3	Terminals	Ohms Resistance
(17)—(36)		5,000
(23)		13,000
(19)—(34)		25,000
(7)—(13)		33,000
(24)		70,000
(20)—(26)		100,000
(25)—(28)		500,000
(33)		250
(37)	1–2	4
	2–3	2
(38)	(Note: 20-inch—External)	53

Table 3—CONDENSER CAPACITIES
(Other than Filter Condenser)

No. on Figs. 2 and 3	MFD. Capacity
(27)	.01
(6)—(12)—(16)—(18)	.05
(9)—(22)	.25
(21)	.0005

(32) Filter Condenser **Part No. 4067**

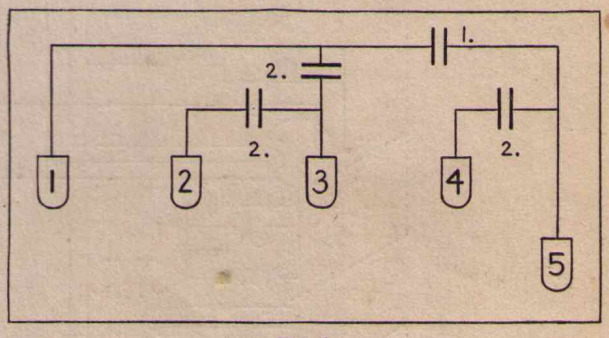

Fig. 1

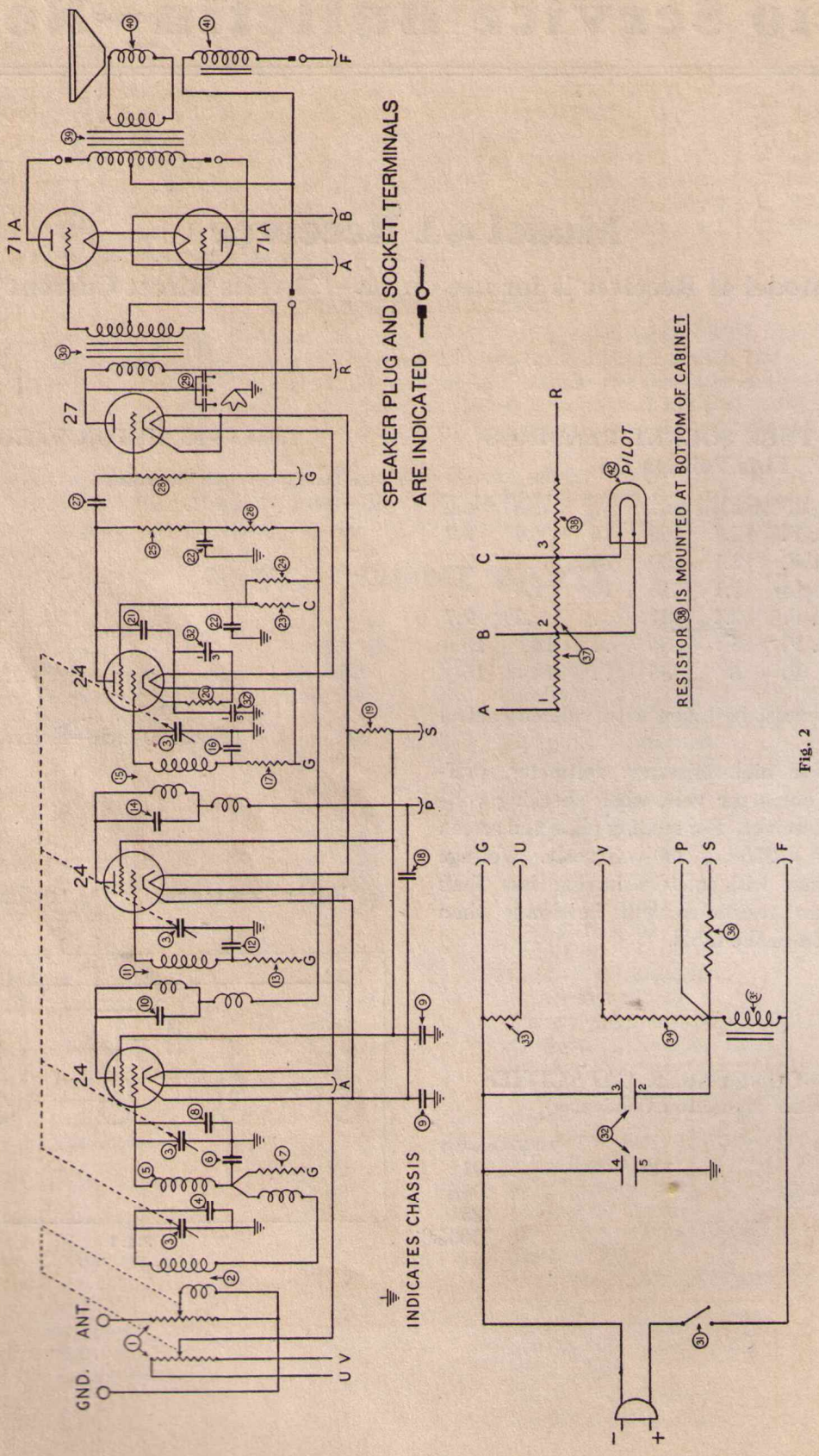
SPEAKER PLUG AND SOCKET TERMINALS ARE INDICATED
INDICATES CHASSIS
RESISTOR (38) IS MOUNTED AT BOTTOM OF CABINET
PILOT
71A
71A
27
24
24
24
ANT.
GND.
G
U
V
P
S
F
A
B
C
R

Fig. 2

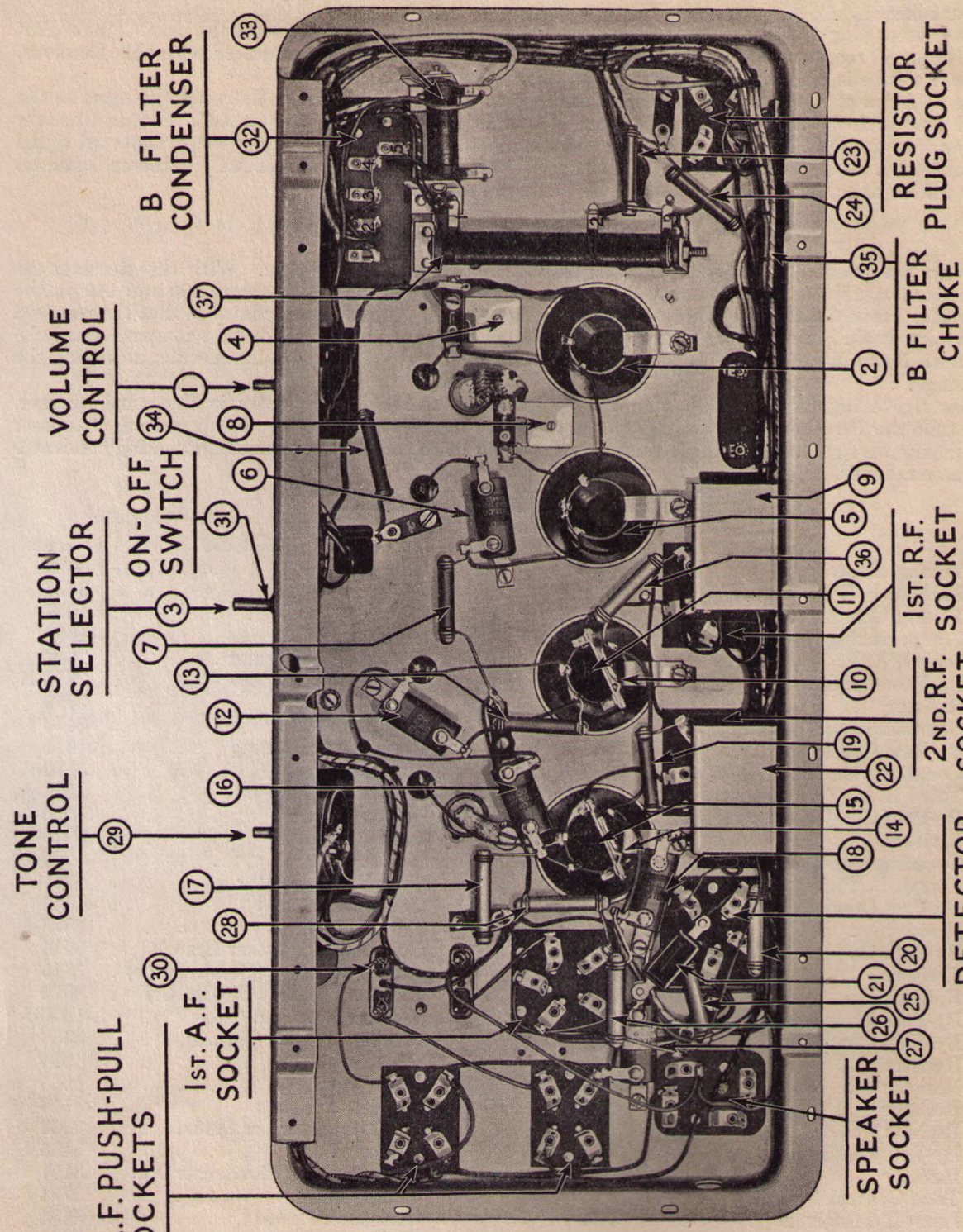
B FILTER CONDENSER
33
32
VOLUME CONTROL
37
4
1
STATION SELECTOR
34
8
ON-OFF SWITCH
6
31
3
TONE CONTROL
7
13
29
12
16
2ND A.F. PUSH-PULL SOCKETS
30
1ST. A.F. SOCKET
17
28
SPEAKER SOCKET
26
27
DETECTOR SOCKET
25
21
20
2ND. R.F. SOCKET
18
15
14
19
22
10
1ST. R.F. SOCKET
11
36
5
9
B FILTER CHOKE
2
35
RESISTOR PLUG SOCKET
24
23

Fig. 3

GENERAL

This Receiver is for use on 100 to 130 volts direct current. It must not be connected to an alternating current line.

The resistor plug must be placed in the socket at the rear right-hand corner of the base. This socket is used for an 80 rectifier tube in some of the A.C. models. No rectifier is required with this Receiver, although if a tube is placed in this socket no damage will be done.

The field coil of the speaker used with this Receiver is of low resistance. It is not the same as the field coil used with the A.C. Electric Receiver. If by mistake, a speaker from an A.C. Electric Receiver is plugged into the D.C. Receiver, no damage will be done, but only an extremely weak, distorted signal will be obtained. If a speaker from a D.C. Electric Receiver is plugged into an A.C. Receiver, again no damage will be done, but the reception will be weak and distorted.

COMPENSATING

Always use an oscillator signal when adjusting compensating condensers. With the Receiver set up for operation, adjust the oscillator and Receiver so the signal is tuned in between 120 and 140 on the tuning scale. Have the Receiver volume control turned on full. Adjust the oscillator so that the received signal is very weak. Using a fibre wrench turn down on the adjusting nut of the first compensating condenser until it is quite tight. This purposely throws the first stage out of balance while adjusting the second stage.

After tightening this first adjusting nut compensate the second condenser in the usual manner, that is, tune the Receiver very carefully to the oscillator signal and adjust the compensating condenser for the maximum signal. After this adjustment has been made, adjust the first compensating condenser in the same manner.

REPLACEMENT PARTS

No. on Figs. 2 and 3	Description	Part No.
①	Volume Control	4094
②	First R. F. Transformer	3884-A
③	Tuning Condenser	4069-E
④	Compensating Condenser	3772-A
⑤	Second R. F. Transformer	3884-B
⑥	By-Pass Condenser	3584-D
⑦	Resistor	3525
⑧	Compensating Condenser	3772-A
⑨	By-Pass Condenser	3557-A
⑩	Coupling Condenser	3892-A
⑪	Third R. F. Transformer	3884-C
⑫	By-Pass Condenser	3584-D
⑬	Resistor	3525
⑭	Coupling Condenser	3892-A
⑮	Fourth R. F. Transformer	3884-C
⑯	By-Pass Condenser	3584-D
⑰	Resistor	3526
⑱	By-Pass Condenser	3584-D
⑲	Resistor	3656
⑳	Resistor	3767
㉑	By-Pass Condenser	3774
㉒	By-Pass Condenser	3557-A
㉓	Resistor	3766
㉔	Resistor	3542
㉕	Resistor	3769
㉖	Resistor	3767
㉗	By-Pass Condenser	3897-A
㉘	Resistor	3769
㉙	Tone Control	4037-A
㉚	Input Transformer	3872
㉛	On-Off Switch	3517
㉜	Filter Condenser Block	4067
㉝	Resistor	4142
㉞	Resistor	3656
㉟	Choke	3422
㊱	Resistor	3526
㊲	Resistor	4057
㊳	Resistor	4058
㊴	Output Transformer	2848
㊵	Voice Coil and Cone	2814-B
㊶	Field Coil	2799
㊷	Pilot Lamp	3463
	Resistor Conn. Plug	4071
	Knobs (Large)	3580-A
	Knobs (Small)	3579-A
	Knobs (Switch)	3676-A
	Spring (Knob)	3305
	Grid Clip	4060
	Grid Clip Insulator	4061
	Condenser Shield	4065
	Tube Shield	3878-A
	Cushion (Condenser Brace)	3914
	Rubber Washer (Cond. Brace)	3915
	Rubber Washer (Condenser)	3920
	Speaker Plug and Cable	L-1056-A
	Rubber Washer (Furniture)	3558
	Pilot Insulator	4054
	Pilot Guard	4055
	Condenser Brush	3748
	R. F. Transformer Shield	3862
	Bottom Plate	3406
	Compensating Condenser Nut	3151
	Tuning Scale	3794
	Condenser Cable	3484
	Condenser Cable Spring	3012
	Pilot Lamp	3463
	4-hole Tube Socket	3423-A
	5-hole Tube Socket	3442-A

PHILADELPHIA STORAGE BATTERY COMPANY
Ontario and C Streets, Philadelphia, Pa.

May, 1930 Form No. 2323 Printed in U. S. A.

Factory

PHILCO
REG. U.S. PAT. OFF.

Radio Service Bulletin—No. 29

Model 30 Receiver

The Model 30 Receiver is designed for use with the latest 2-volt filament type tubes only.

Table 1—Tube Socket Readings Taken with Average Set Checker

Tube	Circuit	Filament Volts	Plate Volts	Grid Volts	Plate Current Milliamperes	Screen Grid Volts
32	1st R. F.	2.0	150	..	.0015	60
32	2nd R. F.	2.0	150	..	.0015	58
32	3rd R. F.	2.0	150	..	.0015	58
30	Detector Rectifier	2.0	...	..	....	..
30	Detector Amplifier	2.0	15	..	....	..
30	1st Audio	2.0	90	Note 1	.002	..
31	2d Audio	2.0*	150	24	.008	..
31	Push-Pull	2.0*	150	24	.008	..

*These readings reversed with respect to other Filament Voltage readings.

NOTE 1. With volume control in "Off" position, approximately 4 volts; with volume control full on, less than 1 volt.

Always use high-resistance voltmeter, preferably 1000 ohms per volt, when checking voltages in the Receiver. For reading plate and screen voltages, use a 250- or 300-volt scale. Voltage readings taken with meters having less than 250,000 ohms resistance will be lower than voltages given in the table.

When testing a Model 30 Receiver, all tubes must be in their proper sockets. The speaker must be connected and the tube shield must be fastened in place. The readings in Table 1 were taken using "A," "B" and "C" batteries.

Table 2—Resistor Data

No. on Figs. 1 and 2	Color	Resistance Ohms
①	Golden Yellow	5,000
㊵	Auto Buff	25,000
⑥	Jade Green	70,000
㉖ ㉗	Silver Gray	100,000
㉘	White	250,000
㉙ ㉚ ㉜	Battleship Gray	500,000
㉝	Tubular (two section)	250 / 800

Table 3—Condenser Data

No. on Figs. 1 and 2	Capacity—MFD.
㉔	.00005
㉚ ㉛	.000250
㉝	.01
③ ⑨ ⑮	.05
⑪ ⑫ ⑳ ㉑	.05 with 250-ohm resistor winding
㊴	.25 single section
㉒	.25 two sections

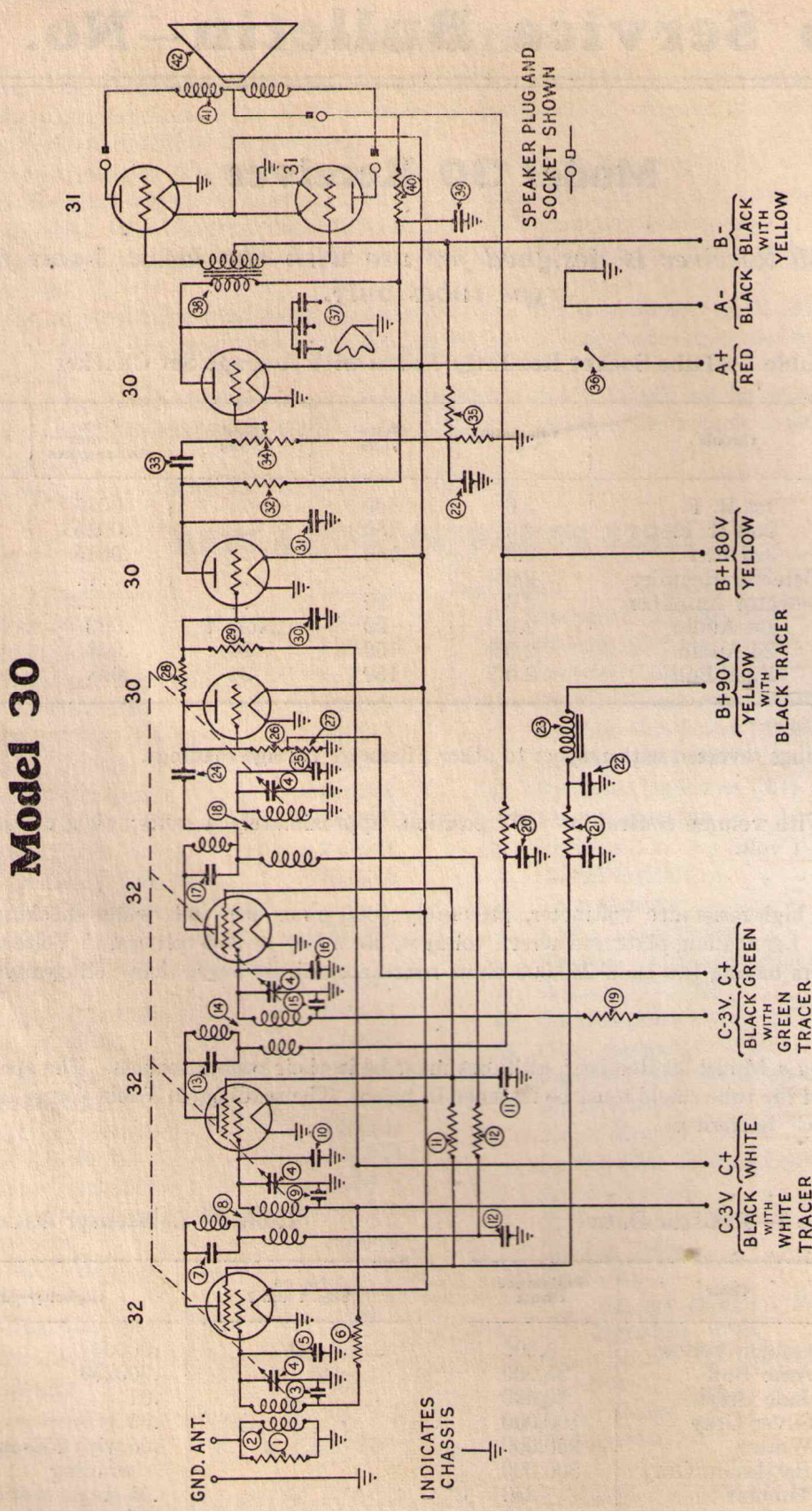
Model 30
SPEAKER PLUG AND SOCKET SHOWN
B- BLACK WITH YELLOW
A- BLACK
A+ RED
B+180V YELLOW
B+90V YELLOW WITH BLACK TRACER
C-3V. C+ BLACK GREEN WITH GREEN TRACER
C-3V C+ BLACK WHITE WITH WHITE TRACER
GND. ANT.
INDICATES CHASSIS
31
30
30
30
32
32
32

Fig. 1

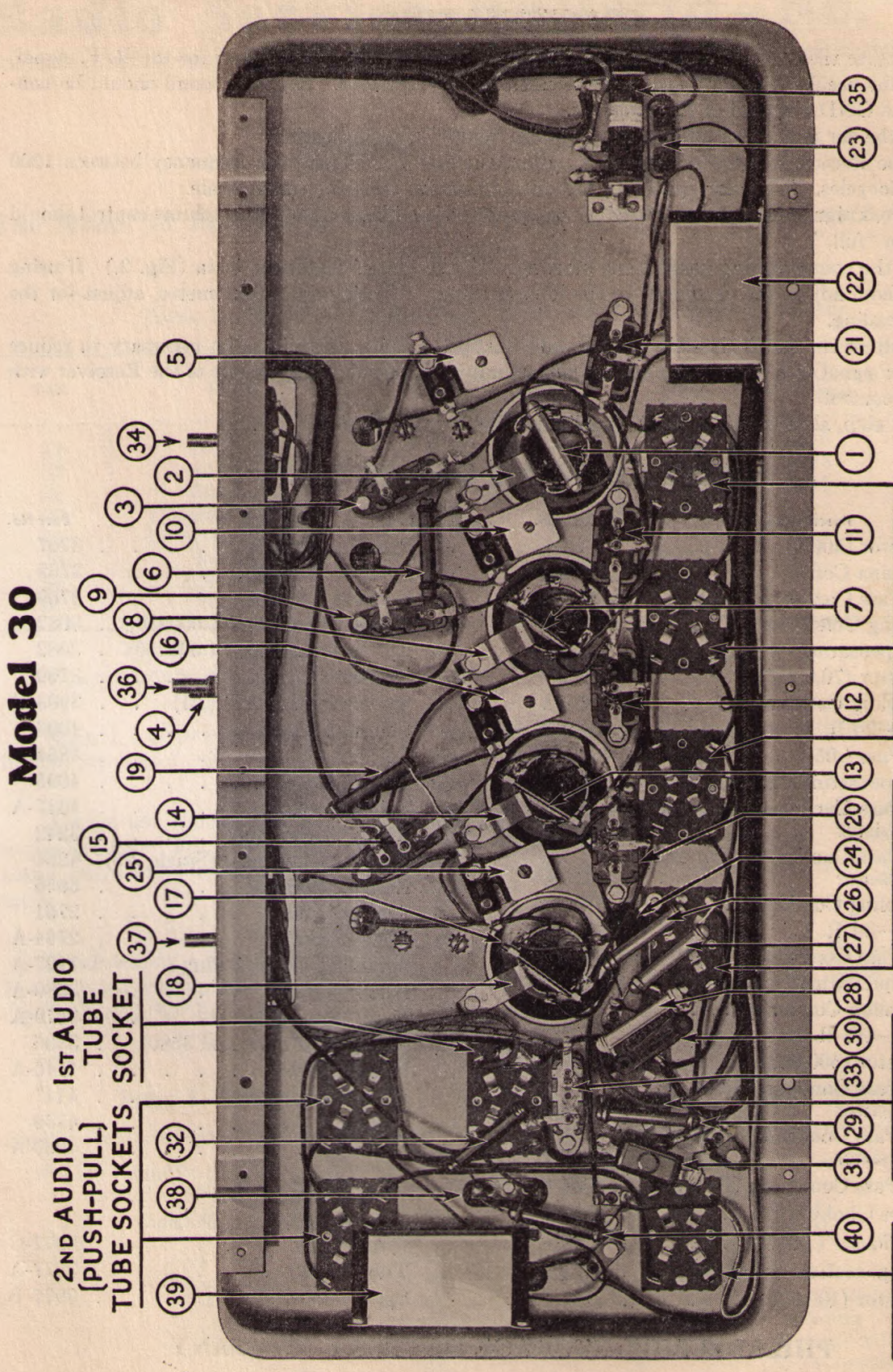
Model 30
2ND AUDIO [PUSH-PULL] TUBE SOCKETS
1ST AUDIO TUBE SOCKET
SPEAKER SOCKET
DETECTOR AMPLIFIER TUBE SOCKET
DETECTOR RECTIFIER TUBE SOCKET
R F TUBE SOCKETS
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Fig. 2

COMPENSATING

Compensate the Model 30 in the usual manner. Use a good D.C. oscillator for the R. F. signal, connecting the oscillator lead to the ANT terminal of the Receiver. A good ground should be connected to the GND terminal of the Receiver.

Either the ear method or an output meter can be used while adjusting.

With the Receiver set up for operation, adjust the oscillator signal to a frequency between 1200 and 1300 kilocycles. This corresponds to 120 and 130 on the Receiver tuning scale.

Use a weak signal and tune the Receiver sharply to the oscillator note. The volume control should be turned on "full."

Adjust the compensating condensers, starting with the fourth condenser ㉕ in (Fig. 2.) If using the ear method, adjust the condenser to the loudest signal. If using an output meter, adjust for the maximum reading.

Next adjust the third, then the second, and finally the first. It will not be necessary to reduce the oscillator signal as the successive condensers are adjusted. Reduce the volume of the Receiver with the volume control.

In each step, always adjust for the maximum signal or reading.

REPLACEMENT PARTS LIST

No. on Figs. 1 and 2	Description	Part No.
①	Resistor (5000)	3526
②	Antenna Coil	4182-A
③	By-Pass Condenser (.05)	3615-E
④	Tuning Condenser	4000-G
⑤	Compensating Condenser	3968-A
⑥	Resistor (70,000)	3542
⑦	Coupling Condenser	3892-A
⑧	Coil—2d R. F.	4182-B
⑨	By-Pass (.05)	3615-E
⑩	Compensating Condenser	3968-A
⑪	By-Pass Condenser (.05) and Resistor	3615-B
⑫	By-Pass Condenser (.05) and Resistor	3615-C
⑬	Coupling Condenser	3892-A
⑭	Coil—3d R. F.	4182-B
⑮	By-Pass Condenser (.05)	3615-F
⑯	Compensating Condenser	3968-A
⑰	Coupling Condenser	3892-A
⑱	Coil—4th R. F.	4182-B
⑲	Resistor (500,000)	3769
⑳	By-Pass Condenser (.05) and Resistor	3615-C
㉑	By-Pass Condenser (.05) and Resistor	3615-B
㉒	By-Pass Condenser (Double .25)	3557
㉓	Filter Choke	3518
㉔	Condenser (.00005)	3774
㉕	Compensating Condenser	3772-A
㉖	Resistor (100,000)	3767
㉗	Resistor (100,000)	3767
㉘	Resistor (250,000)	3768
㉙	Resistor (500,000)	3769
㉚	By-Pass Condenser (.000250)	3082
㉛	By-Pass Condenser (.000250)	3082
㉜	Resistor (500,000)	3769
㉝	By-Pass Condenser (.01)	3903-F
㉞	Volume Control	4093
㉟	Resistor	3864
㊱	On-Off Switch	4095
㊲	Tone Control	4037-A
㊳	Audio Transformer	3242
㊴	By-Pass Condenser (Single .25)	4264
㊵	Resistor (25,000)	3656
㊶	Speaker Motor	2761
㊷	Cone Assembly	2764-A
	Speaker Cord and Plug	L-1127-A
	Knob (Large)	3580-A
	Knob (Small)	3579-A
	Spring (For 3579 and 3580)	3305
	Knob (Switch)	4146-A
	Spring (For 4146)	4147
	Tuning Scale	4139
	Grid Clip	4060-A
	"A" Battery (2-volt) "Philco Drynamic 92-R"	
	Tube Socket (32 type tube) Assembly	3977-C
	Tube Socket	3977-A
	Speaker Socket	3977-B

PHILADELPHIA STORAGE BATTERY COMPANY
Ontario and C Streets, Philadelphia, Pa.

August, 1930 Form No. 2436 Printed in U. S. A.

Factory

PHILCO

Radio Service Bulletin—No. 36

Models 20 and 20-A Receivers

Model 20 Receivers are for Operation on 105-125 volt, 50-60 cycle AC Lines.
Model 20-A Receivers are for Operation on 105-125 volt, 25-60 cycle AC Lines.

Bulletin 28 covers the first few weeks' production of Models 20 and 20-A. These Receivers can be identified as having one or two compensating condensers. The later models have three compensating condensers fastened to the tuning condenser housing and are covered by Bulletin 36.

Table 1—Tube Socket Readings Taken with AC Set Tester, AC Line, 115 Volts

Tube		Filament Voltage	Plate Voltage	Grid Voltage	Screen Grid Voltage	Cathode Voltage	Plate Milliamperes
Type	Circuit						
24	1st R. F.	2.3	250	3.0	90.0	12	4.5
24	2nd R. F.	2.3	250	3.0	90.0	11	4.5
24	Detector	2.3	35	1.0	2.0	8	....
27	1st Audio	2.3	120	1.0	....	8	3.0
71-A	2d Audio	5.0	215	50.0	....		18.0
71-A	Push–Pull	5.0	215	50.0	....		18.0
80	Rectifier	5.0	....		....		36/Plate

All readings taken with antenna disconnected and ground on. Volume Control on full.

Table 2—Power Transformer Voltages

Terminals	A. C. Volts	
1—2	2.5	Heaters of 24 and 27 Tubes
3—4	105 to 125	Primary
7—8	5.0	Filament of 71-A Tubes
5	....	Center Tap of 7—8
10—11	5.0	Filament of 80 Tube
9—12	650	Plates of 80 Tube
6	....	Center Tap of 9—12 and 1—2
	....	

Table 4—Condenser Data
(Other Than Filter Condenser)

No. on Figs. 3 and 4	Capacity MFD
⑯	.00025
⑲	.01
⑤ ⑥ ㉒	.05
⑧	.05 with 250-ohm resistor winding
⑭	.25 (two sections)
⑬	.5

Table 3—Resistor Data

No. on Figs. 3 and 4	Terminal	Resistance	Color
㉕	1—2	1,400	Long Tubular
	2—3	187	
	3—4	75	
	5—6	2,470	
	6—7	975	
⑫		50,000	Orange
⑱		100,000	Silver Gray
⑮		250,000	White
⑰ — ⑳		500,000	Battleship Gray

Model 20—Filter Condenser—Part No. 4235

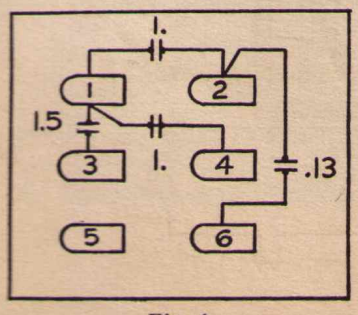

Fig. 1

Model 20-A—Filter Condenser—Part No. 4269

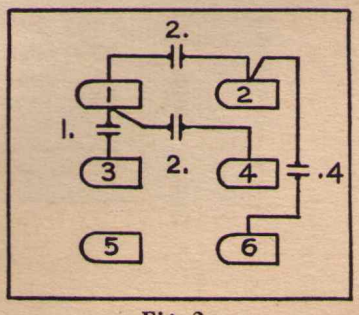

Fig. 2

Models 20 and 20-A

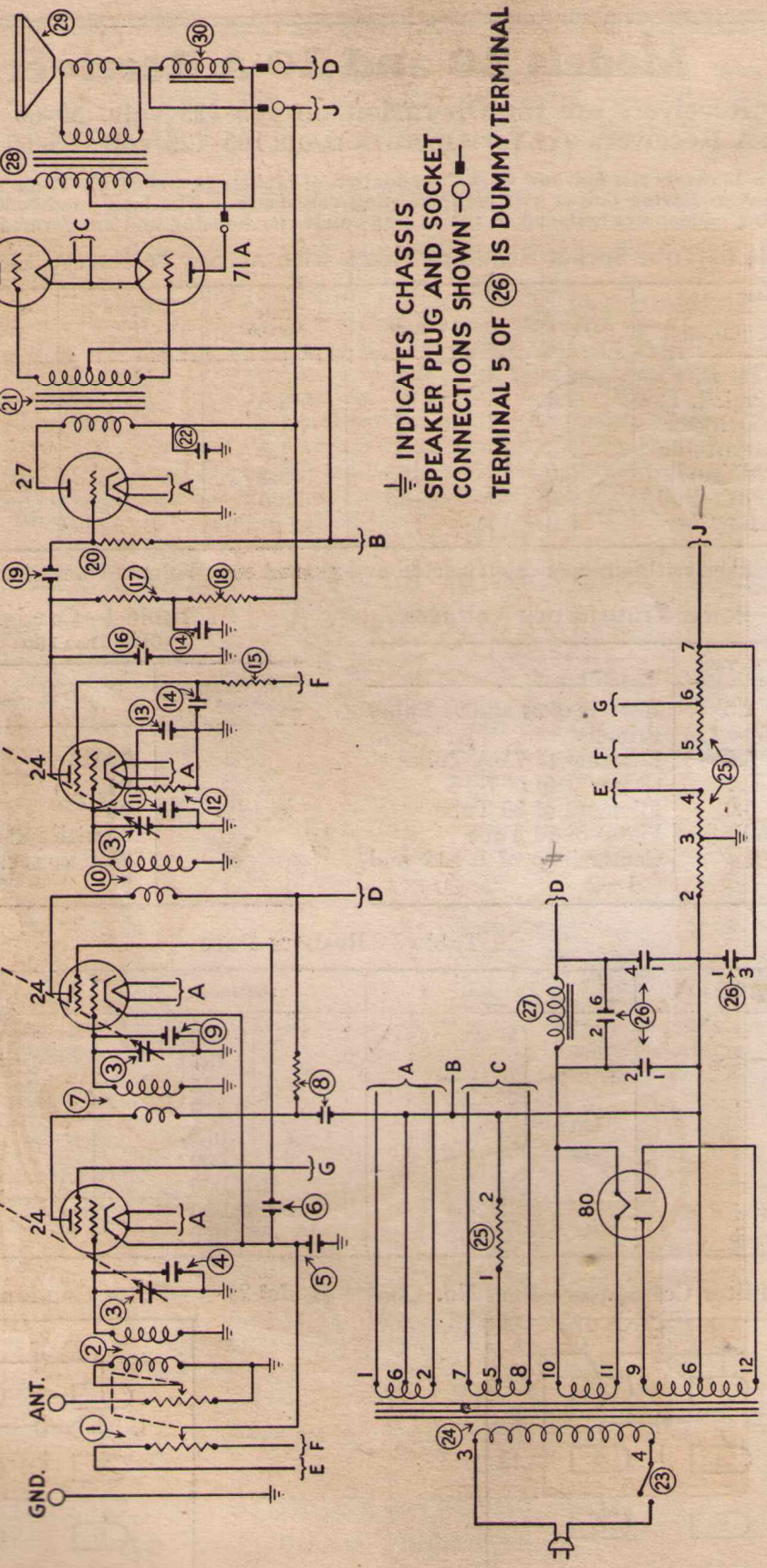

Fig. 3

Models 20 and 20-A

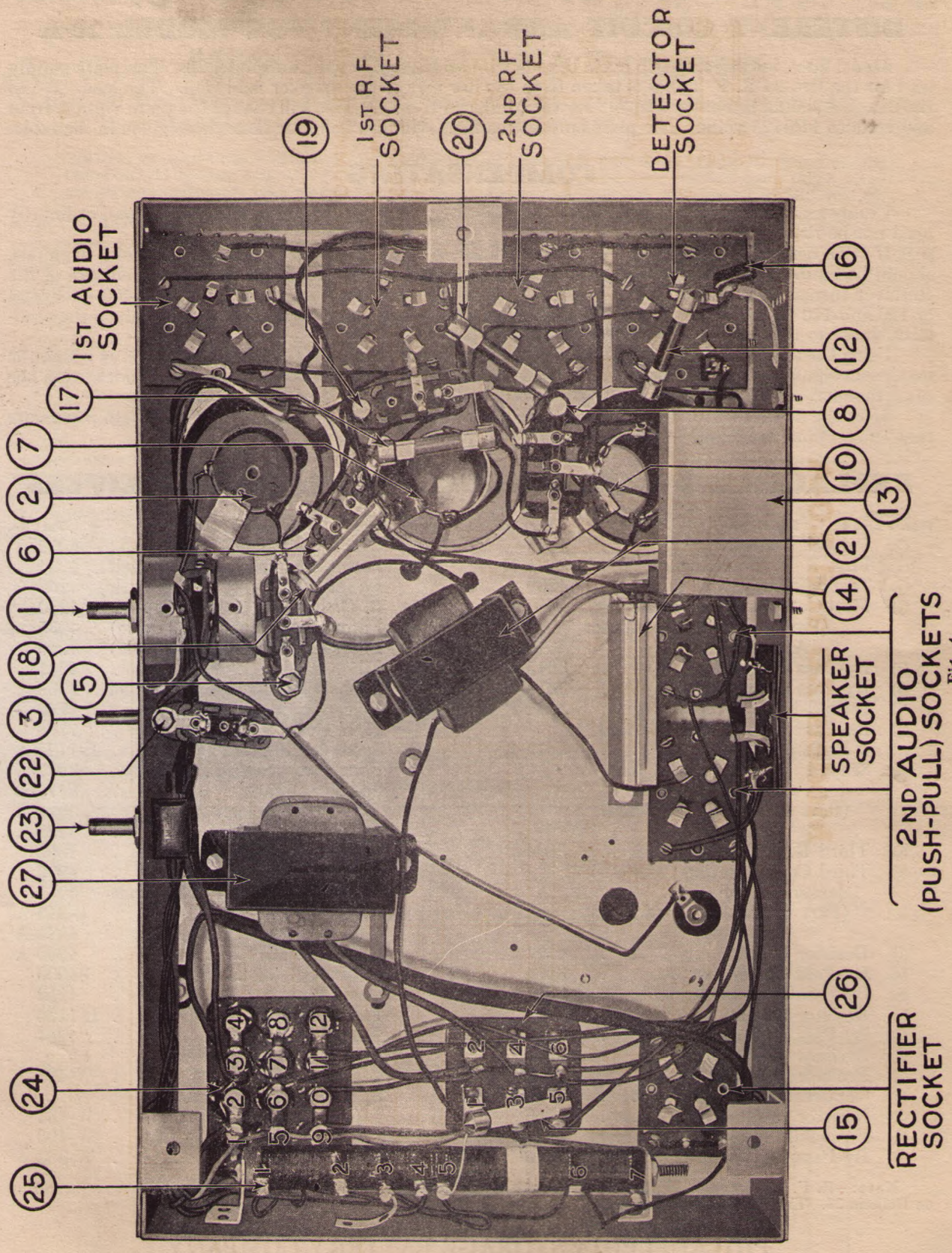

Fig. 4

DIFFERENT CIRCUIT ARRANGEMENT FOR MODEL 20-A

Model 20-A for use on 25-60 cycle lines is wired differently than the Model 20. The plate supply lead for the two 24 R. F. Tubes is taken from the low side of the Speaker field Coil. The lead "D" to the 24 tubes should be changed to "J" for the Model 20-A only. This will change the plate voltage from 250 volts to 115-125 volts. The plate current readings will also be lower than those given in the table.

COMPENSATING

Compensating condensers in all Philco Models are carefully adjusted at the Factory and ordinarily need not be readjusted.

If at all necessary to readjust,—a good oscillator, such as described in our earlier Service Manuals, should be used. With the Receiver and oscillator set up for operation, and the volume control of the Receiver turned on full—adjust the oscillator signal to a frequency between 1200 and 1400 kilocycles or 120 and 140 on the Philco scale. Tune the Receiver sharply to the signal and then reduce the oscillator signal so that it is barely audible in the Speaker.

Using the special fibre wrench, adjust the third compensating condenser to that point at which the maximum signal is heard in the Speaker, then adjust the second and finally the first condenser in the same manner, always adjusting for that position which gives the maximum signal.

After the adjustments are completed tune the Receiver to several broadcast programs to make sure that the stations are tuned in at the proper place on the tuning scale.

REPLACEMENT PARTS—MODELS 20 and 20-A RECEIVERS

No. on Figs. 3 and 4	Description	Part No.
①	Volume Control	4094
②	First R. F. Transformer	3884-N
③	Tuning Condenser	4200-A
④	First Compensating Condenser (Part of Tuning Condenser Assembly)	
⑤	By-Pass Condenser (.05)	3615-J
⑥	By-Pass Condenser (.05)	3615-M
⑦	Second R. F. Transformer	3884-P
⑧	By-Pass Condenser (.05) and Resistor	3615-K
⑨	Second Compensating Condenser (Part of Tuning Condenser Assembly)	
⑩	Third R. F. Transformer	3884-P
⑪	Third Compensating Condenser (Part of Tuning Condenser Assembly)	
⑫	Resistor (50,000)	4237
⑬	By-Pass Condenser (.5)	3583
⑭	By-Pass Condenser (double .25)	3557
⑮	Resistor (250,000)	3768
⑯	By-Pass Condenser (.00025)	3082
⑰	Resistor (500,000)	3769
⑱	Resistor (100,000)	3767
⑲	Condenser (.01)	3903-F
⑳	Resistor (500,000)	3769
㉑	Push-Pull Input Transformer	4232
㉒	By-Pass Condenser (.05)	3615-L
㉓	On-off Switch	4095
㉔	PowerTransformer(50-60 cycle)	4234
	PowerTransformer(25-60 cycle)	4268
㉕	B. C. Resistor	4230
㉖	Filter Condenser (50-60 cycle)	4235
	Filter Condenser (25-60 cycle)	4269
㉗	Filter Choke	4231
㉘	Push-Pull Output Transformer	2766
㉙	Voice Coil and Cone	2769-B
㉚	Field Coil	2768
	Speaker Plug and Cord	L-1124-A
	Four-Prong Socket Assembly	3977-A
	Speaker Socket	3977-B
	Five-Prong Socket Assembly	3979-A
	R. F. Tube Shield	4228-A
	Volume Control Insulators	4092
	Volume Control Insulators	4286
	Tuning Condenser Dial Scale	4261
	A. C. Cord	L-943-A
	Knob (Large)	4289-A
	Knob (Small)	4290-A
	Cabinet	34000
	Bezel Plate	4252
	Fahnstock Clip	L-1126
	Finishing Rosettes	4267
	Speaker Mounting Screws (three used)	W-493
	Speaker Mounting Screws (one used)	W-483
	Chassis Hold-Down Bolts	W-490
	Feet	W-353

Note:—R. F. Transformers ②, ⑦ and ⑩ should not be confused with R. F. Transformers ②, ⑤, ⑧ and ⑫ on Bulletin 28. They are not interchangeable.

PHILADELPHIA STORAGE BATTERY COMPANY
Ontario and C Streets, Philadelphia, Pa.

September, 1930 Form No. 2253-36 Printed in U. S. A.

PHILCO
REG. U.S. PAT. OFF.

Radio Service Bulletin—No. 46

Models 111 and 111-A Receivers

Model 111 Receivers are for operation on 100-130 volt, 50-60 cycle AC lines
Model 111-A Receivers are for operation on 100-130 volt, 25-60 cycle AC lines

Table 1—Tube Socket Readings Taken with AC Set Tester AC Line—115 volts

Tube		Filament Volts	Plate Volts	Screen Grid Volts*	Control Grid Volts	Cathode Volts	Plate Milli-Amperes	Screen-Grid Milli-Amperes ‡
Type	Circuit							
24	1st R. F.	2.1	190	60	.2	5	1.7	1.75
27	Osc.	2.1	45	..	.7	7	1.6	....
24	1st Det.	2.1	180	62	4.6	8	.5†	.15
24	1st I. F.	2.1	185	65	...	5	1.5	1.7
24	2nd I. F.	2.1	190	82	2.2	5	3	1.85
27	Det. Rect.	2.2	...	..	.4	.5	.....	....
27	Det. Amp.	2.2	35	..	.4	5	.20‡	....
27	1st A. F.	2.1	95	..	1.2	5	4.	....
45	2nd A. F.	2.2	255	..	50	...	32.5	....
45	2nd A. F.	2.2	255	..	50	...	32.5	....
80	Rect.	4.9	...	..	...	...	50/Plate	....

*Read with C 100 Scale.
†Read with 20 Mil. Scale.
‡Read with 2 Mil. Scale.

Note—Volume Control Off; Station Selector turned to Low Frequency End; Range Switch set in "Normal" Position.

Table 2—Power Transformer Voltages

Terminals	A.C. Volts	
1—2		Primary
3		Center Tap 80 Tube
4		Center Tap 45 Tubes
5—6	2.67	Heaters for 24 and 27 Tubes
7—8	2.68	Filaments for 45 Tubes
9—12	750.	Plates 80 Tube
10—11	5.0	Filament 80 Tube
Rubber Covered Lead		Center Tap for 24 and 27 Tubes

Table 3—Condenser Data
(Other Than Filter Condenser)

No. on Figs. 3 and 4	Capacity
(6)	.05
(10) (11)	.05 and 250 Ohm Resistor
(17)	.25 (two sections)
(19) (23) (27) (33) (38)	.00011
(21)	.0007
(28)	.05
(29)	.05 and 250 Ohm Resistor
(35)	.00005
(40)	.5
(42)	.00025
(43)	.015
(45)	.05
(61)	.015 (two sections)
(67)	.05

Table 4—Resistor Data

No. on Figs. 3 and 4	Resistance	Color
(1)	10,000	Black
(8) (39) (41) (66) (68)	100,000	Silver Gray—Yellow Tip
(16)	50,000	Orange
(18)	13,000	Belgium Blue
(20)	1,000	Brown Body—Black Tip—Red Dot
(34)	500,000	Battleship Gray
(44)	500,000	Battleship Gray
(46)	250,000	White
(48)—(64)	70,000	Jade Green
(51)—(52)	25,000	Auto Brown—Yellow Tip
(57)	10,000	Long Tubular
(58)	70	Flat Wire Wound (two sections)
(59)	800	Short Tubular

Model 111 Condenser Block Part No. 3754

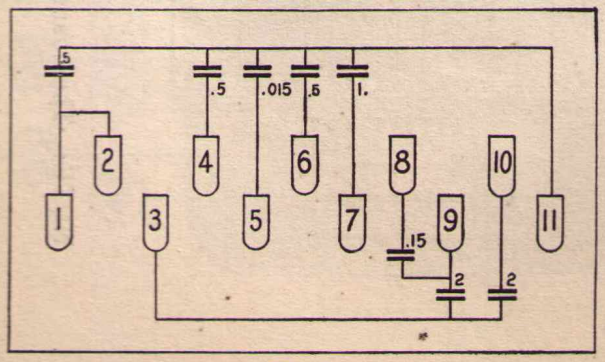

Fig. 1

Model 111-A Condenser Block Part No. 3755

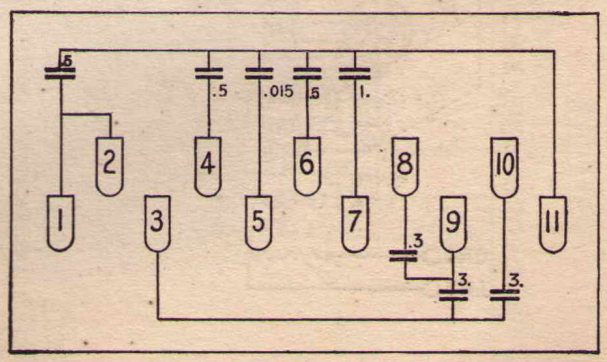

Fig. 2

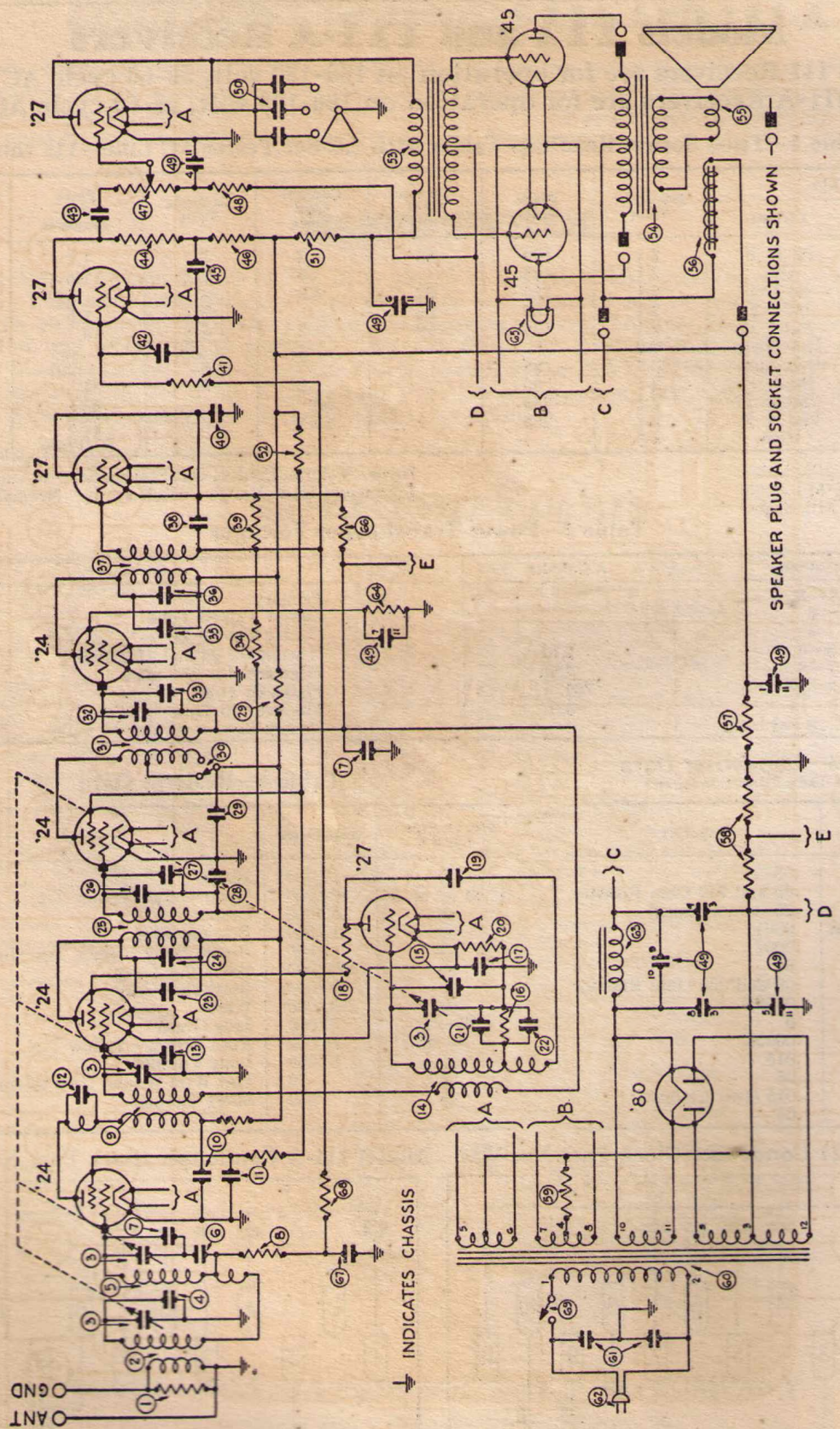

Fig. 3

NOTE: The connection shown between Condenser No. ⑦ and Condenser No. ⑥ should also be connected to ground.

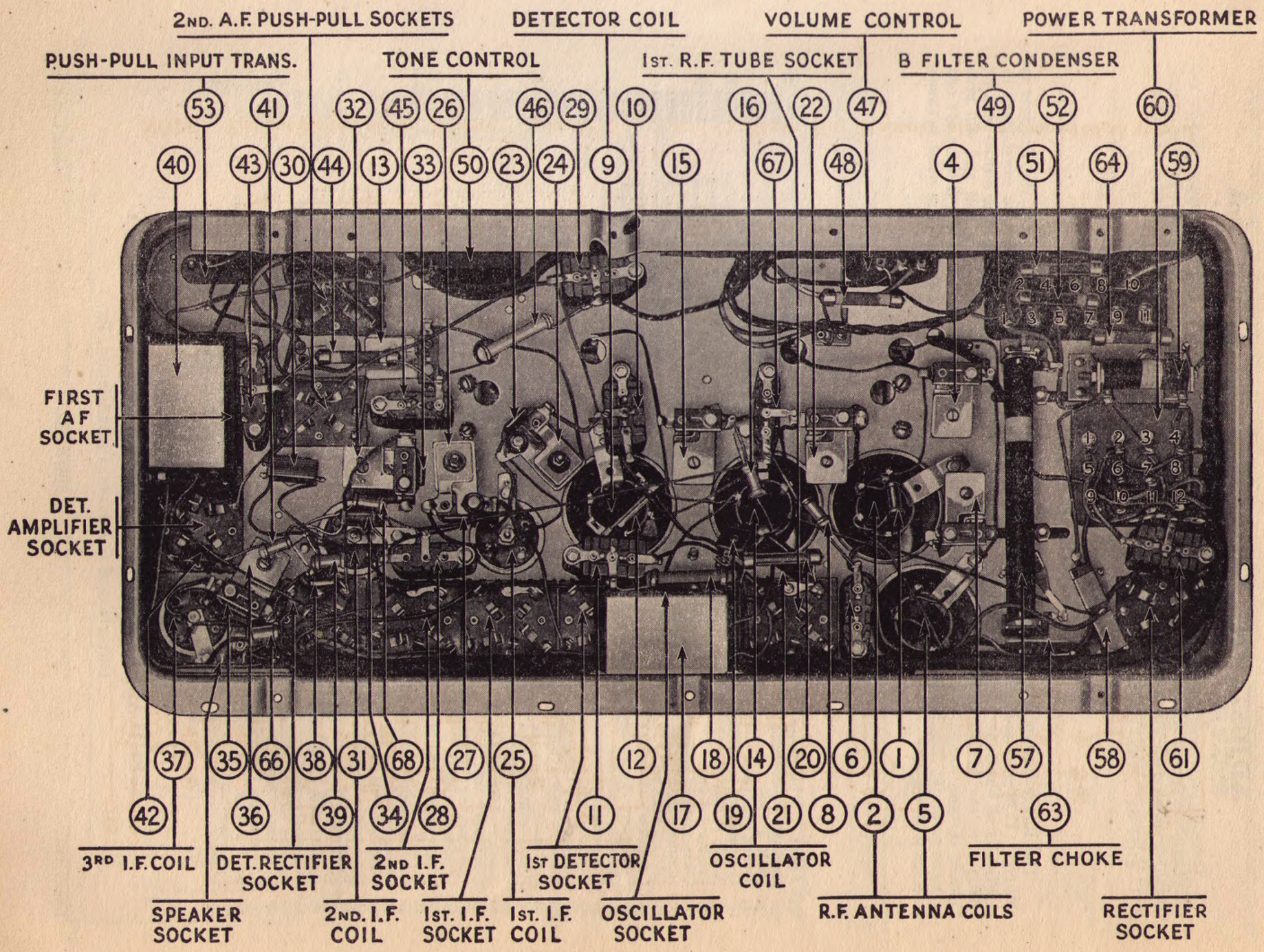
2ND. A.F. PUSH-PULL SOCKETS
DETECTOR COIL
VOLUME CONTROL
POWER TRANSFORMER
PUSH-PULL INPUT TRANS.
TONE CONTROL
1ST. R.F. TUBE SOCKET
B FILTER CONDENSER
53 41 32 45 26 46 29 10 16 22 47 49 52 60
40 43 30 44 13 33 50 23 24 9 15 67 48 4 51 64 59
FIRST AF SOCKET
DET. AMPLIFIER SOCKET
37 35 66 38 31 68 27 25 12 18 14 20 6 1 7 57 58 61
42 36 39 34 28 11 17 19 21 8 2 5 63
3RD I.F. COIL
DET. RECTIFIER SOCKET
2ND I.F. SOCKET
1ST DETECTOR SOCKET
OSCILLATOR COIL
FILTER CHOKE
SPEAKER SOCKET
2ND. I.F. COIL
1ST. I.F. SOCKET
1ST. I.F. COIL
OSCILLATOR SOCKET
R.F. ANTENNA COILS
RECTIFIER SOCKET

Fig. 4

ADJUSTMENT OF MODELS 111 AND 111-A

These Receivers are accurately adjusted at the Factory prior to their shipment. Under no circumstances are the adjusting condensers to be changed in the field. This alignment requires special oscillator equipment, which all Philco Distributors have. If for any reason the Receiver needs adjustment it must be returned to the Distributor's Service Department.

RANGE SWITCH

The Range Switch, No. ㉚ in Fig. 3, is placed in the NORMAL position when the Receiver is shipped. This gives great distance range and is the setting which will be found most satisfactory in practically all locations. In places far from broadcasting stations, however, the Range Switch may be changed to the MAXIMUM position. This will make the Receiver super-sensitive and will give extreme distance range. Do not use the Range Switch in the MAXIMUM position if there are one or more powerful broadcasting stations near you. In any location there will be less noise between stations with the Range Switch in the NORMAL position.

REPLACEMENT PARTS

No. on Figs. 3 and 4	Description	Part No.
①	Resistor—10,000 Ohms	4412
②	1st R. F. Coil	3884-J
③	Tuning Condenser	4000-D
④	Compensating Condenser	3772-A
⑤	2nd R. F. Coil	3884-T
⑥	Condenser—.05	3615-L
⑦	Compensating Condenser	3968-A
⑧	Resistor—100,000 Ohms	4411
⑨	1st Detector Coil	3884-V
⑩	Condenser—.05 and 250 Ohms	3615-C
⑪	Condenser—.05 and 250 Ohms	3615-C
⑫	Coupling Condenser	3892-A
⑬	Compensating Condenser	3968-A
⑭	Oscillator Coil	3884-U
⑮	Compensating Condenser	3968-A
⑯	Resistor—50,000 Ohms	4518
⑰	Condenser—.25 double	3557
⑱	Resistor—13,000 Ohms	3766
⑲	Condenser—.00011	4519
⑳	Resistor—1,000 Ohms	4590
㉑	Condenser—.0007	4520
㉒	Compensating Condenser	3772-B
㉓	Condenser—.00011	4519
㉔	Compensating Condenser	3772-C
㉕	1st I. F. Coil	4501-B
㉖	Compensating Condenser	3772-C
㉗	Condenser—.0001	4519
㉘	Condenser—.05	3615-J
㉙	Condenser—.05 and 250 Ohms	3615-B
㉚	Range Switch	3116
㉛	2nd I. F. Coil	4501-C
㉜	Compensating Condenser	3772-C
㉝	Condenser—.00011	4519
㉞	Resistor—500,000 Ohms	4517
㉟	Condenser—.00005	4587
㊱	Compensating Condenser	3772-D
㊲	3rd I. F. Coil	4501-D
㊳	Condenser—.00011	4519
㊴	Resistor—100,000 Ohms	4411
㊵	Condenser—.5	3583
㊶	Resistor—100,000 Ohms	4411
㊷	Condenser—.00025	3082
㊸	Condenser—.015	3793-B
㊹	Resistor—500,000 Ohms	3769
㊺	Condenser—.05	3615-S
㊻	Resistor—250,000 Ohms	3768
㊼	Volume Control	4093
㊽	Resistor—70,000 Ohms	3542
㊾	B Filter Condenser Block—60 cycles	3754
	B Filter Condenser Block—25 cycles	3755
㊿	Tone Control	4037-A
(51)	Resistor—25,000 Ohms	3656
(52)	Resistor—25,000 Ohms	3656
(53)	Push-pull Input Transformer	3537
(54)	Push-pull Output Transformer	2848
(55)	Voice Coil and Cone Assembly	2794-B
(56)	Field Coil	2850
(57)	B Resistor—10,000 Ohms	4532
(58)	C Resistor	3764
(59)	C Resistor—800 Ohms	3763
(60)	Power Transformer—60 cycles	4446
	Power Transformer—25 cycles	4447
(61)	Condenser—.015 double	3793-E
(62)	A C Cord and Plug	L-943-A
(63)	Filter Choke	3422
(64)	Resistor—70,000 Ohms	3542
(65)	Pilot Lamp	3463
(66)	Resistor—100,000 Ohms	4411
(67)	Condenser—.05	3615-D
(68)	Resistor—100,000 Ohms	4411
(69)	On-Off Switch	4095
	Insulator for Part Nos. 3557-3583	4105
	Pilot Bracket Assembly	4027-A
	Bolt for Pilot Bracket Assembly	W-439
	Tone Control Nut	W-434
	By-pass Condenser Mounting Bolt	W-443
	Bottom Shield Bolt	W-453
	Chassis Mounting Bolt	W-468

PHILADELPHIA STORAGE BATTERY COMPANY

Ontario and C Streets, Philadelphia, Pa.

January, 1931 Form No. 2544 Printed in U. S. A.

Factory

PHILCO

REG. U.S. PAT. OFF.

Radio Service Bulletin No. 53A

This Bulletin supersedes Bulletin No. 53

Model 46 Receiver

Model 46 Receivers are for Operation on 105-125 volt, DC Lines. Power Consumption 42 Watts

WARNING—This Receiver is for use on 105 to 125 Volts, DC only. The type 14 and 17 tubes using a 14 volt filament and type 2 ballast tube with a 9 volt filament are designed for use in this Receiver.

The 46-E Receiver is for use on 210 to 240 Volts, DC only. The type 14 and 17 tubes and type 3 ballast tube with a 128 Volt filament are used in this Receiver.

These two chasses are not interchangeable.

Table 1—Tube Socket Readings Taken with Set Tester, DC Line, 115 Volts

Tube		Filament Voltage	Plate Voltage	Grid Voltage	Screen Grid Voltage	Cathode Voltage (Measured with Prod)	Plate Milliamperes
Type	Circuit						
14	1st R. F.	13.5	100	1.5	60	2.5	2
14	2nd R. F.	13.5	100	1.5	60	2.5	2
14	Detector	13.5	30	1.0	25	2.5	.1
17	1st Audio	13.5	100	.25	..	4.5	5
71-A	2d Audio	4.5	90	15.5	..	...	11.5
71-A	Push-Pull	4.5	90	15.5	..	...	11.5
2	Ballast	8	...	.....	..	...	....

All readings taken with antenna disconnected and ground on. Volume Control on full.

The majority of set testers are not equipped to measure a DC filament voltage as high as 14 volts. In this case the volt meter binding post prods will have to be used. This method will also have to be used in checking cathode voltages across resistances No. 17—No. 39 and No. 28 and No. 29.

The field coil of the Speaker used with this Receiver is of low resistance. It is not the same as the field coil used with the AC Electric Receiver. If, by mistake, a speaker from an AC Electric Receiver is plugged into the DC Receiver no damage will result.

Table 2—Condenser Data

(Other than Filter Condenser)

No. on Figs. 2 and 3	Capacity MFD
(19)	.0005
(21)	.01
(5)—(11)—(15)	.05
(12)	.05 and 250-ohm resistor
(7)	.25
(18)—(23)	.25 (two sections)

Part No.—4860

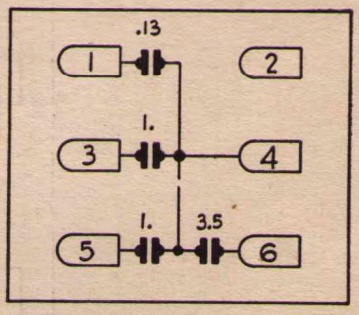

Fig. 1

Table No. 3—Resistor Data

No. on Figs. 2 and 3	Terminal	Resistance	Color		
			Body	Tip	Dot
(28)	2—3 1—2 3—4	10 14 29	Tubular		
(29)		200	Tubular		
(30)		210	Flat Wire Wound		
(39)		250	Flat Wire Wound		
(16)		5,000	Green	Black	Red
(37)—(40)		13,000	Brown	Orange	Orange
(6)—(10)—(17)—(36)		32,000	Orange	Red	Orange
(35)—(38)		70,000	Jade Green		
(24)		99,000	White	White	Orange
(25)		240,000	Red	Yellow	Yellow
(20)—(22)		490,000	Yellow	White	Yellow

Model 46

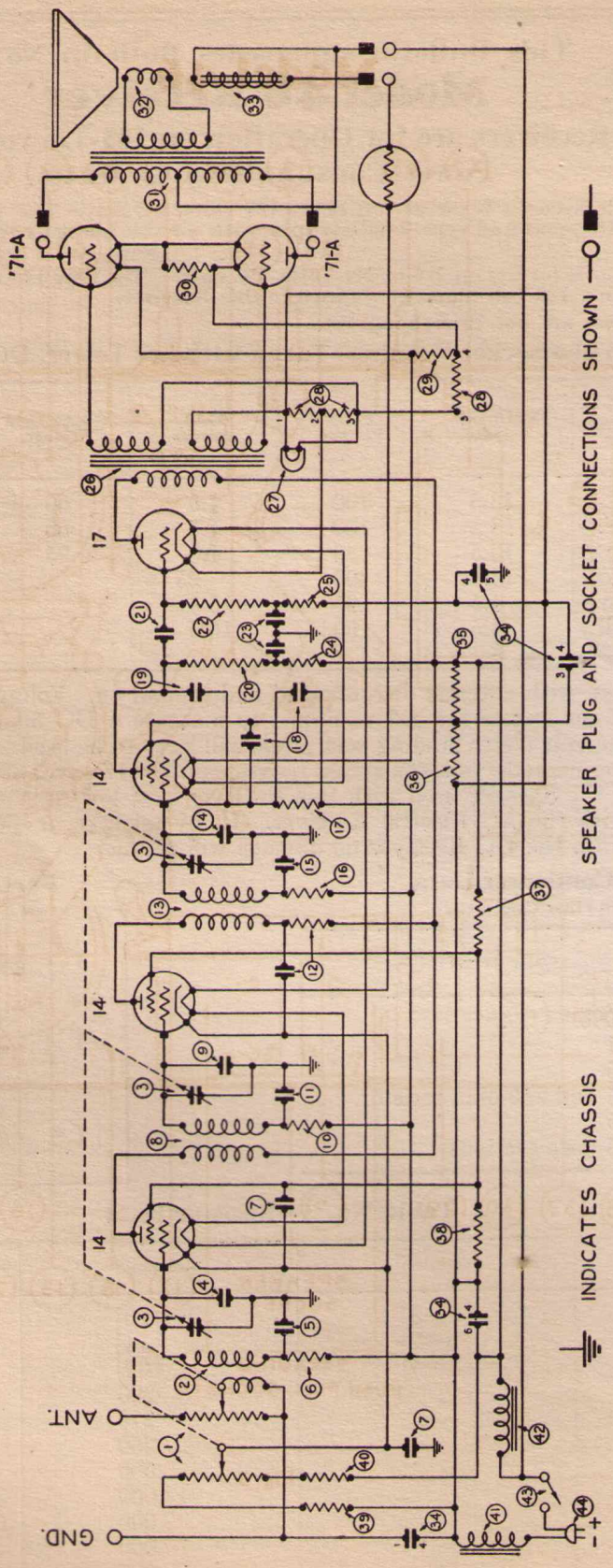

Fig. 2

Model 46

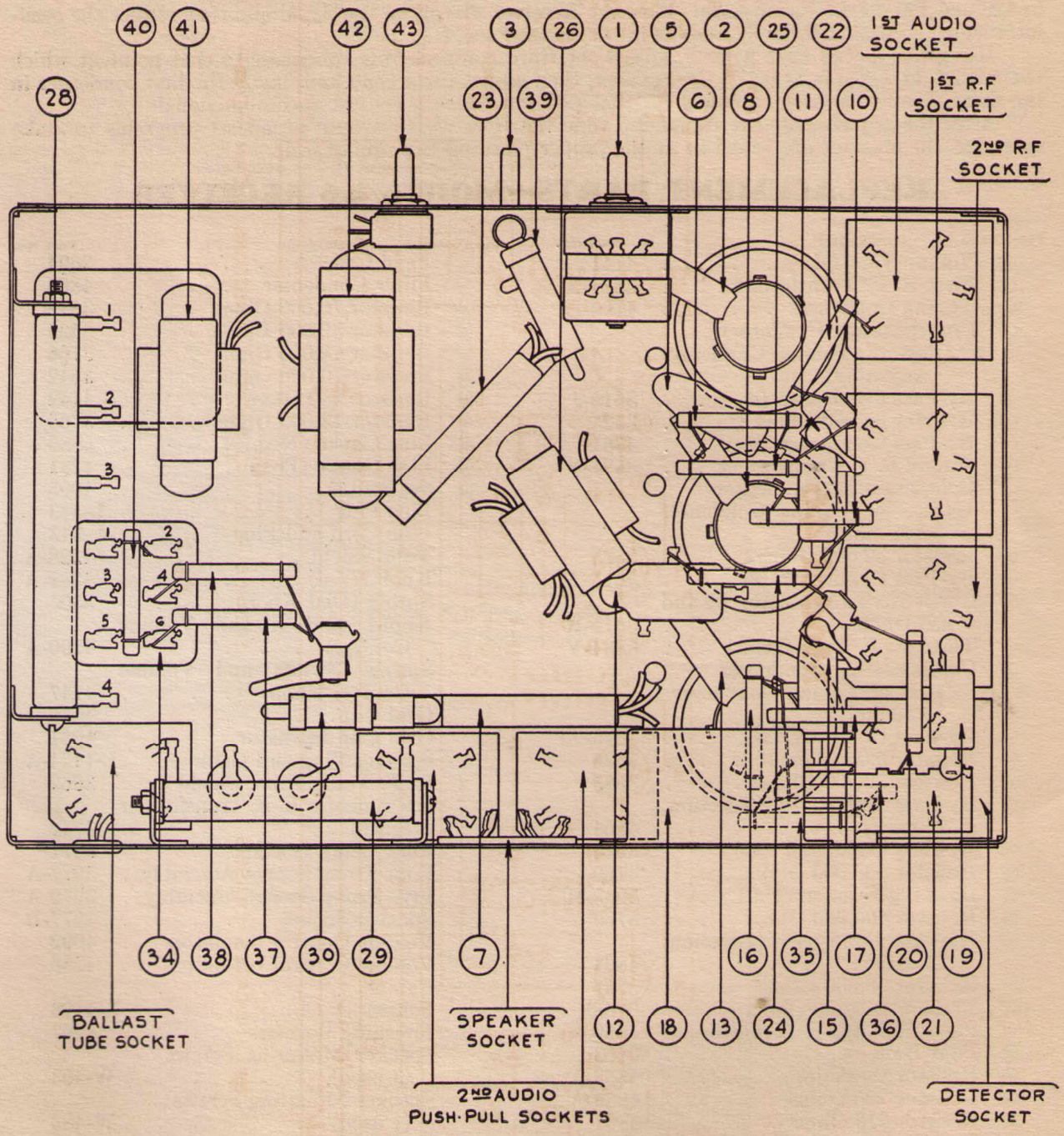

Fig. 3

COMPENSATING

Compensating condensers in all Philco Models are carefully adjusted at the Factory and ordinarily need not be readjusted.

If at all necessary to readjust,—a good oscillator, such as described in our earlier Service Manuals, should be used. With the Receiver and oscillator set up for operation, and the volume control of the Receiver turned on full—adjust the oscillator signal to a frequency between 1200 and 1400 kilocycles or 120 and 140 on the Philco scale. Tune the Receiver sharply to the signal and then reduce the oscillator signal so that it is barely audible in the Speaker.

Using the special fibre wrench, adjust the third compensating condenser to that point at which the maximum signal is heard in the Speaker, then adjust the second and finally the first condenser in the same manner, always adjusting for that position which gives the maximum signal.

After the adjustments are completed tune the Receiver to several broadcast programs to make sure that the stations are tuned in at the proper place on the tuning scale.

REPLACEMENT PARTS—MODEL 46 RECEIVER

No. on Figs. 2 and 3	Description	Part No.
①	Volume Control	4141
②	First R. F. Transformer	3884-X
③	Tuning Condenser	4200-D
④	Comepnsating Condenser (Part of Tuning Condenser Assembly)	
⑤	By-Pass Condenser .05	3615-J
⑥	Resistor 32,000 Ohms	3525
⑦	By-Pass Condenser .25	4864
⑧	Second R. F. Transformer	3884-Y
⑨	Compensating Condenser (Part of Tuning Condenser Assembly)	
⑩	Resistor 32,000 Ohms	3525
⑪	By-Pass Condenser .05	3615-M
⑫	Condenser and Resistor .05 and 250 Ohms	3615-K
⑬	Third R. F. Transformer	3884-Y
⑭	Compensating Condenser (Part of Tuning Condenser Assembly)	
⑮	By-Pass Condenser .05	3615-M
⑯	Resistor 5,000 Ohms	3526
⑰	Resistor 32,000 Ohms	3525
⑱	By-Pass Condenser (2-section, .25 each)	4864
⑲	By-Pass Condenser .0005	3910
⑳	Resistor 490,000 Ohms.	3769
㉑	Blocking Condenser .01	3903-H
㉒	Resistor 490,000 Ohms	3769
㉓	By-Pass Condenser (2-section, .25 each)	4864
㉔	Resistor 99,000 Ohms	3767
㉕	Resistor 240,000 Ohms	3768
㉖	Push-Pull Input Transformer	4862
㉗	Pilot Bulb	3463
㉘	Resistor (3-section)	4858-A
㉙	Resistor 200 Ohms	4859-A
㉚	Resistor 210 Ohms	4861
㉛	Push-Pull Output Transformer	2766
㉜	Voice Coil and Cone	2769-B

No. on Figs. 3 and 4	Description	Part No.
㉝	Field Coil	2694
㉞	Filter Condenser	4860
㉟	Resistor 70,000 Ohms	3542
㊱	Resistor 32,000 Ohms	3525
㊲	Resistor 13,000 Ohms	3766
㊳	Resistor 70,000 Ohms	3542
㊴	Resistor 250 Ohms	4142
㊵	Resistor 13,000 Ohms	3766
㊶	Line Choke (Neg.)	4886
㊷	Line Choke (Pos.)	4231
㊸	Set Switch	4095
	Line Plug	L-543
	Line Cord and Plug	L-943
	Tube Shield	4228-A
	Knob (Dial)	4289-A
	Spring (Dial Knob)	3305
	Knobs (Switch and Volume Control)	4290-A
	Spring (Switch and Volume Control Knob)	4147
	Grid Clip	4060
	Grid Clip Insulator	4061
	Speaker Plug and Cable	L-1124-A
	R. F. Transformer Shield	3862
	Grommet for R. F. Transformer Shield	3747
	Pilot Lamp Bracket	4871
	Four Prong Socket Assembly	3977-A
	Five Prong Socket Assembly	3979-A
	Speaker Socket	3977-B
	Volume Control Insulators	4092
	Volume Control Insulators	4286
	Cabinet	
	Fahnstock Clip	L-1126
	Finishing Rosettes	4267
	Speaker Mounting Screws (3 used)	W-493
	Speaker Mounting Screws (1 used)	W-483
	Tuning Condenser Dial Scale	4261
	Mica for Compensating Condensers	4318

PHILADELPHIA STORAGE BATTERY COMPANY
Ontario and C Streets, Philadelphia, Pa.

June, 1931 Form No. 2590A Printed in U. S. A.

PHILCO

Radio Service Bulletin — No. 54

Models 112 and 112-A Receivers

Model 112 Receivers are for operation on 100-130 volt, 50-60 cycle AC lines
Model 112-A Receivers are for operation on 100-130 volt, 25-60 cycle AC lines

Table 1—Tube Socket Readings Taken with AC Set Tester AC Line—115 volts

Tube		Filament Volts	Plate Volts	Screen Grid Volts*	Control Grid Volts	Cathode Volts	Plate Milli-Amperes	Screen-Grid Milli-Amperes ‡
Type	Circuit							
24	1st R. F.	2.1	190	60	.2	5	1.7	1.75
27	Osc.	2.1	45	..	.7	7	1.6	....
24	1st Det.	2.1	180	62	4.6	8	.5†	.15
24	1st I. F.	2.1	185	65	...	5	1.5	1.7
24	2nd I. F.	2.1	190	82	2.2	5	3	1.85
27	Det. Rect.	2.2	...	..	.4	.5	.....	....
27	Det. Amp.	2.2	35	..	.4	5	.20‡	....
27	1st A. F.	2.1	95	..	1.2	5	4.	....
45	2nd A. F.	2.2	255	..	50	...	32.5	....
45	2nd A. F.	2.2	255	..	50	...	32.5	....
80	Rect.	4.9	...	..	...	...	50/Plate	....

*Read with C 100 Scale.
†Read with 20 Mil. Scale.
‡Read with 2 Mil. Scale.

Note—Volume Control Off; Station Selector turned to Low Frequency End; Range Switch set in "Normal" Position.

Table 2—Power Transformer Voltages

Terminals	A.C. Volts	
1—2		Primary
3		Center Tap 80 Tube
4		Center Tap 45 Tubes
5—6	2.67	Heaters for 24 and 27 Tubes
7—8	2.68	Filaments for 45 Tubes
9—12	750.	Plates 80 Tube
10—11	5.0	Filament 80 Tube
Rubber Covered Lead		Center Tap for 24 and 27 Tubes

Table 3—Condenser Data
(Other Than Filter Condenser)

No. on Figs.	CAPACITY	COLOR
(6)	.05	Bakelite Container
(10) (11)	.05 and 250 Ohm Resistor	Bakelite Container
(17)	.25 (two sections)	Metal Container
(19) (23) (27) (33) (38)	.00011	Blue, Golden Yellow
(21)	.0007	White, Golden Yellow
(28)	.05	Bakelite Container
(29)	.05 and 250 Ohm Resistor	Bakelite Container
(35)	.00005	Light Blue, White
(40)	.5	Metal Container
(42)	.00025	Yellow
(43)	.015	Bakelite Container
(45)	.05	Bakelite Container
(61)	.015 (two sections)	Bakelite Container
(67)	.05	Bakelite Container

Table 4—Resistor Data

No. on Figs.	Power (Watts)	Resistance	COLOR Body	Tip	Dot
(20)	1.	1,000	Brown	—Black	—Red
(1)	.5	10,000	Brown	—Black	—Orange
(18)	1.	13,000	Brown	—Orange	—Orange
(51) (52)	1.	25,000	Red	—Green	—Orange
(16) (39) (70)	.5	50,000	Green	—Brown	—Orange
(48) (64)	1.	70,000	Violet	—Black	—Orange
(8) (41) (66) (68)	.5	100,000	White	—White	—White
(46)	1.	250,000	Red	—Yellow	—Yellow
(34)	.5	500,000	Yellow	—White	—Yellow
(44)	1.	500,000	Yellow	—White	—Yellow
(58)		70	Flat Wire Wound (two sections)		
(59)		800	Short Tubular		
(57)		10,000	Long Tubular		

Model 112 Condenser Block Part No. 3754

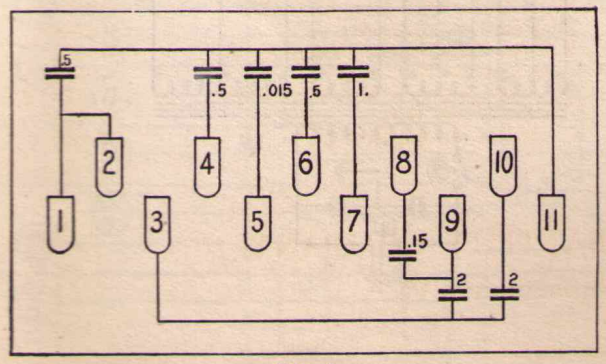

Fig. 1

Model 112-A Condenser Block Part No. 3755

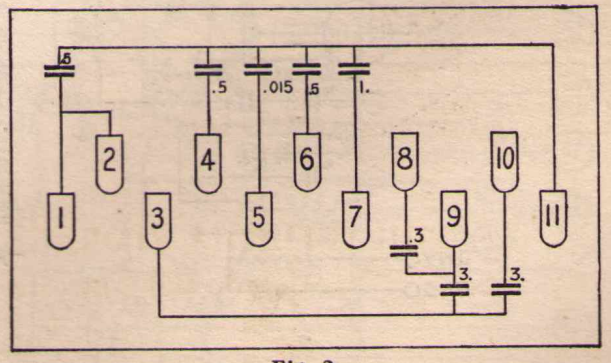

Fig. 2

MODELS 112 AND 112-A

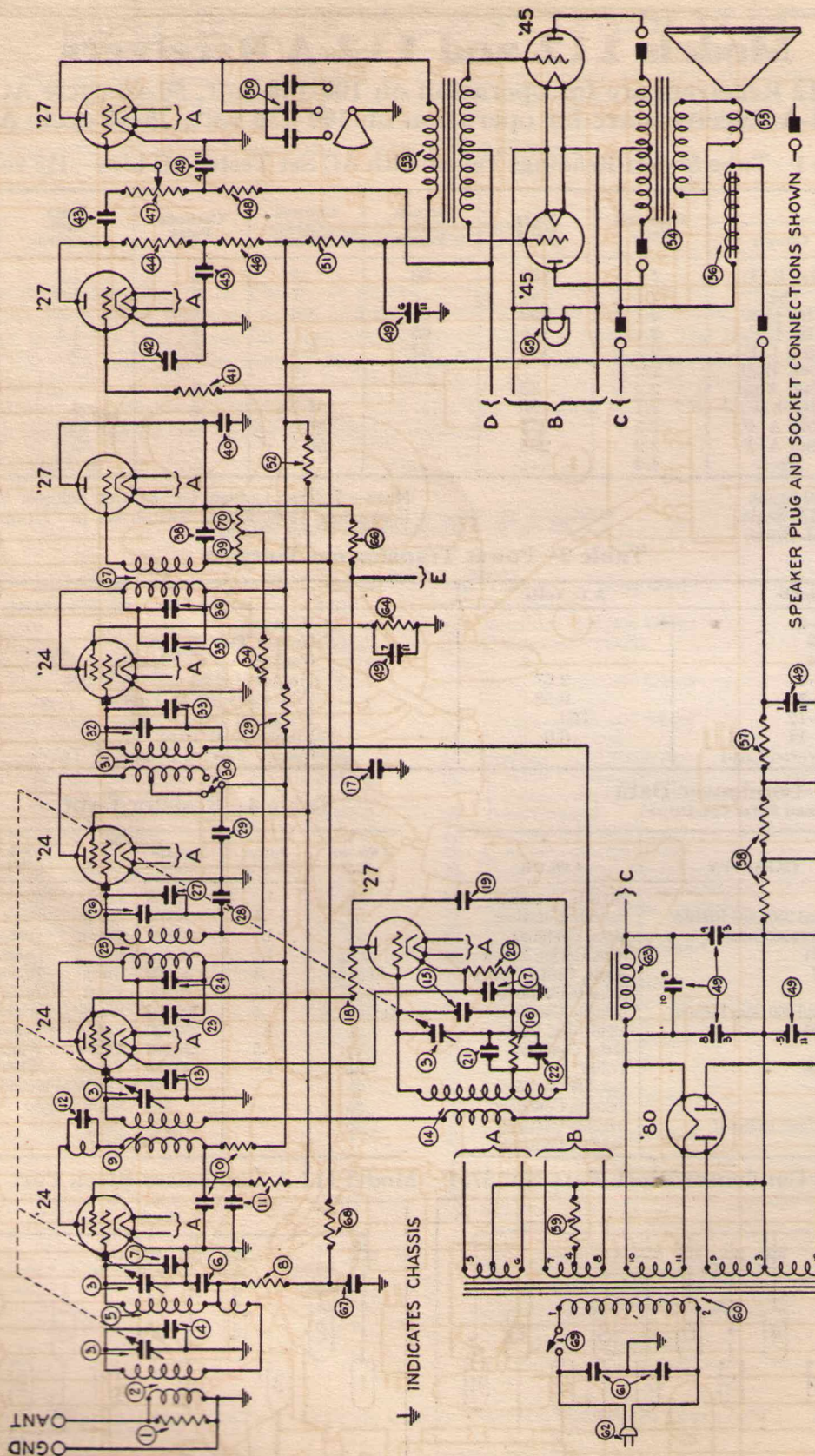

Fig. 3

MODELS 112 AND 112-A

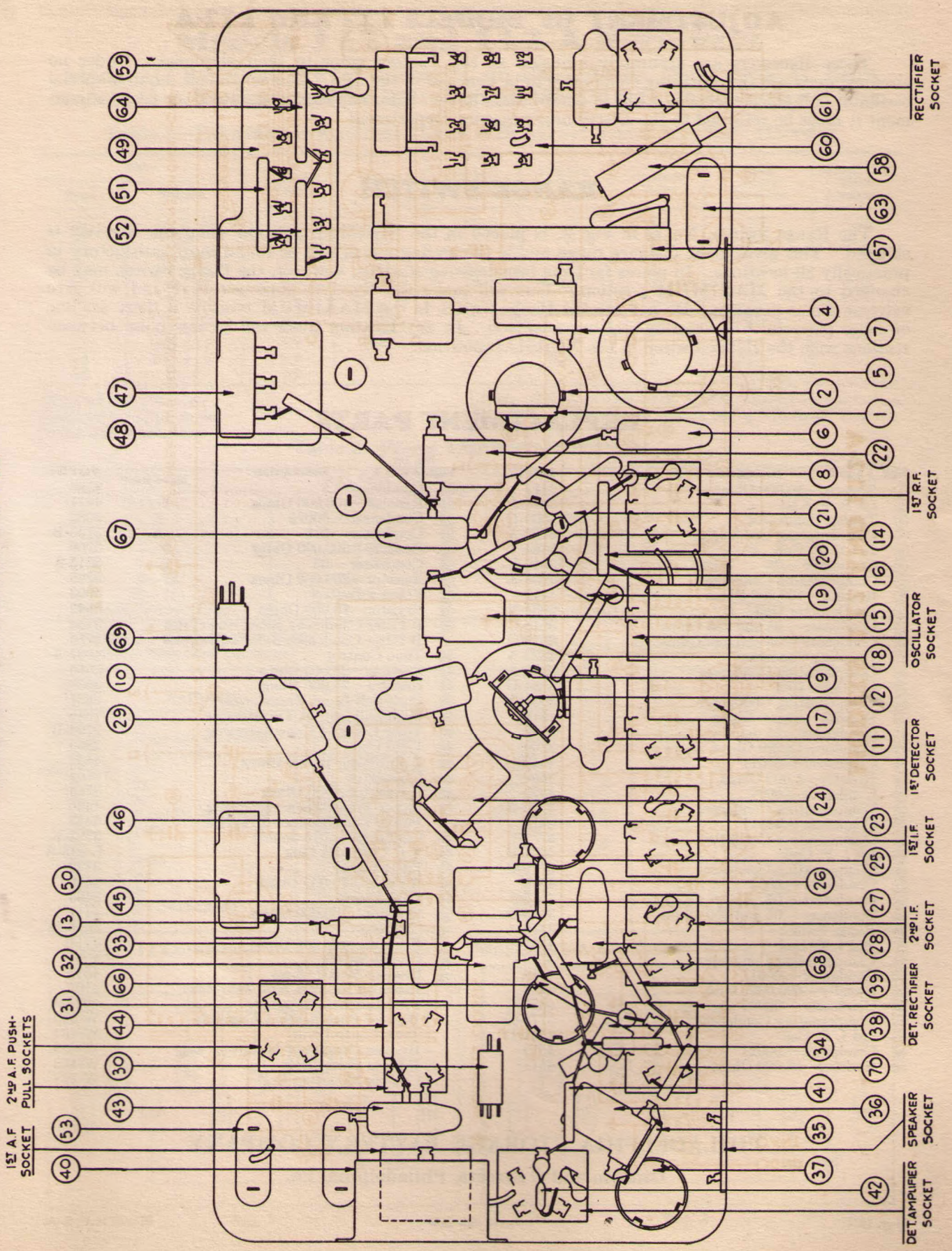

Fig. 4

ADJUSTMENT OF MODELS 112 AND 112-A

These Receivers are accurately adjusted at the Factory prior to their shipment. Under no circumstances are the adjusting condensers to be changed in the field. This alignment requires special oscillator equipment, which all Philco Distributors have. If for any reason the Receiver needs adjustment it must be returned to the Distributor's Service Department.

RANGE SWITCH

The Range Switch, No. ㉚ in Fig. 3, is placed in the NORMAL position when the Receiver is shipped. This gives great distance range and is the setting which will be found most satisfactory in practically all locations. In places far from broadcasting stations, however, the Range Switch may be changed to the MAXIMUM position. This will make the Receiver super-sensitive and will give extreme distance range. Do not use the Range Switch in the MAXIMUM position if there are one or more powerful broadcasting stations near you. In any location there will be less noise between stations with the Range Switch in the NORMAL position.

REPLACEMENT PARTS

No. on Figs. 3 and 4	Description	Part No.
①	Resistor—10,000 Ohms	4412
②	1st R. F. Coil	3884-J
③	Tuning Condenser	4000-D
④	Compensating Condenser	3772-A
⑤	2nd R. F. Coil	3884-T
⑥	Condenser—.05	3615-L
⑦	Compensating Condenser	3968-A
⑧	Resistor—100,000 Ohms	4411
⑨	1st Detector Coil	3884-V
⑩	Condenser—.05 and 250 Ohms	3615-C
⑪	Condenser—.05 and 250 Ohms	3615-C
⑫	Coupling Condenser	3892-A
⑬	Compensating Condenser	3968-A
⑭	Oscillator Coil	3884-U
⑮	Compensating Condenser	3968-A
⑯	Resistor—50,000 Ohms	4518
⑰	Condenser—.25 double	3557
⑱	Resistor—13,000 Ohms	3766
⑲	Condenser—.00011	4519
⑳	Resistor—1,000 Ohms	4590
㉑	Condenser—.0007	4520
㉒	Compensating Condenser	3772-B
㉓	Condenser—.00011	4519
㉔	Compensating Condenser	3772-C
㉕	1st I. F. Coil	4501-B
㉖	Compensating Condenser	3772-C
㉗	Condenser—.0001	4519
㉘	Condenser—.05	3615-J
㉙	Condenser—.05 and 250 Ohms	3615-B
㉚	Range Switch	3116
㉛	2nd I. F. Coil	4501-C
㉜	Compensating Condenser	3772-C
㉝	Condenser—.00011	4519
㉞	Resistor—500,000 Ohms	4517
㉟	Condenser—.00005	4587
㊱	Compensating Condenser	3772-D
㊲	3rd I. F. Coil	4501-D
㊳	Condenser—.00011	4519
㊴	Resistor—50,000 Ohms	4518
㊵	Condenser—.5	3583
㊶	Resistor—100,000 Ohms	4411
㊷	Condenser—.00025	3082
㊸	Condenser—.015	3793-B
㊹	Resistor—500,000 Ohms	3769
㊺	Condenser—.05	3615-S
㊻	Resistor—250,000 Ohms	3768
㊼	Volume Control	4093
㊽	Resistor—70,000 Ohms	3542
㊾	B Filter Condenser Block—60 cycles	3754
	B Filter Condenser Block—25 cycles	3755
㊿	Tone Control	4037-A
(51)	Resistor—25,000 Ohms	3656
(52)	Resistor—25,000 Ohms	3656
(53)	Push-pull Input Transformer	3537
(54)	Push-pull Output Transformer	2848
(55)	Voice Coil and Cone Assembly	2794-B
(56)	Field Coil	2850
(57)	B Resistor—10,000 Ohms	4532
(58)	C Resistor	3764
(59)	C Resistor—800 Ohms	3763
(60)	Power Transformer—60 cycles	4446
	Power Transformer—25 cycles	4447
(61)	Condenser—.015 double	3793-E
(62)	A C Cord and Plug	L-943-A
(63)	Filter Choke	3422
(64)	Resistor—70,000 Ohms	3542
(65)	Pilot Lamp	3463
(66)	Resistor—100,000 Ohms	4411
(67)	Condenser—.05	3615-D
(68)	Resistor—100,000 Ohms	4411
(69)	On-Off Switch	4095
(70)	Resistor 50,000 Ohms	4518
	Insulator for Part Nos. 3557-3583	4105
	Pilot Bracket Assembly	4027-A
	Bolt for Pilot Bracket Assembly	W-439
	Tone Control Nut	W-434
	By-pass Condenser Mounting Bolt	W-443
	Bottom Shield Bolt	W-453
	Chassis Mounting Bolt	W-468

PHILADELPHIA STORAGE BATTERY COMPANY
Ontario and C Streets, Philadelphia, Pa.

May, 1931 Form No. 2650 Printed in U. S. A.

PHILCO
REG. U.S. PAT. OFF.

Radio Service Bulletin—No. 55

MODEL 212 AND 212-A RADIO-PHONOGRAPH

MODEL 212 IS FOR USE ON 50-60 CYCLE 100-130 VOLT AC LINES
MODEL 212-A IS FOR USE ON 25-40 CYCLE 100-130 VOLT AC LINES

Particular attention is called to the noted change in the wiring diagram on Fig. 1.

The chasses of the 212 and 212-A are the same as the chasses of the 111 and 111-A except for the additional wiring of the radio-phono switch and pickup.

The tube socket readings, transformer, condenser and resistor data, the filter condenser arrangements and all other information given in Bulletin No. 54 for 112 and 112-A should be used for the 212 and 212-A respectively.

The parts list in Bulletin No. 54 is supplemented with the following which are the additional parts used in the Radio Phonograph.

ADDITIONAL PARTS LIST--MODELS 212 AND 212-A

No. on Fig. 1		Part No.
⑦⓪	Motor (50-60 cycles)	4784
	Motor (25 cycles)	4785
⑦①	Phonograph On-Off Switch	4748
⑦②	Pick-up Head	4584
⑦③	Radio-Phono Switch	4514
⑦④	Cord Connector Plug	4091
⑦⑤	Cord Connector Socket	4124
	Turn Table	4735

The numbering in Fig. 1 from ① to ⑥⑨ is the same as in Figs. 3 and 4 shown in Bulletin No. 54 with the exception of resistor ⑦⓪ in Bulletin No. 54, which is ⑦⑥ in Bulletin No. 55.

We are not issuing instructions on the repair of the turntable motor, the record changer mechanism or the pick-up head. If the motor should become defective, replace with another motor. Do not attempt to repair it. Return it to your distributor.

The pick-up should be handled in the same way. If it does not operate properly remove the head and return it to your distributor.

If the record changer mechanism is out of adjustment it should be returned to your distributor's service department for servicing.

The worm gear of the motor should be greased with a clear petroleum jelly. Add a few drops of light machine oil to the two oil holes of the phonograph motor once every six months. These oil holes are located underneath the turntable.

May, 1931
Philadelphia, Pa.

PHILCO
REG. U.S. PAT. OFF.

Form No. 2638

Printed in U.S.A.

MODEL 212 AND 212-A RADIO-PHONOGRAPH

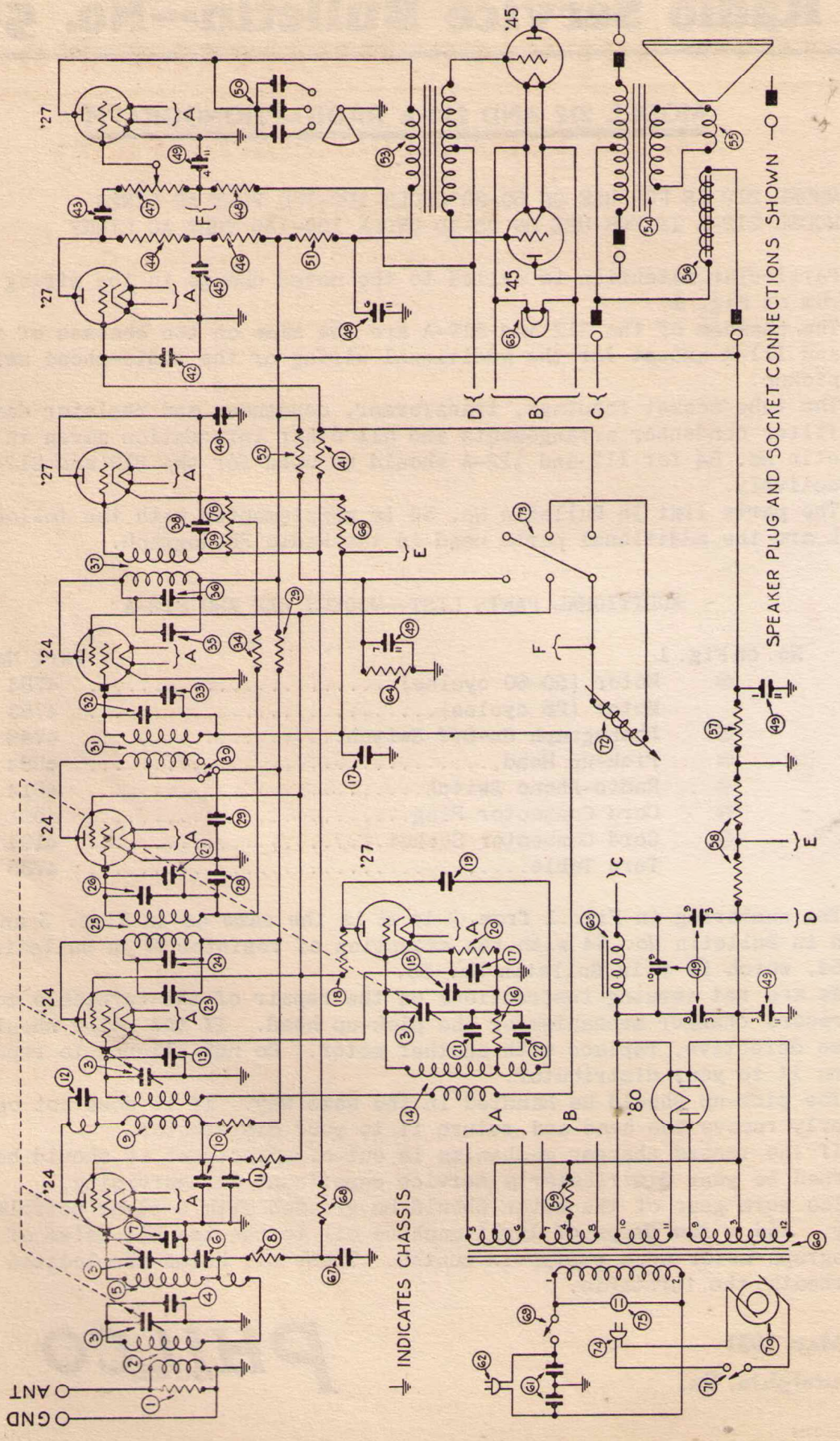

Fig. 1

PHILCO
REG. U.S. PAT. OFF.

Radio Service Bulletin—No. 56

Models 90 and 90-A Receivers

Model 90 Receivers are for Operation on 105-125 volt, 50-60 cycle AC Lines.
Model 90-A Receivers are for Operation on 105-125 volt, 25-60 cycle AC Lines.

Table 1—Tube Socket Readings Taken with AC Set Tester, AC Line, 115 Volts

Tube		Filament Voltage	Plate Voltage	Grid Voltage	Screen Grid Voltage	Cathode Voltage	Plate Milliamperes
Type	Circuit						
24	1st R. F.	2.1	250	3.3	83	15	3
27	Osc.	2.1	60	1	...	15	2
24	1st Det.	2.1	250	5.5	23	15	.5
24	1st I. F.	2.1	250	3.8	80	15	4.5
24	2nd Det.	2.1	48	3.7	42	15	3
27	1st Audio	2.1	140	.25	...	10	....
45	Audio	2.2	243	46	...	...	30
45	Audio	2.2	243	46	...	...	30
80	Rect.	4.5	...	...	...	...	...

All readings taken with antenna disconnected and ground on. Volume Control on full.

Table 2—Power Transformer Voltages

Terminals	A.C. Volts		Color
1—2	105 to 125	Primary	Black (Small Gauge)
3—5	2.5	Heaters of 24 and 27 Tubes	Black (Heavy Gauge)
4	2.5	Center Tap of 3—5	Black with Yellow
6—8	2.5	Filament of 45 Tubes	Dark Green
7	2.5	Center Tap of 6—8	Black with Green
9—10	5.0	Filament of 80 Tube	Light Blue
11—13	650.	Plates of 80 Tube	Yellow
12	...	Center Tap of 11—13	Yellow with Green

Table 3—Resistor Data

No. on Fig.	Terminal	Power (Watts)	Resistance	Color Body—Tip—Dot
	1—2	...	800	
	2—3	...	263	
	3—4	...	75	
(38)	5—6	...	370	(Long Tubular)
	6—7	...	1,800	
	7—8	...	1,430	
(47)	....	1.	13,000	Brown—Orange—Orange
(21)	....	.5	50,000	Green—Brown—Orange
(43)	....	1.	50,000	Green—Brown—Orange
(33)	....	1.	250,000	Red—Yellow—Yellow
(34) (23)	....	.5	250,000	Red—Yellow—Yellow
(24)	....	.5	1,000,000	Brown—Black—Green

Table 4—Condenser Data

No. on Figs.	Capacity	Color
(9)	.09 Double	Black Bakelite Container
(10)	.09 Double	Black Bakelite Container
(11) (15) (16) (20) (48)	.00011	Blue, Golden Yellow
(17) (22)	.000035	Yellow and Green
(25)	.5	Metal Container
(28)	.25 Double (Black wires to Ground) .5 (White wire to Ground)	Metal Container
(29)	.05	Black Bakelite Container
(36) (37)	6.	Electrolytic Type
(36) (25 to 40 cycles)	10.	Electrolytic Type
(40)	.015 Double	Black Bakelite Container
(41)	.0007	White, Golden Yellow
(46)	.001	Green and White

Models 90 and 90-A

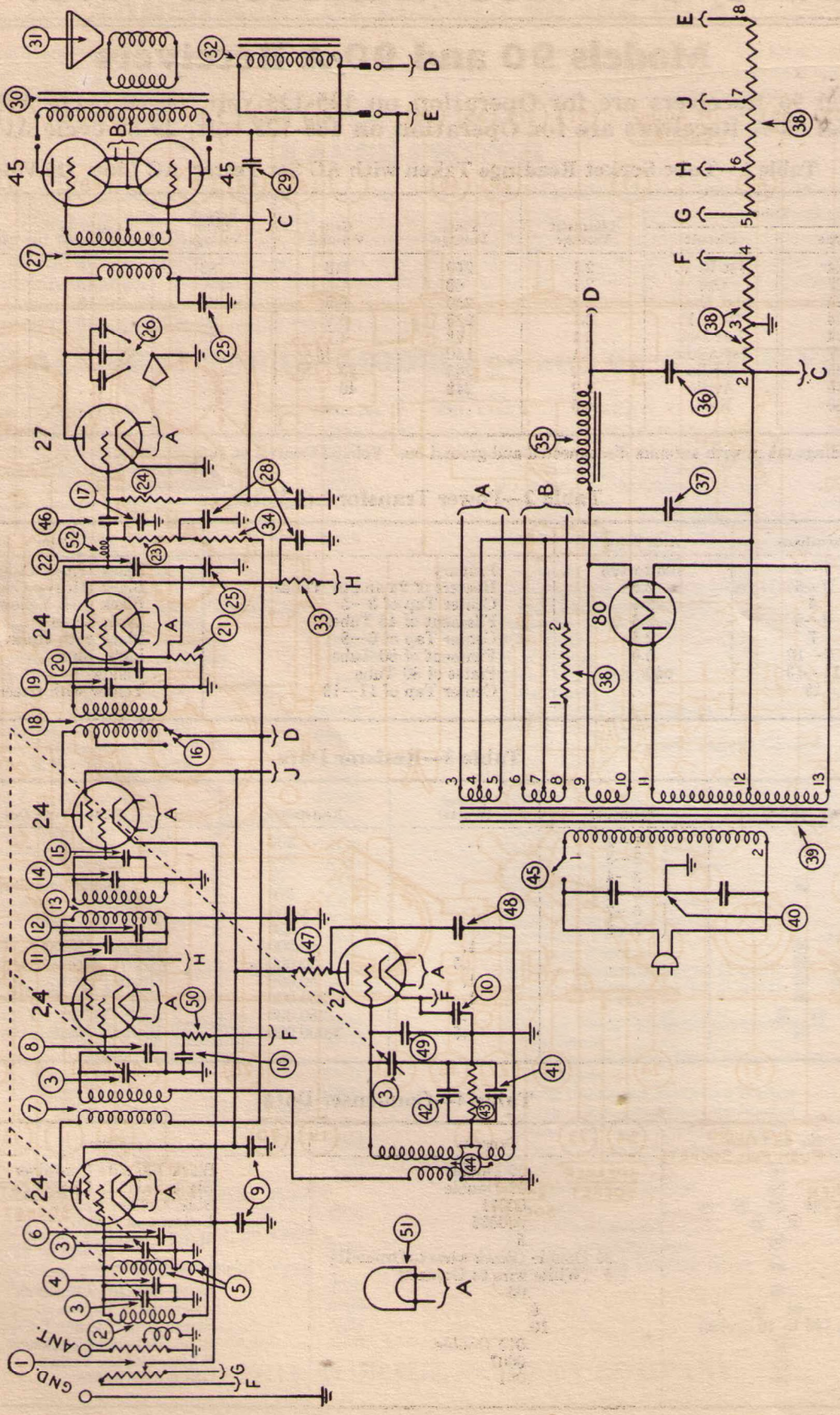

Fig. 1

Models 90 and 90-A

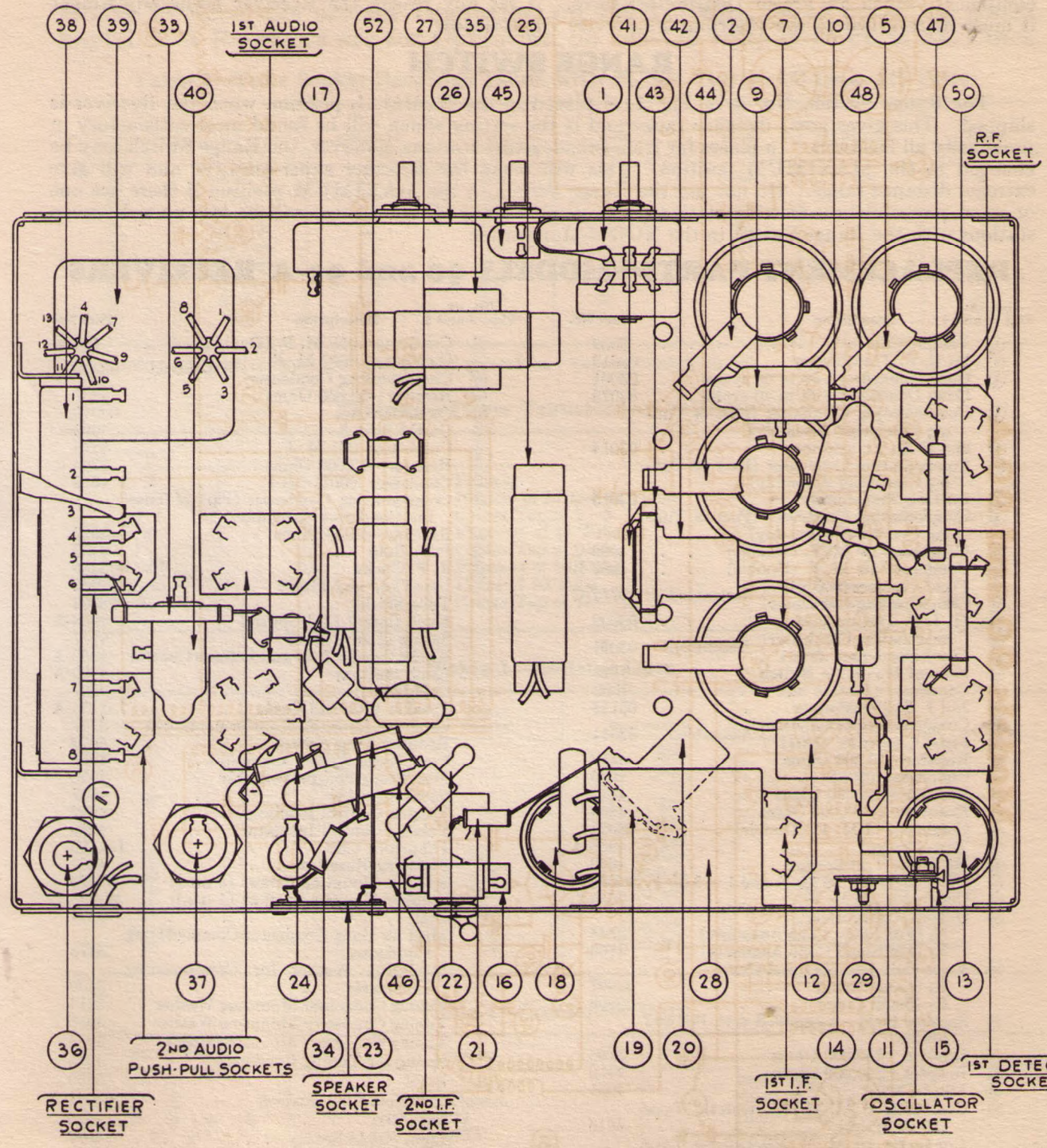

Fig. 2

ADJUSTMENT OF MODELS 90 and 90-A

These Receivers are accurately adjusted at the Factory prior to their shipment. Under no circumstances are the adjusting condensers to be changed in the field. This alignment requires special oscillator equipment, which all Philco Distributors have. If for any reason the Receiver needs adjustment it must be returned to the Distributor's Service Department.

RANGE SWITCH

The Range Switch, No. ⑯ in Fig. 1, is placed in the NORMAL position when the Receiver is shipped. This gives great distance range and is the setting which will be found most satisfactory in practically all locations. In places far from broadcasting stations, however, the Range Switch may be changed to the MAXIMUM position. This will make the Receiver super-sensitive and will give extreme distance range. Do not use the Range Switch in the MAXIMUM position if there are one or more powerful broadcasting stations near you. In any location there will be less noise between stations with the Range Switch in the NORMAL position.

REPLACEMENT PARTS—MODELS 90 and 90-A RECEIVERS

No. on Figs. 3 and 4	Description	Part No.
①	Volume Control	5039
②	1st R. F. Transformer	03013
③	Gang Condenser—50 to 60 cycles	03001
	Gang Condenser—25 to 40 cycles	03078
④	Compensating Condenser (Part of Tuning Condenser Assembly)	
⑤	2nd R. F. Transformer	03014
⑥	Compensating Condenser (Part of Tuning Condenser Assembly)	
⑦	1st Det. Transformer	03015
⑧	Compensating Condenser (Part of Tuning Condenser Assembly)	
⑨	Condenser .09 M. F. (Double)	4989-C
⑩	Condenser .09 M. F. (Double)	4989-B
⑪ ⑫	Fixed Condenser .00011 / Compensating Condenser } Assembled	3772-C
⑬	1st I. F. Transformer	03009
⑭ ⑮	Compensating Condenser / Fixed Condenser .00011 } Assembled	03051
⑯	Normal Maximum Switch	3116
⑰	Condenser (.000035 mf)	4990
⑱	2nd I. F. Transformer	03143
⑲ ⑳	Compensating Condenser / Fixed Condenser .00011 } Assembled	03051
㉑	Resistor—50,000 Ohms	4518
㉒	Condenser .00035	4990
㉓	Resistor—250,000 Ohms	4410
㉔	Resistor—1,000,000 Ohms	4409
㉕	Condenser .5 M. F. (Double)	03024
㉖	Tone Control	4037-A
㉗	1st Audio Transformer	4952
㉘	Condensers 2—.25 M. F. and 1—.5 M. F.	03029
㉙	Condenser .05 M. F.	3615-G
㉚	Output Transformer:	
	H_2 (For Large Cone Assembly)	2848
	K_2 (For Small Cone Assembly)	2766
㉛	Voice Coil Assembly and Cone:	
	H_2 (Large Cone)	02997
	K_2 (Small Cone)	02996
㉜	Speaker Field—Assembled with Pot and Frame	
㉝	Resistor—250,000 Ohms	3768
㉞	Resistor—250,000 Ohms	4410
㉟	Filter Choke	4951
㊱	Condenser 6 M. F. Electrolytic Type (50-60 cycles)	4916
	Condenser 10 M. F. Electrolytic Type (25-40 cycles)	5142
㊲	Condenser 6 M. F. Electrolytic Type (25-40) and (50-60) cycles	4916
㊳	B. C. Resistor	4953
㊴	Power Transformer (50 to 60 cycles)	4938
	Power Transformer (25 to 40 cycles)	4939
㊵	Condenser .015 M. F. (Double)	3793-E
㊶ ㊷	Condenser .0007 M. F. / Compensating Condenser } Assembled	03050
㊸	Resistor—50,000 Ohms	4237
㊹	Oscillator Coil	03016
㊺	On-Off Switch	4095
㊻	Condenser .001 M. F.	5215
㊼	Resistor—13,000 Ohms	3766
㊽	Condenser .00011 M. F.	4519
㊾	Compensating Condenser (Part of Tuning Condenser Assembly)	
㊿	Resistor—5,000 Ohms	3526
(51)	Pilot Bulb	3463
(52)	R. F. Choke	03086
	Line Cord and Plug	L-943
	Tube Shield	03002
	Knob (large) Dial Control	4958-A
	Spring (Dial Knobs)	4147
	Knobs (small) Tone and Volume Control	4959-A
	Knob (switch)	4290-A
	Grid Clip	4897
	Speaker Plug and Cable	L-1124-A
	Grommet for R. F. Transformer Shield	3747
	Rectifier Tube Socket	5026
	Four Prong Socket Assembly	4955
	Five Prong Socket Assembly	4956
	Speaker Socket	4957
	Volume Control Insulator	4092
	Volume Control Insulator	4286
	Fahnstock Clip	L-1126
	Finishing Rosettes	4267
	Speaker Mounting Screws (3 used)	W-493
	Speaker Mounting Screws (1 used)	W-483
	Dial	5021
	Mica for Gang Condenser Compensating Condenser	3473
	Insulating Washer for Compensating Condenser	3500
	Tuning Condenser Mounting Washer	3914
	Tuning Condenser Mounting Washer	3915
	Tuning Condenser Mounting Sleeve	3916
	Spring for Tuning Condenser	4255
	Bezel	5009
	Complete Pilot Bracket	03081-A
	Dial Disc	4925
	Light Shield Screen	4937
	Friction Drive Bracket	4930
	Brass Collar for Friction Drive	4935
	Shaft	4931

PHILADELPHIA STORAGE BATTERY COMPANY

Ontario and C Streets, Philadelphia, Pa.

May, 1931 Form No. 2649 Printed in U. S. A.

PHILCO

REG. U.S. PAT. OFF.

Radio Service Bulletin—No. 57

Models 70 and 70-A Receivers

Model 70 Receivers are for operation on 100-130 volt, 50-60 cycle AC lines
Model 70A Receivers are for operation on 100-130 volt, 25-60 cycle AC lines

Table 1—Tube Socket Readings Taken with AC Set Tester AC Line—115 volts

Tube		Filament Volts	Plate Volts	Screen Grid Volts	Control Grid Volts	Cathode Volts	Plate Milli-amperes
Type	Circuit						
24	1st R. F.	2.25	250	85	3.	19.5	3.
24	1st Det.	2.25	250	87	5.5	21.5	.5
27	Osc.	2.25	85	...	2.	19.5	2.5
24	1st I. F.	2.25	250	87	3.	19.5	3.
24	2nd Det.	2.25	105	75	6.	22.	.1
47	Audio	2.25	245	255	1.	...	...
80	Rectifier	4.7	...	...	...	...	40/plate

Note—Volume Control Off; Station Selector turned to Low Frequency End.

Table 2—Power Transformer Voltages

Terminals	A.C. Volts		
1–2	105 to 125	Primary	Black (Small Gauge)
3–5	2.5	Filament of 47	Dark Green
6–8	2.5	Filament of 24	Black (Heavy Gauge)
9–10	5.	Filament of 80	Light Blue
11–13	700.	Plates of 80	Yellow
4	.....	Center Tap of 3–5	Black, Green Tracer
7	.....	Center Tap of 6–8	Black, Yellow Tracer
12	.....	Center Tap of 11–13	Yellow, Green Tracer

Table 3—Condenser Data

No. on Figs. 3 and 4	Capacity MFD	Color
⑤	.09	
⑨	.00041	Yellow Orange
⑫	.09	
⑮ ⑰ ㉑	.00011	Blue, Golden Yellow
㉘	.05	
㉕	.00005	Light Blue, White
㉖	.5	
㉘	.0005	Green
㉙	.00025	Yellow
㉛	.09 and 250 Ohm Resistor	
㉞	.01	
㊱	.25	
㊶	(25 to 40 cycles) 6.	
㊶	(50 to 60 cycles) 10.	
㊸	6.	

Table 4—Resistor Data

No. on Figs. 3 and 4	Resistance	Terminal	Color Body	Color Tip	Color Dot
⑪ ㉗	50,000	...	Green	Brown	Orange
⑭	5,000	...	Green	Black	Red
⑯	13,000	...	Brown	Orange	Orange
㉜ ㉟	250,000	...	Red	Yellow	Yellow
㉝	100,000	...	White	White	Orange
	1,060	1–2			
	2,300	2–3			
㊵	70	4–5	Long Tubular		
	180	5–6			

MODELS 70 AND 70-A

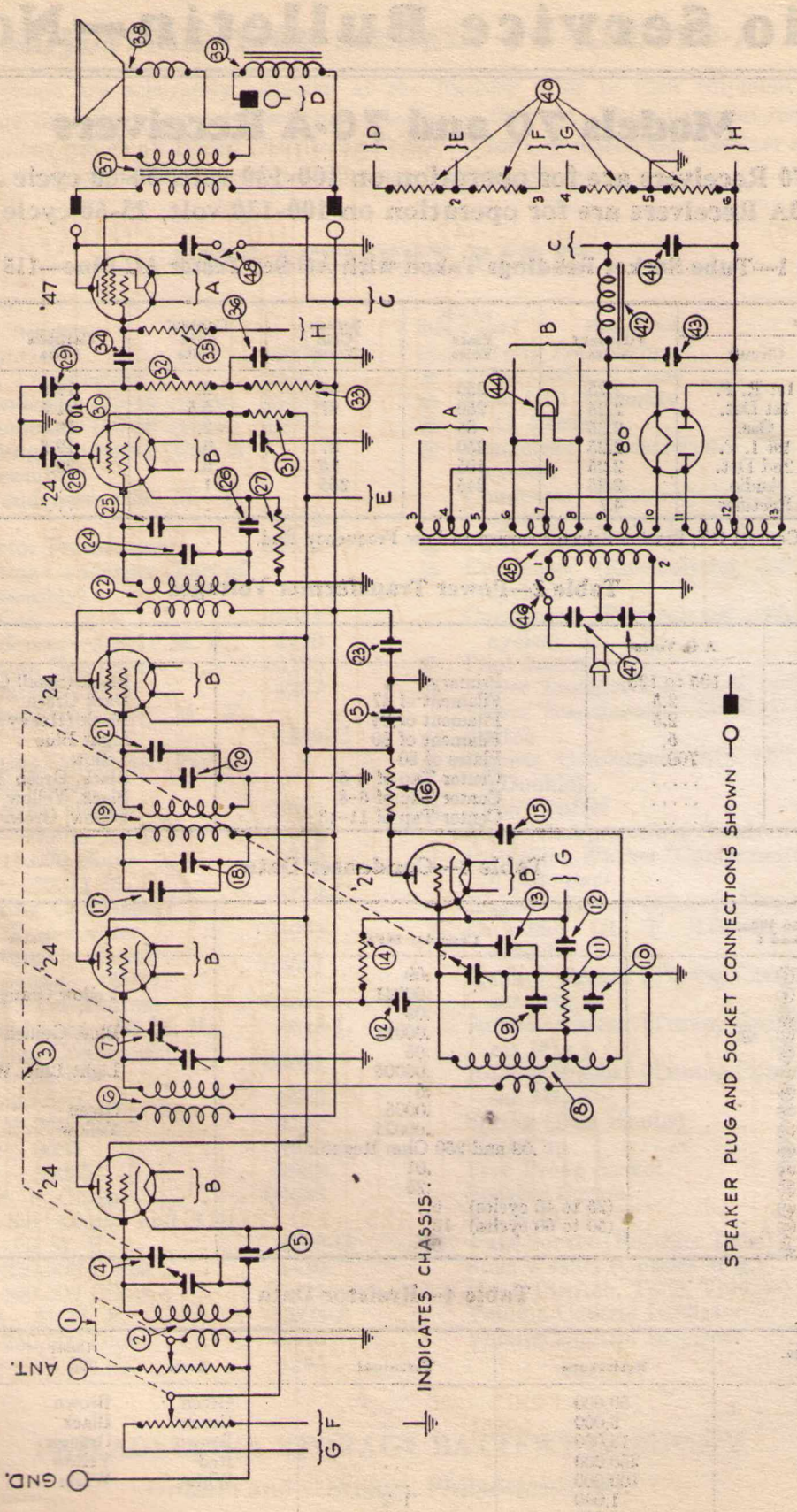

Fig. 1

MODELS 70 AND 70-A

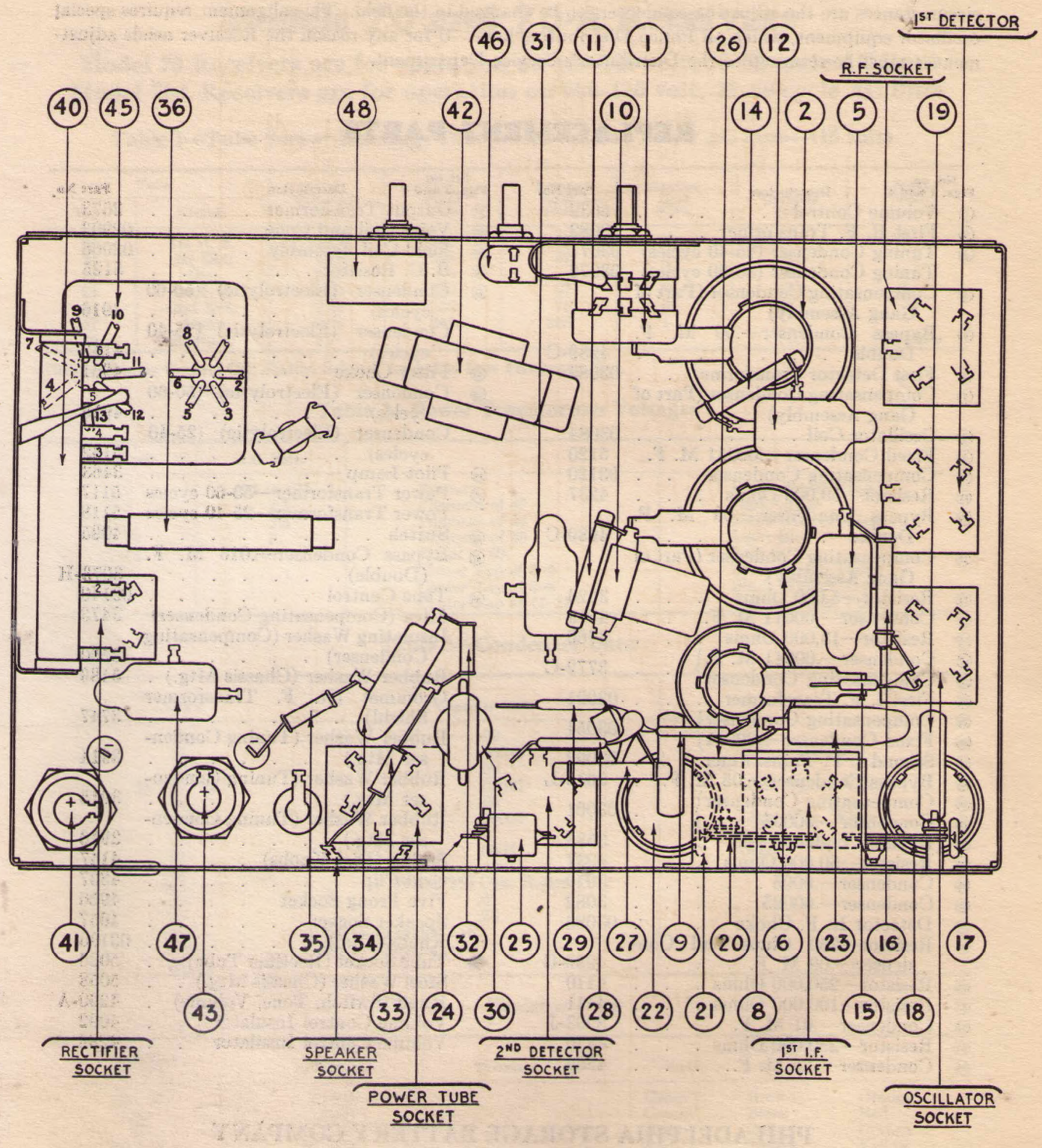

Fig. 2

ADJUSTMENT OF MODELS 70 AND 70-A

These Receivers are accurately adjusted at the Factory prior to their shipment. Under no circumstances are the adjusting condensers to be changed in the field. This alignment requires special oscillator equipment, which all Philco Distributors have. If for any reason the Receiver needs adjustment it must be returned to the Distributor's Service Department.

REPLACEMENT PARTS

No. on Figs. 3 and 4	Description	Part No.
①	Volume Control	5039
②	First R. F. Transformer	03082
③	Tuning Condenser (25-40 cycles)	03077
	Tuning Condenser (50-60 cycles)	03076
④	Compensating Condenser (Part of Gang Assembly)	
⑤	Bypass Condenser—.09 M. F. Double	4989-C
⑥	First Detector Transformer	03083
⑦	Compensating Condenser (Part of Gang Assembly)	
⑧	Oscillator Coil	03084
⑨	Fixed Condenser—.00041 M. F.	5120
⑩	Compensating Condenser	03120
⑪	Resistor—50,000 Ohms	4237
⑫	Bypass Condenser—.09 M. F. Double	4989-C
⑬	Compensating Condenser (Part of Gang Assembly)	
⑭	Resistor—5,000 Ohms	3526
⑮	Condenser—.00011 M. F.	4519
⑯	Resistor—13,000 Ohms	3766
⑰ ⑱	Condenser—.00011 M. F. / Compensating Condenser	3772-C
⑲	First I. F. Transformer	03091
⑳ ㉑	Compensating Condenser / Fixed Condenser—.00011	03051
㉒	Second I. F. Transformer	03092
㉓	Bypass Condenser—.05 M. F.	3615-L
㉔ ㉕	Compensating Condenser / Condenser—.00005	03061
㉖	Bypass Condenser—.5	3583
㉗	Resistor—50,000 Ohms	4237
㉘	Condenser—.0005	3910
㉙	Condenser—.00025	3082
㉚	Detector R. F. Choke	03086
㉛	Resistor—250 Ohms and Condenser—.09 M. F.	4989-G
㉜	Resistor—250,000 Ohms	4410
㉝	Resistor—100,000 Ohms	4411
㉞	Condenser—.01 M. F.	3903-J
㉟	Resistor—250,000 Ohms	4410
㊱	Condenser—.25 M. F..	4264

No. on Figs. 3 and 4	Description	Part No.
㊲	Output Transformer	2673
㊳	Voice Coil and Cone	02993
㊴	Field Coil Assembly	02966
㊵	B. C. Resistor	5125
㊶	Condenser (Electrolytic) (50-60 cycles)	4916
	Condenser (Electrolytic) (25-40 cycles)	4142
㊷	Filter Choke	4951
㊸	Condenser (Electrolytic) (50-60 cycles)	4916
	Condenser (Electrolytic) (25-40 cycles)	5142
㊹	Pilot Lamp	3463
㊺	Power Transformer—50-60 cycles	5117
	Power Transformer—25-40 cycles	5118
㊻	Switch	4095
㊼	Bypass Condenser—.015 M. F. (Double)	3973-H
㊽	Tone Control	03140
	Mica (Compensating Condenser)	3473
	Insulating Washer (Compensating Condenser)	3500
	Rubber Washer (Chassis Mtg.)	5189
	Grommet (R. F. Transformer Shield)	3747
	Rubber Washer (Tuning Condenser Mtg.)	3914
	Rubber Washer (Tuning Condenser Mtg.)	3915
	Rubber Washer (Tuning Condenser Mtg.)	3916
	Spring (Dial Knobs)	4147
	Grid Clip	4897
	Five Prong Socket	4956
	Speaker Socket	4957
	Knobs (Dial)	03196
	Tube Socket (Rectifier Tube)	5026
	Steel Washer (Chassis Mtg.)	5058
	Knob (Switch, Tone, Volume)	4290-A
	Volume Control Insulator	4092
	Volume Control Insulator	4286

PHILADELPHIA STORAGE BATTERY COMPANY

Ontario and C Streets, Philadelphia, Pa.

May, 1931 Form No. 2651 Printed in U. S. A.

PHILCO

REG. U.S. PAT. OFF.

Service Bulletin—No. 57-A

Models 70 and 70-A Receivers

(This Bulletin Supersedes Service Bulletin No. 57 for All Parts Replacements)

Model 70 Receivers are for operation on 100-130 volt, 50-60 cycle AC lines
Model 70A Receivers are for operation on 100-130 volt, 25-60 cycle AC lines

Table 1—Tube Socket Readings Taken with AC Set Tester AC Line—115 volts

Tube		Filament Volts	Plate Volts	Screen Grid Volts	Control Grid Volts	Cathode Volts	Plate Milli-amperes
Type	Circuit						
24	1st R. F.	2.25	250	85	3.	19.5	3.
24	1st Det.	2.25	250	87	5.5	21.5	.5
27	Osc.	2.25	85	. . .	2.	19.5	2.5
24	1st I. F.	2.25	250	87	3.	19.5	3.
24	2nd Det.	2.25	105	75	6.	22.	.1
47	Audio	2.25	245	255	1.	. . .	. . .
80	Rectifier	4.7	. . .	. . .	. . .	. . .	40/plate

Note—Volume Control Off; Station Selector turned to Low Frequency End.

Table 2—Power Transformer Voltages

Terminals	A.C. Volts		
1–2	105 to 125	Primary	White
3–5	2.5	Filament of 47	Dark Green
6–8	2.5	Filament of 24	Black
9–10	5.	Filament of 80	Light Blue
11–13	700.	Plates of 80	Yellow
4	. . . . .	Center Tap of 3–5	Black, Green Tracer
7	. . . . .	Center Tap of 6–8	Black, Yellow Tracer
12	. . . . .	Center Tap of 11–13	Yellow, Green Tracer

Table 3—Condenser Data

No. on Figs. 1 and 2	Capacity (mfd.)	Color
(15)	.00011	Blue and Golden Yellow
(26)	.00025	Yellow
(9)	.00041	Yellow and Orange
(25)	.0005	Green
(31)	.01	Black Bakelite
(45)	.015 (Double)	Black Bakelite
(21)	.05	Black Bakelite
(5) (12)	.09 (Double)	Black Bakelite
(28)	.09 (with 250 ohms)	Black Bakelite
(40)	.09 (50–60 cycles)	Black Bakelite
(40)	.18 (25–40 cycles)	Black Bakelite
(33)	.25	Metal
(23)	.5	Metal
(38)	6 (50–60 cycles)	Electrolytic
(38)	10 (25–40 cycles)	Electrolytic
(41)	6 (50–60 cycles)	Electrolytic
(41)	10 (25–40 cycles)	Electrolytic

Table 4—Resistor Data

No. on Figs. 1 and 2	Terminal	Power (watts)	Resistance (ohms)	Color		
				Body	Tip	Dot
(28)	Combined with	.09 mfd.)	250	Black Bakelite		
(37)	1–2		1060	Long Tubular		
	2–3		2300			
	4–5		70			
	5–6		240			
(14)	. . . .	.5	5,000	Green	Black	Red
(16)	. . . .	1.	13,000	Brown	Orange	Orange
(30)	(50–60 cycles)	.5	45,000	Yellow	Green	Orange
(11) (24)	. . . .	.5	51,000	Green	Brown	Orange
(30)	(25–40 cycles)	.5	99,000	White	White	Orange
(29) (32)	. . . .	.5	240,000	Red	Yellow	Yellow

MODELS 70 AND 70-A

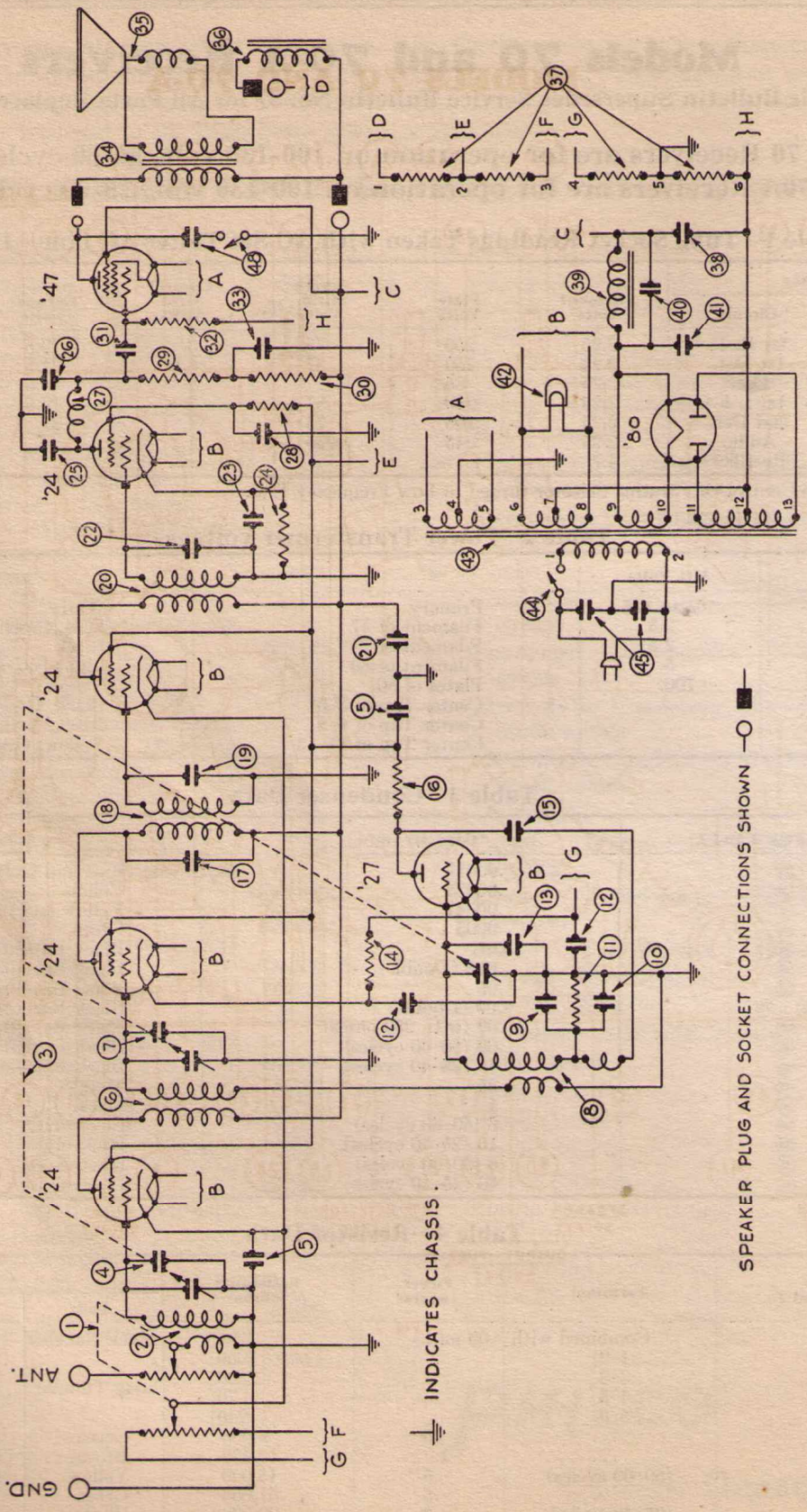

Fig. 1

MODELS 70 AND 70-A

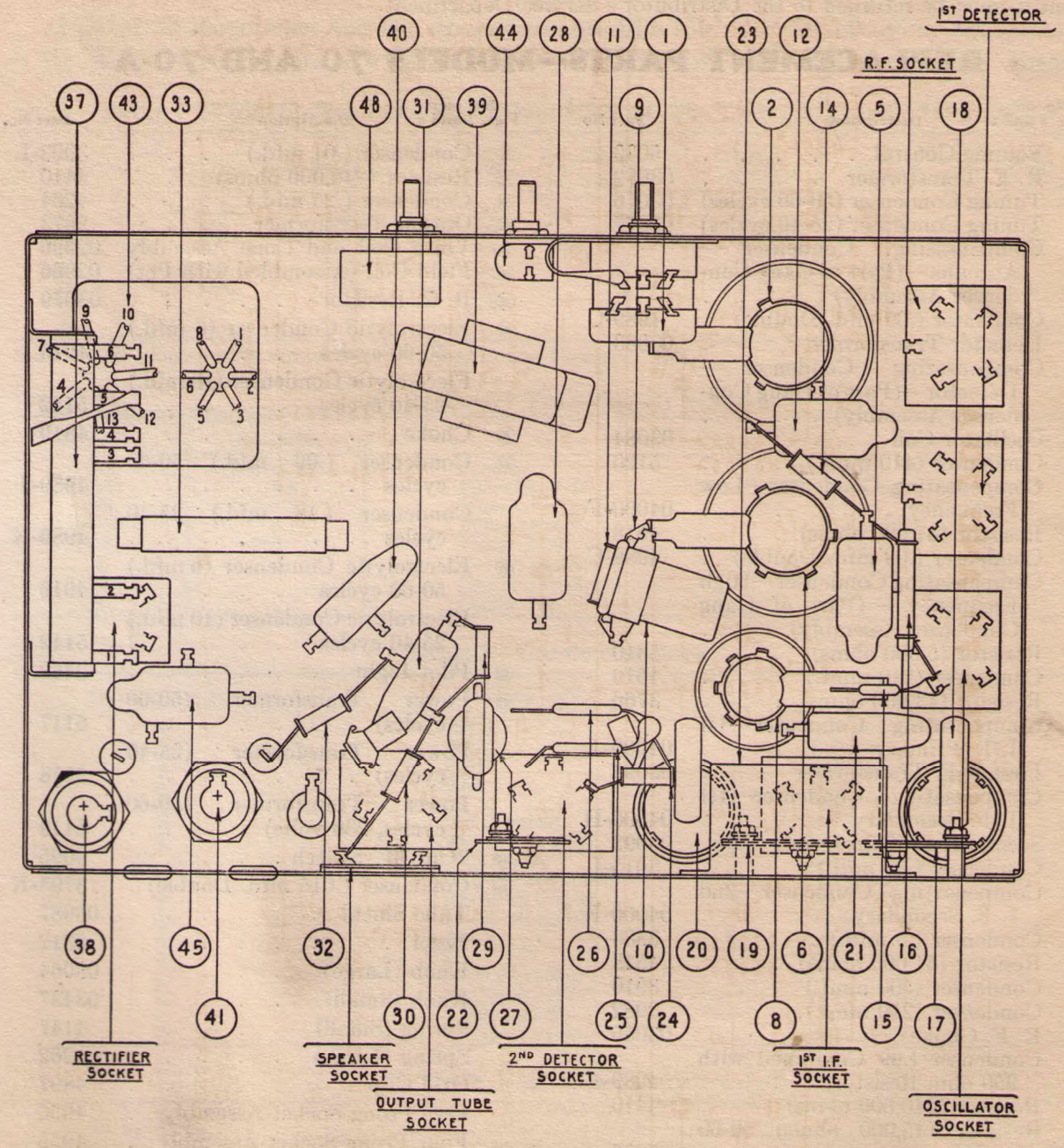

Fig. 2

ADJUSTMENT OF MODELS 70 AND 70-A

These Receivers are accurately adjusted at the Factory prior to their shipment. Under no circumstances are the adjusting condensers to be changed in the field. This alignment requires special oscillator equipment, which all Philco Distributors have. If for any reason the Receiver needs adjustment it must be returned to the Distributor's Service Department.

REPLACEMENT PARTS—MODELS 70 AND 70-A

No. on Figs. 3 and 4	Description	Part No
①	Volume Control	5039
②	R. F. Transformer	03082
③	Tuning Condenser (50-60 cycles)	03076
	Tuning Condenser (25-40 cycles)	03077
④	Compensating Condenser — Antenna—(Part of Gang Condenser Assembly)	
⑤	Condenser (.09 mfd. Double)	4989-C
⑥	Detector Transformer	03083
⑦	Compensating Condenser — Detector—(Part of Gang Condenser Assembly)	
⑧	Oscillator Coil	03084
⑨	Condenser (410 mmf.)	5120
⑩	Compensating Condenser—Low Frequency	04000-F
⑪	Resistor (51,000 ohms)	4518
⑫	Condenser (.09 mfd. Double)	4989-C
⑬	Compensating Condenser—High Frequency — (Part of Gang Condenser Assembly)	
⑭	Resistor (5,000 ohms)	5310
⑮	Condenser (110 mmf.)	4519
⑯	Resistor (13,000 ohms)	3766
⑰	Compensating Condenser—1st I. F. Primary	04000-J
⑱	First I. F. Transformer	03091
⑲	Compensating Condenser—1st I. F. Secondary	04000-H
⑳	Second I. F. Transformer	03092
㉑	Condenser (.05 mfd.)	3615-L
㉒	Compensating Condenser—2nd I. F. Secondary	04000-K
㉓	Condenser (.5 mfd.)	3583
㉔	Resistor (51,000 ohms)	4518
㉕	Condenser (500 mmf.)	3910
㉖	Condenser (250 mmf.)	3082
㉗	R. F. Choke	03086
㉘	Condenser (.09 Combined with 250 ohm Resistor)	4989-E
㉙	Resistor (240,000 ohms)	4410
㉚	Resistor (45,000 ohms) 50-60 cycles	5256
	Resistor (99,000 ohms) 25-40 cycles	4411

No. on Figs. 3 and 4	Description	Part No.
㉛	Condenser (.01 mfd.)	3903-L
㉜	Resistor (240,000 ohms)	4410
㉝	Condenser (.25 mfd.)	4264
㉞	Output Transformer	2673
㉟	Voice Coil and Cone Assembly	02996
㊱	Field Coil (Assembled with Pot)	02966
㊲	B. C. Resistor	03079
㊳	Electrolytic Condenser (6 mfd.) 50-60 cycles	4916
	Electrolytic Condenser (10 mfd.) 25-40 cycles	5142
㊴	Choke	4819
㊵	Condenser (.09 mfd.) 50-60 cycles	4989-J
	Condenser (.18 mfd.) 25-40 cycles	4989-K
㊶	Electrolytic Condenser (6 mfd.) 50-60 cycles	4916
	Electrolytic Condenser (10 mfd.) 25-40 cycles	5142
㊷	Pilot Light	3463
㊸	Power Transformer (50-60 cycles)	5117
	Power Transformer (25-40 cycles)	5118
	Power Transformer (50-60 cycles, 230 volts)	5119
㊹	"On-Off" Switch	4095
㊺	Condenser (.015 mfd. Double)	3793-K
	Tube Shield	03987
	Bezel	5312
	Knob (Large)	03064
	Knob (Small)	03437
	Spring (Small)	4147
	Spring (Large)	5262
	Grid Clip	4897
	Five Prong Socket Assembly	4956
	Four Prong Socket Assembly	4955
	Dial Complete	03031

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Service Department

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Radio Service Bulletin - No. 58

MODEL 270 AND 270-A RADIO-PHONOGRAPH

MODEL 70 IS FOR USE ON 50-60 CYCLE 105-125 VOLT AC LINES
MODEL 70-A IS FOR USE ON 25 CYCLE 105-125 VOLT AC LINES

The chassis of the 270 and 270-A are the same as the chassis for the 70 and 70-A except for the additional wiring to the radio-phono switch and the electric turntable and pick-up.

The tube socket readings, transformer, condenser and resistor data, the filter condenser arrangement and all other information given in Bulletin No. 57 should be used for the 270 and 270-A respectively.

The parts list in Bulletin No. 57 is supplemented with the following which are the additional parts used in the Radio Phonograph.

ADDITIONAL PARTS LIST - MODELS 270 AND 270-A

No. on Fig. 1		Part No.
㊾	Switch (for motor)	5168
㊿	Motor (50 to 60 cycle)	4543
	(25 cycle)	4561
(51)	Pick-Up Head	5251
(52)	Volume Control	5117
(53)	Pick-Up Coupling Transformer . . .	5167
(54)	Phono-Radio Switch	5170
(55)	Resistor (33000 ohms)	3525
	Turntable	4547
	Cord Connector Plug	4091
	Cord Connector Socket	4124
	Needle Cup	4101
	Needle Box	4102

The numbering in Fig. 1 from ① to ㊽ is the same as the numbering in Figs. 3 and 4 shown in Bulletin No. 57.

Do not attempt repair work on the turntable motor. Should this part become defective, replace with another motor and return it to the factory

The pick-up should be handled in the same way. If it doesn't operate properly, - remove the mounting bolt which holds the pick-up head to the tone arm, - replace with another and return it to the factory.

Grease the worm gear of the motor with a clear petroleum jelly or a commercially pure vaseline. In order to oil the bearings of the motor it is necessary to remove the turntable.

There is an oil cup located at the top of the motor board, in which a few drops of light machine oil may be added as needed.

May, 1931
Philadelphia, Pa.

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MODELS 270 AND 270-A

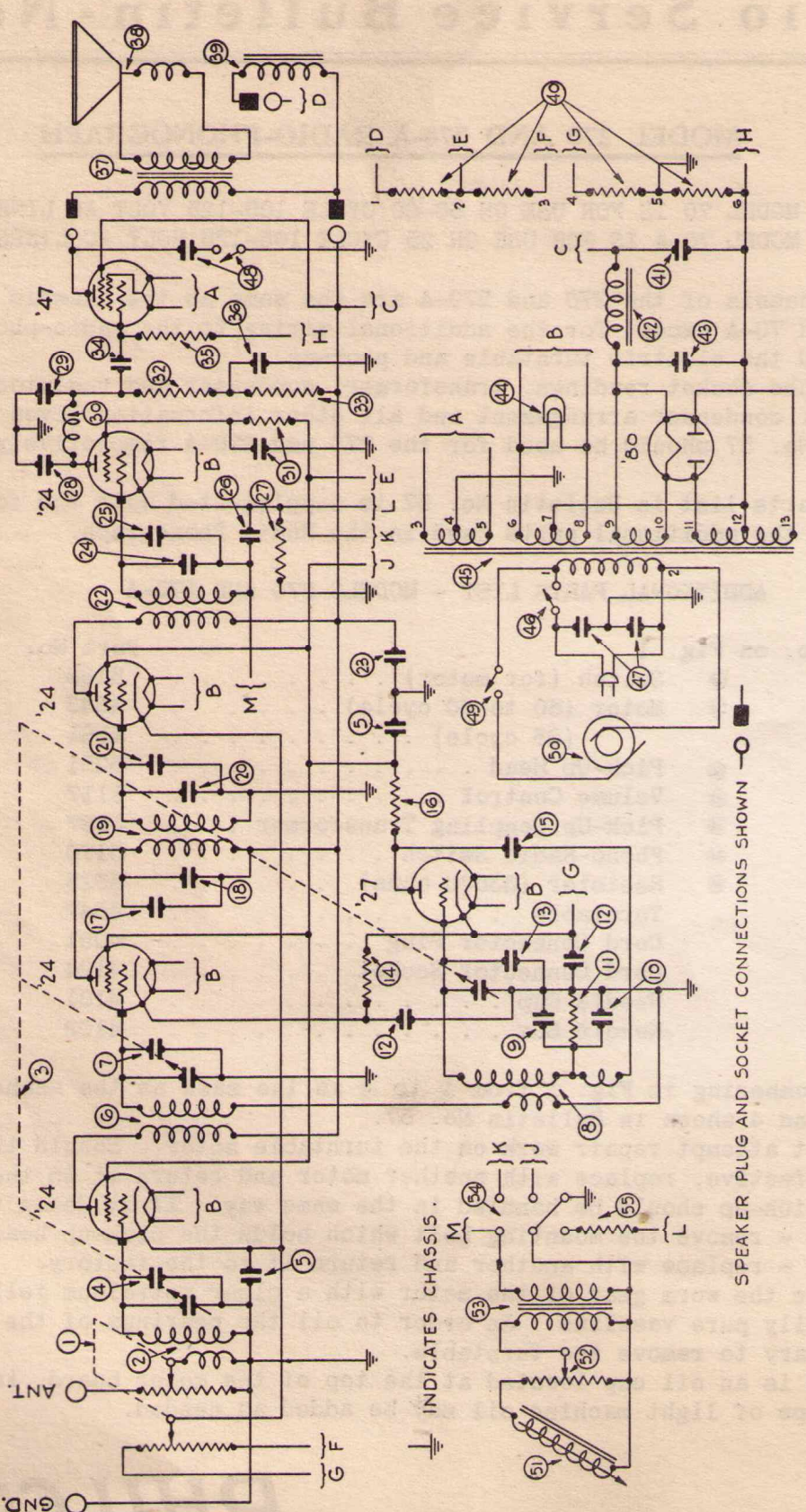

Fig. 1

PHILCO
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Radio Service Bulletin No. 59

Philco Parts Replacement Policy

RADIO PARTS

Philco Radio Parts Are Guaranteed for 90 Days to the User

1st: Get a pad of service report forms from Philco.

2nd: Fill out the form each week covering all Philco repair work on current models, whether this work is done by your own shop or by your dealers.

3rd: Mail the report to Philco each week.

4th: As soon as these reports are received by Philco all the parts listed that are within the guarantee period will be shipped and billed to you.

5th: On the first and fifteenth of each month, you will receive from Philco a Parts Return Authorization sheet. On this sheet list the quantity of each part to be returned and send it in with the parts reported on the two previous service reports.

6th: When these parts are received by Philco, they will be checked against the service reports for the period covered by the authorization sheet.

7th: When the parts are received, credit will be issued by Philco to equal the billing of parts shipped on the service reports, provided our inspection finds the parts to have been defective.

8th: If due to some special condition you have any parts to return to Philco which are not listed on a service report, first write in for permission to make this return. If your request is in order, you will receive a return authorization for the material.

9th: When new models are announced, order a small quantity of all those parts not already in stock.

10th: This system will maintain your parts stock for current models. When a model is beyond the guarantee period, it will be necessary to order parts as your stock is depleted.

RADIO TUBES

Philco Tubes Are Guaranteed for 90 Days to the User

1st: All Philco tubes are code dated.

2nd: Philco notifies all Distributors when code dates are beyond guarantee.

3rd: With the exception of mishandled tubes, all defective tubes returned having code dates which are within the guaranty period will be replaced.

4th: Returned tubes found to be O. K. will be re-code dated and packed in new wrappers and returned to the Distributor.

5th: You can procure from Philco a small supply of tube labels for use on tubes that bear a beyond the guarantee code date but which you know have not been in service the full ninety (90) days of the guarantee period.

6th: Tubes bearing this label may be returned for our consideration.

7th: No tubes will be replaced which bear beyond the guarantee code dates unless the above label is attached and properly filled in.

8th: No labels need be used on tubes which are within the guarantee period.

PHILCO
REG. U.S. PAT. OFF.

May, 1931
Philadelphia, Pa.

HENRY T. PAISTE, JR.
Service Department

Form No. 2671

Printed in U. S. A.

Using a Philco fibre wrench, part No. 3164, adjust the third I. F. condenser until the maximum reading is obtained in the output meter. Next, adjust the second I. F. condenser and then the secondary and primary condensers of the first I. F. stage for maximum reading on the meter. During these adjustments it may be necessary to reduce the signal strength by turning down the volume control of the receiver so that the needle will not be deflected beyond the end of the scale.

HIGH FREQUENCY CONDENSER – Remove the "A" terminal lead from the control grid of the first detector tube and replace the grid clip. Replace the tube shield. Connect the "A" terminal of the oscillator to the antenna post of the Receiver and the "G" terminal of the oscillator to the ground terminal of the chassis. Do not change the oscillator setting. Turn up the attenuator of the oscillator until it is all the way on. Set the Philco scale to approximately 140 (1400 K. C.); set the NORMAL - MAXIMUM switch in the Maximum Position provided the Receiver is not too far out of adjustment the eighth harmonic of the 175 note will be heard at or near the 140 position of the scale. Set the station selector knob at exactly 140 and tune the high frequency condenser until the oscillator note is peaked at exactly 140 on the Receiver scale. Next adjust the detector condenser for maximum reading on the output meter.

If the Receiver is so far out of adjustment that the eighth harmonic of 175 K. C. is not audible, it will be necessary to set the oscillator for broadcast frequencies. Set the tuning control of the oscillator at approximately 1400 K. C. (as indicated in the data furnished with the instrument), then adjust the high frequency condenser for maximum signal in the output meter. Set the first and second antenna condensers for maximum signal in the output meter reducing the atenuator setting as the signal increases to prevent damage to the meter mechanism. Turn the center control of the oscillator to intermediate frequency and reset the tuning control of the oscillator to the 175 K. C. position and proceed as outlined above. Final adjustment must be made when the oscillator is set at exactly 175 K. C. in the intermediate position.

ANTENNA CONDENSERS – With the oscillator set at the original 175 K. C. position adjust the first and then the second antenna condenser for maximum reading in the output meter.

LOW FREQUENCY CONDENSER – Set the oscillator on broadcast position and tune to exactly 600 K. C. The oscillator signal should be received at 60 on the Receiver scale. Adjust the low frequency condenser until the maximum reading is obtained in the output meter with the Receiver set at 60.

SEE BULLETIN NO. 67 FOR CALIBRATION OF OSCILLATOR AT BROADCAST FREQUENCIES.

Where it is necessary to replace the tuning scale on the Model 112 Superheterodyne, put a mark opposite 55 on the tuning condenser drum. Remove the old scale and place the new one in position so that 55 is exactly opposite the above mark.

PHILCO

Henry T. Paiste Jr.

Service Department

May, 1931

Philadelphia, Pa.

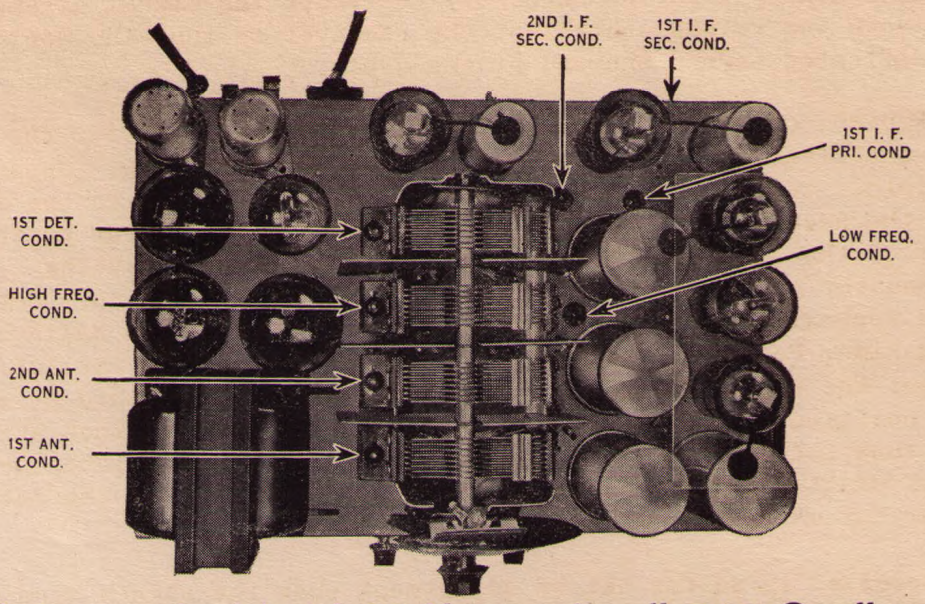
Form No. 2639

Printed in U.S.A.

PHILCO

REG. U.S. PAT. OFF.

Service Bulletin No. 61



Adjusting the Model 90 Using a Jewell 560 Oscillator

Set up the Receiver for operation using standard tubes. Set the Normal-Maximum switch in the Normal position.

Intermediate Frequency Adjustment—Remove the tube shield. Remove the control grid clip of the first detector tube (Type 24 tube nearest back of the Receiver Chassis under the tube shield). Connect the "A" terminal of the oscillator to the control grid of the first detector tube. The "G" terminal must be connected to the Receiver Chassis. Turn the filament control of the oscillator on about ½ the total movement. The middle switch much be turned to the intermediate position. The tuning control of the oscillator must be set for exactly 175 K.C., as indicated in the calibration data sent with the instrument.

Turn the volume control of the Receiver on full. Set the atenuator control so that an audible signal is received in the speaker. Connect the ± and the low terminals of the output meter to the voice coil terminals of the speaker. Adjust the atenuator control for not more than ½ full scale reading of the meter.

Using a Philco part No. 3164 fibre wrench, adjust the second I. F. secondary condenser for maximum reading in the output meter. Adjust the first I. F. secondary and then the first I. F. primary condensers for maximum reading in the output meter. Reduce the oscillator signal to prevent any damage to the meter mechanism. Replace the grid clip on the first detector tube and replace the tube shield.

High Frequency Compensator — Connect the "A" and "G" terminals of the oscillator to the ANT and GND terminals of the Receiver. Do not change the oscillator setting. Tune the Receiver to exactly 140 and adjust the high frequency compensator for maximum reading in the output meter.

Antenna and Detector Condensers — With the Receiver and oscillator in the same setting, set the detector and antenna condensers for maximum reading in the output meter. If the Receiver is so far out of adjustment that the signal is extremely weak when adjusting the high frequency condenser it is advisable to temporarily check the adjustment of the detector and antenna condensers. Final adjustment of these condensers must be made as described.

Low Frequency Condenser—With the oscillator turned to broadcast frequency set the Philco scale at 60 and adjust the low frequency compensating condenser for maximum signal in the output meter. If the signal comes in off the 60 position on the Philco scale, set the Receiver slightly off the signal towards 60 and adjust the signal for maximum strength in this position. By repeating this, you will be able to bring the signal up to the 60 setting on the Philco scale.

PHILCO

Henry J. Paiste Jr.

Service Department

May, 1931

Philadelphia, Pa.

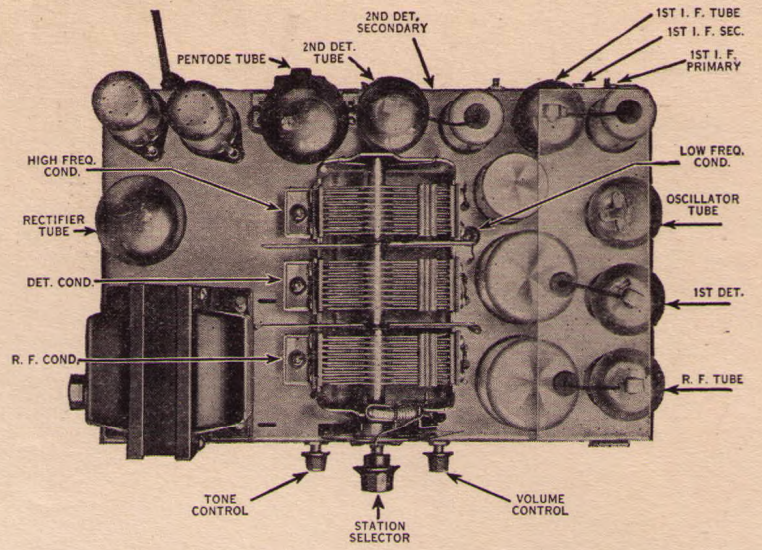
Form No. 2672

Printed in U.S.A.

PHILCO

REG. U.S. PAT. OFF.

Service Bulletin No. 62



Adjusting the Model 70 Using a Jewel 560 Oscillator

Set up the receiver for operation using standard tubes.

Intermediate Frequency of "IF" Stages.— Remove the tube shield, and connect the "A" terminal of the oscillator to the control grid of the first detector tube, leaving the grid clip disconnected. The "G" terminal of the oscillator must be connected to the Receiver Chassis. Turn on the filament control of the oscillator about ½ the total movement. The middle switch must be turned to the intermediate setting. The tuning control of the oscillator must be set for exactly 175 K.C. This setting can be determined from the calibration data sent with the instrument. The toggle switch you have installed in accordance with the instructions in Bulletin No. 67 must be turned to the 260 K.C. position.

Turn the volume control of the Receiver on full. Set the atenuator control so that an audible signal is received in the speaker. Connect the ± and the low terminals of the output meter to the voice coil terminals of the speaker. Adjust the atenuator control so that not more than ½ scale deflection is obtained on the output meter.

Using a Philco part No. 3164 fibre wrench, adjust the second "IF" secondary condenser for maximum reading in the output meter. Next—adjust the first "IF" secondary and then the first "IF" primary condensers for maximum reading in the output meter. Replace the grid clip on the first detector tube and replace the tube shield.

High Frequency Compensator. — Connect the "A" terminal oscillator to the ANT terminal of the receiver and the "G" terminal of the oscillator to the receiver chassis. Set the toggle switch on the oscillator for 175 K.C. Turn the Philco scale to exactly 140. Adjust the high frequency condenser for maximum reading in the output reading 140 on the Philco scale.

If the receiver is so far out of adjustment that the signal is not audible, find the signal on the Philco scale. The setting of the High Frequency Condenser will determine the position on the Philco scale where the eighth harmonic of 175 K.C. oscillator note will be tuned in. It must be tuned in at exactly 140 on the Philco scale.

Antenna or R. F. Condenser. — With the oscillator and the receiver still in the same setting, adjust the R. F. condenser for maximum reading in the output meter.

Low Frequency Condenser.—Set the oscillator for broadcast frequency, and adjust the tuning control for exactly 600 K.C., then tune the receiver to exactly 60 on the Philco scale. Adjust the low frequency condenser for maximum reading in the output meter.

PHILCO

Henry J. Paiste Jr.

Service Department

May, 1931

Philadelphia, Pa.

Form No. 2673

Printed in U.S.A.

FORM NO. 2253

PHILCO

Factory

Radio Service Bulletin No. 77

CORRECT POWER SUPPLY FOR PHILCO MODEL 212

It is extremely important that the Model 212 be operated ONLY on the type of electric power noted on the name-plate label at the back of the radio chassis. For example, the standard 60 cycle instruments will not operate correctly on 50 cycles, there being a noticeable loss of power in the electric motor. When ordering these instruments, be sure to specify exactly the type of power with which they are to be used. The following different type automatic record changers and motors are carried in stock, and can be obtained on order.

ELECTRIC POWER	AUTOMATIC RECORD CHANGER PHILCO PART NUMBER	MOTOR PHILCO PART NO.
60 cycle 110 volt	4585	4784
60 cycle 220 volt	4600	4786
50 cycle 110 volt	5332	5333
50 cycle 200 volt	5334	5335
50 cycle 220 volt	5336	5337
50 cycle 240 volt	5338	5339
40-42 cycle 110 volt	5131	5130
40-42 cycle 220 volt	5340	5341
25 cycle 110 volt	4586	4785
25 cycle 220 Volt	5342	5343

June 19, 1931

Philadelphia, Pa.

Philadelphia Storage Battery Co.

Henry J. Paraste Jr.

Service Department

FORM NO. 2253

PHILCO

Radio Service Bulletin No. 83

DIFFERENCE IN WIRING MODELS 270-270A FROM 70 AND 70-A

In the model 270 chassis, the second I. F. transformer and its associated compensating condenser are different from those used in the model 70 chassis. The part numbers on these 270 units are 03263, and 03317 respectively.

A wire is run from the end of the secondary of the I. F. transformer to the stationary plate of the I. F. tuning condenser. A 500,000 ohm resistor, part 3769, is mounted from the end of the secondary lug on the I. F. transformer to ground.

A 32,000 ohm resistor, part 3525, is mounted from the cathode clip of the second detector socket to a wire support insulator, mounted on the audio coupling condenser, 3903-J. The wire running from the B.C. resistor, part 5125, to the screen grid clip of the I. F. tube socket is removed.

The phonograph cable assembly is wired as follows:

A. White wire connects to the stationary plate of second I. F. tunning condenser.

B. Yellow wire connects to the wire support insulator on audio coupling condenser.

C. Black wire connects to screen grid clip of I. F. tube.

D. Green wire connects to the B.C. resistor, part 52125, where second detector screen supply is normally connected.

E. Tinned copper braid connects to ground.

July 8, 1931

Philadelphia Pa.

Philadelphia Storage Battery Co.

Henry J. Paste Jr.

Service Department

Factory

PHILCO

REG. U.S. PAT. OFF.

Service Bulletin—No. 85

Models 90 and 90-A Receivers

(Above Serial No. 237,001)

This Bulletin Does Not Supersede Service Bulletin No. 56

Model 90 Receivers are for Operation on 100-130 volt, 50-60 cycle AC Lines.
Model 90-A Receivers are for Operation on 100-130 volt, 25-60 cycle AC Lines.

Table 1—Tube Socket Readings Taken with AC Set Tester, AC Line, 115 Volts

Tube		Filament Volts	Plate Volts	Screen Grid Volts	Control Grid Volts	Cathode Volts	Plate Milliamperes
Type	Circuit						
24	R. F.	2.0	255	60	.25	20	2.4
27	Osc.	2.0	65	...	.6	20	3.6
24	1st Det.	2.0	250	64	6.0	24	.25
24	I. F.	2.0	270	76	.25	18	.4
27	Det. Rect.	2.0	0	...	0	17	0
27	Det. Amp.	2.0	140	...	.4	18	2.0
27	1st A. F.	2.0	45	...	.4	20	1.8
47	Output	2.0	220*	240*	1.0*	..	32.*
80	Rectifier	4.5					

All readings taken with antenna disconnected and ground on. Volume Control on full.
*These readings must be taken from the underside of the chassis using test prods and leads unless the set checker is specially equipped for testing pendode tubes.

Table 2—Power Transformer Voltages

Terminals	A.C. Volts		Color
1—2	105 to 125	Primary	White
3—5	2.5	Heaters of 24 and 27 Tubes	Black
4	2.5	Center Tap of 3—5	Black with Yellow
6—8	2.5	Filament of 47 Tube	Dark Green
7	2.5	Center Tap of 6—8	Black with Green
9—10	5.0	Filament of 80 Tube	Light Blue
11—13	650.	Plates of 80 Tube	Yellow
12	...	Center Tap of 11—13	Yellow with Green

Table 3—Resistor Data

No. on Figs. 1 and 2	Terminal	Power (Watts)	Resistance (Ohms)	Color		
				Body	Tip	Dot
⑤⑧	1—2		180	(Long Tubular)		
	2—3		60			
	3—4		3,500			
④②		1.	5,000	Green	Black	Red
①		.5	10,000	Brown	Black	Orange
②⑥ ②⑦		1.0	25,000	Red	Green	Orange
⑤⑩		.5	25,000	Red	Green	Orange
① ⑤ ⑥ ② ④		.5	51,000	Green	Brown	Orange
④⑤		1.	51,000	Green	Brown	Orange
② ④⑨		.5	70,000	Violet	Black	Orange
① ⑦		.5	99,000	White	White	Orange
② ⑤ ② ⑨		.5	240,000	Red	Yellow	Yellow
⑤①		1.	240,000	Red	Yellow	Yellow
③⑥ ① ⑧		.5	490,000	Yellow	White	Yellow

Table 4—Condenser Data

No. on Figs. 1 and 2	Capacity	Color
① ④ ④	.00011	Blue, Golden Yellow
① ⑨	.00025	Yellow
① ⑧ ② ③ ② ⑧	.01	Black Bakelite Container
⑤②	.015	Black Bakelite Container
③⑤ ④⑥ ④⑦	.05	Black Bakelite Container
③⑧	.09	Black Bakelite Container
② ④	.1-.13-.25-1.	Metal Container
③⑩	.25-1.	Metal Container
⑤⑥ ⑤⑦	(50-60 Cycles) 6.	Electrolytic Type
	(25-40 Cycles) 10.	Electrolytic Type

Philco Models 90 and 90-A

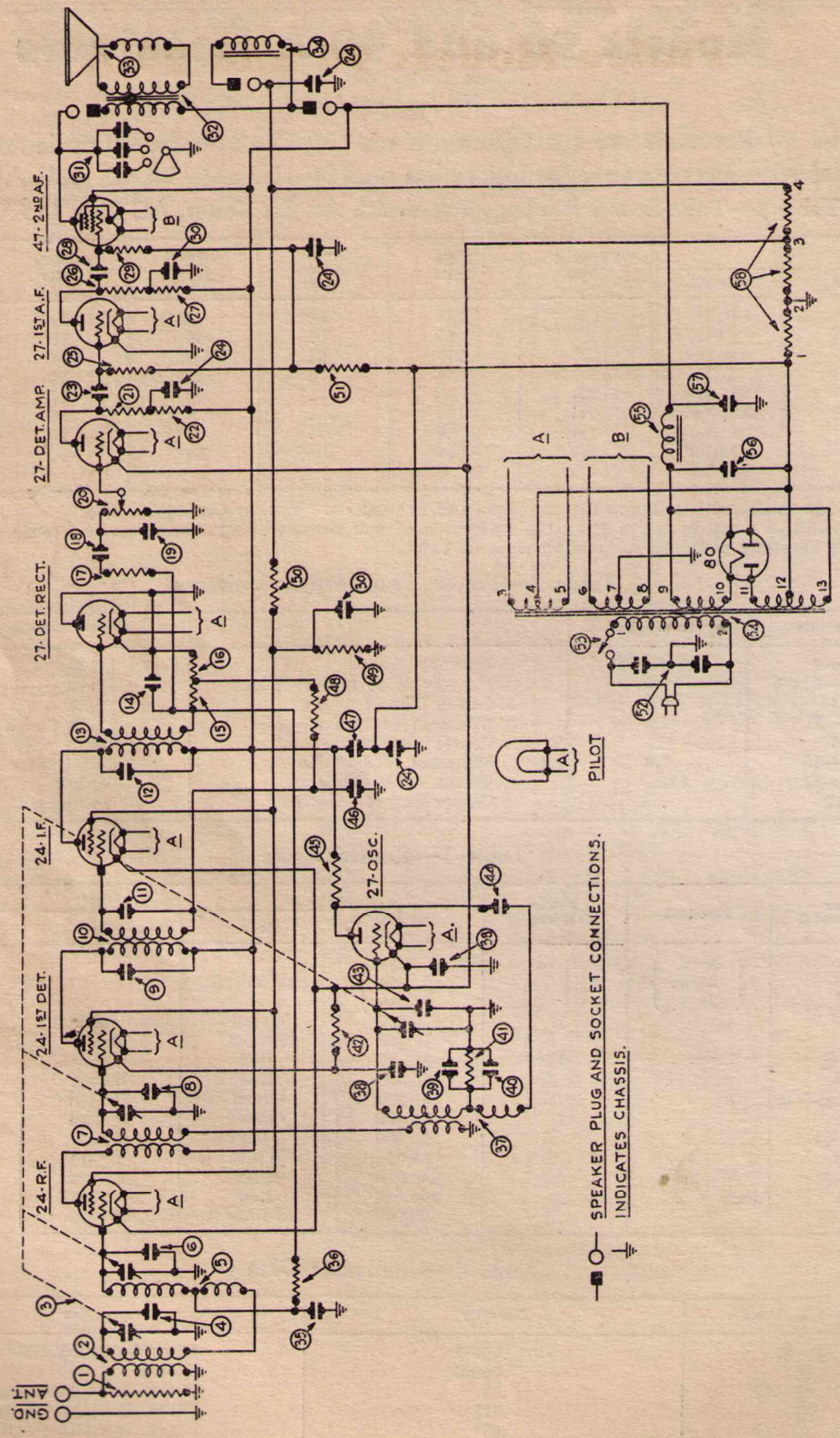


Fig. 1

Philco Models 90 and 90-A

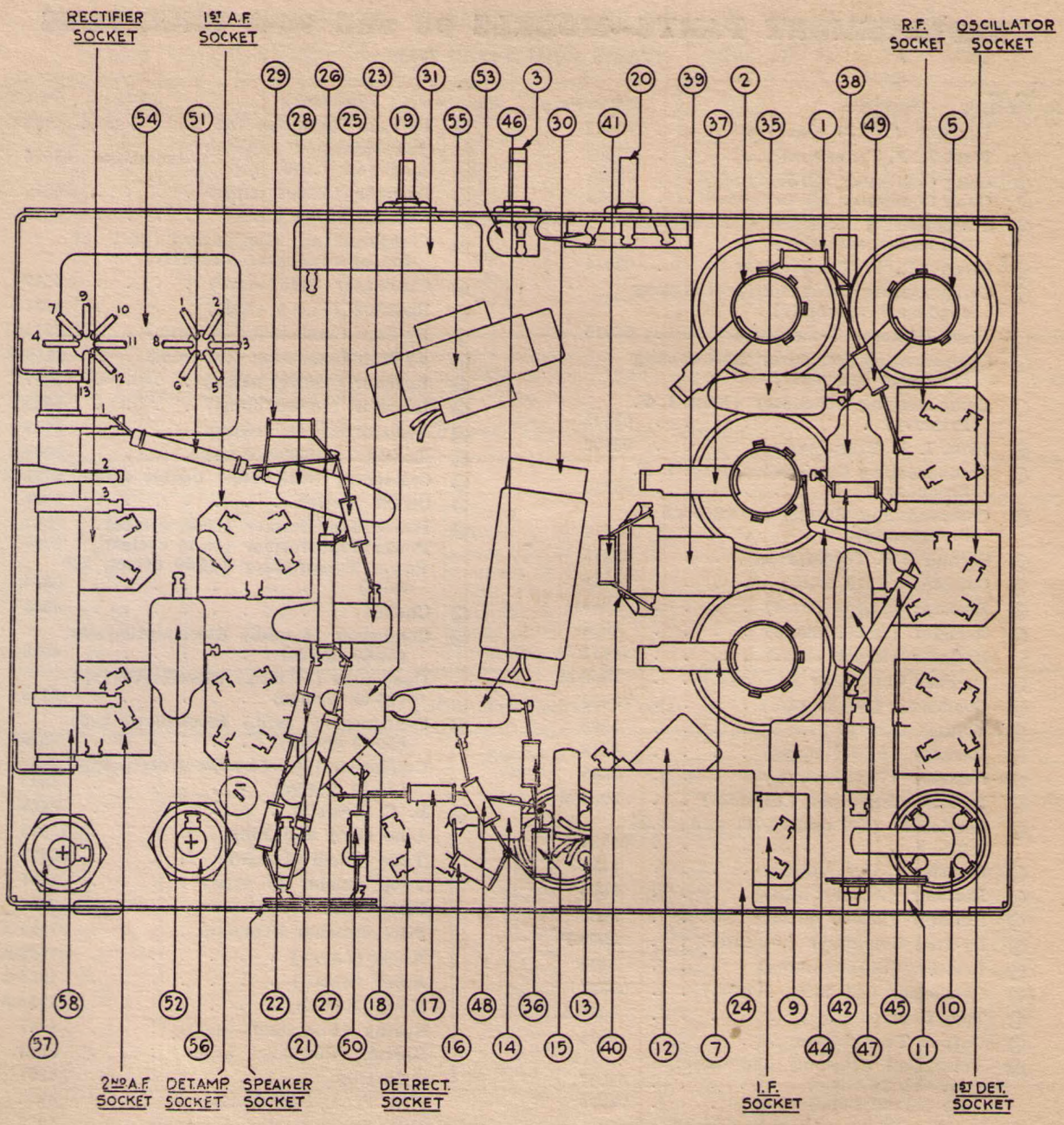


Fig. 2

ADJUSTMENT OF MODELS 90 and 90-A

These Receivers are accurately adjusted at the Factory prior to their shipment. Under no circumstances are the adjusting condensers to be changed in the field. This alignment requires special oscillator equipment, which all Philco Distributors have. If for any reason the Receiver needs adjustment it must be returned to the Distributor's Service Department.

REPLACEMENT PARTS—MODELS 90 and 90-A RECEIVERS

(Above Serial No. 237,001)

No. on Figs. 3 and 4	Description	Part No.
①	Resistor (10,000 ohms)	4412
②	First R. F. Transformer	03360
③	Gang Condenser (50-60 cycles)	03001
	Gang Condenser (25-40 cycles)	03078
④	Compensating Condenser (part of gang condenser assembly)	
⑤	Second R. F. Transformer	03014
⑥	Compensating Condenser (part of gang condenser assembly)	
⑦	First Detector Transformer	03015
⑧	Compensating Condenser (part of gang condenser assembly)	
⑨	Compensating Condenser (First I. F. Primary)	03315
⑩	First I. F. Transformer	03009
⑪	Compensating Condenser (First I. F. Secondary)	03315
⑫	Compensating Condenser (Second I. F. Primary)	03317
⑬	Second I. F. Transformer	03345
⑭	Condenser (110 mmf.)	4519
⑮	Resistor (51,000 ohms)	4518
⑯	Resistor (51,000 ohms)	4518
⑰	Resistor (99,000 ohms)	4411
⑱	By-Pass Condenser (.01 mfd.)	3903-M
⑲	Condenser (.00025 mfd.)	3082
⑳	Volume Control	5366
㉑	Resistor (51,000 ohms)	4518
㉒	Resistor (70,000 ohms)	5385
㉓	By-Pass Condenser (.01 mfd.)	3903-M
㉔	Condenser (1-.1 mfd., 1-.13 mfd., 2-.25 mfd.)	03325
㉕	Resistor (240,000 ohms)	4410
㉖	Resistor (25,000 ohms)	3656
㉗	Resistor (25,000 ohms)	3656
㉘	By-Pass Condenser (.01 mfd.)	3903-P
㉙	Resistor (240,000 ohms)	4410
㉚	Condenser (.25 mfd., 1 mfd.)	03327
㉛	Tone Control	4037-A
㉜	Output Transformer	2673
㉝	Voice Coil Assembly and Cone:	
	H_2 (Large Cone)	02997
	K_2 (Small Cone)	02996
㉞	Speaker Field (Assembled with pot and frame)	
㉟	By-Pass Condenser (.05 mfd.)	3615-W
㊱	Resistor (490,000 ohms)	4517
㊲	Oscillator Coil	03016
㊳	By-Pass Condenser (.09 mfd.) double	4989-G
㊴ ㊵	Compensating Condenser / Condenser (.0007 mfd.) } Assembled	03050
㊶	Resistor (51,000 ohms)	4518
㊷	Resistor (5,000 ohms)	5310
㊸	Compensating Condenser (part of tuning condenser assembly)	
㊹	Condenser (110 mmf.)	4519
㊺	Resistor (51,000 ohms)	4237
㊻	By-Pass Condenser (.05 mfd.)	3615-U
㊼	By-Pass Condenser (.05 mfd.)	3615-E
㊽	Resistor (490,000 ohms)	4517
㊾	Resistor (70,000 ohms)	5385
㊿	Resistor (25,000 ohms)	4516
(51)	Resistor (240,000 ohms)	3768
(52)	Condenser (.015 mfd.) double	3793-E
(53)	On-Off Switch	4095
(54)	Power Transformer (50-60 cycles)	5362
	Power Transformer (25-40 cycles)	5363
	Power Transformer (50-60 cycles, 220 volts)	5364
(55)	Choke	4951
(56)	Condenser (6 mfd.) Electrolytic type (50-60 cycles)	4916
	Condenser (10 mfd.) Electrolytic type (25-40 cycles)	5142
(57)	Condenser (6 mfd.) Electrolytic type (50-60 cycles)	4916
	Condenser (10 mfd.) Electrolytic type (25-40 cycles)	5142
(58)	B. C. Resistor	5365
	Line Cord and Plug	L-943
	Tube Shield (Large)	03373
	Tube Shield (27 type)	5387
	Pilot Bulb	3463
	Pilot Bracket Complete	03081-A
	Knob (Large)	4958-A
	Knob (Small)	4959-A
	Knob (Switch)	4290-A
	Spring (For small knobs)	4147
	Spring (For large knobs)	5262
	Grid Clip	4897
	Five Prong Socket Assembly	4956
	Four Prong Socket Assembly	4955
	Volume Control Insulator	4092
	Dial	5021
	Light Shield Screen	4937
	Bezel	5009

PHILADELPHIA STORAGE BATTERY COMPANY
Ontario and "C" Streets, Philadelphia, Pa.

Form No. 2649A

August, 1931 Printed in U. S. A.

PHILCO

REG. U.S. PAT. OFF.

Service Bulletin—No. 86

Models 50 and 50-A Receivers

Model 50 Receivers are for operation on 100-130 volt, 50-60 cycle AC lines
Model 50-A Receivers are for operation on 100-130 volt, 25-60 cycle AC lines

Table 1—Tube Socket Readings Taken with AC Set Tester AC Line—115 volts

Tube		Filament Volts	Plate Volts	Screen Grid Volts	Control Grid Volts	Cathode Volts	Plate Milli-amperes
Type	Circuit						
24	1st R.F.	2.4	245	90	2.5	3.0	4.5
24	2nd R.F.	2.4	250	90	2.5	3.0	5.5
24	Det.	2.4	100	42	8.0	8.0	0
47	Output	2.4	175*	190*	1.0*	...	2.7*
80	Rect.	5.0	...	...	...	...	30/

Note—Volume Control on full; Station Selector turned to Low Frequency End.
*These readings must be taken from the underside of the chassis, using test prods and leads unless the set checker is specially equipped for testing pentode tubes.

Table 2—Power Transformer Voltages

Terminals	A.C. Volts		Color
1–2	105 to 125	Primary	Black (Small Gauge)
3–5	2.5	Filament of 24 and 47	Black
6–7	5.	Filament of 80	Light Blue
8–10	700.	Plates of 80	Yellow
4	.....	Center Tap of 3–5	Black, Yellow Tracer
9	.....	Center Tap of 8–10	Yellow, Green Tracer

Table 3—Condenser Data

No. on Figs. 2 and 3	Capacity MFD	Container
(9) (10)	.00025	Yellow
(12) (16)	.01	Black Bakelite Container
(25)	.05	Black Bakelite Container
(22)	.05 and 150 Ohm resistor	Black Bakelite Container
(15)	.1, .15, .25, 2-.5 (50-60 cycles)	Metal Container
	.05, .15, .25, 2-.5 (25-40 cycles)	
(24)	.05	
(33)	(50 to 60 cycles) 6.	Electrolytic
	(25 to 40 cycles) 10.	Electrolytic
(34)	6.	Electrolytic

Table 4—Resistor Data

No. on Figs. 3 and 4	Power (Watts)	Resistance	Color		
			Body	Tip	Dot
(22)	...	150 and .05 Mfd.	Black Bakelite Container		
(11)	.5	10,000	Brown	Black	Orange
(23)	1.	15,000	Brown	Green	Orange
(26)	1.	25,000	Red	Green	Orange
(28)	.5	32,000	Orange	Red	Orange
(27) (29)	.5	99,000	White	White	Orange
(21)	.5	160,000	Brown	Blue	Yellow
(13)	.5	240,000	Red	Yellow	Yellow
(14) (20)	.5	490,000	Yellow	White	Yellow

PHILCO MODELS 50 AND 50-A

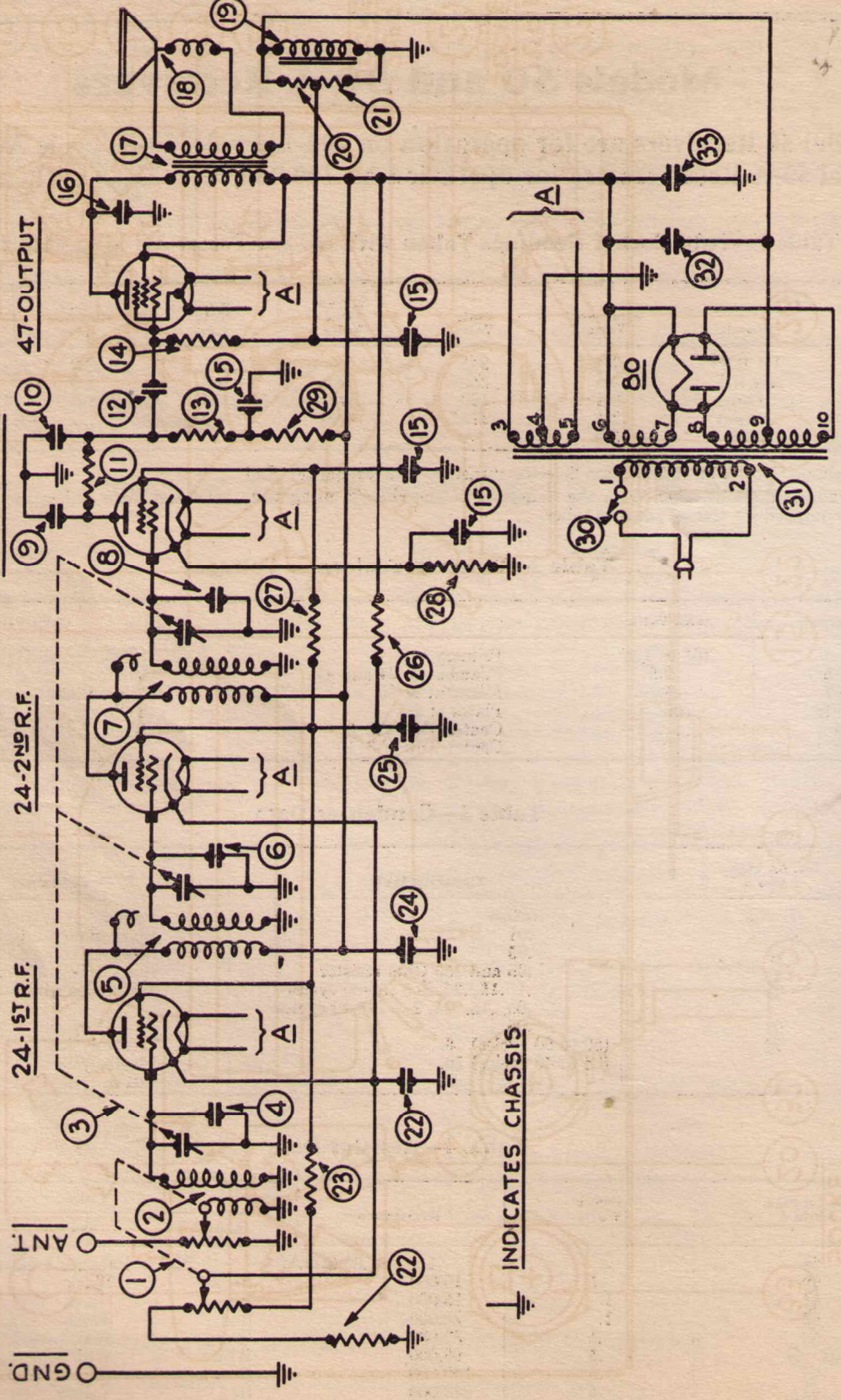


Fig. 1

PHILCO MODELS 50 AND 50-A

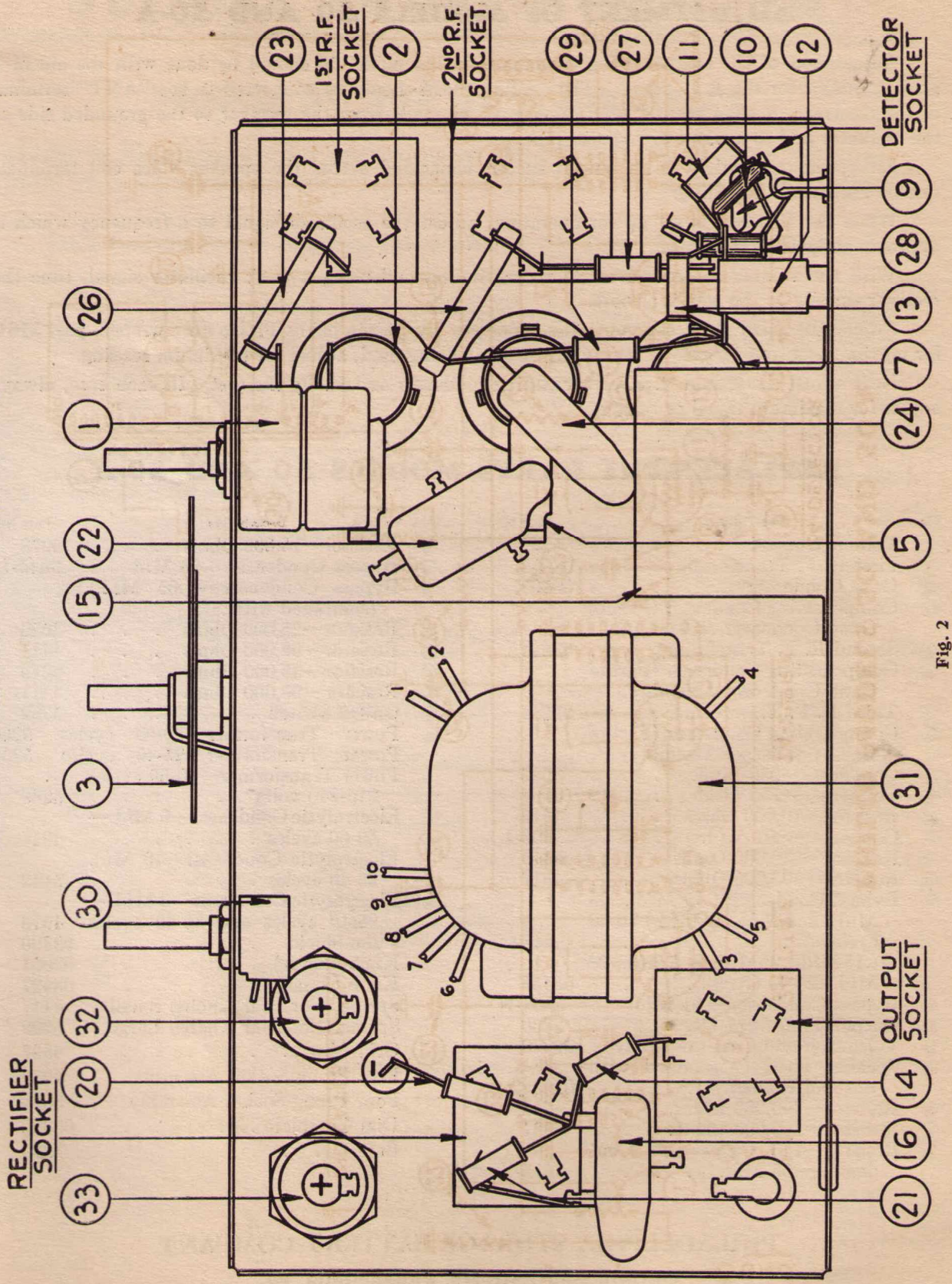


Fig. 2

ADJUSTMENT OF MODELS 50 AND 50-A

Adjustment of the compensating condensers in the model 50 should be done with the aid of a good oscillator for the R.F. signal. The oscillator lead should be connected to the "ANT" terminal of the receiver. A good ground connection must be made from the receiver to the grounded side of the oscillator and to a water or radiator pipe.

Either the ear method or an output meter, connected across the speaker voice coil terminals can be used while adjusting.

When the Receiver is set up for operation, adjust the oscillator signal to a frequency which is approximately 1400 kilocycles.

With the volume control advanced to maximum, and using a weak oscillator signal, tune the receiver sharply to the oscillator note.

Adjust the third R. F. compensating condenser by means of the Philco fibre wrench, part 3164, for maximum output signal. If an output meter is being used, adjust for maximum reading.

Next adjust the second R. F. compensating condenser and finally the first. In each case, always adjust for maximum signal or reading.

REPLACEMENT PARTS MODELS 50 AND 50-A

No. on Figs. 3 and 4	Description	Part No.
①	Volume Control	5232
②	First R. F. Transformer	03283
③	Gang Condenser	03293
④	Compensating Condenser (Part of Gang Condenser Assembly)	
⑤	Second R. F. Transformer	03284
⑥	Compensating Condenser (Part of Gang Condenser Assembly)	
⑦	Third R. F. Transformer	03284
⑧	Compensating Condenser (Part of Gang Condenser Assembly)	
⑨	Condenser—250 Mmf.	3082
⑩	Condenser—250 Mmf.	3082
⑪	Resistor—10,000 Ohms	4412
⑫	Condenser—.01 Mfd.	3903-L
⑬	Resistor—240,000 Ohms	4410
⑭	Resistor—490,000 Ohms	4517
⑮	Bypass Condenser (.15 Mfd., .25 Mfd., 2-.5 Mfd., .1 Mfd.) 50-60 cycles	03459
	(.15 Mfd., .25 Mfd., 2-.5 Mfd., .05 Mfd.) 25-40 Cycles	03455
⑯	Bypass Condenser—.01 Mfd.	3903-N
⑰	Output Transformer	2660
⑱	Voice Coil and Cone Assembly	02970
⑲	Speaker Field (Assembled with Pot and Frame)	02942
⑳	Resistor—490,000 Ohms.	4517
㉑	Resistor—160,000 Ohms.	5331
㉒	Resistor—150 Ohms and Condenser—.05 Mfd.	3615-X
㉘	Resistor—15,000 Ohms	5278
㉔	Bypass Condenser—.05 Mfd.	3615-L
㉕	Bypass Condenser—(.05 Mfd.) (combined with ⑮)	
㉖	Resistor—25,000 Ohms	3656
㉗	Resistor—99,000 Ohms	4411
㉘	Resistor—32,000 Ohms	5279
㉙	Resistor—99,000 Ohms	4411
㉚	On-Off Switch	5382
㉛	Power Transformer—50-60 cycles	5266
	Power Transformer—25-40 cycles	5267
	Power Transformer—50-60 cycles 210-240 volts	5268
㉜	Electrolytic Condenser—6 Mfd.—50-60 cycles	4916
	Electrolytic Condenser—10 Mfd. 25-40 cycles	5142
㉝	Electrolytic Condenser—6 Mfd.—25-40 cycles and 50-60 cycles	4916
	Tube Shield	03390
	Knob (Large)	03064
	Knob (Small)	03427
	Spring (For Dial Knobs) Small	4147
	Spring (For Dial Knobs) Large	5262
	Grid Clip	4897
	Five Prong Socket Assembly	4956
	Four Prong Socket Assembly	5026
	Dial Complete	03322
	Bezel	5383

PHILADELPHIA STORAGE BATTERY COMPANY

Ontario and C Streets, Philadelphia, Pa.

Form No. 2727 Printed in U. S. A.

PHILCO

REG. U.S. PAT. OFF.

Service Bulletin—No. 87

Philco Model 35 Receiver

The Model 35 Receiver is designed for use with the latest 2-volt filament type tubes only.

Table 1—Tube Socket Readings Taken with Set Tester.

Tube	Circuit	Filament Volts	Plate Volts	Grid Volts	Plate Current Milliamperes	Screen Grid Volts
32	R. F.	1.9	133	. . .	3.0	60
32	1st Det.	1.9	133	. . .	3.0	63
30	Osc.	1.9	60	. . .	1.5	. . .
32	I. F.	1.9	133	. . .	3.5	60
30	2nd Det.	1.9	55	2.5	.05	. . .
30	1st Audio	1.9	65	. . .	.05	. . .
33	Output	1.9*	125*	7*	12.*	135*

All readings taken with volume control at maximum, antenna disconnected, and ground connected. *These readings must be taken from the under side of the chassis using test prods and leads unless the set checker is specially equipped for testing pentode tubes.

Always use high-resistance voltmeter, preferably 1000 ohms per volt, when checking voltages in the Receiver. For reading plate and screen voltages, use a 250- or 300-volt scale. Voltage readings taken with meters having less than 250,000 ohms resistance will be lower than voltages given in the table.

When testing a Model 35 Receiver, all tubes must be in their proper sockets. The speaker must be connected and the tube shield must be fastened in place. The readings in Table 1 were taken using "A," "B" and "C" batteries.

The speaker is shipped separately from the cabinet. It must be mounted with the screws furnished so that the magnet is toward the bottom of the cabinet.

Note:—It will be necessary to renew the "C" battery at the same time the "B" batteries are renewed.

Table 2—Resistor Data

No. on Figs. 1 and 2	COLOR			Resistance Ohms
	Body	Tip	Dot	
③ ㉕	Red	Yellow	Yellow	240,000
⑫ ⑭	Green	Brown	Orange	51,000
㉗	Yellow	White	Yellow	490,000
㉝	Orange	Black	Red	3,000
㊱	Orange	Red	Orange	32,000
㊳	White	White	Orange	99,000
㊵	Green	Black	Red	5,000
㊶	Brown	Black	Orange	10,000

Table 3—Condenser Data

No. on Figs. 1 and 2	Capacity—MFD.
④ ⑲ ㊲	.09
⑪	.000410
⑮	.000110
㉒ ㉘	.002
㉖	.01
㊴	2.

Philco Model 35

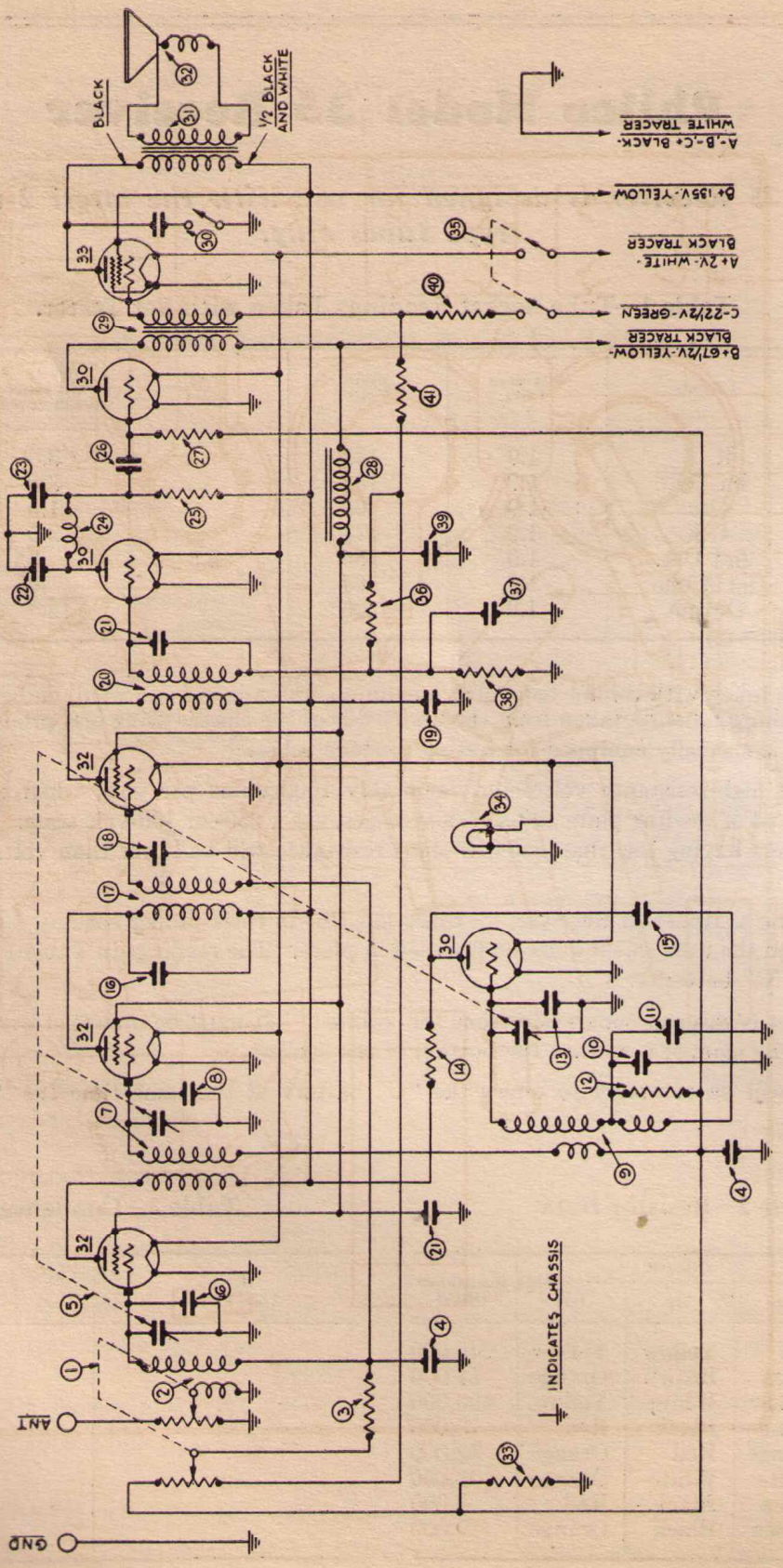


Fig. 1

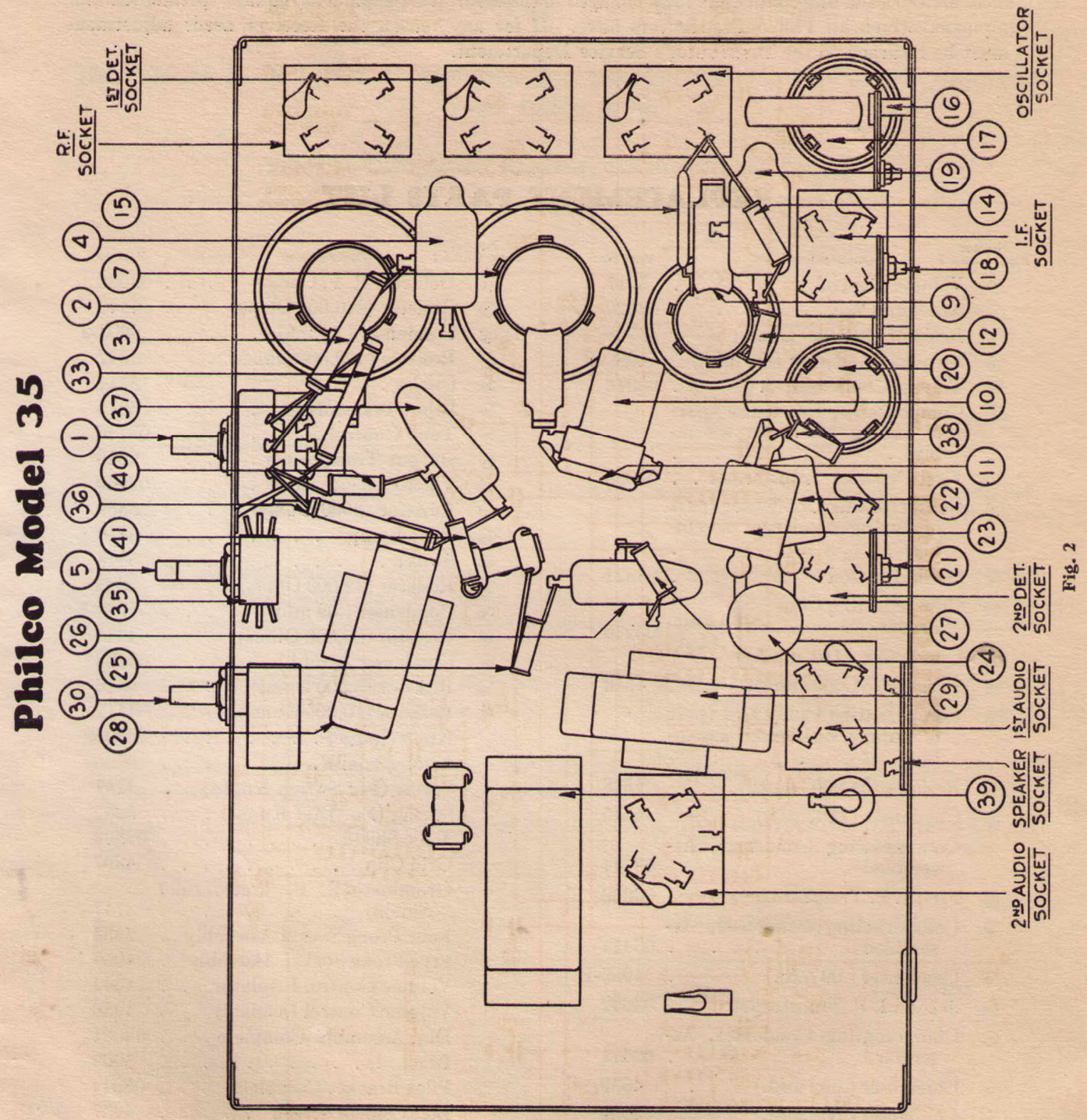

Philco Model 35
R.F. SOCKET
1ST DET. SOCKET
OSCILLATOR SOCKET
I.F. SOCKET
2ND DET. SOCKET
1ST AUDIO SOCKET
SPEAKER SOCKET
2ND AUDIO SOCKET
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Fig. 2

Adjustment of Model 35

These Receivers are accurately adjusted at the Factory prior to their shipment. Under no circumstances are the adjusting condensers to be changed in the field. This alignment requires special oscillator equipment, which all Philco Distributors have. If for any reason the Receiver needs adjustment it must be returned to the Distributor's Service Department.

REPLACEMENT PARTS LIST

No. on Figs. 1 and 2	Description	Part No.
①	Volume Control	5317
②	Antenna Coil	03320
③	Resistor (240,000 Ohms)	3768
④	By-pass Condenser (.09 mfd.)	4989-B
⑤	Tuning Condenser	03076
⑥	Compensating Condenser (part of tuning condenser assembly)	
⑦	First Detector Transformer	03083
⑧	Compensating Condenser (part of tuning condenser assembly)	
⑨	Oscillator Coil	03321
⑩	Compensating Condenser, Assembled	03249
⑪	Condenser (410 mmf.) Assembled	
⑫	Resistor (51,000 Ohms)	4518
⑬	Compensating Condenser (part of tuning condenser assembly)	
⑭	Resistor (51,000 Ohms)	4518
⑮	Condenser (110 mmf.)	4519
⑯	Compensating Condenser, Assembled	03411
⑰	First I. F. Transformer	03009
⑱	Compensating Condenser, Assembled	03411
⑲	Condenser (.09 mfd.)	4989-B
⑳	Second I. F. Transformer	03092
㉑	Compensating Condenser, Assembled	03411
㉒	Condenser (.002 mfd.)	4059
㉓	Condenser (.002 mfd.)	4059
㉔	Detector R. F. Choke	03086
㉕	Resistor (240,000 Ohms)	4410
㉖	Condenser (.01 mfd.)	3903-J
㉗	Resistor (490,000 Ohms)	4517
㉘	Choke	5314
㉙	Input Transformer	5315
㉚	Tone Control	03140
㉛	Output Transformer	2646
㉜	Voice Coil and Cone	02949
㉝	Resistor (3000 Ohms)	5309
㉞	Pilot Lamp	5316
㉟	Switch	5318
㊱	Resistor (32,000 Ohms)	3525
㊲	Condenser (.09 mfd.)	4989-F
㊳	Resistor (99,000 Ohms)	4411
㊴	Condenser (2 mfd.)	03298
㊵	Resistor (5,000 Ohms)	5310
㊶	Resistor (10,000 Ohms)	4412
	Knob (Large)	03063
	Knob (Small)	03064
	Spring (For Switch Knobs)	4147
	Spring (For Dial Knobs)	5262
	Tube Shield	03306
	Grid Clip	4897
	Grommet (R. F. Transformer Shield)	3747
	Four Prong Socket Assembly	4955
	Five Prong Socket Assembly	4956
	Volume Control Insulator	4092
	Volume Control Insulator	4286
	Dial Assembly Complete	03031
	Bezel	5009
	Pilot Bracket Complete	03011
	Light Shield Screen	4937

PHILADELPHIA STORAGE BATTERY COMPANY
Ontario and C Streets, Philadelphia, Pa.

Form 2726. Printed in U. S. A.

PHILCO

REG. U.S. PAT. OFF.

SERVICE BULLETIN No. 93

Installing New Rubber Bushings in Model 212 Tone Arm

Audio Howl in Model 270

The adjustment on the Model 212, which determines the descending position of the needle onto the record, may fail to hold in some cases. Investigation has shown that this condition is caused by the tone arm cutting through the two rubber bushings at the point where the arm is suspended. The tone arm is allowed to rest upon the suspension shaft, causing a loose fit and making it impossible to obtain a permanent adjustment.

New bushings, Philco part 4891, can be installed by removing the two nuts, the collar and the shaft, at the back end of the tone arm. When installing the new bushings, make a careful examination of the holes in the tone arm to see that the edges are free from burrs or sharp points.

A few cases of audio howl on the Model 270 have been called to our attention. If the shipping screws have been loosened so that the chassis is floating on its rubber supports and the howl persists, the condition can usually be eliminated by placing a metal tube shield over the second detector tube.

PHILCO

Henry J. Paiste Jr.

August, 1931
Philadelphia, Pa.

Service Department

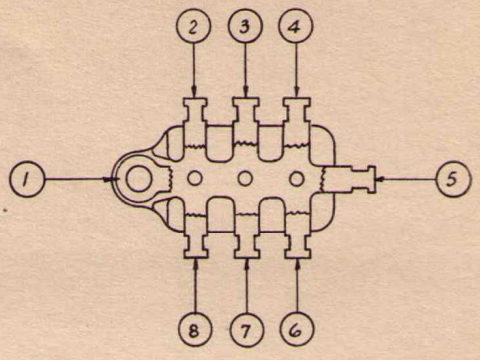
Form No. 2751 **Printed in U.S.A.**

PHILCO
REG. U.S. PAT. OFF.

Service Bulletin No. 94

Standard By-Pass Condenser Data

The tables below list the various Philco standard by-pass condensers in black bakelite containers. The drawing shows all possible lug connections and the tables list the lug numbers.



Condenser 3615 .05 Mfd.

Part No.	Cond. Cap. Mfd.	Lugs Used	Wire Resis. Ohms	Resis. Wiring Lugs	Cond. Wiring Lugs
3615-B	.05	1-3-5	250	3-5	1-5
3615-C	.05	1-5-7	250	5-7	1-5
3615-D	.05	1-3-5	...	...	1-5
3615-E	.05	2-5	...	...	...
3615-F	.05	2-3-5	...	...	3-5
3615-G	.05	5-8	...	...	...
3615-H	.05	3-5-8	...	...	5-8
3615-J	.05	1-5-7	...	...	1-5
3615-K	.05	3-5-8	250	3-5	5-8
3615-L	.05	1-5	...	...	...
3615-M	.05	2-5-7	...	...	2-5
3615-N	.05	1-4-7	...	...	1-4
3615-P	.05	1-4-7	250	4-7	1-4
3615-R	.05	1-5-7	250	5-7	1-5
3615-S	.05	1-4	...	...	...
3615-T	.05	1-5-7	150	1-7	1-5
3615-U	.05	1-5-7	...	...	1-7
3615-W	.05	1-2-5	...	...	1-5
3615-X	.05	1-2-5-7	150	1-7	1-5
3615-Y	.05	1-2-5-7	150	1-5	1-7

Condenser 3793 .015 Mfd.

Part No.	Cond. Cap. Mfd.	Lugs Used	Wire Resis. Ohms	Resis. Wiring Lugs	Cond. Wiring Lugs
3793-B	.015	5-7	...	...	...
3793-C	.015	2-4	...	...	...
3793-D	.015	2-6	...	...	...
3793-E	Twin .015	1-5-7	...	...	1-5 & 1-7
3793-F	.015	5-7-8	...	...	7-8
3793-G	.015	2-3-6	...	...	2-6
3793-H	Twin .015	1-3-5	...	...	1-3 & 1-5

Condenser 3903 .01 Mfd.

Part No.	Cond. Cap. Mfd.	Lugs Used	Wire Resis. Ohms	Resis. Wiring Lugs	Cond. Wiring Lugs
3903-F	.01	3-5	...	...	...
3903-G	.01	2-4-7	...	...	2-4
3903-H	.01	5-8	...	...	...
3903-J	.01	2-5-7	...	...	2-5
3903-K	.01	1-2-4-7	...	...	1-7
3903-L	.01	3-5-8	...	...	3-5
3903-M	.01	4-7-8	...	...	4-8
3903-N	.01	3-5-8	...	...	5-8
3903-P	.01	2-5-7	...	...	2-7

Condenser 4989 .09 Mfd.

Part No.	Cond. Cap. Mfd.	Lugs Used	Wire Resis. Ohms	Resis. Wiring Lugs	Cond. Wiring Lugs
4989-B	Twin .09	1-3-5	...	...	1-3 & 1-5
4989-C	Twin .09	1-5-7	...	...	1-5 & 1-7
4989-D	.09	1-5	...	...	...
4989-E	.09	1-5-7	250	7-5	1-5
4989-F	.09	1-5-7	...	...	1-5
4989-G	Twin .09	1-4-7	...	...	1-4 & 1-7
4989-H	Twin .09	1-5	...	...	1-5 & 1-5

August, 1931

Philadelphia, Pa.

PHILCO
REG. U.S. PAT. OFF.

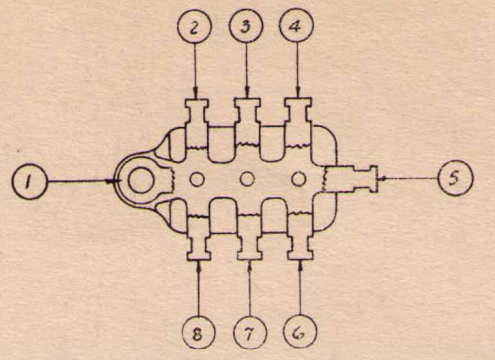
HENRY T. PASTE, Jr.

Service Dept.

PHILCO

Service Bulletin—No. 94A

(This Bulletin Supersedes Service Bulletin No. 94)



Standard By-Pass Condenser Data

The tables below list the various Philco standard by-pass condensers in black bakelite containers. The drawing shows all possible lug arrangements and the tables list the lug numbers.

Condenser 3615 .05 Mfd.

Part No.	Cond. Cap. Mfd.	Lugs Used	Wire Resis. Ohms	Resis. Wiring Lugs	Cond. Wiring Lugs
3615-B	.05	1-3-5	250	3-5	1-5
3615-C	.05	1-5-7	250	5-7	1-5
3615-D	.05	1-3-5	...	...	1-5
3615-E	.05	2-5	...	...	...
3615-F	.05	2-3-5	...	...	3-5
3615-G	.05	5-8	...	...	...
3615-H	.05	3-5-8	...	...	5-8
3615-J	.05	1-5-7	...	...	1-5
3615-K	.05	3-5-8	250	3-5	5-8
3615-L	.05	1-5	...	...	...
3615-M	.05	2-5-7	...	...	2-5
3615-N	.05	1-4-7	...	...	1-4
3615-P	.05	1-4-7	250	4-7	1-4
3615-R	.05	1-5-7	250	5-7	1-5
3615-S	.05	1-4	...	...	...
3615-T	.05	1-5-7	150	1-7	1-5
3615-U	.05	1-5-7	...	...	1-7
3615-W	.05	1-2-5	...	...	1-5
3615-X	.05	1-2-5-7	150	1-7	1-5
3615-Y	.05	1-2-5-7	150	1-5	1-7
3615-AA	.05	1-3-5-8	...	...	1-5
3615-AB	.05	1-4-7-8	...	...	1-4
3615-AC	.05	1-5-7-8	...	...	1-7
3615-AD	.05	3-5-8	...	...	3-5
3615-AE	.05	1-7-8	...	...	7-8
3615-AF	Twin .05	4-7-8	...	...	4-8 & 7-8
3615-AG	.05	1-3-5	...	...	1-5
3615-AH	.05	1-5	...	...	1-5
3615-AJ	Twin .05	1-3-6-8	...	...	1-3 & 1-6
3615-AK	.05	1-5-7-8	...	...	1-7

Condenser 3793 .015 Mfd.

Part No.	Cond. Cap. Mfd.	Lugs Used	Wire Resis. Ohms	Resis. Wiring Lugs	Cond. Wiring Lugs
3793-B	.015	5-7	...	...	...
3793-C	.015	2-4	...	...	...
3793-D	.015	2-6	...	...	...
3793-E	Twin .015	1-5-7	...	...	1-5 & 1-7
3793-F	.015	5-7-8	...	...	7-8
3793-G	.015	2-3-6	...	...	2-6
3793-H	Twin .015	1-3-5	...	...	1-3 & 1-5
3793-J	.015	2-5-7	...	...	2-5
3793-K	Twin .015	1-3-5-8	...	...	1-3 & 1-5
3793-L	Twin .015	5-7-8	...	...	7-8
3793-M	Twin .015	5-7-8	...	...	5-8 & 7-8

Condenser 3903 .01 Mfd.

Part No.	Cond. Cap. Mfd.	Lugs Used	Wire Resis. Ohms	Resis. Wiring Lugs	Cond. Wiring Lugs
3903-F	.01	3-5	...	...	...
3903-G	.01	2-4-7	...	...	2-4
3903-H	.01	5-8	...	...	...
3903-J	.01	2-5-7	...	...	2-5
3903-K	.01	1-2-4-7	...	...	1-7
3903-L	.01	3-5-8	...	...	3-5
3903-M	.01	4-7-8	...	...	4-8
3903-N	.01	3-5-8	...	...	5-8
3903-P	.01	2-5-7	...	...	2-7
3903-R	.01	4-7-8	...	...	4-7
3903-S	Twin .01	1-5-7	...	...	1-5 & 1-7
3903-T	.01	5-7-8	...	...	7-8
3903-U	.01	1-2-5-7	...	...	1-7
3903-W	.01	2-4-7	...	...	2-7
3903-X	.01	3-5-8	...	...	3-8
3903-Y	.01	3-5	...	...	3-5

Condenser 4989 .09 Mfd.

Part No.	Cond. Cap. Mfd.	Lugs Used	Wire Resis. Ohms	Resis. Wiring Lugs	Cond. Wiring Lugs
4989-B	Twin .09	1-3-5	...	...	1-3 & 1-5
4989-C	Twin .09	1-5-7	...	...	1-5 & 1-7
4989-D	.09	1-5	...	...	...
4989-E	.09	1-5-7	250	7-5	1-5
4989-F	.09	1-5-7	...	...	1-5
4989-G	Twin .09	1-4-7	...	...	1-4 & 1-7
4989-H	Twin .09	1-5	...	...	1-5 & 1-5
4989-J	.09	3-5	...	...	3-5
4989-K	Twin .09	3-5	...	...	3-5
4989-L	.09	3-4-8	200	3-8	4-8
4989-M	Twin .09	4-7-8	...	...	4-8 & 7-8

March, 1932

Philadelphia, Pa.

PHILCO
Service Department

Printed in U. S. A.

PHILCO

REG. U.S. PAT. OFF.

Service Bulletin No. 98

Standard Compensating Condensers

The various compensating condensers used in the models 35, 70, 270, 370, 90, 112, and 212 have been changed so as to include a bakelite mounting board on which the code letter of the condenser appears. In the case of the I. F. compensating condensers, which have been used in conjunction with a parallel fixed condenser, the new compensating condensers have been increased in capacity so that the fixed condensers are no longer required. For replacement purposes, if desired, the new compensating condensers can be substituted on earlier sets for the earlier combination of a fixed and an adjustable condenser.

The low frequency compensating condensers have been changed with respect to the bakelite mounting, but their capacity remains unchanged, thereby requiring the parallel fixed condenser as in the past.

All of these new condensers can be identified by the letter which is stamped on the bakelite mounting board. For example part 04000-E has the letter E stamped over the surface of the mounting board; part 04000-F has the letter F stamped on the board.

The following table lists the part numbers of the various new condensers, their identification code letter, capacity range, where used, the superseded part number, and the part number of the parallel fixed condenser when one is still used.

Part Number	Identification Code Letter	Capacity Range Mmf.	Used on Models	Supersedes	Used with Fixed Condenser
04000-B	B	40-250	90 (Early and Late)	03050	4520 (700 mmf.)
04000-D	D	6-50	112, 212	3772-A	———
04000-E	E	5-30	112, 212	3968-A	———
04000-F	F	40-250	112, 212	3772-B	4520 (700 mmf.)
			370, 70, 270	03120	5120 (410 mmf.)
			35	03249	5120 (410 mmf.)
04000-H	H	40-180	70*, 270*, 370*, 90* early	03051	———
04000-J	J	40-180	70*, 270*, 370*, 212*, 112*, 90* early	3772-C	———
04000-K	K	30-140	70*, 370*	03061	———
04000-L	L	30-140	270*	03262	———
			112*	3772-D	———
04000-M	M	15-130	35*	03411	———

*FIXED PARALLEL CONDENSER NOT REQUIRED

PHILCO

REG. U.S. PAT. OFF.

Henry T. Paret Jr.

Service Department

September, 1931

Philadelphia, Pa.

Printed in U.S.A.

PHILCO
REG. U.S. PAT. OFF.

Service Bulletin No. 100

Installing Batteries in Model 35 Highboy

On the initial shipments of the Model 35 Highboy, the cabinet was constructed without a bottom. It was the intention of the factory that in cases where it is desired to place batteries in the cabinet, the same procedure should be followed as in the Model 30 Lowboy last season, namely:

Remove the shipping cradle across the bottom of the cabinet, saw this piece to length (22 3/8"), stain, and again bolt to the bottom of the cabinet with the opposite side out. A shelf of adequate proportions to support all of the batteries is thus provided.

Cabinets now coming through the factory are equipped with a special battery shelf. These shelves are available for installation in the cabinets of earlier shipment, if desired, and can be obtained without charge from the Philco National Service Station.

The new shelves are supplied in three pieces—a board and two support strips. The strips should be installed inside the cabinet, flush with the bottom side rails and attached with wood screws to the rails. The shelf can either be placed loosely on the supports or it can be attached with wood screws supplied. Both the shelf and the support strips have screw holes already drilled.

PHILCO
REG. U.S. PAT. OFF.

Henry T. Paiste Jr.

Service Department

September, 1931
Philadelphia, Pa.

Printed in U. S. A.

PHILCO
REG. U.S. PAT. OFF.

Factory

Radio Service Bulletin—No. 101

Models 112 and 112-A Receivers

(Above Serial No. 174,001)

Model 112 Receivers are for operation on 115 volt, 50-60 cycle AC lines
Model 112-A Receivers are for operation on 115 volt, 25-60 cycle AC lines

Table 1—Tube Socket Readings taken with A.C. Set Tester A.C. Line—115 volts

Tube		Filament Volts	Plate Volts	Screen Grid Volts	Control Grid Volts	Cathode Volts	Plate Milli-amperes	Screen-Grid Milli-amperes
Type	Circuit							
24	1st R. F.	2.25	160	75	.2	5.0	4.0	1.
27	Osc.	2.25	55	...	.6	7.5	1.8	..
24	1st Det.	2.25	160	75	2.5	8.0	.8	1.
24	1st I. F.	2.25	160	75	.2	5.0	4.0	1.
24	2nd I. F.	2.25	160	75	6.*	4.0	4.0	1.
27	Det. Rect.	2.25	...	...	...	...	...	..
27	Det. Amp.	2.25	20	...	...	4.0	...	..
27	1st A. F.	2.30	150	...	...	4.0	3.0	..
47	2nd A. F.	2.30	245	255	16.5	...	31**	9.
47	2nd A. F.	2.30	245	255	16.5	...	31**	9.
80	Rect.	5.0	...	...	...	...	54/54	..

*60 Volt scale.

**Special adapter must be used for this test.

Note—Volume control off; station selector turned to low frequency end; range switch set in "Normal" position.

Table 2—Power Transformer Voltages

Terminals	A.C. Volts	
1—2	115.	Primary
3—4	2.67	Heater for 24 and 27 Tubes
6		Not used
5—7	2.68	Filaments for 47 Tubes
10—12	750.	Plates 80 Tube
11		Center Tap 80 Tube
8—9	5.0	Filament 80 Tube
Rubber Covered Lead		Center Tap for 24 and 27 Tubes

Table 3—Condenser Data

No. on Figs.	CAPACITY	COLOR
(6) (9) (19) (42)	.05	Bakelite Container
(13) (14) (21)	.05 and 250 Ohms	Bakelite Container
(25)	.25	Metal Container
(30) (59)	.00011	Blue, Golden Yellow
(36)	.00025	Yellow
(40)	.015	Bakelite Container
(53)	.0007	White, Golden Yellow
(60)	.015 Double	Bakelite Container
(65) (68)	6 Mfd.	Electrolytic

Table 4—Resistor Data

No. on Figs.	Resistance (Ohms)	Power (Watts)	COLOR		
			Body	Tip	Dot
(69)	2 Sections 70 ohms ea.		Flat	Wire Wound Tubular	
(63)	205				
(58)	1,000	1	Brown	Black	Red
(1)	10,000	½	Brown	Black	Orange
(47) (57)	13,000	1	Brown	Orange	Orange
(51)	15,000	2	Red	Orange	Black
(37)	25,000	1	Red	Green	Orange
(46)	25,000	½	Red	Green	Orange
(31) (32) (54)	51,000	½	Green	Brown	Orange
(26)	70,000	½	Violet	Black	Orange
(43)	70,000	1	Violet	Black	Orange
(8) (10) (33) (35)	99,000	½	White	White	Orange
(38)	99,000	1	White	White	Orange
(24)	490,000	½	Yellow	White	Yellow
(39)	490,000	1	Yellow	White	Yellow

Model 112 Condenser Block Part No. 3754

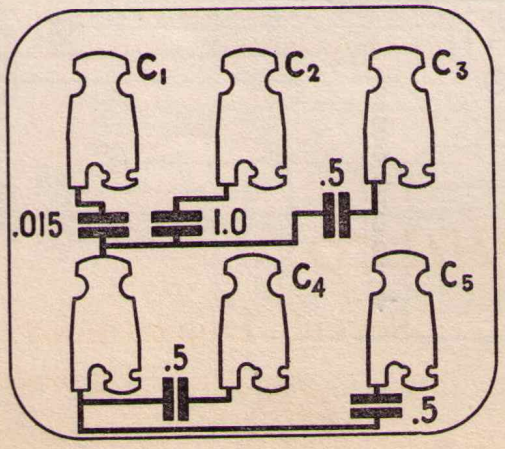


Fig. 1

Model 112-A Condenser Block Part No. 3755

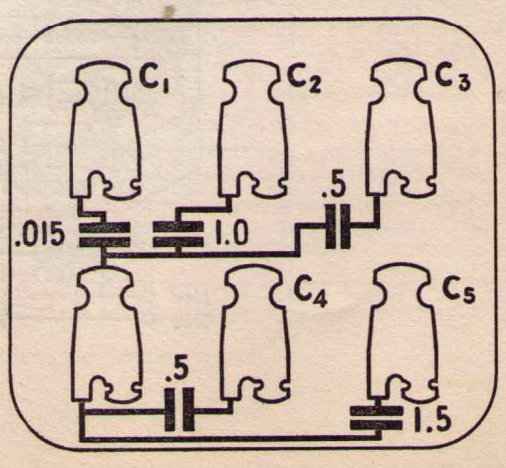


Fig. 2

MODELS 112 AND 112-A
(Above Serial No. 174,001)

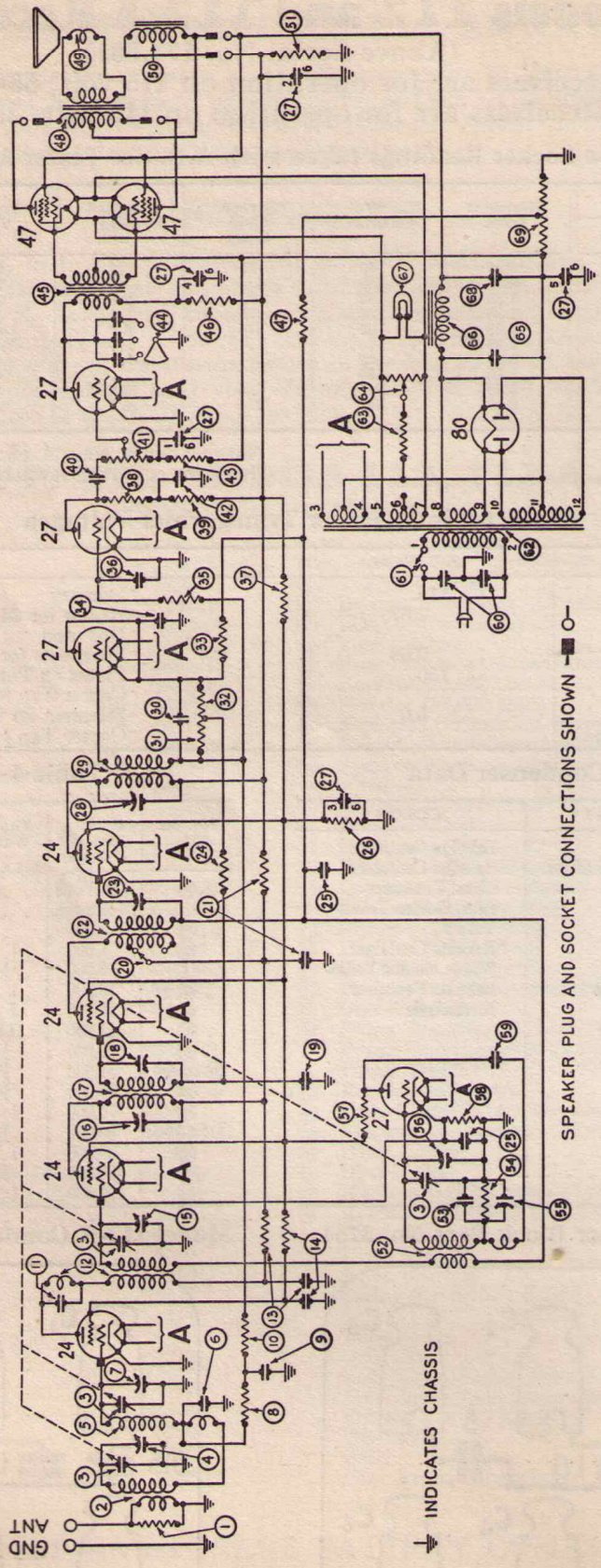


Fig. 3

MODELS 112 AND 112-A

(Above Serial No. 174,001)

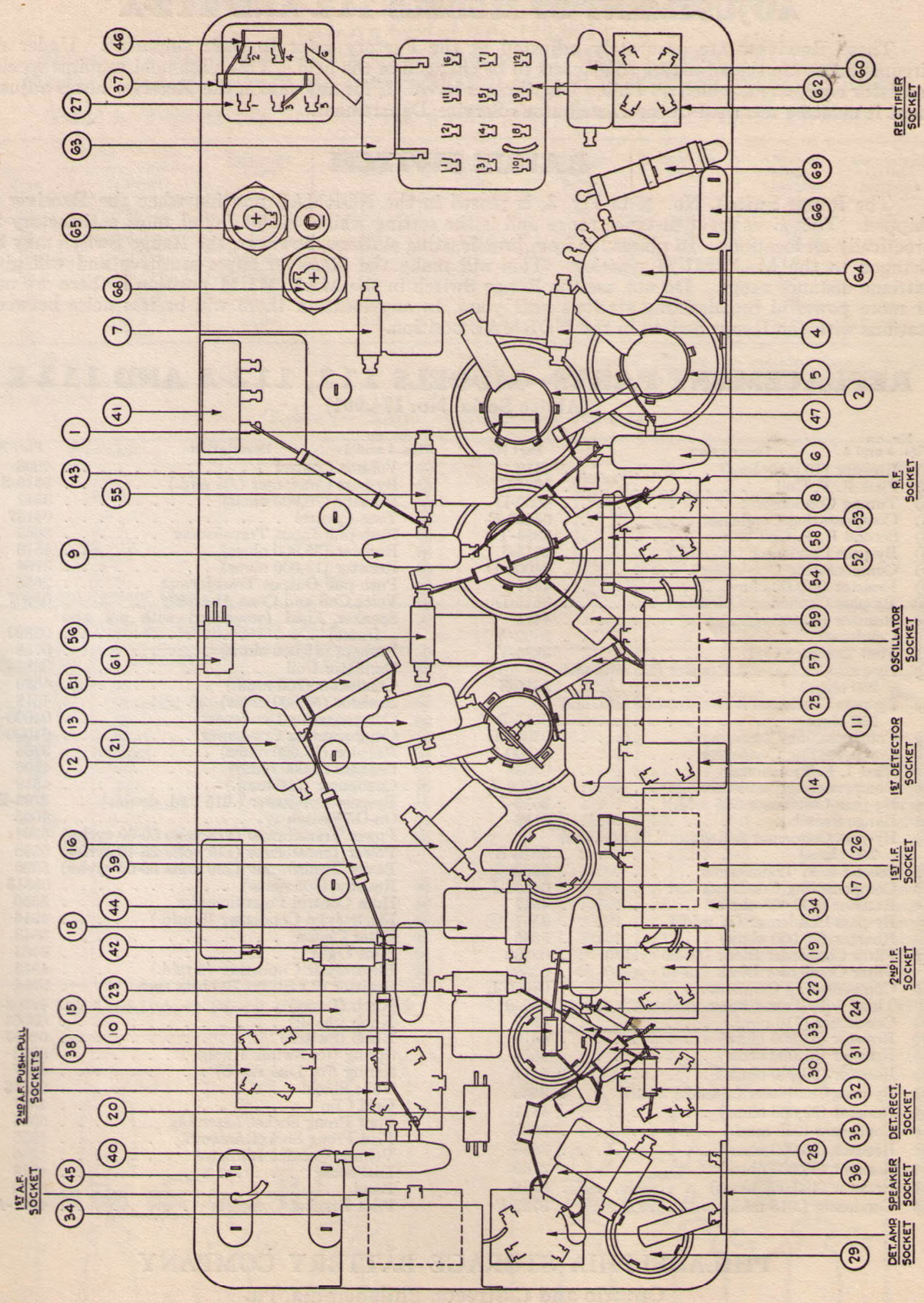


Fig. 4

ADJUSTMENT OF MODELS 112 AND 112-A

These Receivers are accurately adjusted at the Factory prior to their shipment. Under no circumstances are the adjusting condensers to be changed in the field. This alignment requires special oscillator equipment, which all Philco Distributors have. If for any reason the Receiver needs adjustment it must be returned to the Distributor's Service Department.

RANGE SWITCH

The Range Switch, No. ⑳ in Fig. 3, is placed in the NORMAL position when the Receiver is shipped. This gives great distance range and is the setting which will be found most satisfactory in practically all locations. In places far from broadcasting stations, however, the Range Switch may be changed to the MAXIMUM position. This will make the Receiver super-sensitive and will give extreme distance range. Do not use the Range Switch in the MAXIMUM position if there are one or more powerful broadcasting stations near you. In any location there will be less noise between stations with the Range Switch in the NORMAL position.

REPLACEMENT PARTS—MODELS 112, 112-A AND 112-E

(Above Serial No. 174,001)

No. on Figs. 3 and 4	Description	Part No.
①	Resistor (10,000 ohms)	4412
②	First R. F. Coil	3884-S
③	Tuning Condenser	4000-D
④	Compensating Condenser	04000-E
⑤	Second R. F. Coil	3884-T
⑥	By-pass Condenser (.05 mfd.)	3615-J
⑦	Compensating Condenser	04000-D
⑧	Resistor (99,000 ohms)	4411
⑨	By-pass Condenser (.05 mfd.)	3615-D
⑩	Resistor (99,000 ohms)	4411
⑪	Condenser	3892-A
⑫	First Detector Coil	3884-V
⑬	By-pass Condenser & Resistor (.05 mfd. and 250 ohms)	3615-Z
⑭	By-pass Condenser & Resistor (.05 mfd. and 250 ohms)	3615-B
⑮	Compensating Condenser	04000-E
⑯	Compensating Condenser	04000-J
⑰	First I. F. Transformer	03038
⑱	Compensating Condenser	04000-J
⑲	By-pass Condenser (.05 mfd.)	3615-J
⑳	Range Switch	3116
㉑	By-pass Condenser & Resistor (.05 mfd. and 250 ohms)	3615-B
㉒	Second I. F. Transformer	03039
㉓	Compensating Condenser	04000-J
㉔	Resistor (490,000 ohms)	4517
㉕	By-pass Condenser (¼ mfd.)	3557
㉖	Resistor (70,000 ohms)	5385
㉗	Filter Condenser Block (50-60 cycles)	03489
	Filter Condenser Block (25-40 cycles)	03589
㉘	Compensating Condenser	04000-L
㉙	Third I. F. Transformer	03040
㉚	Condenser (110 mmf.)	4519
㉛	Resistor (51,000 ohms)	4518
㉜	Resistor (51,000 ohms)	4518
㉝	Resistor (99,000 ohms)	4411
㉞	By-pass Condenser (.5 mfd.) 2 used	3583
㉟	Resistor (99,000 ohms)	4411
㊱	Condenser (250 mmf.)	3082
㊲	Resistor (25,000 ohms)	3656
㊳	Resistor (99,000 ohms)	3769
㊴	Resistor (490,000 ohms)	3768
㊵	Condenser (.015 mfd.)	3793-F
㊶	Volume Control	4093
㊷	By-pass Condenser (.05 mfd.)	3615-S
㊸	Resistor (70,000 ohms)	3542
㊹	Tone Control	03137
㊺	Push-pull Input Transformer	5662
㊻	Resistor (25,000 ohms)	4516
㊼	Resistor (13,000 ohms)	3766
㊽	Push-pull Output Transformer	2635
㊾	Voice Coil and Cone Assembly	02997
㊿	Speaker Field (assembled with pot and frame)	02892
(51)	Resistor (15,000 ohms)	5718
(52)	Oscillator Coil	3884-U
(53)	Condenser (700 mmf.)	4520
(54)	Resistor (50,000 ohms)	4518
(55)	Compensating Condenser	04000-F
(56)	Compensating Condenser	04000-E
(57)	Resistor (13,000 ohms)	3766
(58)	Resistor (1,000 ohms)	4590
(59)	Condenser (110 mmf.)	4519
(60)	By-pass Condenser (.015 mfd. double)	3793-E
(61)	On-Off Switch	4095
(62)	Power Transformer (115 volts 50-60 cycles)	5594
	Power Transformer (115 volts 25-40 cycles)	5595
	Power Transformer (230 volts 50-60 cycles)	5596
(63)	Resistor (205 ohms)	03513
(64)	Hum Control Potentiometer	5650
(65)	Electrolytic Condenser (6 mfd.)	4916
(66)	Filter Choke	5643
(67)	Pilot Light	3463
(68)	Electrolytic Condenser (6 mfd.)	4916
(69)	Resistor (2 sections 70 ohms each)	3764
	Knob (Large)	03063
	Knob (Small)	03064
	Knob (Switch)	03437
	Spring (for Switch Knob)	5262
	Spring (for Dial Knob)	4147
	Tube Shield	03518
	Grid Clip	4897
	Four Prong Socket Assembly	5026
	Five Prong Socket Assembly	4956
	Volume Control Insulator	4286
	Dial Scale	4276
	Bezel	5010
	Pilot Bracket Complete	4027-A

PHILADELPHIA STORAGE BATTERY COMPANY
Ontario and C Streets, Philadelphia, Pa.

September, 1931 Form No. 2779 Printed in U. S. A.

PHILCO

REG. U.S. PAT. OFF.

Service Bulletin—No. 102

AVERAGE CHARACTERISTICS PHILCO TUBES

Type	Purpose	Base	Dimensions		Filament		Plate Volts		Plate Current Ma. Amp.	Grid Volts Amp.	Screen Volts	Mutual Conductance Micromhos	Voltage Amplification Factor	Plate Impedance Ohms	Maximum Undistorted Output Milliwatts
			Height Max.	Dia. Max.	Volts	Amps.	Det.	Amp.							
00-A	Super Sensitive Detector....	X	4 11/16"	1 13/16"	5.0	.25	45	.....	.....	1.5	.....	666	20	30,000	.....
01-A	Detector and Amplifier.....	X	4 11/16"	1 13/16"	5.0	.25	45	90 135	1-3	4.5 9.0	.....	725 800	8	11,000 10,000	.....
2	Ballast Tube.....	X	4 11/16"	1 9/16"	.....	.3	Used in	110 Volt Philco Sets	Direct	Current					
3	Ballast Tube.....	X	5 5/8"	2 1/8"	.....	.3	Used in	220 Volt Philco Sets	Direct	Current					
10	Power Oscillator and Amplifier.....	X	6 1/4"	2 7/16"	7.5	1.25	.....	250 350 425	10 16 18	−22 −31 −39	.....	1330 1550 1600	8	6,000 5,150 5,000	400 900 1600
12-A	Detector and Amplifier.....	X	4 11/16"	1 13/16"	5.0	.25	.....	90 135 180	5.2 6.2 7.6	−4.5 −9.0 −13.5	.....	1500 1600 1700	8.5	5,600 5,300 5,000	30 115 260
14*	Detector and Amplifier.....	Y	5 1/8"	1 3/4"	14.0	.3	.....	180 180 250	4 4 4	−1.5 −3.0 −3.0	75 90 90	1050 1000 1050	420 400 525	400,000 400,000 500,000	.....
17*	Detector and Amplifier.....	Y	4 11/16"	1 13/16"	14.0	.3	.....	90 135 180	2.7 4.5 5.0	−6.0 −9.0 −13.5	.....	820 1000 1000	9	11,000 9,000 9,000	.....
20	Power Amplifier.....	X	4 1/8"	1 13/16"	3.3	.132	.....	90 135	3.0 6.5	−16.5 −22.5	.....	415 525	3.3	8,000 6,300	45 110
22	Amplifier.....	X	5 3/8"	1 13/16"	3.3	.132	.....	135	1.5	−1.5	45	350	300	850,000	.....
24	Detector and Amplifier.....	Y	5 3/8"	1 13/16"	2.5	1.75	.....	180 180 250	4 4 4	−1.5 −3.0 −3.0	75 90 90	1050 1000 1000	420 400 525	400,000 400,000 500,000	.....
26	Amplifier.....	X	4 11/16"	1 13/16"	1.5	1.05	.....	90 135 180	3.8 6.3 7.4	−6 −9 −13.5	.....	950 1130 1170	8.2	8,600 7,200 7,000	.....
27	Detector and Amplifier.....	Y	4 11/16"	1 13/16"	2.5	1.75	.....	90 135 180	2.7 4.5 5.0	−6 −9 −13.5	.....	820 1000 1000	9	11,000 9,000 9,000	.....
30	Detector and Amplifier.....	X	4 1/4"	1 9/16"	2.0	.06	45	90	1.8	−4.5	.....	700	9.3	13,000	.....
31	Power Amplifier.....	X	4 1/4"	1 9/16"	2.0	.130	.....	135	6.8	−22.5	.....	760	3.8	4,950	150
32	Detector and Amplifier.....	X	4 11/16"	1 13/16"	2.0	.06	.....	135	1.4	−3	67.5	505	580	1,150,000	.....
33	Power Pentode.....	Y	4 11/16"	1 13/16"	2.0	.260	.....	135	14.0	−13.5	135	1400	63	45,000	650
35	Super Control Amplifier....	Y	5 3/8"	1 13/16"	2.5	1.75	.....	250	5.0	−3.0	90	1050	370	350,000	.....
36	Detector and Amplifier.....	Y	4 11/16"	1 9/16"	6.3	.3	90 Screen 45	90 135 135	MA. 1.8 Amp. 3.0 Amp. 3.5	−1.5	55 67.5 75	850 1050 1100	170 315 275	200,000 300,000 250,000	.....
37	Detector and Amplifier.....	Y	4 1/4"	1 9/16"	6.3	.3	90	90 135	2.7 4.5	−6 −9	.....	780 900	9	11,500 10,000	.....
38	Power Pentode.....	Y	4 11/16"	1 9/16"	6.3	.3	.....	135	8	−13.5	135	900	100	110,000	375
45	Power Amplifier.....	X	5 5/8"	2 3/16"	2.5	1.5	.....	180 250	25 34	−34.5 −50.0	.....	1850 2000	3.5	1,900 1,750	780 1600
47	Power Pentode.....	Y	5 5/8"	2 3/16"	2.5	1.5	.....	250	32	−16.5	250	2500	95	38,000	2500
50	Power Amplifier.....	X	6 1/4"	2 11/16"	7.5	1.25	.....	350 400 450	45 55 55	−63 −70 −84	.....	2000 2100 2100	3.8	1,900 1,800 1,800	2400 3400 4600
71-A	Power Amplifier.....	X	4 11/16"	1 13/16"	5.0	.25	.....	90 135 180	12 17.5 20.0	−19 −29.5 −43.0	.....	1330 1520 1620	3.0	2,250 1,960 1,850	125 370 700
80	Full Wave Rectifier.....	X	5 5/8"	2 1/8"	5.0	2.0	Maximum A. C. Voltage Each Plate to Filament 350 400 550			Max. D. C. Load M A. 125 110 135					
81	Half Wave Rectifier	X	6 1/4"	2 7/16"	7.5	1.25	Maximum A. C. Voltage Each Plate to Filament 700			Max. D. C. Load MA. 85					
X-99	Detector and Amplifier.....	X	4 1/8"	1 3/16"	3.3	.063	20/45	90	2.5	−4.5	.....	425	6.6	15,500	.....
V-99	Detector and Amplifier.....	V	3 1/2"	1 1/16"	3.3	.063	20/45	90	2.5	−4.5	.....	425	6.6	15,500	.....

*For Direct Current Operation Only.

PHILADELPHIA STORAGE BATTERY COMPANY

Ontario and C Streets, Philadelphia, Pa.

September, 1931 Form No. 2791 Printed in U. S. A.

Factory

PHILCO

REG. U.S. PAT. OFF.

Service Bulletin — No. 108

Model 4 Short Wave Converter

Model 4 Receivers are for operation on 115 volt, 50-60 cycle AC lines

Table 1—Tube Socket Readings—Line Voltage—115 volts

Tube		Filament Volts	Plate Volts	Screen Grid Volts	Control Grid Volts	Cathode Volts
Type	Circuit					
27	Oscillator	2.4	110	..	.1	0
24	Detector	2.4	25	25	.3	0
80	Rectifier	5.0	170/170	..	..	..

NOTE: The above voltage readings were taken from the socket terminals on the underside of the chassis, using a Weston multi-range voltmeter, 1000 ohms per volt. The radio set tester cannot be used either for voltage or plate current readings because of the effect of the long leads through the set tester cord.

Table 2—Power Transformer Voltages

Terminals	A. C. Volts		Color
1—2	105—125	Primary	White
3—5	2.5	Filament of 24 and 27	Black
6—7	5.0	Filament of 80	Light Blue
8—10	340	Plates of 80	Yellow
4	...	Center Tap of 3—5	Black with Yellow Tracer
9	...	Center Tap of 8—10	Yellow with Green Tracer

Table 3—Condenser Data

Nos. on Figs. 1 and 2	Capacity Mfd.	Container
(20)	.00011	Blue and Golden Yellow
(12)	.0008	Green and Orange
(10)	.00125	Blue and Orange
(2)	.05	Black Bakelite Container
(29) (30)	6.	Electrolytic

Table 4—Resistor Data

Nos. on Figs. 1 and 2	Power (Watts)	Resistance (Ohms)	COLOR		
			Body	Tip	Dot
(32)		4750 4750	Long Tubular		
(4)	1.	13000	Brown	Orange	Orange
(22)	1.	99000	White	White	Orange
(9)	.5	240,000	Red	Yellow	Yellow
(19)	.5	2 Megohms	Red	Black	Green

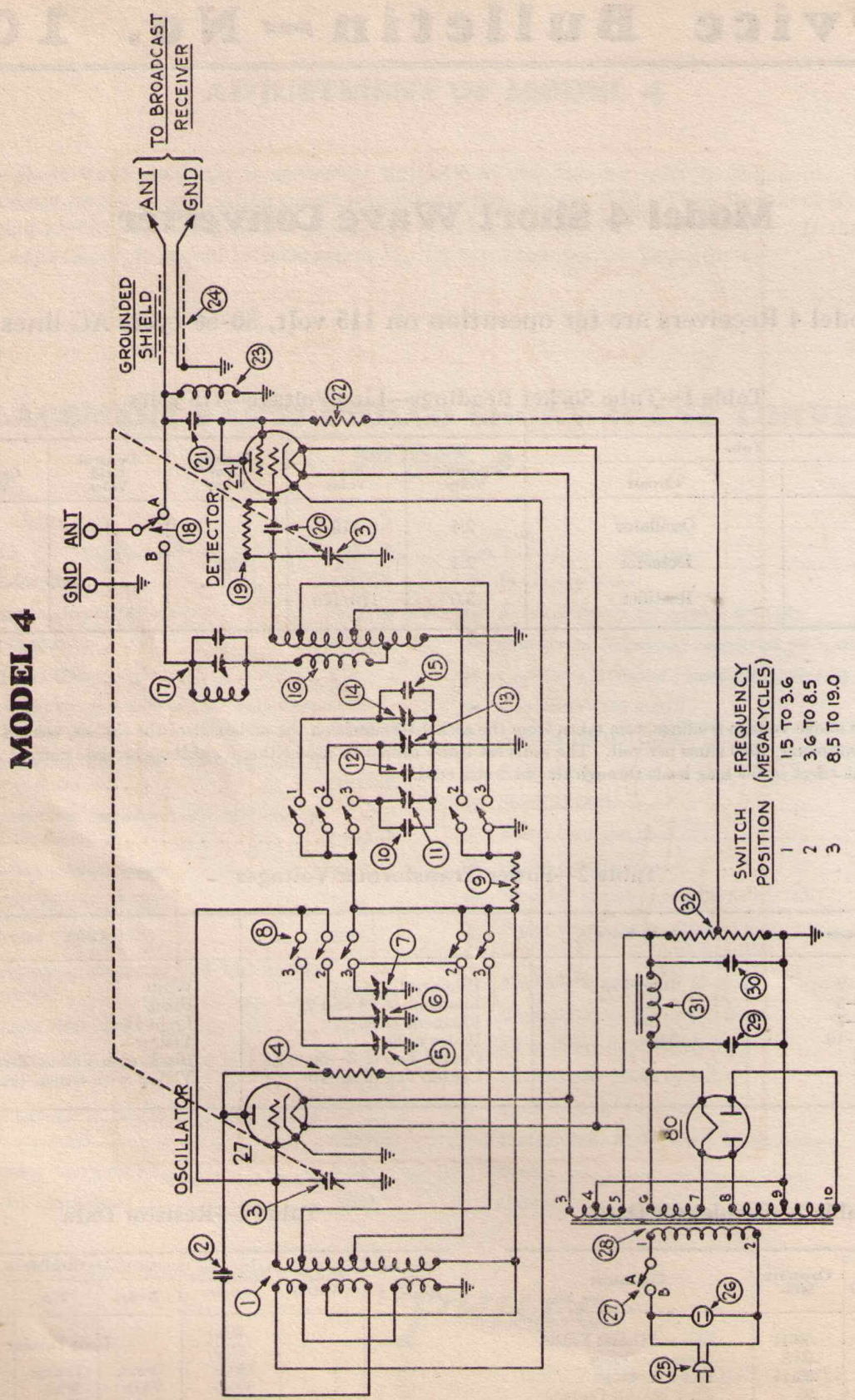
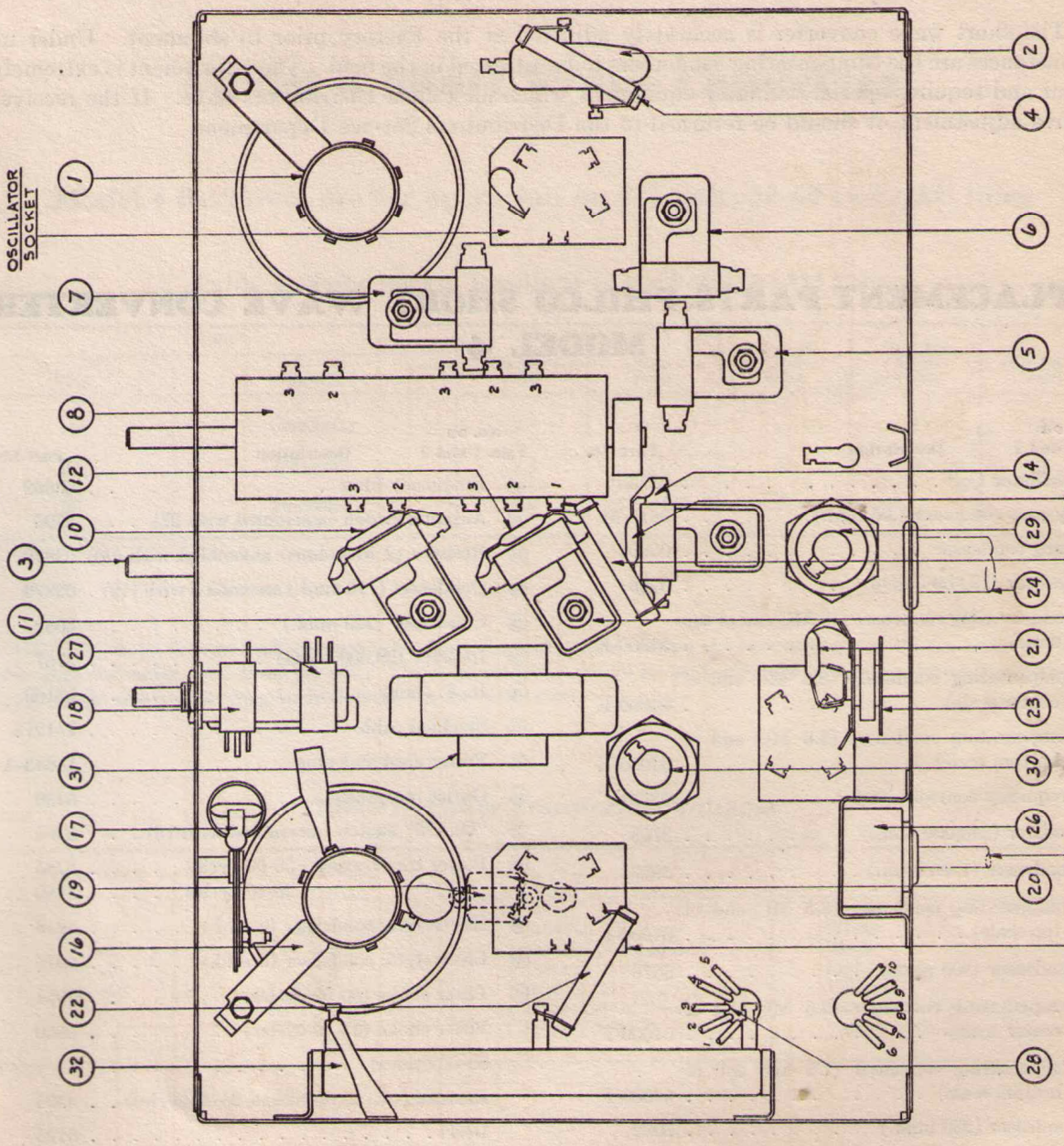

MODEL 4
TO BROADCAST RECEIVER
ANT
GND
GROUNDED SHIELD
GND ANT
DETECTOR
OSCILLATOR
SWITCH POSITION
FREQUENCY (MEGACYCLES)
1 1.5 TO 3.6
2 3.6 TO 8.5
3 8.5 TO 19.0

Fig. 1


MODEL 4
OSCILLATOR SOCKET
RECTIFIER SOCKET
DETECTOR SOCKET
1
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3
4
5
6
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8
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10
11
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Fig. 2

ADJUSTMENT OF MODEL 4

The short wave converter is accurately adjusted at the Factory prior to shipment. Under no circumstances are the compensating condensers to be adjusted in the field. The adjustment is extremely critical and requires special oscillator equipment which all Philco Distributors have. If the receiver requires adjustment, it should be returned to the Distributor's Service Department.

REPLACEMENT PARTS PHILCO SHORT WAVE CONVERTER MODEL 4

No. on Figs. 1 and 2	Description	Part No.
①	Oscillator Coil	03733*
②	By-pass condenser (.05 mfd.)	3615-M
③	Gang condenser	03692
④	Resistor (13,000 ohms)	3766
⑤	Compensating condenser (19 MC end of top scale)	04000-E
⑥	Compensating condenser (8.5 MC end of center scale)	04000-E
⑦	Compensating condenser (3.6 MC end of bottom scale)	04000-E
⑧	Frequency control switch	03751
⑨	Resistor (240,000 ohms)	3768
⑩	Condenser (1250 mmf.)	5886
⑪	Compensating condenser (8.5 MC end of top scale)	04000-F
⑫	Condenser (800 mmf.)	5878
⑬	Compensating condenser (3.6 MC end of center scale)	04000-F
⑭	Compensating condenser (1.5 MC end of bottom scale)	04000-F
⑮	Condenser (250 mmf.)	3082
⑯	Detector transformer	03731
⑰	Frequency filter	03662
⑱	Antenna switch (assembled with 27)	5796
⑲	Resistor (2 Megohms) assembled with (20)	03879
⑳	Condenser (110 mmf.) assembled with (19)	03879
㉑	Condenser (250 mmf.)	3082
㉒	Resistor (99,000 ohms)	3767
㉓	R. F. choke	03103
㉔	Shielded cable	L-1278
㉕	Power cord and plug	L-943-A
㉖	Outlet receptacle	5439
㉗	"On-Off" switch (assembled with 18)	5796
㉘	Power transformer—50-60 cycles 25-40 cycles	5785 5786
㉙	Electrolytic condenser (6 mfd.)	4916
㉚	Electrolytic condenser (6 mfd.)	4916
㉛	Filter choke (50-60 cycles)	4951
	Filter choke (25-40 cycles)	5930
	50-60 cycles)	
	Resistor (two 32,000 ohms, 25-40 cycles)	3525
	Bezel	5175
	Cabinet	40600

*Includes matched oscillator coil and detector transformer.

PHILCO
Service Department

Printed in U. S. A.

PHILCO

REG. U.S. PAT. OFF.

Service Bulletin — No. 113

Model 70 Grandfather Clock

For operation on 115 volts, 60 cycles

The Model 570 contains the same radio equipment as the Model 70. It contains, in addition, the electric clock, connected to a double outlet receptacle at the back of the cabinet.

The electric clock should never require any attention providing it is permanently connected to a live current outlet of 115 volts, 60 cycles. The clock will stop if the current is interrupted at any time, and must then be started and set again by hand.

If for any reason the clock does not operate correctly, do not attempt to repair the operating unit, but replace it with another unit and return the defective one to the factory. The unit is fastened to a mounting board, and the entire assembly is then fastened to the face and cabinet with large mounting screws. To remove the unit, first remove the assembly, including the clock face. Remove the second hand by means of a standard clock hand puller which can be obtained from any jewelry store. Do not attempt to remove the second hand by prying with a screw driver as this will ruin the hand. Unscrew the nut which holds the hour and the minute hands in place, and lift these from their shaft. Remove the wood screws which hold the operating unit to the mounting board, and lift the unit from the board.

When re-assembling the new unit, first place the hour hand on its shaft. Replace the minute hand, and tighten with the nut. Insert a rod through the center hole in the back of the clock until it touches the end of the rotor shaft. Resting the rod on a solid surface, gently tap the second hand in place.

The following is a list of the special replacement parts which are supplied for the Model 570.

Clock Unit (60 cycles)	5475
Clock Face	5476
Hour Hand	5477
Minute Hand	5478
Second Hand	5479
Clock Glass	5480
Clock Hand Nut	5870

PHILCO

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Service Department

Nov. 1931
Printed in U. S. A.

Hartley

PHILCO

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Service Bulletin—No. 114

Models 51 and 51-A Receivers

Model 51 Receivers are for operation on 100-130 volt, 50-60 cycle AC line
Model 51-A Receivers are for operation on 100-130 volt, 25-40 cycle AC line

Table 1—Tube Socket Readings Taken with AC Set Tester AC Line—115 volts

Tube		Filament Volts	Plate Volts	Screen Grid Volts	Control Grid Volts	Cathode Volts	Plate Milli-amperes
Type	Circuit						
24	Osc. & 1st Det.	2.2	220*	85*	9.0*	9.0*	...
35	I.F.	2.2	210	85	3.0	3.0	6.2
24	2nd Det.	2.2	75	54	5.2	5.2	0
47	Output	2.2	210**	240**	0.2**	...	28.**
80	Rect.	5.0	240/Plate	...	...	...	30/ Plate

Note—Volume Control on full; Station Selector turned to Low Frequency End.
*These readings must be taken from the underside of the chassis, using a suitable high resistance D.C. voltmeter equipped with test prods and leads.
**These readings must likewise be taken from the underside of the chassis unless the set tester is especially equipped for testing pentode tubes.

Table 2—Power Transformer Voltages

Terminals	A.C. Volts	Connection	Color
1–2	105 to 125	Primary	Black (Small Gauge)
3–5	2.5	Filament of 24, 35 and 47	Black
6–7	5.	Filament of 80	Light Blue
8–10	700.	Plates of 80	Yellow
4	.....	Center Tap of 3–5	Black, Yellow Tracer
9	.....	Center Tap of 8–10	Yellow, Green Tracer

Table 3—Condenser Data

Nos. on Figs. 1 and 2	Capacity Mfd.	Container
(20) (22)	.00025	Yellow
(10) (36)	.00011	Blue and Golden Yellow
(26) (28)	.01	Black Bakelite Container
(14)	.05	Black Bakelite Container
(23)	.1, .15, .25, 2-.5 (50-60 cy.)	Metal Container
	.2, .15, .25, 2-.5 (25-40 cy.)	Metal Container
(43)	6 (50-60 cycles)	Electrolytic
	10 (25-40 cycles)	Electrolytic
(44)	6	Electrolytic

Table 4—Resistor Data

Nos. on Figs. 1 and 2	Power (Watts)	Resistance (Ohms)	Color		
			Body	Tip	Dot
(34)	...	250 and .05 Mfd.	Black Bakelite Container		
(13)	.5	1,000	Brown	Black	Red
(35)	.5	8,000	Grey	Black	Red
(21)	.5	10,000	Brown	Black	Orange
(39)	1.	25,000	Red	Green	Orange
(18)	.5	32,000	Orange	Red	Orange
(40)	1.	32,000	Orange	Red	Orange
(37)	2.	51,000	Green	Brown	Orange
(19) (25)	.5	99,000	White	White	Orange
(33)	.5	160,000	Brown	Blue	Yellow
(24) (27) (32)	.5	490,000	Yellow	White	Yellow

PHILCO MODELS 51 AND 51-A

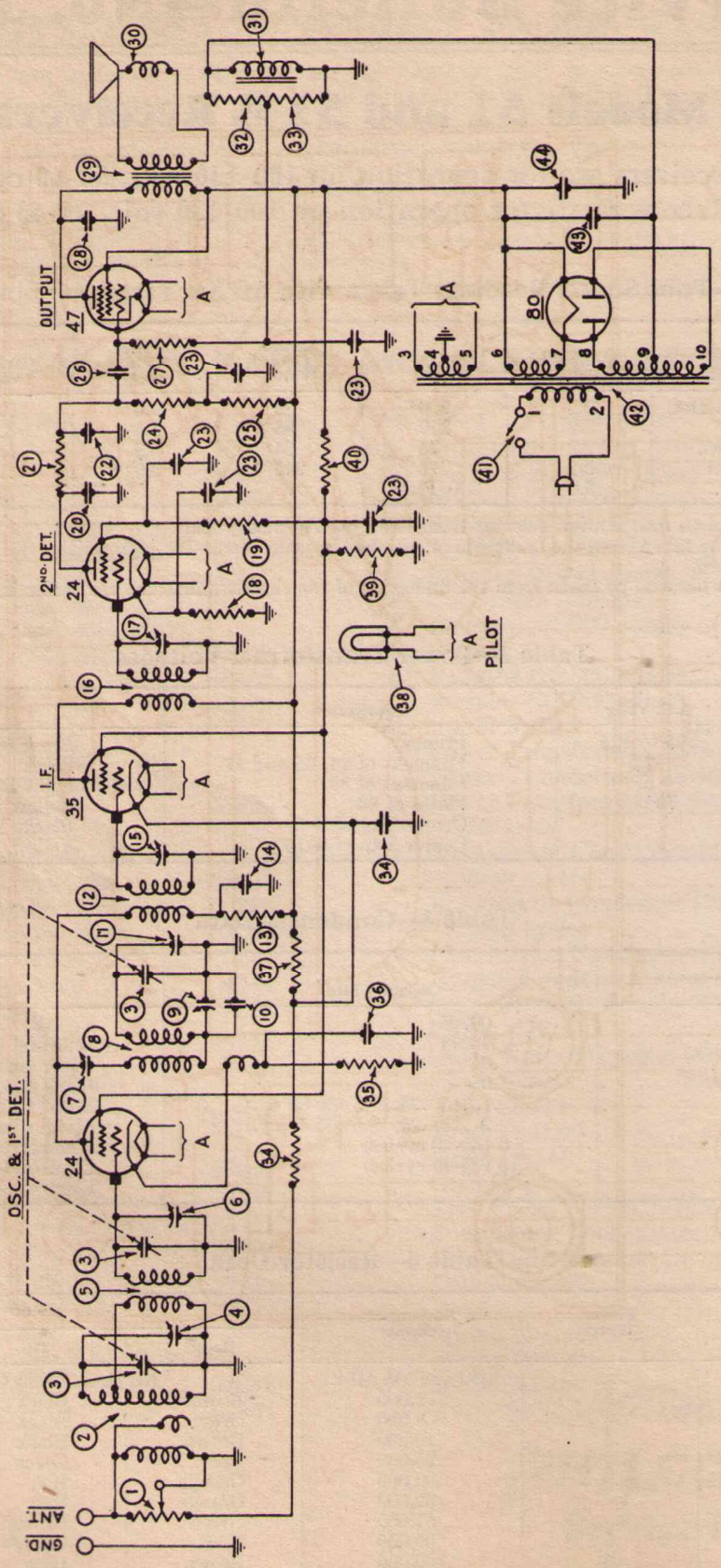

Fig. 1

PHILCO MODELS 51 AND 51-A

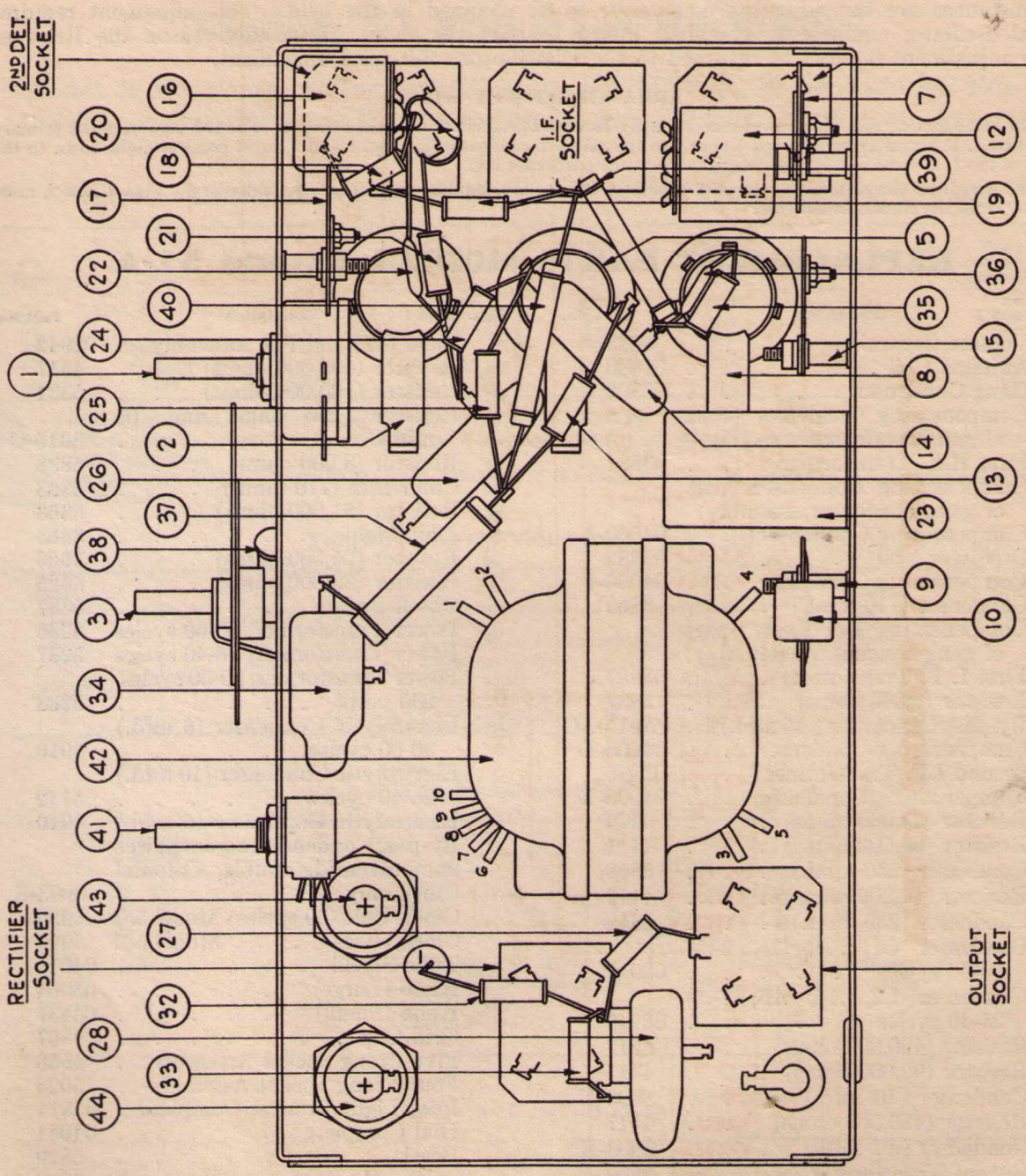

Fig. 2

ADJUSTMENT OF MODELS 51 and 51-A

These Receivers are accurately adjusted at the Factory prior to their shipment. Under no circumstances are the adjusting condensers to be changed in the field. This alignment requires special oscillator equipment, which all Philco Distributors have. If for any reason the Receiver needs adjustment it must be returned to the Distributor's Service Department.

ARRANGEMENT OF WIRES

The placing of certain wires in the receiver will effect the operation to a marked extent. The red wire from the primary of the first I. F. transformer ⑫, Figs. 1 and 2, to the .05 mfd. condenser ⑭, Figs. 1 and 2, must come straight down to the corner of the I. F. tube socket, then straight up to the condenser lug.

The wire from the plate of the detector-oscillator tube to the coupling compensating condenser ⑦, Figs. 1 and 2, must be away from the chassis at the side.

REPLACEMENT PARTS MODELS 51 and 51-A

No. on Figs. 1 and 2	Description	Part No.
①	Volume Control	5839
②	Antenna Coil	03880
③	Gang Condenser	03809
④	Compensating Condenser (Part of gang condenser assembly)	
⑤	First R.F. Transformer	03881
⑥	Compensating Condenser (part of gang condenser assembly)	
⑦	Compensating Condenser	04000-A
⑧	Oscillator Coil	03882
⑨	Compensating Condenser	04000-F
⑩	Condenser (710 mmf.)	5863
⑪	Compensating Condenser (part of gang condenser assembly)	
⑫	First I. F. Transformer	03887
⑬	Resistor (1,000 ohms)	5837
⑭	By-pass Condenser (.05 mfd.)	3615-AC
⑮	Compensating Condenser	04000-D
⑯	Second I.F. Transformer	03886
⑰	Compensating Condenser	04000-D
⑱	Resistor (33,000 ohms)	5279
⑲	Resistor (99,000 ohms)	4411
⑳	Condenser (250 mmf.)	5858
㉑	Resistor (10,000 ohms)	4412
㉒	Condenser (250 mmf.)	5858
㉓	Condenser (.1, .15, .25, 2-.5) 50-60 cycles	03915
	Condenser (.2, .15, .25, 2-.5) 25-40 cycles	03945
㉔	Resistor (490,000 ohms)	4517
㉕	Resistor (99,000 ohms)	4411
㉖	Condenser (.01 mfd.)	3903-N
㉗	Resistor (490,000 ohms)	4517
㉘	Condenser (.01 mfd.)	3903-K
㉙	Output Transformer	2660
㉚	Voice Coil and Cone Assembly TYPE "S" (Large)	02887
	TYPE "P" (Small)	02861
㉛	Field Coil and Pot Assembly	02942
㉜	Resistor (490,000 ohms)	4517
㉝	Resistor (160,000 ohms)	5331
㉞	Resistor (250 ohms and .05 mfd.)	3615-C
㉟	Resistor (8,000 ohms)	5838
㊱	Condenser (710 mmf.)	5863
㊲	Resistor (51,000 ohms)	5868
㊳	Pilot Light	3463
㊴	Resistor (25,000 ohms)	3656
㊵	Resistor (32,000 ohms)	3525
㊶	On-off Switch	5382
㊷	Power Transformer, 50-60 cycles	5266
	Power Transformer, 25-40 cycles	5267
	Power Transformer, 50-60 cycles, 230 volts	5268
㊸	Electrolytic Condenser (6 mfd.) 50-60 cycles	4916
	Electrolytic Condenser (10 mfd.) 25-40 cycles	5142
㊹	Electrolytic Condenser (6 mfd.)	4916
	By-pass Condenser (across power line) .01 mfd. double, Colonial Clock only	3903-S
	Clock Unit (60 cycles) Model 551	5950
	Clock Glass Model 551	5942
	Tube Shield	04011
	Knob (Large)	03064
	Knob (Small)	03437
	Grid Clip	4897
	Five Prong Socket Assembly	4956
	Four Prong Socket Assembly	5026
	Pilot Light Bracket Complete	03814
	Dial Complete	04031
	Bezel	5879
	Spring (Large)	5262
	Spring (Small)	4147
	Scroll (Model 551)	44613
	Turnings (3 used) Model 551	44607

PHILCO
Service Department

Factory

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Service Bulletin—No. 115

Model 490 Receiver

Table 1—Tube Socket Readings—Line Voltage 115 volts

Tube		Filament	Plate	Screen Grid	Control Grid	Cathode	Plate Milli-
Type	Circuit	Volts	Volts	Volts	Volts	Volts	amperes
			SHORT WAVE UNIT*				
27	Osc.	2.2	110	...	3.3	0	...
24	1st Det.	2.2	24	24	5.	0	...
			BROADCAST UNIT*				
24	R. F.	2.1	220	50	6.	15	2.
27	Osc.	2.1	80	...	6	15	2.3
24	1st Det.	2.1	210	55	5	15	.5
24	I. F.	2.1	220	60	8	15	0
27	Rect. Det.	2.1	...	...	...	14	...
27	Ampl. Det.	2.1	150	...	0	15	1.3
27	1st Audio	2.1	150	...	2	15	1.5
47	Output	2.4**	205**	220**	7**	...	28.**
80	Rectifier	4.5	220/Plate	...	...	...	...

*The voltage readings of the short wave unit were taken from the under side of the chassis, using a Weston Multi-range voltmeter, 1000 ohms per volt. The radio set tester cannot be used, either for voltage or plate current readings because of the effect of the long leads through the set tester cord.
**These readings must likewise be taken from the socket terminals on the under side of the chassis unless the set tester is especially equipped with an adapter for testing pentode tubes.

Table 2—Power Transformer Voltages

Terminals	A.C. Volts	Circuit	Color
		SHORT WAVE UNIT	
4–5	105 to 125	Primary	Black
1–3	2.5	Secondary	Yellow
2	...	Center Tap 1–3	Green
		BROADCAST UNIT	
1–2	105 to 125	Primary	White
3–5	2.5	Heaters of 24 and 27 Tubes	Black
4	...	Center Tap of 3–5	Black with Yellow
6–8	2.5	Filament of 47 Tube	Dark Green
7	...	Center Tap of 6–8	Black with Green
9–10	5.0	Filament of 80 Tube	Light Blue
11–13	650.	Plates of 80 Tube	Yellow
12	...	Center Tap of 11–13	Yellow with Green

Table 3—Resistor Data

Nos. on Figs. 1, 2 and 3	Terminal	Power (Watts)	Resistance (Ohms)	COLOR		
				Body	Tip	Dot
(91)	1–2 2–3 3–4	..	180 60 3500		Long Tubular	
(29)	.....	1	5,000	Green	Black	Red
(65)	.....	½	5,000	Green	Black	Red
(33)	.....	½	10,000	Brown	Black	Orange
(4)	.....	1	13,000	Brown	Orange	Orange
(73)	.....	½	25,000	Red	Green	Orange
(80) (81)	.....	1	25,000	Red	Green	Orange
(25) (26)	.....	1	32,000	Orange	Red	Orange
(46) (48) (55) (64)	.....	½	51,000	Green	Brown	Orange
(69) (81)	.....	1	51,000	Green	Brown	Orange
(56) (71)	.....	½	70,000	Violet	Black	Orange
(22)	.....	1	99,000	White	White	Orange
(50) (78)	.....	½	99,000	White	White	Orange
(9) (92)	.....	1	240,000	Red	Yellow	Yellow
(78) (83)	.....	½	240,000	Red	Yellow	Yellow
(49) (59)	.....	½	490,000	Yellow	White	Yellow
(92)	.....	1	490,000	Yellow	White	Yellow
(19)	.....	½	2,000,000	Red	Black	Green

Table 4—Condenser Data

Nos. on Figs. 1, 2 and 3	Capacity Mfd.	Container
(20) (47) (67)	.00011	Blue and Golden Yellow
(14) (21) (52)	.00025	Yellow
(63)	.0007	White and Golden Yellow
(12)	.0008	Green and Orange
(10)	.00125	Blue and Orange
(51) (79) (82)	.01	Black Bakelite
(84)	.015 Double	Black Bakelite
(2) (58) (68) (72)	.05	Black Bakelite
(61) (89)	.09 (50-60 cycles)	Black Bakelite
(89)	.18 (25-40 cycles)	Black Bakelite
(54)	3–.25 each	Metal
(70)	1, .25, .1 (50-60 cycles)	Metal
	1, .25, .25 (25-40 cycles)	Metal
(87)	6 (50-60 cycles)	Electrolytic
(90)	6 (50-60 cycles)	Electrolytic
(87)	10 (25-40 cycles)	Electrolytic
(90)	14 (25-40 cycles)	Electrolytic

MODEL 490

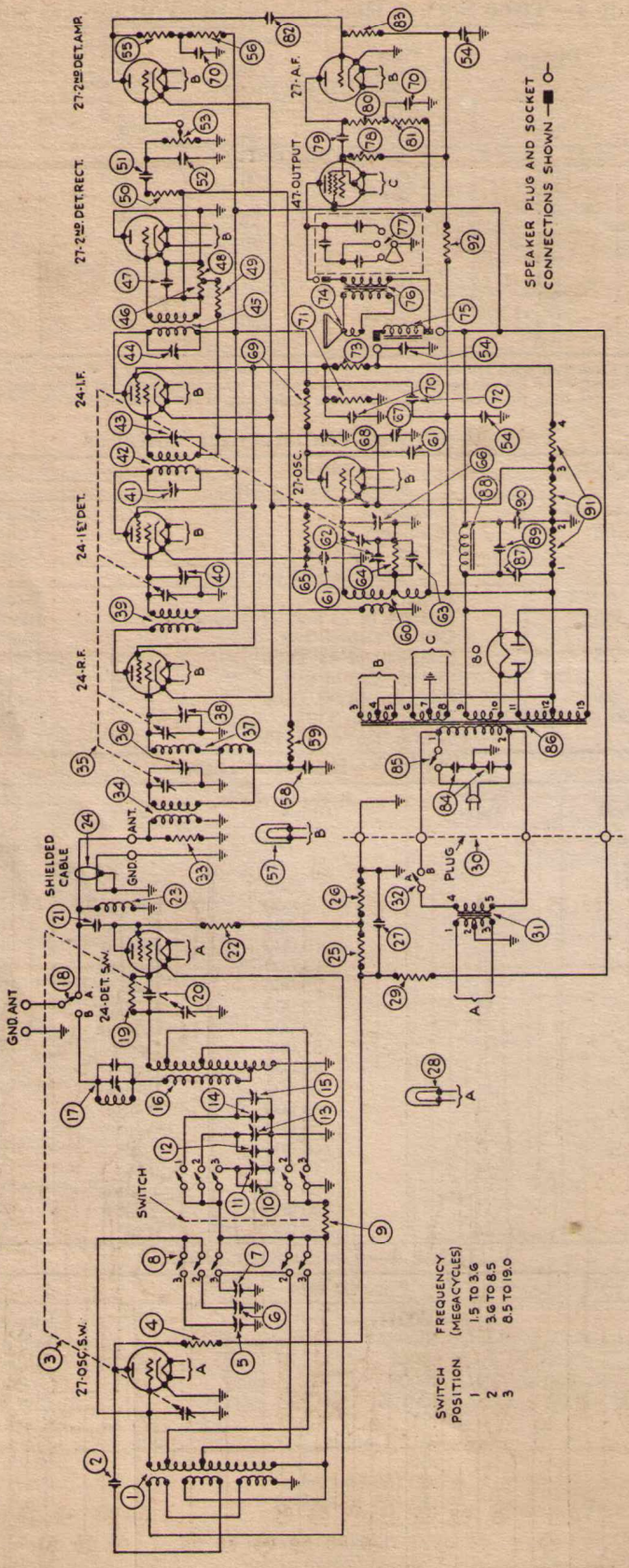

Fig. 1—Wiring Diagram.

MODEL 490

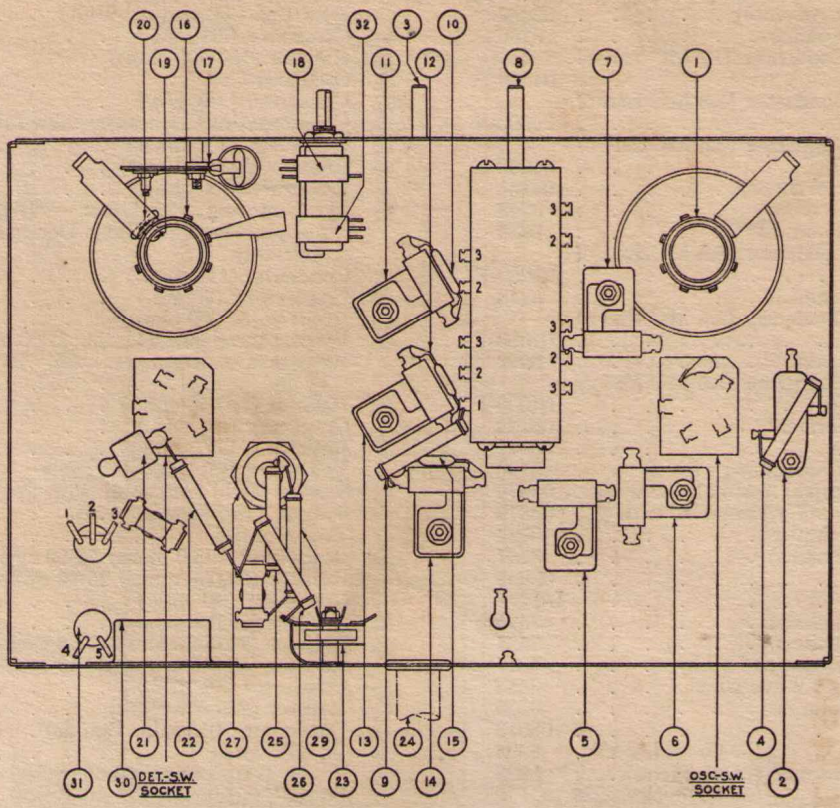

Fig. 2—Short Wave Chassis.

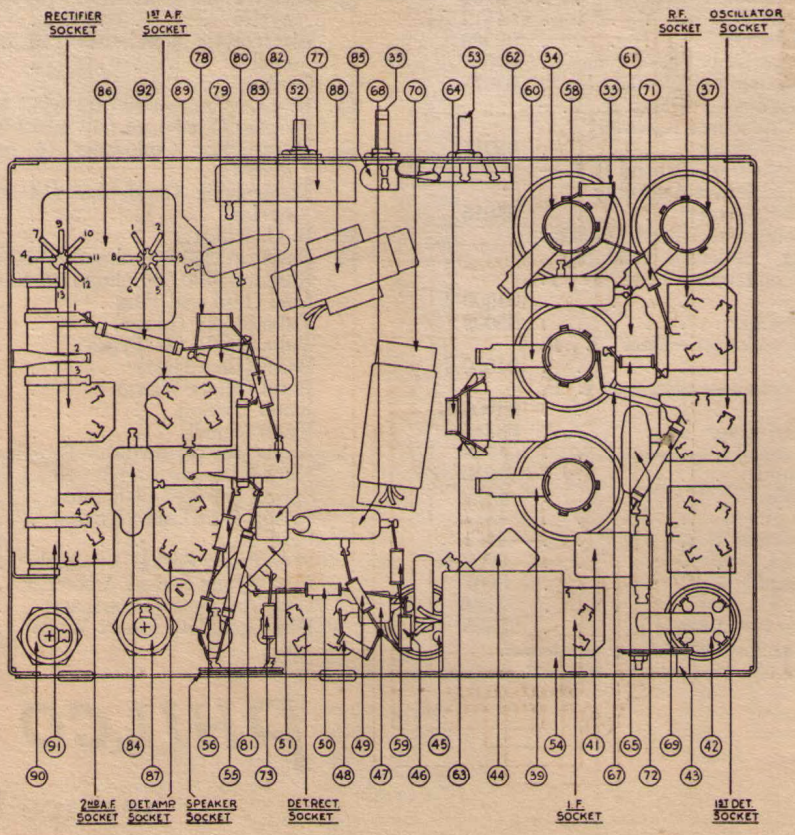

Fig. 3—Broadcast Chassis.

REPLACEMENT PARTS MODEL 490

No. on Figs. 1 and 2	Description	Part No.
①	Oscillator Coil*	03734
②	By-pass Condenser (.05 mfd.)	3615-M
③	Gang Condenser Assembly	03692
④	Resistor (13,000 ohms)	3766
⑤	Compensating Condenser (19 MC end of Top Scale)	04000-E
⑥	Compensating Condenser (8.5 MC End of Center Scale)	04000-E
⑦	Compensating Condenser (3.6 MC End of Bottom Scale)	04000-E
⑧	Frequency Control Switch	03751
⑨	Resistor (240,000 ohms)	3768
⑩	Condenser (1,250 mmf.)**	5886
⑪	Compensating Condenser (8.5 MC End of Top Scale)**	04000-F
⑫	Condenser (800 mmf.)	5878
⑬	Compensating Condenser (3.6 MC End of Center Scale)	04000-F
⑭	Condenser (250 mmf.)	3082
⑮	Compensating Condenser (1.5 MC End of Bottom Scale)	04000-F
⑯	Detector Transformer*	03734
⑰	Frequency Filter	03662
⑱	Antenna Switch Assembled with ㉜	5796
⑲	Resistor (2 megohms) Assembled with ⑳	03879
⑳	Condenser (110 mmf.) Assembled with ⑲	03879
㉑	Condenser (250 mmf.)	3082
㉒	Resistor (99,000 ohms)	3767
㉓	R. F. Choke	03893
㉔	Shielded Cable	L-1278
㉕	Resistor (32,000 ohms)	3525
㉖	Resistor (32,000 ohms)	3525
㉗	Electrolytic Condenser (6 mfd.)	4916
㉘	Pilot Light (Short Wave Unit)	3463
㉙	Resistor (5,000 ohms)	3526
㉚	Plug	03913
㉛	Filament Transformer (50-60 cycles)	5906
	Filament Transformer (25-40 cycles)	5923
	Filament Transformer (50-60 cycles, 230 volts)	5924
㉜	On-off Switch (Assembled with ⑱)	5796
㉝	Resistor (10,000 ohms)	4412
㉞	First R. F. Transformer	03360
㉟	Gang Condenser Assembly (50-60 cycles)	03001
	Gang Condenser Assembly (25-40 cycles)	03078
㊱	Compensating Condenser—First R. F.—Part of Gang Condenser Assembly	
㊲	Second R. F. Transformer	03014
㊳	Compensating Condenser—Second R. F.—Part of Gang Condenser Assembly	
㊴	First Detector Transformer	03015
㊵	Compensating Condenser—First Detector—Part of Gang Condenser Assembly	
㊶	Compensating Condenser—First I. F. Primary	04000-J
㊷	First I. F. Transformer	03009
㊸	Compensating Condenser—First I. F. Secondary	04000-J
㊹	Compensating Condenser—Second I. F. Primary	04000-L
㊺	Second I. F. Transformer	03345
㊻	Resistor (51,000 ohms)	4518
㊼	Condenser (110 mmf.)	4519
㊽	Resistor (51,000 ohms)	4518
㊾	Resistor (490,000 ohms)	4517
㊿	Resistor (99,000 ohms)	4411
(51)	Condenser (.01 mfd.)	3903-R
(52)	Condenser (250 mmf.)	3082
(53)	Volume Control	5366
(54)	By-pass Condenser (3—.25 mfd.)	03325
(55)	Resistor (51,000 ohms)	4518
(56)	Resistor (70,000 ohms)	5385
(57)	Pilot Light (Broadcast Unit)	3463
(58)	Condenser (.05 mfd.)	3615-W
(59)	Resistor (490,000 ohms)	4517
(60)	Oscillator Coil	03016
(61)	Condenser (.09 mfd.)	4989-G
(62)	Compensating Condenser—Low Frequency	04000-B
(63)	Condenser (700 mmf.)	4520
(64)	Resistor (51,000 ohms)	4518
(65)	Resistor (5,000 ohms)	5310
(66)	Compensating Condenser — High Frequency—Part of Gang Condenser Assembly	
(67)	Condenser (110 mmf.)	4519
(68)	Condenser (.05 mfd.)	3615-U
(69)	Resistor (51,000 ohms)	4237
(70)	By-pass Condenser (1., .25, .1) 50-60 cycles	03327
	By-pass Condenser (1., .25, .25) 25-40 cycles)	03624
(71)	Resistor (70,000 ohms)	5385
(72)	Condenser (.05 mfd.)	3615-E
(73)	Resistor (25,000 ohms)	4516
(74)	Voice Coil and Cone Assembly	02996
(75)	Speaker Field (Assembly with Pot)	02966
(76)	Output Transformer	2673
(77)	Tone Control	03137
(78)	Resistor (240,000 ohms) 50-60 cycles	4410
	Resistor (99,000 ohms) 25-40 cycles	4411
(79)	Condenser (.01 mfd.)	3903-P
(80)	Resistor (25,000 ohms)	3656
(81)	Resistor (25,000 ohms) 50-60 cycles	3656
	Resistor (50,000 ohms) 25-40 cycles	4237
(82)	Condenser (.01 mfd.)	3903-M
(83)	Resistor (240,000 ohms)	4410
(84)	Condenser (.015 mfd. Double)	3793-E
(85)	On-off Switch	4095
(86)	Power Transformer (50-60 cycles)	5362
	Power Transformer (25-40 cycles)	5363
	Power Transformer (50-60 cycles, 230 volts	5364
(87)	Electrolytic Condenser (6 mfd.) 50-60 cycles	4916
	Electrolytic Condenser (10 mfd.) 25-40 cycles	5142
(88)	Choke	4819
(89)	By-pass Condenser (.09 mfd.) 50-60 cycles	4989-J
	By-pass Condenser (.18 mfd.) 25-40 cycles	4989-K
(90)	Electrolytic Condenser (6 mfd.) 50-60 cycles	4916
	Electrolytic Condenser (14 mfd.) 25-40 cycles	5725
(91)	B. C. Resistor	03457
(92)	Resistor (240,000 ohms) 50-60 cycles	3768
	Resistor (490,000 ohms) 25-40 cycles	3769
	Line Cord and Plug	L-943
	Tube Shield (Large)	03982
	Tube Shield (27 Type)	5387
	Bezel (Broadcast)	5009
	Bezel (Short Wave)	5175
	Knob (Large)	03063
	Knob (Small)	03064
	Knob (On-Off Switch—Broadcast)	03437
	Knob (Control Switch—Short Wave)	5811
	Spring (For Small Knobs)	4147
	Spring (For Large Knobs)	5262
	Grid Clip	4897
	Five Prong Socket Assembly	4956
	Four Prong Socket Assembly	4955
	Dial Complete (Broadcast)	03031
	Dial Complete (Short Wave)	03890

*Includes matched oscillator coil and detector transformer.

**These parts replaced on later production by .0018 mfd. condenser, part 6018.

PHILCO

Service Department

Factory

PHILCO

REG. U.S. PAT. OFF.

Service Bulletin—No. 116

Paste over Table 1 - Service Bulletin 116

Table 1—Tube Socket Data taken with AC Set Tester—AC Line 115 Volts

Tube		Filament Volts	Plate Volts	Screen Grid Volts	Control Grid Volts	Cathode Volts	Plate Milli-amperes
Type	Circuit						
			SHORT WAVE UNIT*				
27	Osc.	2.2	110	...	3.3	0	...
24	Det.	2.2	24	24	5.	0	...
			BROADCAST UNIT				
24	R. F.	2.4	255	50	3.5	25	7.5
24	1st. Det.	2.4	260	60	9	38	...
27	Osc.	2.4	60	...	3.5	25	2.
24	I. F.	2.4	265	50	3	22	3.5
24	2nd Det.	2.4	116	40	7	25	...
47	Output	2.5**	205**	220**	.7**	..	28**
80	Rectifier	4.5	260/Plate				

*The voltage readings of the short wave unit were taken from the under side of the chassis, using a Weston multi-range voltmeter, 1000 Ohms per volt. The radio set tester cannot be used, either for voltage or plate current readings because of the effect of the long leads through the set tester cord.

**These readings must likewise be taken from the socket terminals on the under side of the chassis unless the set tester is especially equipped with an adapter for testing pentode tubes.

All the above readings were taken with volume control at maximum.

Table 2—Power Transformer Voltage

Terminals	A. C. Volts	Circuit	Color
		SHORT WAVE UNIT	
4–5	105 to 125	Primary	Black
1–3	2.5	Secondary	Yellow
2	...	Center Tap 1–3	Green
		BROADCAST UNIT	
1–2	105 to 125	Primary	White (Small Gauge)
3–5	2.5	Filament of 47	Dark Green
6–8	2.5	Filament of 24	Black (Heavy Gauge)
9–10	5.	Filament of 80	Light Blue
11–13	700	Plate of 80	Yellow
4	...	Center Tap of 3–5	Black, Green Tracer
7	...	Center Tap of 6–8	Black, Yellow Tracer
12	...	Center Tap of 11–13	Yellow, Green Tracer

Table 3—Resistor Data

No. on Figs. 1, 2 and 3	Terminal	Power (Watts)	Resistance (Ohms)	Color		
				Body	Tip	Dot
(44)	....	....	250	.....	Black Bakelite	.....
(63)	1–2	....	1060	.....	Long Tubular	.....
	2–3	....	2300			
	4–5	....	70			
	5–6	....	240			
(29) (59)	....	1	5,000	Green	Black	Red
	....	.5	5,000	Green	Black	Red
(4) (64)	....	1	13,000	Brown	Orange	Orange
(25) (26)	....	1	32,000	Orange	Red	Orange
(45)	(50–60 cycles)	.5	45,000	Yellow	Green	Orange
(47) (58)	....	.5	51,000	Green	Brown	Orange
(22)	....	1	99,000	White	White	Orange
(45)	....	.5	99,000	White	White	Orange
(9)	....	1	240,000	Red	Yellow	Yellow
(51) (70)	....	.5	240,000	Red	Yellow	Yellow
(19)	....	.5	2,000,000	Red	Black	Green

MODELS 470 AND 470-A

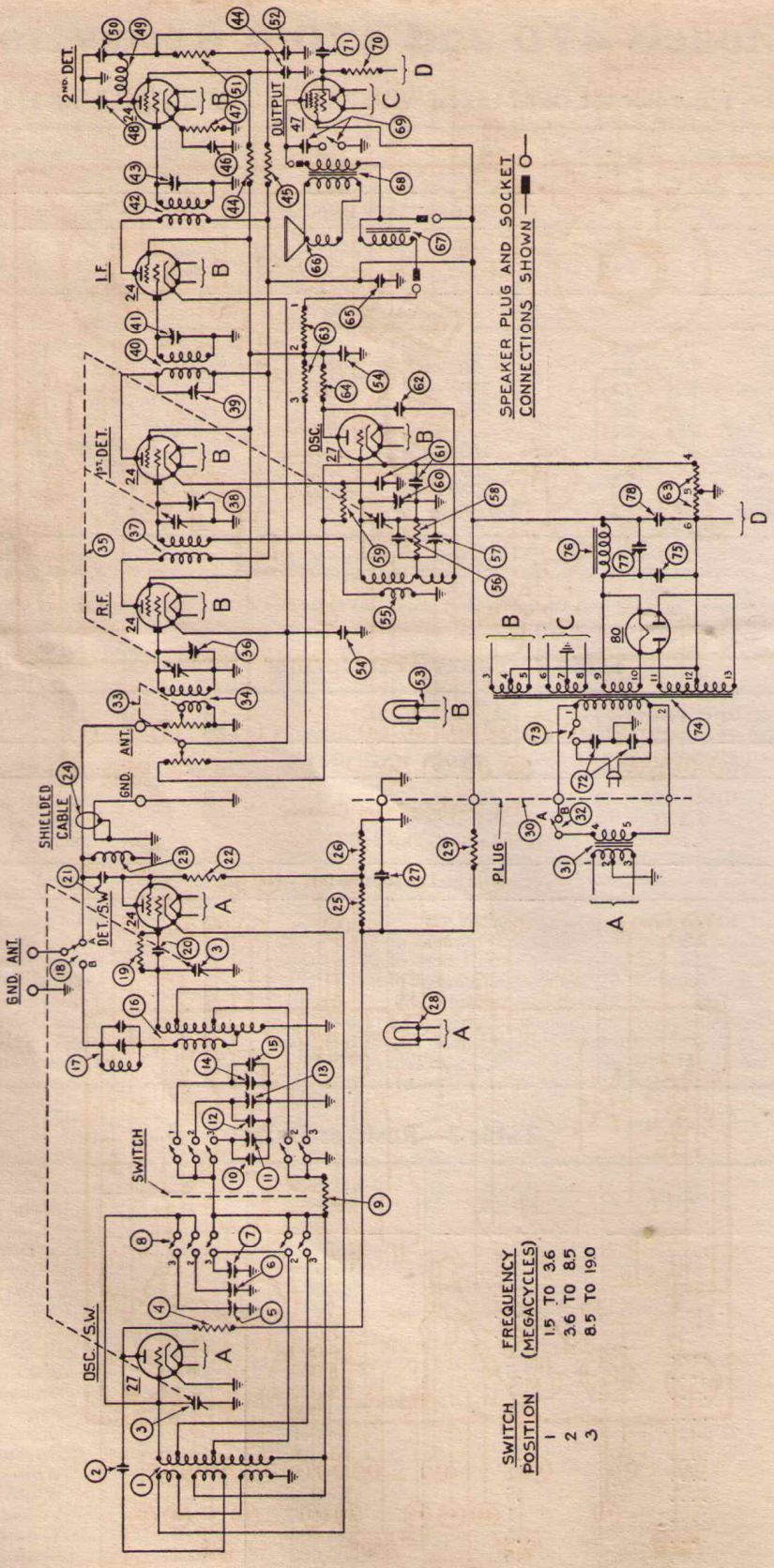

Fig. 1—Wiring Diagram.

MODELS 470 AND 470-A

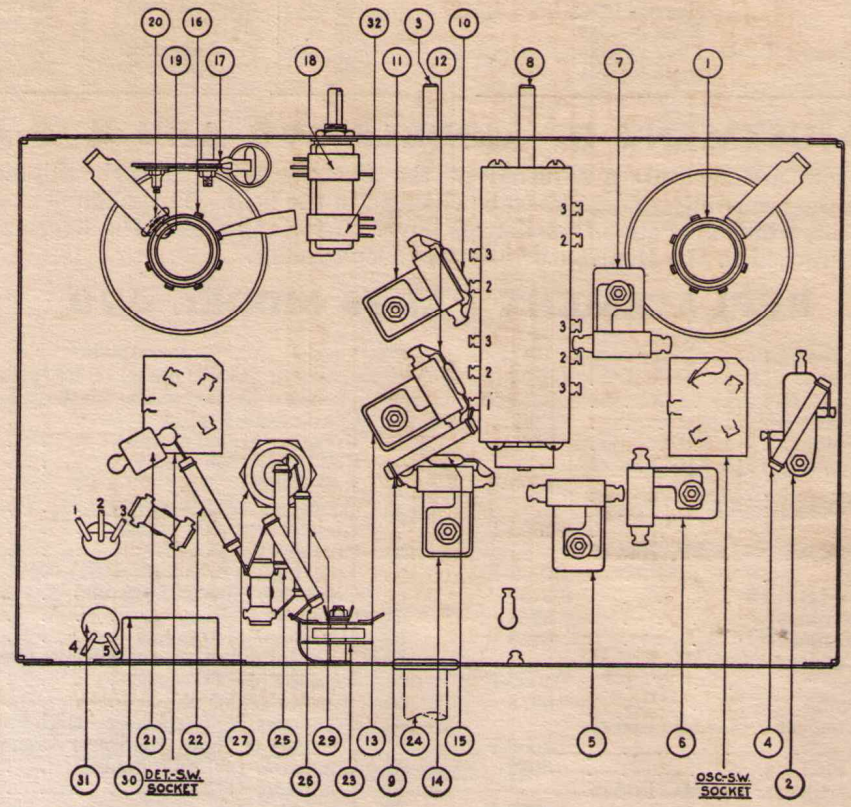

Fig. 2—Short Wave Chassis.

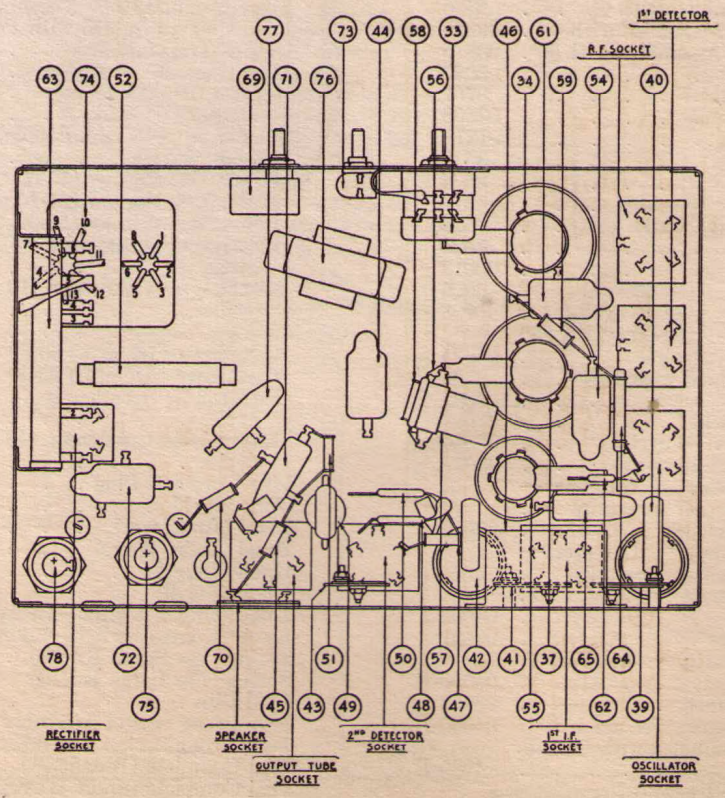

Fig. 3—Broadcast Chassis.

Table 4—Condenser Data

Nos. on Fig. 1, 2 and 3	Capacity (Mfd.)	Container
(20) (62)	.00011	Blue and Golden Yellow
(14) (21) (50)	.00025	Yellow
(56)	.00041	Yellow and Orange
(48)	.0005	Green
(12)	.0008	Green and Orange
(10)	.00125	Blue and Orange
(71)	.01	Black Bakelite
(72)	.015 (Double)	Black Bakelite
(2) (65)	.05	Black Bakelite
(54) (61)	.09 (Double)	Black Bakelite
(77)	.09 (50–60 cycles)	Black Bakelite
(77)	.18 (25–40 cycles)	Black Bakelite
(52)	.25	Metal
(46)	.5	Metal
(75)	6 (50–60 cycles)	Electrolytic
(75)	10 (25–40 cycles)	Electrolytic
(78)	6 (50–60 cycles)	Electrolytic
(78)	10 (25–40 cycles)	Electrolytic

ADJUSTMENT OF MODELS 470 AND 470-A

These Receivers are accurately adjusted at the Factory prior to their shipment. Under no circumstances are the adjusting condensers to be changed in the field. This alignment requires special oscillator equipment, which all Philco Distributors have. If for any reason the Receiver needs adjustment it must be returned to the Distributor's Service Department.

REPLACEMENT PARTS MODEL 470

No. on Figs. 1 and 2	Description	Part No.
(1)	Oscillator Coil*	03734
(2)	By-pass Condenser (.05 mfd.)	3615-M
(3)	Gang Condenser Assembly	03692
(4)	Resistor (13,000 ohms)	3766
(5)	Compensating Condenser (19 MC End of Top Scale)	04000-E
(6)	Compensating Condenser (8.5 MC End of Center Scale)	04000-E
(7)	Compensating Condenser (3.6 MC End of Bottom Scale)	04000-E
(8)	Frequency Control Switch	03751
(9)	Resistor (240,000 ohms)	3768
(10)	Condenser (1,250 mmf.)**	5886
(11)	Compensating Condenser (8.5 MC End of Top Scale**	04000-F
(12)	Condenser (800 mmf.)	5878
(13)	Compensating Condenser (3.6 MC End of Center Scale)	04000-F
(14)	Condenser (250 mmf.)	3082
(15)	Compensating Condenser (1.5 MC End of Bottom Scale)	04000-F
(16)	Detector Transformer*	03734
(17)	Frequency Filter	03662
(18)	Antenna Switch Assembled with (32)	5796
(19)	Resistor (2 megohms) Assembled with (20)	03879
(20)	Condenser (110 mmf.) Assembled with (19)	03879
(21)	Condenser (250 mmf.)	3082
(22)	Resistor (99,000 ohms)	3767
(23)	R. F. Choke	03893
(24)	Shielded Cable	L-1278
(25)	Resistor (32,000 ohms)	3525
(26)	Resistor (32,000 ohms)	3525
(27)	Electrolytic Condenser (6 mfd.)	4916
(28)	Pilot Light (Short Wave Unit)	3463
(29)	Resistor (5,000 ohms)	3526
(30)	Plug	03913
(31)	Filament Transformer (50-60 cycles)	5906
	Filament Transformer (25-40 cycles)	5923
	Filament Transformer (50-60 cycles, 230 volts)	5924
(32)	On-off Switch (Assembled with (18))	5796
(33)	Volume Control	5039
(34)	First R. F. Transformer	03082
(35)	Tuning Condenser (50-60 cycles)	03076
	Tuning Condenser (25-40 cycles)	03077
(36)	Compensating Condenser — Antenna — Part of Gang Condenser Assembly	
(37)	First Detector Transformer	03083
(38)	Compensating Condenser — Detector — Part of Gang Condenser Assembly	
(39)	Compensating Condenser — First I. F. Primary	04000-J
(40)	First I. F. Transformer	03091
(41)	Compensating Condenser — First I. F. Secondary	04000-H
(42)	Second I. F. Transformer	03092
(43)	Compensating Condenser—Second I. F.	04000-K
(44)	Resistor (250 ohms Combined with .09 mfd. Condenser)	4989-E
(45)	Resistor (45,000 ohms) 50-60 cycles	5256
	Resistor (99,000 ohms) 25-40 cycles	4411
(46)	Condenser (.5 mfd.)	3583
(47)	Resistor (51,000 ohms)	4518
(48)	Condenser (500 mmf.)	3910
(49)	R. F. Choke	03086
(50)	Condenser (250 mmf.)	3082
(51)	Resistor (240,000 ohms)	4410
(52)	Condenser (.25 mfd.)	4264
(53)	Pilot Light (Broadcast Unit)	3463
(54)	Condenser (.09 mfd. double)	4989-C
(55)	Oscillator Coil	03084
(56)	Condenser (410 mmf.)	5120
(57)	Compensating Condenser—Low Frequency	04000-F
(58)	Resistor (51,000 ohms)	4518
(59)	Resistor (5,000 ohms)	5310
(60)	Compensating Condenser—High Frequency —Part of Gang Condenser Assembly	
(61)	Condenser (.09 mfd. double)	4989-C
(62)	Condenser (110 mmf.)	4519
(63)	B. C. Resistor	03079
(64)	Resistor (13,000 ohms)	3766
(65)	Condenser (.05 mfd.)	3615-L
(66)	Voice Coil and Cone Assembly	02996
(67)	Field Coil Assembled with Pot	02966
(68)	Output Transformer	2673
(69)	Tone Control	03140
(70)	Resistor (240,000 ohms)	4410
(69)	Condenser (.01 mfd.)	3903-L
(72)	Condenser (.015 mfd. double)	3793-K
(73)	"On-off" Switch	4095
(74)	Power Transformer (50-60 cycles)	5117
	Power Transformer (25-40 cycles)	5118
	Power Transformer (50-60, 230 volts)	5119
(75)	Electrolytic Condenser (6 mfd.) 50-60 cycles	4916
	Electrolytic Condenser (10 mfd.) 25-40 cycles	5142
(76)	Choke	4819
(77)	Condenser (.09 mfd.) 50-60 cycles	4989-J
	Condenser (.18 mfd.) 25-40 cycles	4989-K
(78)	Electrolytic Condenser (6 mfd.) 50-60 cycles	4916
	Electrolytic Condenser (10 mfd.) 25-40 cycles	5142
	Line Cord and Plug	L-943
	Tube Shield	03987
	Bezel (Broadcast)	5008
	Bezel (Short Wave)	5178
	Knob (Large)	03063
	Knob (Small)	03064
	Knob (On-Off Switch—Broadcast)	03437
	Knob (Control Switch—Short Wave)	5811
	Spring (For Small Knobs)	4147
	Spring (For Large Knobs)	5262
	Grid Clip	4897
	Five Prong Socket Assembly	4956
	Four Prong Socket Assembly	4955
	Dial Complete (Broadcast)	03031
	Dial Complete (Short Wave)	03890

*Includes matched oscillator coil and detector transformer.

**These parts replaced on later production by .0018 mfd. condenser, part 6018.

PHILADELPHIA STORAGE BATTERY COMPANY
Ontario and C Streets, Philadelphia, Pa.
Printed in U. S. A.

PHILCO

REG. U.S. PAT. OFF.

Service Bulletin No. 120

Adjusting Philco Superheterodynes

The compensating condensers in every Philco Receiver are carefully adjusted before the set leaves the factory. Under ordinary circumstances they should never have to be re-adjusted in the field. Extremely rough handling during shipment, or a slight change in some of the electrical characteristics of the radio circuit may in some cases make re-adjustment necessary.

The indications that the set may require re-adjustment are poor sensitivity, poor selectivity and dial readings in kilocycles off more than 20 K.C. In some cases, an unstable condition of the set with a tendency to squeal or howl on certain sections of the dial may also be an indication of improper adjustment.

Under no circumstances should a re-adjustment be attempted unless the necessary equipment is available and unless the proper instruction has been received. Your distributor will gladly assist you in both of these matters.

The general method of adjusting the compensating condensers in all Philco superheterodyne receivers is the same. Once this procedure is understood for one model, it can be applied with but little change to the various other Philco models. By means of the instructions below and by reference to the different illustrations, the complete adjustments can be made on all Philco superheterodynes.

EQUIPMENT. The following equipment is needed:

1. Intermediate frequency oscillator accurately calibrated at 175 K. C. and 260 K. C. The Philco Oscillator Model 095 is recommended.
2. Output meter. The oscillator mentioned above is equipped with an output meter.
3. Philco fibre wrench, part 3164.

INTERMEDIATE FREQUENCY OR I. F. ADJUSTMENTS. The adjustment of the I. F. compensating condensers should be done in the following manner:

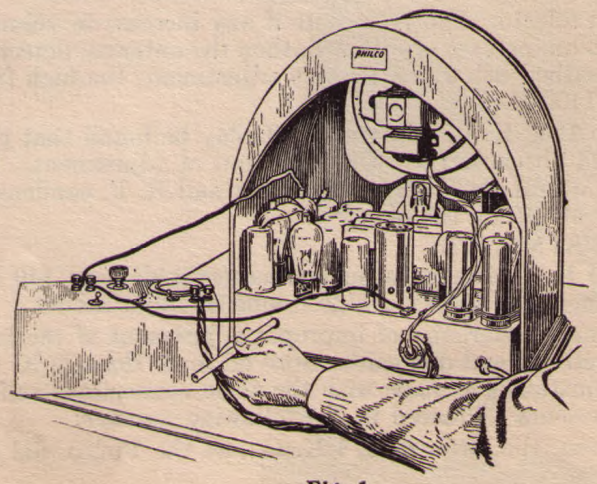

Fig. 1

1. Make the necessary connections between the oscillator and the receiver as shown in the illustration, Fig. 1. The connections consist of (a) the ground wire to the GND. terminal of the radio set and to the G terminal of the oscillator; (b) the A terminal of the oscillator to the grid of the first detector tube (tube shield in place and first detector grid clip removed), (c) output meter terminals to the primary of the output transformer (this connection is obtained at the speaker plug and socket through the Philco plug-in adapter, part 6095), (d) power cord of receiver to the electric power outlet after all other connections have been completed.
2. Turn on the radio set and the oscillator. For Philco models of the 70 and 35 series, the oscillator switch should be placed in the 260 K. C. position. For models of the 111, 112, 90 and 51 series, the switch should be placed in the 175 K. C. position. When adjusting sets with a NORMAL-MAXIMUM switch, the switch should be placed in the NORMAL position. Turn the radio volume control to Maximum. Set the dial between 60 and 65 on the Philco scale. Adjust the oscillator control (attenuator) until a reading is obtained on the output meter of approximately ½ the scale deflection.
3. By means of the Philco fibre wrench, part 3164, adjust the various intermediate frequency condensers, one at a time, to obtain maximum reading in the output meter. Locations of all compensating condensers are shown in the illustrations on pages 3 and 4. It is desirable to start with the last I. F. compensating condenser in the circuit (2nd I. F. secondary in the case of the 112) and progress in the adjustments toward the first. It may be necessary while the adjustments are being made, to lower the setting of the oscillator control from time to time so as to keep the output meter reading within the scale range.
4. After these adjustments have been completed, remove the oscillator connection from the grid terminal of the first detector tube and restore the grid clip connection to this terminal.

COUPLING CONDENSER. Adjust the coupling condenser in the Model 51 at 175 K. C. in the same manner as the I. F. condenser.

HIGH FREQUENCY ADJUSTMENTS. Improper adjustment of the high frequency compensating condenser is characterized by weak reception and poor selectivity at the high frequency end of the dial and by dial readings being off by more than 20 K. C. at this end of the dial. Proceed in the following manner:

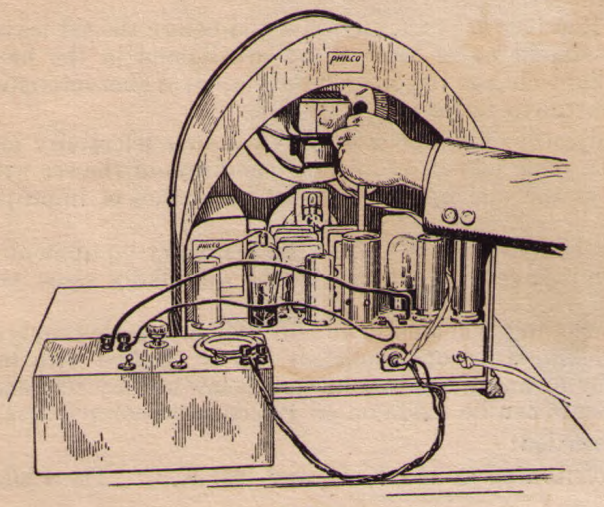

Fig. 2

1. Connect from the A terminal of the oscillator to the ANT terminal of the broadcast receiver. All other connections remain the same as for adjustment of the I. F. compensating condensers. See Fig. 2 for complete connections.
2. Set the switch on the oscillator to 175 K. C. Set the dial of the receiver to exactly 140 (1400 K. C.). The eighth harmonic of 175 K. C. will be received at this point. Turn the volume control to maximum. Turn on the oscillator and adjust the control until a ½ scale reading is obtained on the output meter. If the receiver is badly out of adjustment, it may not be possible to obtain such a reading, in which case the meter reading must be disregarded temporarily and the adjustments made by ear.
3. Carefully adjust the high frequency compensating condenser for maximum reading in the output meter or for maximum volume if the output is not great enough to be read on the meter.
4. When making this adjustment, it may be found that a given position of the adjusting nut can be obtained at which maximum reading is noted, but that the meter reading decreases when the fibre wrench is lifted from the nut. Allow for this condition by turning slightly beyond the point of maximum reading, then when the wrench is removed the reading will go up instead of down.
5. After making the adjustment, turn the station selector slightly to note if any increase in volume is obtained as the set is being re-tuned. If such an increase is obtained, then the antenna, detector and r. f. condensers should be adjusted as described below. After this adjustment, the high frequency condenser can again be re-adjusted at 1400 K. C.
6. In some cases, when first starting to make the 1400 K. C. adjustment, it may be found that the signal from the oscillator cannot be heard at 140 because the set is so far out of adjustment. In this case, tune the set to the signal, and then adjust the Antenna Detector and R. F. condenser first. Re-adjust the high frequency condenser at 140 on the dial.

ANTENNA, DETECTOR, AND R. F. ADJUSTMENTS:

The adjustment of the antenna, detector, and R. F. compensating condensers is done at 140 on the dial in the same manner and with the same connections as for the high frequency adjustments.

LOW FREQUENCY ADJUSTMENT. The characteristics of improper adjustment of the low frequency condensers are weak reception, poor selectivity and dial calibrations off more than 20 K. C. at the low end of the dial. The low frequency adjustment is made with the same connections as for the high frequency and Antenna condenser adjustments. Proceed in the following manner:

1. With the receiver and the oscillator in operation, the latter at 175 K. C., set the Philco dial at exactly 70 on the scale.
2. With the volume control at maximum, adjust the oscillator output until the output meter reads approximately ½ scale deflection. Adjust the low frequency compensating condenser for maximum reading in the output meter.
3. If the signal comes in stronger at a position off 70 on the Philco scale, adjust for maximum output on the meter at this "Off K. C." position of the dial. Now re-tune the set slightly to obtain any further possible increase, adjusting the compensating condenser and re-tuning the dial each time so as to bring the point of maximum output as near 70 as possible.
4. Re-set the dial to exactly 140, and re-adjust the high frequency condenser. It is possible that the adjustment of the low frequency condenser has affected the high setting of the dial slightly.

PHILCO

Service Department

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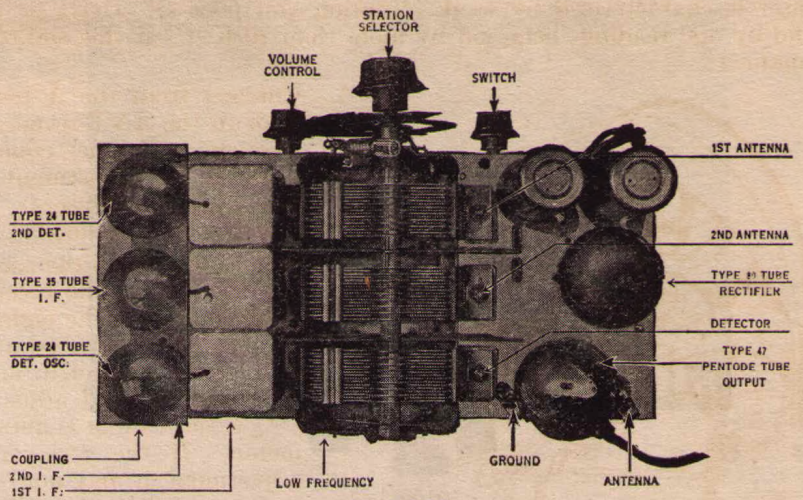
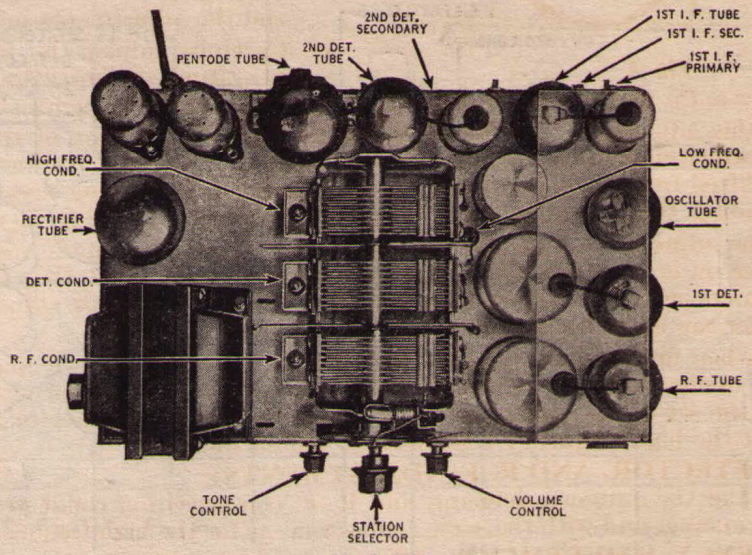
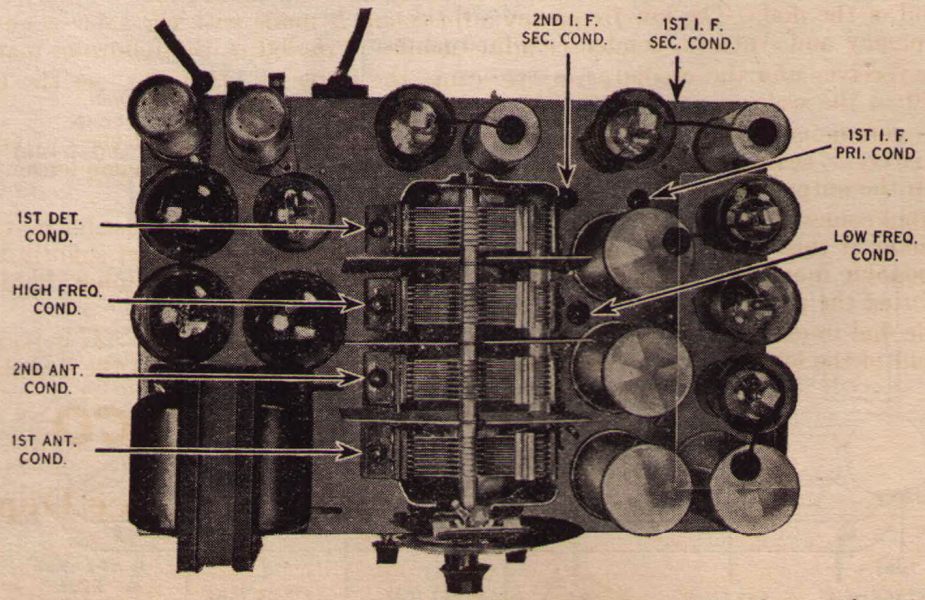
LOCATIONS OF COMPENSATING CONDENSERS



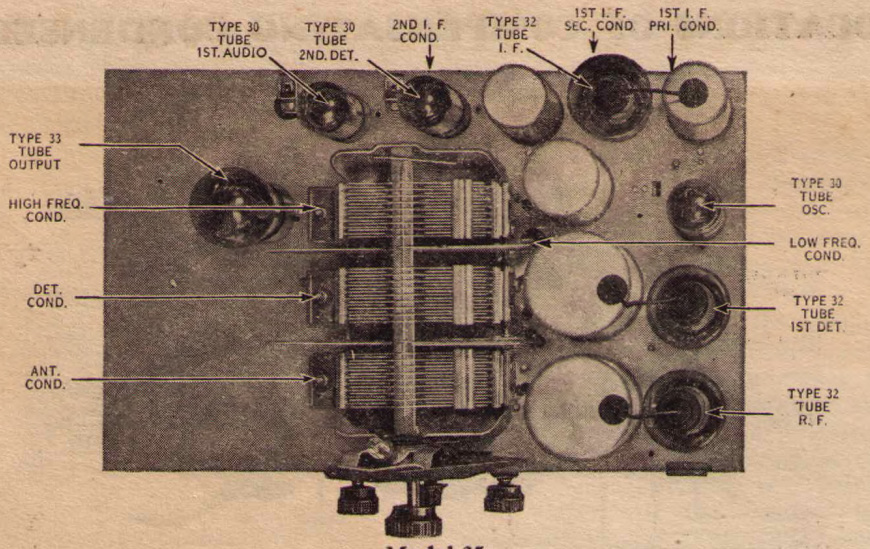
Model 51



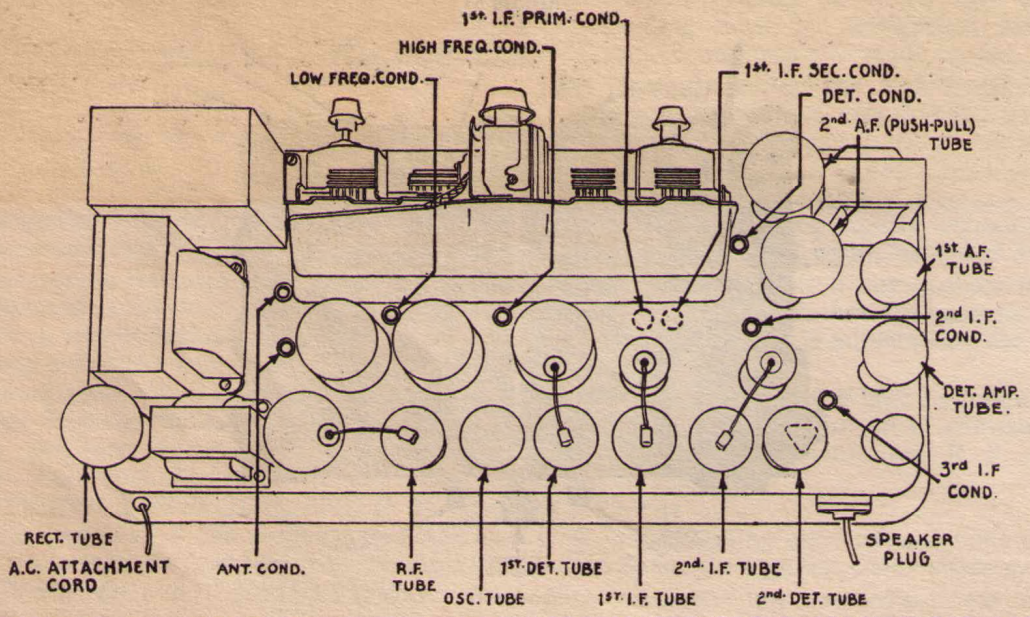
Model 70



Model 90

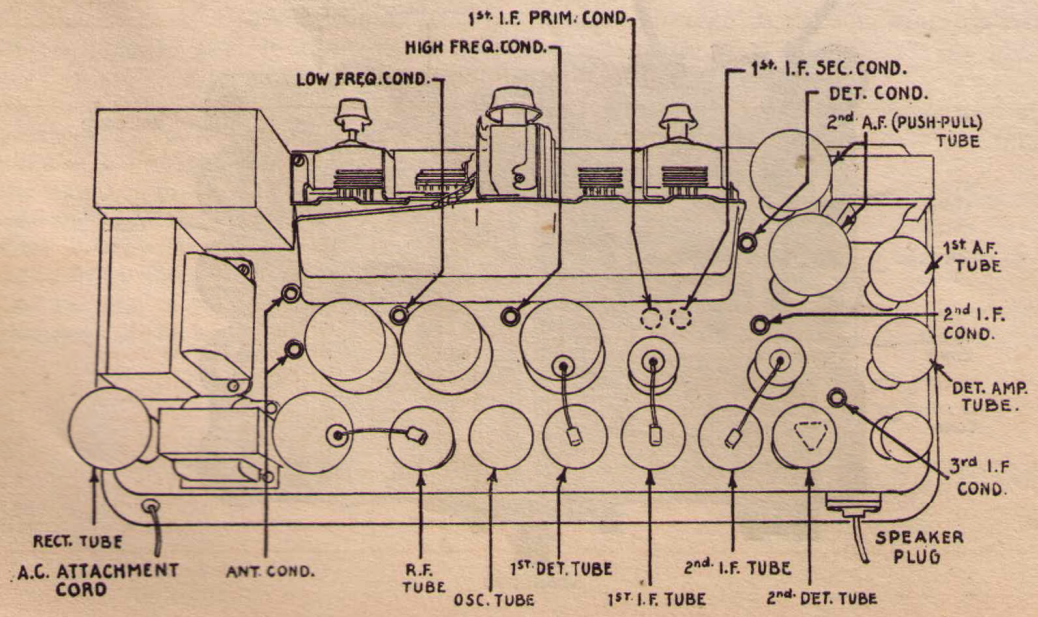


Model 35



NOTE: THE 1st I. F. PRIM. AND SEC. CONDENSERS CAN ONLY BE REACHED THRU THE BASE PLATE OF THE RECEIVER

Model 111

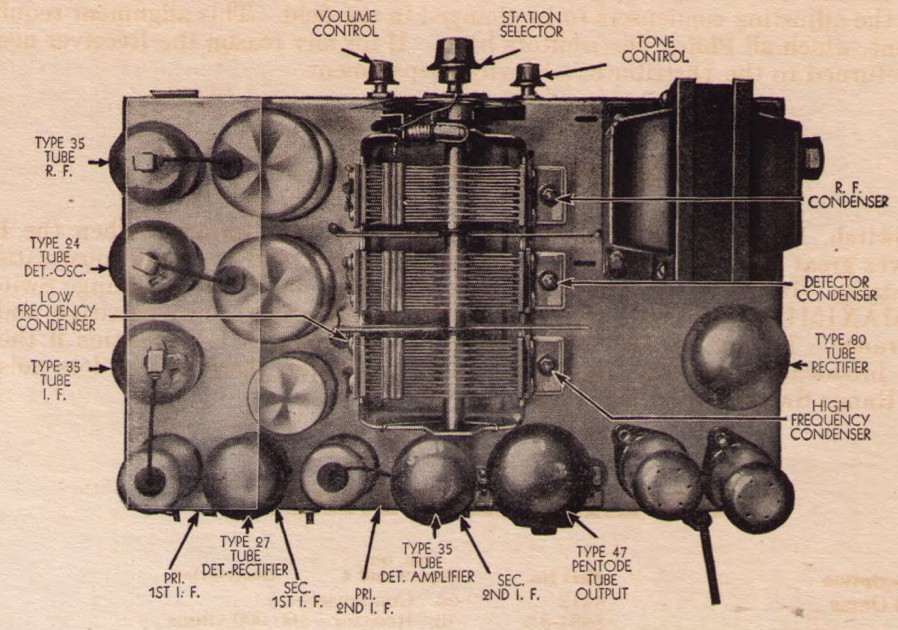


Model 112

PHILCO

Service Bulletin — No. 120B

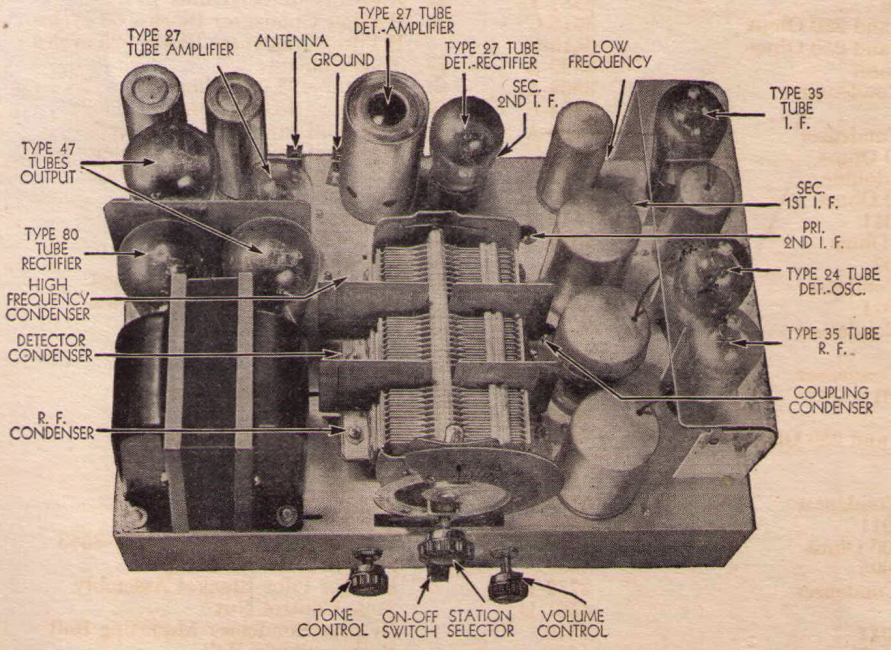
Location of Compensating Condensers, Models 70 and 90



Model 70

(Above Serial No. B-22,000)

Adjust I.F. compensating condensers at 260 K.C.



Model 90

(Serial Nos. B-32,001 to B-35,000 and above B-53,100)

Adjust I.F. compensating condensers and coupling condenser at 260 K.C.

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Installation and Service Bulletin

PHILCO
TRANSITONE
AUTOMOBILE RADIO

Model 7

TRANSITONE AUTOMOBILE RADIO CORPORATION
Ontario and C Streets
PHILADELPHIA, PA.

Form 2891

Printed in U. S. A.

Standard Installation Procedure

ONE of the physical requisites of automobile radio today is a small, rugged, compact Receiver which can be installed easily and quickly and which, after installation, is not in the way. The Receiver must give outstanding radio performance in any automobile and must be trouble-proof.

The Receiver must be designed so that it is economical to operate from the standpoint of batteries and tubes and so that it will give the car owner many hours of satisfaction undisturbed by bothersome service troubles.

The new Philco Transitone Receiver, Model 7, is probably the most compact, super-heterodyne car radio. Performance and adaptability to all cars are built into this rugged unit from the very start and insure continuous performance and simplified installations.

The details of installation as covered by this bulletin are only of value if placed in the hands of your service or shop manager. In order to take advantage of these improvements, everyone connected with the actual installation work should be thoroughly familiar with the standard procedure. However, even with the simplified installation, it is advisable to use only skilled mechanics so that no damage will be done to the customer's automobile.

1—Installation Service Station Requirements

Facilities—The Philco Transitone installation service station must have convenient drive-in facilities. The workshop must be clean and light, and must be well ventilated. A customer's waiting room should be provided in the front of the service station, where merchandise can be displayed. It is not advisable to allow the car owners to wait around in the shop while work is being done on their cars.

Personnel—The manager or person whose duty it is to contact the customers as they come in, must have a pleasing personality and must know the subject of automobile radio thoroughly.

There are four classes of work connected with the installation of a Philco Transitone, and the service station must have men capable of doing a good job in each class. A skilled top man or upholsterer is necessary for dropping the headlining and replacing it when installing an antenna. An automotive mechanic is necessary for the mechanical installation of the Receiver units.

The men should be thoroughly familiar with the various ignition systems now in use. A good radio service man should also be available at all times for testing and repairing installations whenever necessary. He should also take care of the "B" battery and tube replacements which are developing into a profitable business.

An important point to be borne in mind is that the men working on the installations must be neat and clean, and well qualified for the work to be done. Inexperienced help will cause trouble, resulting in unnecessary complaints.

There should be a sufficient number of men so that it will be possible to finish all the installations the same day the customers' cars are brought in. In addition, they must be able to handle promptly all Philco Transitone service work on other cars that might come in during the day.

Tools and Equipment Needed—Installation service stations will find that it is to their advantage to employ good mechanics and to supply them with enough good tools to insure high-grade installations. The tools will pay for themselves in the time and labor saved on installations.

The following list of tools are necessary for installation work:

1—Hack Saw
12—Hack Saw Blades
1—Compass Saw
1—200-Watt Soldering Iron
Solder and Flux
3—Screw Drivers (Assortment)
1—Screw Driver (small for set screws)
1—Electric Drill (⅜" or ½")
1—Set of Drills
1—1" Hole Saw with Mandrel
1—Pliers
1—Diagonal Cutters
1—Scissors
1—Shears
3—Wrenches (assortment) open end
1—Hammer (1-lb. machinist)
1—Hammer (upholsterer)

1—Cold Chisel
1—Bench Vise
1—Brace
1—Flat File (10″ medium)
2—Rat-Tail Files (8″ and 10″ medium)
1—Center Punch
1—Socket Wrench (¼″)
1—Socket Wrench (⅝″)
1—Template—Receiver
1—Template—Speaker
1—Template—Control Panel
1—Rule (Steel)
1—Truck Jack Lift
Assortment of Wood Screws, Bolts, Nuts and Lock Washers
Whisk Brooms
Protecting covers for the seats, fenders and doors.
Chamois
Cleaning Cloths
Copper Braid (½″)
Wire Terminals
Lamp Guards
Light Leads
Extension Cords
Ball of Twine
Shielded High Tension Cable
Wire (As needed)

In addition to these tools, sufficient quantities of Spark Plug Resistors, Part No. 4531, Distributor Resistors, Part No. 4546, Screw-Type Resistors, Part No. 4581, and Interference Condensers, Part No. 4522, must also be kept on hand for immediate use.

While most of these tools are no doubt used in other lines of work at the service station—keep a separate kit of tools available for the installation work, so that no operation will be delayed while another mechanic is using a particular tool.

Templates—A set of paper templates is inserted in this bulletin. They are to be used as a guide in making metal templates which will be more serviceable. The best plan, however, is to use the Receiver Housing, Part No. 6058, as a template. The speaker housing and a mounting bracket make an ideal template for locating the speaker bolt holes. These can be ordered through your distributor.

2—Antenna

Requirements—Within certain limits, a large antenna will deliver greater signal strength than a small one. The signal impressed on the antenna is directly proportional to its length and its effective height, and inversely proportional to its resistance.

The effective height does not necessarily mean the distance between earth and the flat top portion of the antenna, for in the automobile no earth connection is used. The body and chassis of the car are used as a counterpoise and function in much the same manner. The effective height can be considered as the distance between the antenna and the metallic body of the car.

This means that best reception is secured when the largest possible antenna is installed in the top of the car, when it is farthest separated from the ground used and when the antenna and lead-in wires are soldered and offer the least resistance.

Experiments conducted over a period of years have established the fact that the antenna should be separated from the nearest metal of the car body by at least three inches.

Car Top Construction—Before considering the installation of antenna, it is well to consider the top construction of the cars of today. They may be divided roughly into the following groups:

1. Slat Top
2. Poultry Wire
3. Fabric
4. Metal Bow and Cross Braces
5. Open and Convertible

The slat type top consists of the conventional wood bow across the top with the slats running lengthwise and fastened to the bows. The top padding is supported by the slats. In the second group, the slats are replaced with poultry wire which is stretched tightly over the bows and fastened to the roof rails. The padding in this case is laid over the poultry wire. The third group uses muslin or some other fabric stretched over the bows for supporting the top padding.

Metal bows may be encountered in a few cars, or there may be metal reenforcement brackets on some of the bows. In a few cases, metal diagonal cross braces are used.

Open and convertible model car tops have practically all the same construction, the top material is fastened over the movable bows.

Top Construction and Factory Antenna List

Car	Top Construction		Antenna		Lead-in Location
	Wood Slat	Poultry Screen	Wire	Poultry Screen	
Auburn	V				
Buick	V				
Cadillac	V		V		Front rt. post
Chevrolet	V				
Chrysler	Imp. 80	All others	Imp. 80	All others	Front rt. post
Cord					
DeSoto		V		V	Front rt. post
Dodge—6 & 8		V		V	Front rt. post
Duesenberg			Special Bodies		
Durant		V			
Essex	Fabric				
Ford		V			
Franklin		V		V	Front rt. post
Graham	V				
Hudson	Fabric	Club Sdn.			
Hupmobile		V			
Jordan		V			
LaSalle	V		V		Front rt. post
Lincoln		V	Tops are Cleared		
Marmon		V		V	Front rt. post
Nash			V		Front rt. post
Oakland	Fabric				
Oldsmobile					
Packard		V			
Peerless		V		V	Front left post
Pierce Arrow		V		V	Front rt. post
Plymouth		V		V	Front rt. post
Pontiac					
Reo		V		V	Front rt. post
Rolls Royce					
Studebaker		V		V	Front rt. post
Stutz					
Willys-Knight					

By maintaining clearance between the poultry wire and the metal quarters of the body during the construction of the car, the car manufacturers have been able to build in a good car antenna. A few of the car factories install a wire antenna in the roof.

Installing an Antenna in Cars with Slat Top Construction—The headlining should be lowered from front to back so that a copper screen antenna can be installed in the roof.

1. Use a good grade of copper screen. No. 14 or No. 16 mesh, 36-inches wide is satisfactory and can be used in practically all installations.

2. Maintain three inches clearance between the screen and the car body and all metal work in the top. Cut out a section of the screen to get this clearance around the dome light.

3. The wiring in the top to the dome light and switch must be run along the side of the top frame, then along the top edge of the side of a bow to the dome light fixture.

4. An 18-gauge stranded copper, rubber and cotton covered antenna lead-in should be soldered to a front corner of the antenna screen. If the Receiver is to be located on the right side of the car, solder the lead-in to the right front corner of the antenna; if the Receiver is to be located on the left side, the antenna lead-in should be soldered to the left front corner. It is a good plan to solder or bond the whole front edge of the antenna screen.

5. The copper screen must be tacked securely so that it cannot come loose.

6. The headlining and all trim must be carefully replaced.

Tack the screen to the farthest bow in the rear that will give three inches clearance from the rear metal apron. With the edge of the screen lined up with the bottom front edge of the bow, the screen is tacked against the face of the bow, close to the top. It is necessary to tack the screen in this manner, so that the listing strip used to support the headlining can be tacked to the face of the bow.

On bows on which the listing strip is not tacked, it will be quite all right to tack the screen along the bottom of the bow. Tack the screen to each bow from the back to the front of the screen. Do not come closer than three inches to the metal aprons along the sides and the metal frame above the windshield.

The lead-in should be concealed behind the windshield moulding, or if the front corner post is hollow, it can be run down the inside of the post. In a few cases, it may be necessary to bring the lead-in down through the wind hose along the side of the corner post.

After the antenna and lead-in have been installed, test the antenna for grounds. Use a high resistance volt-meter and a 45-volt battery, testing between the antenna lead-in and the body of the car. Do not hold the test connections to the antenna and the car body with your fingers,—as the leakage across your body will cause a high reading on the meter.

Having made certain that the antenna system is clear of grounds and leaks, proceed with replacing the headlining and trim.

Installing an Antenna in Cars with Poultry Wire Reenforcement—The poultry wire when cleared of grounds may be used as an antenna. This may be done in either of two ways. The top deck may be removed and the netting cleared where the edges ground on the car body. The more practical way is to drop the headlining the entire length of the car and clear from beneath.

A strip three inches wide is cut from the poultry wire reenforcement around the four sides. The poultry screen is then laced securely in place using double strands of number six waxed linen cord. Use short lengths of cord and fasten securely. The poultry wire must be held taut so the top will not sag. Care must be taken to keep the sharp ends of the screen bent back so they will not puncture the padding and the top deck material and will not extend through the headlining.

On standard installations, the antenna lead-in must be soldered across the front end of the screen and brought down the front right corner post. In cases where the post is solid, the lead-in may sometimes be brought down inside the windshield moulding or down the hollow rubber wind hose which is used in many cars.

Rearrange the dome light wiring so that there is a minimum coupling between the wires and the poultry wire antenna. Test the installation for grounds, using a 45-volt "B" battery and a high resistance voltmeter. Replace the headlining and trim carefully.

Installing an Antenna in Cars with Fabric Top Construction—In a few cars, the top padding is supported by muslin strips stretched over wood bows. An antenna can be easily installed in these cars in much the same manner used in cars with the slat top construction. Instead of tacking the screen under the bows however, the screen can be placed over the bows and tacked only at the rear and the front. Otherwise the procedure is the same.

Installing an Antenna in Cars with Metal Braces—In case there are metal diagonal braces in the top, the braces must be freed of grounds or the efficiency of the antenna will be greatly impaired.

Usually the rear ends of the braces are fastened to the wood top frame while the front ends are fastened by means of brackets to the front corner posts.

Drop the headlining and work from the inside of the car. Release the front end of the braces. Ream out the hole in the bracket and use fibre washers and sleeve bushings to insulate the cross brace bolts from the brackets.

Usually the dome light is connected to one of the braces. Disconnect the lead from the brace and run a new ground to the car body.

When both braces have been insulated, the antenna can be installed in the standard manner.

Installing an Antenna in Cars with Metal Bows—In the few cars in which metal bows are encountered, a different kind of antenna is used.

After the headlining has been lowered, provisions are made to install a wire antenna. Screw eyes or staples should be securely fastened around the wood top frame of the car and separated from the bows by at least three inches. They should be so spaced that the wire will be parallel to the bows and the loops two to three inches apart. Using 18-gauge stranded rubber covered wire, lace the wire through the screw-eyes or staples. The antenna lead must be brought down one of the front corner posts, depending on the location of the Receiver.

Test the antenna and lead-in for any possible grounds and then carefully replace the headlining and trim.

Open and Convertible Model Cars—The tops of the open and convertible models are designed to fold back. Since the antenna cannot in any manner interfere with this, a wire antenna is the only practical one.

Remove the top material and lay it back, leaving the side flaps in place. Secure a piece of top fabric, matching that removed, and fasten it properly in place over the cross ribs and over the side flaps.

Cut a piece of drill cloth or muslin approximately three inches smaller than the width of the top and about the length of it. Punch holes in the drill cloth through which the antenna wire is to be woven. The holes should be in rows, three inches apart, parallel to the cross ribs. Space the holes about ten inches apart in each row.

Use 18-gauge stranded rubber covered wire and weave it back and forth through the holes in the cloth. When completed, the cloth is fastened to the front and rear bows only.

The antenna lead-in must be brought down in the rear so the top may be lowered easily.

The top material and all trim must be carefully replaced. While it is hardly probable that the

antenna is grounded, check it with a voltmeter to make sure.

Receiver Installation—Install the Receiver on the inside of the dash, high and as far to the right as possible. Two sets of clinch-on nuts are provided, one set on the back, the other on the left end, so that the Receiver may be mounted on the dash in either position. The end mounting will be found very convenient when a car is equipped with a hot water heater and not much room is available for the Receiver.

Using a template, mark the location of the bolt holes. Be sure to allow sufficient clearance for the Receiver. Center-punch and drill three small holes from the inside of the dash. Then drill again, using a 3/8-inch drill. This can usually be done from the engine side of the dash.

In case there is a vacuum tank or other apparatus near where the holes are to be drilled, remove the apparatus to avoid damaging it. Smooth off any burrs or rough edges on the holes. The paint on the dash around the holes should be scraped so that there will be good contact between the Receiver and the dash.

The Receiver which is being installed should be given a quick operating check as a precautionary measure. While the Receiver is still on the bench, remove the front cover plate. Place the plate and the screws to one side. Remove the corks from the set of clinch-on nuts which are to be used and then install the Receiver mounting studs in the Receiver. Place a 5/16-inch shake-proof lock washer on the short end of the stud and screw the bolt into the Receiver. The bolts should be fastened securely.

In the Model "A" Ford, due to the location of the gas tank, it is necessary to mount the Receiver on the left side of the dash in the engine compartment.

Splice the antenna lead of the Receiver to the antenna lead-in in the car. If any shielding is necessary on the antenna lead, it should be done at this time. The antenna lead is the white-black lead extending from the lower right rear corner of the Receiver.

Install the Receiver on the dash, placing the large flat washers on the inside against the padding. The small washers should be placed against the metal side of the dash. The Receiver must be fastened securely to the dash.

Speaker—The speaker should be mounted on the inside of the dash over the steering column or toward the center. It should be placed high enough so that it will not interfere with the operation of any of the pedals or controls.

Using a template, mark the location for the two bolt holes. Be sure to allow sufficient clearance for the speaker. Center-punch and drill two small holes from the inside of the dash. Then drill again, using a 7/16-inch drill. Install the speaker and bolt it securely to the dash.

In the Model "A" Ford, the Speaker must be mounted on brackets against the right kick pad. The brackets should be made up locally.

Control Unit—The control unit has been designed so that it may be mounted in either of two positions on the steering column. The unit is compact, simple to install, easy to operate and has an artistic and well balanced appearance. It is shipped from the factory with two flexible shafts for the volume control and the tuning control coupled to it, although they may be removed very easily if it is ever necessary.

There is a mounting bracket which must be fastened to the steering column by means of a metal strap. This bracket should be installed in a horizontal position on the right side of the steering column, or in a vertical position above the steering column. Bend the metal strap around the steering column without using the felt pad. The round nut should be on the inside against the column. The strap should be fitted closely around the column and lapped over the end.

There are four small holes in the end of the strap. Cut off the excess strap about 3/8-inch beyond the hole that is to be used. Ream out the hole to 1/4-inch.

Place the strap in position around the column again, this time placing the felt pad between the strap and the column. Fit the metal bracket against the column in the position desired, with the planed surface up. The fastening screw extends through the bracket and the hole in the strap and engages the round nut. Tightening the screw draws up the metal strap so that the bracket is clamped securely in place. Fasten the control to the bracket by means of the fillister head screw on the back of the housing.

The volume control and switch knob is on the left and is connected to the left hand flexible shaft. The tuning control knob is on the right and is coupled to the flexible shaft on the right. The black wire from the rear of the housing is the pilot lamp lead which must be connected to the Fahnstock terminal on the upper front edge of the Receiver. Dress the two flexible shafts and the wire neatly along the steering column and then up under the cowl. The two shafts should be held in place

along the column by clamping them to the bottom edge of the instrument panel.

The volume control shaft must be fitted in the sleeve on the left hand side of the upper front panel of the Receiver. The shaft should be pushed in until the tip is all the way in the coupling on the volume control shaft. Fasten the casing by tightening the set screw on the bottom of the sleeve. This is inside of the Receiver.

With the volume control and switch knob turned off (in a counter-clock-wise direction) and with the volume control in the same position, tighten the bottom set screw in the coupling. Then rotate the shaft one-quarter turn in a clockwise direction and tighten the second set screw.

The tuning control shaft should be fastened in a similar manner. After dressing the shaft and fastening it in place, fit the shaft in the remaining sleeve in the upper front panel, and fasten the casing in place. The dial should be set at 55 and the condenser plates should be fully meshed. Tighten the bottom set screw and turn the shaft clockwise one-quarter turn and then tighten the second set screw. It will be necessary to use a short screw driver for this operation.

After the flexible shaft is connected, a finer adjustment of the tuning condenser can be made so that the dial is properly lined up. This is done by tuning the Receiver to a station whose frequency is known. Check the scale to see how far off the dial setting is. If it needs changing, remove the face plate from the control housing. This is held on by two screws, one at the top and one at the bottom, which can be reached from the back of the housing.

Hold the tuning control to keep it from turning and lift the toothed edge of the scale over the teeth of the drive assembly and turn the dial to the proper setting. Then allow the dial to drop back in place so that the teeth on the dial mesh with the teeth on the drive assembly.

After the steering column control has been installed and the flexible shafts connected, replace the front cover plate on the Receiver.

***Battery Box**—The battery box is designed so that it can be installed in the floor of the car or suspended from it. In either case, check the location carefully so that there is sufficient riding clearance between the box and all the tie rods, braces, etc., on the chassis when the rear springs are depressed. Don't put the box right beside the muffler where the batteries will get hot.

To install the box in the floor, after the proper location is found, cut a hole 10¼ x 8⅝ in the floor boards and drop the box in the hole so that it is supported by the flanges.

Drill two holes in the side of the box, a 9/16-inch hole for the small "A" cable bushing and a ¾-inch hole for the "A-B" cable bushing.

Fasten the box to the floor by means of four No. 8 ¾-inch wood screws. The holes for these screws are punched in the flange of the box but are covered by the cork gasket. These can be located and the cork punched out, before the box is installed.

When installing the box beneath the floor, after the proper location is found, drill two holes in the floor, 5/16-inch, for wood floors and ½-inch for metal floors. The flat bolt strap can be used as a template for drilling the holes.

After the holes are drilled, place this flat strap on the floor over the holes and push the long carriage bolts through from the top.

Holes must be drilled and the cable couplings installed, three Philco dry "B" batteries, P-302, placed in the box and connected,—and all cable connections made to the fuse mountings. Then the lid must be screwed down tightly, so that the entire box is water-tight.

Push the battery box up against the floor with the bolts extending through the square holes in the flange. Put the box support on next, with a bolt passing through the hole in the end. Run a nut up on both bolts and slip the slotted end of the support over the other bolt and nut. After tightening both nuts, put on a lock nut and a cotter pin in the end of each bolt.

The battery box is shipped from the factory with a cardboard liner inside it. This liner must be left in the box. After the cable couplings are installed, place three P-302 Philco dry "B" batteries in it and connect them in series. The battery cable should then be cut off at the proper length and connections made to the fuses and batteries.

The blue-white lead must be connected to B+135 volts and the green-white lead to B+67½ volts. The black-white wire is the "A" lead which must be connected to the ten-ampere fuse and from there, a single lead which is supplied, must be run to the car battery. "B"— of the batteries must be connected through the one-ampere fuse to the battery side of the ten-ampere "A" fuse.

The bakelite fuse mountings should be screwed to the wood hold-down which is placed over the batteries. Before the lid is put on, the flaps of the liner should be folded over the hold-down.

Cable Connections—The speaker and battery plugs must be connected in their respective sockets on the front panel and the ground tabs from the cable shields grounded under a screw head. The cables should be dressed and fastened in place.

* Three heavy duty Philco batteries, P-308, can be used in place of the standard size batteries and will give relatively longer life. Use the large box and lid (4465 and 4467) and place one battery in upright and the other two on their sides with the terminals in the center. Pack the batteries to prevent bumping around.

The battery cable should be run down in back of the right kick pad and then through the floor and along the frame to the "B" battery box. It should be clamped in place securely.

Suppression—The standard spark plug resistors 4531 can be installed on the plugs in most cars. Likewise the standard distributor resistor 4546 can be used in the distributor head in most cases.

On cars such as the Buick, where the standard spark plug resistor cannot be used, the special screw type resistor 4851 should be used. In a few cars, it will be necessary to use it at the distributor head also. When using the latter resistor, be sure it is as near as possible to the end of the lead.

Standard suppression calls for the use of one resistor on each spark plug or in the plug end of each lead and one resistor at the distributor in the high tension coil to the distributor lead.

In the case of a two coil system, two resistors are necessary, one in each high tension coil lead at the distributor. When dual ignition is used, each spark plug must be equipped with a resistor.

There are numerous exceptions to the above. If the radio installations are carefully made, it will be possible in many Buick and Cadillac installations to do without the spark plug resistors, using only one resistor in the distributor head.

In addition to the standard use of resistors, two 4522 Condensers are also required, one on the brush side of the generator cut-out, the other on the battery terminal of the ignition coil.

When installing an interference condenser, connect the lead to the apparatus terminal. The bracket of the condenser must be bolted to the engine or some other grounded metal part of the chassis.

The use of resistors on the spark plugs and distributor head, and of condensers on the coil and generator, is termed standard suppression and is required in most installations.

In a great many cases, when radio installations are made by the car factories, radio spark plugs are used. These are regular spark plugs with the resistor unit built in the plug and sealed. In addition to making a very neat installation on the motor, their performance is entirely satisfactory. Plugs of this character are invariably marked "radio." Don't install the standard resistors on plugs of this type.

Peening the Rotor Arm—Quite frequently it is necessary to peen the rotor in the distributor in order to reduce the gap between the rotor and the high tension contacts. The gap should be held to about .004 inches maximum, but care should be taken that the rotor does not brush any of the contacts.

Do not build up the rotor with solder as it does not make a permanent job. Place the rotor on a flat steel block and hammer the end of the rotor carefully with a small machinist's hammer. Repeat this operation until there is just sufficient clearance between the rotor and the contacts. Using a file, dress the end of the rotor to its original shape. If a double end rotor is used, both ends should be treated alike, completing the operation first on one end, then the other.

Extreme caution should be used in this operation so that the distributor will not be damaged. Never pass an installation if the rotor brushes the contacts, as this affects the timing.

Shielding—In the past, a great number of service men were prone to shield the high tension leads indiscriminately. This gave rise to numerous complaints on the car performance.

There is never any need for shielding the high tension leads. The only possible exception to this is when the coil is mounted on the instrument panel and practically touches the Receiver. The high tension coil lead should be shielded in such cases in the following manner:

First cover the lead with a piece of loom similar to that used on the "B" cables. Then cover this with hollow copper braid. The shielding on the cable should start one inch from the coil terminal and be carried on through the engine compartment. Ground the shielding with a pigtail at the dash.

Shielded Antenna Lead—If a stubborn case of interference is encountered, shielding the antenna lead between the Receiver housing and the point where the lead-in leaves the front corner post will usually be very effective. The shield must extend from the corner post to the Receiver housing and be bonded to it.

Do not use the so called shielded antenna lead-in wire as the losses are too great. The best lead suitable for this is 7 m/m Beldenlac shielded secondary cable made by Belden.

Additional Suppression—The intense high frequency field present under the hood is sometimes carried beyond the dash by pipe lines, rods and wires. To prevent this, some precautions are necessary.

Isolate the high tension leads from the rest of the car wiring. Never run low tension wires from the coil, horn wires or other cables in the high tension manifold or close to the high tension cables and parallel to them.

Additional interference condensers may sometime be needed on fuse blocks, on the ammeter, or possibly on the dome light lead where it enters the front corner post. Always connect the "A" lead to the car battery. Unnecessary interference will most

likely be encountered if the "A" lead is connected elsewhere.

Occasionally it will be necessary to bond the dash to engine block. Use heavy copper braid for this, bolting the braid to both the dash and the engine block.

Use a smaller copper braid for bonding rods and pipe lines, fastening the braid to the dash with self tapping screws, and soldering the other end to the parts to be bonded. Keep all bonds as short as possible, but allow sufficient slack so as not to interfere with the operation of choke rods, etc.

Adjusting the R. F. Padding Condensers—In order to obtain the maximum results from the radio installation, the first and second R. F. padders should be adjusted after the installation is completed. This should not be attempted except by a competent service man.

It will be necessary to remove the front cover plate and to set up a good oscillator capable of generating a signal of approximately 1400 K. C. The Philco I. F. Oscillator, Model 095, can be used very satisfactorily for this adjustment as well as all other adjustments on the Receiver. Connect a six foot lead to the oscillator output terminal, simply dropping it over the back of the seat, and turn on the oscillator. Turn on the Receiver and tune to approximately 140 on the Receiver scale. Adjust the oscillator frequency to 1400 K. C. When using the Philco oscillator, set it for the 175 K. C. range and use the eighth harmonic. Turn on full volume on the Receiver and adjust the output of the oscillator until the signal is barely audible. Tune the Receiver sharply to the signal and then adjust the first R. F. padder. This is the one mounted to the extreme right on the condenser housing. Adjust this for maximum signal and then proceed with the second padder, the one in the center. Use only the standard fibre padding wrench. Replace the front panel and the adjustment is completed.

Servicing—A great number of the demands for service made by the car owners will be imaginary and can be traced largely to ignorance of what is to be expected from automobile radio.

When the installation is turned over to the customer, certain things should be pointed out. Interference from street cars and power lines, lack of signal under bridges and tunnels and in some cities, apparent fading at street crossings due to shielding by overhead cables and wires, are easy to explain to the customer and will not be construed as alibis which is likely to happen if the customer is told only after registering a complaint.

On the other hand, listen attentively to the customer's complaint. There may be some need for service which you cannot detect immediately.

By far the greatest number of service jobs will be replacing old tubes and batteries. Don't guarantee batteries for six months or a year, without knowing to what service they will be put. The "B" current drain of the Receiver is exceptionally low. Batteries should last six months or better except when the radio is played for a great number of hours each day. This too can be explained to the customer when the installation is first made.

Special Adjustments—These adjustments should only be made by a competent radio service man using a good I. F. Oscillator. The Philco Oscillator, Model 095, is recommended for this work.

The following procedure must be adhered to closely after first removing the front cover plate and the base plate.

Intermediate Frequency or I. F. Stages—Remove the grid clip from the detector oscillator tube and connect the output of the oscillator to the control grid. The detector oscillator is the second tube from the right.

With the Receiver and oscillator turned "on", set the oscillator for 175 K. C. Adjust the oscillator attenuator so that the signal is barely audible with the Receiver volume control turned on full. If the oscillator is equipped with an output meter, connect the meter and adjust the attenuator so that a half scale reading is obtained.

Using a Philco No. 3164 fibre wrench, adjust the second I. F. Condenser. This is numbered twenty-five on the schematic and base view on Pages 10 and 11. The correct adjustment is obtained when the strongest signal is heard in the speaker or the maximum reading is secured on the meter.

Next adjust the secondary and primary I. F. Condensers, nineteen and twelve respectively. Disconnect the oscillator and reconnect the clip to the control grid.

High Frequency Compensator—Connect the output of the oscillator to the antenna lead and the housing of the Receiver. With the Receiver turned on and the oscillator set for 175 K. C., tune the Receiver to 1400 K. C., the eighth harmonic of 175 K. C., and adjust the third padder on the tuning condenser for maximum signal. This is the one on the extreme left of the housing. The purpose of this adjustment is to line up the condenser so that 1400 K. C. is tuned in at 140 on the scale when the scale is set properly.

It may be necessary to adjust the first two compensators on the tuning condensers at 1400 K. C., in order to get a strong enough signal through.

R. F. Compensators—After the detector oscillator has been padded at 1400 K. C., adjust the first and second R. F. Condensers on tuning condenser at 1400 K. C.

Low Frequency Condenser—Now tune the Receiver to 700 K. C. and adjust the condenser fourteen. During this operation the tuning condenser must be shifted and the compensators must be adjusted to bring in the maximum signal.

After this has been done, check the adjustment of the high frequency condenser at 1400 K. C. again.

Table 1—Tube Socket Readings

Tube		Filament Volts	Plate Volts	Control Grid Volts	Screen Grid Volts	Cathode Volts	Plate Milli-Amperes
Type	Circuit						
36	R.F.	6.0	129	0.0	61	0.0	2.8
36	Det.-Osc.	6.0	129	0.0	61	6.0	0.8
36	I.F.	6.0	129	0.0	61	0.5	2.0
38	2nd Det.	6.0	115	0.0	50	0.0	6.0
38	Output	6.0	125	0.0	129	11.0	6.0

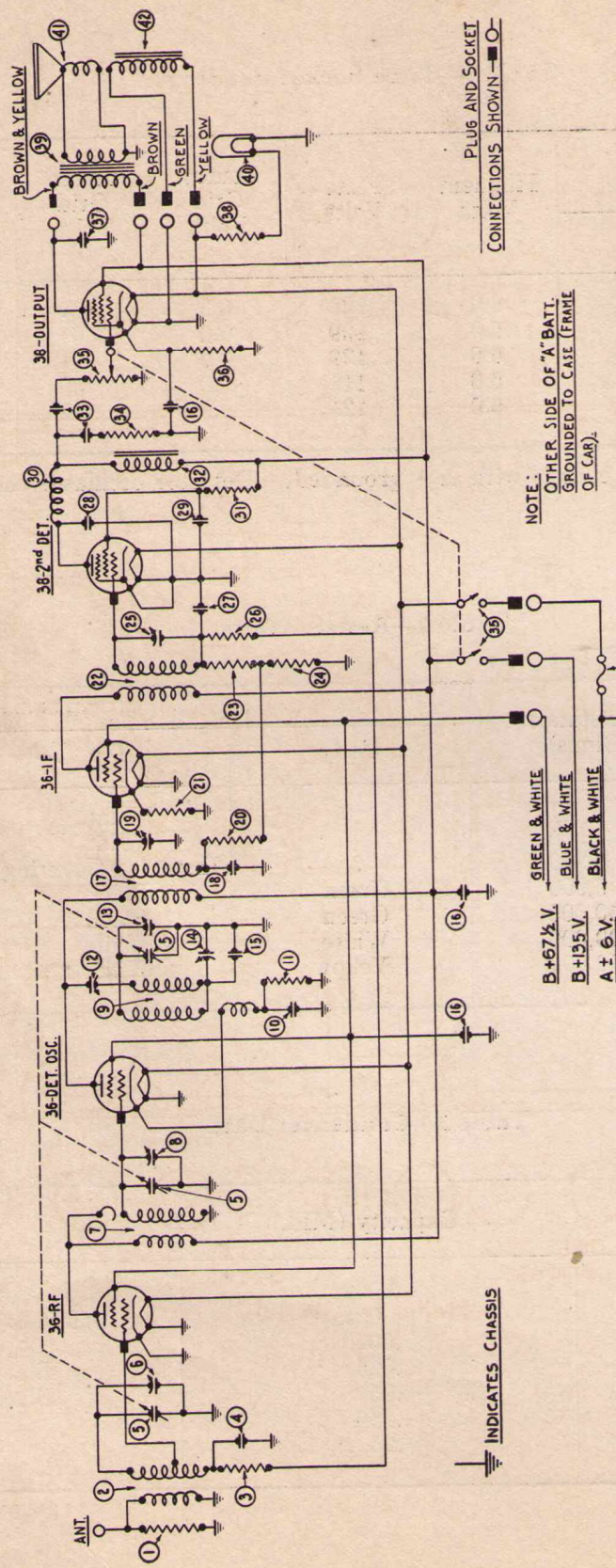
All voltage readings taken to chassis with A+ grounded. Detector oscillator cathode readings taken with receiver tuned 550 K.C.

Table 2—Resistor Data

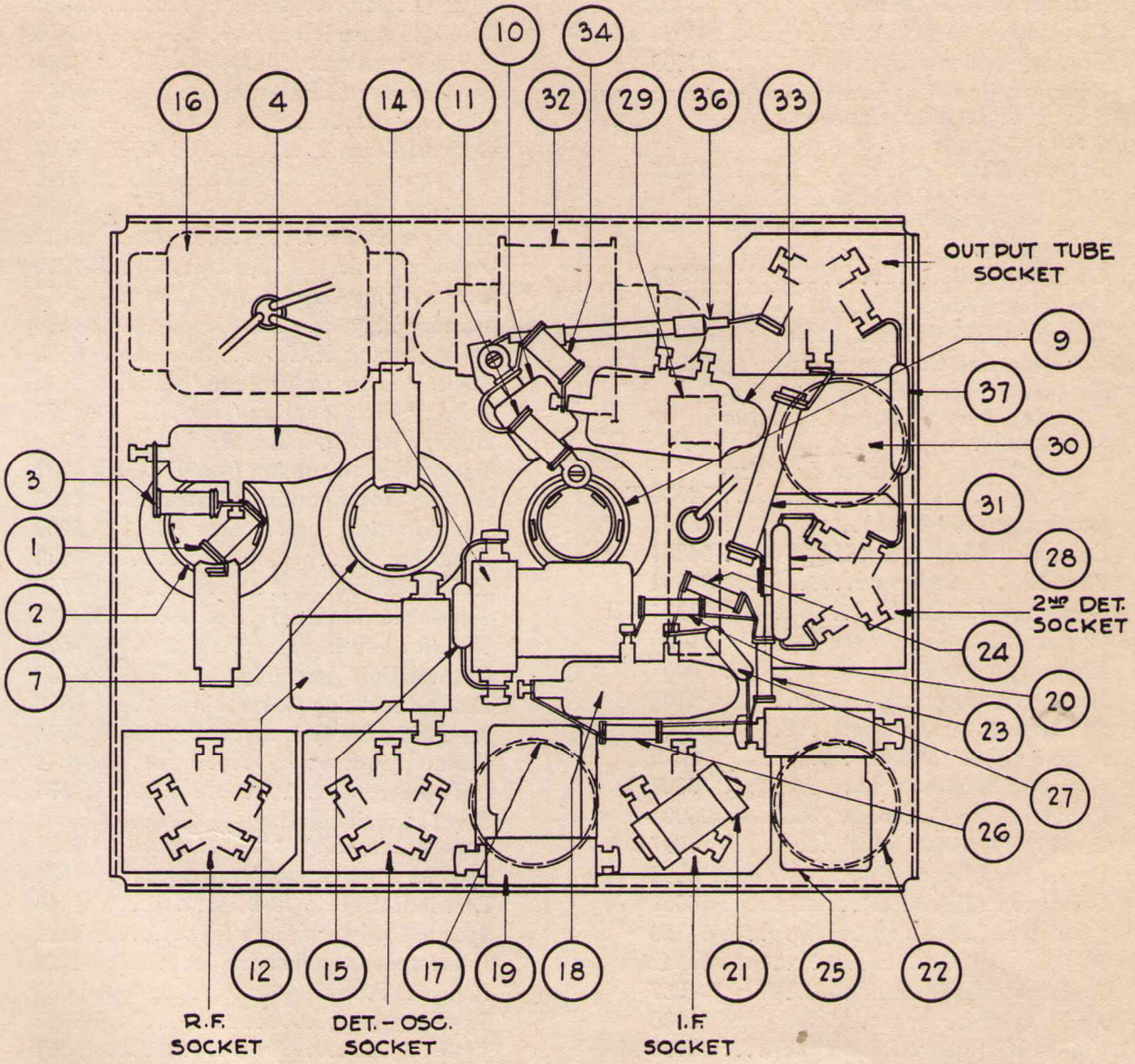
Nos. on Figs. 1 & 2	Resistance (Ohms)	COLOR		
		Body	Tip	Dot
㊳	7		Flat	
㉑	225		Flat	
㊱	1,250		Insulated Covering	
① ⑪	5,000	Green	Black	Red
㉛ ㉞	50,000	Green	Black	Orange
③ ㉓ ㉔	99,000	White	White	Orange
⑳ ㉖	490,000	Yellow	White	Orange

Table 3—Condenser Data

Nos. on Figs. 1 & 2	Capacity (Mfd.)	Color
㉗	.00025	Yellow
⑩ ⑮	.0007	White & Golden Yellow
㉘ ㊲	.002	Blue
㉝	.015	Black Bakelite
④ ⑱	.05	Black Bakelite
㉙	.25	Metal
⑯	.25, .5, 1.	Metal



Model 7—Wiring Diagram



Model 7—Chassis

Replacement Parts Model 7

	Description	Part No.
①	Resistor (5000 Ohms)	6096
②	Antenna Coil	04348
③	Resistor (99,000 Ohms)	6099
④	Condenser (.05 Mfd.)	3615-AG
⑤	Tuning Condenser Assembly	04308
⑥	Compensating Condenser—R.F.—Part of Tuning Condenser Assembly.	
⑦	Detector Transformer	03284
⑧	Compensating Condenser—Detector—Part of Tuning Condenser Assembly.	
⑨	Oscillator Coil	03382
⑩	Condenser (700 Mmf.)	4520
⑪	Resistor (5000 Ohms)	6096
⑫	Compensating Condenser, Coupling	04000-A
⑬	Compensating Condenser, High Frequency, Part of Tuning Condenser Assembly.	
⑭	Compensating Condenser, Low Frequency	04000-F
⑮	Condenser (700 Mmf.)	5863
⑯	Condenser (.25, .5, 1. Mfd.)	04354
⑰	First I. F. Transformer	04352
⑱	Condenser (.05 Mfd.)	3615-AH
⑲	Compensating Condenser, 1st I.F.	04000 D
⑳	Resistor (490,000 Ohms)	6097
㉑	Resistor (225 Ohms)	6107
㉒	Second I. F. Transformer	04353
㉓	Resistor (99,000 Ohms)	6099
㉔	Resistor (99,000 Ohms)	6099
㉕	Compensating Condenser, 2nd I. F.	04000-A
㉖	Resistor (490,000 Ohms)	6097
㉗	Condenser (250 Mmf.)	3082
㉘	Condenser (.002 Mfd.)	4059
㉙	Condenser (.25 Mfd.)	04360
㉚	R. F. Choke	04342
㉛	Resistor (50,000 Ohms)	4237
㉜	Audio Choke	5930
㉝	Condenser (.015 Mfd. Double)	3793-M
㉞	Resistor (50,000 Ohms)	6098
㉟	Volume Control and On-Off Switch	6109
㊱	Resistor (1250 Ohms)	6106
㊲	Condenser (.002 Mfd.)	4059
㊳	Resistor (7 Ohms)	5110
㊴	Output Transformer	2589
㊵	Pilot Light	4567

	Description	Part No.
㊶	Voice Coil and Cone Assembly	02996
㊷	Field Coil Assembled with Pot	02915
㊸	Fuse (1 Amp.)	4540
㊹	Fuse (10 Amp.)	5676
	Fibre Wrench	3164
	Battery Box (3 Batteries)	6083
	Lid	6084
	Support Strap	6087
	Support	6092
	Support Bolts	6094
	Receiver Studs	6122
	Battery Cable	L-1359
	Battery Plug Cap	4885
	Battery Plug	4539
	32-in. Tuning Shaft	6128
	32-in. Volume Control Shaft	6129
	Battery Box Coupling (large)	4596
	Battery Box Coupling Washer	5822
	Battery Box Coupling (small)	6137
	Battery Box Coupling Washer	6138
	Fuse Housing	5209
	Fuse Clip	5233
	Rubber Sleeve	5719
	Screws (for housing)	W-147
	Nut (for housing)	W-624
	Control Unit Assembly	04343
	Control Housing Cover	6030
	Mounting Bracket	6035
	Clamp Strap	04344
	Clamp Screw	W-674
	Key (Interchangeable)	6091
	Speaker Extension Cable	02984
	Speaker Plug Resistor	4531
	Distributor Head Resistor	4546
	Special Resistor (Screw Type)	4581
	Interference Condenser	4522
	Philco I. F. Oscillator	Model 095
	Type 36 Tube	5582
	Type 38 Tube	5584
	Knobs	5166
	Receiver Housing	6058
	Speaker Housing	2710
	48″ V. C. Flexible Shaft (Model A Ford)	6298
	48″ Tuning Control Shaft (Model A Ford)	6299