

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					Samoon		
Туре	Circuit	Filament Voltage	Plate Voltage	Grid Voltage	Grid Voltage	Cathode Voltage	Plate Milliamperes
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	No. c Tubes 3 a		gs. I	Capacity MFD	
3 - 4	105 to 125	Primary					
7 - 8	5.0	Filament of 71-A Tubes		(16)		.00025	
5		Center Tap of 7–8		(19)		.01	
10 - 11	5.0	Filament of 80 Tube	5	6	(22)	.05	
9 - 12	650	Plates of 80 Tube		8	0.00	.05 with 250-ohm resistor winding	
6		Center Tap of 9-12 and		14		.25 (two sections)	
	8 K ¹ K	1-2		(13)	, s	.5	

Table 3—Resistor Data

No. on Figs. 3 and 4	Terminal	Resistance	Color
(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	$ \begin{cases} 1 - 2 \\ 2 - 3 \\ 3 - 4 \\ 5 - 6 \\ 6 - 7 \end{cases} $	$\begin{cases} 1,400\\ 187\\ 75\\ 2,470\\ 975 \\ \end{bmatrix} \\ 50,000\\ 100,000\\ 250,000\\ 500,000 \end{cases}$	Long Tubular Orange Silver Gray White Battleship Gray

Model 20-Filter Condenser-Part No. 4235





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

Table 4—Condenser Data (Other Than Filter Condenser)





No. 36

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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

	Fis	No. 0 28. 3 2	and 4 Description	Part No.	No. 6 Figs. 3	and 4 - Description	Part No.
$\widehat{0}$ First R. F. Transformer . $3884-N$ $\widehat{0}$ PowerTransformer(50-60 cycle) 42 $\widehat{0}$ Tuning Condenser . $4200-A$ PowerTransformer(25-60 cycle) 42 $\widehat{0}$ First Compensating Condenser (Part of Tuning Condenser (05) $3615-J$ $\widehat{0}$ Filter Condenser ($50-60$ cycle) 42 $\widehat{0}$ By-Pass Condenser (0.05) $3615-J$ $\widehat{0}$ Filter Condenser ($25-60$ cycle) 42 $\widehat{0}$ By-Pass Condenser (0.05) $3615-J$ $\widehat{0}$ Filter Condenser ($25-60$ cycle) 42 $\widehat{0}$ By-Pass Condenser (0.05) $3615-J$ $\widehat{0}$ Filter Condenser ($25-60$ cycle) 42 $\widehat{0}$ By-Pass Condenser (0.05) $3615-J$ $\widehat{0}$ Filter Condenser ($25-60$ cycle) 42 $\widehat{0}$ By-Pass Condenser (0.05) $3615-M$ $\widehat{0}$ Push-Pull Output Transformer 27 $\widehat{0}$ By-Pass Condenser (0.05) and denser $\widehat{0}$ Filter Condenser ($25-60$ cycle) 42 $\widehat{0}$ Resistor : $3615-M$ $\widehat{0}$ Filter Condenser ($25-60$ cycle) 42 $\widehat{0}$ Resistor : $3615-K$ $\widehat{0}$ $\widehat{0}$ $\widehat{0}$ $\widehat{0}$ Second Compensating Con- denser : $3884-P$ $\widehat{0}$ $\widehat{0}$ $\widehat{0}$ Third R. F. Transformer $3884-P$ $\widehat{0}$ $\widehat{0}$ 42 $\widehat{0}$ Third Compensating Con- denser : 233537 $\widehat{0}$ $\widehat{0}$ $\widehat{0}$ By-Pass Condenser ($50,000$) 3768 $\widehat{0}$ $\widehat{0}$ $\widehat{0}$ Resistor ($500,000$) 3			Volume Control	4094	(23)	On-off Switch	4095
(a) Tuning Condenser4200-APowerTransformer(25-60 cycle)44(a) First Compensating Condenser(a) First Compensating Condenser(a) First Condenser (50-60 cycle)44(b) Ry-Pass Condenser (.05)3615-J(a) Filter Condenser (25-60 cycle)44(c) By-Pass Condenser (.05)3615-K(a) Filter Condenser (25-60 cycle)44(c) By-Pass Condenser (.05)3615-K(a) Filter Condenser (25-60 cycle)44(c) By-Pass Condenser (.05)3615-K(a) Filter Condenser (25-60 cycle)44(c) By-Pass Condenser (.05)3684-P(a) Filter Condenser (25-60 cycle)44(c) By-Pass Condenser (.5)3683Filter Condenser (25-60 cycle)44(c) By-Pass Condenser (.5)3683Cabinet42(c) Resistor (500,000)3769Speaker Mounting Screws(c) By-Pass Condenser (.01) <td></td> <td>$\overset{\bigcirc}{2}$</td> <td>First R. F. Transformer</td> <td>3884-N</td> <td>(24)</td> <td>PowerTransformer(50-60 cvcle)</td> <td>4234</td>		$\overset{\bigcirc}{2}$	First R. F. Transformer	3884-N	(24)	PowerTransformer(50-60 cvcle)	4234
(i)First Compensating Condenser (Part of Tuning Condenser Assembly)(ii)B. C. Resistor44(iii)(iiii)(iiiii)(iiiii)(iiiii)(iiiii)(iiiii)(iiiii)(iiiii)(iiii)(iiiii)(iiiii)(iiiii)(iiiii)(iiiii)(iiiii)(iiiii)(iiii)(iiii)(iiiii)(iiiii)(iiiii)(iiiii)(iiiii)(iiii)(iiii)(iiii)(iiii)(iiii)(iiiii)(iiiii)(iiiii)(iiiii)(iiiii)(iiii)(iiii)(iiii)(iiii)(iiii)(iiiii)(iiiii)(iiiii)(iiii)(iiii)(iiii)(iiii)(iiii)(iiii)(iiii)(iiii)(iiii)(iiii)(iiiii)(iiiii)(iiii)(iiii) </td <td></td> <td>3</td> <td>Tuning Condenser</td> <td>4200-A</td> <td></td> <td>PowerTransformer(25-60 cvcle)</td> <td>4268</td>		3	Tuning Condenser	4200-A		PowerTransformer(25-60 cvcle)	4268
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		(4)	First Compensating Condenser		(25)	B. C. Resistor	4230
Assembly)Filter Condenser $(25-60 \text{ cycle})$ 42(a) By-Pass Condenser $(.05)$ $3615-J$ (b) Filter Choke $$		\bigcirc	(Part of Tuning Condenser		(26)	Filter Condenser (50-60 cycle)	4235
(a)By-Pass Condenser $(.05)$ 3615 -J(b)Filter Choke 44 (c)By-Pass Condenser $(.05)$ 3615 -M(c)Push-Pull Output Transformer 27 (c)By-Pass Condenser $(.05)$ and(c) 27 (c)Field Coil 27 (c)By-Pass Condenser $(.05)$ and(c) 27 (c) 27 (c)By-Pass Condenser $(.05)$ and(c) 27 (c) 27 (c)Second Compensating Condenser(c) 27 (c) 27 (c)Third R. F. Transformer 3884 -P(c)Speaker Plug and Cord $L-11$ (c)Third Compensating Condenser 3884 -P(c) 42 42 (c)Third Compensating Condenser 3884 -P(c) 42 42 (c)Third Compensating Condenser 4237 (c) 4237 4237 4237 (d)Tuning Condenser $(.5)$ 3583 Cabinet 422 42 (f)Resistor $(50,000)$ 3768 4237 4237 4237 4237 (f)Resistor $(250,000)$ 3768 422 422 422 422 (f)Resistor $(100,000)$ 3769 3622 422 422 422 (f)Resistor $(100,000)$ 3769 3615 -L 422 422 4237 (f)Resistor $(100,000)$ 3769 3615 -L 422 422 (f)Resistor $(100,000)$ 3769 3615 -L 422 (f)Resistor $(500,000$			Assembly)		-	Filter Condenser (25-60 cycle)	4269
(i)By-Pass Condenser $(.05)$ $3615-M$ (ii)Push-Pull Output Transformer 27 (i)Second R. F. Transformer $3884-P$ (ii)Voice Coil and Cone 27 (ii)By-Pass Condenser $(.05)$ and(iii)Field Coil $$ 27 (iii)Second Compensating Condenser $3615-K$ Speaker Plug and Cord $L-11$ (iii)Second Compensating Condenser $6000000000000000000000000000000000000$		(5)	By-Pass Condenser (.05) .	3615-J	27)	Filter Choke	4231
$\widehat{0}$ Second R. F. Transformer $3884-P$ $\textcircled{9}$ Voice Coil and Cone 27 $\widehat{9}$ By-Pass Condenser (.05) and Resistor $\textcircled{9}$ Field Coil 27 $\widehat{9}$ Second Compensating Con- denser $\overbrace{9}$ Field Coil 27 $\widehat{9}$ Second Compensating Con- denser $\overbrace{9}$ Field Coil 27 $\widehat{9}$ Second Compensating Con- denser $\overbrace{9}$ Field Coil 27 $\widehat{9}$ Third R. F. Transformer $3884-P$ Speaker Socket Assembly 39 $\widehat{9}$ Third Compensating Con- denser $3884-P$ Volume Control Insulators 42 $\widehat{9}$ Third Compensating Con- denser $3884-P$ Volume Control Insulators 42 $\widehat{9}$ Resistor (50,000) 4237 Knob (Large) 42 $\widehat{9}$ Resistor (250,000) 3768 Fahnstock Clip 42 $\widehat{9}$ Resistor (250,000) 3768 Fahnstock Clip 42 $\widehat{9}$ Resistor (500,000) 3767 Speaker Mounting Screws 42 $\widehat{9}$ Resistor (100,000) 3769 Speaker Mounting Screws $($ one used) 4232 $\widehat{9}$ Push-Pull Input Transformer 4232 Chassis Hold-Down Bolts $W-4$ $\widehat{9}$ Pass Condenser (.05) $3615-L$ Feet $W-3$		6	By-Pass Condenser (.05)	3615 - M	(28)	Push-Pull Output Transformer	2766
(i)By-Pass Condenser (.05) and Resistor(i)Field Coil 27 Speaker Plug and Cord(i)Second Compensating Con- denser 3615 -KSpeaker Plug and Cord $L-11$ Four-Prong Socket Assembly(i)Third R. F. Transformer 3884 -PSpeaker Socket 3615 -K(ii)Third Compensating Con- denser 3884 -PVolume Control Insulators 420 (ii)Third Compensating Con- denser 3884 -PVolume Control Insulators 420 (iii)Third Compensating Con- denser 4237 $Nob (Large)$ 421 (iii)By-Pass Condenser (.5) 3583 Cabinet 422 (iii)By-Pass Condenser (.00025) 3082 Finishing Rosettes 422 (iii)By-Pass Condenser (.00025) 3082 Finishing Rosettes 422 (iii)By-Pass Condenser (.00025) 3082 Finishing Rosettes 422 (iii)Resistor (500,000) 3767 (three used) $$		$\overline{7}$	Second R. F. Transformer .	3884-P	29	Voice Coil and Cone	2769-B
Resistor3615-KSpeaker Plug and CordL-11(Part of Tuning Condenser Assembly)Speaker Socket Assembly38(Part of Tuning Condenser Assembly)Five-Prong Socket Assembly38(Part of Tuning Condenser denser3884-PVolume Control Insulators42(Part of Tuning Condenser denser3884-PVolume Control Insulators42(Part of Tuning Condenser denserAssembly)Knob (Large)42(Part of Tuning Condenser denserAssembly)Knob (Large)42(Part of Tuning Condenser (Part of Tuning Condenser Assembly)Knob (Small)42(Part of Tuning Condenser (Part of Tuning Condenser (Part of Tuning Condenser (Part of Tuning Condenser4237Knob (Small)42(Part of Tuning Condenser (Part of Tuning Condenser (Solo00)4237Knob (Small)4242(Part of Tuning Condenser (.5)3583Cabinet340(Part of Tuning Condenser (.00025)3082Finishing Rosettes42(Part of 250,000)3768Fahnstock ClipL-11(Part of 250,000)3769Speaker Mounting Screws42(Part of 500,000)3769Speaker Mounting Screws42(Part of 500,000)3769(ne used)W-4(Part of 500,000)3769Speaker Mounting Screws(ne used)W-4(Part of 500,000)3769(ne used)W-4(Part of 500,000)3769Speaker Mounting Screws(ne used)W-4(Part of 500,000)3769 <td></td> <td>(8)</td> <td>By-Pass Condenser (.05) and</td> <td></td> <td>30</td> <td>Field Coil</td> <td>2768</td>		(8)	By-Pass Condenser (.05) and		30	Field Coil	2768
 Second Compensating Condenser		-	Resistor	3615-K		Speaker Plug and Cord L	-1124-A
denser \ldots Speaker Socket. 39 (Part of Tuning Condenser Assembly)Five-Prong Socket Assembly 39 (and Third R. F. Transformer 3884 -PVolume Control Insulators 42 (and Third Compensating Con- denser \ldots 3884 -PVolume Control Insulators 42 (and the control former 3884 -PVolume Control Insulators 42 (and the control former 4237 Tuning Condenser Dial Scale 42 (and the control former 4237 Knob (Large) 42 (and the control former 4237 Knob (Small) 42 (and the control former 4237 Knob (Small) 42 (and the control former 4237 Knob (Small) 42 (b) By-Pass Condenser (.5) 3583 Cabinet 342 (and the control former 3768 Fahnstock Clip 11 (b) By-Pass Condenser (.00025) 3082 Finishing Rosettes -42 (c) Resistor (500,000) 3767 (three used) 42 (a) Push-Pull Input Transformer 4232 Chassis Hold-Down BoltsW-4(a) By-Pass Condenser (.05) 4232 Feet 4232		9	Second Compensating Con-			Four-Prong Socket Assembly	3977-A
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		-	denser			Speaker Socket	3977-B
Assembly)R. F. Tube Shield42(1)Third R. F. Transformer3884-PVolume Control Insulators40(1)Third Compensating Con- denserVolume Control Insulators42(1)Third Compensating Con- denserVolume Control Insulators42(1)Third Tuning Condenser Assembly)Tuning Condenser Dial Scale42(2)Resistor (50,000)4237Knob (Large)42(3)By-Pass Condenser (.5)3583Cabinet42(3)By-Pass Condenser (.00025)3557Bezel Plate42(4)By-Pass Condenser (.00025)3082Finishing Rosettes42(5)Resistor (500,000)3768Fahnstock Clip1-11(6)By-Pass Condenser (.00025)3082Finishing Rosettes42(7)Resistor (500,000)3769Speaker Mounting Screws42(6)Condenser (.01)3903-FSpeaker Mounting Screws44(9)Push-Pull Input Transformer4232Chassis Hold-Down BoltsW-4(2)Push-Pull Input Transformer4232Chassis Hold-Down BoltsW-4(2)By-Pass Condenser (.05)3615-LFeetW-3			(Part of Tuning Condenser			Five-Prong Socket Assembly	3979-A
 (i) Third R. F. Transformer . 3884-P (i) Third Compensating Con- denser			Assembly)			R. F. Tube Shield	4228-A
 Third Compensating Con- denser (Part of Tuning Condenser Assembly) Resistor (50,000) 4237 By-Pass Condenser (.5) 3583 By-Pass Condenser (.5) 3583 Cabinet 		10	Third R. F. Transformer .	3884-P		Volume Control Insulators .	4092
denserTuning CondenserTuning Condenser Dial Scale 42 (Part of Tuning CondenserA. C. CordL-4Assembly)Knob (Large)42(Part of Tuning Condenser 4237 Knob (Large)(Part of Tuning Condenser 4237 Knob (Small)(Part of Tuning Condenser 557 Bezel Plate(Part of Tuning Condenser 3768 Fahnstock Clip(Part of Tuning Condenser 3768 Fahnstock Clip(Part of Tuning Condenser 3769 Speaker Mounting Screws(Part of Tuning Condenser 3767 (three used)(Part of Tuning Condenser 3769 Speaker Mounting Screws(Part of Tuning Condenser 3769 (one used)(Part of Condenser 3769 (one used)(Part of Condenser 3769 (one used)(Part of 500,000) 3769 <td></td> <td>(11)</td> <td>Third Compensating Con-</td> <td></td> <td></td> <td>Volume Control Insulators .</td> <td>4286</td>		(11)	Third Compensating Con-			Volume Control Insulators .	4286
(Part of Tuning Condenser Assembly)A. C. Cord L- Knob (Large)			denser			Tuning Condenser Dial Scale	4261
Assembly) Knob (Large) 42 (2) Resistor (50,000) 4237 Knob (Small) 42 (3) By-Pass Condenser (.5) 3583 Cabinet 340 (4) By-Pass Condenser (double .25) 3557 Bezel Plate 42 (5) Resistor (250,000) 3768 Fahnstock Clip 42 (6) By-Pass Condenser (.00025) 3082 Finishing Rosettes 42 (6) By-Pass Condenser (.00025) 3082 Finishing Rosettes 42 (7) Resistor (500,000) 3769 Speaker Mounting Screws 42 (9) Condenser (.01) 3903-F Speaker Mounting Screws W-4 (9) Condenser (.000) 3769 (one used) W-4 (9) Resistor (500,000) 3769 (one used) W-4 (9) Push-Pull Input Transformer 4232 Chassis Hold-Down Bolts W-4 (9) Pass Condenser (.05) 3615-L Feet W-3			(Part of Tuning Condenser			A. C. Cord	L-943-A
(i) Resistor (50,000)			Assembly)			Knob (Large)	4289-A
(i) By-Pass Condenser (.5) 3583 Cabinet 340 (i) By-Pass Condenser (double .25) 3557 Bezel Plate 42 (i) Resistor (250,000) 3768 Fahnstock Clip 1-11 (ii) By-Pass Condenser (.00025) 3082 Finishing Rosettes 42 (ii) By-Pass Condenser (.00025) 3082 Finishing Rosettes 42 (iii) By-Pass Condenser (.0000) 3769 Speaker Mounting Screws 42 (iii) Condenser (.01) 3903-F Speaker Mounting Screws 44 (iii) Condenser (.000) 3769 (one used) W-4 (iii) Push-Pull Input Transformer 4232 Chassis Hold-Down Bolts W-4 (iii) By-Pass Condenser (.05) 3615-L Feet W-3		(12)	Resistor (50,000)	4237		Knob (Small)	4290-A
(a) By-Pass Condenser (double .25) 3557 Bezel Plate 42 (b) Resistor (250,000) . 3768 Fahnstock Clip .		(13)	By-Pass Condenser (.5) .	3583		Cabinet	34000
(i) Resistor (250,000)		14	By-PassCondenser(double .25)	3557		Bezel Plate	4252
(i) By-Pass Condenser (.00025) . 3082 Finishing Rosettes		(15)	Resistor (250,000)	3768		Fahnstock Clip L	-1126
Image: The sensition of the sense sensition of the sensition of the sensition		(16)	By-Pass Condenser (.00025).	3082		Finishing Rosettes	4267
(i) Resistor (100,000)		17	Resistor (500,000)	3769		Speaker Mounting Screws	100
Image: Weight of the sector (0.01)3903-FSpeaker Mounting ScrewsImage: Weight of the sector (500,000)3769(one used)W-4Image: Weight of the sector (500,000)3769Chassis Hold-Down BoltsW-4Image: Weight of the sector (0.05)3615-LFeetW-3		18	Resistor (100,000)	3767		(three used $)$	V-493
		(19)	Condenser (.01)	3903-F		Speaker Mounting Screws	
(a) Push-Pull Input Transformer4232Chassis Hold-Down BoltsW-4(a) By-Pass Condenser (.05) <t< td=""><td></td><td>20</td><td>Resistor (500,000)</td><td>3769</td><td></td><td>(one used)</td><td>V-483</td></t<>		20	Resistor (500,000)	3769		(one used)	V-483
By-Pass Condenser (.05) 3615-L Feet		21	Push-Pull Input Transformer	4232		Chassis Hold-Down Bolts . V	v-490
		22	By-Pass Condenser (.05)	3615-L		Feet	v-353

Note:—R. F. Transformers (2), (2) and (2) should not be confused with R. F. Transformers (2), (3), (3) and (2) on Bulletin 28. They are not interchangeable.

PHILADELPHIA STORAGE BATTERY COMPANY

Ontario and C Streets, Philadelphia, Pa.