



Models 15, 16, 18, 23

Specifications—Models 15, 16

TYPE OF CIRCUIT: Models 15 and 16 are six (6) tube alternating current superheterodyne models employing the new Philco built-in super aerial system which eliminates an outside aerial and reduces local interference to a minimum.

PHILCO BUILT-IN SUPER AERIAL SYSTEM:

Included in the built-in super aerial system is a statically shielded loop for broadcast band reception and a short wave receiving loop. A feature of the built-in broadcast band statically shielded loop is that the receiver may be turned to the position in which it picks up a minimum amount of interference, or if interference is not present the receiver may be set in the position where best reception is obtained.

In addition, other features of design are: Three tuning ranges; special high gain R. F. stage; Philco high-efficiency Loktal tubes; automatic volume control, tone control and a Beam power audio output stage. In general, these models are similar but differ in their tuning mechanisms and cabinets.

Model 15 is dial tuned and assembled in cabinet type "T" (Table model).

Model 16 is equipped with six electric push buttons for automatically selecting stations in addition to dial tuning. Five push buttons

are used for stations one of which can be used in combination with special type PHILCO TELEVISION receivers for reception of television sound programs, when such are available. The sixth push button selects dial tuning.

Philco television sets contain information for adjusting the push button on the 16 when they become available.

TUNING RANGES:

540 to 1550 K. C. 1.5 to 3.5 M. C. 5.7 to 18.0 M. C.

INTERMEDIATE FREQUENCY: 460 K. C.

POWER SUPPLY: 115 volts A. C., 60 cycle
115 volts A. C., 25 cycle

POWER CONSUMPTION: 40 watts.

AUDIO OUTPUT: 2 watts.

PHILCO TUBES USED: 1232E, R. F.; 7J7E, converter; 7B7E, I. F.; 7C6, second detector, AVC and first audio; 7B5E, audio output and 7Y4, rectifier.

CABINET DIMENSIONS: Height, 10 $\frac{1}{8}$ "; Width 14 $\frac{1}{8}$ "; Depth, 8".

Specifications—Models 18, 23

TYPE OF CIRCUIT: Models 18 and 23 are six tube Push-Button and dial tuned set. The models are also designed to receive the sound of a television program tuned in by special type Philco Television sets, when such are available.

In addition, other features of design are: Tone control, three tuning ranges covering the frequencies listed below; and a pentode audio output circuit. Outside aerial connections are also provided for remote localities where station signal strength is very weak.

The receivers are equipped with six electric tuning push buttons for automatically selecting stations. Five of the push buttons are used for broadcast stations and one for selecting dial tuning. One of the station push buttons (low frequency push button preferably) may be set up for use with the sound programs of Philco Television models, when available.

PHILCO BUILT-IN SUPER AERIAL SYSTEM (Model 23 only):

Included in the built-in super aerial system is a statically shielded loop for broadcast band reception and a short wave receiving loop.

The feature of the built-in broadcast band statically shielded loop is that it may be tuned to the position in which it picks up a minimum amount of interference, or if interference is not present the loop may be set in the position where best reception is obtained.

POWER SUPPLY: 115 Volts, 25 and 60 Cycle A. C.

POWER CONSUMPTION: 45 watts.

FREQUENCY TUNING RANGES: (Three)

540 to 1550 K. C. 1.5 to 3.5 M. C. 6.0 to 18.0 M. C.

INTERMEDIATE FREQUENCY: 460 K. C.

AUDIO OUTPUT: 2 watts.

PHILCO TUBES USED: 1232E, R. F.; 6J8EG, Converter; 7B7E, I. F.; 7C6, Second Detector A. V. C. and First Audio; 41E, Audio Power Output; 84, Rectifier.

CABINET DIMENSIONS: Type 18 F; Height, 37"; Width, 23 $\frac{3}{4}$ "; Depth, 9 $\frac{3}{4}$ ". Type

Adjusting Electric Push-Button Tuning

In order to adjust the electric push buttons accurately for reception of broadcast stations, a vacuum tube voltmeter such as Philco Model 028 should be used. In addition, an insulated padding screw driver Part No. 45-2610 and Loktal aligning adaptor Part No. 45-2767 are required. With this equipment at hand proceed as follows:

Select eight of the most popular stations received in the locality. Insert the station call letters into the windows above the buttons. The station with the lowest frequency is placed in the first button on the left and the highest frequency is placed in the button on the extreme right. Each push button is adjusted by two set screws located on the rear of the push button unit. Each set of screws is numbered and covers a frequency range as follows:

Push Button	Frequency Range
1	540-1000 K.C.
2	650-1100 K.C.
3	740-1300 K.C.
4	900-1500 K.C.
5	1100-1600 K.C.

Looking at the front of the cabinet, the first button on the left is adjusted by set screw No. 1. The next push button by set screw No. 2 and the remaining push buttons in order.

1. Remove the 7C6 Detector tube from its socket and insert the aligning adaptor in the socket, then replace the tube in the adaptor. Connect the negative terminal of the vacuum tube voltmeter to the (light color)

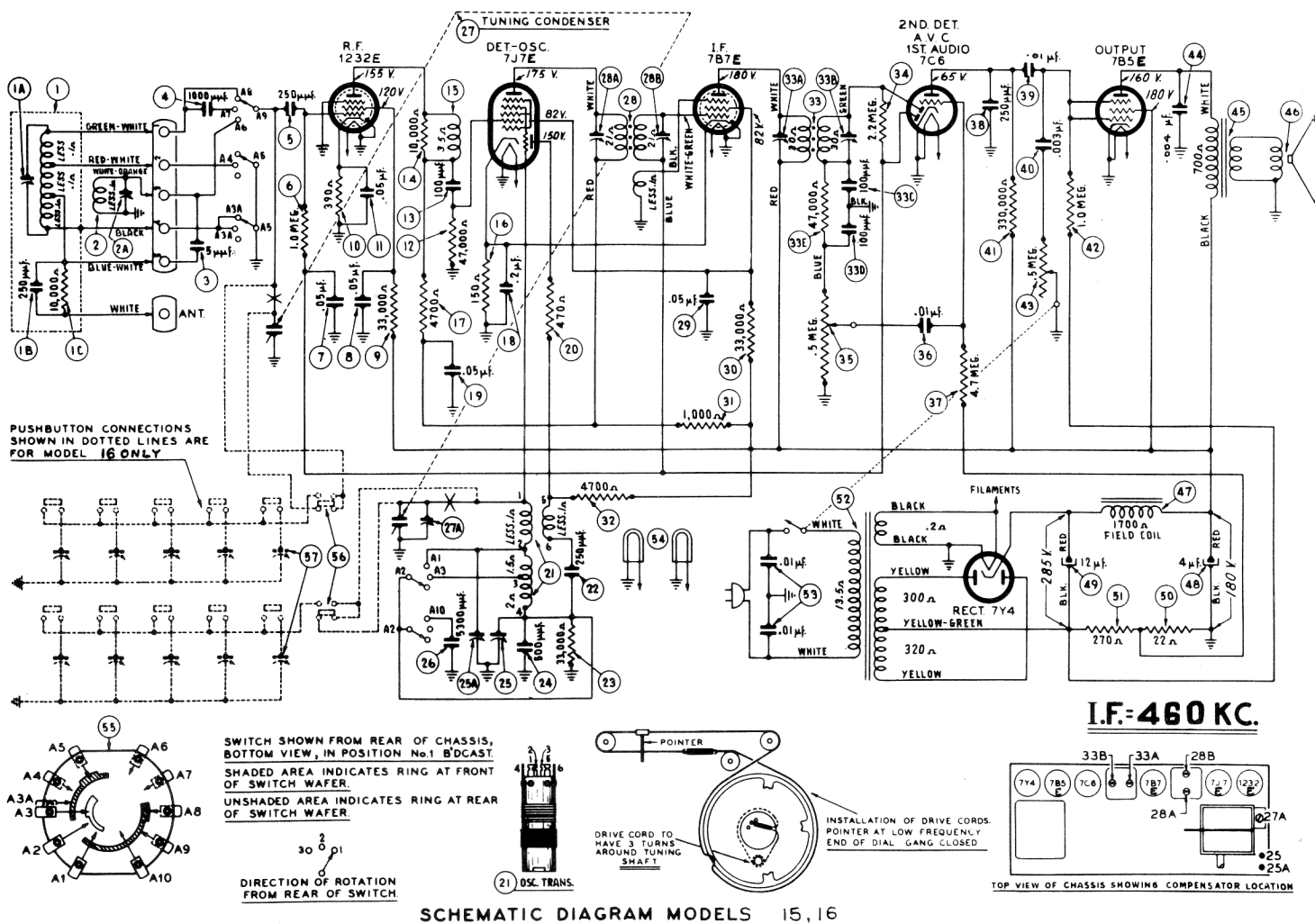
wire which protrudes from the side of the adaptor. Attach the positive terminal of the voltmeter to the black wire.

2. Turn the receiver on and set the tuning range selector to "Broadcast" (Manual Tuning). Dial push button "In."

3. Set up the Model 177 signal generator about 3 feet from the receiver and connect a loop constructed out of about 2 feet of wire to the high and ground output jacks of the signal generator. Turn the output controls to maximum and set the modulation control to "MOD. ON." Manually tune in the first station to be set up on push button No. 1. After doing this set the indicator of the 177 Signal Generator to the frequency of the station being received. As the indicator approaches the frequency of the station a whistle will be heard; leave the indicator at this point. Press in station No. 1 push button. Using the insulated screw driver turn the No. 1 "Osc." screw until the broadcast, station identified by the signal generator is heard; at this point, turn the indicator of the signal generator away from the frequency of the station. Readjust No. 1 "Osc." and "Ant." screws for maximum deflection of the vacuum tube voltmeter pointer. Station No. 1 is now adjusted properly. After setting up the first station the same procedure as outlined above is used for the remaining stations.

When this model is to be set up to receive the sound of a television program tuned in by the special type Philco television sets, the low frequency push button is used. To tune in these programs, the same procedure as given for ordinary broadcast stations as outlined above is used.

Further details for setting up this receiver for operation with Philco Television models will be supplied with these instruments, when they become available.



Replacement Parts Models 15, 16

Schematic No.	DESCRIPTION	Part No.
1	Loop Assembly (Broadcast)	38-9892
1A	Compensator	31-6318
1B	Mica Cond. (250 mmfd.)	61-0033
1C	Resistor (10,000 ohms, 1/2 watt)	33-310344
2	Loop Assembly (Short Wave)	38-9893
2A	Compensator	31-6320
3	Mica Cond. (5 mmfd.)	30-1097
4	Mica Cond. (1000 mmfd.)	30-1063
5	Mica Cond. (250 mmfd.)	61-0033
6	Resistor (1.0 meg., 1/2 watt)	33-510344
7	Tubular Cond. (.05 mfd.)	30-4518
8	Tubular Cond. (.05 mfd.)	30-4518
9	Resistor (33,000 ohms, 1/2 watt)	33-333344
10	Resistor (390 ohms, 1/2 watt)	33-139336
11	Tubular Cond. (.05 mfd.)	30-4518
12	Resistor (47,000 ohms, 1/2 watt)	33-347344
13	Mica Cond. (100 mmfd.)	30-1128
14	Resistor (10,000 ohms, 1/2 watt)	33-310344
15	R.F. Trans.	32-3194
16	Resistor (150 ohms, 1/2 watt)	33-115336
17	Resistor (4,700 ohms, 1/2 watt)	33-247344
18	Tubular Cond. (.2 mfd.)	30-4536
19	Tubular Cond. (.05 mfd.)	30-4518
20	Resistor (470 ohms, 1/2 watt)	33-147344
21	Osc. Trans.	32-3195
22	Mica Cond. (250 mmfd.)	61-0033
23	Resistor (33,000 ohms, 1/2 watt)	33-333344
24	Silver Mica Cond. (500 mmfd.)	30-1138
25	Compensator (2 section)	31-6317
26	Mica Cond. (5,300 mmfd.)	30-1134
27	Tuning Cond.	31-2375
28	1st I.P. Trans. Assembly	32-3210
29	Tubular Cond. (.05 mfd.)	30-4518
30	Resistor (33,000 ohms, 1/2 watt)	33-333344
31	Resistor (1,000 ohms, 1/2 watt)	33-210344
32	Resistor (4,700 ohms, 1/2 watt)	33-247344
33	2nd I.F. Trans. Assembly	32-3281
34	Resistor (2.2 meg., 1/2 watt)	33-522344
35	Volume Control (.5 meg.)	33-5319
36	Tubular Cond. (.01 mfd.)	30-4572
37	Resistor (4.7 meg., 1/2 watt)	33-547344
38	Mica Cond. (250 mmfd.)	61-0033
39	Tubular Cond. (.01 mfd.)	30-4572
40	Tubular Cond. (.003 mfd.)	30-4580
41	Resistor (330,000 ohms, 1/2 watt)	33-433344
42	Resistor (1.0 meg., 1/2 watt)	33-510344
43	Tone Control (.5 meg.) and On-Off Switch	33-5333
44	Tubular Cond. (.004 mfd.)	30-4578
45	Output Trans.	32-8063
46	Cone and Voice Coil Assembly (Speaker Part No. 36-1478-3)	

Schematic No.	DESCRIPTION	Part No.
47	Field Coil (Replace Speaker Part No. 36-1478)	
48	Electrolytic Cond. (4 mfd.)	30-2401
49	Resistor (22 ohms, 1/2 watt)	33-022336
50	Resistor (270 ohms, 1 watt)	33-127436
51	Power Trans. (115v., 50-60 cycle)	32-8064
52	Power Trans. (115v., 25-40 cycle)	32-8075
53	Line Cond. (.01-.01 mfd. Bakelite)	3903-ODG
54	Pilot Lamps	34-2064
55	Wave Switch	42-1495
56	Push Button Switch (Model 16 only)	42-1528
57	Padder Strip (Model 16 only)	31-6316

Miscellaneous Parts Models 15, 16

DESCRIPTION	Part No.
Line Cord	L-3199C
Clip (Mtg. Osc. Coil)	28-5003

DESCRIPTION	Part No.
Drive Cord Assembly (Pointer)	31-2399
Drive Cord Assembly (Tuning Cond.)	31-2400
Scale	27-5507
Bezel (Push Buttons, Model 16)	28-5742
Bezel (Pin, Model 16)	W-1074
Insulating Bushing (Drive Shaft)	27-9437
Knob	27-4332
Knob (Push Button, Model 16)	27-4824
Pilot Lamp Socket Assembly	38-9904
Pointer	56-1532
Rubber Bushing (Tuning Cond. Drive Shaft)	27-9432
Spring (Tuning, Drive Cord)	28-8751
Spring (Pointer, Drive Cord)	28-8953
Spring (Tuning Shaft Assembly)	28-8955
Speaker	36-1478
Socket (Loktal)	55-0575
Tuning Shaft	56-6052
Tuning Drive Drum Assembly	38-9883
Tab Kit (Model 16)	40-6500
Washer ("C" Type, Tuning Shaft)	23-2043

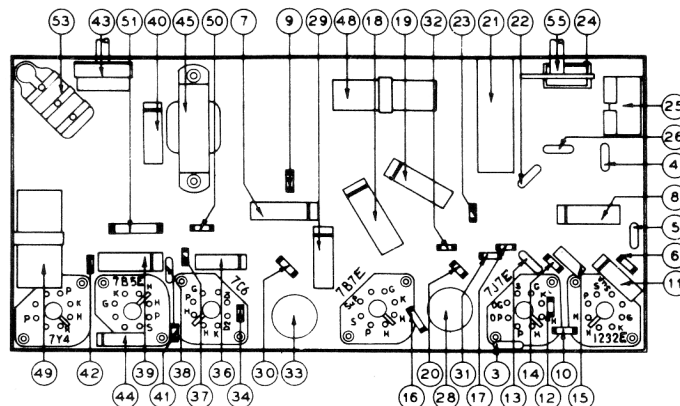
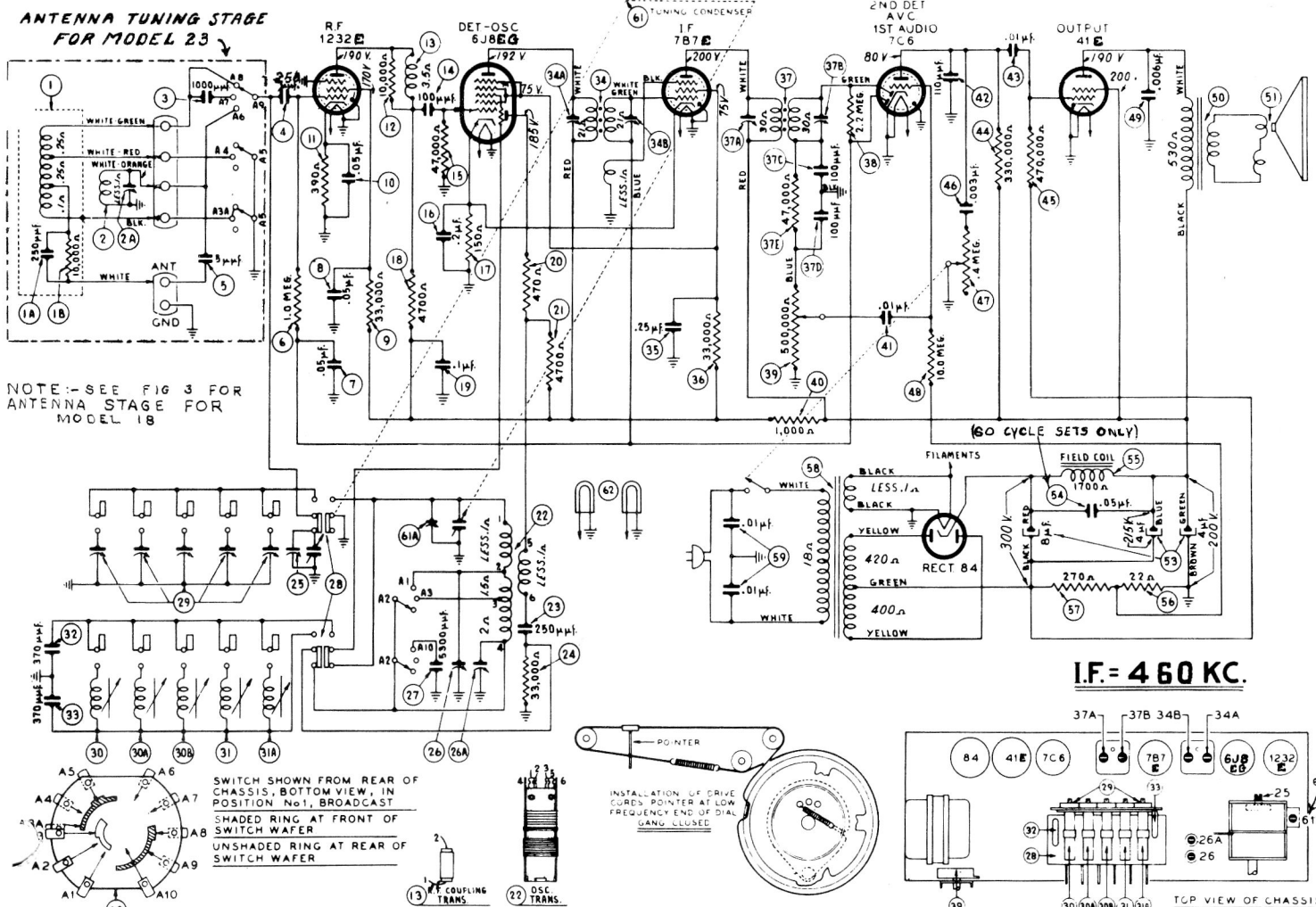


FIG. 1. PART LOCATIONS. UNDERSIDE OF CHASSIS.

ANTENNA TUNING STAGE FOR MODEL 23



I.F. = 460 KC.

Replacement Parts Models 18, 23

Schematic No.	DESCRIPTION	Part No.
1	Loop Assembly (Broadcast Model 23 only)...	38-9895
1A	Mica Cond. (250 mmfd., Model 23 only)...	61-0033
1B	Resistor (10,000 ohms, ½ watt Model 23 only)...	33-310344
2	Loop Assembly (Short Wave Model 23 only)...	38-9968
2A	Compensator (Part of Short Wave Loop Model 23 only)...	31-6320
3	Mica Cond. (1000 mmfd., Model 23 only)...	30-1063
4	Mica Cond. (250 mmfd.)...	61-0033
5	Mica Cond. (5 mmfd., Model 23 only)...	30-1143
6	Resistor (1.0 meg., ½ watt)...	33-510344
7	Tubular Cond. (.05 mfd.)...	30-4519
8	Tubular Cond. (.05 mfd.)...	30-4123
9	Resistor (33,000 ohms, ½ watt)...	33-333344
10	Tubular Cond. (.05 mfd.)...	30-4519
11	Resistor (390 ohms, ½ watt)...	33-139336
12	Resistor (10,000 ohms, ½ watt)...	33-310344
13	R. F. Coupling Coil...	32-3194
14	Mica Cond. (100 mmfd.)...	30-1128
15	Resistor (47,000 ohms, ½ watt)...	33-347344
16	Tubular Cond. (.2 mfd.)...	30-4536
17	Resistor (150 ohms, ½ watt)...	33-115336
18	Resistor (4,700 ohms, ½ watt)...	33-247344
19	Tubular Cond. (.1 mfd.)...	30-4455
20	Resistor (470 ohms, ½ watt)...	33-147344
21	Resistor (4,700 ohms, ½ watt)...	33-247344
22	Osc. Transformer...	32-3195
23	Mica Cond. (250 mmfd.)...	61-0033
24	Resistor (33,000 ohms, ½ watt)...	33-333344
25	Compensator (Single)...	31-6308
26	Compensator (2 section)...	31-6302
27	Mica Cond. (5300 mmfd.)...	30-1134
28	Push Button Switch...	42-1493
29	Coils and Padder Assembly...	32-3209
30	Coil No. 1 (540-1000 K.C.)...	
30A	Coil No. 2 (650-1100 K.C.)...	32-3042
30B	Coil No. 3 (740-1300 K.C.)...	
31	Coil No. 4 (900-1500 K.C.)...	
31A	Coil No. 5 (100-1600 K.C.)...	32-3041
32	Silver Mica Cond. (370 mmfd.)...	30-1110
33	Silver Mica Cond. (370 mmfd.)...	30-1110
34	1st I.F. Trans....	32-3210
35	Tubular Cond. (.25 mfd.)...	30-4448
36	Resistor (33,000 ohms, ½ watt)...	33-333344
37	2nd I.F. Trans....	32-3211
38	Resistor (2.2 meg., ½ watt)...	33-522344
39	Volume Control (500,000 ohms)...	33-5319
40	Resistor (1,000 ohms, ½ watt)...	33-210344
41	Tubular Cond. (.01 mfd.)...	30-4572
42	Mica Cond. (110 mmfd.)...	30-1130
43	Tubular Cond. (.01 mfd.)...	30-4572
44	Resistor (330,000 ohms, ½ watt)...	33-433344
45	Resistor (470,000 ohms, ½ watt)...	33-447344
46	Tubular Cond. (.003 mfd.)...	30-4469
47	Tone Control (4 meg.) and On-Off Switch...	33-5333
48	Resistor (10.0 meg., ½ watt)...	33-610344
49	Tubular Cond. (.006 mfd.)...	30-4504
50	Output Trans....	32-8056
51	Cone and Voice Coil Assembly...	36-1480
53	Electrolytic Cond. (4-4.8 mfd.)...	30-2400
54	Tubular Cond. (.05 mfd., 60 cycle sets only)...	30-4123
55	Field Coil (Replaces 370 mmfd.)...	33-522336
56	Resistor (22 ohms, ½ watt)...	33-022336
57	Resistor (270 ohms, 1 watt)...	33-127436

SCHEMATIC DIAGRAM MODELS 18, 23

Schematic No.	DESCRIPTION	Part No.
58	Power Trans. (115 volt, 60 cycle)...	32-8055
59	Power Trans. (115 volt, 25 cycle)...	32-8076
60	Line Cond. (.01-.01 Bakelite)...	3903-DG
61	Wave Switch (Model 18)...	42-1541
62	Wave Switch (Model 23)...	42-1495
63	Tuning Cond. ...	31-2375
64	Pilot Lamps (Model 18 only)...	34-2064
65	Broadcast Ant. Coil (Model 18 only)...	32-3346
66	Compensator (single section, Model 18 only)...	31-6308
67	Wave Switch (Model 18)...	42-1541
68	Mica Cond. (1650 mmfd., Model 18 only)...	5877
69	Short Wave Ant. Coil (Model 18 only)...	32-3351

Miscellaneous Parts Models 18, 23

DESCRIPTION	Part No.
Bezel (Dial)...	27-4842
Bezel (Push Button)...	27-4843
Line Cord...	L-3199C
Clip (Osc. Coil Mtg.)...	28-5003
Scale...	27-5507
Drive Cord Assembly (Pointer)...	31-2382
Drive Cord Assembly (Tuning Cond.)...	31-2400
Insulating Bushing (Drive Shaft)...	27-9437
Knob (Push Button)...	27-4824
Knob...	27-4332
Pilot Lamp Socket Assembly...	38-9908
Pointer...	56-1479
Rubber Hose (Tuning Cond. Drive)...	27-9432

DESCRIPTION	Part No.
Spring (Tuning Drive Cord)...	28-8751
Spring (Pointer Drive Cord)...	28-8953
Spring (Drive Shaft Grounding)...	28-8955
Screw (Bezel Mtg.)...	W1834FA26
Speaker (Model 18)...	36-1480
Speaker (Model 23)...	36-1496
Socket (5 prong)...	27-6035
Socket (6 prong)...	27-6036
Socket (Loktal)...	27-6131
Socket (Octal)...	27-6120
Tab Kit...	40-6502
Tuning Shaft...	56-6052
Tuning Drive Drum Assembly...	38-9883
Washer ("C" Type Tuning Shaft)...	28-2043
Speaker Cable...	41-3491

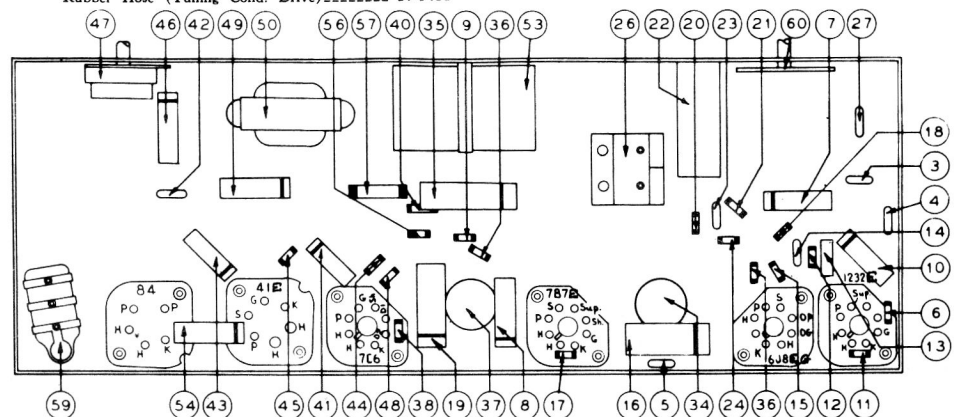


FIG. 2. PART LOCATIONS, UNDERSIDE OF CHASSIS.

ALIGNMENT OF COMPENSATORS

EQUIPMENT REQUIRED

1. **Signal Generator** with a frequency range from 115 to 36,000 K. C., such as Philco Model 177.
2. **Aligning Indicator**, Philco Model 028, vacuum tube voltmeter and circuit tester incorporates sensitive audio output meter and vacuum tube

voltmeter. This instrument can be used as an aligning indicator.

3. **Fibre Handle Screw Driver**, Philco Part No. 45-2610. When using the vacuum tube voltmeter for aligning the receiver, an aligning adaptor Part No. 45-2767 is required.

CONNECTING ALIGNING INSTRUMENTS

1. **Audio Output Meter**: If the Philco Model 028 audio output meter is used, it is connected to the speaker voice coil terminals or the plate and screen terminals of the 7B5E tube. Adjust the meter to use the 0 to 10 volt A. C. scale.

2. **Vacuum Tube Voltmeter**: To use the vacuum tube voltmeter as an aligning indicator make the following connections:

Adjusting I. F. Circuit: Remove the 1232 R. F. tube from its socket and insert the aligning adaptor, then replace the tube in the adaptor. Connect the negative terminal of the vacuum tube voltmeter to the light colored wire which protrudes from the side of the adaptor. Attach the positive terminal of the vacuum tube voltmeter to the black wire of the adaptor.

Adjusting R. F. Circuit: To adjust the R. F. circuit, the aligning adaptor is inserted in the 7C6 second detector tube socket. The vacuum tube voltmeter remains connected to the adaptor as given in the paragraph above. With the voltmeter connected in this manner, a very sensitive indication of the A. V. C. voltage is obtained when the padders are adjusted.

After connecting the aligning adaptors, adjust the compensators as shown in the tabulation below. Locations of the compensators are shown in Schematic Diagram. If the aligning meter pointer goes off scale when adjusting the compensators, reduce the strength of the signal from the generator.

MODELS 15, 16

Operations in Order	SIGNAL GENERATOR		RECEIVER			SPECIAL INSTRUCTIONS
	Output Connections	Dial Setting	Dial Setting	Control Settings	Adjust Compensators	
1	No. 1 Ter. on Loop Panel Note B	460 K. C.	580 K. C.	Vol. Cont. Max. Range Switch "Brdest"	33A, 33B, 28A, 28B	Dial Push-Button "In" Model 16
2	Use Loop, Note C	18.0 M. C.	18.0 M. C.	Vol. Cont. Max. Range Switch "S.W."	27A, 2A, Note D	Check Image at 17,080 M. C.
3	Use Loop, Note C	1500 K. C.	1500 K. C.	Range Switch "Brdest"	25A, 1A	Note A
4	Use Loop, Note C	600 K. C.	600 K. C.	Range Switch "Brdest"	25	Roll Tuning Condenser
5	Use Loop, Note C	1500 K. C.	1500 K. C.	Range Switch "Brdest"	25A, 2A	
6	Use Loop, Note C	18.0 M. C.	18.0 M. C.	Range Switch "S.W."	2A, Note D	Roll Tuning Condenser & Adjust Padder to First Peak from Tight Position

MODELS 18, 23

Operations in Order	SIGNAL GENERATOR		RECEIVER			Special Instructions
	Output Connections to Receiver	Frequency Setting	Dial Setting	Control Settings	Adjust Compensators	
1	High Side to No. 1 Ter. Loop Panel	460 K. C.	580 K. C. No Signal	Range-Switch "Brdest." Vol. Max. Dial Push-Button "In"	37A, 37B, 34A, 34B	See Note B, E
2	Use Loop on Generator Note E Model 18	18.0 M. C.	18.0 M. C.	Range Switch "SW"	61A, 25 Model 18 61A Model 23	Note A. Image should be 920 K.C. below 18 M.C.
3	Use Loop on Generator Note E Model 18	1500 K. C.	1500 K. C.	Range Switch Brdest.	25, 64 Model 18 26, 25 Model 23	
4	Use Loop on Generator Note E Model 18	600 K. C.	600 K. C.	Range Switch Brdest.	26A	Roll tuning condenser
5	Use Loop on Generator Note E Model 18	1500 K. C.	1500 K. C.	Range Switch Brdest.	26, 64 Model 18 26, 25 Model 23	
6	Use Loop on Generator Note E Model 18	18.0 M. C.	18.0 M. C.	Range Switch "SW"	2A Model 23	Roll tuning condenser and adjust Padder to First Peak from Tight Position

NOTE A—DIAL CALIBRATION: In order to adjust the receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this, proceed as follows: Turn the tuning condenser to the maximum capacity position (plates fully meshed). With the condenser in this position, set the tuning pointer on the extreme left index line at the low frequency end of the broadcast scale.

NOTE B—When adjusting the I. F. padders the high side of the signal generator output is connected through a .1 mfd. condenser to terminal No. 1 of the loop terminal panel at the rear of the chassis. The ground or low side of the generator is connected to the chassis of the receiver.

NOTE C—When aligning the R. F. Circuits a loop is made from a few turns of wire and connected to the generator output terminals; the signal generator is then placed two or three feet from the loop in the cabinet.

NOTE D—S. W. Oscillator compensator (27A) is located on top of the tuning condenser. Antenna compensators (1A) and (2A) are located on the loop. When adjusting the "Ant" compensators, the receiver loop should be held in place against the back of the cabinet.

NOTE E—In Model 18 the I.F. dummy is connected to ANT. Terminal and for aligning R.F. circuits a dummy consisting of a 100 mmfd. condenser is connected in series with high side of generator output to ANT. Terminal.

PHILCO PRODUCTS LIMITED

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TORONTO, ONT

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