



SERVICE BULLETIN No. 294 for members of RADIO MANUFACTURERS SERVICE

A PHILCO Service Plan

Electrical Specifications

Model 38-C2, Code 121, is an eleven tube, A.C. operated superheterodyne receiver with three tuning ranges covering the frequencies listed below, and employs the PHILCO AUTOMATIC TUNING DIAL MECHANISM. Additional design features incorporated in this receiver are: Magnetic Tuning Control on the broadcast tuning range; Automatic Volume Control; Bass Compensation; Special Push-pull Pentode Audio Output circuit designed for the reduction of harmonic distortion; Four Point Tone Control; R.F. Circuit completely shielded and contained in one unit; all aligning compensators accessible from the top of the chassis.

POWER SUPPLY:

Voltage	Frequency Cycles	Power Consumption
115	50 to 60	140 Watts
115	25 to 40	140 Watts
115/230	50 to 60	140 Watts

Different transformers are required for operation on the voltages and frequencies listed above. The part numbers for these transformers are listed on page 3. A special transformer for operation on either 115 or 230 volt—50 to 60 cycles A.C. power circuit can be obtained. This transformer is provided with a plug and socket for selection of either voltage rating. Place the plug with arrow pointing toward voltage being used.

FREQUENCY RANGES: Three.

- Range one—530 to 1720 K.C.
- Range two—2.3 to 7.4 M.C.
- Range three—7.35 to 22.0 M.C.

INTERMEDIATE FREQUENCY: 470 K.C.

AUDIO OUTPUT: 7 Watts.

TUBES USED: 6U7G, R.F. Amplifier; 6A8G, Det. Osc.; 6N7G Osc. Control; 6K7G, I.F. Amplifier; 6H6G, Magnetic Tuning Discriminator; 6R7G, 2nd Det., A.V.C., 1st Audio; 6J5G, Audio Phase Inverter; 6J5G, 2nd Audio; Two 6F6G, Output; and 5X4G, Rectifier.

TONE CONTROL: Four Point.

- A. Brilliant—for speech.
- B. Bright—for normal reception of music.
- C. Mellow—first noise-reducing stage.
- D. Deep—Noise-reducing for distant reception.

PHILCO SPEAKER: H-32.

CABINET: Type XX.

Aerial Connections

To obtain the full advantage of the sensitivity of this receiver the Philco High Efficiency Aerial must be used. Connect the aerial as follows:

The aerial terminal panel located on the rear of the chassis, contains three terminals marked "Red," "Blk" and "Gnd". Connect the red and black wires of the aerial lead in (Transmission Line) to the "Red" and "Blk" terminals respectively. Connect the "Gnd" terminal to a good ground source. If a temporary aerial is used, connect it to the "Red" terminal.

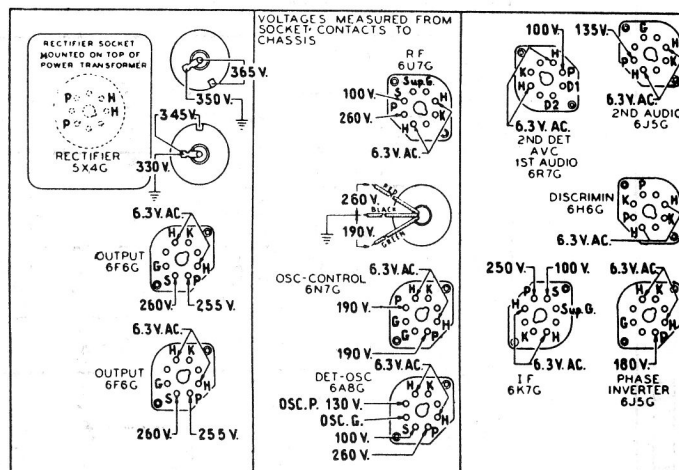


Fig. 1. Underside View of Chassis showing Socket Voltages

The voltages indicated by the arrows were measured with a Philco 025A Circuit Tester, which contains a sensitive voltmeter. Line voltage 115 A.C.—Volume control minimum—Dial set at point where no signal is present—Range Switch in broadcast position.

Automatic Tuning Mechanism

Service Data

Service data and a complete parts list for the Automatic Tuning Mechanism of this receiver will be found in Service Bulletin 273. When referring to bulletin 273, use the dial parts list for Model 37-310 as the same parts are used on Model 38-C2. There are four automatic dial parts, however, which differ from those shown in bulletin 273. These parts are marked with an asterisk on page 3 of this bulletin.

Service Notes

For reference between illustrations, Parts List, and for replacement of parts, the various diagrams in this bulletin are marked with "circled numbers" indicating a particular part.

Physical views of the R.F. transformers are shown on page 2. Each transformer is marked with the corresponding schematic diagram circled number. The connections of the R.F. transformer are numbered to indicate the connecting points in the circuit diagram which are correspondingly marked.

The colors of the I.F. transformer leads are marked on the schematic diagram.

Range switch lugs are marked with a letter and number—example (A2)—indicating the connecting point in the circuit diagram. Each range switch section is marked with a letter indicating the position of the section from the rear of the chassis. Section "A" is used in the oscillator circuit. Section "B" the "RF" circuit, and Section "C" the antenna circuit.

The colors of the connections on the power transformer and speaker unit are also marked on the schematic diagram.

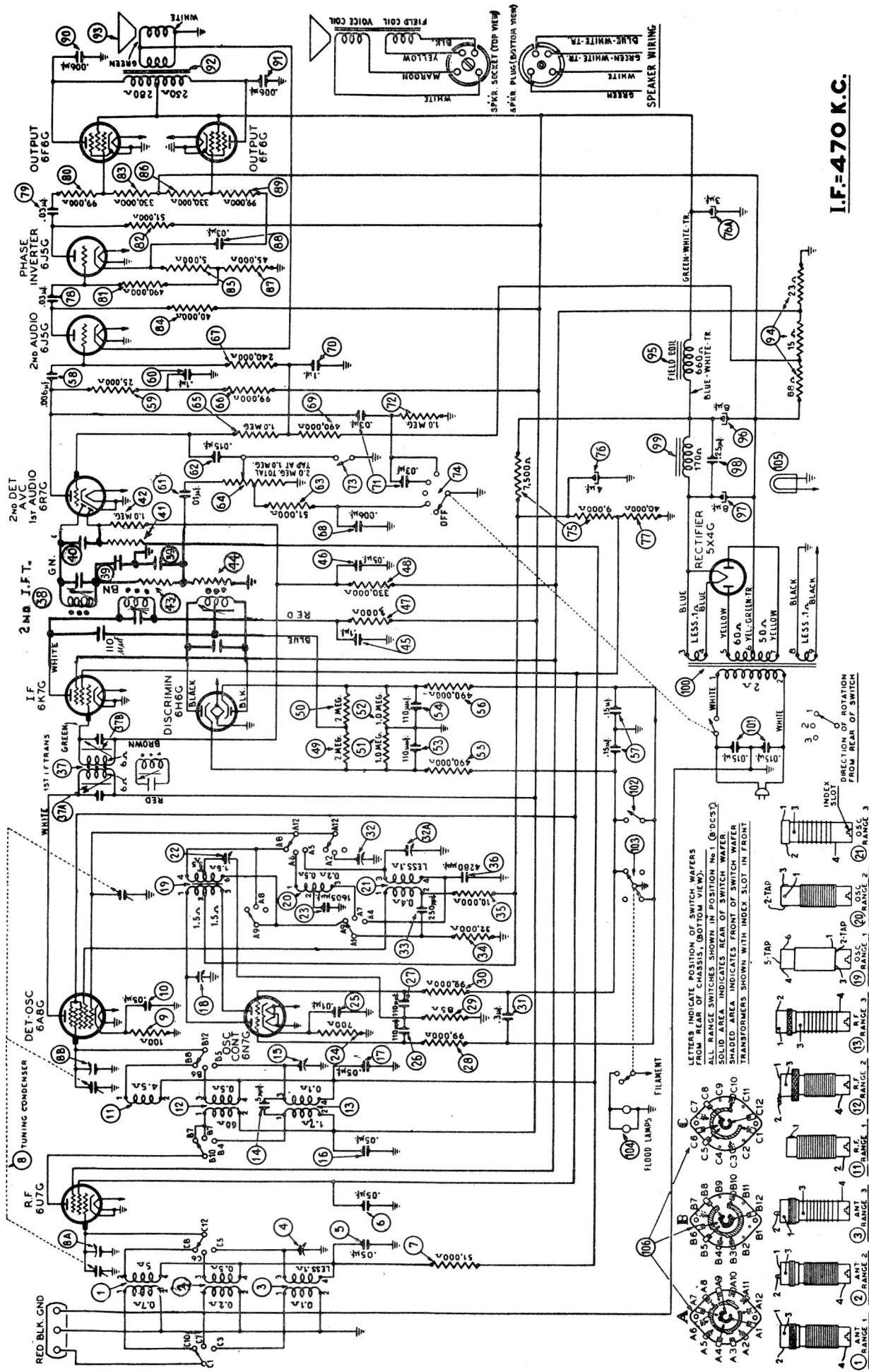


Fig. 2. Schematic Diagram

Model 38-C2, Code 121

I.F.=470 K.C.

Replacement Parts

Schem. No.	Description	Part No.
1	Antenna Transformer (Range 1).....	32-2575
2	Antenna Transformer (Range 2).....	32-2576
3	Antenna Transformer (Range 3).....	32-2577
4	Compensator (Range 1).....	31-6160
5	Cond. (.05 mfd tubular).....	30-4519
6	Cond. (.05 mfd .05 mfd, Bakelite).....	3615DG
7	Resistor (51,000 ohms, 1/2 watt).....	32-351344
8	Tuning Condenser Assembly.....	31-2075
9	Resistor (100 ohms, 1/2 watt).....	33-110344
10	Condenser (.05 mfd, tubular).....	32-2979
11	R.F. Transformer (Range 1).....	32-2982
12	R.F. Transformer (Range 2).....	32-2985
13	R.F. Transformer (Range 3).....	30-1097
14	Compensator (.5 mfd, Mica).....	31-6212
15	Compensator (R.F. Range 3).....	30-4519
16	Condenser (.05 mfd, tubular).....	31-6212
17	Compensator Osc. (Range 1).....	32-2373
18	Osc. Transformer (Range 1).....	32-2383
19	Osc. Transformer (Range 2).....	32-2386
20	Osc. Transformer (Range 3).....	31-6151
21	Compensator (Range 1 Series).....	31-6201
22	Resistor (700 ohms, 1/2 watt).....	33-170344
23	Condenser (.01 mfd, tubular).....	30-4479
24	Condenser (110 mfd, Mica).....	30-1031
25	Condenser (110 mfd, Mica).....	33-39344
26	Resistor (99,000 ohms, 1/2 watt).....	33-39344
27	Resistor (85 ohms, 1/2 watt).....	33-085344
28	Resistor (99,000 ohms, 1/2 watt).....	33-39344
29	Resistor (99,000 ohms, 1/2 watt).....	6287DU
30	Condenser (.3 mfd, Bakelite).....	31-6211
31	Compensator (2 sections).....	30-1032
32	Resistor (250 mfd, Mica).....	33-32344
33	Resistor (32,000 ohms, 1/2 watt).....	33-310344
34	Resistor (10,000 ohms, 1/2 watt).....	31-6202
35	Condenser (4280 mfd, Mica).....	32-2741
36	1st I.F. Transformer.....	32-2742
37	2nd I.F. Transformer.....	8035DG
38	Condenser (110-110 mfd, Mica).....	30-1031
39	Condenser (110 mfd, Mica).....	33-510344
40	Resistor (1.0 meg., 1/2 watt).....	33-510344
41	Resistor (1.0 meg., 1/2 watt).....	33-510344
42	Resistor (1.0 meg., 1/2 watt).....	33-510344
43	Resistor (51,000 ohms, 1/2 watt).....	33-351344
44	Resistor (330,000 ohms, 1/2 watt).....	33-433344
45	Condenser (.1 mfd, tubular).....	30-4455
46	Condenser (.05, Bakelite).....	3615SG
47	Resistor (1000 ohms, 1/2 watt).....	33-210344
48	Resistor (330,000 ohms, 1/2 watt).....	33-433344
49	Resistor (2.0 meg., 1/2 watt).....	33-520344
50	Resistor (2.0 meg., 1/2 watt).....	33-520344
51	Resistor (1.0 meg., 1/2 watt).....	33-510344
52	Resistor (1.0 meg., 1/2 watt).....	33-510344
53	Condenser (110 mfd, Mica).....	30-1031
54	Condenser (110 mfd, Mica).....	30-1031
55	Resistor (490,000 ohms, 1/2 watt).....	33-449344
56	Resistor (490,000 ohms, 1/2 watt).....	33-449344
57	Cond. (.15 mfd—15 mfd, Bakelite).....	6287DG
58	Condenser (.006 mfd, tubular).....	30-4445
59	Resistor (25,000 ohms, 1/2 watt).....	33-325344
60	Condenser (.01 mfd, tubular).....	30-4455
61	Condenser (.01 mfd, tubular).....	30-4479
62	Condenser (.01 mfd, tubular).....	32-351344
63	Resistor (51,000 ohms, 1/2 watt).....	33-5233
64	Volume Control.....	33-5233
65	Resistor (1.0 meg., 1/2 watt).....	33-510344
66	Resistor (93,000 ohms, 1/2 watt).....	33-39344
67	Resistor (240,000 ohms, 1/2 watt).....	33-42344
68	Condenser (.006 mfd, tubular).....	30-4467
69	Resistor (490,000 ohms, 1/2 watt).....	33-449344
70	Condenser (.1 mfd, tubular).....	30-4499
71	Cond. (.03 mfd—.03 mfd, Bakelite).....	8318DU
72	Resistor (1.0 meg., 1/2 watt).....	33-510344
73	Audio Shorting Switch (Parts (6) and (16) Bulletin 273).....	42-1303
74	Tone Control.....	42-1303

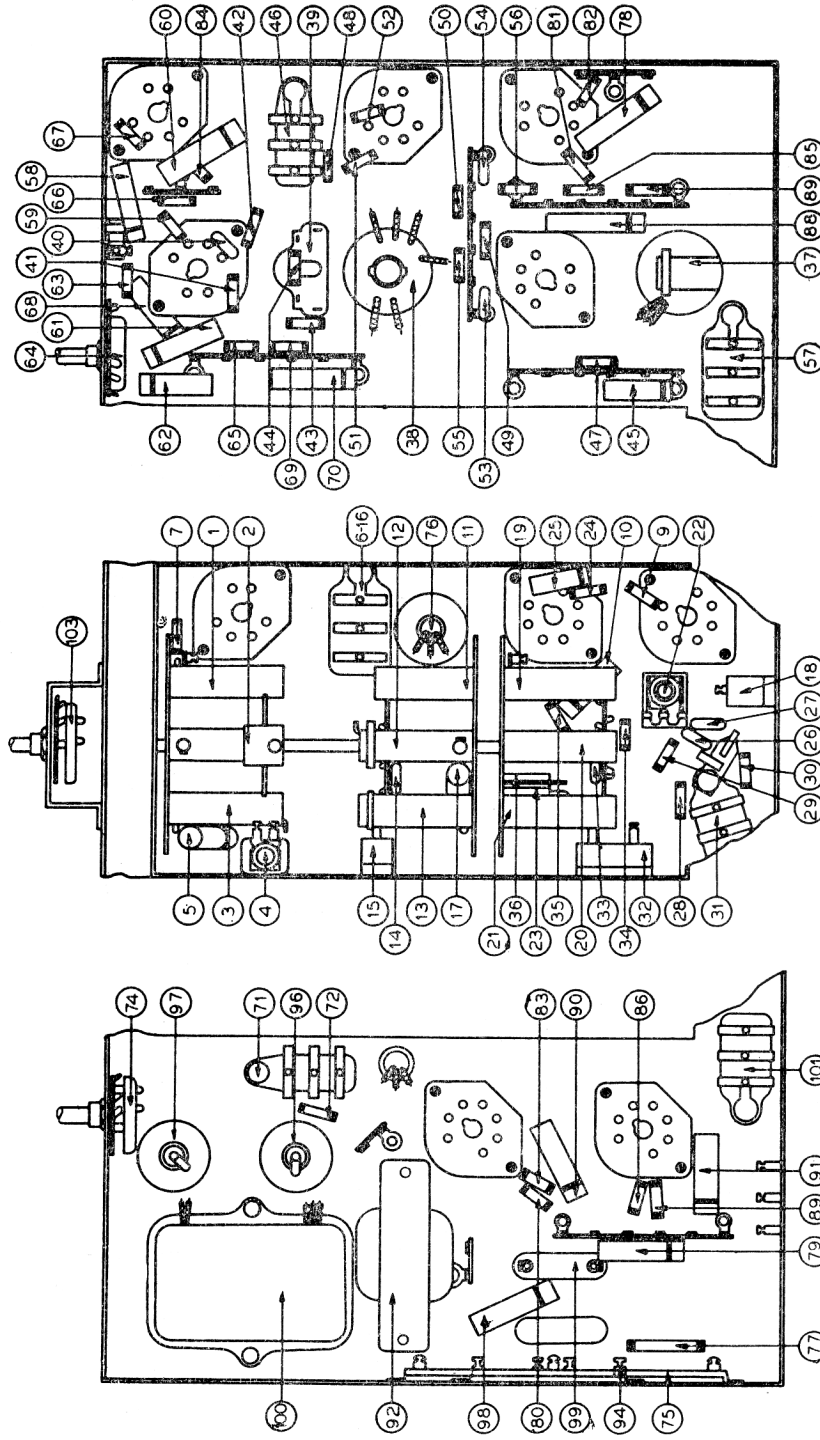


Fig. 3. Part Locations, Underside of Chassis

Schem. No.	Description	Part No.
75	Resistor (7,500 ohms—9,000 ohms Wire Wound).....	33-3320
76	Electrolytic Cond. (4 mfd—3 mfd.).....	30-2243
77	Resistor (40,000 ohms, 1 watt).....	33-340444
78	Condenser (.03 mfd, tubular).....	30-4449
79	Resistor (93,000 ohms, 1/2 watt).....	33-399344
80	Resistor (490,000 ohms, 1/2 watt).....	33-449344
81	Resistor (51,000 ohms, 1/2 watt).....	33-351344
82	Resistor (330,000 ohms, 1/2 watt).....	33-433344
83	Resistor (40,000 ohms, 1/2 watt).....	33-340344
84	Resistor (5,000 ohms, 1/2 watt).....	33-250244
85	Resistor (320,000 ohms, 1/2 watt).....	33-433344
86	Resistor (45,000 ohms, 1/2 watt).....	33-45344
87	Condenser (.03 mfd, tubular).....	30-4449
88	Resistor (99,000 ohms, 1/2 watt).....	33-399344
89	Condenser (.006 mfd, tubular).....	30-4445
90	Condenser (.006 mfd, tubular).....	30-4445
91	Output Transformer.....	32-7754
92	Cone & Voice Coil Assembly.....	36-3801
93	Field & Pot. Assembly.....	36-3961
94	Field & Pot. Assembly.....	30-2211
95	Elec. Cond. (16 mfd.) (25 cycle).....	30-2211
96	Elec. Cond. (60 cycle).....	30-2211
97	Electrolytic Condenser.....	30-2211
98	Cond. (tubular) (25 cycle).....	30-4549
99	Cond. (.25 mfd, tubular) (60 cycle).....	32-7115
100	Power Transformer (115V—50-60 Cycles).....	32-7869
101	Power Transformer (115V, 25-40 cycles).....	32-7870
102	Condenser (.015 mfd—.015 mfd. Bakelite).....	3793DG
103	A.F.C. Shorting Switch.....	45-2330
104	A.F.C. Switch.....	43-1379
105	Plot Lamp Bulb.....	34-2064
106	Wave Switch.....	33-1392
107	Automatic Tuning Mechanism (comp.).....	33-1145
108	Cable (Power).....	41-3830
109	Chip (Speaker).....	31-1961
110	Coupling (Tuning Condenser).....	38-3693
111	Coupling (Range Switch & Mash).....	27-4326
112	Knob (Range Switch).....	27-4326
113	Knob (Tuning).....	27-4331
114	Knob (Vernier).....	27-4331
115	Knob (Tone, Volume).....	27-4332
116	Mfg. Rubber (Chassis).....	27-4564
117	Mfg. Rubber (Rear of R.F. Unit).....	27-4197
118	Mfg. Rubber (Front of R.F. Unit).....	27-4581
119	Shield (R.F. Unit).....	38-8969
120	Shield (Tube) (Square).....	28-2726
121	Shield (Tube) (Round).....	8005
122	Shield Base (Square).....	28-2725
123	Socket Assembly (Pilot Lamp).....	38-9100
124	Socket (6 prong).....	27-6086
125	Socket (7 prong) (6F6G tubes).....	27-6057
126	Speaker H-32.....	27-6087
127	Support (rear of R.F. Unit).....	36-1300
128	Terminal Panel (Antenna).....	38-8923
129	Bezel Assembly.....	38-8746
130	Cover (Back of cabinet).....	38-8833
131	*Cover (handle).....	27-8865
132	*Dial Screen Holder.....	28-5092
133	*Escutcheon Assembly (Station tabs).....	27-5358
134	*These Automatic Tuning Mechanism Parts differ from those shown in Service Bulletin 273.	45-2472

The Genuine PHILCO Replacement Parts listed above must be used to obtain the Accurate Balanced Performance built into this Philco Model

Alignment of Compensators

EQUIPMENT REQUIRED: (1) Signal Generator, having a fundamental frequency range covering the intermediate and tuning frequencies of the receiver. Philco Model 088 Signal Generator which has a fundamental frequency range from 110-20000 K.C. is the correct instrument for this purpose; (2) Output Meter, Philco Model 025A Circuit Tester incorporates a sensitive output meter and is recommended; (3) Philco Fibre Handle Screw Driver, Part No. 27-7059 and Fibre Wrench, Part No. 3164.

OUTPUT METER: The 025A Output Meter is connected to the plate and cathode terminals of one of the 6F6G tubes. Adjust the meter to use the (0-30) volt scale and advance the attenuator control of the generator until a readable indication is noted on the output meter after signal is applied to stage being adjusted.

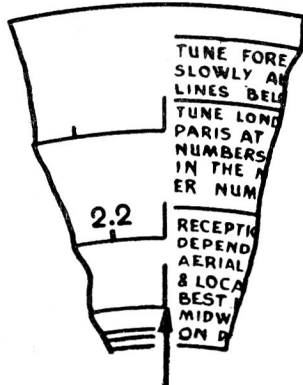
DIAL CALIBRATION: In order to adjust the compensators of this receiver correctly, the dial must be aligned to track properly with the tuning condenser. To do this proceed as follows:

1. Loosen the set screws on the shaft coupling of the tuning condenser. Then turn the tuning condenser until the plates are in the maximum capacity position. Now turn the dial until the glowing beam indicator is on the INDEX LINE at the low frequency end of Range 2. See Fig. 4. With dial and tuning condenser in this position, tighten set screws.
2. Turn the tuning condenser control until the indicator is on the 2.2 M.C. Mark.
3. With the dial in this position, loosen the shaft coupling set screws. Then turn the dial until the indicator is again on the INDEX LINE. Tighten the set screws in this position. Be careful when turning the dial that the position of the tuning condenser is not disturbed.

INTERMEDIATE FREQUENCY CIRCUIT

A. Set the receiver and signal generator controls as follows:

1. Range Switch (Broadcast)
2. Volume Control (Maximum)
3. Magnetic Tuning Switch "out"
4. Tone control & A.C. switch first position.
5. Signal generator dial 470 K.C.



INDEX LINE

Fig. 4. Dial Calibration

Tuning Range: 530 to 1720 K.C.

Range Switch Position	Signal Generator and Receiver Dials	Compensators in Order
1	1550 K.C.	(18), (8B) and (8A)
1	580 K.C.	(22), Roll gang. Note B
1	1550 K.C.	(18), (8B), (8A)

Tuning Range 2.3 to 7.4 M.C.

Range Switch Position	Signal Generator and Receiver Dial	Compensators in Order
2	6.0 M.C.	(32)

Tuning Range 7.35 to 22.0 M.C.

Range Switch Position	Signal Generator and Receiver Dial	Compensators in Order
3	20.0 M.C.	(32A), (15), (4)

Roll Tuning condensers when adjusting (15) and (4). See Note B. Check image at 17.060. See Note A. (32A)

3 20.0 M.C.

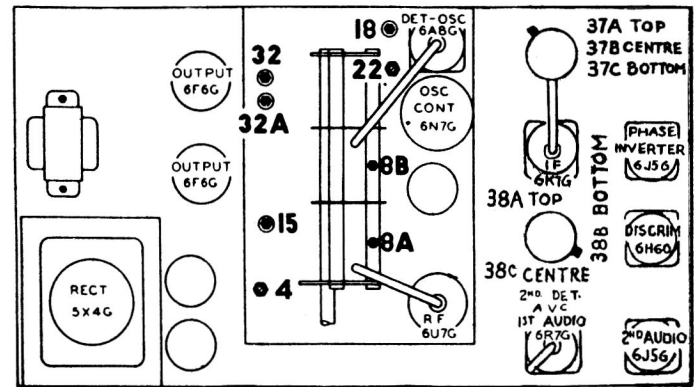


Fig. 5. Compensator Locations

MAGNETIC TUNING CIRCUIT ADJUSTMENTS

1. Set the Magnetic Tuning switch in the "out" position.
2. Turn the signal generator indicator to 1000 K.C. and adjust the "Attenuator" control for a weak signal.
3. Adjust volume control for a readable indication on the output meter.
4. Now tune the receiver dial for maximum output at 1000 K.C. The dial must be tuned very accurately to the 1000 K.C. signal in order to make the following adjustment correctly.
5. Turn the Magnetic Tuning switch "in" and adjust compensator (38B) for maximum output.

The above adjustments are now checked for accuracy as follows:

FREQUENCY TEST

With the 1000 K.C. signal tuned for maximum output turn the Magnetic Tuning control back and forth; that is, from the "out" to "in" position. The reading of the output meter should not change in either position. If the output meter reading changes, the above magnetic tuning circuit adjustments should be repeated.

A further check on the Magnetic Tuning adjustment is to very carefully tune in a broadcasting station and turn the switch from the "out" to the "in" position. With the switch in either position, the tone of the station being received should not change. If a change of tone or hiss develops repeat the above Magnetic Tuning Adjustments.

SENSITIVITY TEST

1. To check the magnetic tuning circuit for sensitivity, turn the magnetic tuning switch to the "out" position, and tune in the 1000 K.C. signal. Then adjust the "attenuator" control of the signal generator for a good audible signal. Approximately 20 volts on the output meter.

2. Now detune the signal (first above and then below) the 1000 K.C. mark to a point at which the signal is weakly heard. At each point turn the magnetic tuning control "on". When the control is turned on the signal should return to normal output strength. If the magnetic tuning circuit does not pull the signal into resonance, the compensator should be carefully readjusted.

NOTE "A"—To accurately adjust the high frequency oscillator compensator to the fundamental instead of the image signal, turn the oscillator compensator to the maximum capacity position (clockwise). From this position slowly turn the compensator counter-clockwise until a second maximum peak is obtained on the output meter. Adjust the compensator for maximum output using this second peak. The first peak from maximum capacity position of the compensator is the image signal and must not be used in adjusting the compensator.

If the above procedure is correctly performed, the image signal will be found (much weaker) by turning the receiver dial 940 K.C. below the frequency being used on any high frequency range.

NOTE "B"—When adjusting the low frequency compensator of Range One (Broadcast) or the antenna and R.F. compensators of the high frequency tuning ranges; the receiver Tuning Condenser must be adjusted (rolled) as follows: First tune the compensator for maximum output, then vary the tuning condenser of the receiver for maximum output about the frequency dial mark. Now turn the compensator slightly to the right or left and vary the receiver tuning condenser for maximum output. If the output reading increases, turn the compensator in the same direction a trifle more, and again vary the tuning condenser for maximum output. If the output decreases, set the compensator in the opposite direction. This procedure of first setting the compensator and then varying the tuning condenser is continued until there is no further gain in output reading.

PHILCO PRODUCTS LIMITED

Toronto

MODEL 38-C2
Supplementary Service Bulletin
to Bulletin #294

Shown on this bulletin are changes which were made during
the various production runs of this model.

Run #2

#30-1032 - 250 Mmfd. condenser was added from
screen grid to ground of the 6U7G tube
in the R.F. Stage, to eliminate a tendency
towards oscillation above 18 Megacycles.

March, 1938.

PHILCO PRODUCTS LIMITED,
Service Department.