



PHILCO

REG. U.S. PAT. OFF.

Service Bulletin No. 222



Model 116B (Code 121)

GENERAL SPECIFICATIONS

Type Circuit: Superheterodyne, with push-pull pentodes connected as triodes in output; output 10 watts; built in connections for Philco All-wave aerial; aerial selector built into and operated by wave-band switch.

Power Supply: Alternating Current. Voltage and frequency as specified on chassis nameplate.

Tubes Used: Eleven (11) Total: 1 type 78 R.F., 1 type 77 1st detector, 1 type 76 oscillator, 2 type 78 I.F., 1 type 37 2nd detector, 1 type 77 1st audio, 1 type 42 driver, 2 type 42 output, 1 type 80 rectifier.

Wave Bands: Five—(1) Shortwave, daytime; (2) Shortwave, night-time; (3) Police and amateur; (4) Standard Broadcast; (5) Longwave (weather forecasts).

Frequency Ranges: Band (1)—9.7-22.5 Megacycles; Band (2)—4.1-10.0 Megacycles; Band (3)—1.5-4.1 Megacycles; Band (4)—540 to 1500 K.C.; Band (5)—150-390 K.C.

Program Control: 5 positions: (1) Mellow, (2) Brilliant, (3) Speech, (4) Normal, (5) noise reducing. Last two positions recommended for foreign short wave stations.

Tuning Meter: Shadow type tuning meter, mounted directly above scale.

Waveband Indicator: Glowing arrow on tuning scale shifts to proper scale when waveband switch is turned.

Automatic Volume Control: Fully effective on all stations.

Bass Compensation: Automatic: Effective when needed.

Tuning Drive: Dual planetary, ball bearing. 80 to 1 ratio for slow-speed tuning, 10 to 1 for main drive.

Intermediate Frequency: 460 K.C.

Power Consumption: 100 watts.

Speaker: Type H-13.

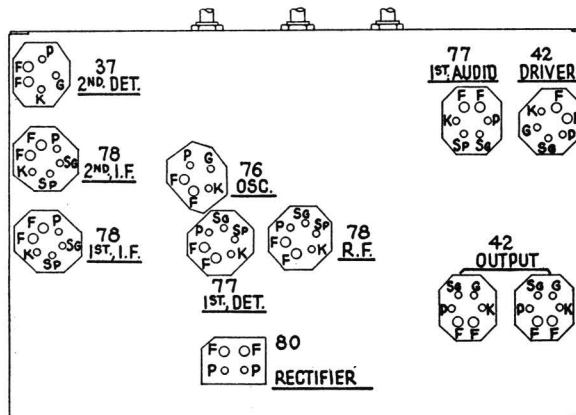


Fig. 1. Tube Sockets as viewed from bottom

Tube Socket Voltages

Measured to Ground—Line Voltage 115

Tube Point	78 R.F.	77 1st Det.	76 Osc.	78 1st I.F.	78 2d I.F.	37 2d Det.	77 1st A.F.	42 Driver	42 Output
P	187	202	75	193	199	0	67	192	279
SG	74	74	...	74	74	..	52	192	279
K	1.8	5.4	5.0	1.8	5.1	..	..	...	...

80 Rect. Cathode—290V.

Above voltages were obtained by using a PHILCO type 025 Circuit Tester (or 048A All-purpose Tester), using test prods applied to underside of chassis. Volume control at minimum; dial at 55; waveband switch standard broadcast (band 4). Use Fig. 1 for test points. H-13 Speaker used.

Power Transformer Data

Terminals	A.C. Volts	Current	Circuit	Color
1-2	120	.....	Primary	White
3-5	720	123 M.A.	Secondary	Yellow
6-7	5.0	2.0 A.	Fil. Rect.	Blue
8-9	6.3	5.0 A.	Filaments	Black
4	...	.....	Center Tap of 3-5	Yellow, Green Tracer

Adjusting Compensating Condensers

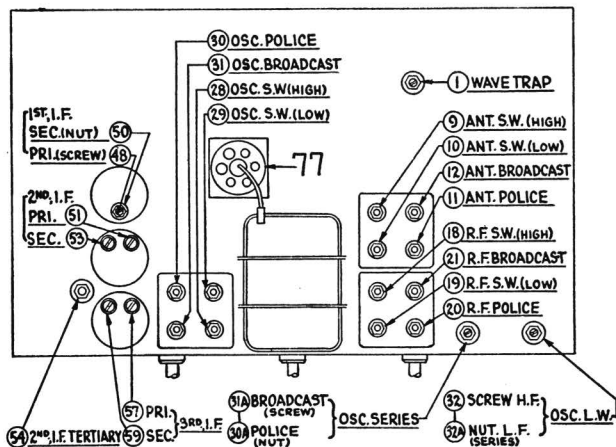


Fig. 2. Locations of Compensating Condensers

Adjustment of compensating condensers in Model 116 requires an accurate signal generator covering long-wave, standard wave, police, and short-wave frequencies. The PHILCO Model 088 All-Wave Signal Generator, having a continuous range of from 100 to 20000 K.C. will be ideal for this purpose.

An output meter is also needed. PHILCO Model 025 Circuit Tester includes a high-grade output meter.

Philco No. 3164 fibre wrench and No. 27-7059 fibre handled screwdriver complete the equipment needed for making these adjustments. The locations of the various compensating condensers is shown in Fig. 2. Connect the output meter to the plate contacts of the output tubes (using the adapters provided with the "025") and set it at the 0-30 volt range.

I.F.—Set the Signal Generator at 460 K.C., and attach its antenna lead to the grid cap of the 77 1st detector tube (having removed the grid clip from the tube). Connect the ground terminal of the Signal Generator to the ground terminal of the set. Turn on the set, turn the waveband switch to

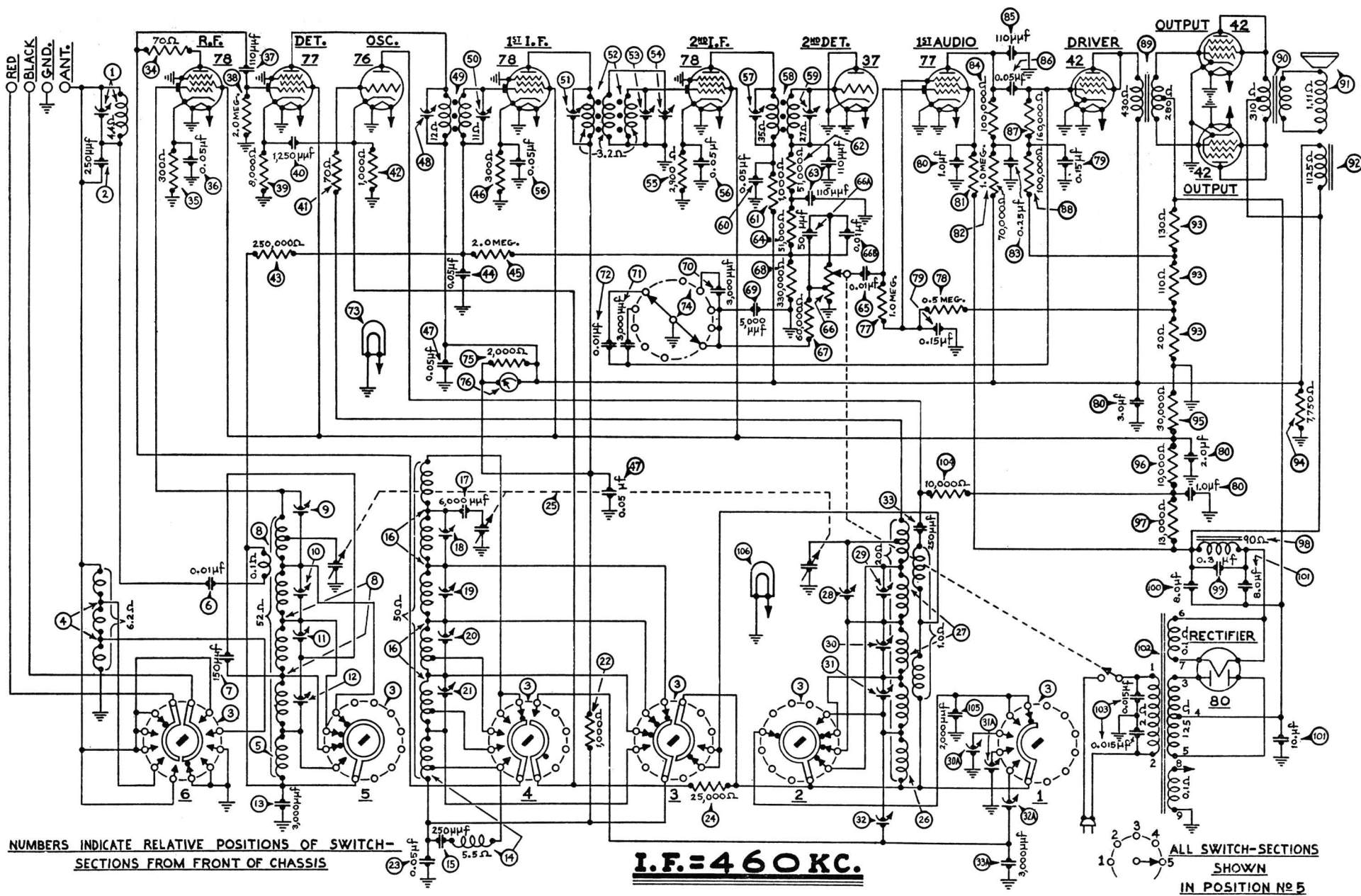


Fig. 3. Schematic Diagram of Model 116-121

Replacement Parts—Model 116—121

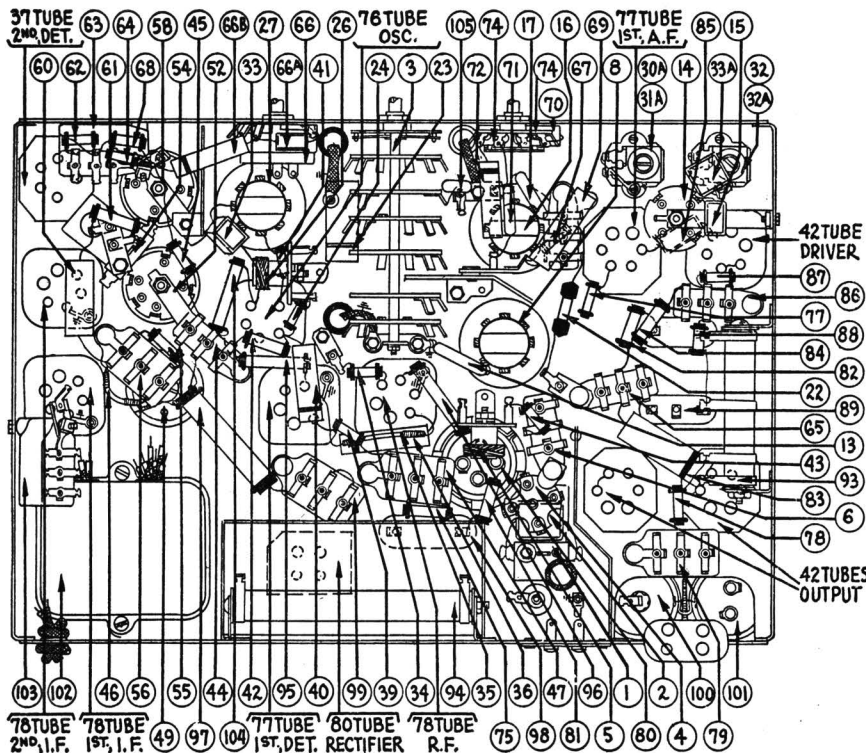


Fig. 4 Bottom View of Chassis

	Description	Part No.	List Price
①	Wave Trap	35-6889	\$1.00
②	Condenser (.00025 Mfd. Mica)	30-1032	.35
③	Waveband Switch	42-1118	2.80
④	Transmission Line Transformer	32-1608	1.00
⑤	Antenna Transformer (Long Wave)	32-1729	.55
⑥	Condenser (.01 Mfd. Bakelite Block)	3903-SU	.25
⑦	Condenser (.000015 Mfd. Mica)	130-1030	.35
⑧	Antenna Transformer (Standard, Police, Shortwave)	32-1735	3.60
⑨	Compensating Condenser (Ant. S.W. High Band)	Part of ⑩	...
⑩	Compensating Condenser (Ant. S.W. Low Band)	Part of ⑪	...
⑪	Compensating Condenser (Ant. Police)	Part of ⑫	...
⑫	Compensating Condenser (Ant. Standard)	Part of ⑬	...
⑬	Condenser (.003 Mfd. Mica)	7301	.45
⑭	R. F. Transformer (Long Wave)	32-1730	1.25
⑮	Condenser (.00025 Mfd. Mica)	30-1038	.35
⑯	R. F. Transformer (Standard, Police, S.W.)	32-1468	2.30
⑰	Condenser (.002 Mfd. Mica)	30-1042	.40
⑱	Compensating Condenser (R.F. Shortwave (High Band))	Part of ⑲	...
⑲	Compensating Condenser (R.F. Shortwave (Low Band))	Part of ⑲	...
⑳	Compensating Condenser (R.F. Police)	Part of ⑲	...
㉑	Compensating Condenser (R.F. Standard)	Part of ⑲	...
㉒	Resistor (1000 ohms) (Brown-Black-Red)	5837	.20
㉓	Condenser (.05 Mfd. Tubular)	30-4123	.35
㉔	Resistor (25000 ohms) (Red-Green-Orange)	33-1013	.20
㉕	Tuning Condenser Assembly	31-1606	5.50
㉖	Oscillator Transformer (Long Wave)	32-1731	.55
㉗	Oscillator Transformer (Standard, Police, Shortwave)	32-1736	3.50
㉘	Compensating Condenser (Osc. S.W., High Band)	Part of ㉘	...
㉙	Compensating Condenser (Osc. S.W., Low Band)	Part of ㉘	...
㉚	Compensating Condenser (Osc. Police)	Part of ㉘	...
㉛	Compensating Condenser (Osc. Police Series)	Part of ㉛	.70
㉜	Compensating Condenser (Osc. Standard)	Part of ㉜	.70
㉝	Compensating Condenser (Osc. Standard Series)	Part of ㉜	.70
㉞	Compensating Condenser (Osc. Longwave)	31-6050	.40
㉟	Compensating Condenser (Osc. Longwave Series)	31-6050	.40
㊱	Condenser (.00025 Mfd. Mica)	5858	.35
㊲	Condenser (.003 Mfd. Mica)	30-1028	.60
㊳	Resistor (70 ohms) (Violet-Black-Black)	33-1129	.20
㊴	Resistor (300 ohms Flexible) (Orange-Black-Brown)	33-3010	.20
㊵	Condenser (.05 Mfd. Tubular)	30-4020	.35
㊶	Condenser (.00011 Mfd. Tubular)	*30-4340	.25
㊷	Resistor (2 Megs.) (Red-Black-Green)	*32-1025	.20
㊸	Resistor (8000 ohms) (Gray-Black-Red)	33-1114	.20
㊹	Condenser (.00125 Mfd. Tubular)	30-4336	.25
㊺	Resistor (70 ohms) (Violet-Black-Black)	33-1129	.20
㊻	Resistor (1000 ohms) (Brown-Black-Red)	5837	.20
㊼	Resistor (240000 ohms) (Red-Yellow-Yellow)	33-1097	.20
㊽	Condenser (.05 Mfd. Bakelite Block)	3615-SG	.35

	Description	Part No.	List Price
⑬	Resistor (2 Megs.) (Red-Black-Green)	33-1025	\$0.20
⑭	Resistor (300 ohms Flexible) (Orange-Black-Black)	33-3010	.20
⑮	Condenser (.05 Mfd. Twin Bakelite Block)	3615-DG	.40
⑯	Compensating Condenser (1st I.F. Primary)	Part of ⑰	...
⑰	First I.F. Transformer	32-1642	2.00
⑱	Compensating Condenser (1st I.F. Secondary)	Part of ⑰	...
⑲	Compensating Condenser (2nd I.F. Primary)	Part of ⑲	31-6023 .85
⑳	Second I.F. Transformer	32-1734	1.85
㉑	Compensating Condenser (2nd I.F. Secondary)	Part of ⑲	31-6028 .85
㉒	Compensating Condenser (2nd I.F. Tertiary)	04000-R	.45
㉓	Resistor (2900 ohms) (Red-White-Red)	5309	.20
㉔	Condenser (.05 Mfd. Twin Bakelite Block)	3615-DG	.40
㉕	Compensating Condenser (3rd I.F. Primary)	Part of ㉕	31-6003 .45
㉖	3rd I.F. Transformer	32-1188	.65
㉗	Compensating Condenser (3rd I.F. Secondary)	Part of ㉕	31-6003 .45
㉘	Condenser (.05 Mfd. Tubular)	30-4123	.35
㉙	Resistor (1000 ohms) (Brown-Black-Red)	5837	.20
㉚	Resistor (51000 ohms) (Green-Brown-Orange)	33-1163	.20
㉛	Condenser (.00011 Mfd. Twin Bakelite Block)	8035-DG	.25
㉜	Resistor (51000 ohms) (Green-Brown-Orange)	33-1163	.20
㉝	Condenser (.01 Mfd. Bakelite Block)	3903-SU	.25
㉞	Volume Control and On-Off Switch (See Note Below)	33-5022	1.45
㉟	Condenser (.00005 Mfd. Mica)	30-1029	.35
㊱	Condenser (.05 Mfd. Tubular)	30-4020	.35
㊲	Resistor (60000 ohms) (Blue-Black-Orange)	33-1181	.20
㊳	Resistor (330000 ohms) (Orange-Orange-Yellow)	33-1200	.20
㊴	Condenser (.004 Mfd. Tubular)	30-4185	.40
㊵	Condenser (.004 Mfd. Tubular)	30-4185	.40
㊶	Condenser (.003 Mfd. Mica)	30-1028	.60
㊷	Condenser (.01 Mfd. Tubular)	30-4169	.30
㊸	Pilot Lamp (Shadow Tuning Meter)	Part of ㊸	42-1119 .55
㊹	Tone Control Switch	6984	.20
㊺	Resistor (2000 ohms) (Red-Black-Red)	45-2083	2.50
㊻	Shadow Tuning Meter	33-1096	.20
㊼	Resistor (1 Meg.) (Brown-Black-Green)	6097	.20
㊽	Resistor (500000 ohms) (Yellow-White-Yellow)	6287-DG	.40
㊾	Condenser (.15 Mfd. Twin Bakelite Block)	30-2121	2.50
㊿	Condenser (Electrolytic—1 Mfd., 3 Mfd., 2 Mfd., 1 Mfd.)	4409	.20
1	Resistor (1 Meg.) (Brown-Black-Green)	5385	.20
2	Resistor (70000 ohms) (Violet-Black-Orange)	30-4134	.45
3	Condenser (.25 Mfd. Tubular)	4411	.20
4	Resistor (100000 ohms) (White-White-Yellow)	30-1031	.35
5	Condenser (.00011 Mfd. Mica)	3615-SU	.35
6	Resistor (160000 ohms) (Brown-Blue-Orange)	33-1191	.20
7	Resistor (100000 ohms) (White-White-Yellow)	33-1165	.20
8	Audio Transformer	32-7057	2.75
9	Output Transformer	32-7078	1.40
10	Cone and Voice Coil Assembly (H-13)	02825	1.20
11	Field Coil & Pot Assembly (H-13)	36-3104	2.70
12	B.C. Resistor (Wirewound) (20 ohms, 110 ohms, 130 ohms)	33-3021	.20
13	Resistor (Wirewound) (7750 ohms)	33-3020	.35
14	Resistor (30000 ohms) (Orange-Black-Orange)	7836	.20
15	Resistor (10000 ohms) (Brown-Black-Orange)	3524	.20
16	Resistor (13000 ohms) (Brown-Orange-Orange)	6450	.40
17	Filter Choke	32-7056	2.20
18	Condenser (.3 Mfd. Bakelite Block)	**6287-DU	.40
19	Condenser (Electrolytic, 8 Mfd.)	††30-2025	1.35
20	Condenser (Electrolytic, 8 Mfd., 10 Mfd.)	30-2045	1.80
21	Power Transformer (115 V. 60 Cycles)	32-7291	7.00
22	Power Transformer (115 V. 25 Cycles)	32-7292	9.25
23	Power Transformer (230 V. 50 Cycles)	32-7293	6.75
24	Condenser (.015 Mfd. Twin Bakelite Block)	3793-DG	.40
25	Resistor (10000 ohms) (Brown-Black-Orange)	3524	.20
26	Condenser (.002 Mfd. Mica)	30-1042	.40
27	Pilot Lamp (Dial)	34-2039	.15
28	Condenser (.006 Mfd. Tubular) (Not shown in Fig. 4)	30-4125	.25
29	Condenser (.006 Mfd. Tubular) (Not shown in Fig. 4)	30-4125	.25
30	Dial Scale	27-5107	.40
31	Dial Mask and Hub Assembly	31-1575	.40
32	Dial Hub	28-7129	.10
33	Dial Spring Clamp	28-2837	.10
34	Socket—4-Prong	27-6042	.10
35	Socket—5-Prong	27-6035	.11
36	Socket—6-Prong	27-6036	.11
37	Speaker Plug Socket	27-6033	.08
38	Knob (Volume, Tone Waveband)	27-4208	.10
39	Knob (Station Selector)	27-4206	.12
40	Knob (Slow Speed)	27-4207	.10
41	Tube Shield	28-2728	.10
42	Tube Shield Base	28-2725	.03
43	A.C. Cord & Plug	L-943A	.60
44	Bezel	28-2936	.40
45	Bezel Glass	27-7890	.60
46	Chassis Mtg. Bolt	W-1496	1.60 per C
47	Chassis Mtg. Washer (Rubber)	27-4201	1.40 per C
48	Chassis Mtg. Bumper (Rubber)	27-4200	3.75 per C

*Mounted on top of chassis.

†Mounted inside ③.

**In 25-cycle model, this is part No. 04357.

††In 25-cycle model, this is part No. 30-2026

Note: Volume Control is 2 meg., tapped at 400,000 ohms

standard broadcast (second position from left) and set dial at 55. Turn condenser ④ (2nd I.F. tertiary) all the way down before adjusting the other I.F. Compensators. Now with the fibre screwdriver, adjust condensers ⑥ and ⑦ (3rd I.F.), ③ and ① (2nd I.F.), and then ⑩ and ④ (1st I.F.) until maximum reading is obtained in the output meter. Turn down the "attenuator" on the signal generator if the output meter needle goes off the scale. Now adjust condenser ④ (2nd I.F. tertiary for maximum reading).

WAVE TRAP—Connect the Signal Generator antenna and ground leads to the antenna and ground posts of the set. Replace the grid clip on the 77 tube cap. With the signal generator operating at 460 K.C. and the set controls adjusted as for I.F., adjust wavetrap ① until the minimum reading is obtained in the output meter.

SHORTWAVE (DAYTIME BAND)—Turn wave band switch to the shortwave (daytime) position (extreme right). Set signal generator at 18 megacycles and dial of set at 18.0 (top scale). Now adjust the oscillator, Antenna, and R.F. shortwave compensators in turn, for maximum reading. These are ⑩, ⑨ and ⑧ respectively.

SHORTWAVE (NIGHT-TIME BAND)—Turn the waveband switch to position 4 (counting from the left). Set the

signal generator and receiver at 9.5 megacycles and adjust the oscillator, antenna and R.F. compensators respectively, in this band for maximum reading. These are ⑩, ⑨ and ⑧.

POLICE AND AMATEUR BAND—Turn the waveband switch to position 3. Set the dial and signal generator at 4.0 megacycles and adjust condensers ⑩, ① and ② respectively for maximum reading.

Set the signal generator at 1600 K.C. and turn the dial to 1.6. Adjust condenser ⑩a (nut), oscillator police series, to maximum reading.

STANDARD BROADCAST BAND—Turn the waveband switch to position 2 (from left). Set the dial and signal generator at 1500 K.C. and adjust condensers ①, ② and ③ for maximum reading.

Set the dial and signal generator at 600 K.C. and adjust condenser ①a (screw), broadcast series, for maximum reading.

LONGWAVE BAND—Turn waveband switch to position 1 (left). Set the dial and signal generator at 340 K.C. and adjust condenser ② (screw) to maximum. This is the upper end of the longwave (low frequency) band. Finally, set the dial and signal generator at 175 K.C. and adjust condenser ②a (nut) for maximum reading. This is the lower end of the longwave band.

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