



## SERVICE BULLETIN No. 310 for members of RADIO MANUFACTURERS SERVICE

A PHILCO Service Plan

## SPECIFICATIONS

### Model 39-3116

**TYPE CIRCUIT:** Philco Model 39-3116, code 121, is a 14-tube receiver employing a superheterodyne circuit with three tuning ranges for reception of standard and short wave broadcast stations and Philco Mystery Control for Electric Automatic Tuning of eight (8) standard broadcast stations. The Philco Mystery Control also controls the volume and turns the set "off" without any connections between the receiver and control unit. In addition, other features of design are—Automatic Volume Control; Continuously Variable Tone Control; Bass Compensation, Degenerative Push-pull Pentode Audio Output Circuit, and Compensators selected for minimum drift.

**POWER SUPPLY:** 115 volts, 25-40 & 50-60 cycles.

**POWER CONSUMPTION:** 190 watts.

**TUNING RANGES:** 540 to 1720 K.C.; 1.7 to 5.8 M.C.; 5.8 to 18 M.C.

**I.F. FREQUENCY:** 460 K.C.

**PHILCO TUBES USED:** Receiver—6K7EG, R.F. Amplifier; 6A8EG, First Detector Oscillator; 78E, I.F. Amplifier; 6Q7G, Second Detector, A.V.C. and first Audio; 37, Phase Inverter; two (2) 42E, Audio Output, and one 80, Rectifier.

**Mystery Control Amplifier**—78E, First Control Amplifier; 6J7EG, Second Control Amplifier; 6J5G, A.V.C.;

6ZY5G, and a 2A4G, Thyatron Rectifier.

**Mystery Control Unit**—One type 30.

**AUDIO OUTPUT:** 10 watts.

**AERIAL AND GROUND:** To obtain maximum performance from this receiver, the Philco Safety Aerial, Part No. 40-6370, should be used. The antenna circuit of this receiver is especially designed for use with this aerial. When installing the aerial, care should be taken to keep the aerial lead-in wire away from the horizontal inductor coil located in the bottom of the cabinet.

Do not coil up any excess lead-in and drop it in the back of the cabinet. Run the aerial lead-in directly to the "Ant" terminal post on the back of the receiver. A good ground connection should be made to the terminal post marked "Gnd." When no ground connection is used, the link on the terminal panel on rear of set should be adjusted to connect "Gnd" terminal with terminal to which link is attached.

A line filter is shipped with this receiver. It is a .5 mfd. condenser in a self-contained unit, which is to be connected between the receiver and the power line. This is necessary to prevent interference in the power line from interfering with the operation of the Mystery Control amplifier.

CABINET DIMENSION:	Height	Width	Depth
Console .....	36 3/4"	34 3/4"	14 3/4"
Mystery Control .....	5 1/2"	7 1/4"	9 1/8"

### Adjusting Mystery Control for Reception of Stations

The procedure for setting up stations on the Mystery Control receivers is similar to the procedure followed in setting up Philco Electric Automatic Tuning Models. The eight (8) stations, however, are automatically dialed by the remote control unit instead of by pushing buttons.

To set up stations on Mystery Tuning, proceed as follows:

1. Select and remove the desired eight (8) station call letters from the station tab card supplied with the receiver. Insert the station tabs in the apertures (windows) of the bezel. The lowest frequency station is placed in the first window on the left, and the remaining station tabs in the order of increasing frequency.
2. Connect a Model 177 Signal Generator to the "Ant" and "Gnd" terminals of the receiver, set the Signal Generator with modulation "On." Turn the range selector switch to "Broadcast" and tune in the lowest frequency station. This should be between 540 and 1030 K.C. Then adjust the Signal Generator to the frequency of the station until a beat note is heard.
3. Leaving the Signal Generator connected, turn the Range Selector Disc of the receiver to "Automatic". Now, using a padding screw driver, adjust the first 540 to 1030 K.C. oscillator padder (bottom row of holes) at the rear of the chassis, until the station identified by the modulated signal of the generator

is tuned in to maximum signal. Next, adjust the first 540 to 1030 K.C. Antenna Padder (top row of holes) for maximum signal.

4. Turn the Signal Generator off the station frequency and readjust the "Ant" and "Osc" Padders for maximum output. This should be done with the volume control adjusted for low volume. This procedure is repeated for each of the remaining stations. The next station, of course, will be the next highest in frequency, that is within the 540 to 1030 K.C. range of the second set of padders. The Third Station is adjusted by the third set of padders under 670 to 1160 K.C. and the remaining stations in the order of increasing frequency.
5. Now, insert the small call letter tab of the first station in the third aperture of the bezel on the remote Mystery Control unit. Celluloid tabs are also supplied to be placed over each call letter. The remaining call letter tabs are then placed in the order of increasing frequency around the bezel from right to left (counter clockwise).
6. Insert the "loud" and "soft" tabs in the first and second apertures on the right hand side of the bezel. See instructions supplied with each model for dialing stations and controlling volume.

## Replacement Parts Model 39-3116

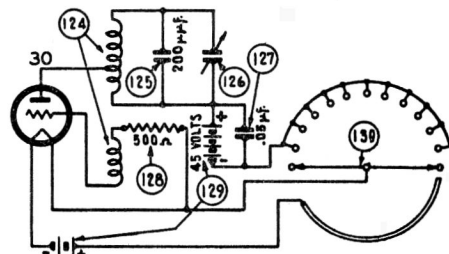
No.	Description	Part No.	No.	Description	Part No.	No.	Description	Part No.
1	Antenna transformer (Broadcast).....	32-3056	70	Electrolytic cond. (18 mfd. 475 v.).....	30-2200	126	Air padder (Primary inductor).....	31-6268
2	Antenna transformer (Police).....	32-3053	71	Field coil (replace speaker).....	36-1450	127	Tubular condenser (.05 mfd.).....	30-4519
3	Antenna transformer (Short-wave).....	32-3055	72	Resistor.....	33-3364	128	Resistor (500 ohm, 1/2 watt).....	33-150344
4	Compensator (Antenna short-wave).....	31-6212	73	Power transf. 115 v. 50-60 cycles.....	32-8001	129	Mystery pack.....	41-8016
5	Tubular condenser (.05 mfd.).....	30-4519		115 v. 25-40 cycles.....	32-8017	130	Pulsar unit.....	38-9704
6	Resistor (51,000 ohm, 1/2 watt).....	33-351344	74	By-pass condenser (.5 mfd. (A.C. plug).....	34-2210	131	Stepper unit (25 cycle).....	38-9816-2
7	Resistor (2.0 meg. 1/2 watt).....	33-520344	75	Pilot lamp (Bullseye).....	32-2064		(60 cycle).....	38-9816-6
8	Tubular condenser (.1 mfd.).....	30-4455	76	Pilot lamp resistor (16 ohm, 1 watt).....	33-016431			
9	Resistor (8,000 ohm, 1/2 watt).....	33-280344	77	Pilot lamp (Dial).....	34-2064			
10	Tuning condenser.....	31-2308	78	Filament transf. 115 v. 50-60 cycles.....	32-7993			
11	Tubular condenser (.05 mfd.).....	30-4123		115 v. 25-40 cycles.....	32-8016			
12	R.F. transformer (Broadcast).....	32-2370	79	Motor transf. 115 v. 50-60 cycles.....	32-7990			
13	R.F. transformer (Police).....	32-3054		115 v. 25-40 cycles.....	32-8015			
14	R.F. transformer (Short-wave).....	32-3046	80	Volume control motor 60 cycle.....	35-1151			
15	Mica condenser (5 mmfd.).....	30-1097		25 cycle.....	35-1152			
16	Compensator (R.F. short-wave).....	31-6212	81	Rotary selector switch.....	42-1468			
17	Tubular condenser (.05 mfd.).....	30-4519	82	Resistor (10 ohm).....	33-3363			
18	Resistor (51,000 ohm, 1/2 watt).....	33-351344	83	Pilot lamp assem. (Station indicator).....	33-9709			
19	Oscillator transformer (Broadcast).....	32-2120	84	Switch (Manual volume control).....	42-1469			
20	Oscillator transformer (Police).....	32-3052	85	Resistor (150 ohm, 1/2 watt).....	33-115344			
21	Oscillator transformer (Short-wave).....	32-3051	86	Tubular condenser (.1 mfd.).....	30-4499			
22	Compensator strip (oscillator).....	31-6266	87	Tubular condenser (.1 mfd.).....	30-4499			
23	Compensator (Oscillator 600 Kc.).....	31-6230	88	Electrolytic cond. 60 cycle (30 mfd.).....	30-2361			
24	Tracking condenser (1230 mmfd.).....	31-6262		25 cycle (45 mfd.).....	30-2377			
25	Tracking condenser (3425 mmfd.).....	31-6263	89	Push-button padder unit.....	31-6264			
26	Mica condenser (250 mmfd.).....	30-1032	90	Electric push-button transf. assembly.....	32-3091			
27	Resistor (32,000 ohm, 1/2 watt).....	33-332344	90A	Oscillator coil No. 1 (540-1030 Kc.).....	32-3042			
28	Resistor (10,000 ohm, 1/2 watt).....	33-310344	90B	Oscillator coil No. 2 (540-1030 Kc.).....	32-3042			
29	Resistor (10,000 ohm, 1 watt).....	33-310444	90C	Oscillator coil No. 3 (670-1160 Kc.).....	32-3042			
30	Resistor (5,000 ohm, 2 watt).....	33-250544	90D	Oscillator coil No. 4 (670-1160 Kc.).....	32-3042			
31	Electrolytic cond. (4 mfd. 250 v.).....	30-2334	90E	Oscillator coil No. 5 (900-1470 Kc.).....	32-3041			
32	Mica condenser (250 mmfd.).....	30-1032	90F	Oscillator coil No. 6 (900-1470 Kc.).....	32-3041			
33	1st I.F. Transformer.....	32-3089	90G	Oscillator coil No. 7 (1100-1600 Kc.).....	32-3041			
34	Tubular condenser (.01 mfd.).....	30-4572	90H	Oscillator coil No. 8 (1100-1600 Kc.).....	32-3041			
35	Resistor (1.0 Meg., 1/2 watt).....	33-510344	91	Silver mica condenser (370 mmfd.).....	30-1110			
36	Resistor (330,000 ohm, 1/2 watt).....	33-433344	92	Silver mica condenser (370 mmfd.).....	30-1110			
37	Resistor (330,000 ohm, 1/2 watt).....	33-433344	93	Bakelite block condenser (.025 mfd.).....	7653SG			
38	2nd I.F. Transformer.....	32-2645	94	Resistor (150 ohm).....	33-3362			
39	Mica condenser (110 mmfd.).....	30-1031	95	Electrolytic condenser (16 mfd.).....	30-2379			
40	Tubular condenser (.01 mfd.).....	30-4479	96	R.F. Choke.....	32-1281			
41	Mica condenser (50 mmfd.).....	30-1029	97	Tubular condenser (.05 mfd.).....	30-4123			
42	Volume control.....	33-5300	98	Bakelite block condenser (.025 mfd.).....	7653SG			
43	Resistor (70,000 ohm, 1/2 watt).....	33-370344	99	Tubular condenser (.1 mfd.).....	30-4499			
44	Tubular condenser (.004 mfd.).....	30-4334	100	Tubular condenser (.5 mfd.).....	30-4551			
45	Resistor (2.0 Meg., 1/2 watt).....	33-520344	101	Resistor (4,000 ohm, 1 watt).....	33-240444			
46	Tubular condenser (.015 mfd.).....	30-4529	102	Resistor (51,000 ohm, 1/2 watt).....	33-351344			
47	Resistor (1.0 Meg., 1/2 watt).....	33-510344	103	3rd control amplifier coil.....	32-3158			
48	Tubular condenser (.1 mfd.).....	30-4527	104	Tubular condenser (.02 mfd.).....	30-4516			
49	Resistor (99,000 ohm, 1/2 watt).....	33-399344	105	Mica condenser (550 mmfd.).....	30-1092			
50	Tubular condenser (.01 mfd.).....	30-4169	106	Resistor (750,000 ohm, 1/2 watt).....	33-475344			
51	Resistor (490,000 ohm, 1/2 watt).....	33-449344	107	Resistor (1.0 Meg., 1/2 watt).....	33-510344			
52	Resistor (5,000 ohm, 1/2 watt).....	33-250344	108	Resistor (99,000 ohm, 1/2 watt).....	33-399344			
53	Resistor (45,000 ohm, 1/2 watt).....	33-345344	109	Tubular condenser (.05 mfd.).....	30-4123			
54	Tubular condenser (.02 mfd.).....	30-4481	110	Resistor (99,000 ohm, 1/2 watt).....	33-399344			
55	Tone control.....	33-5287	111	Tubular condenser (.05 mfd.).....	30-4123			
56	Tubular condenser (.01 mfd.).....	30-4572	112	Tubular condenser (.05 mfd.).....	30-4444			
57	Tubular condenser (.01 mfd.).....	30-4572	113	Resistor (1.5 Meg., 1/2 watt).....	33-510344			
58	Resistor (51,000 ohm, 1/2 watt).....	33-351344	114	Tubular condenser (.05 mfd.).....	30-4519			
59	Resistor (490,000 ohm, 1/2 watt).....	33-449344	115	2nd control amplifier coil.....	32-3087			
60	Resistor (490,000 ohm, 1/2 watt).....	33-449344	116	Tubular condenser (.05 mfd.).....	30-4444			
61	Resistor (240,000 ohm, 1/2 watt).....	33-424344	117	Control amplifier sensitivity control.....	33-5295			
62	Tubular condenser (.1 mfd.).....	30-4499	118	Resistor (300 ohm, 1/2 watt).....	33-130344			
63	Tubular condenser (.01 mfd.).....	30-4501	119	1st control amplifier coil.....	32-3086			
64	Output transformer.....	32-7996	120	Silver mica condenser (130 mmfd.).....	30-1122			
65	Cone & Voice Coil assembly.....	36-4089	121	Air padder (Secondary inductor).....	31-6268			
66	Tubular condenser (.01 mfd.).....	30-4501	122	Second. inductor (Mystery tuning).....	40-6415			
67	Resistor (3,000 ohm, 1/2 watt).....	33-230344	123	Wave Switch.....	42-1451			
68	Resistor (1.0 Meg., 1/2 watt).....	33-510344	124	Primary inductor (Mystery tuning).....	32-3097			
69	Electrolytic cond. (25 mfd. 300 v.).....	30-2360	125	Silver mica condenser (200 mmfd.).....	30-1115			

## Miscellaneous Parts

Bezel assembly (Cabinet).....	38-9732
Bezel screws.....	W-1835
Dial drive cord (Short).....	31-2315-01
Dial drive cord (Long).....	31-2320-01
Dial scale.....	27-6428
Dial pointer.....	56-1033
Bakelite disc (Tuning).....	27-4766
Bakelite disc (Volume).....	27-4765
Bakelite disc (Tone).....	27-4764
Bake. disc assembly (Range switch).....	38-9786
Pilot lamp assembly (Bullseye).....	38-9712
Pilot lamp assembly (Dial-Left).....	38-9711
Pilot lamp assembly (Dial-Right).....	38-9694
Pilot lamp assembly (Station tabs).....	38-9709
Socket (4 prong).....	27-6042
Socket (5 prong).....	27-6035
Socket (6 prong).....	27-6036
Socket (6 prong octal).....	27-6086
Socket (7 prong octal).....	27-6057
Socket (7 p. octal—special for 6A8EG).....	27-6099
Speaker—complete.....	36-1450
Spring (Dial drive cable).....	28-8913
Washer (Keyed washer—tuning drum shafts).....	56-1029
Washer (Spring washer—tuning drum shafts).....	6717
Tab Kit.....	40-6434
Speaker Cable.....	41-3474
Line Cord.....	L-2839

## Mystery Control Unit

Bezel.....	56-1240
Bezel Screws.....	W-2138
Cap (Tuning disc).....	27-4793
Disc (Tuning).....	27-4792
Finger stop (Tuning disc).....	27-4794
Screw (Finger stop).....	W-2139
Spacer (Finger stop).....	27-4795
Socket (4 prong for type 30 tube).....	27-6119



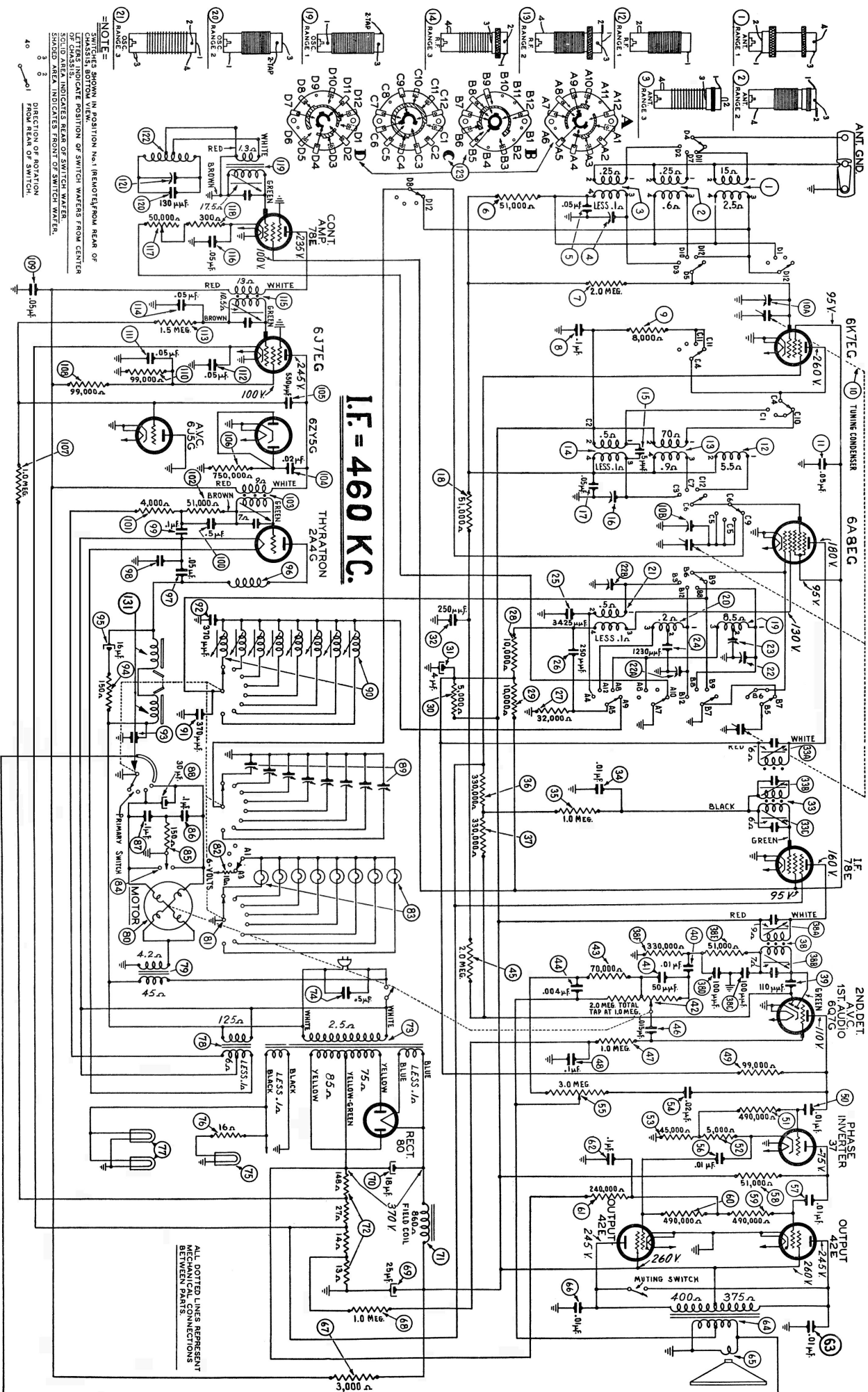


FIG. 2—Model 39-3116 Diagram and Socket Voltages  
Socket Voltage Measured for Socket Contacts to Chassis, Line Voltage 115 V.-A.C. Volume Minimum, Range Selector (Broadcast)

# Alignment of Compensators and Mystery Control Model 39-3116

## EQUIPMENT REQUIRED:

- (1) Signal Generator; Philco Model 177.
- (2) Output Meter, Philco Model 026 Circuit Tester.
- (3) Philco Fiber Handle Screw Driver, Part No. 27-7059, and Fiber Wrench, Part No. 7696.

## OUTPUT METER:

The Philco 026 Output Meter is connected to the plate terminals of the type 42 tubes and adjusted for the 0 to 30 V.A.C. scale. After connecting the output meter, adjust the compensators in the order as shown in the tabulations below. Locations of the Compensators are shown in Fig. 4. If the output meter pointer goes off scale when adjusting the compensators, reduce the strength of the signal from the generator.

## RADIO RECEIVER CIRCUIT ADJUSTMENTS—Model 39-3116

Operation	SIGNAL GENERATOR			RECEIVER			Special Instructions
	Output Connections to Receiver	Dummy Antenna (Note A)	Dial Setting	Dial Setting	Control Setting	Adjust Compensators	
1	78E Grid	.1 mfd.	460 K.C.	600 K.C.	Vol. Max. Range Switch Brdcast.	38A, 38B	Turn Out 38B Full
2	6A8EG Grid	.1 mfd.	460 K.C.	600 K.C.	Vol. Max. Range Switch Brdcast.	33C, 33A, 33B, 38B	Note B
3	Antenna and Ground	150 mmfd.	1550 K.C.	1550 K.C.	Vol. Max. Range Switch Brdcast.	22, 10B, 10A	
4	Antenna and Ground	150 mmfd.	600 K.C.	600 K.C.	Vol. Max. Range Switch Brdcast.	23	Roll gang
5	Antenna and Ground	150 mmfd.	1550 K.C.	1550 K.C.	Vol. Max. Range Switch Brdcast.	22	
6	Antenna and Ground	400 ohms	5.0 M.C.	5.0 M.C.	Vol. Max. Range Switch Police	22A	
7	Antenna and Ground	400 ohms	18.0 M.C.	18.0 M.C.	Vol. Max. Range Switch Short Wave	22B, 16, 4	Note C

**NOTE A**—The “Dummy Antenna” consists of a condenser connected in series with the signal generator output lead (high side). Use the capacity as specified in each step of the above procedure.

**NOTE B**—Dial Calibration: In order to adjust the receiver correctly the dial must be aligned to track properly with the tuning condenser. To adjust the dial, proceed as follows: With the tuning condenser closed (maximum capacity), set the dial pointer on the extreme left index line at the low frequency end of the broadcast scale. The arrangement of the drive cable is shown in Fig. 3.

**NOTE C**—See page 6 for Control frequency Amplifier adjustments.

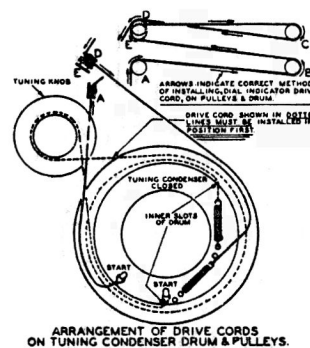


FIG. 3—Arrangement of Dial Pointer and Cables Models 39-3116

USE PHILCO TEST EQUIPMENT FOR BEST RESULTS

Model 177 All Wave Signal Generator

Model 026 Circuit Tester



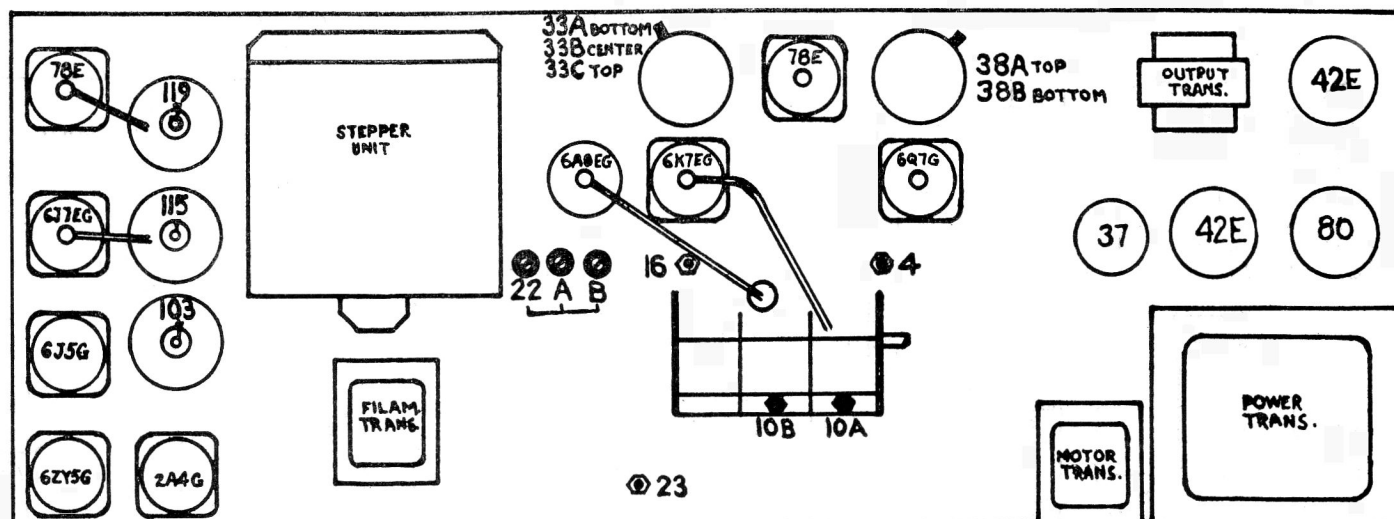


FIG. 4—Locations of Compensators—Model 39-3116

## Adjusting Control Frequency Amplifier

The Mystery Control receivers are shipped with five (5) different control frequencies which range from 350 to 400 K.C. These are identified by code numbers appearing on the serial number ticket and on the rear of the chassis. These code numbers and frequencies are as follows:

- Code 5—355 K.C.
- Code 6—367 K.C.
- Code 7—375 K.C.
- Code 8—383 K.C.
- Code 9—395 K.C.

The purpose of the different control frequencies is to prevent interaction between two Mystery Control receivers which are on the same floor or are exceptionally close together. When several Mystery Control receivers are to be located close together, it will be necessary to use different control frequencies to avoid interaction between the receivers. In order to prevent interaction between receivers, there should be a difference of 20 K.C. between their control frequencies.

If three receivers are to be operated at the same time and are closely situated, it will be advisable to adjust the control frequency of the first set to 355 K.C., the second set to 375 K.C. and the third to 395 K.C.

When realigning or changing the control frequency of the Mystery Control circuit, a Philco Model 177 Signal Generator with a coil of wire (about 4 or 5 turns—12" in diameter) attached to the output terminals is required. The leads between the coil of wire, and Signal Generator should be long enough so that the coil of wire can be placed near the large secondary inductor in the bottom of the receiver cabinet.

With this apparatus, the Control Frequency is adjusted as follows:

1. With the temporary coil of wire in the center of (or near) the secondary inductor, the control frequency to which the Mystery Control Amplifier is tuned can be determined by tuning the Signal Generator between 350 and 400 K.C. When the Signal Generator is tuned to the control frequency, the Thyatron (2A4G) tube will glow (blue haze). If this frequency is to be used, leave the Signal Generator indicator at this point or turn the indicator to any other frequency desired between 350 and 400 K.C.
2. When the control frequency is selected, turn the sensitivity control (117) located on the left rear of the chassis—towards the position marked "extreme".

Using the 2A4G Thyatron tube as a resonance indicator, adjust padders (103), (115), (119) for maximum signal. This will be indicated by the brilliance of the glow in the 2A4G Thyatron tube. As the padders are adjusted, gradually turn the sensitivity control to the "near" position or reduce the output from the Signal Generator. When the padders are correctly adjusted to maximum, the Thyatron will glow with the sensitivity control (117) at the "near" position and with a very weak signal from the Signal Generator.

3. Next, adjust the padding condenser (121) on the secondary inductor located in the bottom of the receiver. The padding condenser is located in one corner of the secondary inductor and is encased in a cardboard container. This padding condenser should be carefully adjusted for maximum glow in the 2A4G tube. Use the weakest signal possible from the Signal Generator that will cause the 2A4G to glow. Also, have the sensitivity control as close as possible to the "near" position. Extreme care should be used in adjusting the padder to the exact point of resonance, as the secondary inductor is a very sharply tuned circuit. After adjusting the circuit, remove the Signal Generator and loop from the receiver.
4. The Mystery Control unit is now adjusted as follows:
  - A. Dial any one of the stations indicated on the remote unit by pulling the selector to the "Stop" position. Then, as the dial is released at the "Stop," press the "Stop" down and hold it in this position.
  - B. Holding the "Stop" in this position, bring the Mystery Control unit close to the receiver. Using the padding wrench, tune the padding screw (126) located on the bottom of the unit until the 2A4G Thyatron in the receiver glows at full brilliance.

Now, turn the sensitivity control on the receiver towards the "near" position until a point is reached where the 2A4G tube almost stops glowing. Then, readjust the padder (126) of the unit again for maximum brilliance in the 2A4G tube. The Mystery Control unit should now be adjusted to the same frequency as the control frequency in the receiver.

# PHILCO PRODUCTS LIMITED

Parts and Service Division

Toronto, Canada