

RADIO MANUFACTURERS SERVICE

Lesson Number Seven

INSTRUCTIONS
For Adjusting
COMPENSATING CONDENSERS
in
1934-35
PHILCO RADIO RECEIVERS



Prepared by

PHILCO SERVICE DEPARTMENT

Especially for Members of

Radio Manufacturers Service

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INSTRUCTIONS

For Adjusting Compensating Condensers in 1934-35 PHILCO RADIO RECEIVERS

Introduction

Radio Manufacturers Service Lesson Number 1, published in December, 1933, contained complete instructions for adjusting the compensating condensers in all Philco receivers manufactured up to that time. This Lesson, No. 7, contains similar instructions for Philco models brought out during 1934. The Serviceman who has Lessons 1 and 7 will therefore have adjusting instructions for all Philco receivers, both current and past models, up to February 1935.

Equipment necessary for performing the adjustments covered in this Lesson, includes the following, all of which are illustrated on the opposite page:-

(1) Signal Generator for standard broadcast frequencies (including police frequencies). The Philco Model 024 is recommended as being efficient, compact and rugged.

(2) Short-wave signal generator—for adjusting short-wave compensators in all-wave sets and most of the “standard and short-wave” (two-band) sets. The Philco model 091 crystal controlled short-wave signal generator is recommended. This has a fundamental frequency of 3.6 megacycles, any harmonic (multiple) of which may be used for adjusting.

(3) Output meter. Two types are indicated on the opposite page. The type 012 shadow output meter indicates output by a shadowmeter similar to that used in the larger Philco receivers. The type 025 circuit tester contains a needle type meter and in addition to functioning as an output meter, it is designed for measurements of voltage (AC or DC), current, resistance, capacity, and also continuity testing; in fact it is a complete testing unit.

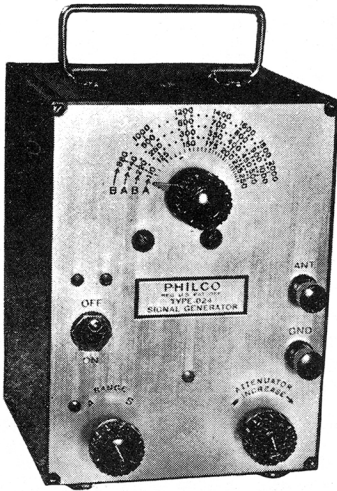
Both the 012 and 025 are furnished complete with the necessary adapters for making a quick connection to the output tube or tubes in the receiver to be adjusted.

Model 048-A is dual unit including both the 024 and 025 instruments mounted in a beautiful portable mahogany case with removable lid.

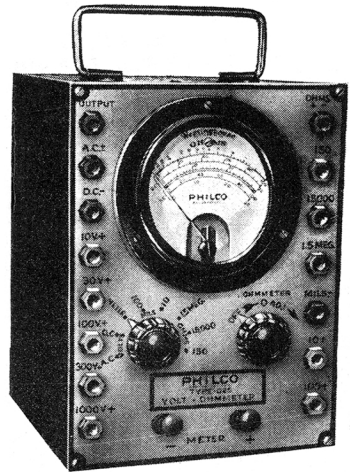
(4) Padding wrench and screwdriver, for the actual adjusting operations. Philco fibre padding wrench Part No. 7696 retails for 35c and Part No. 3164 (a smaller lighter wrench) lists for 20c. The fibre handle screwdriver, Part No. 27-7059 lists for 60c.

Points to Remember When Making Adjustments

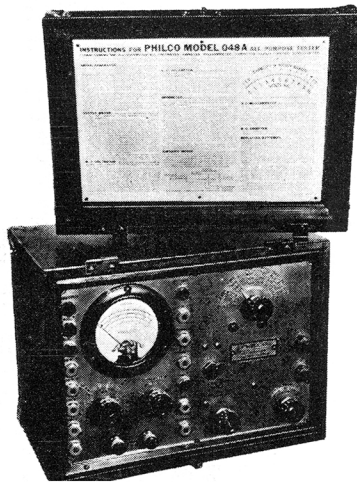
1. Follow ALL instructions carefully.
2. Connect output meter to plate and cathode of output tube in sets with single output tube, and to the plates of both output tubes in “push-pull” or double output tube sets.
3. Be sure the receiver and signal generator are turned “on”.
4. Adjust attenuator on signal generator so that approximately a half scale reading is obtained on the output meter.
5. Remember that in most sets, some of the adjustments are made with antenna lead from signal generator connected to grid of first detector tube and others with it connected to the antenna post. Do not forget to change as called for in the instructions.
6. Make adjustments in the correct order as per instructions if proper results are expected.
7. Consult your Philco Distributor's Service Manager if you experience any difficulty.



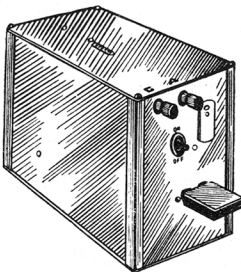
Philco
Signal Generator
Model 024



Philco
Circuit Tester
Model 025



Philco
New All-Purpose
Set Tester
Model 048A



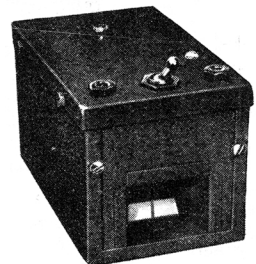
Philco
Short-Wave
Signal Generator
Model 091



Fibre Wrench



Insulated Screw Driver



Philco
Shadow Output Meter
Model 012

MODEL 16 (Codes 125, 126, 127)

Adjustment of Intermediate Frequency

1. Remove the antenna connection from the receiver, disconnect the grid clip from the first detector (type 77 tube), and connect the "ANT" output terminal of the broadcast signal generator to the grid cap of this tube; connect the "GND" terminal of the signal generator to the "GND" terminal of the receiver.

2. Connect the 0 to 20 volt range of the output meter to the plate prongs of the two output tubes or to the two bottom prongs of the speaker plug.

3. Adjust the signal generator to a frequency of 460 K.C. Place the receiver in operation with the dial turned to the low frequency end of the broadcast band, wave band switch to extreme left, and with the volume control adjusted near its maximum setting. Adjust the signal generator attenuator for approximately half-scale reading of the output meter.

4. Using the fibre adjusting screw driver, adjust the I.F. compensating condensers in the following order to give maximum reading in the output meter: ①, ②, ③, ④, ⑤, ⑥, ⑦. (Fig. 1).

Adjustment of Wave Trap

1. Connect the signal generator leads to the antenna and ground terminals of the receiver. Replace the grid clip on the first detector grid cap.

2. Set the wave-band switch of the receiver to the extreme left (broadcast position) (Range No. 1, 550-1500 K.C.), and turn the station selector to 550 K.C.

3. With the signal generator in operation at 460 K.C., adjust the wave-trap ⑧ condenser until a minimum reading is obtained on the output meter. The fibre wrench is used for this adjustment.

Adjustment of High Frequency Padders

1. Leaving the output meter connected to the receiver connect the short-wave signal generator to the antenna and ground terminals of the chassis and place the signal generator in operation.

2. Turn the wave-band switch to Range 4

(extreme right) and adjust the station selector to 18.0 megacycles, at which point the fifth harmonic of the 3600 K.C. signal will be heard. By means of the Philco fibre wrench, adjust the oscillator, R.F. and antenna padders for maximum reading in the output meter and in the order mentioned. These padders are numbered ⑨, ⑩ and ⑪, respectively in figure No. 1. To make certain that the adjustment has been correctly made check the sixth harmonic at 21.6 M.C. on the dial.

3. Turn the wave-band switch to Range 3 (4.1-10.0 M.C.) and adjust the tuning dial to 7.2 M.C. (the second harmonic of the 3600 K.C. signal). Adjust the oscillator, R.F. and antenna padders (⑫, ⑬ and ⑭, respectively) for maximum output. Check the calibration of the dial at the upper portion of the third band by tuning in the image of the 10.8 M.C. signal at approximately 9.9 on the dial. (If there is an appreciable error in calibration at this point, readjust padder ⑫ for maximum output. Return the dial to the 7.2 M.C. position, tuning for maximum output. Readjust padders ⑬ and ⑭.)

4. Turn the wave-band switch to scale No. 2 (1.5-4.0 M.C.) and tune in the fundamental frequency from the signal generator at 3.6 M.C. Adjust padders ⑮, ⑯ and ⑰ for maximum output.

5. At this point it will again be necessary to make use of the broadcast type signal generator. Connect the output of this signal generator to the antenna and ground terminals of the chassis. Turn the station selector dial to 1.5 M.C. (Range 2) and adjust the signal generator to the same frequency (1500 K.C.). Adjust padder ⑱ (nut).

6. Turn the wave-band switch to Range No. 1 (broadcast band) and set the dial at 1500 K.C. Adjust the signal generator to this frequency and adjust padders ⑲, ⑳ and ㉑ for maximum output.

7. Tune the receiver and the signal generator to 600 K.C. and adjust padder ㉒ (screw) for maximum output.

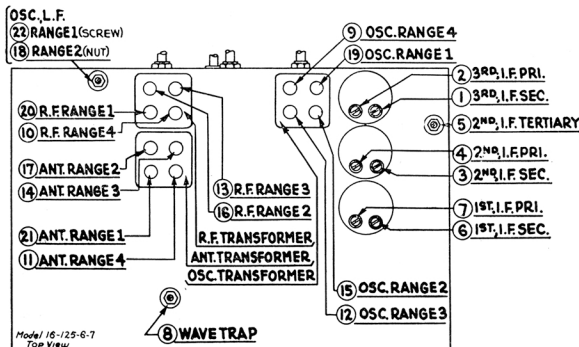


Fig. 1

MODEL 18 (Code 124)

Adjustment of Intermediate Frequency

1. Remove the grid clip from the cap of the 6A7 tube and attach the shielded antenna lead from the broadcast signal generator to the grid cap of the 6A7. Set the switch of the signal generator at 260 K.C. (the I.F. of Model 18) and the dial of the set at 55. Turn on the set and signal generator. Adjust each of the three I.F. compensating condensers in turn to give maximum reading in the output meter (connected as explained on page 2). If the needle on the meter goes off scale, turn down the attenuator adjustment of the signal generator. See Fig. 2 for locations of the I.F. compensating condensers. The first and 2d I.F. primary condensers ① and ③ are accessible through the two holes in the chassis sub-base directly over them. The 1st I.F. secondary ② is accessible from the rear.

Adjustment of Antenna High Frequency, Detector, and Oscillator High Frequency Condensers (④, ⑤, and ⑥)

2. These are located on top of the tuning condenser assembly and adjusted from above. (See Fig. 3). ④ is mounted on the section nearest front of set. Replace the grid cap clip on the 6A7 and connect the antenna lead of signal generator direct to antenna post of set for these adjustments. Set signal generator at 1500 and dial of set at 150.

Oscillator, Low Frequency, Adjustment

3. This adjustment ⑦ is made from rear of chassis (see Fig. 2). Set Signal Generator at 600 and dial of set at 60. The tuning condenser assembly should be "rocked" while this adjustment is being made.

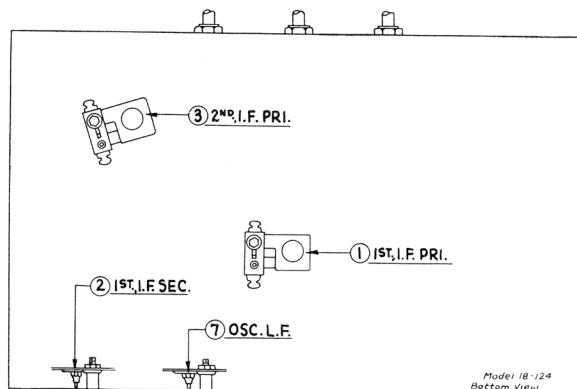


Fig. 2

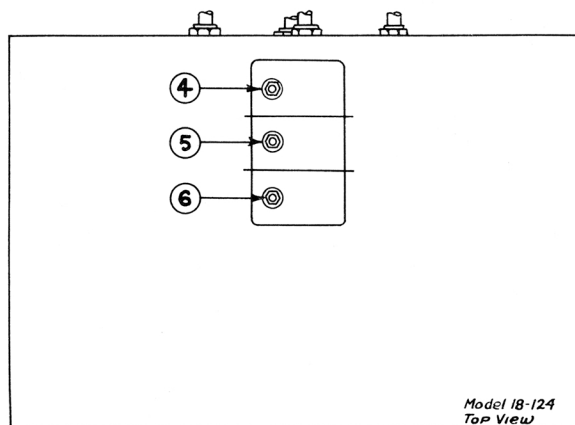


Fig. 3

MODEL 28

The chassis must be removed from cabinet in order to make all adjustments.

Adjustments are made in the following order—

Adjustment of Intermediate Frequency

Remove the grid clip from the type 6-A-7 tube and connect the "ANT" output terminal of the broadcast signal generator to the grid cap of the tube. Connect the "GND" terminal of the signal generator to the receiver chassis.

Connect the output meter adapter leads to the plate and cathode prongs of the type 43 tube. Set the signal generator at 460 K.C. (the intermediate frequency of Model 28) and with the receiver and signal generator turned on, the wave band switch at left and dial at 600 K.C., adjust each of the I.F. compensating condensers in turn, to give maximum response in the output of the receiver. The three pairs of I.F. compensating condensers are located one pair at the top of each of the three I.F. transformer shields. These are the three metal "cans" near the rear of the chassis. Each of the transformers has a dual compensating condenser mounted at its top, and accessible through a hole in the top of the coil shield. In the dual compensators, the Primary circuit is adjusted by turning the screw; the Secondary circuit is adjusted by turning the hex-head nut.

Adjustment of Wave Trap

Replace the grid clip upon the Detector-Oscillator tube (Type 6-A-7). Connect the output

from the signal generator directly to the antenna terminal of the receiver. Set the Wave-Band Switch of the receiver to the standard broadcast band (left-hand position) and the Station Selector at the low frequency (540 K.C.) end. Adjust the Wave Trap condenser to give MINIMUM response to a 460 K.C. signal from the signal generator. The Wave Trap (7) is located at rear and underneath the chassis, and is shown in Figure 4. It is reached from the rear of the chassis by inserting the fibre wrench through the hole near left-hand rear corner of chassis.

Antenna and Oscillator "High" and "Low" Frequency Adjustments

The "antenna" and "oscillator H.F." compensators are located on top of the tuning condenser assembly, reached from above.

Set the signal generator at 1500 K.C., tune in this signal on the set and adjust the antenna compensator (8) (nearest tuning control) to give maximum reading in the output meter.

Next adjust the oscillator H.F. condenser (9) (located on the other section of tuning condenser) to maximum reading.

Finally, set the signal generator at 600, tune in this signal and adjust the "oscillator L.F." condenser, located underneath chassis (10) in Fig. 4) to maximum reading. This adjustment is reached through the hole in top of chassis, between the two electrolytic condensers (left-hand end of chassis when facing rear).

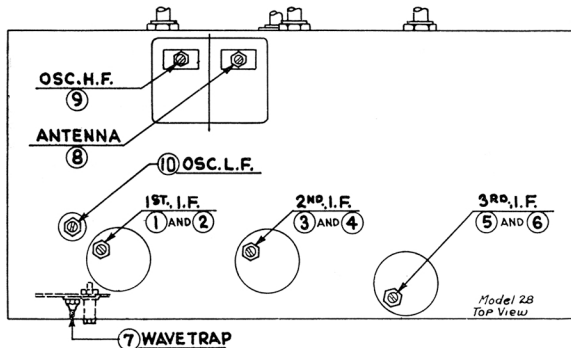


Fig. 4

MODEL 29

Adjustments are made in the following order:

Adjustment of Intermediate Frequency

Remove the grid clip from the type 6-A-7 tube and connect the "ANT" output terminal of the signal generator to the grid cap of the tube. Connect the "GND" terminal of the signal generator to the "GND" terminal of the receiver chassis.

Connect the output meter as explained on page 2. Set the signal generator at 460 K.C. (the intermediate frequency of Model 29) turn wave-band switch of receiver to left and dial to 600 K.C. Turn receiver and Signal Generator "ON". Adjust each of the I.F. compensating condensers in turn, to give maximum response in the output of the receiver. The three pairs of I.F. compensating condensers are located, one pair at the top of each of the three I.F. transformer shields. These are the metal "Cans" near the rear of chassis. Each of these transformers has a dual compensating condenser mounted at its top, and accessible thru a hole in the top of the coil shield. In the dual compensators, the Primary circuit is adjusted by turning the screw; the Secondary circuit is adjusted by turning the hex-head nut.

Adjustment of Wave Trap

Replace the grid clip upon the Detector-Oscillator tube (Type 6-A-7). Connect the out-

put leads from the Signal Generator directly to the antenna and ground terminals of the receiver. Set the wave-band switch of the receiver to the standard broadcast band (left hand position) and the Station Selector at the low frequency (540 K.C.) end. Adjust the Wave Trap condenser to give MINIMUM response to a 460 K.C. Signal from signal generator. The Wave Trap is located at rear and underneath the chassis, and is shown in Figure 6. It is reached from the rear of the chassis, thru hole at right hand end of set base.

Detector, and Oscillator—"High" and "Low" Frequency Adjustments

The "Antenna" and "Oscillator H.F." compensators are located on top of the tuning condenser assembly, reached from above.

Set the signal generator at 1500 K.C., tune in this signal on the set, and adjust the antenna compensator (nearest tuning control), to give maximum reading in the output meter.

Next adjust the oscillator H.F. condenser, located on the other section of tuning condenser, to maximum reading. Finally set the signal generator at 600, tune in this signal and adjust the oscillator L.F. condenser, located underneath chassis (see Fig. 6) to maximum reading. This adjustment is reached thru the hole in top of chassis, between the two electrolytic condensers (left-hand end of chassis when facing rear).

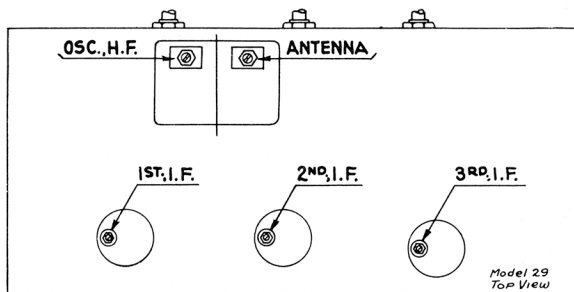


Fig. 5

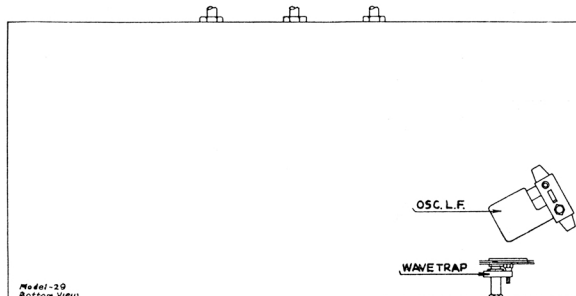


Fig. 6

MODEL 32

Adjustment of Intermediate Frequency

Remove the grid cap clip from the type 36 (type 77 in later sets) tube and connect the shielded antenna lead from the signal generator to the grid cap. Connect the ground lead from signal generator to ground post of set.

The intermediate frequency is 260 kilocycles.

Connect the output meter as explained on page 2. Set the signal generator frequency switch at 260 K.C., turn it and the receiver "on" and adjust the attenuator of the signal generator so as to get a half scale deflection on the meter. Now with the fibre hex wrench, adjust each of the I.F. condensers in turn so as to obtain maximum reading in the meter. (See Fig. 7).

The high frequency and low frequency compensating condensers are now re-aligned. Figure 8 shows the location of these compensating condensers. Before making these adjustments replace the grid clip on the 36 (77 in later sets) tube, and connect the antenna and ground leads from the signal generator direct to the antenna and ground posts of set.

High Frequency Compensating Condenser Adjustment

The High Frequency compensating condenser is first adjusted. This adjustment is made with the signal generator set at 1400 kilocycles. Adjust dial of Receiver to 140. Next the Detector and Antenna Condensers, also located on the tuning condenser assembly, should be adjusted, with the signal generator still operating at 1400. It may be necessary to readjust the attenuator on the signal generator for these adjustments.

Low Frequency Compensating Condenser Adjustment

The last adjustment is that of the low frequency (L.F.) compensating condenser which is accessible from above through the hole in chassis alongside the tuning condenser assembly. This adjustment is made with the signal generator set to give a 700 K.C. signal, and the Receiver dial at 70.

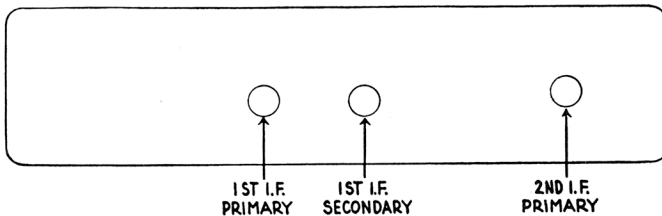


Fig. 7

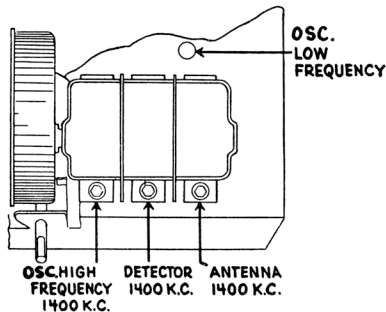


Fig. 8

MODEL 34

Do not attempt to adjust the compensating condensers mounted upon sections numbered 3 and 4 of the Tuning Condenser Assembly. These have been adjusted, and sealed, at the factory.

Phileo Model 024 Signal Generator which covers broadcast and police band frequencies, is recommended for the adjustment of the intermediate frequency and low frequency compensating condensers.

Phileo Model 091 crystal-controlled Signal Generator is recommended for the high frequency adjustments. It gives an accurate and constant 3600 kilocycle (3.6 megacycle) signal, the harmonics of which include the necessary high

Adjustment of Wave Trap

2. Replace the grid clip upon the Detector-Oscillator tube (Type 1C6). Connect the output leads from the signal generator directly to the antenna and ground terminals of the receiver. Set the Wave-Band Switch of the receiver to the standard broadcast band (Range 1) and the Station Selector at the low frequency (520 K.C.) end. Adjust the Wave Trap condenser to give MINIMUM response to a 460 K.C. signal from the signal generator. The Wave Trap is located at rear and underneath the chassis, and is shown in Figure 9. It is reached from the rear of the chassis.

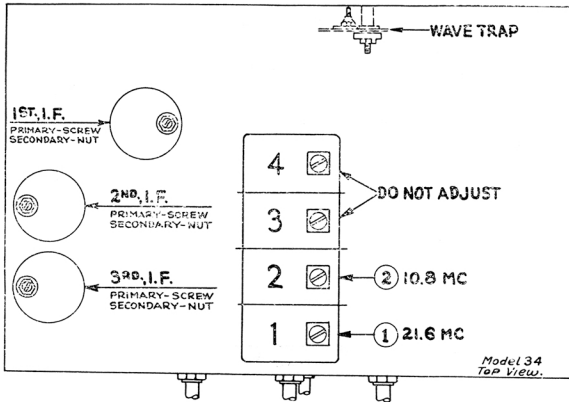


Fig. 9

frequencies for adjusting the compensating condensers in the high frequency circuits.

Adjustment of Intermediate Frequency

1. Remove the grid clip from the type 1C6 tube and connect the "ANT" output terminal of the broadcast signal generator to the grid cap of the tube. Connect the "GND" terminal of the signal generator to the "GND" terminal of the receiver chassis.

Connect the output meter as explained on page 2. Set the signal generator at 460 K.C. (the intermediate frequency of Model 34) and adjust each of the I.F. compensating condensers in turn, to give maximum response in the output of the receiver. The location of the I.F. compensating condensers is shown in Figure 9. Each of these transformers has a dual compensating condenser mounted at its top, and accessible thru a hole in the top of the coil shield. In the dual compensators, the Primary circuit is adjusted by turning the screw; the Secondary circuit is adjusted by turning the hex-head nut.

Adjustment of Dial Frequencies

3. Model 34 has four separate frequency bands or ranges, each obtained by one of the four positions of the wave-band switch. There is a compensating condenser for each range, which must now be adjusted. In the following procedure, the frequency ranges referred to, and obtained by the different positions of the switch are:

- Range 1..... 520 K.C.—1500 K.C.
- Range 2..... 1.5 M.C.—4.0 M.C.
- Range 3..... 4.0 M.C.—11.0 M.C.
- Range 4..... 11.0 M.C.—23.0 M.C.

The Model 091 (or equivalent) short-wave signal generator is used for these adjustments.

Connect the output terminals of the Model 091 or equivalent Signal Generator, to the "ANT" and "GND" terminals of the receiver chassis. Set the Wave-Band Switch at Range 4, and the Station Selector at 21.6 M.C. The sixth harmonic of the 3.6 M.C. crystal in the Model 091 Signal Generator is picked up at this point. Adjust the

MODEL 38 (Code 123)

The I.F. or intermediate frequency of the set is 460 K.C. Refer to Fig. 11 for locations of compensating condensers.

Adjustment of Intermediate Frequency

Set signal generator at 460 K.C. Remove grid clip from cap of 1A6 tube and connect antenna lead from signal generator to cap of tube, connect ground lead to ground post of set. Set dial of receiver at 55 and wave band switch at left. See that set is connected to batteries and Volume control full "on." Connect output meter to primary terminals of output transformer (on chassis). Turn "on" the receiver and signal generator. Adjust the four I.F. compensating condensers ①, ②, ③ and ④ to give maximum response in the output meter. These adjustments are all made from the rear of the chassis through holes in sub-base.

Antenna High Frequency and Oscillator High Frequency (standard wave) Adjustments

These are condensers ⑤ and ⑥ located on top of the tuning condenser assembly and adjusted from above. Set signal generator at 1500. Replace grid clip on cap of 1A6 tube and connect

antenna and ground leads from signal generator direct to antenna and ground posts of set. Turn dial of set to 150 and adjust condensers ⑤ and ⑥ for maximum reading in output meter.

Oscillator Low Frequency (standard wave) Adjustment

Set signal generator at 600 and turn dial of set to 60. Adjust condenser ⑦, reached from rear of chassis, to give maximum reading in output meter.

Antenna High Frequency and Low Frequency (police band) Adjustment

Turn wave band switch to the right. Set signal generator at 2000 and dial at 2.0 (lower scale). Adjust condenser ⑧ to give maximum response in output meter. Now turn dial to 1.5 and set signal generator at 1500. Adjust condenser ⑨ for maximum response. Condensers ⑧ and ⑨ are reached from above through the two holes in top of chassis to rear of tuning condenser assembly.

NOTE: If reading on output meter is too great during adjustments, turn down "attenuator" on signal generator.

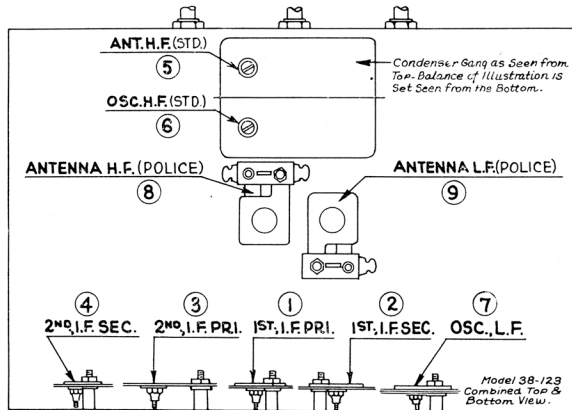


Fig. 11

NOTE: Condensers ⑤ and ⑥ are shown as viewed from top of chassis; all others in position seen from bottom.

MODEL 39

The adjustment of compensating condensers in Model 39 requires the use of a signal generator capable of producing a signal on standard broadcast frequencies, and another for the short-waves or high frequencies. For the former we suggest Philco Model 024 Signal Generator, and for the Short-wave, Model 091 Crystal Controlled Oscillator. The Model 024 covers frequencies from 105 to 2000 K.C. and the 091 has a fundamental frequency of 3600 K.C. (3.6 M.C.) any harmonic (multiple) of which may be used.

Other equipment needed includes the usual output meter, and a suitable insulated handle wrench and screwdriver for adjusting the condensers.

First connect the output meter to the plate contacts of the type 19 output tube.

The two pairs of I.F. compensating condensers are located one pair at the top of each of the two I.F. transformer shields. These are the two metal "cans" near the rear corner of the chassis. Each of the I.F. transformers has a dual compensating condenser mounted at its top, and accessible through a hole in the top of the coil shield. In the dual compensators, the Primary circuit is adjusted by turning the screw; the Secondary circuit is adjusted by turning the hex-head nut. The condenser numbers, referring to Fig. 12 are ①, ②, ③ and ④.

Adjustment of Wave Trap

Replace the grid clip upon the Detector-Oscillator tube (Type 1C6). Connect the output leads from the broadcast signal generator directly

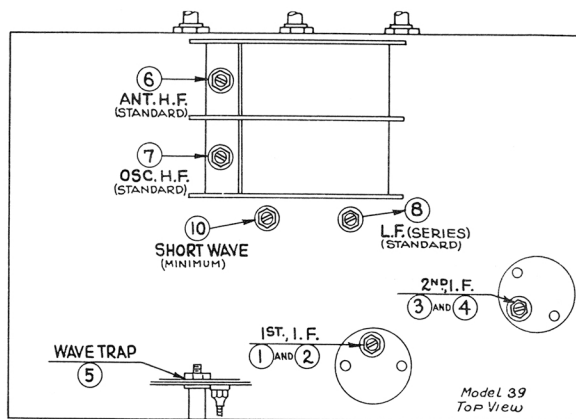


Fig. 12

Adjustments are then made in the following order; positions of all compensators (except number ⑨ visible in Fig. 13) are shown in Fig. 12.

Adjustment of Intermediate Frequency

Remove the grid clip from the type 1C6 tube and connect the "ANT" output terminal of the standard wave signal generator to the grid cap of the tube. Connect the "GND" terminal of the signal generator to the "GND" terminal of the receiver chassis.

Set the signal generator at 460 K.C. (the intermediate frequency of Model 39) and with the receiver and signal generator turned on, the wave band switch at left and dial at 600 K.C., adjust each of the I.F. compensating condensers in turn, to give maximum response in the output meter. If the needle of the meter goes off scale, turn back the attenuator on the signal generator.

to the antenna and ground terminals of the receiver. Set the Wave-Band Switch of the receiver to the standard broadcast band (left position) and the Station Selector at the low frequency (600 K.C.) end. Adjust the Wave Trap condenser to give MINIMUM response to a 460 K.C. signal from the signal generator. The Wave Trap ⑤ is located at rear and underneath the chassis, and is shown in Fig. 12. It is reached from the rear of the chassis, by inserting the fibre wrench through the hole near rear center of sub-base.

Adjustments for Standard Waves

H.F. end: Set signal generator at 1500 K.C. and dial at 150 (lower scale). Now adjust condensers ⑥ (Antenna) and ⑦ (Oscillator H.F.) to get maximum response. These condensers are located on the tuning condenser assembly and visible in Fig. 12.

L.F. (series): Turn dial to 60 and set signal generator at 600. Adjust condenser ⑧ for maximum output. This is reached from the top, through hole in chassis at rear of tuning condenser (see Fig. 12).

Adjustment of Short-Wave Compensators

The crystal controlled signal generator is used for these adjustments. Connect its leads to antenna and ground posts of set. Turn the wave band switch to the right, and the shortwave signal generator "on." H.F. or maximum: Turn the dial of the set to about half way between 14

and 15 megacycles (top scale) and you should there pick up the 4th harmonic (14.4) of the 3.6 M.C. signal. Adjust the S.W. (maximum) compensator ⑨ (see Fig. 13) to give maximum response in the output meter. This compensator is reached from underneath the chassis.

S.W. (minimum): Turn the dial of set to a little more than 7 megacycles at which point the second harmonic of the signal generator (7.2 M.C.) should be heard. Adjust condenser ⑩ (S.W. series) for maximum response. This condenser is reached from above, through hole in top of chassis (see Fig. 12).

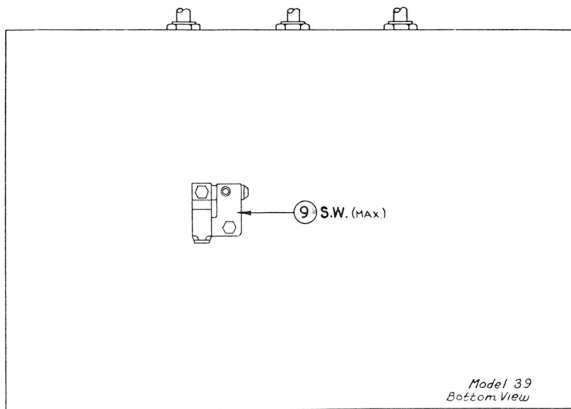


Fig. 13

MODEL 45

The chassis must be removed from cabinet in order to make all adjustments.

Adjustments are made in the following order:

Adjustment of Intermediate Frequency

Remove the grid clip from the type 6A7 tube and connect the "ANT" output terminal of the signal generator to the grid cap of the tube. Connect the "GND" terminal of the signal generator to the "GND" terminal of the receiver chassis.

Connect the output meter as explained on page 2. Set the signal generator at 460 K.C. (the intermediate frequency of Model 45) and with the receiver and signal generator turned on, the wave band switch at left and dial at 600 K.C., adjust each of the I.F. compensating condensers in turn, to give maximum response in the output of the receiver. The three pairs of I.F. compensating condensers are located one pair at the top of each of the three I.F. transformer shields. These are the three metal "cans" near the rear of the chassis (see Fig. 14). Each of the transformers has a dual compensating condenser mounted at its top, and accessible through a hole in the top of the coil shield. In the dual compensators, the Primary circuit is adjusted by turning the screw; the Secondary circuit is adjusted by turning the hex-head nut.

Adjustment of Wave Trap

Replace the grid clip upon the Detector-Oscillator tube (Type 6A7). Connect the output

leads from the signal generator directly to the antenna and ground terminals of the receiver. Set the Wave-Band Switch of the receiver to the standard broadcast band (left hand position) and the Station Selector at the low frequency (540 K.C.) end. Adjust the Wave Trap condenser to give MINIMUM response to a 460 K.C. signal from the signal generator. The Wave Trap is located at rear and underneath the chassis, and is shown in Figure 15. It is reached through the rear of the chassis, by inserting the fibre wrench through the hole near right-hand rear corner of chassis.

Antenna, and Oscillator "High" and "Low" Frequency Adjustments

The "antenna" and "oscillator H.F." compensators are located on top of the tuning condenser assembly, reached from above.

Set the signal generator at 1500 K.C., tune in this signal on the set and adjust the antenna compensator (nearest tuning control) to give maximum reading in the output meter.

Next adjust the oscillator H.F. condenser (located on the other section of tuning condenser) to maximum reading.

Finally set the signal generator at 600, tune in this signal and adjust the oscillator "L.F. condenser", located underneath chassis (see Fig. 15) to maximum reading. This adjustment is reached through the hole in top of chassis, between the two electrolytic condensers (left hand end of the chassis when facing rear).

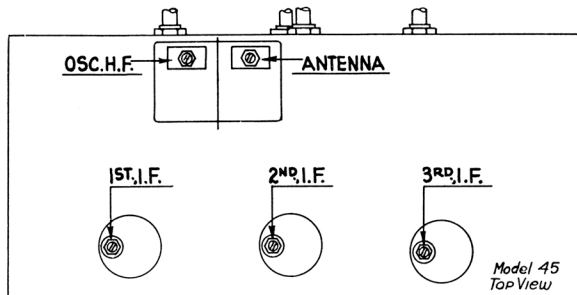


Fig. 14

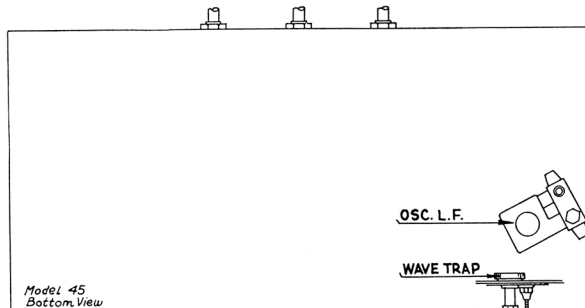


Fig. 15

MODEL 49

For adjusting compensating or padding condensers in Model 49, an accurately calibrated signal generator covering the broadcast range of frequencies is required and also a crystal controlled signal generator for the high frequency adjustments. For the former we suggest the Philco Model 024 Signal Generator and for the latter the Model 091, Crystal Controlled high frequency signal generator.

Adjustment of Intermediate Frequency

The I.F. (intermediate frequency) of Model 49 is 260 K.C.

Remove the grid clip from the top of the 6A7 tube and connect the shielded antenna lead from

are reached through the hole in top. If the needle on the output meter goes off the scale, turn down the "attenuator" on the Signal Generator until a lower reading is obtained.

Now remove Antenna lead of signal generator from grid cap of 6A7 tube and reconnect it to antenna post of receiver. Replace cap on 6A7 tube.

Antenna, Detector and Oscillator High Frequency (Broadcast) Adjustments

These condensers Nos. (5), (6) and (7), are located on top of the tuning condenser gang (See Fig. 16) adjustment made by means of the fibre wrench. Set the signal generator at 1500

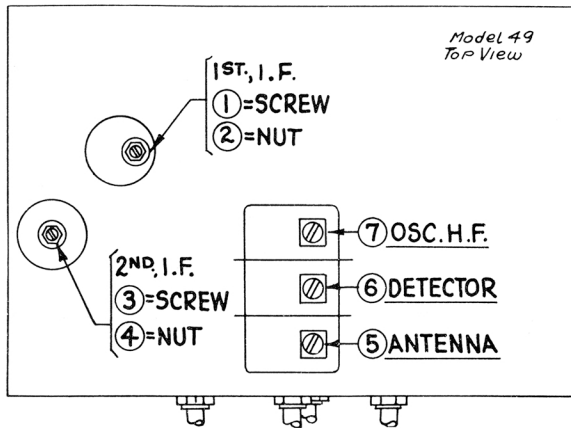


Fig. 16

the Signal Generator to the cap of this tube. Connect the ground lead of the Signal Generator to the ground post of receiver. Connect the output meter adapter leads to the plates of the output tubes (type 43) in the receiver. Set the wave-band switch at the left position (standard broadcast).

Set the wave switch of the Signal Generator at 260 K.C., and the dial of the receiver at 55. Turn on the set (volume full on), and the Signal Generator. Now adjust the 1st I.F. Primary and Secondary condensers (Nos. (1) and (2) in Fig. 16) and the 2d I.F. primary and secondary condensers ((3) and (4)) to give maximum reading on the output meter. The I.F. primary condenser is adjusted by turning the screw on top of the I.F. transformer and the secondary is adjusted by turning the nut. The I.F. transformers are in the smaller metal "cans". The screw and nut

K.C. tune in the signal at 150 on dial and adjust these condensers in the order given, to give maximum output reading.

Oscillator Low Frequency (standard waves) Adjustment

This is condenser (8) (see Fig. 17) located underneath chassis and accessible from underneath. Use the fibre wrench. Set signal generator switch at 600, tune in the signal at 60 on the dial and adjust condenser to maximum.

Antenna and Oscillator High Frequency Short Wave Adjustment

The crystal controlled signal generator is used for these adjustments. These are condensers 9 (Ant.) and 10 (Osc. H.F.) located underneath

chassis. ⑨ is adjusted from underneath, and ⑩ from above, through hole in sub-base directly behind tuning condenser assembly. The fundamental frequency of the Philco Model 091 crystal controlled signal generator is 3600 K.C. or 3.6 megacycles. The third harmonic of this is 10.8

M.C. Turn the wave-band switch of the set to the right and the dial to just below 11 M.C. The 10.8 harmonic should be picked up here and the two condensers should be adjusted to give maximum reading on the output meter, on this signal. Fig. 17 shows these two compensators.

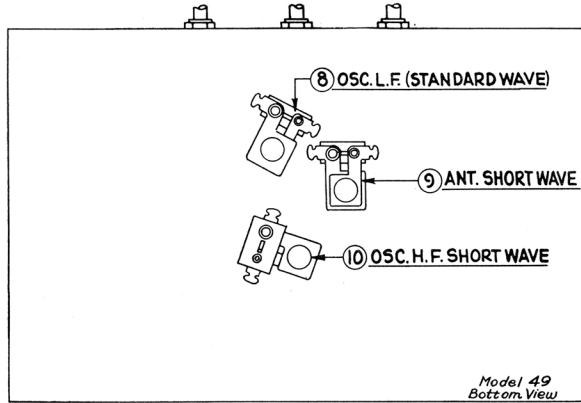


Fig. 17

MODEL 59

In Model 59 the I.F. primary and secondary condensers and the "regeneration" compensating condenser are located at the rear of chassis and accessible from the rear; the "ANT" and "OSC. H.F." are located on the side of the tuning condenser gang.

Adjustment of Intermediate Frequency

Referring to Fig. 18, the I.F. primary and secondary condensers ① and ② should be adjusted first. Remove the grid cap clip from the detector-oscillator tube (77 with shield) and connect the antenna lead from the signal generator to the cap of this tube. Connect the ground lead from the signal generator to the ground terminal of the set. Connect output meter as explained on page 2. Set the frequency switch of the signal generator at 460 K.C. (the I.F. of model 59), and turn the switches of the set and signal generator on. Turn volume control full on. Turn the dial pointer on the set to 60, and then adjust the I.F. compensating condensers ① and ② by means of a fibre wrench so that maximum reading is obtained in the output meter. If the needle goes off scale, adjust the attenuator on the signal generator so that a lower reading is obtained.

Antenna and Oscillator High Frequency Adjustments

Next adjust the ANT. and OSC. H.F. (high frequency) condensers ③ and ④. These are

located on the tuning condenser gang and not shown in cut. To adjust these condensers it is necessary to remove the chassis from the cabinet, necessitating removing back plate, base screws, knobs and pointers. Replace the grid clip on the 77 det. oscillator tube and connect the antenna and ground leads of the signal generator direct to the antenna and ground terminals of the set. Set the signal generator switch at 1400, turn the receiver condenser shaft until the rotary plates barely start to mesh with the stationary ones. Tune in the 1400 K.C. signal here and adjust condensers ③ and ④ for maximum output meter reading. When replacing the dial pointer, be sure it is mounted exactly as it was removed.

Regeneration Condenser Adjustment

Finally adjust the regeneration condenser ⑤. With the set connected to an antenna, turn the station selector to receive a station at about 130 on the dial. With a screw driver turn the small fibre hex-head screw (which operates the regeneration condenser) located at rear of chassis below antenna and ground terminals, clockwise until the set squeals or oscillates. Then turn the hex-screw $\frac{1}{4}$ of a turn back until the squealing stops. Tune in other stations on different points on the scale to make sure that the squealing is eliminated. It will be necessary to readjust this condenser if a different type 77 tube is used for second detector.

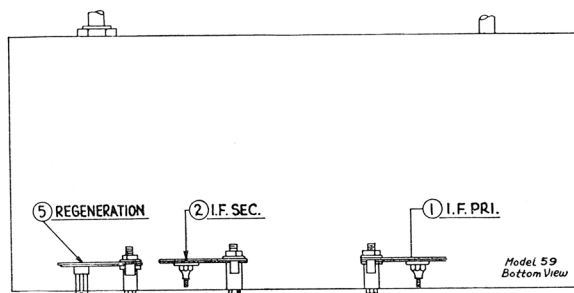


Fig. 18

MODEL 66

Adjustments are made in the following order:

Adjustment of Intermediate Frequency

1. Remove grid clip from cap of 6A7 tube and connect antenna lead from signal generator to cap of tube. Connect ground lead to ground post on set. Turn on set and signal generator; set wave switch of latter to 460 K.C. (the I.F. of Model 66) and dial of set at 540, wave band switch to left. Adjust each of the four I.F. compensating condensers ①, ②, ③ and ④ in turn so that maximum reading is obtained in the output meter (connected as explained on page 2). If the meter reading goes off scale, adjust the attenuator on the signal generator so as to get a lower reading. These I.F. condensers (visible in Fig. 19) are adjusted by inserting the hex wrench through the holes in rear of chassis sub-base (except one to extreme left when facing rear of set). Two of the holes are covered by small metal buttons which can be removed temporarily by hand.

Adjustment of Wave Trap

2. Replace grid clip on cap of 6A7 tube and connect antenna lead from signal generator to antenna post on set. Set signal generator at 460 K.C., dial at 55, and adjust wave trap ⑤ so as to get MINIMUM reading in output meter.

Antenna and Oscillator High Frequency Adjustments

3. These adjustments ⑥ and ⑦ are located on top of the tuning condenser assembly at right (facing front of set) and adjusted from above. The "ANT" is nearest front of set. Set signal generator at 1700 and dial of set at 170 and adjust these two condensers to get maximum output meter reading. See Fig. 20.

Oscillator Low Frequency Adjustment

4. This condenser ⑧ is located underneath chassis (see Fig. 19) and is reached from underneath. Set dial of set at 60 and signal generator switch at 600, and adjust for maximum reading.

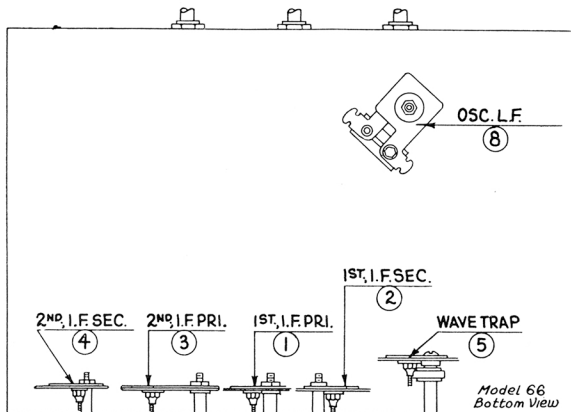


Fig. 19

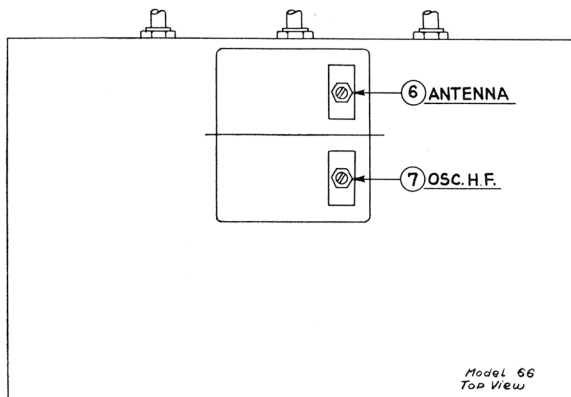


Fig. 20

MODEL 84

Adjustment of Intermediate Frequency

The I.F. primary and I.F. secondary condensers should be adjusted first. Remove grid clip from 77 detector-oscillator and connect antenna lead from signal generator to cap of tube. Connect ground lead from signal generator to ground post of set. Set the signal generator at 460 K.C. (the I.F. of Model 84) and the dial pointer at 60. Adjust I.F. condensers ① and ② so that maximum signal is obtained. These condensers are at rear of chassis, accessible from rear. See Fig. 21.

"Regeneration" Condenser Adjustment

Next, adjust the "regeneration" condenser. This is ③ located at the right hand rear of chassis (facing rear). Adjustment is made by turning the fibre hex nut with either a screw driver or the special fibre wrench. The procedure is: tune in a signal at the high frequency (1500) end of the dial and turn the fibre nut clockwise until

oscillation or squealing is heard. Then turn the nut half a turn back (to left). Now tune in a low frequency station, and if squealing is still heard, turn the adjusting nut half a turn back from the squealing point.

Adjustment of Oscillator High Frequency and Antenna Compensating Condensers

The OSC HF ④ and ANT compensating condensers ⑤ are adjusted last in the order mentioned. These are located on the tuning condenser gang, the ANT ⑤ being nearest the front of set. See Fig. 22. In early production sets use the fibre handle screw driver for adjustment, later production, the fibre hex wrench. In making these adjustments, set the signal generator at 1400 and the station selector at 140.

To make these adjustments, the grid clip must be reconnected to the 77 tube, and the signal generator antenna lead direct to the antenna terminal on the set.

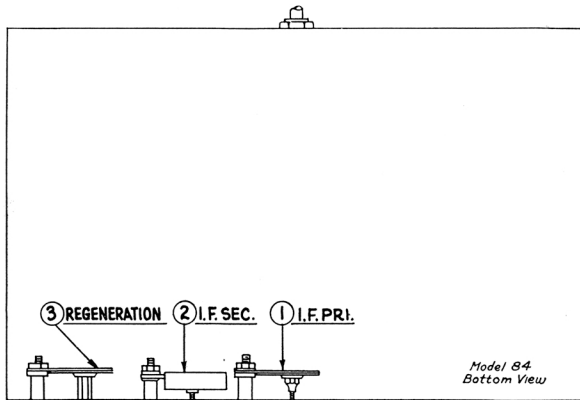


Fig. 21

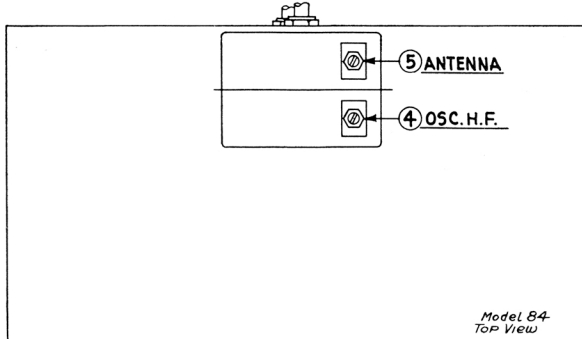


Fig. 22

MODEL 118

For adjusting compensating or padding condensers in Model 118, an accurately calibrated signal generator covering the broadcast range of frequencies is required and also a crystal controlled signal generator for the high frequency adjustments. For the former we suggest the Philco Model 024 Signal Generator and for the latter the Model 091, Crystal Controlled high frequency signal generator.

Adjustment of Intermediate Frequency

The I.F. (intermediate frequency) of Model 118 is 260 K.C.

Remove the grid clip from the top of the 6A7 tube and connect the shielded antenna lead from the Broadcast Signal Generator to the cap of this

the scale, turn down the "attenuator" on the Signal Generator until a lower reading is obtained.

Note: In early production the 1st I.F. compensating condensers only are adjusted as described above, and there is no ④ (2d I.F. secondary adjustment). The 2d I.F. primary ③ is a flat type compensating condenser reached and adjusted through hole in top of chassis near the 42 (driver) tube.

Adjustment of Wave Trap

Remove antenna lead from grid cap of 6A7 tube and attach it to antenna post on set. Replace cap on 6A7 tube. With Signal Generator still operating at 260 K.C., adjust wave-trap

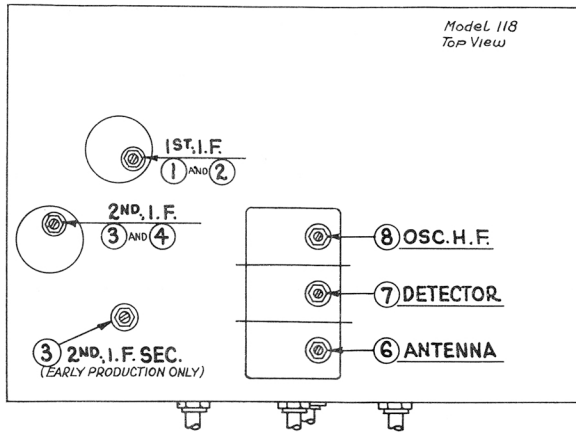


Fig. 23

tube. Connect the ground lead of the Signal Generator to the ground post of receiver. Connect the output meter as explained on page 2. Set the wave-band switch at the left position (standard broadcast).

Set the wave switch on the Signal Generator at 260 K.C., and the dial of the receiver at 55. Turn on the set (volume full on), and the Signal Generator. Now adjust the 1st I.F. Primary and Secondary condensers (Nos. ① and ② in Fig. 23) and the 2d I.F. primary and secondary condensers (③, and ④) to give maximum reading on the output meter. The I.F. primary condenser is adjusted by turning the screw on top of the I.F. transformer and the secondary is adjusted by turning the nut. The I.F. transformers are in the smaller metal "cans." The screw and nut are reached through the hole in top. If the needle on the output meter goes off

condenser (⑤ in Fig. 24) so as to get MINIMUM reading in output meter. This adjustment is made from underneath the chassis.

Adjustment of Antenna, Detector and Oscillator High Frequency (Broadcast)

These condensers Nos. ⑥, ⑦, and ⑧, are located on top of the tuning condenser gang, adjustment made by means of the fibre wrench. Set the signal generator at 1500 K.C., tune in the signal at 150 on dial and adjust these condensers in the order given, to give maximum output reading. ⑥ is located on the section nearest the front and ⑦ on the center section.

Oscillator Low Frequency Adjustment

This is condenser ⑨ (see Fig. 24) located underneath chassis and accessible from underneath. Use the fibre wrench. Set signal generator

switch at 600, tune in the signal at 60 on the dial and adjust condenser to maximum.

**Antenna and Oscillator High Frequency
(short wave) Adjustment**

The crystal controlled signal generator is used for these adjustments. Connect its output to the antenna post on set. Condensers ⑩ (Ant. H.F.) and ⑪ (Osc. H.F.) are located under-

neath chassis, and adjusted from underneath. The fundamental frequency of the Philco Model 091 crystal controlled signal generator is 3600 K.C. or 3.6 megacycles. The third harmonic of this is 10.8 M.C. Turn the waveband switch of the set to the right and the dial to just below 11 M.C. The 10.8 harmonic should be picked up here and the two condensers should be adjusted to give maximum reading on the output meter, on this signal.

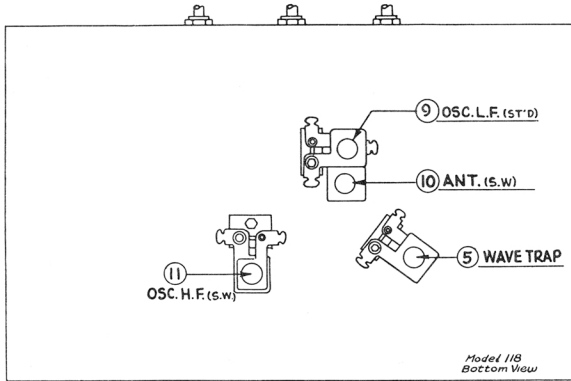


Fig. 24

MODEL 144

Do not attempt to adjust the compensating condensers mounted upon sections numbered 3 and 4 of the Tuning Condenser Assembly (Fig. 25). These have been adjusted, and sealed, at the factory.

Philco Model 024, an accurately calibrated signal generator covering broadcast and police band frequencies, is recommended for the adjustment of the intermediate frequency and low frequency compensating condensers.

Philco Model 091 crystal-controlled Signal Generator is recommended for the high frequency adjustments. It gives an accurate and constant 3600 kilocycle (3.6 megacycle) signal, the har-

Adjustment of Wave Trap

2. Replace the grid clip upon the Detector-Oscillator tube (Type 6A7). Connect the output leads from the signal generator directly to the antenna and ground terminals of the receiver. Set the Wave-Band Switch of the receiver to the standard broadcast band (extreme left) and the Station Selector at the low frequency (520 K.C.) end. Adjust the Wave Trap condenser to give MINIMUM response to a 460 K.C. signal from the signal generator. The Wave Trap is located at rear and underneath the chassis, and is shown in Figure 25. It is reached from the rear of the chassis.

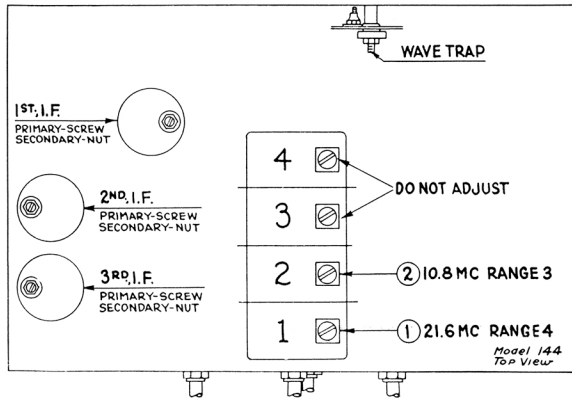


Fig. 25

monics of which include the necessary high frequencies in adjusting the compensating condensers in the high frequency circuits.

Adjustment of Intermediate Frequency

1. Remove the grid clip from the type 6A7 tube and connect the "ANT" output terminal of the signal generator to the grid cap of the tube. Connect the "GND" terminal of the signal generator to the "GND" terminal of the receiver chassis.

Connect an output meter as explained on page 2. Set the signal generator at 460 K.C. (the intermediate frequency of Model 144) and adjust each of the I.F. compensating condensers in turn, to give maximum response in the output of the receiver. The location of the I.F. compensating condensers is shown in Figure 25. Each of the I.F. transformers has a dual compensating condenser mounted at its top, and accessible through a hole in the top of the coil shield. In the dual compensators, the Primary circuit is adjusted by turning the screw; the Secondary circuit is adjusted by turning the hex-head nut.

Adjustment of Dial Frequencies

3. Model 144 has four separate frequency bands or ranges, each obtained by one of the four positions of the wave-band switch. There is a compensating condenser for each range, which must now be adjusted. In the following procedure, the frequency ranges referred to, and obtained by the different positions of the switch are:

- Range 1..... 520 K.C.—1500 K.C.
- Range 2..... 1.5 M.C.—4.0 M.C.
- Range 3..... 4.0 M.C.—11.0 M.C.
- Range 4..... 11.0 M.C.—23.0 M.C.

Connect the output terminals of the Model 091 or equivalent Signal Generator, to the "ANT" and "GND" terminals of the receiver chassis. Leave the output meter connected to the receiver. Set the Wave-Band Switch to Range 4, and the Station Selector at 21.6 M.C. The sixth harmonic of the 3.6 M.C. crystal in the Model 091 Signal Generator is picked up at this point. Adjust the compensating condenser ① on Section 1 of Tuning Condenser for maximum response in

the output of the receiver. Turn the Wave-Band Switch to Range 3, and the Station Selector to 10.8 M.C. Here, the third harmonic of the 3.6 M.C. crystal will be heard. Adjust the compensating condenser ② on Section 2 of Tuning Condenser for maximum response in the output of the receiver.

Turn the Wave-Band Switch to Range 2, and adjust the Station Selector to 3.6 M.C. The "Antenna" connection between the Signal Generator and the receiver chassis must be removed for this adjustment, otherwise the output of the Signal Generator will be too great. Adjust the compensating condenser ③ to give maximum response in the output meter. This compensating condenser is located underneath the chassis and is not accessible from above. See Figure 26.

This concludes adjustments requiring the Model 091 (or equivalent) high frequency signal generator.

The Model 024 or its equivalent is now used again. Turn the Wave-Band Switch of the set to Range 2 and the Station Selector to 1.5 M.C.

Set the Signal Generator at 1500 K.C. Make sure the "Antenna" connection between the Signal Generator and the Chassis has been restored. Adjust compensating condenser ④ located underneath the chassis, (Figure 26). Adjustment is made from the underside of the chassis.

Turn the Wave-Band Switch to Range 1 and the Station Selector to 1400 K.C. Set the Signal Generator at 1400 K.C. Adjust compensating condenser ⑤, which is located underneath the chassis. (See Figure 26). This adjustment is made from the underside of the chassis.

Finally, with Wave-Band Switch at Range 1, and Station Selector at 520 K.C., set the Signal Generator at 520 K.C. and adjust compensating condenser ⑥ (Figure 26). This compensating condenser is also mounted underneath the chassis, and reached from below.

For proper and accurate adjustment of Model 144, the procedure must be followed exactly in the order given. The adjustment should not be undertaken without proper equipment as mentioned above.

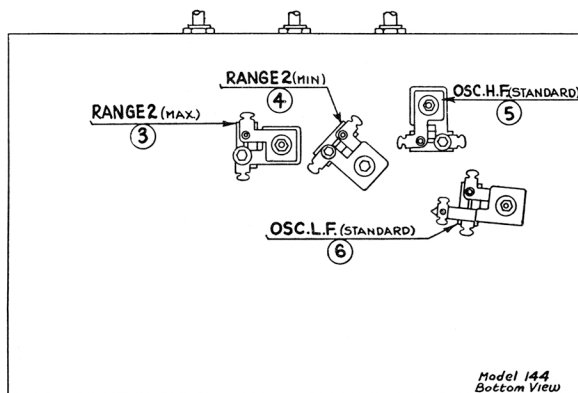


Fig. 26

MODEL 200

The quality performance of this receiver depends to a great extent upon providing a wide channel through the R.F. and I.F. stages to permit the passage of a broadcast signal without cutting of the side bands.

In order to produce this wide tuning band, the set must be carefully and accurately adjusted. These adjustments will be more critical than in the conventional radio, and the procedure will be somewhat more complicated.

In making the adjustments, it is necessary to use an unmodulated signal generator. The PHILCO Model 048 Set Tester or the Model 024 Signal Generator can be readily adapted for this purpose by the installation of a single-pole double-throw switch, and an additional grid leak resistor, as shown in Figure 27. This switch will adapt the signal generator for either a modulated or an unmodulated signal.

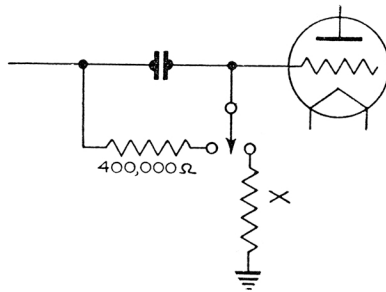


Fig. 27

With an unmodulated signal, it is not possible to obtain an indication of output by means of the usual form of output meter. An indirect indication can be obtained, however, through the automatic volume control system by connecting a high resistance voltmeter having a scale reading of 0.5 or 0-10 volts across the R.F. cathode resistor. This connection can be made conveniently through the use of leads equipped with test clips. With this arrangement, maximum output at the second detector will be indicated by a minimum reading of the meter, and vice versa. In other words, the action will be just the opposite of an output meter used to measure audio frequency voltage at the power output stage. With no signal applied to the receiver, the bias voltage indicated by the voltmeter, will be approximately 3 volts. This voltage will be reduced by the application of a signal to the R.F. or I.F. input circuits.

Adjustment of Intermediate Frequency

After preparing the unmodulated signal generator and connecting the voltmeter as directed, proceed as follows:

1. Set the receiver tuning dial at its extreme low frequency position. Remove the grid clip from the cap of the 6-A-7 detector oscillator tube, and connect the signal generator antenna lead in its place. Connect the ground lead from the signal generator to the ground terminal of the chassis. Adjust the signal generator frequency to 175 K.C. (I.F. of model 200). Turn the fidelity-selectivity control of the receiver all the way to the left.

2. Adjust the 6 I.F. padding condensers ①, ②, ③, ④, ⑤ and ⑥ (see Fig. 28) in the tops of the 3 I.F. cans, for maximum output (minimum meter reading), starting with the compensator or padder at the front of the chassis, and continuing with the adjustments toward the rear of the set. During these adjustments, the output of the signal generator should be regulated to maintain a voltmeter reading of approximately 2 volts.

3. Connect a 250 Mmf. Condenser from the plate of the 2nd I.F. tube to ground. This will increase the voltmeter reading to approximately 2.5 volts.

4. Readjust the 3d I.F. secondary padder ⑤ for maximum output. Now remove the 250 Mmf. Condenser.

5. Readjust the 3rd I.F. primary padder ⑥ for maximum output. Do not touch the grid padder ⑤ again.

6. Turn the fidelity-selectivity control all the way to the right.

7. Adjust the 1st & 2nd I.F. tertiary padders ⑦ and ⑧ for MINIMUM output (maximum voltmeter reading).

8. Leaving the fidelity-selectivity control in the right hand position, it will be found, upon varying the frequency of the signal generator, that two definite dips will appear in the voltmeter reading—one at 167 K.C. and another at 182 K.C. These dips in the voltmeter reading indicate peaks in the tuning curve. The amplitude of these peaks should be equal; that is, the same voltmeter reading should be obtained at

both 167 K.C. and 182 K.C. Any variations in these two readings can be corrected by a *slight* readjustment of the 3rd I.F. primary padder (6). If the peak at 167 K.C. is higher than the one at 182 K.C., the primary padder will have to be turned out. If the reverse is true, the capacity of this padder must be increased. In any case, the voltmeter readings must be made equal by dividing the differences through readjustment.

Range Frequency Adjustments

The R.F. portion of the receiver is adjusted as follows:

9. Replace the grid clip on the detector-oscillator tube and connect the antenna terminal of the signal generator to the antenna terminal of the chassis. Turn the fidelity-selectivity control all the way to the left and set the receiver dial at 1,500 K.C. The same type of output indication is employed as in the I.F. adjustments.

10. Adjust the signal generator for a frequency of 1,500 K.C. Adjust the "oscillator" padding condenser (9) and the "detector" padding condenser (10) for maximum output and in the order mentioned. Regulate the signal generator output control to maintain a voltmeter reading of 2 volts as before.

11. Turn in padder (11) (R.F.) until the voltmeter reads 2.5 volts and then adjust padder (12) (ANT.) for maximum output.

12. Readjust padder (11) for maximum output. Do not touch padder (12) again.

13. Set the receiver dial and the signal generator at 600 K.C. Adjust the "oscillator low frequency" padder (13) for maximum output. As the R.F. tuning is rather broad, there will be a considerable range on the dial that will give about the same output when the oscillator L.F. padder is adjusted for maximum. The padder must be adjusted at the middle of this range. This point may be determined with accuracy in the following manner: Starting with the usual voltmeter reading of 2 volts, slowly turn the receiver dial toward the low frequency end and, at the same time, readjust the padder (13) for maximum output until a point is reached where

the maximum output is indicated by a voltmeter reading of 2.5 volts. Note carefully the exact dial reading at this point. Follow the same procedure while turning the dial in the opposite direction until the output reading decreases to the same value. Set the dial at the exact center of these two points and readjust padder (13) for maximum output.

14. Adjust the 3d I.F. tertiary padder (14) to give minimum width in the shadow tuning meter in the receiver. This padder is reached from rear of chassis.

Adjustment of 10 Kilocycle Filter

The 10 K.C. filter in the audio circuit will rarely require readjustment. As the proper adjustment of this padder (15) on diagram) requires an accurately calibrated audio oscillator, it should be reset only in the event that it has been tampered with or in cases where it has become necessary to replace one of the elements of this filter. An emergency adjustment of this filter can be made in the following manner:

15. Connect the signal generator to the control grid of the type 6-A-7 tube, leaving the grid clip in place.

16. Disconnect the voltmeter from the R.F. cathode resistor and connect an output meter to the plates of the power output tubes in the usual way.

17. Set the receiver dial at 550 K.C. At this point, the oscillator in the receiver will be tuned to 725 K.C. The adjustment of the signal generator (switch in unmodulated position) to approximately this same frequency will cause an audible beat note to be heard in the speaker. By means of the signal generator tuning control, reduce the frequency of this beat note until zero beat is reached, at which point the output meter reading will decrease to 0. Turning the receiver dial in either direction will gradually increase the frequency of the audible note so that at 540 or 560 K.C. a 10,000 K.C. note will be heard. At either of these points, the padder (15) should be adjusted for minimum reading of the output meter.

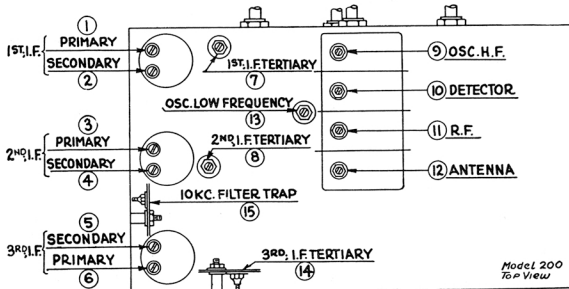


Fig. 28

MODEL 201

The quality performance of this receiver depends to a great extent upon providing a wide channel through the R.F. and I.F. stages to permit the passage of a broadcast signal without cutting of the side bands.

In order to produce this wide tuning band, the set must be carefully and accurately adjusted. These adjustments will be more critical than in the conventional radio, and the procedure will be somewhat more complicated.

In making the adjustments, it is necessary to use an unmodulated signal generator. The PHILCO Model 048 Set Tester or the Model 024 Signal Generator can be readily adapted for this purpose by the installation of a single-pole double-throw switch, and an additional grid leak resistor, as shown in Figure 27. This switch will

be used for connecting the voltmeter as directed, proceed as follows:

1. Set the receiver tuning dial at its extreme low frequency position, with the wave-band switch turned to the left (standing broadcast position). Remove the grid clip from the cap of the 6A7 detector-oscillator tube, and connect the signal generator antenna lead in its place. Connect the ground lead from the signal generator to the ground terminal of the chassis. Adjust the signal generator to 260 K.C. (the I.F. of Model 201). Turn the fidelity-selectivity control of the receiver all the way to the left.

2. Adjust the 1st and 2nd I.F. padding condensers ①, ②, ③ and ④ for maximum output (minimum meter reading) in the order mentioned. During these adjustments, the output

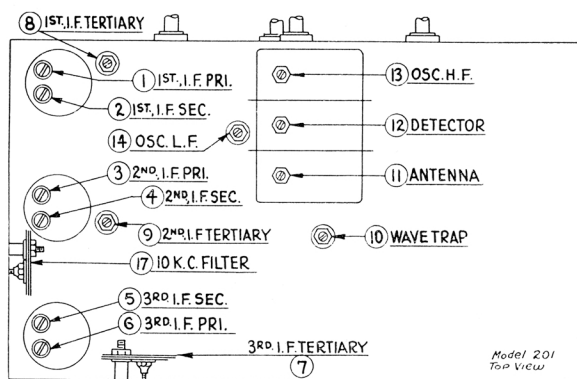


Fig. 29

adapt the signal generator for either a modulated or an unmodulated signal.

With an unmodulated signal, it is not possible to obtain an indication of output by means of the usual form of output meter. An indirect indication can be obtained, however, through the automatic volume control system by connecting a high resistance voltmeter having a scale reading of 0-5 or 0-10 volts across the R.F. cathode resistor of the set. This connection can be made conveniently through the use of leads equipped with test clips. With this arrangement, maximum output at the second detector will be indicated by a minimum reading of the meter, and vice versa. In other words, the action will be just the opposite of an output meter used to measure audio frequency voltage at the power output stage. With no signal applied to the receiver, the bias voltage indicated by the voltmeter, will be approximately 3.5 volts. This voltage will be reduced by the application of a signal to the R.F. or I.F. input circuits.

Adjustment of Intermediate Frequency

After preparing the unmodulated signal gener-

ator of the signal generator should be regulated to maintain a voltmeter reading of approximately 2 volts.

3. Connect a 500 Mmf. condenser from the plate of the 2nd I.F. tube to ground, and adjust padder ⑤ for maximum output.

4. Connect the 500 Mmf. condenser across the secondary of the 3rd I.F. transformer and adjust ⑥ for maximum output.

5. Turn the attenuator on the signal generator to maximum and adjust padder ⑦ for minimum width of shadow in the tuning meter.

6. Reduce the output of the signal generator until the volt-meter again reads 2 volts. Turn the fidelity-selectivity control all the way to the right and adjust padders ⑧ and ⑨ for MINIMUM output (maximum meter reading).

7. Leaving the fidelity-selectivity control in the extreme right hand position and tuning the signal generator through 253 K.C. and 267 K.C., two definite peaks at these points should be noted. The meter readings at these two peaks should be equal, but if not, they can be made equal by readjusting padder ⑧ slightly.

Adjustment of Wave Trap

8. Adjust the signal generator to exactly 260 K.C. and connect the output leads to the antenna and ground terminals on the chassis. Replace the grid clip on the type 6A7 tube. Turn the fidelity-selectivity control all the way to the left. Leaving the receiver dial at the extreme low frequency position, adjust padder (10) (wave-trap) for minimum output.

Range Frequency Adjustments (Broadcast Range)

9. Insert a 250 Mmf. condenser in series with the antenna lead of the signal generator and the antenna terminal on the receiver chassis. Adjust the signal generator and the receiver to 1500 K.C. Turn the fidelity-selectivity control all the way to the left. Adjust padders (11), (12) and (13) for maximum output.

10. Adjust the signal generator and the receiver tuning dial to 600 K.C. Adjust padder (14) for maximum output, at the same time rocking the tuning condenser in the chassis back and forth to obtain the setting for the highest possible output.

Range Frequency Adjustments (Short Wave Range)

The PHILCO Model 091 Crystal Controlled Oscillator is recommended for adjusting the compensating condensers for the short wave tuning range.

11. Connect the antenna and ground leads from the signal generator to the corresponding terminals on the chassis, placing a 400 ohm resistor between the antenna lead of the signal generator and the antenna terminal of the set. (Philco No. 33-3016 flexible resistor will be satisfactory.)

12. Turn the wave-band switch to the right and set the receiver dial at 10.8 M.C. Remove the D.C. voltmeter connections from the R.F. cathode resistor and connect the output meter to the plates of the power output tubes as in adjusting other types of receivers. Adjust the

oscillator padder (15) and the antenna padder (16) for maximum output. These padders are located and adjusted from underneath the chassis and are visible in Fig. 30. When adjusting padder (15) two very definite peaks will be found. It is extremely important that the lower capacity setting be used. To make certain that the adjustment has not been made to the image frequency (which would be the case if padder (15) were adjusted to the higher capacity setting) turn the receiver dial to approximately 10.3 M.C. at which point the image frequency should be heard, but much more weakly than the signal at 10.8 M.C.

Adjustment of 10 Kilocycle Filter

The 10 K.C. filter in the audio circuit will rarely require readjustment. As the proper adjustment of this padder (17) on diagram) requires an accurately calibrated audio oscillator, it should be reset only in the event that it has been tampered with or in cases where it has become necessary to replace one of the elements of this filter. An emergency adjustment of this filter can be made in the following manner:

13. Connect the signal generator to the control grid of the type 6A7 tube, leaving the grid clip in place.

14. Leave the output meter connected to the power output circuit as in Paragraph 12.

15. Set the receiver dial at 550 K.C. and wave-band switch at left. At this point, the oscillator in the receiver will be tuned to 810 K.C. The adjustment of the signal generator (switch in unmodulated position) to approximately this same frequency will cause an audible beat note to be heard in the speaker. By means of the signal generator tuning control, reduce the frequency of this beat note until zero beat is reached, at which point the output meter reading will decrease to 0. Turning the receiver dial in either direction will gradually increase the frequency of the audible note so that at 540 or 560 K.C. a 10,000 K.C. note will be heard. At either of these points, the padder (17) should be adjusted for minimum reading of the output meter.

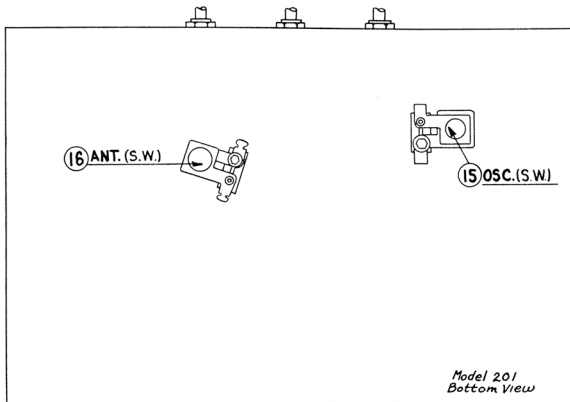


Fig. 30

MODELS 11 and 700 (Auto Radio)

The Receiver must be connected to a six-volt storage battery and turned on for operation. It is assumed that tubes have been checked and that the Receiver is in good condition except for the adjustments.

Remove the speaker lid from the Receiver. Remove the grid cap terminal from the 77 tube (for location see Fig. 31).

Set up the signal generator and adjust it to exactly 260 K.C. Connect the signal generator lead to the grid cap of the 77 tube. The output meter must be connected as explained on page 2.

The Receiver volume control must be turned on to approximately full volume and the attenuator in the generator set for a half-scale reading of the output meter.

The 2d I.F. padders ① and ② are adjusted first (Fig. 31). Turn the adjusting screw ① all the way in. Then, with generator attenuator set so there is approximately half-scale reading, adjust the nut ② with a fibre wrench for the maximum reading on the output meter.

Then adjust the screw ② for maximum reading on the meter. This adjustment is critical. Note the maximum reading obtainable and then turn the screw in again and readjust, just bringing

the adjustment up to the maximum reading. Do not pass it and then back off.

Repeat the above procedure with the 1st I.F. condensers ③ and ④.

After padding the first I.F. stage, remove signal generator lead from the 77 tube and reconnect the grid clip to the 77 tube. Set signal generator to 1580 K.C. and then connect its antenna lead to the antenna lead of the set.

There are four holes in line, one in each of the sections of the tuning condenser housing. (See Fig. 31). Place a nail of the size that fits snugly through the holes and then turn the condenser plates out of mesh until they strike against the nail.

With the tuning condenser in this position adjust the high-frequency padder ⑤ until the maximum reading is obtained in the output meter. This is the true setting for 1580 K.C., 158 on the dial scale.

Next turn the condenser plates in mesh to 140 on the scale, and set the signal generator for 1400 K.C. The R.F. padder ⑥ and the antenna padder ⑦ are next adjusted for the maximum reading on the output meter.

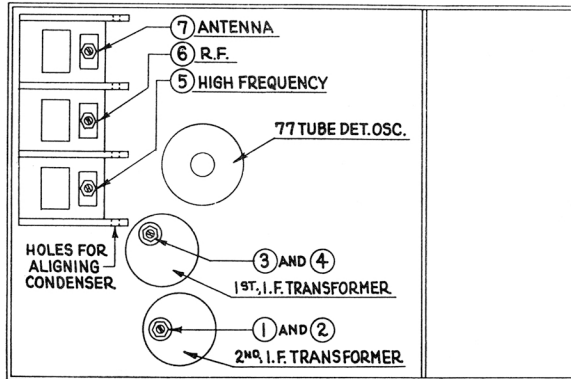


Fig. 31

MODELS 10 (Code 122), 800 and 802 (Auto Radio)

The Receiver must be connected to a six-volt storage battery and turned on for operation. It is assumed that tubes have been checked and that the Receiver is in good condition except for the adjustments.

Remove the speaker lid from the Receiver and disconnect the antenna lead from the Receiver. Remove the grid cap from the 6A7 tube (for location see Fig. 32).

Set up the signal generator and adjust it to exactly 260 K.C. Connect the signal generator lead to the grid cap of the 6A7 tube and ground lead to the shield. (See Fig. 32). The output meter must be connected by means of the adapter to the small prong of the speaker plug and to the chassis.

The Receiver volume control must be turned on to approximately full volume and the attenuator in the generator set for a half-scale reading of the output meter.

The compensators ① and ② (2d I.F.) are adjusted first (Fig. 32). Turn the adjusting screw ① all the way in. Then, with signal generator attenuator set so there is approximately half-scale reading, adjust the nut ② with a fibre wrench for the maximum reading on the output meter.

Then adjust the screw ① for maximum reading on the meter. This adjustment is critical. Note the maximum reading obtainable and then turn the screw in again and readjust, just bringing the

adjustment up to the maximum reading. Do not pass it and then back off.

Repeat the above procedure with the first I.F. condensers, ③ and ④.

After padding the first I.F. stage, remove the signal generator lead from the 6A7 tube and reconnect the grid lead to the 6A7 tube. Connect the antenna lead to the Receiver. Set signal generator to 1500 K.C. and then connect the signal generator lead to the antenna lead.

There are four holes in line, one in each of the sections of the tuning condenser housing. (See Fig. 32). Place a nail of the size that fits snugly through the holes and then turn the condenser plates out of mesh until they strike against the nail.

With the tuning condenser in this position adjust the high-frequency padder ⑤ until the maximum reading is obtained in the output meter. This is the true setting for 1500 K.C., 150 on the dial scale.

Next turn the condenser plates in mesh to 140 on the scale, 1400 K.C., and set the signal generator for 1400 K.C. The R.F. padder ⑥ and the antenna padder ⑦ are next adjusted for the maximum reading on the output meter.

Turn the condenser plates in mesh to 60 on the scale, 600 K.C., and readjust the signal generator to this frequency. Adjust the low-frequency padder ⑧ for the maximum meter reading.

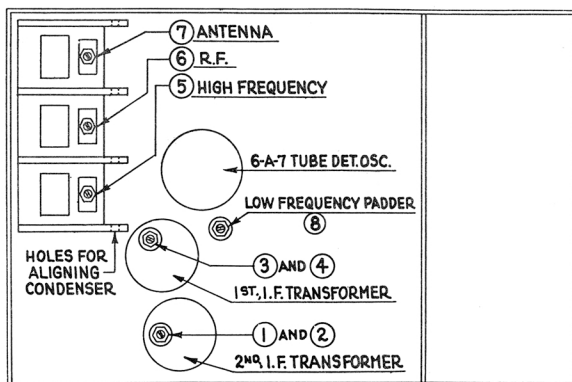


Fig. 32

Use These

NEW R. M. S. HANDBILLS

To Build Up Your Service Business

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LIKE NEW

You'll be surprised what a general overhauling will do to bring back the original tone and performance of your radio. Don't be satisfied with faulty reception. Let us put your set in shape to enjoy in full the million dollar programs now on the air.

*Let us tune-up
your Radio*

Expert Work Guaranteed!

We are members of Radio Manufacturers Service, a national organization of service men sponsored by Philco for the benefit of all radio owners. This organization accepts only members who are qualified by training and experience to give you expert and reliable radio service. Our work measures up to standards which permit us to display the R. M. S. seal. We guarantee satisfaction!



Here's what we do:

1. Inspect chassis.
2. Test tubes.
3. Check speaker.
4. Inspect and lubricate tuning condenser.
5. Inspect and lubricate tuning condenser drive.
6. Precision kilocycle alignment of receiver.
7. Inspect and test aerial, lightning arrester and lead-in.
8. Inspect and check ground connection.
9. Check power connection.
10. Clean and polish cabinet.

PHONE US
We'll be right over!

(Your name and Address printed here) ✕

A snappy new handbill which if used consistently, is bound to bring you more customers and build up your business. Suitable either for mailing use or to be slipped under the prospect's door.

Price per thousand, imprinted, \$2.00

* **ORDER FROM YOUR DISTRIBUTOR**
(Your name and Address printed here)

Two Interesting, New

ENVELOPE INSERT SLIPS

For Use on Counter or in Mailings

RMS "TUNE-UP" INSERT:—

For Reliable

RADIO Repairs

At Reasonable
Fixed Prices



Call
A Member of
RADIO MANUFACTURERS
SERVICE

Honest, Competent  Radio Service

[For Details See Reverse Side]

Does Your Radio Have

- Fuzzy Tone? ● Silent Periods?
- Strange Noises? ● Interference?
- Loose Knobs? ● Overheating?
- Dial Light Out? ● Controls Too Tight?

DON'T WAIT TILL IT'S TOO LATE!

Special Offer

\$2.00

For a Complete
R. M. S. TUNE-UP*
Will Save You Money
AND MAKE YOUR SET GOOD AS NEW

Official Member
RADIO MANUFACTURERS SERVICE
A nation-wide group of service men organized and sponsored by
PHILCO, World's Largest Radio Manufacturer. Members are selected
for experience and equipment and are prepared to quote you stand-
ard prices on any repair. **ALL WORK IS GUARANTEED.**
* R. M. S. Tune-Up is a complete inspection and overhaul. Does not include
replacement parts cost.

CALL US FOR PROMPT, RELIABLE SERVICE

A forceful selling talk to the radio set owner, on the advantage of the R. M. S. tune-up and the quality of R. M. S. Service. Gets attention and brings you business.

"ALL-WAVE AERIAL" INSERT:—

New... 1935

PHILCO All-Wave AERIAL

Guarantees **BETTER RADIO RECEPTION!**



SEE OTHER SIDE OF ENVELOPE

You Need This Aerial!

YOU have invested valuable cash in your radio. In return you are entitled to the finest entertainment your set can give.

TO GET QUICK RESULTS you MUST have an aerial which will GUARANTEE you maximum performance on both foreign and American stations and give you freedom from disturbing electrical noises.

PHILCO HAS IT! After months of careful research, test and development, PHILCO has produced for you the new 1935 ALL-WAVE AERIAL, which has many OUTSTANDING merits in ALL WAVE BANDS, but has many other outstanding new features designed to give you better results. For the owner of a short-wave or all-wave set who wants "performance plus."

The... NEW PHILCO All-Wave AERIAL IS THE Answer

10 Outstanding Advantages!

- Cut-out noise (due to battery cells or capacitors, etc.) on both standard and short-wave stations.
- All connections on set soldered at the factory (time saving, no corrosion, more secure, wiring to cause noise and work better).
- No unsightly "rag" or "spray" to disfigure your home.
- Kit contains ALL necessary parts (including lightning arrester).
- Aerial length (25 feet) of flexible waterproof lead-in furnished.
- Length of aerial can be altered in 100-foot increments without affecting results.
- Aerial need not be suspended at any special angle.
- Maximum efficiency on all the spectrum from 240 to 21,000 kilocycles.
- Improves reception on any set.

PHONE US FOR QUICK INSTALLATION

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R. M. S. Business-Builders For You!

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Enjoy Your Radio At Its Best!

Enjoy ALL of the beautiful programs now on the air from Local AND Distant Stations. Hundreds of fascinating programs -- every day and every night --

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ALL
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EVERY
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PROGRAM



12000 Radio Servicemen
Selected by Philco
Trained to Repair All Kinds of Radios

12000 MEN
Equipped with Latest and Complete
TEST ANALYZERS
and
SIGNAL GENERATORS
To Serve All Radio Owners



RADIO MANUFACTURERS SERVICE
A PHILCO Service Plan

DON'T MISS THE
MARVELOUS
ENTERTAINMENT
ON THE AIR
EVERY
NIGHT



OUR BUSINESS is to give you MORE enjoyment from your Radio Set, regardless of make, model or year. The cost is low. We are trained to make a custom adjustment, to get more stations and better tone quality from your radio.

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