

# PHILCO . . . . . Model 38-116, Code 125



## SERVICE BULLETIN No. 286A for members of RADIO MANUFACTURERS SERVICE A PHILCO Service Plan

### SPECIFICATIONS

**TYPE OF CIRCUIT:** Model 38-116, code 125, employs a fifteen tube, A. C. operated superheterodyne circuit with the Philco Automatic Tuning Dial, having five tuning ranges, covering a frequency range from 530 K. C. to 18.2 M. C.

Incorporated in this model are design features such as Magnetic Tuning control on each tuning range; Automatic Volume Control; Fidelity and Selectivity controlled by variable I. F. Transformers; Bass Compensation; Acoustic Clarifiers to eliminate cabinet resonance; Split Stator Tuning Condensers for spreading short wave stations further apart, and Special Push-Pull Audio Output circuit using 6L6G Beam tubes.

| POWER SUPPLY: | Voltage | Frequency Cycles | Power Consumption |
|---------------|---------|------------------|-------------------|
|               | 115     | 50 to 60         | 165 watts         |
|               | 115     | 25 to 40         | 165 watts         |
|               | 115/230 | 50 to 60         | 165 watts         |

Different transformers are required for operation on the voltages and frequencies listed above. The part numbers for these transformers are listed on page 4. A special transformer for operation on either 115 or 230 volt—50 to 60 cycle A.C. power circuit can be obtained. This transformer is provided with a plug and socket for selection of either voltage rating. Place the plug with arrow pointing toward voltage being used.

**INTERMEDIATE FREQUENCY:** 470 K.C.

| FREQUENCY RANGES: | Range | One              | Two               | Three           | Four              | Five              |
|-------------------|-------|------------------|-------------------|-----------------|-------------------|-------------------|
|                   |       | 530 to 1600 K.C. | 1.58 to 4.75 M.C. | 4.7 to 7.4 M.C. | 7.35 to 11.6 M.C. | 11.5 to 18.2 M.C. |

**UNDISTORTED OUTPUT:** 15 watts.

**PHILCO TUBES USED:** 6U7G R.F.; 6A8G Mixer; 6A8G Oscillator; 6N7G Oscillator control; two 6K7G I. F.; 6K7G 2nd Detector and Magnetic tuning amplifier; two 6J5G discriminator; 6J5G A. V. C.; 6R7G 1st audio; 6J5G audio driver; two 6L6G audio output, and one 5X4G rectifier.

**TONE CONTROLS:** Two—1. High audio-frequency tone varied by Treble-Selectivity control.  
2. Low audio-frequency tone varied by "Bass Tone Control," in the volume control circuit.

**PHILCO SPEAKERS USED:** One type "W5" with three acoustic clarifiers.

**CABINET:** Type XX.

### SERVICE NOTES

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

Physical views of the R. F. and I. F. transformers and the range switch sections are shown on pages 2 and 3. Each part is marked with the corresponding schematic diagram circled number.

The leads and lugs of the R. F. and I. F. transformers are either numbered or the color of the wire marked to indicate the connecting point in the circuit diagram, which is also correspondingly marked.

Rear views of the range switch sections are also shown in Fig. 5. The lugs on each are marked with a letter and number—example (A2)—indicating the connecting point of each lug in the circuit diagram.

Speaker wiring is shown in Fig. 3 and the power transformer wire colors are marked on the schematic diagram.

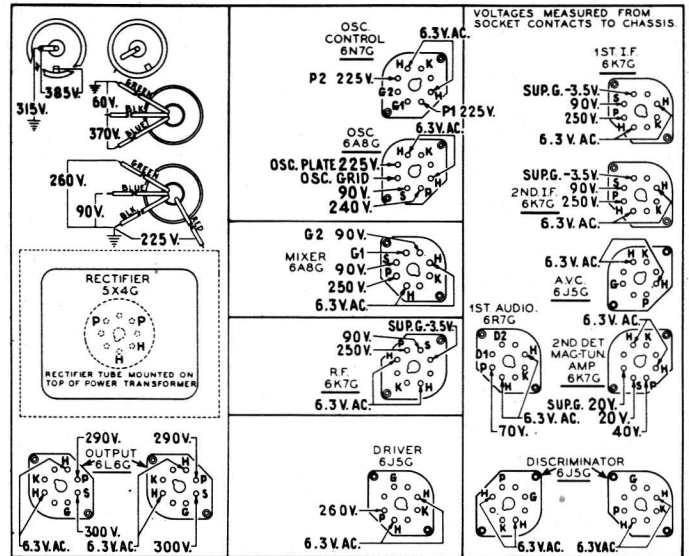


Fig. 1. Underside View of Chassis showing Socket Voltages

The voltages indicated by the arrows were measured with a Philco 026 Circuit Tester, which contains a sensitive voltmeter. Line voltage 115 A. C.—Volume control minimum—Dial set at point where no signal is present—Range Switch in broadcast position.

For band spread purposes, the stator plates of the tuning condensers in this receiver are designed in two sections; one section is of small capacity, and the other of large capacity. The sections are interconnected through the range switch.

The small capacity sections of the stators are used when tuning ranges 3, 4 and 5. When tuning ranges 1 and 2 both stator sections are connected in parallel.

For identifying the sections on the diagram Fig. 2, the dotted line of the tuning condenser is marked as follows: Small capacity sections are marked Ant. "A"; R. F. "A", and Osc. "A", and the large capacity sections—Ant. "B"; R. F. "B", and Osc. "B".

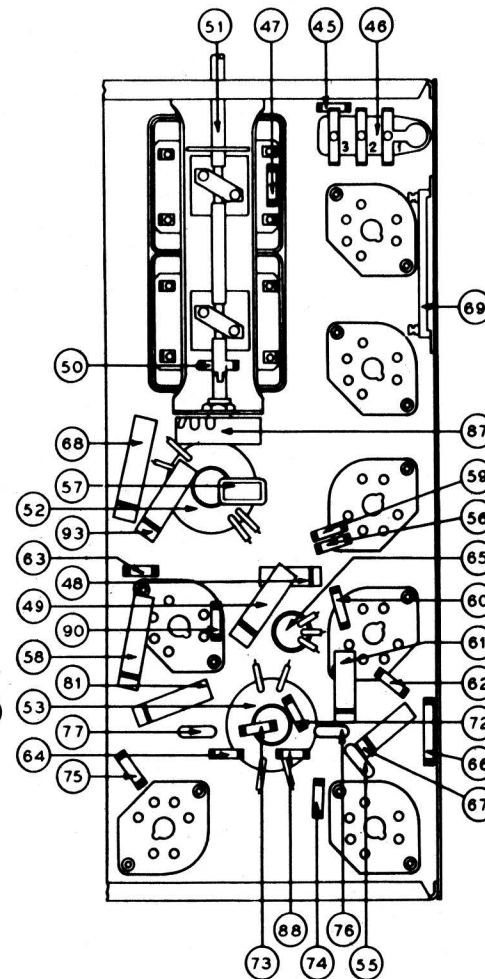
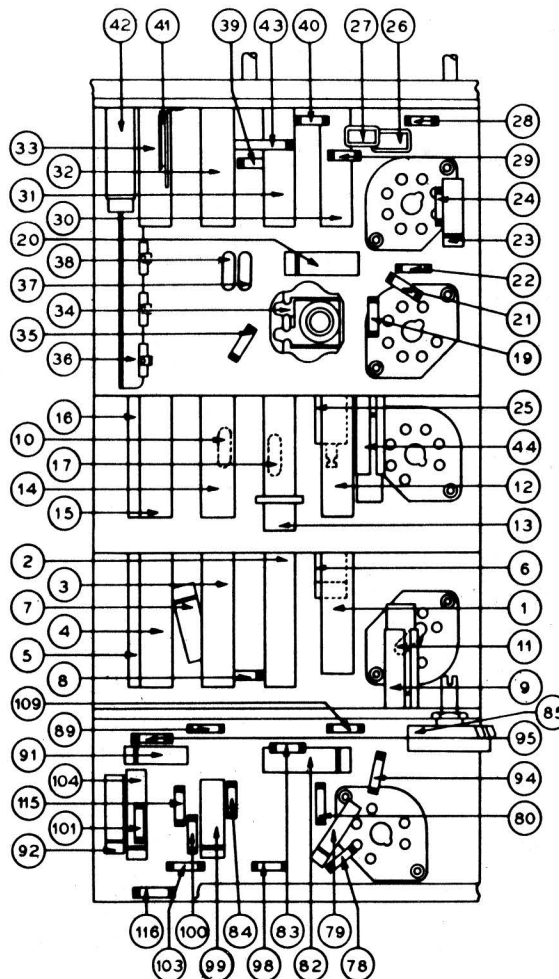
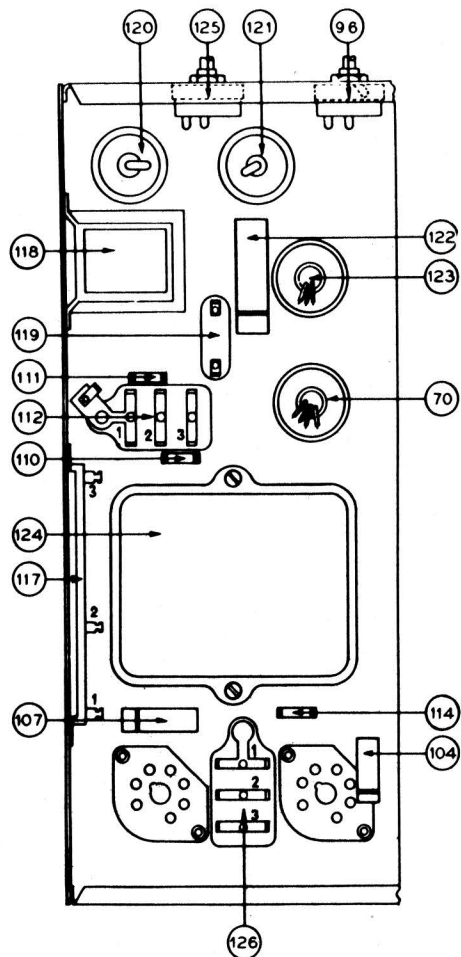
### Automatic Tuning Mechanism Service Data

Service data and a complete parts list for the Automatic Tuning Mechanism of this receiver will be found in Service Bulletin 273. There are four automatic dial parts, however, which differ from those shown in bulletin 273. These parts are marked with an asterisk on page 4 of this bulletin.

### Aerial Connections

To obtain the full advantage of the sensitivity of this receiver the Philco High Efficiency Aerial Part No. 40-6112 should be used. Connect the aerial as follows:

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



Part Locations

Fig. 2. Underside View of Chassis

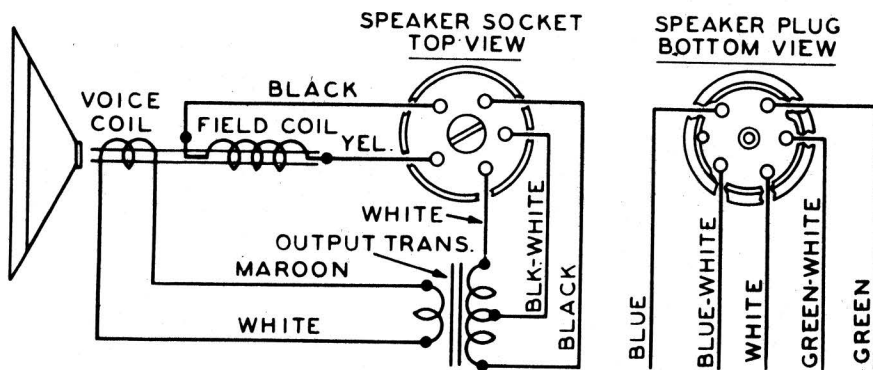


Fig. 3. Speaker Wiring

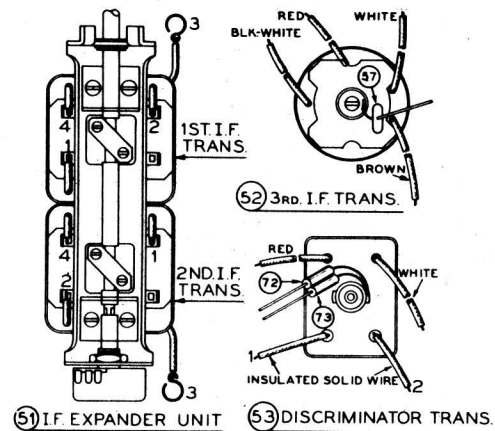


Fig. 4. I. F. Transformer Connections

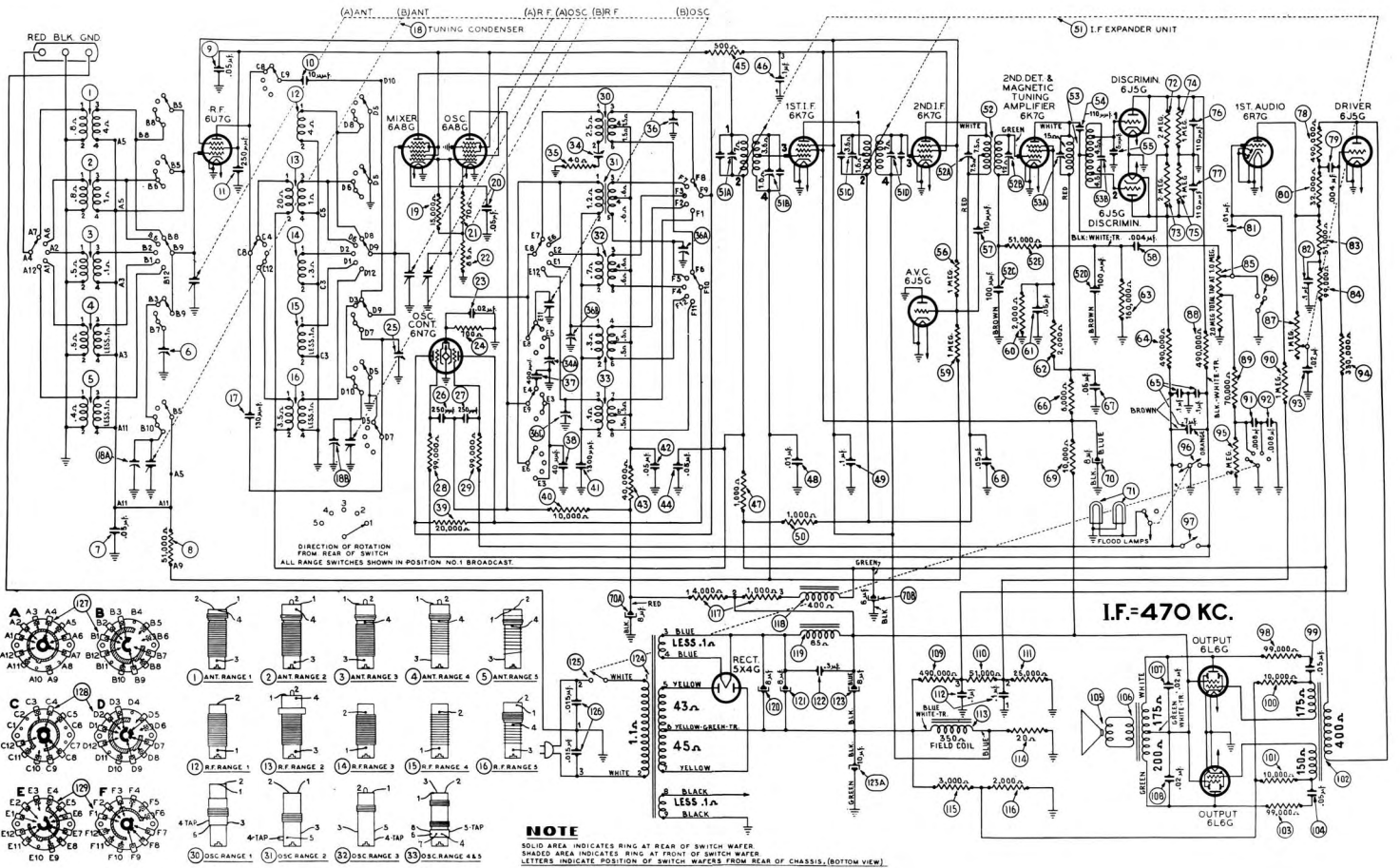


Fig. 5. Schematic Diagram Model 38-116, Code 125

REPLACEMENT PARTS—Model 38-116, Code 125

Table with 4 columns: Schem. No., Description, Part No., List Price. Lists various electronic components like transformers, resistors, capacitors, and switches.

Table with 4 columns: Schem. No., Description, Part No., List Price. Continues listing electronic components including chokes, electrolytic capacitors, and tuning mechanisms.

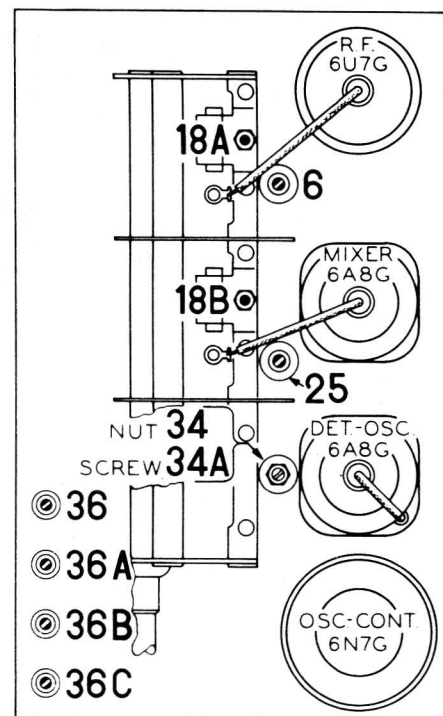


Fig. 6. Top View of R. F. Unit Showing Compensator Locations

Table with 4 columns: Schem. No., Description, Part No., List Price. Lists miscellaneous mounting parts like shafts, shields, and sockets.

MISCELLANEOUS MOUNTING PARTS. Table with 4 columns: Part No., Description, Part No., List Price. Lists various mounting hardware.

\*These Automatic Tuning Mechanism Parts differ from those shown in Service Bulletin 273. †1st I. F. Transformer Section 32-2727 2nd I. F. Transformer Section 32-2728

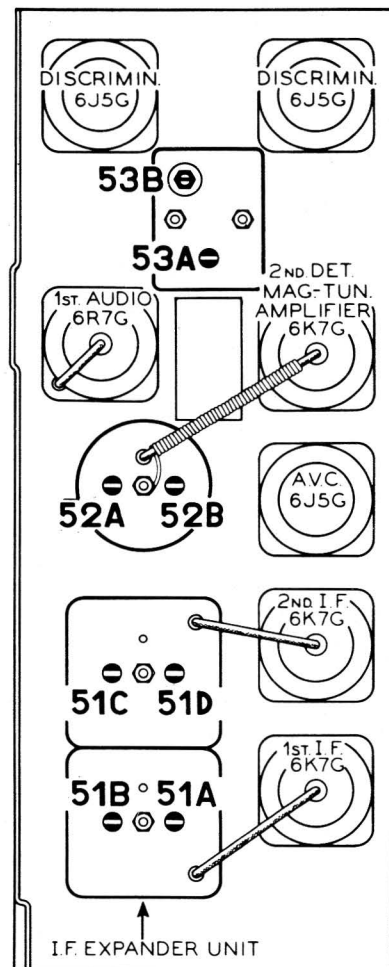


Fig. 7. Top View of I. F. Unit Showing Compensator Locations

## Alignment of Compensators

**EQUIPMENT REQUIRED:** (1) Signal Generator, having a fundamental frequency range covering the tuning and intermediate frequencies of the receiver. **Philco Model 077 Signal Generator** which has a fundamental frequency range from 115 to 36000 K. C. is the correct instrument for this purpose; (2) Output Meter, **Philco Model 026 Circuit Tester** incorporates a sensitive output meter and is recommended; (3) Philco Fibre Handle Screw Driver, Part No. 27-7059 and Fibre Wrench, Part No. 3164.

**OUTPUT METER:** The 026 Output Meter is connected to the plate and cathode terminals of one of the 6L6G tubes. Adjust the meter to use the (0-30) volt scale and advance the attenuator control of the generator until a readable indication is noted on the output meter after signal is applied to stage being adjusted.

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

1. Loosen the set screws on the shaft coupling of the tuning condenser. Then turn the tuning condenser until the plates are in the maximum capacity position. Now turn the dial until the glowing beam indicator is on the Index Line at the low frequency end of range 3. (See Fig. 8). With the dial and tuning condenser in this position tighten set screws.

2. Turn the tuning condenser control until the indicator is on the 4.71 M. C. mark of range 3. (See Fig. 8.)

3. With the dial in this position, loosen the shaft coupling set screws. Then turn the dial until the indicator is again on the Index Line. Tighten the set screws in this position. Be careful when turning the dial that the position of the tuning condenser is not disturbed.

### INTERMEDIATE FREQUENCY CIRCUIT

1. Viewing each instrument from the front, set the receiver and Signal Generator controls as follows:

- Selectivity-fidelity control (clockwise)
- Volume Control at maximum (clockwise)
- Magnetic Tuning Switch (off)
- Bass Compensation Switch first position from "Off"
- Range Switch position one (broadcast)
- Receiver dial 580 K. C.
- Signal Generator indicator set at 470 K. C. and the "Attenuator" control for maximum output.

2. Connect the Signal Generator output cable through a .1 mfd. condenser to the grid of the second 6K7G I. F. tube. Then adjust the I. F. compensators as follows:

a. Close compensator (52B) by turning to the extreme clockwise position, then pad compensator (52A) for maximum output. Now readjust compensator (52B) for maximum output.

b. Connect the Signal Generator output lead through the .1 mfd. condenser to the grid of the 6A8G Mixer tube, and adjust the following compensators for maximum output: (51D), (51C), (51B), (51A).

c. Repad (52A), See Note. A Check for two equal peaks. Treble-Selectivity control in expanded position (counter-clockwise).

### RADIO FREQUENCY CIRCUIT

1. Connect the Signal Generator output cable to the "Red" and "Blk" terminals on the aerial panel (rear of chassis). The ground connection of the cable should be connected to the "Blk" terminal. Set the controls as given under "Intermediate Frequency Circuit" (a-b-c-d) and set the Range Switch, Signal Generator and Receiver Dials as given in the following procedure.

2. Set the controls and adjust the compensators for maximum output as follows:

| Range Switch Position | Signal Generator and Receiver Dials | Compensators in Order                        |
|-----------------------|-------------------------------------|--|
| 1                     | 1550 K. C.                          | (36), (18B), (18A)                           |
| 1                     | 580 K. C.                           | (34)   |
| 1                     | 1550 K. C.                          | (36), (18B), (18A)                           |
| 5                     | 18 M. C.                            | (36C) See Note C                             |
| 5                     | 18 M. C.                            | (25), (6) Roll Tuning Condenser. See Note B  |
| 4                     | 11 M. C.                            | (36B)  |
| 3                     | 7 M. C.                             | (34A)  |
| 2                     | 4.5 M. C.                           | (36A)  |
| 5                     | 18 M. C.                            | (36C) See Note C                             |
| 5                     | 18 M. C.                            | (25), (6), Roll Tuning Condenser. See Note B |

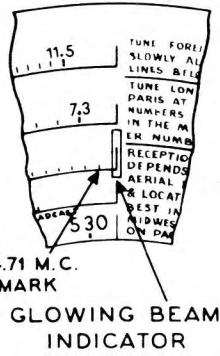


Fig. 8. Dial Calibration

**NOTE "A"**—Slowly shift signal generator indicator between 460 and 480 K. C. As the indicator is turned, two peaks will be noted on the Output Meter; one about 465 K. C. and the other about 475 K. C. These peaks should give the same deflection or reading on the output meter. If the peaks are unequal, Compensator (52A) must be slightly readjusted to the right or left (not more than  $\frac{1}{4}$  of a turn) until the peaks are equalized. Each time the compensator is set in another position, rotate the signal generator through the 460 or 480 K. C. range and note the reading of each peak. This adjustment is used to compensate for slight differences between peaks. If the compensator must be turned more than  $\frac{1}{4}$  of a turn in either direction to equalize the peaks, all padders should be carefully readjusted as given under "Intermediate Frequency Circuit" adjustment procedure.

**NOTE "B"**—When adjusting the low frequency compensator of Range 1 (Broadcast) or the antenna and R. F. compensators of the high frequency tuning range, the receiver Tuning Condenser must be adjusted (rolled) as follows: First tune the compensator for maximum output, then vary the tuning condenser of the receiver for maximum output about the frequency dial mark being used. Now turn the compensator slightly to the right or left and vary the receiver tuning condenser for maximum output. If the out reading increases, turn the compensator in the same direction a trifle more, and again vary the tuning condenser for maximum output. If the output decreases, set the compensator in the opposite direction. This procedure of first setting the compensator and then varying the tuning condenser is continued until there is no further gain in output reading.

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

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

### MAGNETIC TUNING CIRCUIT ADJUSTMENT

a. Set the Magnetic Tuning switch in the "out" position (counter-clockwise).

b. Volume control maximum (extreme clockwise).

c. Turn Treble-Selectivity control to the Selective position (extreme clockwise).

d. Now turn the signal generator indicator to the 1000 K. C. mark and adjust the "Attenuator" control for a weak signal. Then adjust the receiver dial for maximum output at this frequency.

**NOTE:** The receiver dial **MUST** be tuned very accurately to the 1000 K. C. signal in order to make the following adjustments correctly.

e. After adjusting the receiver dial, turn the Magnetic Tuning Switch "on".

f. Now, turn compensator (53B) slightly to the right or left (about  $\frac{1}{4}$  turn) and proceed with adjustment "g."

g. Adjust compensator (53A) primary of the discriminator transformer for **minimum** output; then readjust compensator (53B) secondary of discriminator transformer for **maximum** output.

The above adjustments are now checked for accuracy as follows:

### Frequency Test:

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

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

### Sensitivity Test:

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

2. Now detune the signal (first above and then below the 1000 K. C. mark) to a point at which the signal is weakly heard. At each point turn the magnetic tuning control "ON". When the control is turned "ON" the signal should return to normal output strength. If the magnetic tuning circuit does not pull the signal into resonance, the primary compensator (53A) should be carefully readjusted.