

PHILCO MODEL 044 AUDIO SIGNAL GENERATOR

Philco Model 044 Audio Signal Generator is designed to meet the many service problems requiring an audio frequency source of voltage, such as testing speaker units for rattles and buzzes, adjusting 10 KC. audio filter circuits; locating and isolating trouble in audio amplifier stages; testing overall operation of a radio receiver; checking radio cabinets for loose sections which vibrate at certain frequencies, and making audio frequency comparison tests before and after servicing.

DESCRIPTION:

The generator is designed to operate from 115-volt 50- or 60-cycle A.-C. power supply and provide at the output jacks marked "A.F." and "R.F.", continuously variable audio frequencies in the range from 60 to 11,000 cycles per second or a fixed R-F signal of 580 KC. modulated by the variable audio frequency circuit. The audio signal of this generator is produced by the beat or difference frequency of two R-F oscillators. Two Philco 6Y7G tubes are used for this purpose. One tube acts as a variable oscillator and detector and the other a fixed oscillator and output tube. A 6X5G tube is used in the power circuit for supplying D.C. voltages for operation of the instrument.

OPERATION:

Under separate headings are listed the routine methods for using the audio signal generator in servicing a receiver. These procedures include centering speaker cones; testing and localizing trouble in the audio circuits; adjusting 10 KC. audio filter, and overall test of a radio receiver.

To operate the generator, insert the power cable female plug into the socket on the side of the instrument and connect the male end into a 115-volt, 50- or 60-cycle power supply. The power switch located at the lower right-hand corner of the case is then turned to "on". In order to assure greater stability of operation, the generator should be allowed to heat for at least 10 minutes and then calibrated using the procedure given under "Dial Calibration." This takes but a few minutes and will assure accurate reading of the dial scale.

AUDIO SIGNAL CONNECTIONS:

If an audio test is desired, plug the output cable into the jack marked "A.F." Connect the output cable shield wire into the "GND." jack. The output circuit at this jack delivers an audio signal in the range from 5 to 10 volts, depending on the impedance of the applied load and the frequency used. Attenuation of the output is obtained by the "output control".

R-F SIGNAL CONNECTIONS:

For an overall check of a receiver the jack marked "R.F." supplies a 580 KC. R-F signal modulated by the variable audio signal. The output has no effect

upon the signal at this jack. With the output lead connected into one of the above jacks any of the following tests may be made.

CENTERING SPEAKER CONES:

Speaker cones may be centered using a strong signal of a low frequency by setting the pointer half-way between "0" and "100" on the dial scale of the signal generator. Apply the signal to the antenna when using the 580 KC. R-F signal or the first audio grid when using the "audio" signal.

OVERALL TEST OF A RECEIVER:

The 580 KC. R-F signal is used in checking a receiver for overall tone quality and in locating loose parts in the receiver or cabinet that vibrate at certain frequencies. To use the 580 KC. signal insert the antenna and ground lead of the generator into the "R.F." and "GND." jacks. Connect the other end of the leads to the "Ant." and "Gnd." terminals of the radio chassis. Tune radio dial to 580 KC.

Now slowly vary the signal generator indicator over the entire scale and listen closely to the speaker response. If the receiver distorts or a rattle or buzz develops at some frequency in the audio range, the cause of the distortion or buzz can be readily detected and located by leaving the indicator at that frequency.

TESTING AND LOCALIZING TROUBLES IN AUDIO AMPLIFIERS:

The audio signal generator is most helpful in tracing and localizing trouble or determining the operating condition of audio amplifiers. The output of the "A.F." jack is used for this purpose. Insert the output lead into the "A.F." and "GND." jacks and connect the other end on which the clips are attached to the grid of the output tube and chassis respectively.

By transferring the clip from the grid of each tube beginning with the output tube and continuing to the detector tube each stage of the amplifier can be individually tested for audio response. This method of servicing gives a rapid check of the audio amplifier or localizes the trouble if the audio circuit is inoperative.

By varying the indicator of the audio signal generator a complete check of any of these parts or stages over the entire audio frequency range is obtained.

ADJUSTING 10 KC. AUDIO FILTERS:

The audio signal generator is useful for adjusting audio filters which are usually located in the plate circuit of the detector tube or first audio tube. To adjust an audio filter circuit, for example, connect the output lead clip to the high side of the volume control. Then turn the dial of the signal generator to 10,000 cycles. Leave the dial at this point. Now adjust the audio filter compensator of the receiver for minimum output.

CALIBRATION OF DIAL:

To align the oscillator circuit of the generator with the dial scale, proceed as follows:

CHECKING POINTER:

Rotate the dial scale indicator in a counter-clockwise direction (towards the low frequency end) until the pointer stops. When this position is reached the indicator should be on the zero line. If the pointer is not on the zero line, loosen the set screws on the hub and adjust the pointer to cover the zero line.

ADJUSTING FOR ZERO BEAT:

1. There are two methods of adjusting the oscillator for zero beat. One is to take the output of the "A.F." jack and feed it into the input circuit of an audio amplifier or the audio circuit of a radio receiver. The other method is to take the output of the "R.F." jack and feed it into the antenna of a radio receiver, tuning the receiver to 580 KC.

2. Tune the 044 indicator and listen for an audio signal in the receiver. This signal will change in pitch as the indicator is rotated, and should reach zero frequency (no beat note) when the indicator is at the "zero line." If a note is still heard in this position take the following steps:

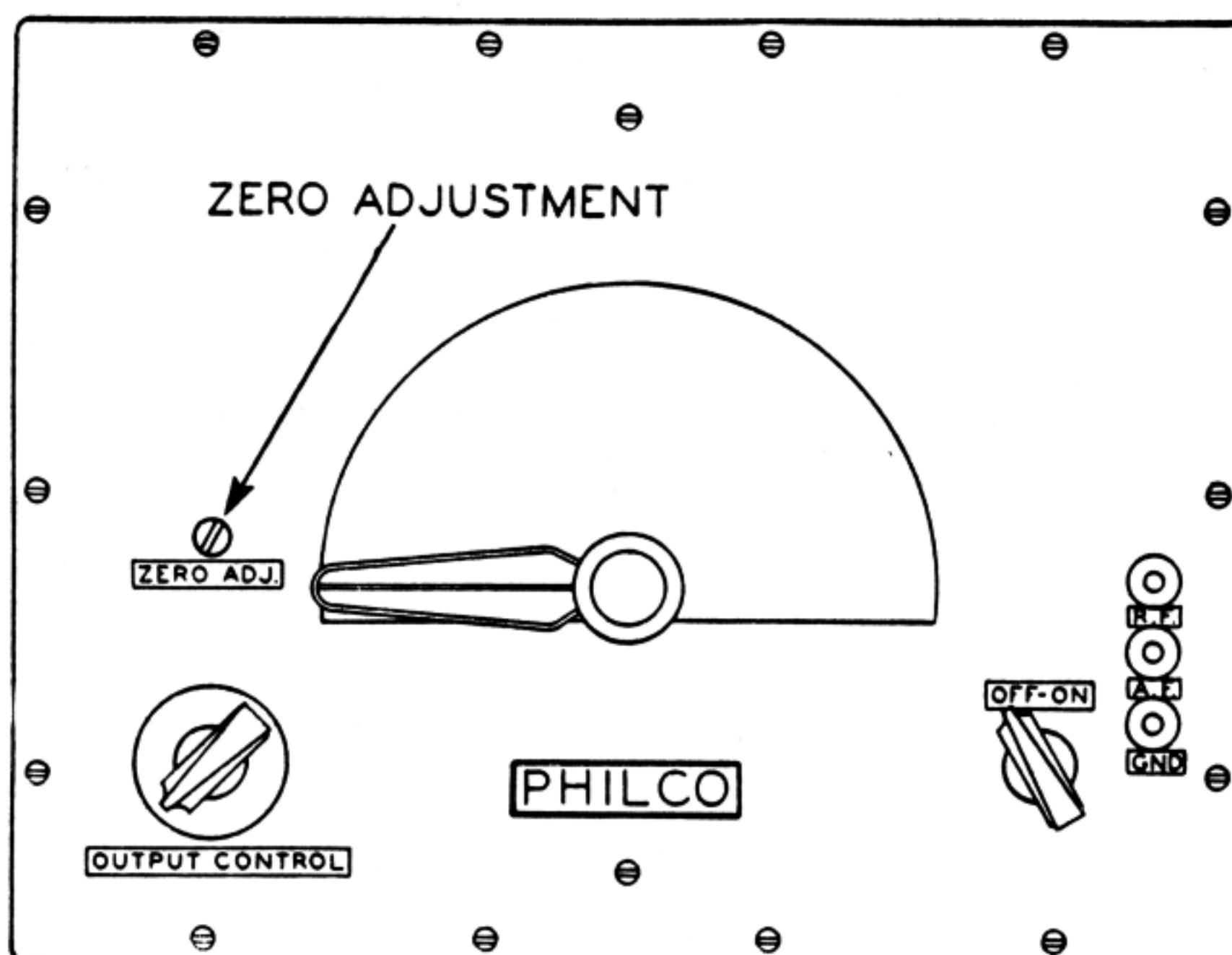
Leave the pointer on the zero line, then insert a screwdriver into the compensator screw hole marked

"zero adj." (see cut). Turn the screw counter-clockwise until the signal goes down to zero frequency, and then starts to increase in frequency. When this point is reached, turn the screw slowly clockwise in the reverse direction. Note that the signal goes down in frequency again. Continue turning the screw until the signal stops. This is the correct position for the zero frequency adjustment. If this adjustment has been carefully made, a low frequency note will be heard as soon as the generator indicator leaves the zero line. This adjustment must be made whenever an exact value of frequency is needed, and will have to be reset slightly as the instrument heats up during a long process of operation.

ENGINEERING CHANGE IN 044 AUDIO SIGNAL GENERATOR:

An engineering development will improve the overall frequency stability of the Model 044 Audio Signal Generator. Two fixed condensers, part No. 30-1099 (yellow, white, blue) and part No. 30-1100 (yellow, white, red) of the moulded bakelite mica type, located across the secondaries of the oscillator coils, should be replaced with the newer silver mica type, part No. 30-1104. These are impregnated and specially designed to minimize drift over the full range of the instrument and to eliminate the effect of temperature variations.

After substitution is completed and before normal frequency response is obtained, it will be necessary



FRONT PANEL OF AUDIO SIGNAL GENERATOR

to readjust the several padder condensers located within the instrument. The procedure as given below should be carefully followed.

Accurate readjustment requires the use of a Philco 077 All Wave Signal Generator, Philco 027 Circuit Tester and a complete radio receiver.

The V.T.V.M. portion of the 027 Circuit Tester is first connected in the AVC circuit of the receiver. This will permit zero adjustment in that the signal voltage can be accurately measured as each adjustment is made. A convenient method of connection to the radio chassis is to insert a 2 megohm resistor, part No. 33-520439, in series with the lead from the "HIGH" terminal of the V.T.V.M., and connect to the grid of any tube having AVC furnished to it. The "LOW" terminal of the V.T.V.M. is clipped to the ground terminal of the radio chassis.

Referring to the diagram the padding condensers should be adjusted in order.

1. Connect the output leads of both the 077 and 044 to the antenna and ground terminals of the receiver.

2. Adjust the 077 and receiver dials to the fundamental frequency of 580 K.C. Turn the modulator switch to the "Mod OFF" and with the 044 indicator set at zero on the scale, adjust compensator (A) to beat with the 077 signal.

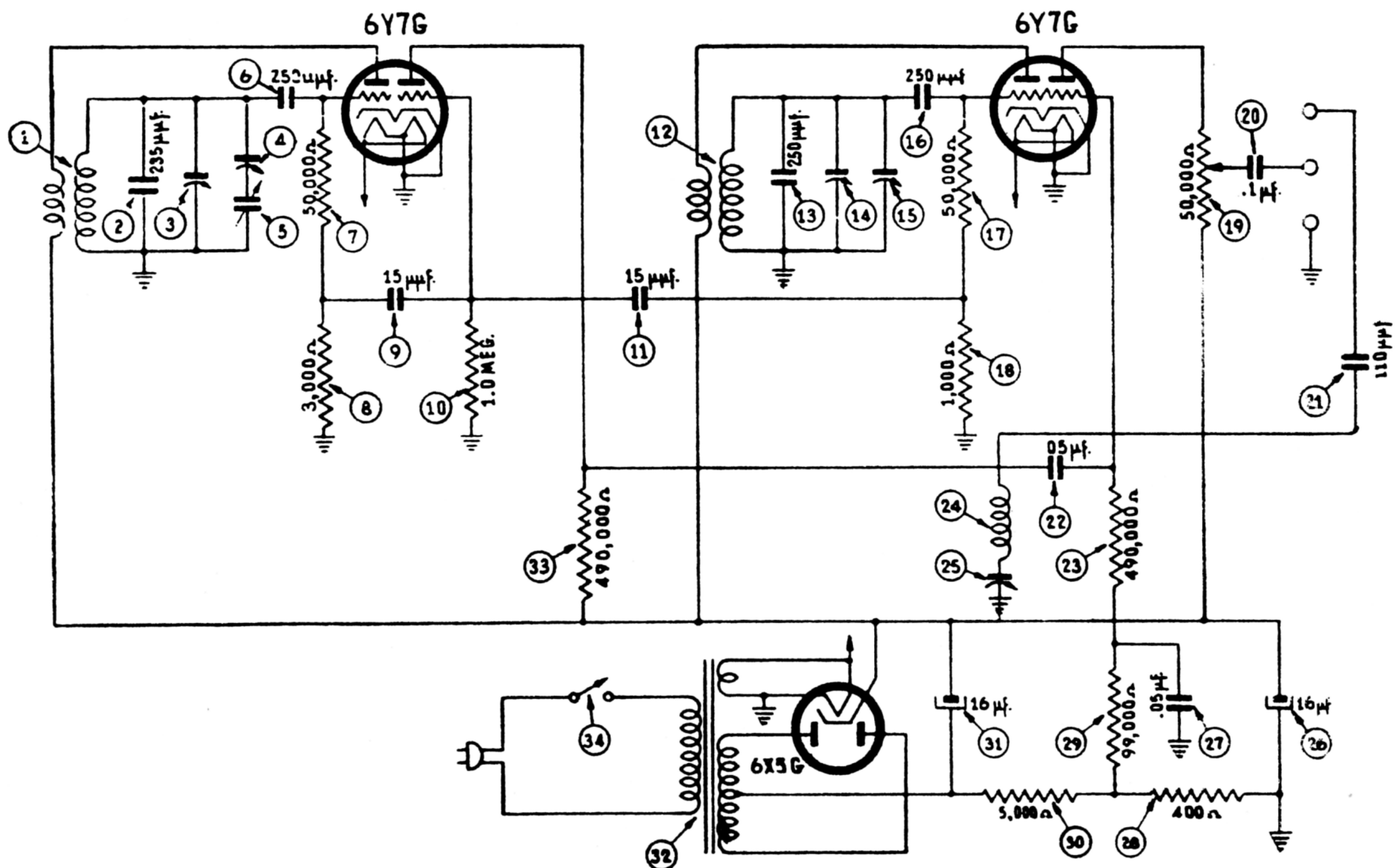
3. Remove the 077 output leads from the receiver terminals and turn the generator "OFF". With the 044 indicator at zero adjust padder (B) for zero beat, then adjust padder (C) "Zero Adj." as usual so the oscillator will produce a signal when the indicator is rotated toward the higher frequencies.

4. Return the 044 indicator to zero and adjust padder (D) until the needle of the V.T.V.M. indicates minimum deflection. If this adjustment is incorrectly made the audio note will be badly distorted. Readjust until distortion is eliminated.

5. Padder (E) should not be tampered with unless it is found that the calibrations for the higher frequencies are incorrect. To adjust (E) it is necessary to have an additional audio signal generator that is accurately calibrated. This is tuned to the indicated frequency of 10,000 cycles and the resulting signal fed into the receiver. The exact tone or pitch should be carefully noted. Connect the 044 to the receiver and set the indicator to 10,000 cycles. Adjust padder (E) until the audio signal reaches the same pitch as previously noted.

The receiver dial remains tuned to the original 580 K.C. setting for all adjustments.

The air padder (C) "Zero Adj." is adjusted as usual for zero beat.



PHILCO MODEL 044 AUDIO SIGNAL GENERATOR (SCHEMATIC DIAGRAM)

REPLACEMENT PARTS

Schem. No.	Description	Part No.	Schem. No.	Description	Part No.
1	Oscillator Transformer	32-2748	25	Compensator (part of 24)	30-2251
2	Condenser (235 mmfd.)	30-1100	26	Electrolytic Condenser	30-4444
3	Compensator	31-6214	27	Condenser (.05 mfd.)	33-140339
4	Compensator	31-6214	28	Resistor (400 ohms)	33-399339
5	Tuning Condenser	31-2057	29	Resistor (99,000 ohms)	33-250339
6	Condenser (250 mmfd.)	30-1032	30	Resistor (5,000 ohms)	32-7842
7	Resistor (51,000 ohms)	33-351339	31	Electrolytic Condenser (part of 26)	33-449339
8	Resistor (3000 ohms)	33-230339	32	Power Transformer	6498
9	Condenser (15 mmfd.)	30-1030	33	Resistor	L-2849
10	Resistor (1 megohm)	33-510339	34	On-Off Switch	41-3317
11	Condenser (15 mmfd.)	30-1030		Cable (Power)	28-5139
12	Oscillator Transformer	32-2747		Cable (Test)	27-4606
13	Condenser (250 mmfd.)	30-1099		Pointer	27-4225
14	Compensator	31-6206		Knob (Pointer)	27-7605
15	Compensator	31-6214		Knob (Attenuator)	27-6053
16	Condenser (250 mmfd.)	30-1032		Felt Washer	27-6087
17	Resistor (51,000 ohms)	33-351339		Socket (Power Tube)	4091
18	Resistor (1000 ohms)	33-210339		Socket (Audio)	27-7951
19	Attenuator	33-5238		Socket (AC cord)	42-1223
20	Condenser (.1 mfd.)	4989SU		Handle	27-8428
21	Condenser (110 mmfd.)	30-1031		Jack Phone Tip	27-8429
22	Condenser (.05 mmfd.)	30-4444		Insulator (jack)	
23	Resistor (490,000)	33-449339		Insulator (jack)	
24	Filter	32-2788			



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