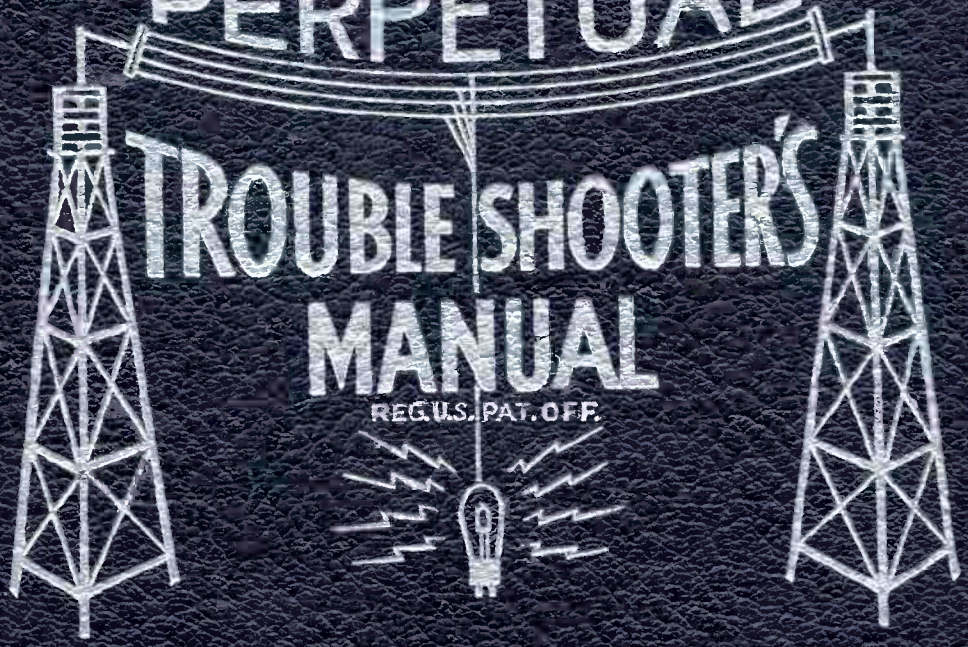
VOLUME VII

PERPETUAL TROUBLE SHOOTER'S MANUAL

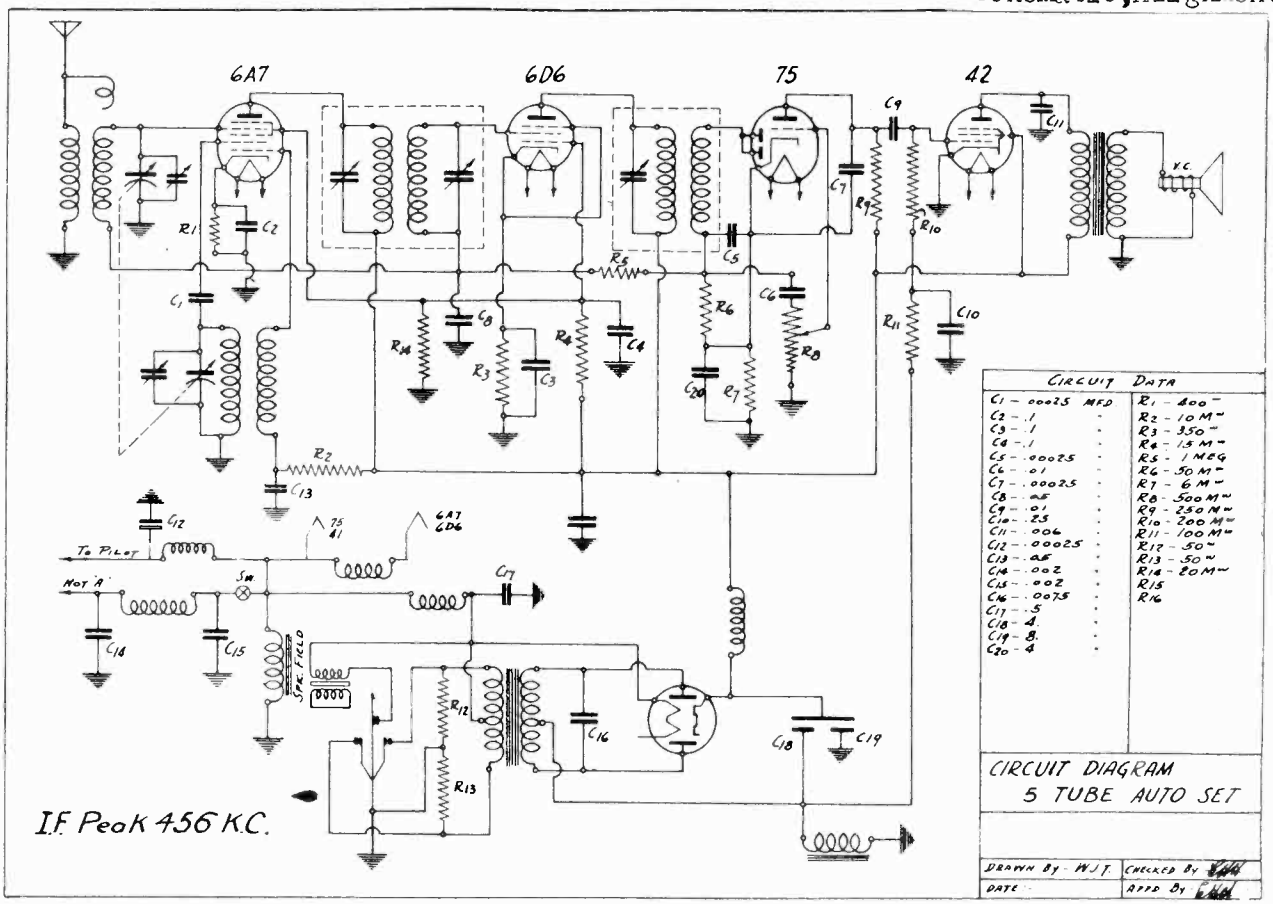
REG. U.S. PAT. OFF.



JOHN F. RIDER

WARWICK MFG. CO.

MODEL 5-Tube Auto
Schematic, Alignment



I. F. ALIGNMENT:

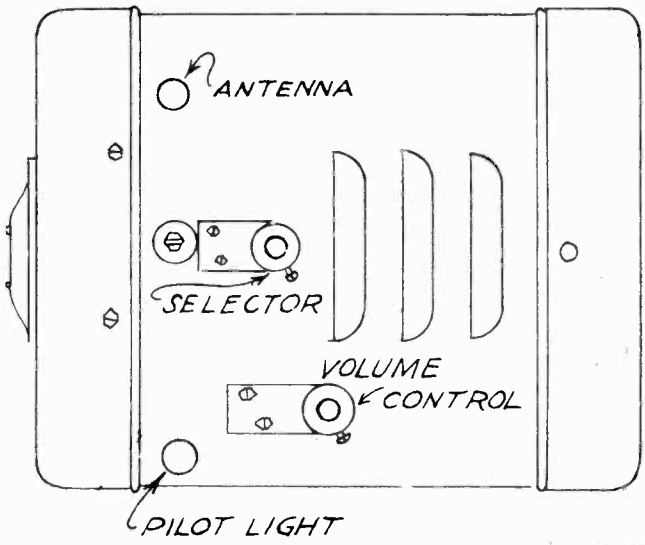
With volume control turned on full and variable gang condenser at maximum capacity, attach test oscillator lead in series with a .1 mfd. condenser to grid of 6A7 tube. Set test oscillator 456 KC and adjust I.F. trimmers for maximum output as indicated on an output meter connected across voice coil of speaker or from plate and screen of 41 tube.

R. F. ALIGNMENT:

Set test oscillator at 1500 KC and connect to antenna of receiver through a 150 mmf. condenser. Rotate variable gang condenser to minimum capacity and back off slightly. Adjust trimmer on oscillator section of gang condenser (first section from shaft end) to resonance indicated by maximum output. Re-set test oscillator at 1400 KC and rotate variable condenser until oscillator signal is picked up. Adjust antenna (rear section) to resonance. Check alignment at 1400, 1000, 600 and 550 kilocycles by setting test oscillator to these frequencies and rotate condenser until signal is picked up. Off tracking at 1000 and 600 kilocycles may be compensated for by slightly bending the slotted plates of the antenna section of gang condenser. DO NOT BEND PLATES OF OSCILLATOR SECTION.

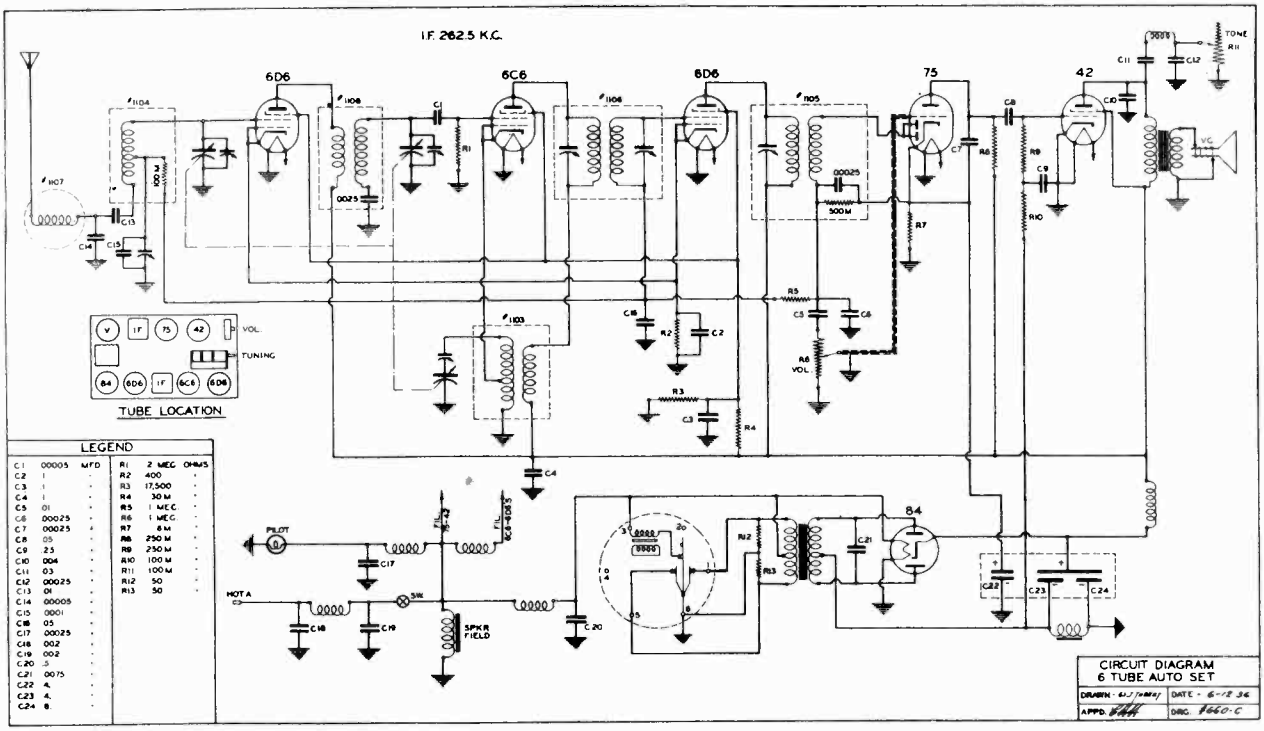
DIAL ADJUSTMENT

To correctly adjust dial pointer, tune the set to a station of known frequency or turn selector knob to end of tuning range in either direction and adjust slotted shaft in back of remote head until dial pointer reaches correct frequency setting. The dial is calibrated in kilocycles. Add one cipher to dial reading to determine frequency of station tuned.



MODEL 6-Tube Auto
Schematic, Alignment

WARWICK MFG. CO.



I. F. ALIGNMENT:

With volume control on full and variable gang condenser at maximum capacity, attach test oscillator lead in series with a .1 mfd. condenser to stator of R. F. section of gang condenser (center section). Set test oscillator at 262.5 KC and adjust I.F. trimmers for maximum output as indicated on an output meter connected across voice coil of speakers or from plate and screen of 42 tube.

Set test oscillator to 600 KC and adjust oscillator padding (located on bakelite strip, 2nd from front). Also adjust 600 KC antenna padding condenser (located on bakelite strip, 1st condenser) Reset test oscillator to 1400 KC and readjust antenna and R. F. trimmers.

R. F. ALIGNMENT:

Set test oscillator at 1550 KC and connect through a 150 mmf. condenser to antenna of reciever. Rotate variable gang condenser to minimum capacity and back off slightly. Adjust trimmer on oscillator section of gang condenser (third section from shaft end) to resonance indicated by maximum output. Re-set test oscillator of 1400 KC and rotate variable condenser until oscillator signal is picked up. Adjust antenna trimmer (front section) and R. F. trimmer (center section) to resonance.

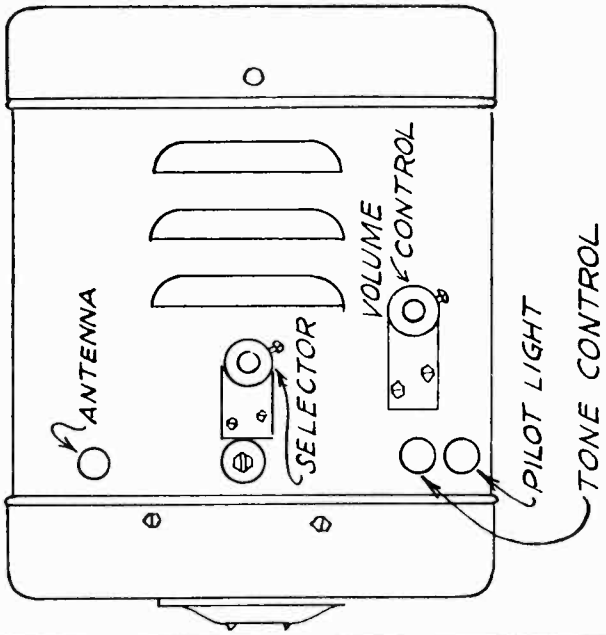
DIAL ADJUSTMENT:

To correctly adjust dial pointer, tune set to a station of known frequency or turn selector knob to end of tuning range in either direction and adjust slotted shaft in back of remote head until dial pointer reaches correct frequency setting. The dial is calibrated in kilocycles. Add one cipher to dial reading to determine frequency at station tuned.

ANTENNA ADJUSTMENT:

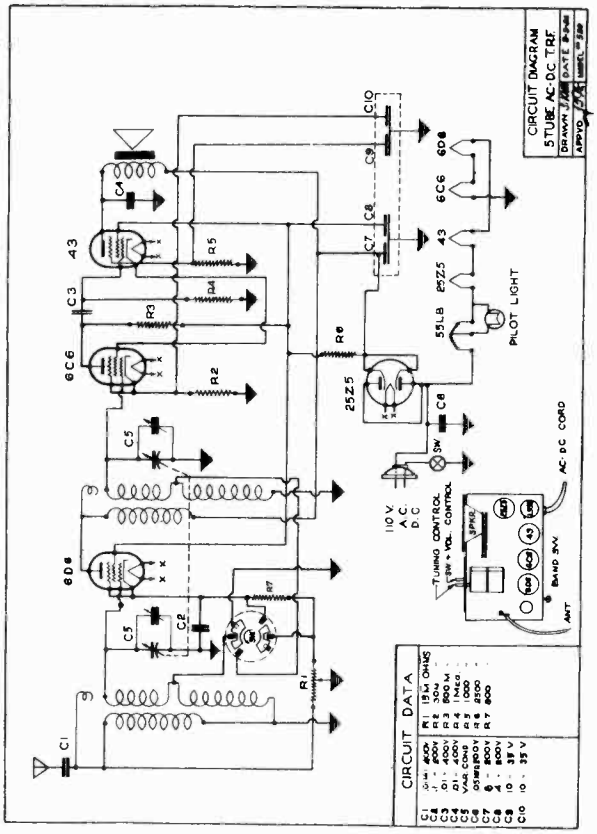
When set is in operation, tune to a station on or about 1400 KC and adjust antenna trimmer to maximum volume. This trimmer is accessable by removing the plug button on the front cover of the receiver.

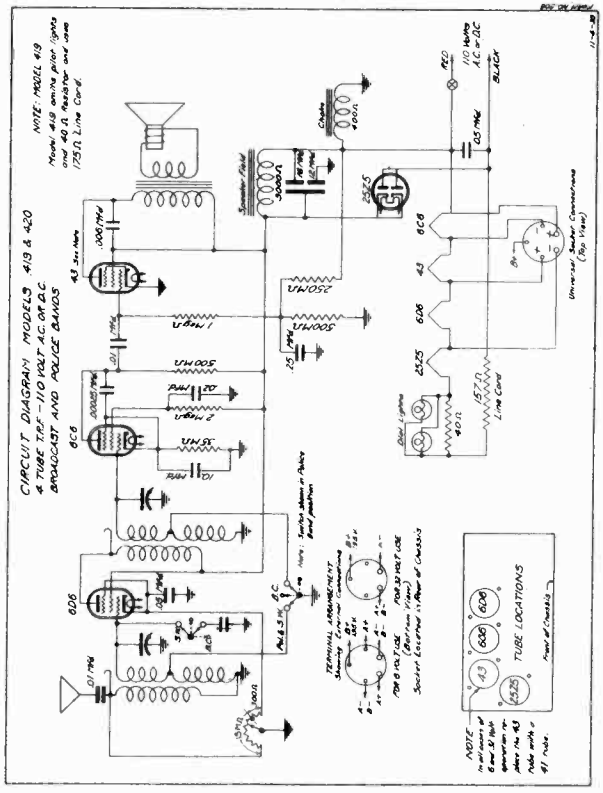
Proper adjustment of this trimmer matches the particular antenna used in the auto to the receiver which increases the sensitivity of the receiver.

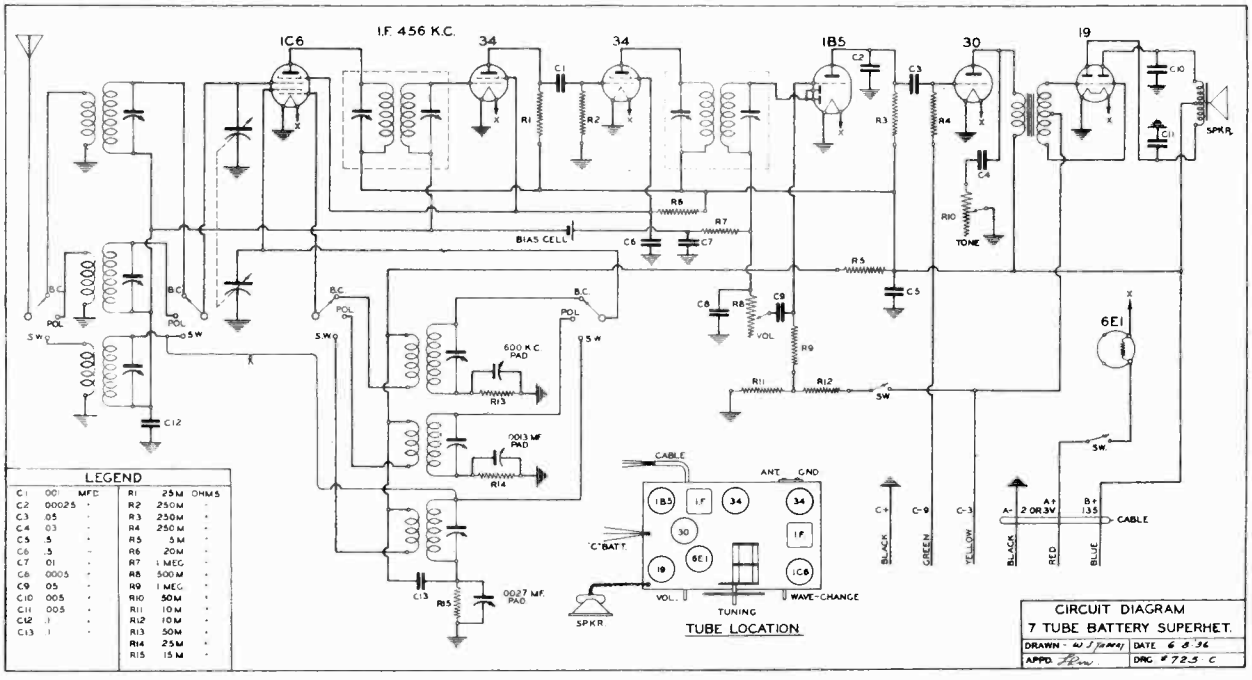


WARWICK MFG. CO.

MODELS 419,420
MODEL 520
MODEL 7-Tube Batt.
Schematics, Socket



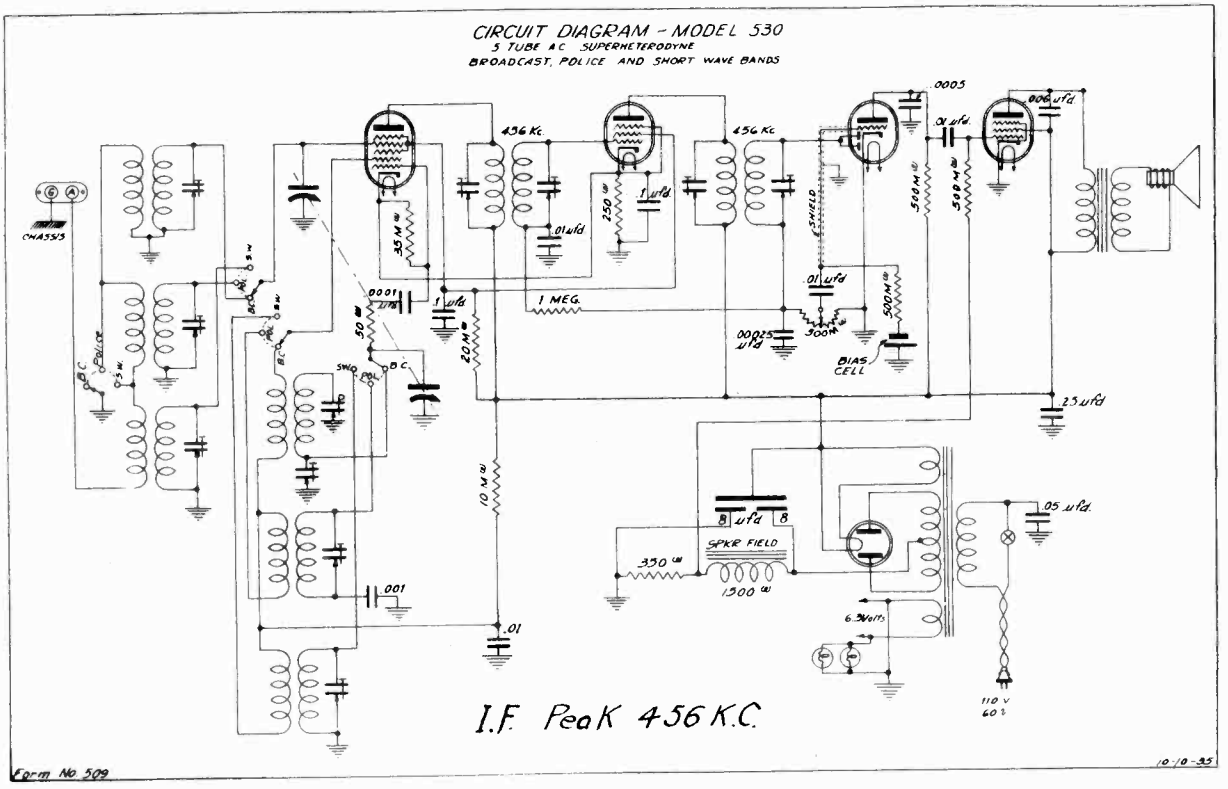


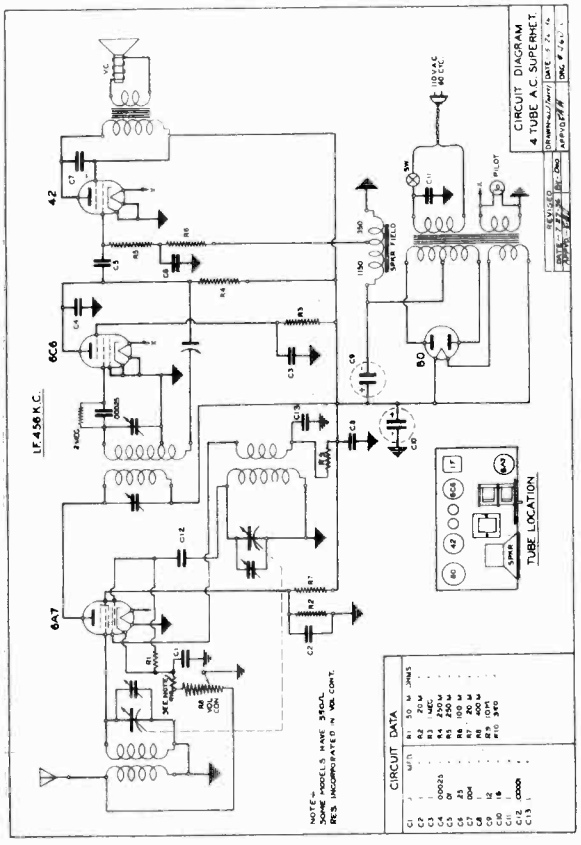


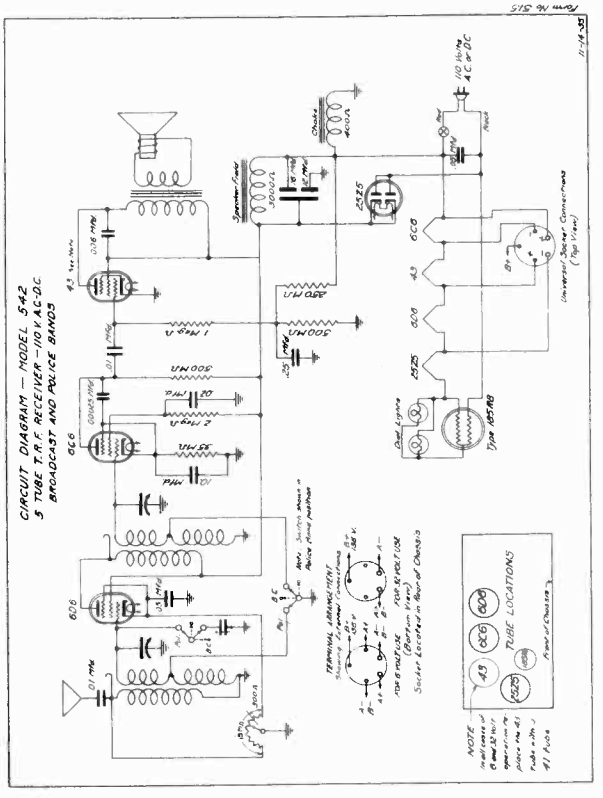
MODEL 530
MODEL 542
MODEL 4-Tube AC

WARWICK MFG. CO.

Schematics, Socket







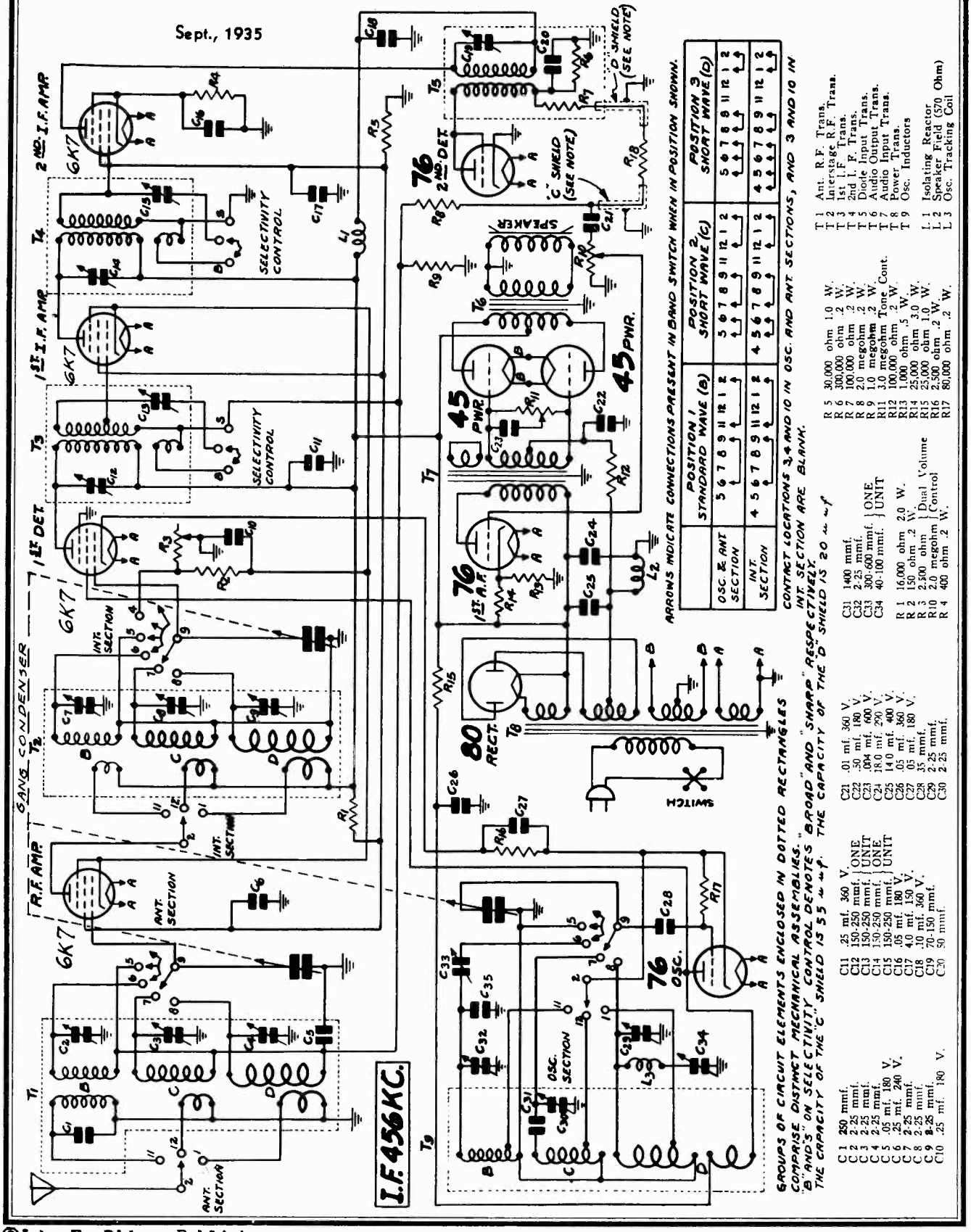
MODEL ODM Series
Schematic

WELLS-GARDNER & CO.

Power Consumption - 90 Watts (At 115 volts 60 cycles)
Power Output - - - - - - 5 Watts Undistorted
Selectivity - 22 KC Broad at 1000 times Signal (Sharp)

Tuning Frequency Range
B Range - - - - - - - - - - 535 to 1730 KC.
C Range - - - - - - - - - - 1715 to 5800 KC.
D Range - - - - - - - - - - 5750 to 18300 KC.

Sept., 1935



ARROWS INDICATE CONNECTIONS PRESENT IN BAND SWITCH WHEN IN POSITION SHOWN.

	POSITION 1 STANDARD WAVE (B)	POSITION 2 SHORT WAVE (C)	POSITION 3 SHORT WAVE (D)
OSC. & ANT SECTION	5 6 7 8 9 11 12 1 2	5 6 7 8 9 11 12 1 2	5 6 7 8 9 11 12 1 2
INT. SECTION	4 5 6 7 8 9 11 12 1 2	4 5 6 7 8 9 11 12 1 2	4 5 6 7 8 9 11 12 1 2

CONTACT LOCATIONS 3, 4 AND 10 IN OSC. AND ANT SECTIONS, AND 3 AND 10 IN INT. SECTION ARE BLANK.

GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES.
"B" AND "C" ON SELECTIVITY CONTROL DENOTES "BROAD" AND "SHARP" RESPECTIVELY.
THE CAPACITY OF THE "C" SHIELD IS 55 ~~ µf. THE CAPACITY OF THE "D" SHIELD IS 20 ~~ µf

C 1 250 mmf.
C 2 2-25 mmf.
C 3 2-25 mmf.
C 4 2-25 mmf.
C 5 .05 mf. 180 V.
C 6 .25 mf. 240 V.
C 7 2-25 mmf.
C 8 2-25 mmf.
C 9 2-25 mmf.
C10 .25 mf. 180 V.
C11 .25 mf. 360 V.
C12 150-250 mmf. } ONE
C13 150-250 mmf. } UNIT
C14 150-250 mmf. } ONE
C15 150-250 mmf. } UNIT
C16 .05 mf. 180 V.
C17 4.0 mf. 150 V.
C18 .10 mf. 360 V.
C19 20-150 mmf.
C20 50 mmf.
C21 .01 mf. 360 V.
C22 .50 mf. 180 V.
C23 .004 mf. 600 V.
C24 18.0 mf. 290 V.
C25 14.0 mf. 400 V.
C26 .05 mf. 360 V.
C27 .05 mf. 180 V.
C28 .35 mmf.
C29 2-25 mmf.
C30 2-25 mmf.
C31 1400 mmf.
C32 2-25 mmf.
C33 300-600 mmf. } ONE
C34 40-100 mmf. } UNIT
R 1 16,000 ohm 2.0 W.
R 2 150 ohm .2 W.
R 3 2,500 ohm } Dual Volume
R10 2.0 megohm } Control
R 4 400 ohm .2 W.
R 5 30,000 ohm 1.0 W.
R 6 300,000 ohm .2 W.
R 7 100,000 ohm .2 W.
R 8 2.0 megohm .2 W.
R 9 1.0 megohm .2 W.
R11 3.0 megohm Tone Cont.
R12 100,000 ohm .2 W.
R13 1,000 ohm .5 W.
R14 25,000 ohm 3.0 W.
R15 25,000 ohm 1.0 W.
R16 2,500 ohm .2 W.
R17 80,000 ohm .2 W.
T 1 Ant. R.F. Trans.
T 2 Interstage R.F. Trans.
T 3 1st I.F. Trans.
T 4 2nd I. F. Trans.
T 5 Diode Input Trans.
T 6 Audio Output Trans.
T 7 Audio Input Trans.
T 8 Power Trans.
T 9 Osc. Inductors
L 1 Isolating Reactor
L 2 Speaker Field (570 Ohm)
L 3 Osc. Tracking Coil

MODEL ODM Series
Voltage, Socket

WELLS-GARDNER & CO.

Trimmers, Coil Data

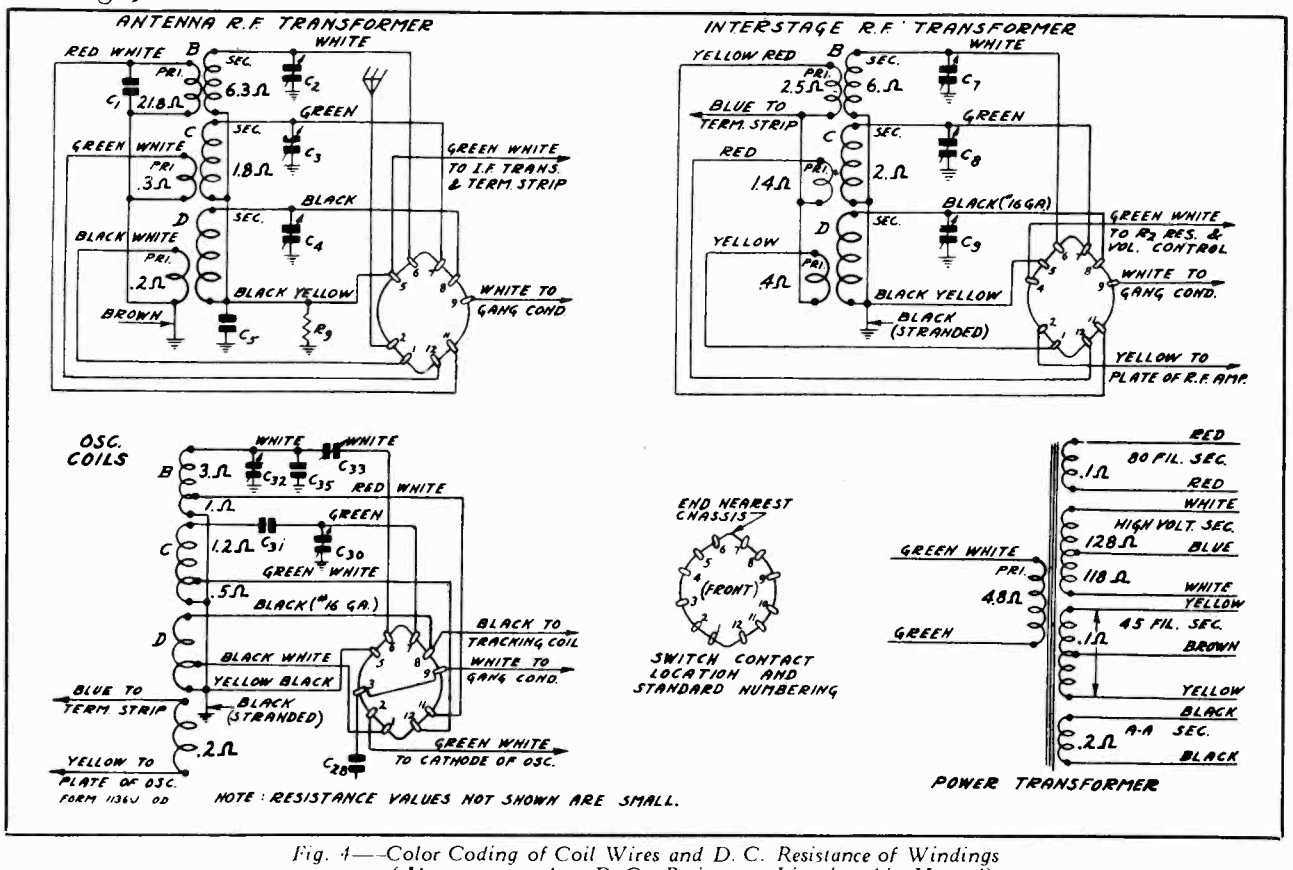


Fig. 4—Color Coding of Coil Wires and D. C. Resistance of Windings
(Also see complete D. C. Resistance List in this Manual)

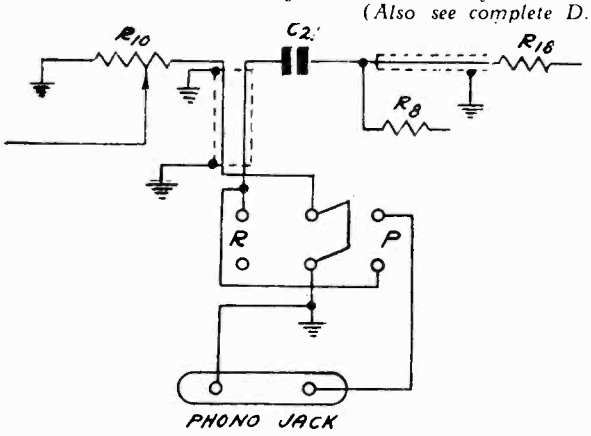


Fig. 7—Phonograph Connections

VOLTAGES AT SOCKETS

Line Voltage, 115 - Volume Control at Maximum
Antenna Shorted to Ground

Type of Tube	Function	Heater or Filam't	Plate to Ground	Screen to Ground	Cathode to Ground	Ca'hode M. A.
6K7 (6D6)	R. F.	6.1	265	120	3.7	9.0
6K7 (6D6)	1st Det.	6.1	265	110	9.5	3.8
76	Osc.	6.1	110			5.8
6K7 (6D6)	1st. I. F.	6.1	265	120	3.7	9.0
6K7 (6D6)	2nd I. F.	6.1	265	120	3.7	9.0
76	2nd Det.	6.1				
76	1st A. F.	6.1	265		14.	5.0
45	Power	2.5	265		50.(1)	22.
80	Rectifier	4.9				90. (total)

(1) As read with 500 Volt Scale. Grid to Ground.

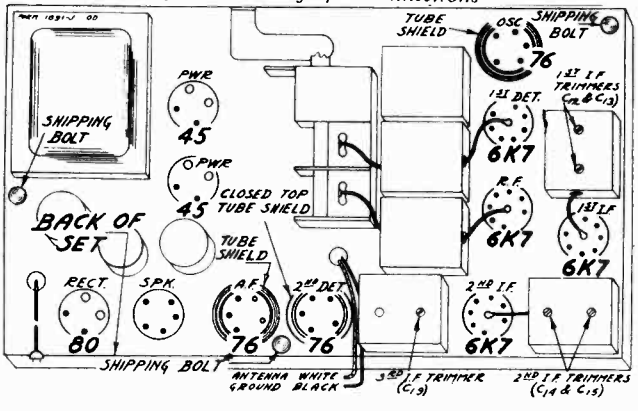


Fig. 5—Location of Tubes

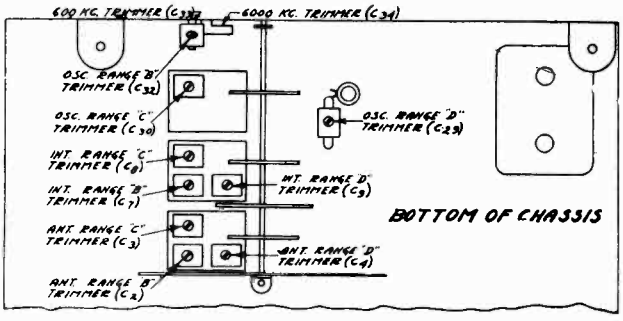


Fig. 3—Location of Trimmers

Alignment and Calibration

Correct alignment is extremely important in connection with all wave receivers. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment.

A signal generator that will provide an accurately calibrated signal at 456, 1730, 1500, 600, 5800, 5000, 18,300, 15,000 and 6000 KC and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used. If a station is tuned in with the selectivity control in the broad position and this control is then turned to the sharp position, the station may disappear. This is not an indication that the receiver is out of alignment.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator through a 0.1 mf. condenser to the grid of the 1st detector.

Connect the ground lead of the receiver to the ground post of the signal generator.

Turn the band selector to the Range B position (standard wave band—purple dial color).

Turn the selectivity control to the sharp position and keep it in this position for all adjustments.

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the A.V.C.

Then adjust the five I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 5.

Range B Alignment

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Keep the band selector in the standard wave position.

Connect the antenna lead of the receiver through a 200 mmf. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range B trimmer (C32) until maximum output is obtained. The location of this trimmer is shown in Fig. 3.

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output

Loosen the pointer set screw and set the large pointer at the 1500 KC mark on the standard wave band scale. Retighten the set screw.

Adjust the interstage Range B trimmer (C7) and antenna Range B trimmer (C2) to maximum.

Do not change the setting of the oscillator Range B trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 600 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Range C Alignment

5800 KC Adjustment

Set the signal generator for 5800 KC.

Connect the antenna lead of the receiver through a 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range C position (1st short wave band—green dial color).

Adjust the oscillator Range C trimmer (C30) until maximum output is obtained. See Fig. 3 for location of this trimmer.

5000 KC Adjustment

Set the signal generator for 5000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range C trimmer (C8) and antenna Range C trimmer (C3) to maximum.

Do not change the setting of the oscillator Range C trimmer.

Range D Alignment

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

Keep the antenna lead of the receiver connected through the 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range D position (2nd short wave band—red dial color).

Adjust the oscillator Range D trimmer (C29) until maximum output is obtained. See Fig. 3 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range D trimmer (C9) and antenna Range D trimmer (C4) to maximum.

When adjusting the interstage Range D trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Then go back and repeat the procedure as given for the 18,300 KC adjustment. If it is found necessary to make any appreciable change in the setting of the oscillator Range D trimmer, the 15,000 KC adjustment must be repeated.

Do not make any further change in the setting of the oscillator Range D trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

D. C. Resistance of Windings

Refer to Fig. 4.

Following are the D. C. resistances of the various windings in the chassis. The values given below will vary slightly in different sets.

Part No.	Winding	Code	D. C. Resistance in Ohms
P-9A405	Antenna R. F. Transformer	T1	
	Range B Primary Winding		21.8
	Range C Primary Winding		0.3
	Range D Primary Winding		0.2
	Range B Secondary Winding		6.3
	Range C Secondary Winding		1.8
	Range D Secondary Winding		Small
P-9A425	Interstage R. F. Transformer	T2	
	Range B Primary Winding		2.5
	Range C Primary Winding		1.4
	Range D Primary Winding		0.4
	Range B Secondary Winding		6.0
	Range C Secondary Winding		2.0
	Range D Secondary Winding		Small
P-9A426	Oscillator Coils	T9	
	Range B Grid Coil		
	Red White Tap to White		3.0
	Red White Tap to Ground		1.0
	Range C Grid Coil		
	Green White Tap to Green		1.2
	Green White Tap to Ground		0.5
	Range D Grid Coil		
	Black White Tap to Black		Small
	Black White Tap to Ground		Small
	Oscillator Plate Coil		0.2
P-9A397	1st I. F. Transformer	T3	
	Primary Winding		4.6
	Secondary Winding		
	Long Portion		3.4
	Short Portion		1.7
	Coupling Winding		0.2
P-9A398	2nd I. F. Transformer	T4	
	Primary Winding		9.4
	Secondary Winding		9.0
	Coupling Winding		0.5
P-9A399	3rd I. F. Transformer	T5	
	Primary Winding		10.2
	Secondary Winding		28.4
P-50X16	Audio Input Transformer	T7	
	Primary Winding		2350.
	Secondary Winding		
	Center Tap to Inside		2000.
	Center Tap to Outside		2690.
P-51X32	Audio Output Transformer	T6	
	Primary Winding		
	Center Tap to Inside		198.
	Center Tap to Outside		222.
	Secondary Winding		0.4
P-12A208	Dynamic Speaker (10")		
	Speaker Voice Coil		1.6
	Speaker Field	L2	570.
P-53X94	115 Volt 60 Cycle Power Trans.	T8	
	Primary Winding		4.8
	Tube Filament Secondary (A-A)		0.2
	Tube Filament Secondary (B-B) (45)		0.1
	Rectifier Filament Secondary		0.1
	High Voltage Secondary Winding		
	Center Tap to Inside		118.
	Center Tap to Outside		128.
P-9A400	2nd I. F. Plate Isolating Reactor	L1	36.
P-9A391	High Frequency Oscillator Tracking Coil	L3	1.2

Twenty-five Cycle Receivers

The twenty-five cycle receiver differs from the sixty cycle receiver only in the fact that a different power transformer is used. The correct power transformer is shown in the parts list.

The twenty-five cycle receiver can be operated satisfactorily from a sixty cycle power supply. However, the reverse is not true, the sixty cycle receiver cannot be operated from a twenty-five cycle power supply.

A 115-230 Volt, 40 to 60 cycle as well as other power transformers with special power ratings are also available for this model.

Changes in Early Models

In the early models of this receiver the tone control resistor (R11) was connected as a series variable resistor connecting in series through the condenser C23 between the grids of the 45 tubes in the audio output stage. In the later models it is employed as a potentiometer in the manner shown in Fig. 2.

The 100,000 ohm resistor (R18) was not used in the early models. Condenser C21 was connected directly to resistor R7.

The type 6K7 metal tubes replace the type 6D6 glass tubes which were used in the early models.

Condenser C35 was added to the oscillator coil standard wave section in later models. It is not, however, used in all cases but only when this capacity is required in this circuit.

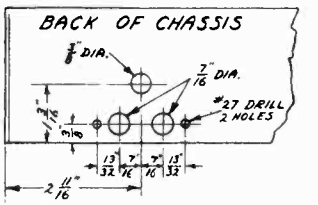


Fig. 8—Details of Panel Drilling for Phono Assembly

Phonograph Connections

Phonograph connections can be made as shown in Fig. 7. The parts required to make this installation are shown in the parts list.

To mount the phono switch and phono jack, drill holes of a size and in the position shown in Fig. 8 at the left hand side (from back) of the rear panel of the chassis.

MODEL 2CM Series
Schematic

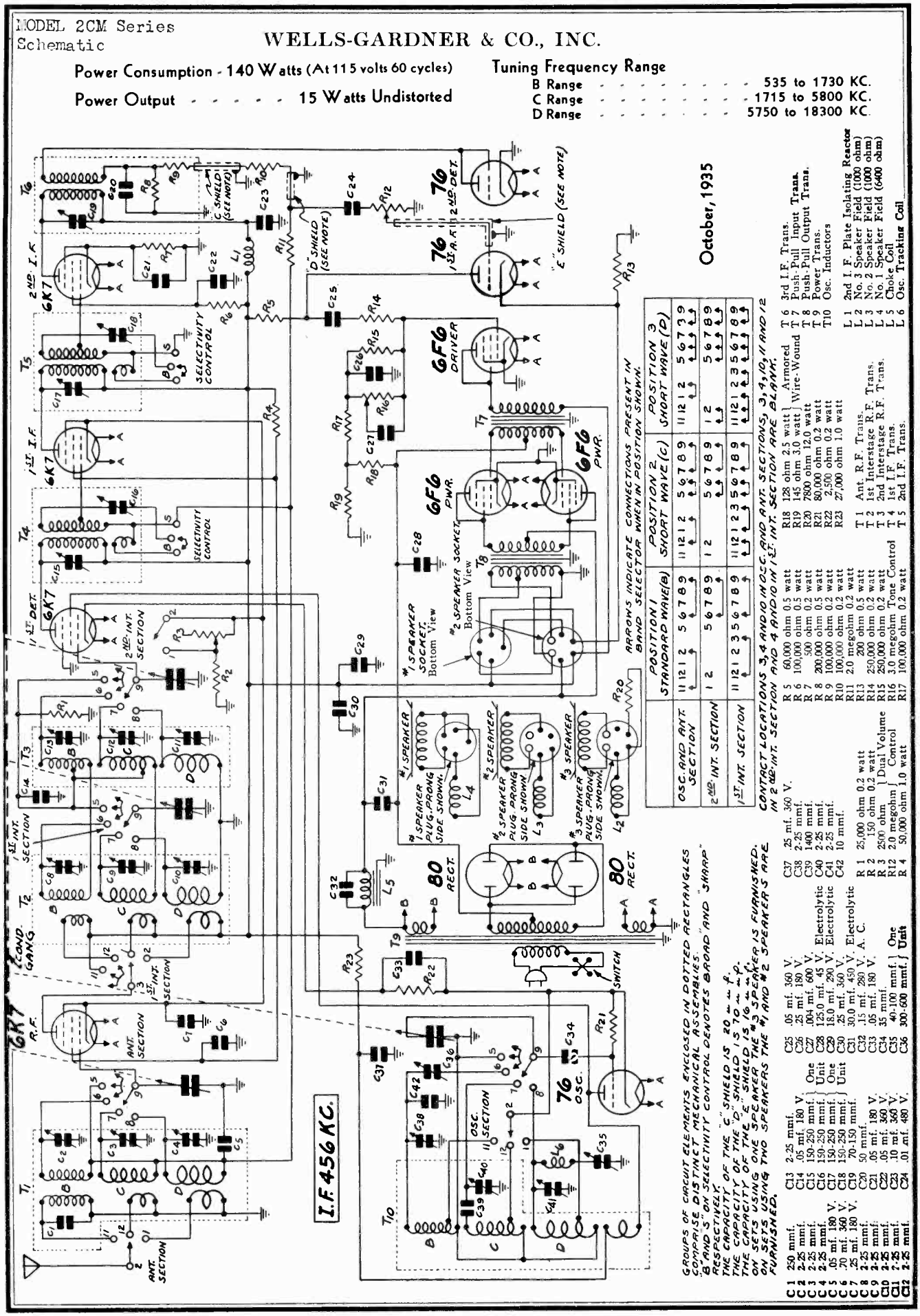
WELLS-GARDNER & CO., INC.

Power Consumption - 140 Watts (At 115 volts 60 cycles)

Power Output - - - - - - 15 Watts Undistorted

Tuning Frequency Range

B Range - - - - - - - - - 535 to 1730 KC.
C Range - - - - - - - - - 1715 to 5800 KC.
D Range - - - - - - - - - 5750 to 18300 KC.



	POSITION 1 STANDARD WAVE(B)	POSITION 2 SHORT WAVE(C)	POSITION 3 SHORT WAVE (D)
OSC. AND ANT. SECTION	11 12 1 2 5 6 7 8 9	11 12 1 2 5 6 7 8 9	11 12 1 2 5 6 7 8 9
2ND INT. SECTION	1 2 5 6 7 8 9	1 2 5 6 7 8 9	1 2 5 6 7 8 9
1ST INT. SECTION	11 12 1 2 3 5 6 7 8 9	11 12 1 2 3 5 6 7 8 9	11 12 1 2 3 5 6 7 8 9

CONTACT LOCATIONS 3,4 AND 10 IN OSC. AND ANT. SECTIONS, 3, 4, 10, 11 AND 12 IN 2ND INT. SECTION AND 4 AND 10 IN 1ST INT. SECTION ARE BLANK.

GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES "B" AND "C" ON SELECTIVITY CONTROL DENOTES BAND "SHARP" RESPECTIVELY.

THE CAPACITY OF THE "C" SHIELD IS 20 m m f.
THE CAPACITY OF THE "D" SHIELD IS 16 m m f.
ON SETS USING ONE SPEAKER THE #3 SPEAKER IS FURNISHED. ON SETS USING TWO SPEAKERS THE #1 AND #2 SPEAKERS ARE FURNISHED.

C1	250 mmf.	C13	2-25 mmf.	C25	.05 mf. 360 V.	C37	.25 mf. 360 V.	R 5	60,000 ohm 0.5 watt	R18	128 ohm 2.5 watt } Armored
C2	2-25 mmf.	C14	.05 mf. 180 V.	C26	.25 mf. 180 V.	C38	2-25 mmf.	R 6	100,000 ohm 0.5 watt	R19	145 ohm 3.0 watt } Wire-Wound
C3	2-25 mmf.	C15	150-250 mmf. } One	C27	.004 mf. 600 V.	C39	1400 mmf.	R 7	500 ohm 0.2 watt	R20	7800 ohm 12.0 watt
C4	2-25 mmf.	C16	150-250 mmf. } Unit	C28	125.0 mf. 45 V. Electrolytic	C40	2-25 mmf.	R 8	200,000 ohm 0.5 watt	R21	80,000 ohm 0.2 watt
C5	.05 mf. 180 V.	C17	150-250 mmf. } One	C29	18.0 mf. 290 V. Electrolytic	C41	2-25 mmf.	R 9	100,000 ohm 0.2 watt	R22	2,500 ohm 0.2 watt
C6	.20 mf. 360 V.	C18	150-250 mmf. } Unit	C30	.25 mf. 360 V.	C42	10 mmf.	R10	100,000 ohm 0.2 watt	R23	27,000 ohm 1.0 watt
C7	.25 mf. 180 V.	C19	70-150 mmf.	C31	30.0 mf. 450 V. Electrolytic			R11	2.0 megohm 0.2 watt		
C8	2-25 mmf.	C20	50 mmf.	C32	.15 mf. 280 V. A. C.	R 1	25,000 ohm 0.2 watt	R13	200 ohm 0.5 watt	T 1	Ant. R.F. Trans.
C9	2-25 mmf.	C21	.05 mf. 180 V.	C33	.05 mf. 180 V.	R 2	150 ohm 0.2 watt	R14	250,000 ohm 0.2 watt	T 2	1st Interstage R.F. Trans.
C10	2-25 mmf.	C22	.05 mf. 360 V.	C34	35 mmf.	R 3	2500 ohm } Dual Volume	R15	250,000 ohm 0.2 watt	T 3	2nd Interstage R.F. Trans.
C11	2-25 mmf.	C23	.10 mf. 360 V.	C35	40-100 mmf. } One	R12	2.0 megohm } Control	R16	3.0 megohm Tone Control	T 4	1st I.F. Trans.
C12	2-25 mmf.	C24	.01 mf. 480 V.	C36	300-600 mmf. } Unit	R 4	50,000 ohm 1.0 watt	R17	100,000 ohm 0.2 watt	T 5	2nd I.F. Trans.

T 6	3rd I.F. Trans.
T 7	Push-Pull Input Trans.
T 8	Push-Pull Output Trans.
T 9	Power Trans.
T10	Osc. Inductors
L 1	2nd I. F. Plate Isolating Reactor
L 2	No. 3 Speaker Field (1000 ohm)
L 3	No. 2 Speaker Field (1000 ohm)
L 4	No. 1 Speaker Field (6400 ohm)
L 5	Choke Coil
L 6	Osc. Tracking Coil

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MODEL 2CM Series
Socket, Trimmers
Voltage, Coil Data

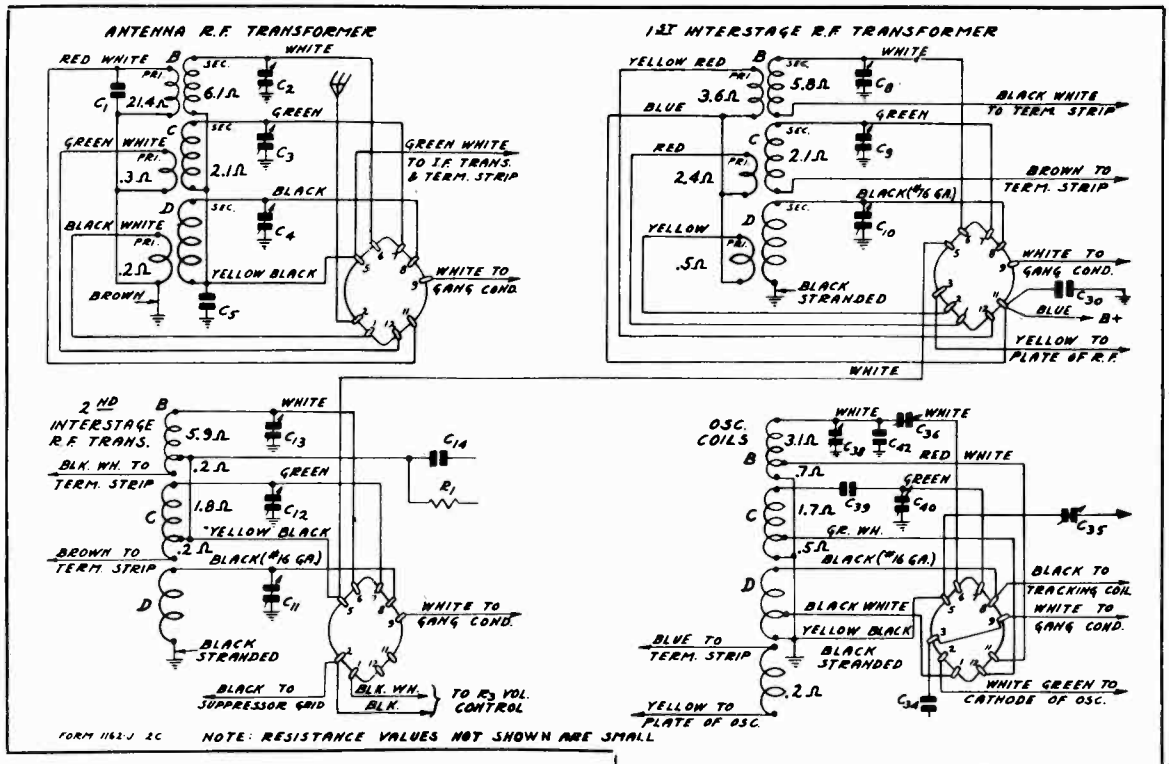


Fig. 4—Color Coding of Coil Wires and D. C. Resistance of Windings. (Also see complete D. C. Resistance List)

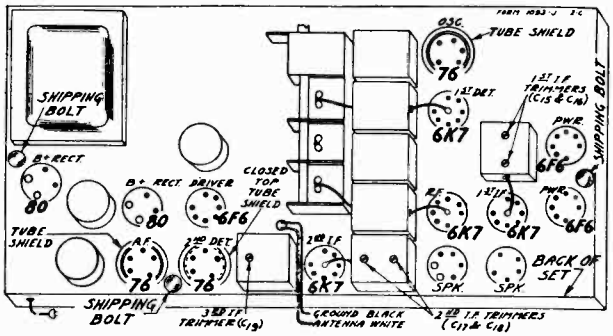
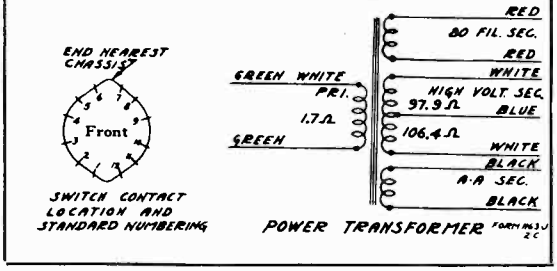


Fig. 5—Location of Tubes



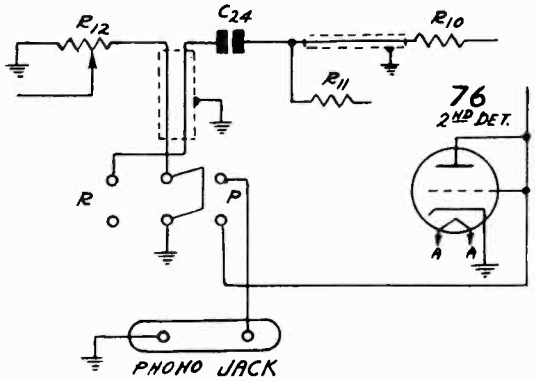


Fig. 7—Phonograph Connections

VOLTAGES AT SOCKETS
Line Voltage 115 - Antenna Shorted to Ground
Volume Control at Maximum

Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cath. to Ground	Cath. M A
6K7	R. F.	6.2	245	80	2.8	7.6
6K7	1st Det.	6.2	245	90	6.5	2.6
76	Osc.	6.2	90			5.3
6K7	1st I. F.	6.2	245	80	2.8	7.6
6K7	2nd I. F.	6.2	245	74	3.9	7.0
76	2nd Det.	6.2				
76	1st A. F.	6.2	110		5.6	2.1
6F6	Driver	6.2	235	230	20.0(1)	27.0
6F6	Power	6.2	345	345	38.0(2)	22.5
80	Rectifier	5.1	500(3)			140.0(4)

(1) As read across R19
(2) Grid to Ground
(3) Plate to Center Tap
(4) Two tubes in parallel

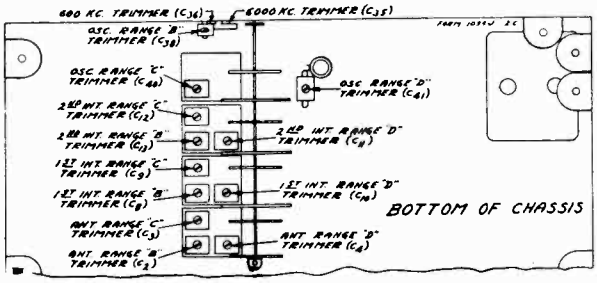


Fig. 3—Location of Trimmers

Alignment and Calibration

Correct alignment is extremely important in connection with all wave receivers. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment.

A signal generator that will provide an accurately calibrated signal at 456, 1730, 1500, 600, 5800, 5000, 18,300, 15,000 and 6000 KC and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used. If a station is tuned in with the selectivity control in the broad position and this control is then turned to the sharp position, the station may disappear. This is not an indication that the receiver is out of alignment.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator to the grid of the 1st detector through a 0.1 MF condenser.

Connect the ground lead of the receiver to the ground post of the signal generator.

Turn the band selector to the Range B position (standard wave band—purple dial color).

Turn the selectivity control to the sharp position and keep it in this position for all adjustments.

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the A.V.C.

Then adjust the five I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 5.

Range B Alignment

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Keep the band selector in the standard wave position.

Connect the antenna lead of the receiver through a 200 mmf. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range B trimmer (C38) until maximum output is obtained. The location of this trimmer is shown in Fig. 3.

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Loosen the pointer set screw and set the large pointer at the 1500 KC mark on the standard wave band scale. Retighten the set screw.

Adjust the 1st and 2nd interstage Range B trimmers (C8 and C13) and antenna Range B trimmer (C2) to maximum.

Do not change the setting of the oscillator Range B trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 600 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Be sure to use a non-metallic screwdriver for this adjustment.

Range C Alignment

5800 KC Adjustment

Set the signal generator for 5800 KC.

Connect the antenna lead of the receiver through a 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range C position (1st short wave band—green dial color).

As mentioned above, keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range C trimmer (C40) until maximum output is obtained. See Fig. 3 for location of this trimmer.

5000 KC Adjustment

Set the signal generator for 5000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the 1st and 2nd interstage Range C trimmers (C9 and C12) and antenna Range C trimmer (C3) to maximum.

Do not change the setting of the oscillator Range C trimmer.

Range D Alignment

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

Keep the antenna lead of the receiver connected through the 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range D position (2nd short wave band—red dial color).

As mentioned above, keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range D trimmer (C41) until maximum output is obtained. See Fig. 3 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the 1st and 2nd interstage Range D trimmers (C10 and C11) and antenna Range D trimmer (C4) to maximum.

When adjusting the 2nd interstage Range D trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Then go back and repeat the procedure as given for the 18,300 KC adjustment. If it is found necessary to make any appreciable change in the setting of the oscillator Range D trimmer, the 15,000 KC adjustment must be repeated.

Do not make any further change in the setting of the oscillator Range D trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Use a non-metallic screwdriver for this adjustment

Twenty-five Cycle Receivers

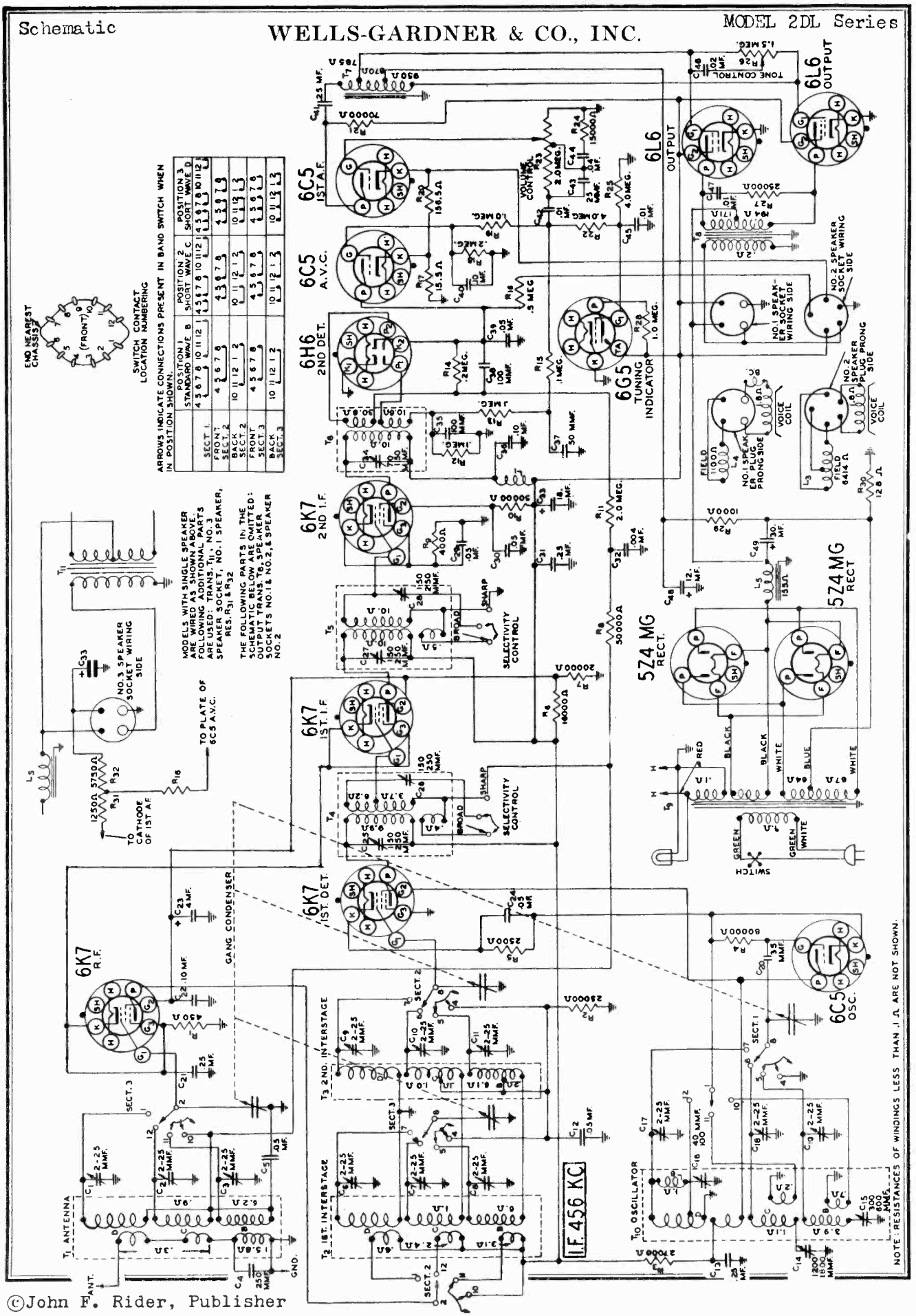
The twenty-five cycle receiver differs from the sixty cycle receiver only in the fact that a different power transformer is used. The correct power transformer is shown in the parts list.

The twenty-five cycle receiver can be operated satisfactorily from a sixty cycle power supply. However, the reverse is not true, the sixty cycle receiver cannot be operated from a twenty-five cycle power supply.

A 115-230 Volt, 40 to 60 cycle as well as other power transformers with special power ratings are also available for this model.

D. C. Resistance of Windings

Part No.	Winding	Code	in Ohms
P-9A418	Antenna R. F. Transformer	T1	
	Range B Primary Winding		21.4
	Range C Primary Winding		0.3
	Range D Primary Winding		0.2
	Range B Secondary Winding		6.1
	Range C Secondary Winding		2.1
	Range D Secondary Winding		Small
P-9A411	1st Interstage R. F. Transformer	T2	
	Range B Primary Winding		3.6
	Range C Primary Winding		2.4
	Range D Primary Winding		0.5
	Range B Secondary Winding		5.8
	Range C Secondary Winding		2.1
	Range D Secondary Winding		Small
P-50X24	Audio Input Transformer	T7	
	Primary Winding		415.0
	Secondary Winding		
	Center Tap to Inside		211.7
	Center Tap to Outside		288.5
P-51X26	Audio Output Transformer	T8	
	Primary Winding		
	Center Tap to Inside		135.5
	Center Tap to Outside		155.3
	Secondary Winding		
	Tap to Upper Side		0.16
	Tap to Ground Side		0.12
P-53X82	Power Transformer (115 Volt-60 Cycle)	T9	
	Primary Winding		1.7
	Tube Filament Secondary (A-A)		Small
	Tube Filament Secondary (B-B) (80)		Small
	High Voltage Secondary Winding		
	Center Tap to Inside		92.9
	Center Tap to Outside		106.4
P-9A427	Oscillator Coils	T10	
	Range B Grid Coil		
	Red White Tap to White		3.1
	Red White Tap to Ground		0.7
	Range C Grid Coil		
	Green White Tap to Green		1.7
	Green White Tap to Ground		0.5
	Range D Grid Coil		
	Black White Tap to Black		Small
	Black White Tap to Ground		Small
	Oscillator Plate Coil		0.2
P-9A400	2nd I. F. Plate Isolating Reactor	L1	34.7
P-12A204	12" Dynamic Speaker (No. 1—See Fig. 2)		
	Speaker Field	L4	6400.
	Voice Coil		Small
P-12A205	12" Dynamic Speaker (No. 2—See Fig. 2)		
	Speaker Field	L3	1000.
	Voice Coil		Small
P-12A226	12" Dynamic Speaker (No. 3—See Fig. 2)		
	Speaker Field	L2	1000.
	Voice Coil		Small
P-52X39	Reactor Assembly	L5	143.6
P-9A391	High Frequency Oscillator Tracking Coil	L6	1.0
P-9A412	2nd Interstage R. F. Coils	T3	
	Range B Section		
	Long Portion		5.9
	Short Portion		0.2
	Range C Section		
	Long Portion		1.8
	Short Portion		0.2
	Range D Section		Small
P-9A413	1st I. F. Transformer	T4	
	Primary Winding		4.4
	Coupling Winding		0.3
	Secondary Winding		
	Tap to Condenser Side		2.3
	Tap to Switch Side		2.3
P-9A414	2nd I. F. Transformer	T5	
	Primary Winding		4.3
	Coupling Winding		0.3
	Secondary Winding		
	Tap to Condenser Side		2.3
	Tap to Switch Side		2.3
P-9A415	3rd I. F. Transformer	T6	
	Primary Winding		9.8
	Secondary Winding		30.0



MODEL 2DL Series
Socket, Trimmers
Coil Data, Phono

WELLS-GARDNER & CO., INC.

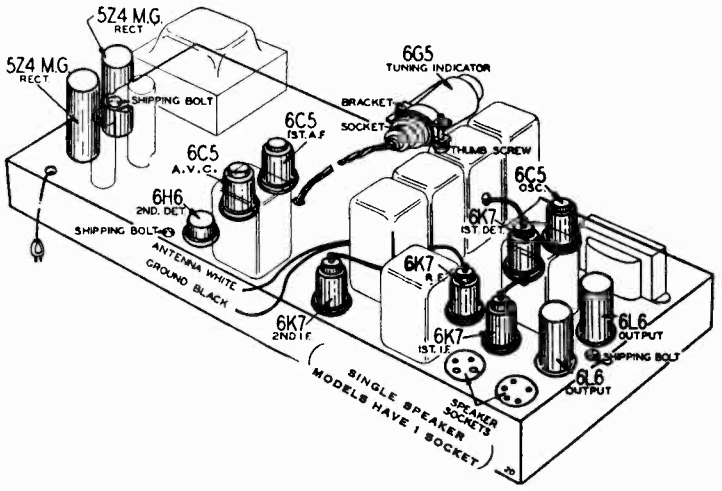


Fig. 5—Location of Tubes

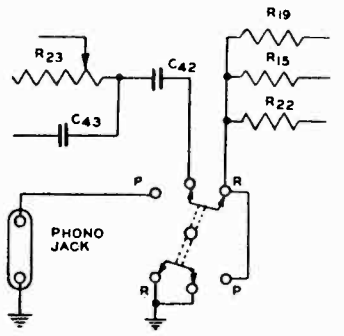


Fig. 7—Phonograph Connections

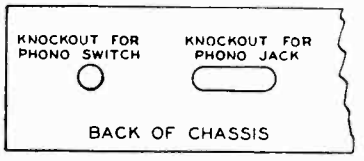


Fig. 8—Location of Phono Knockouts

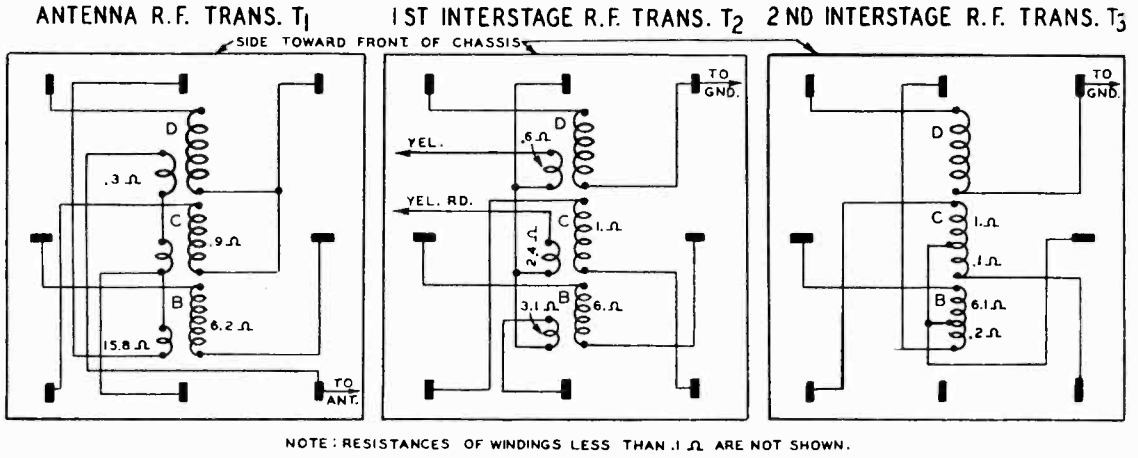
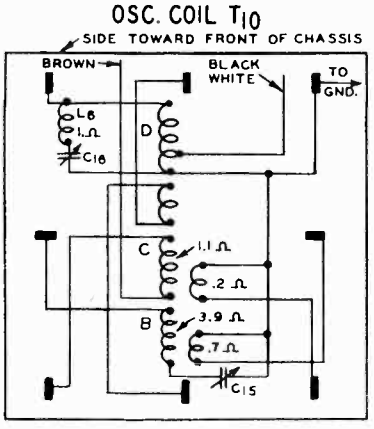


Fig. 6—R.F. and Oscillator Coil Base Terminal Arrangement and D.C. Resistance of Windings



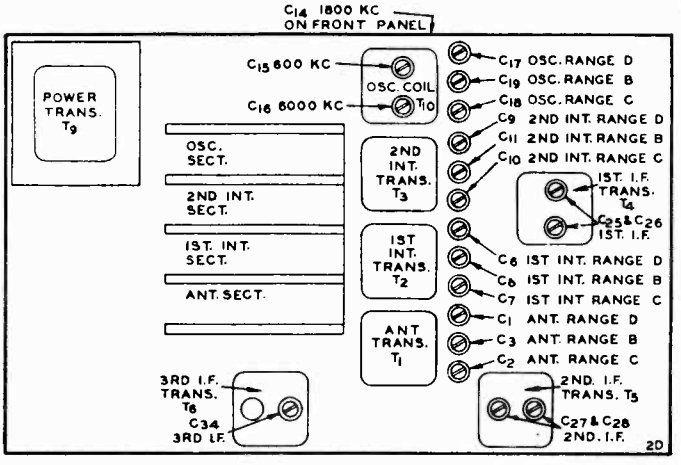


Fig. 3—Location of Trimmers

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator through a .1 mf. condenser to the grid of the 1st detector.

Connect the ground lead of the receiver to the ground post of the signal generator.

Turn the band switch to the Range B position (standard wave band).

Turn the selectivity control to the sharp position and keep it in this position for all adjustments.

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the AVC.

Then adjust the five I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis and the location is shown in Fig. 3.

Range B Alignment

After the procedure for the alignment of each range, as explained below, is completed, it is advisable to repeat the procedure as a final check.

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Keep the band switch in the standard wave position.

Connect the antenna lead of the receiver through a 200 mmf. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent AVC action.

Adjust the oscillator Range B trimmer (C19) until maximum output is obtained. The location of this trimmer is shown in Fig. 3.

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

In sets using pointers, loosen the screw of the large pointer and set the pointer at the 1500 KC mark on the standard wave band scale. Retighten the screw.

In sets using the moving beam of light, there is moving light assembly held to the front of the drive drum by means of a screw. Loosen this screw and move the light assembly until it is at the 1500 KC mark on the dial. Retighten the screw.

Adjust the 1st and 2nd interstage Range B trimmers (C8 and C11) and antenna Range B trimmer (C3) to maximum.

Do not change the setting of the oscillator Range B trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 600 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Range C Alignment

CAUTION—When aligning the short wave bands be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 5000 KC. The signal will then be heard at 5000 KC on the dial of the radio. The image signal, which is much weaker, will be heard at 5000 less 912 KC, or 4088 KC. It may be necessary to increase the input signal to hear the image.

5800 KC Adjustment

Set the signal generator for 5800 KC.

Connect the antenna lead of the receiver through a 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band switch to the Range C position (first short wave band).

Adjust the oscillator Range C trimmer (C18) until maximum output is obtained. See Fig. 3 for location of this trimmer.

5000 KC Adjustment

Set the signal generator for 5000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the 1st and 2nd interstage Range C trimmers (C7 and C10) and antenna Range C trimmer (C2) to maximum.

Do not change the setting of the oscillator Range C trimmer.

1800 KC Adjustment

Set the signal generator for 1800 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 1800 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Range D Alignment

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

Keep the antenna lead of the receiver connected through the 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band switch to the Range D position (second short wave band).

Adjust the oscillator Range D trimmer (C17) until maximum output is obtained. See Fig. 3 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the 1st and 2nd interstage Range D trimmers (C6 and C9) and antenna Range D trimmer (C1) to maximum.

When adjusting the 2nd interstage Range D trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Do not change the setting of the oscillator Range D trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Trimmer Replacement

If one trimmer of the gang trimmer strip should become defective, it is not necessary to replace the entire strip. A single trimmer P-17A36, as shown in the replacement parts list, may be used. Disconnect the lead from the coil side (side not grounded) of the defective trimmer in the strip. This connection is then made to the single trimmer. Connect it to the side of the trimmer not in contact with the adjusting screw. The other side of the single trimmer is then connected to a good ground, using a piece of heavy wire in order to support the trimmer adequately. In replacing a trimmer, be sure to keep both leads as short as possible and keep the ungrounded lead as far from ground as possible.

Planetary Drive Assembly

The planetary assembly is the unit that is integral with the tuning shaft.

If the nut on the back end of this assembly is too tight, the drive will be jerky and will turn hard in high speed. If this condition exists, back off this nut one or two turns and note the effect.

If this nut is too loose, the drive will slip in slow speed. The remedy in this case, of course, is to tighten the nut.

Should the condenser drive cord slip when the planetary pulley is turning, inspect the tuning condenser, drive drum and gears to see if they are turning properly or if they are being obstructed in some way.

If the drive turns unevenly (rough in spots), this may mean that the planetary assembly is defective or damaged internally and a new unit will be required.

Line Voltage: 115
Volume Control: Maximum

Antenna Shorted to Ground
Position of Band Switch: Standard Wave

TUBE	FUNCTION	VOLTAGE BETWEEN SOCKET PRONGS AND GROUND (unless otherwise indicated)							
		Prong No. 1	Prong No. 2	Prong No. 3	Prong No. 4	Prong No. 5	Prong No. 6	Prong No. 7	Prong No. 8
6K7	R.F.	0	6.2(1)	250	110	7.5(2)		6.2(1)	7.5(2)
6K7	1st Det.	0	6.2(1)	250	110			6.2(1)	9.0
6C5	Osc.	0	6.2(1)	110				6.2(1)	
6K7	1st I.F.	0	6.2(1)	250	110	7.5		6.2(1)	7.5(2)
6K7	2nd I.F.	0	6.2(1)	250	145	5(2)		6.2(1)	5.0
6H6	2nd Det.	0	6.2(1)					6.2(1)	
6C5	A.V.C.	0	6.2(1)	5(3)				6.2(1)	0.5
6C5	1st A.F.	0	6.2(1)	130				6.2(1)	6.0
6L6	Power	0	6.2(1)	350	250	20(4)		6.2(1)	
5Z4MG	Rectifier	0	5.0(5)		1024(6)		1024(6)		5.0(5)
6G5	Tuning Indicator	Plate to Ground 25(3)		Target to Ground 250		Cathode to Ground 0		Across Heater 6.2 A.C.	

(1) A.C. voltage as read across heater terminals 2 and 7.
(2) Subject to variation.
(3) As read with 500,000 ohm meter.
(4) As read across R-30.
(5) A.C. voltage as read across heater terminals 2 and 8.
(6) A.C. voltage as read across terminals 4 and 6.

Phonograph Connections

Phonograph connections can be made as shown in Fig. 7. The parts required as shown in the parts list. Knockouts are provided in the back of the chassis for mounting the phono jack and phono switch—See Fig. 8.

The phono switch should be mounted with one set of terminals nearest the bottom of the chassis base.

The connections are made by opening the diode return circuit at the volume control. This is done by removing the wire connecting condenser C42 to resistors R15, R19 and R22, at the terminal strip located near the back of the planetary drive. Cut this wire to correct length and solder it to the proper terminal on the phono switch—See Fig. 7, keeping the wire close to the back of the chassis base.

A wire is then connected from the lug on the above mentioned terminal strip to which C42 was connected, to the correct terminal on the phono switch—See Fig. 7. This wire should be brought directly to the back of the chassis at a point close to the phono jack pin tip nearest the channel provided for a chassis mounting bolt, and then routed over to the switch.

Complete the other connections as illustrated in Fig. 7.

It will be necessary to re-route the AC line cord away from the 6C5 1st audio grid lead by running it between the volume control and the filter choke and then straight back to the hole provided for it in the chassis base.

If a hum is heard when the phono pickup is touched, reverse the two pickup leads.

Twenty-five Cycle Models

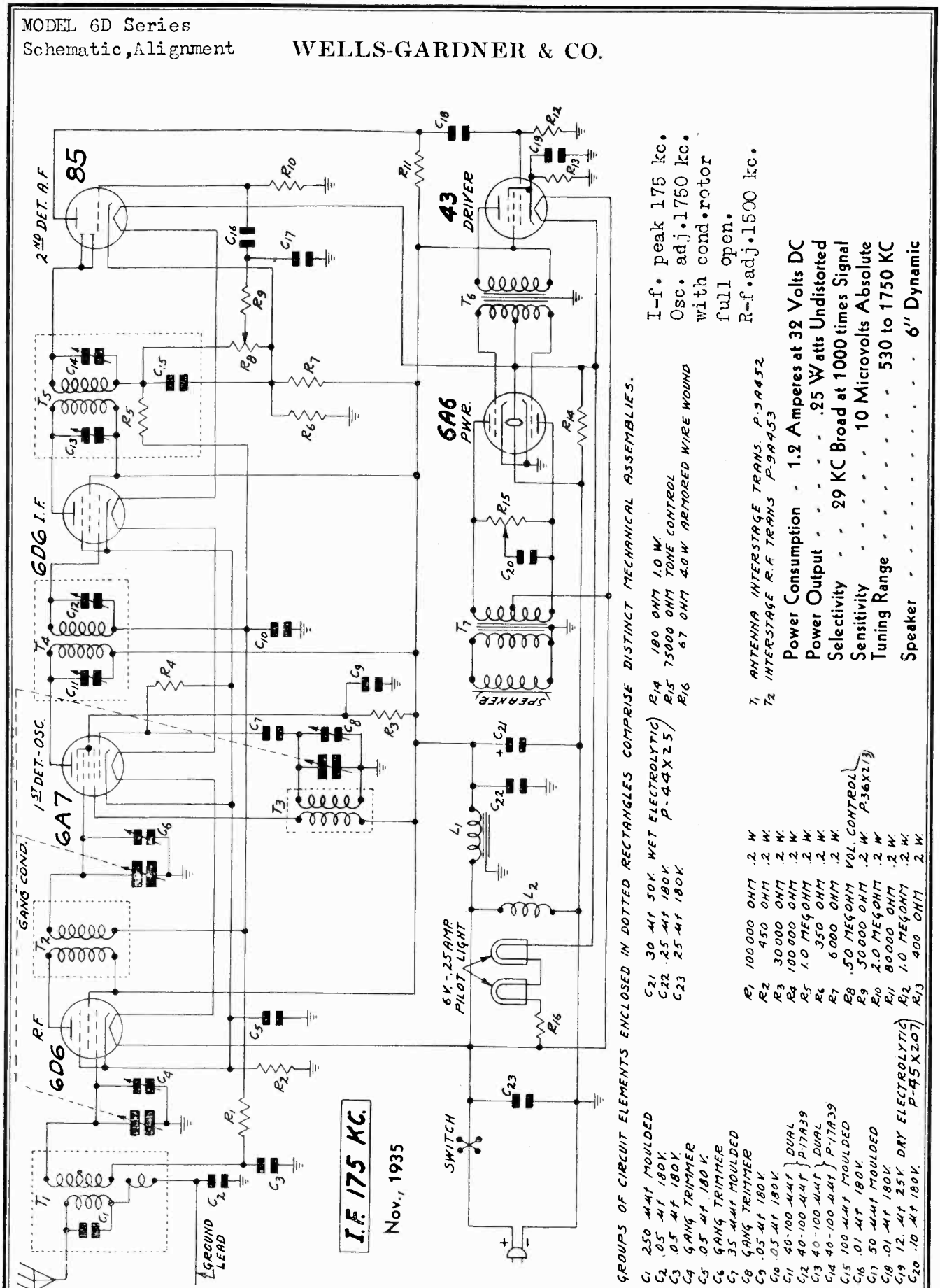
The twenty-five cycle receiver differs from the sixty cycle receiver only in the fact that a different power transformer is used. The correct power transformer is shown in the parts list.

The twenty-five cycle receiver can be operated satisfactorily from a sixty cycle power supply. However, the reverse is not true, the sixty cycle receiver cannot be operated from a twenty-five cycle power supply.

A 115-230 volt, 40 to 60 cycle as well as other power transformers with special power ratings are also available for this model.

MODEL 6D Series
Schematic, Alignment

WELLS-GARDNER & CO.



GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES.

C1 .250 MMF MOULDED
C2 .05 MF 180 V.
C3 .05 MF 180 V.
C4 GANG TRIMMER
C5 .05 MF 180 V.
C6 GANG TRIMMER
C7 35 MMF MOULDED
C8 GANG TRIMMER
C9 .05 MF 180 V.
C10 .05 MF 180 V.
C11 40-100 MMF } DUAL P-17939
C12 40-100 MMF }
C13 40-100 MMF } DUAL P-17939
C14 40-100 MMF }
C15 100 MMF MOULDED
C16 .01 MF 180 V.
C17 50 MMF MOULDED
C18 .01 MF 180 V.
C19 12 MF 25 V. DRY ELECTROLYTIC P-45X207
C20 .10 MF 180 V.
C21 30 MF 50 V. WET ELECTROLYTIC P-44X25
C22 .25 MF 180 V.
C23 25 MF 180 V.

R1 100 000 OHM .2 W.
R2 450 OHM .2 W.
R3 30 000 OHM .2 W.
R4 100 000 OHM .2 W.
R5 1.0 MEGOHM .2 W.
R6 350 OHM .2 W.
R7 6 000 OHM .2 W.
R8 .50 MEGOHM VOL. CONTROL
R9 50 000 OHM .2 W. P-36X213
R10 2.0 MEGOHM .2 W.
R11 80 000 OHM .2 W.
R12 1.0 MEGOHM .2 W.
R13 400 OHM 2 W.
R14 180 OHM 10 W.
R15 15000 OHM TONE CONTROL
R16 67 OHM 4.0 W ARMORED WIRE WOUND

T1 ANTENNA INTERSTAGE TRANS. P-94452
T2 INTERSTAGE R.F. TRANS P-94453

Power Consumption - 1.2 Amperes at 32 Volts DC
Power Output - - - - - - - .25 Watts Undistorted
Selectivity - - 29 KC Broad at 1000 times Signal
Sensitivity - - - - - - - - 10 Microvolts Absolute
Tuning Range - - - - - - - - 530 to 1750 KC
Speaker - - - - - - - - - - - 6" Dynamic

I-f. peak 175 kc.
Osc. adj. 1750 kc.
with cond. rotor
full open.
R-f. adj. 1500 kc.

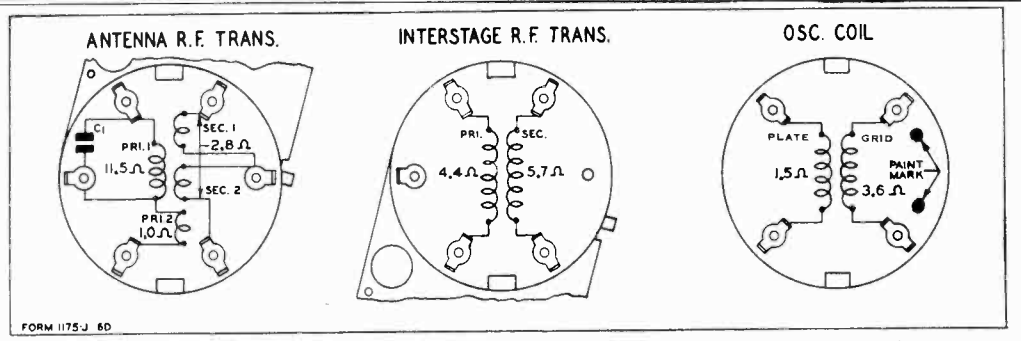


Fig. 3—R.F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

D. C. Resistance of Windings

Refer to Fig. 3

Part No.	Winding	Code	D. C. Resistance in Ohms
P-9A452	Antenna R.F. Transformer	T1	
	Primary No. 1		11.5
	Primary No. 2		1.0
	Secondary Windings in Series		2.8
P-9A453	Interstage R.F. Transformer	T2	
	Primary Winding		4.4
	Secondary Winding		5.7
P-9A454	Oscillator Coil	T3	
	Grid Coil		3.6
	Plate Coil		1.5
P-9A455	1st I.F. Transformer	T4	
	Primary Winding		102.0
	Secondary Winding		99.
P-9A456	2nd I.F. Transformer	T5	
	Primary Winding		101.
	Secondary Winding		102.
P-50X22	Audio Input Transformer	T6	
	Primary Winding		380.
	Secondary Winding		
	Center Tap to Inside		85.
	Center Tap to Outside		95.
P-12A219	Dynamic Speaker		
	Speaker Field	L2	100.
	Speaker Voice Coil		3.1
	Audio Output Transformer (51X23)	T7	
	Primary Winding		
	Center Tap to Inside		152.
	Center Tap to Outside		176.
	Secondary Winding		1.4
P-52X33	Filter Choke	L1	50.

Replacing Drive Cord

Take off the station pointer by removing the screw at the center of the dial.

Remove the pilot lamp assembly by pulling the socket clips upward off the dial assembly.

Loosen the dial assembly by removing the two screws which secure this assembly to the chassis brackets.

Then lay the complete dial assembly face down in front of the chassis. It is not necessary to remove the volume control and tone control collars which hold the indicator cords of these two controls in position.

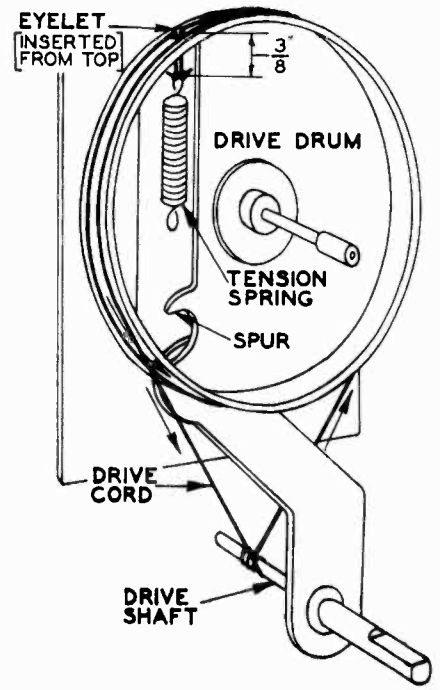


Fig. 6—Replacing Drive Cord

Turn the drive drum until the opening in this drum is approximately vertical and with the hole at the top as shown in Fig. 6.

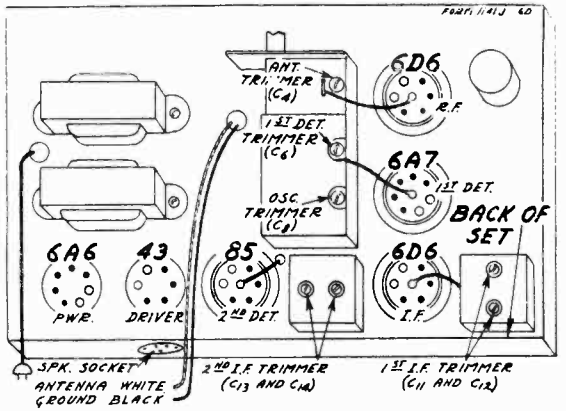


Fig. 4—Tube Arrangement

Remove the tension spring and the old drive cord.

See that the eyelet is in the hole in the drive drum as shown in Fig. 6. Insert one end of the new drive cord from the outside through this eyelet in the drive drum.

Tie the end of the cord which has been inserted through the eyelet to one end of the tension spring.

Wrap the cord in a counter clockwise direction (facing front of chassis) around the drive drum approximately one and one-quarter turns progressing toward the front.

Volume Control at Maximum — Antenna Connected to Ground LEAD

Type of Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground	Normal Plate MA.
6D6	R.F.	6.4	31	31	2	1.5
6A7	1st Det. & Osc.	6.4	31 31(1)	18	2	.2 .65(1
6D6	I.F.	6.4	31	31	2	1.5
85	2nd Det.	6.4	12.5		18	.20
43	1st Audio	25.6	28	31	3.5	7
6A6	Output	6.4	31		0	11 (per plate)

(1) Anode Grid

MODEL 6F Series
R-F. Chassis
Schematic

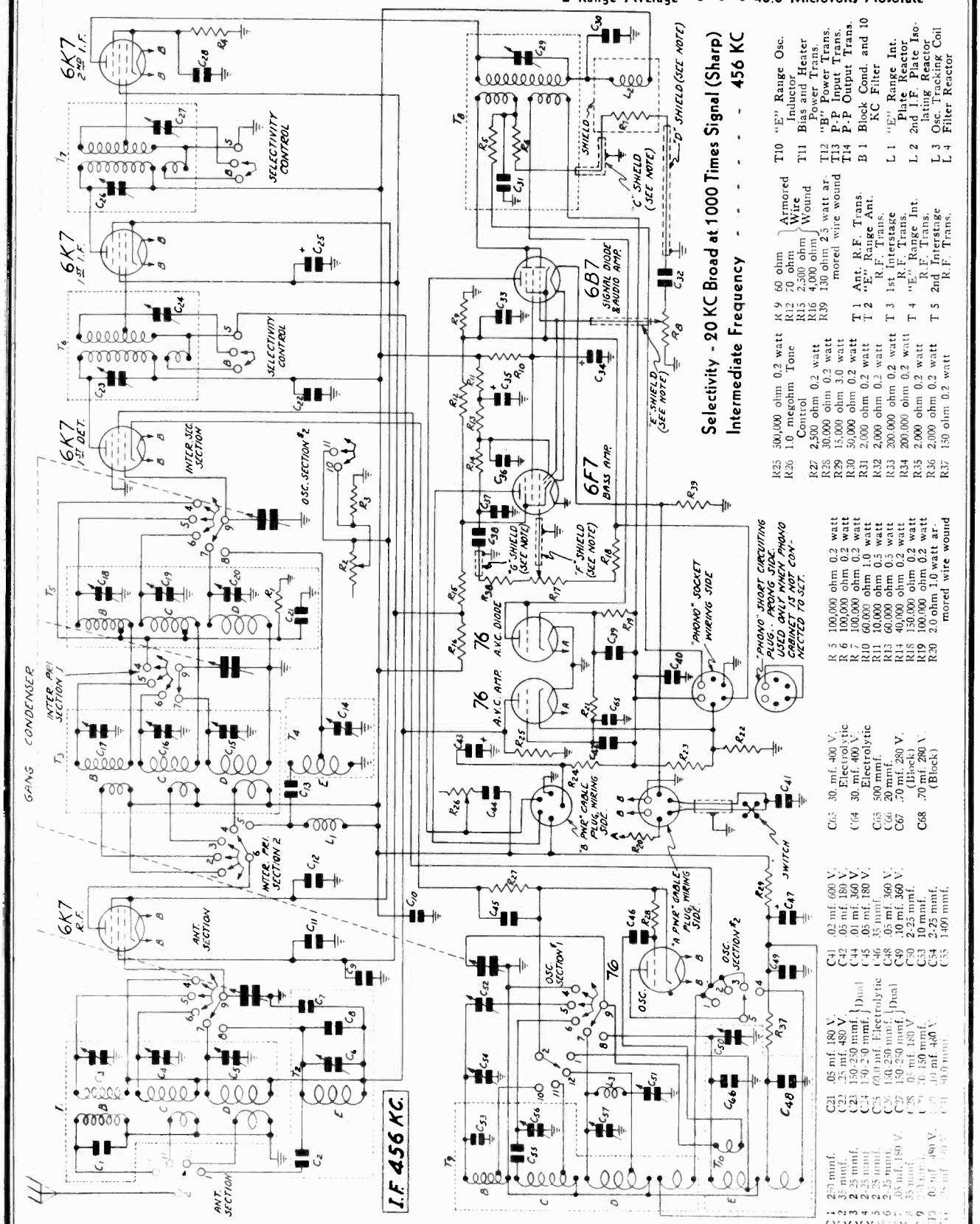
WELLS-GARDNER & CO.

Power Consumption - - - - - - - 290 Watts
(At 115 Volts 60 Cycles)

Power Output - - - - 30 Watts Undistorted

Sensitivity

B Range Average - - - 0.5 Microvolts Absolute
C Range Average - - - 1.0 Microvolts Absolute
D Range Average - - - 2.0 Microvolts Absolute
E Range Average - - - 40.0 Microvolts Absolute



R25 500,000 ohm 0.2 watt
R26 1.0 megohm Tone Control
R27 2,500 ohm 0.2 watt
R28 30,000 ohm 0.2 watt
R29 15,000 ohm 3.0 watt
R30 50,000 ohm 0.2 watt
R31 2,000 ohm 0.2 watt
R32 2,000 ohm 0.2 watt
R33 200,000 ohm 0.2 watt
R34 200,000 ohm 0.2 watt
R35 2,000 ohm 0.2 watt
R36 2,000 ohm 0.2 watt
R37 150 ohm 0.2 watt

R 5 100,000 ohm 0.2 watt
R 6 100,000 ohm 0.2 watt
R 7 100,000 ohm 0.2 watt
R10 60,000 ohm 1.0 watt
R11 10,000 ohm 0.5 watt
R13 60,000 ohm 0.5 watt
R14 40,000 ohm 0.2 watt
R18 150,000 ohm 0.2 watt
R19 100,000 ohm 0.2 watt
R20 2.0 ohm 1.0 watt armored wire wound

R 9 60 ohm
R12 70 ohm
R15 2,500 ohm
R16 4,000 ohm
R39 130 ohm 2.5 watt armored wire wound
} Armored Wire Wound

T 1 Ant. R.F. Trans.
T 2 "E" Range Ant. R.F. Trans.
T 3 1st Interstage R.F. Trans.
T 4 "E" Range Int. R.F. Trans.
T 5 2nd Interstage R.F. Trans.

T10 "E" Range Osc. Inductor
T11 Bias and Heater Power Trans.
T12 "B" Power Trans.
T13 P-P Input Trans.
T14 P-P Output Trans.
B 1 Block Cond. and 10 KC Filter
L 1 "E" Range Int. Plate Reactor
L 2 2nd I.F. Plate Isolating Reactor
L 3 Osc. Tracking Coil
L 4 Filter Reactor

C 1 250 mmf.
C 2 35 mmf.
C 3 2-25 mmf.
C 4 2-25 mmf.
C 5 2-25 mmf.
C 6 2-25 mmf.
C 7 .05 mf. 180 V.
C 8 35 mmf.
C 9 50 mmf.
C10 .05 mf. 480 V.
C11 50 mmf.
C12 50 mmf.
C13 .05 mf. 180 V.
C14 .25 mf. 480 V.
C15 150-250 mmf. } Dual
C16 150-250 mmf. }
C17 150-250 mmf. }
C18 .05 mf. 180 V.
C19 .25 mf. 480 V.
C20 .10 mf. 480 V.
C21 .05 mf. 180 V.
C22 .25 mf. 480 V.
C23 150-250 mmf. } Dual
C24 150-250 mmf. }
C25 60.0 mf. Electrolytic
C26 150-250 mmf. } Dual
C27 150-250 mmf. }
C28 .05 mf. 180 V.
C29 50-150 mmf.
C30 .10 mf. 480 V.
C31 50 mmf.
C32 .02 mf. 600 V.
C33 .05 mf. 180 V.
C34 .01 mf. 360 V.
C35 .05 mf. 180 V.
C36 35 mmf.
C37 .05 mf. 360 V.
C38 .10 mf. 360 V.
C39 2.25 mmf.
C40 10 mmf.
C41 2.25 mmf.
C42 1400 mmf.
C43 .30 mf. 400 V. Electrolytic
C44 .30 mf. 400 V. Electrolytic
C45 .05 mf. 180 V.
C46 500 mmf.
C47 20 mmf.
C48 .70 mf. 280 V. (Block)
C49 .70 mf. 280 V. (Block)
C50 2.25 mmf.
C51 10 mmf.
C52 2.25 mmf.
C53 1400 mmf.
C54 .30 mf. 400 V. Electrolytic
C55 .30 mf. 400 V. Electrolytic
C56 .05 mf. 180 V.
C57 .05 mf. 180 V.
C58 .05 mf. 180 V.
C59 .05 mf. 180 V.
C60 .05 mf. 180 V.
C61 .05 mf. 180 V.
C62 .05 mf. 180 V.
C63 .30 mf. 400 V. Electrolytic
C64 .30 mf. 400 V. Electrolytic
C65 500 mmf.
C66 20 mmf.
C67 .70 mf. 280 V. (Block)
C68 .70 mf. 280 V. (Block)

WELLS-GARDNER & CO.

MODEL 6F Series
A-F. Chassis
Schematic

Tuning Frequency Range

B Range - - - - - - - - - - 535 to 1730 KC
C Range - - - - - - - - - - 1715 to 5800 KC

D Range - - - - - - - - - - 5750 to 18300 KC
E Range - - - - - - - - - - 17500 to 48000 KC

Speaker - - - Two 12 Inch Auditorium Dynamics

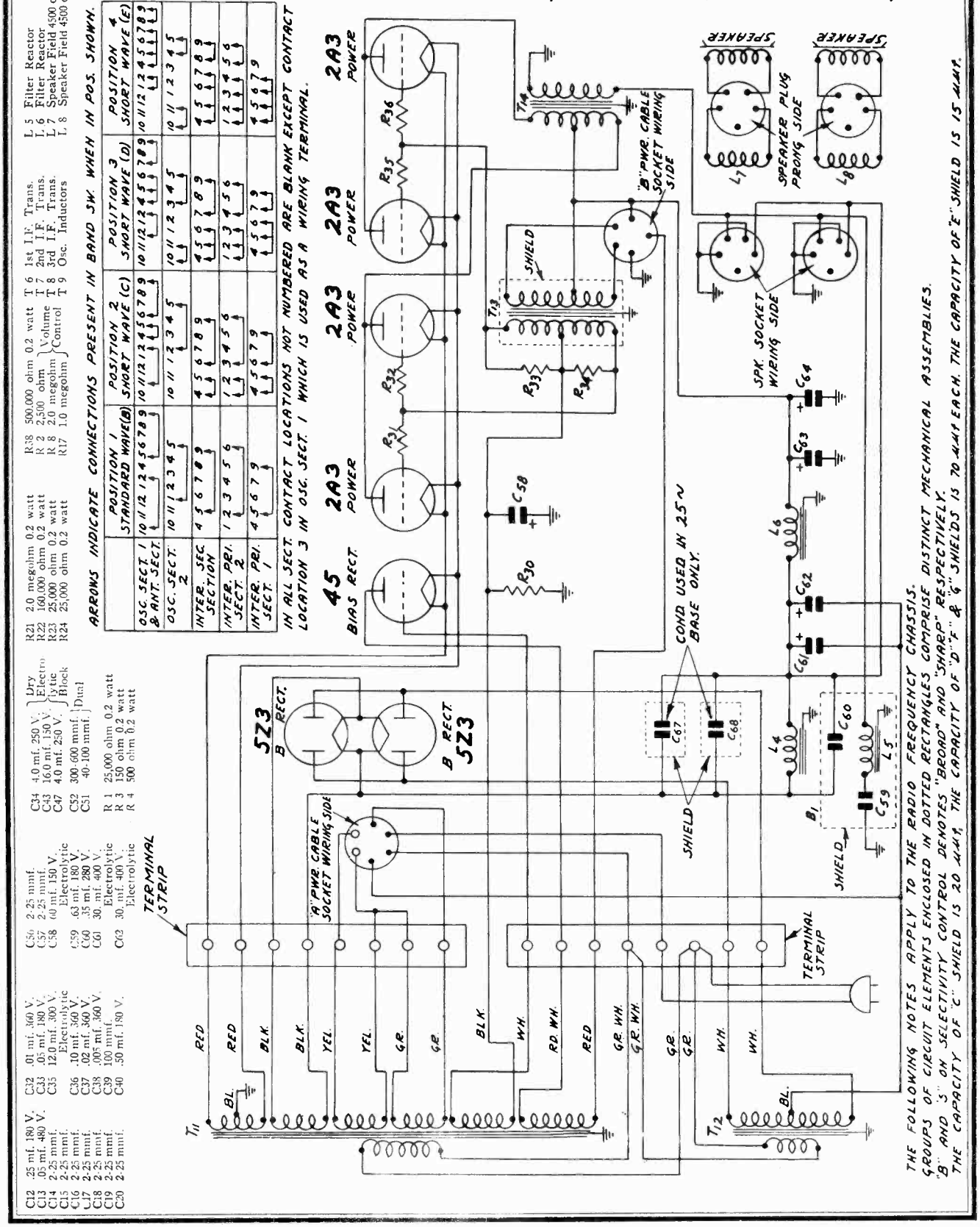
ARROWS INDICATE CONNECTIONS PRESENT IN BAND SW. WHEN IN POS. SHOWN.

	POSITION 1 STANDARD WAVE (B)	POSITION 2 SHORT WAVE (C)	POSITION 3 SHORT WAVE (D)	POSITION 4 SHORT WAVE (E)
OSC. SECT. 1 & ANT. SECT.	10 11 12 1 2 3 4 5 6 7 8 9	10 11 12 1 2 3 4 5 6 7 8 9	10 11 12 1 2 3 4 5 6 7 8 9	10 11 12 1 2 3 4 5 6 7 8 9
OSC. SECT. 2	10 11 1 2 3 4 5	10 11 1 2 3 4 5	10 11 1 2 3 4 5	10 11 1 2 3 4 5
INTER. SEC. SECTION	4 5 6 7 8 9	4 5 6 7 8 9	4 5 6 7 8 9	4 5 6 7 8 9
INTER. PRI. SECT. 2	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
INTER. PRI. SECT. 1	4 5 6 7 9	4 5 6 7 9	4 5 6 7 9	4 5 6 7 9

IN ALL SECT. CONTACT LOCATIONS NOT NUMBERED ARE BLANK EXCEPT CONTACT LOCATION 3 IN OSC. SECT. 1 WHICH IS USED AS A WIRING TERMINAL.

C12	.25 mf. 180 V.	C32	.01 mf. 360 V.	C56	2.25 mmf.	R21	2.0 megohm 0.2 watt
C13	.05 mf. 480 V.	C33	.05 mf. 180 V.	C57	2.25 mmf.	R22	160,000 ohm 0.2 watt
C14	2.25 mmf.	C35	12.0 mf. 300 V. Electrolytic	C58	40 mf. 150 V. Electrolytic	R23	25,000 ohm 0.2 watt
C15	2.25 mmf.			C59	.63 mf. 180 V.	R24	25,000 ohm 0.2 watt
C16	2.25 mmf.	C36	.10 mf. 360 V.	C60	.35 mf. 280 V.	R38	500,000 ohm 0.2 watt
C17	2.25 mmf.	C37	.02 mf. 360 V.	C61	30. mf. 400 V. Electrolytic	R 2	2,500 ohm } Volume
C18	2.25 mmf.	C38	.005 mf. 360 V.	C62	30. mf. 400 V. Electrolytic	R 8	2.0 megohm } Control
C19	2.25 mmf.	C39	100 mmf.			R17	1.0 megohm
C20	2.25 mmf.	C40	.50 mf. 180 V.				

C32	.01 mf. 360 V.	C56	2.25 mmf.	C34	4.0 mf. 250 V. } Dry Electro lytic	T 6	1st I.F. Trans.
C33	.05 mf. 180 V.	C57	2.25 mmf.	C43	16.0 mf. 150 V. } Block	T 7	2nd I.F. Trans.
C35	12.0 mf. 300 V. Electrolytic	C58	40 mf. 150 V. Electrolytic	C47	4.0 mf. 250 V. } Dual	T 8	3rd I.F. Trans.
C36	.10 mf. 360 V.	C59	.63 mf. 180 V.	C52	300-600 mmf. }	T 9	Osc. Inductors
C37	.02 mf. 360 V.	C60	.35 mf. 280 V.	C51	40-100 mmf. }	L 5	Filter Reactor
C38	.005 mf. 360 V.	C61	30. mf. 400 V. Electrolytic	R 1	25,000 ohm 0.2 watt	L 6	Filter Reactor
C39	100 mmf.	C62	30. mf. 400 V. Electrolytic	R 3	150 ohm 0.2 watt	L 7	Speaker Field 4500 ohm
C40	.50 mf. 180 V.			R 4	500 ohm 0.2 watt	L 8	Speaker Field 4500 ohm



THE FOLLOWING NOTES APPLY TO THE RADIO FREQUENCY CHASSIS.
GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES.
"B" AND "S" ON SELECTIVITY CONTROL DENOTES "BROAD" AND "SHARP" RESPECTIVELY.
THE CAPACITY OF "C" SHIELD IS 20 MMF. THE CAPACITY OF "D", "E" & "F" SHIELDS IS 70 MMF EACH. THE CAPACITY OF "E" SHIELD IS 15 MMF.

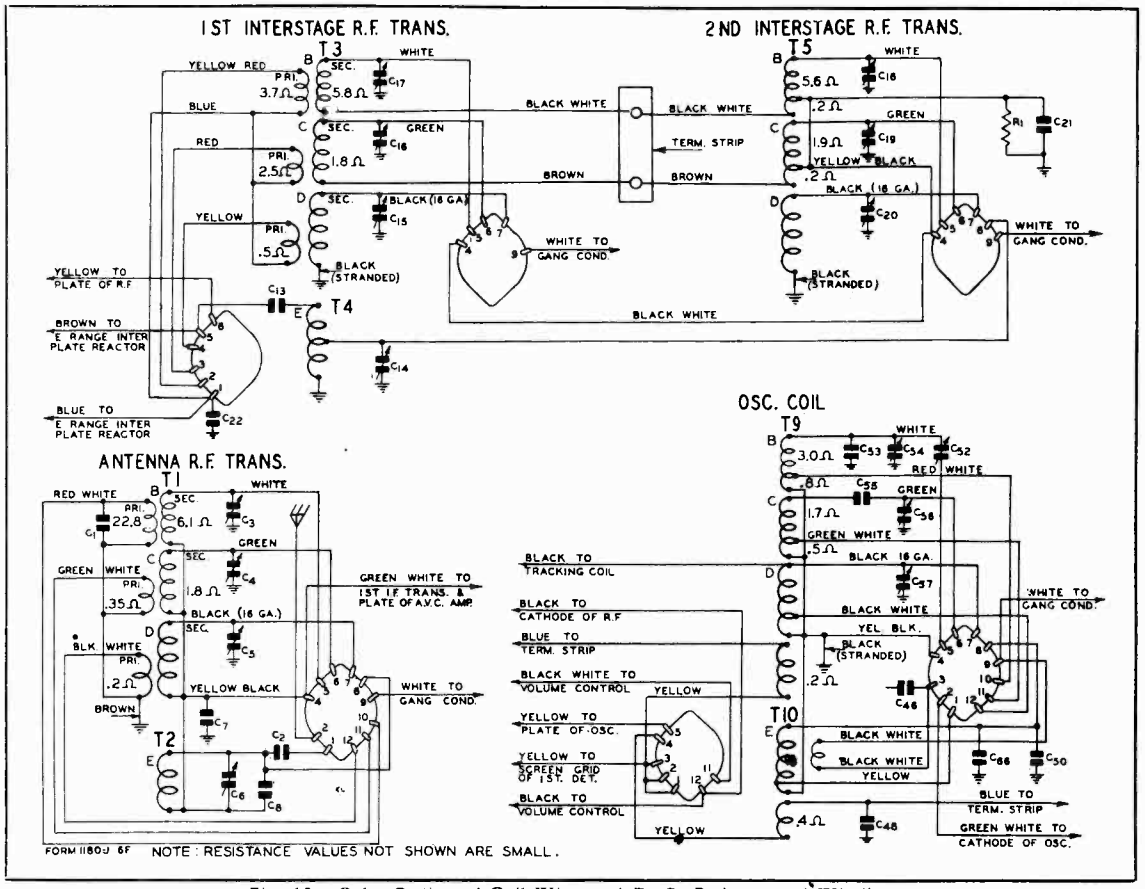


Fig. 12—Color Coding of Coil Wires and D. C. Resistances of Windings

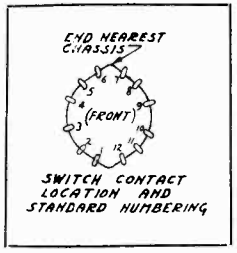


Fig. 9—Numbering of Switch Contacts

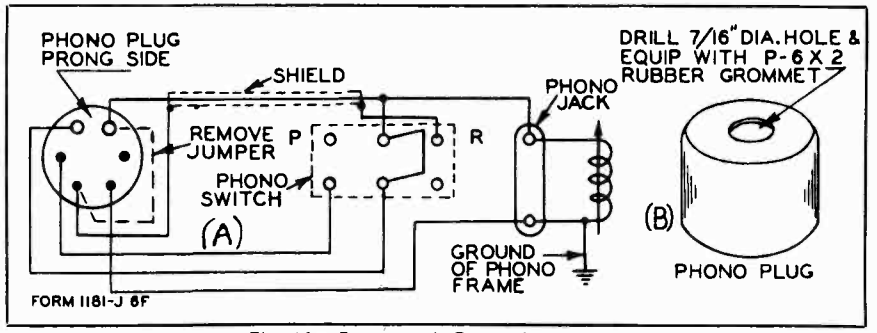


Fig. 13—Phonograph Connections

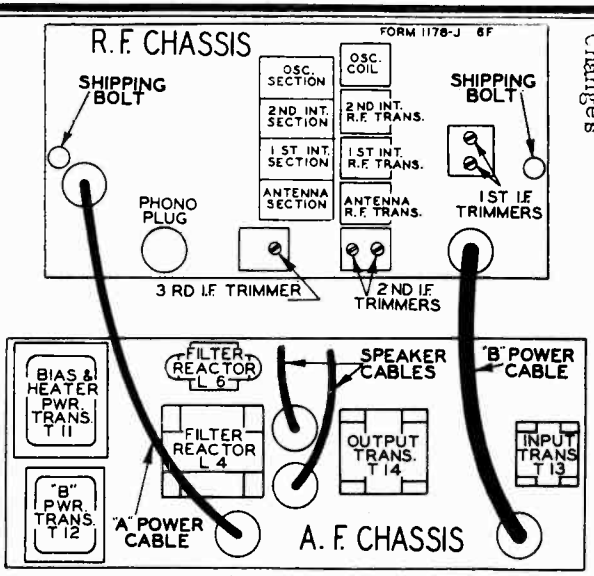


Fig. 4—Top View of Chassis Showing Location of Units

Changes in Early Models

In the early models condenser C65, shown in the R.F. Schematic Fig. 2, was not used. A 20 mmf. condenser, also designated as C65, was connected in parallel with condenser C14.

Condenser C10 from B+ to ground was not used in early models. Another condenser in the early models, also designated as C10 and 250 mmf. in value, was connected from the A.V.C. amplifier plate to ground.

Resistor R38 was not used in early models.

On the A.F. chassis the speaker sockets were wired with ground to the opposite side of voice coil.

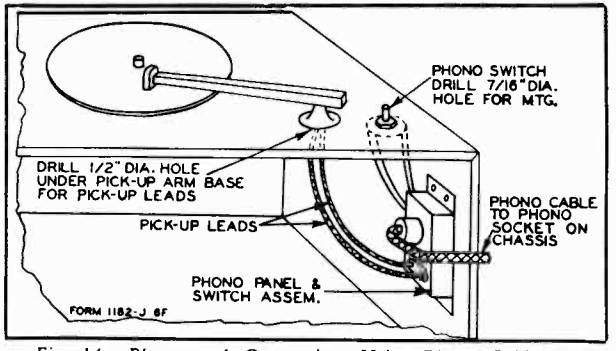


Fig. 14—Phonograph Connections Using Phono Cable and Panel Assembly

WELLS-GARDNER & CO., INC.

MODEL 6F Series
Voltage, Trimmers
Chassis Views

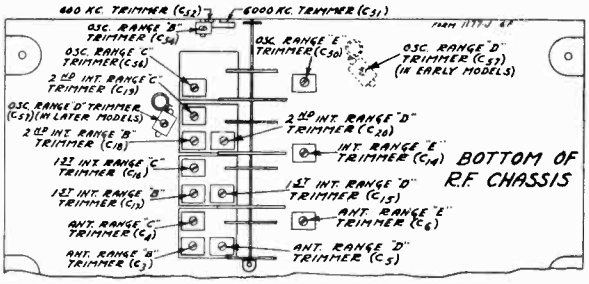


Fig. 6—Trimmer Location

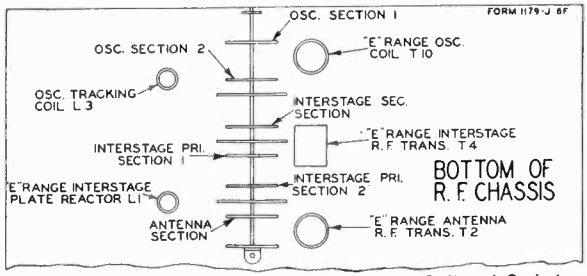


Fig. 5—Bottom View of Chassis Showing Coil and Switch Section Location

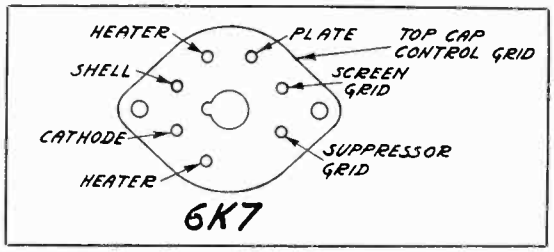


Fig. 7—Bottom View of Metal Tube Socket

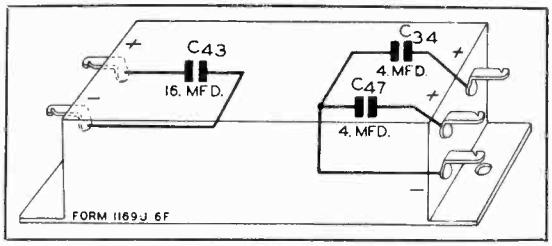


Fig. 8—Condenser Block Internal Wiring

VOLTAGES AT SOCKETS
Antenna Shorted to Ground - Line Voltage 110
Volume Control Maximum

Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground	Cathode M. A.
6K7	R. F.	5.8	300	110	4.1	10.5
6K7	1st Det.	5.8	300	142	10.0	3.5
76	Osc.	5.8	142			10.0
6K7	1st I. F.	5.8	300	110	4.1	10.5
6K7	2nd I. F.	5.8	300	110	3.7	10.0
6B7	Sig. Diode & Audio Amp.	5.8(1) 5.6(2)	300	115	3.6	4.5
6F7	Bass Amp.	5.8(1) 5.6(2)	275(3) 125(4)	115	7.2	9.0
76	A.V.C. Diode	4.9				
76	A.V.C. Amp.	4.9	0		-62.0	
2A3	Power	2.35	300		60(5)	60.0(6)
5Z3	'B' Rect.	4.8				375.0(7)
45	Bias Rect.	2.4				

(1) Measured with A. C. Voltmeter—early models with letter "A" under chassis.
(2) Measured with D. C. Voltmeter—later models with letter "B" under chassis.
(3) Pentode Plate
(4) Triode Plate
(5) Control Grid to ground.
(6) Each Side of push-pull Circuit—120 Ma. total for 4 tubes.
(7) Total for both tubes—Miliameter in series with 1st Choke.

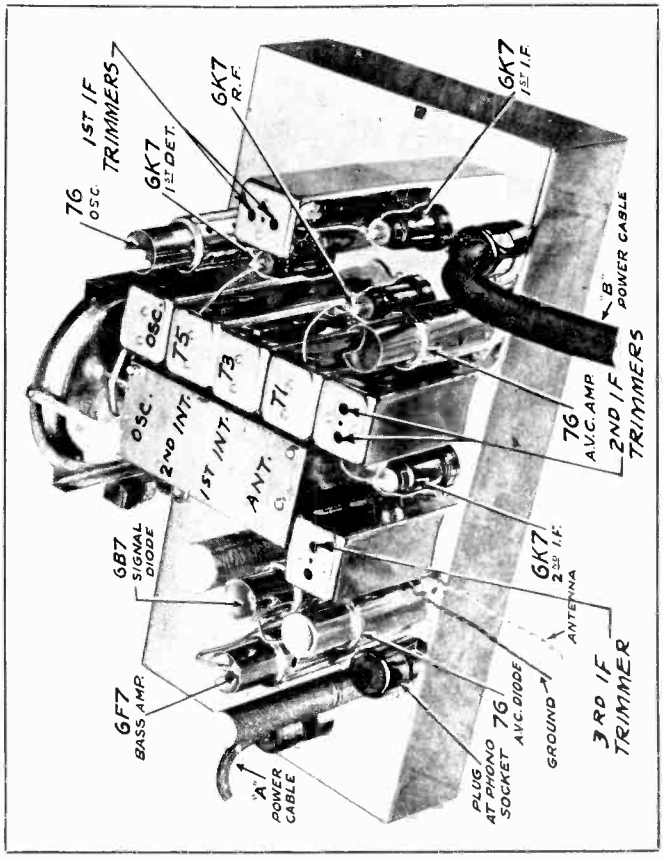


Fig. 10—Tube Arrangement in R.F. Chassis

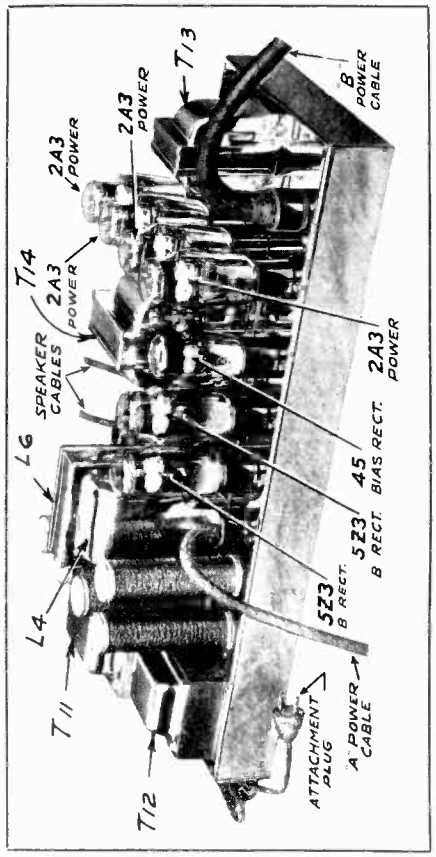


Fig. 11—Tube Arrangement in A.F. Chassis

MODEL 6F Series
Circuit Data
Alignment

WELLS-GARDNER & CO., INC.

Circuit

This model is a four band receiver with a tuning range in each band as shown in the specifications above. Four band coverage is accomplished by means of four sets of antenna, interstage and oscillator coils and a six section four position switch.

Among the many features incorporated in this receiver are—Improved Automatic Volume Control, Adjustable Selectivity Control, Dual Volume and Sensitivity Control, Bass Compensator and a 30 Watt High Fidelity Audio Amplifier. These are discussed in the following circuit description.

Referring to the R.F. Schematic Fig. 2, the following are the code numbers of the R.F. and Oscillator Assemblies:

T1 —Antenna R.F. Transformer
T2 —E Range Antenna R.F. Transformer
T3 —1st Interstage R.F. Transformer
T4 —E Range Interstage R.F. Transformer
T5 —2nd Interstage R.F. Transformer
T9 —Oscillator Inductors
T10—E Range Oscillator Inductors

The standard wave, 1st, 2nd and 3rd short wave coils in each assembly are indicated by the letters B, C, D and E, respectively. The six sections of the band switch are designated in the R.F. schematic Fig. 2 and in Fig. 5 as the antenna section, interstage primary section 2, interstage primary section 1, interstage secondary section, oscillator section 2 and oscillator section 1.

The band switch completes connections to the coils in use. It also short circuits the antenna R.F. transformer secondaries, the interstage transformer primaries and secondaries and the oscillator coils of lower frequency, not in use.

The antenna transformer with tuned secondary feeds into a type 6K7 R.F. amplifier tube. The output of this tube is fed into a double tuned R.F. stage. The output of the latter actuates the control grid of a 6K7 tube which functions as the 1st detector.

A separate type 76 tube is employed in the oscillator circuit. The oscillating circuit is always resonant at a frequency which is 456 KC above the frequency to which the R.F. amplifier is tuned.

The oscillator potential is fed into the cathode circuit of the 6K7 first detector tube. As a result of the beating of the two frequencies, the intermediate or beat frequency of 456 KC is present in the plate circuit of this tube.

Two stages of I.F. amplification are employed using 6K7 tubes. The primaries and secondaries of the first and second I.F. transformers and the primary of the 3rd I.F. transformer are tuned by small trimmer condensers.

Referring to the 1st and 2nd I.F. transformers T6 and T7 in Fig. 2, it will be noted that there are coupling windings below the primaries.

When the selectivity control is in the sharp position, the coupling winding is open circuited and the loose coupling which exists between the primary and secondary of this transformer results in high selectivity. When the selectivity control is in the broad position, the coupling winding which is wound under the primary is connected in series with the secondary. This provides overcoupling which results in a greatly widened resonance curve. Passage of a wide range of audio frequencies is thus obtained.

A dual manual volume control is employed. In one section the audio voltage applied to the 1st audio tube is varied (R8). In the other section the R.F. and 1st I.F. bias is varied (R2). The purpose of the latter section is to reduce the sensitivity of the receiver at low volume settings in order to cut down noise pick-up between stations. The variable section R2 is shorted out by the band selector switch when it is in the Range D and E positions.

The 3rd I.F. transformer has 2 secondary windings. One of these windings works into the diode section of the 6B7 signal diode. The other winding works into the 76 A.V.C. diode.

The audio voltage developed by the signal diode across volume control resistor R8 is transmitted through the movable arm to the control grid of the pentode section of the 6B7 tube, which acts as a one stage audio amplifier. The pentode plate of this tube is connected through the "B" power cable to one side of the primary of the push-pull input transformer in the power stage.

The audio voltage developed across volume control resistor R8 is also applied through the movable arm to the control grid of the triode section of the 6F7 bass amplifier. A resistance capacity filter composed of condensers C36 and C37 and resistor R14 in the triode plate circuit of this tube bypasses the higher audio frequencies. The lower audio frequencies which pass through this filter develop a voltage across resistors R38, R17 and R18.

R17 is the bass note control and is connected mechanically to the manual volume control. The movable arm is connected to and applies the bass audio voltage to the control grid of the pentode section of the 6F7 bass amplifier. At high volume settings the movable arm is at the low potential end of R17 (near R18). At low volume settings it is at the other end of this resistor in order to increase the bass note response. The reason for the increase in low note response is that the characteristics of the ear are such that the low notes are not heard as well as the middle register notes at lower volume levels.

The plate of the pentode section of the 6F7 tube is connected through the "B" power cable to the other side of the primary of the push-pull input transformer.

The A.V.C. system used in this receiver is one which has a flat characteristic over an extremely wide input range. As mentioned above, it will be seen in Fig. 2 that one of the 3rd I.F. transformer secondary windings works into the 76 A.V.C. diode tube. A signal passing through this transformer will result in a voltage across diode resistor R19. This voltage is applied to the control grid of the 76 A.V.C. amplifier.

Referring now to Figs. 2 and 3, there is a diode circuit consisting of the A.V.C. amplifier voltage winding of power transformer T11 (sixth winding from top) the plate and cathode elements of the 45 bias rectifier tube and resistors R22, R23 and R24. The diode current flowing in this circuit establishes a drop across these resistors. This voltage is below ground and furnishes operating voltages for the 76 A.V.C. amplifier tube which functions as a DC amplifier. Under no signal conditions, the plate of this tube is at ground potential. The grid is at the voltage of the maximum negative voltage end of resistor R23 while the cathode is at the minimum negative voltage end of this resistor. The resulting bias voltage brings this tube below the cut-off point and no plate current flows.

When a signal of a predetermined value or greater flows in the 3rd I.F. transformer, the voltage established across diode resistor R19 reduces the bias voltage of the A.V.C. amplifier to the point at which plate current flows in this tube. The plate current establishes a drop in resistor R25, lowering the plate voltage by the amount of this drop. The plate of the A.V.C. amplifier tube is connected to the control grid circuits of the R.F. and 1st I.F. tubes, resulting in A.V.C. action.

The ouput stage employs four type 2A3 tubes arranged in push-pull parallel. Fixed bias voltage for these tubes is obtained from a diode circuit in which are the output bias winding of power transformer T11 (fifth winding from top) and the grid and cathode elements of the type 45 bias rectifier tube. 30 watts of undistorted output may be obtained. Two 12" auditorium type dynamic speakers are used. Each speaker is provided with deflecting vanes for the purpose of spreading the directional higher audio notes through the entire room.

Two type 5Z3 tubes connected in parallel are used as "B" power rectifiers in the power unit. There are 2 power transformer assemblies, T11 and T12. In assembly T11 the top 4 windings illustrated in Fig. 3 supply the tube heater and filament voltages and the pilot lamp voltages. As mentioned, the fifth winding supplies the output stage bias voltage and the sixth winding supplies the A.V.C. amplifier tube voltages. Assembly T12 supplies the "B" voltage.

To reduce hum, DC is used in the heater circuits of the 6F7 and 6B7 tubes. The 2 heaters are connected in series in the negative "B" line.

The 45 bias rectifier tube, mention of which has already been made, has two functions. The cathode and grid elements act as a diode supplying bias voltage for the output tubes. The cathode and plate elements act as a diode supplying operating voltages for the A.V.C. amplifier. The two associated transformer windings must be in phase and wired as per the color code in the A.F. Schematic, Fig. 3.

The phono short circuiting plug, which is in the phono socket completes the signal diode circuit connections. Phonograph circuit connections are explained in the article under that name in this manual.

Metal Tubes

One type of the new metal tubes is used in this receiver, namely the 6K7. This replaces the type 6D6 glass tube. This metal tube operates at the same voltages and is nearly identical in characteristics to the corresponding glass tube which it replaces. In Fig. 7 are shown the metal tube pin positions from a bottom socket view.

The shells of metal tubes get quite hot and users should be cautioned against touching them.

Phonograph Connections

A phonograph socket is provided on the R.F. chassis by means of which phonograph connections can be made without electrical changes in the chassis. The receiver is shipped from the factory with a plug in this socket. If no phonograph is used this plug must be inserted as it completes the signal diode circuit for radio reception.

Two sets of accessories are supplied for phonograph connections for this model. One set is used when the phonograph is contained in a separate cabinet, and the other set is used when the phonograph and radio are in a combination cabinet. The electrical connections are the same in both cases and are illustrated in Fig. 13 (A). Parts required in either case are shown in the parts list in this manual.

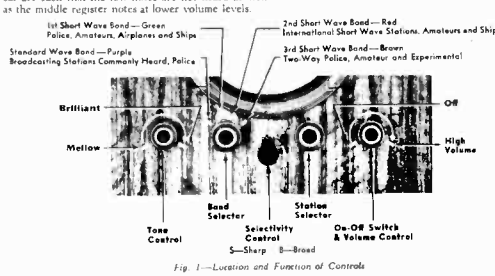


Fig. 1—Location and Function of Controls

Phonograph in Separate Cabinet

For this assembly, a 5 conductor cable and a small metal panel assembly are supplied. This assembly has the radio-phono switch, tip jacks for pick-up leads and terminal plate for phono cable.

The phono panel is mounted at the most convenient place in the cabinet at which connections can be completed. The switch is secured to the motor board as illustrated in Fig. 14.

The socket at the end of the cable is secured to the terminal plate on the panel and the plug at the other end of the cable is inserted into the phono socket on the R.F. chassis.

When the switch is thrown to the radio side, the phono pick-up is excluded from the signal diode circuit. When it is thrown to the phono side, the signal diode circuit is opened and the phonograph connections completed to this circuit. Resistor R23 is short circuited. This brings the grid and cathode of the 76 A.V.C. amplifier to the same potential and causes a plate current in this tube of sufficient intensity to bring the R.F. and 1st I.F. tubes to the point of cut off (See article on circuit for further information regarding operation of A.V.C. system).

Phonograph and Radio in Combination Cabinet

For this assembly, a number of separate items as shown in the parts list are supplied. The phono short circuiting plug supplied with the receiver is used after certain changes have been made.

First take off the shell of this plug by twisting the shell in either direction. The shell is then drilled and equipped with a rubber grommet as shown in Fig. 13 (B). Next unsolder and remove the jumper wire from the plug as shown in Fig. 13 (A). Extend the leads through the hole in the shell and solder the leads to the prongs on the plug as illustrated. Complete the connections to the switch and tip jacks as shown. The switch is mounted on the motor board and the tip jacks at the nearest convenient place.

The description of the connections as given for the separate phonograph cabinet also applies to the combination.

Alignment and Calibration

Correct alignment is extremely important in connection with all-wave receivers. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment.

A signal generator that will provide an accurately calibrated signal at 456, 1730, 1500, 600, 5800, 5000, 18,300, 15,000, 6000, 48,000 and 40,000 KC and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used. If a station is tuned in with the selectivity control in the broad position and this control is then turned to the sharp position, the station may disappear. This is not an indication that the receiver is out of alignment.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator to the grid of the 1st detector through a 0.1 mf condenser.

Connect the ground lead of the receiver to the ground post of the signal generator.

Turn the band selector to the Range B position (standard wave band—purple dial color).

Turn the selectivity control to the sharp position and keep it in this position for all adjustments.

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off actuon of the A.V.C.

Then adjust the five I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 4.

Range B Alignment

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Keep the band selector in the standard wave position.

Connect the antenna lead of the receiver through a 200 mmf. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range B trimmer (C54) until maximum output is obtained. The location of this trimmer is shown in Fig. 6.

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Loosen the pointer set screw and set the large pointer at the 1500 KC mark on the standard wave band scale. Re-tighten the set screw.

Adjust the 1st and 2nd interstage Range B trimmers (C17 and C18) and antenna Range B trimmer (C3) to maximum.

Do not change the setting of the oscillator Range B trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 600 KC trimmer until the peak of greatest intensity is obtained. See Fig. 6 for location of this trimmer.

Be sure to use a non-metallic screwdriver for this adjustment.

Range C Alignment

5800 KC Adjustment

Set the signal generator for 5800 KC.

Connect the antenna lead of the receiver through a 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range C position (1st short wave band—green dial color).

As mentioned above, keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range C trimmer (C56) until maximum output is obtained. See Fig. 6 for location of this trimmer.

5000 KC Adjustment

Set the signal generator for 5000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the 1st and 2nd interstage Range C trimmers (C16 and C19) and antenna Range C trimmer (C4) to maximum.

Do not change the setting of the oscillator Range C trimmer.

Range D Alignment

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

Keep the antenna lead of the receiver connected through the 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range D position (2nd short wave band—red dial color).

As mentioned above, keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range D trimmer (C57) until maximum output is obtained. See Fig. 6 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC. Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the 1st and 2nd interstage Range D trimmers (C15 and C20) and antenna Range D trimmer (C5) to maximum.

When adjusting the 2nd interstage Range D trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Then go back and repeat the procedure as given for the 18,300 KC adjustment. If it is found necessary to make any appreciable change in the setting of the oscillator Range D trimmer, the 15,000 KC adjustment must be repeated.

Do not make any further change in the setting of the oscillator Range D trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC trimmer until the peak of greatest intensity is obtained. See Fig. 6 for location of this trimmer.

Use a non-metallic screwdriver for this adjustment.

Range E Alignment

48,000 KC Adjustment

Set the signal generator for 48,000 KC.

Keep the antenna lead of the receiver connected through the 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range E position (3rd short wave band—brown dial color).

Adjust the oscillator Range E trimmer (C10) until maximum output is obtained. See Fig. 6 for location of this trimmer.

40,000 KC Adjustment

Set the signal generator for 40,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range E trimmer (C14) and antenna Range E trimmer (C6) to maximum.

Do not change the setting of the oscillator Range E trimmer.

Switch Contact Location Numbering

A standard arrangement for switch contact location numbering has been adopted. This numbering is illustrated in Fig. 9. In contact locations not used, the number applying to that particular location is not employed.

Twenty-five Cycle Receivers

The twenty-five cycle receiver differs from the sixty cycle receiver in the fact that special twenty-five cycle filament and "B" power transformers must be used. It also has two additional condensers in the power unit C67 and C68 as illustrated in Fig. 3. The twenty-five cycle transformers and the condensers are shown in the parts list.

The twenty-five cycle receiver can be operated satisfactorily from a sixty cycle power supply if the two condensers C67 and C68 are removed. However, the reverse is not true, that is, a sixty cycle receiver cannot be operated from a twenty-five cycle power supply.

115-230 Volt, 40 to 60 cycle filament and "B" power transformers are also available for this model.

WELLS-GARDNER & CO.

MODEL 6F Series
Resistance
Parts

TRANSFORMERS AND COILS

New Part No.	Code	Winding	List Price
P-9A428	T1	Antenna R.F. Transformer and Can Assembly	$4.05
P-9A435	T2	"E" Range Antenna R.F. Coil Assembly	.85
P-9A429	T3	1st Interstage R.F. Transformer and Can Assembly	3.40
P-9A436	T4	"E" Range Interstage R.F. Coil Assembly	.60
P-9A430	T5	2nd Interstage R.F. Coils Assembly	3.50
P-9A432	T6	1st I.F. Transformer and Can Assembly	3.05
P-9A433	T7	2nd I.F. Transformer and Can Assembly	3.05
P-9A434	T8	3rd I.F. Transformer and Can Assembly	3.00
P-9A431	T9	Oscillator Coils and Can Assembly	3.50
P-9A437	T10	"E" Range Oscillator Coil Assembly	1.00
*P-53X88	T11	Filament Transformer (115 Volt - 60 Cycle)	6.85
*P-53X106		Filament Transformer (115 Volt - 25 Cycle)	13.30
*P-53X104		Filament Transformer (115-230 Volt; 40-60 Cycle)	11.50
*P-53X85	T12	"B" Power Transformer (115 Volt - 60 Cycle)	8.65
*P-53X105		"B" Power Transformer (115-230 Volt; 40-60 Cycle)	15.00
*P-53X107		"B" Power Transformer (115 Volt - 25 Cycle)	17.50
*P-50X25	T13	Audio Input Transformer	5.35
*P-51X33	T14	Audio Output Transformer	6.65
P-9A391	L1	"E" Range Interstage Plate Reactor	.25
P-9A450	L2	2nd I.F. Plate Isolating Reactor	.55
P-9A391	L3	High Frequency Oscillator Tracking Coil	.25
*P-52X35	L4	Filter Reactor	8.45
*	L5	10 KC Reactor (Part of P-48X201)	.85
*P-52X36	L6	Filter Reactor	3.55
*P-48X201	B1	Block Condenser (C59 & C60) and 10 KC Reactor—(L5) Assembly	2.35

*These items are part of the A.F. Chassis. All others are on R.F. Chassis.

DIAL AND DRIVE ASSEMBLY

New Part No.	Old Part No.	Description	List Price
		Dial Assembly Complete Less Large Pointers, less Pilot Lamp Sockets and Bulbs	$5.75
P-28X35		Gear Spreader Springs Only	.10
P-28X49		Tension Pulley Spring Only	.10
P-8X36		Drive Belt	.20
P-28X45		Pointer Slide Take-up Spring	.10
P-10X9		4 Inch Indicator Cords	doz. .10
P-29X51		Brass Collars and Set Screws only for securing above Drive Cords to Shaft	.20
		Dial Strip Only (Specify Series No. and Name of Receiver)	.65
P-30X43		Dial Clamp to secure Dial Strip to Frame (with 6-32 x 3/16" Mounting Screw)	.10
		Double End Pointer (Specify Series No. and Name of Receiver)	.10
P-15X26		Micrometer Pointer	.10
P-7A26	2012	Pilot Lamp Bulb (6 - 8V)	.15
P-7A34		Pilot Lamp Sockets and Spring Clip	.15

PHONO ATTACHMENT PARTS

(The following parts are recommended for use when Radio and Phonograph are in separate cabinets)

The first two items only are required

New Part No.	Old Part No.	Description	List Price
P-13X228		Phono Cable (20 feet long)	$5.25
P-13A7		Phono Panel and Switch Assembly Complete	4.15
		The following items are part of the phono panel and switch assembly (P-13A7) listed above and may be purchased separately:	
P-25X263		Phono Attachment Panel Only	2.40
P-2A50		Phono Switch	.60
P-3A12	1193	Phono Jack	.10
P-6A205		6 Prong Phono Cable Pin Plate	.10
P-19X6	20351	Flat Washers	.10
P-10A36	2122	Switch Knob	.20

(The following parts are recommended for use when Radio and Phonograph are in the same cabinet)

The first item only is required

P-13A8		Complete Phono Kit (includes all following parts)	1.20
P-6X2	10153	Rubber Grommet	.10
P-2A50		Phono Switch	.60
P-3A12	1193	Phone Jack	.10
P-10A36	2122	Switch Knob	.20
5 Ft.		Shielded Hook-up Wire	.20

Prices Subject to Change Without Notice.

D. C. Resistance of Windings

Refer to Figs. 12, 2 & 3.

Part No.	Winding	Code	D. C. Resistance in Ohms
P-9A428	Antenna R.F. Transformer	T1	
	Range B Primary Winding		22.8
	Range C Primary Winding		0.35
	Range D Primary Winding		0.2
	Range B Secondary Winding		6.1
	Range C Secondary Winding		1.8
	Range D Secondary Winding		Small
P-9A435	"E" Range Antenna R.F. Coil	T2	Small
P-9A429	1st Interstage R.F. Transformer	T3	
	Range B Primary Winding		3.7
	Range C Primary Winding		2.5
	Range D Primary Winding		0.5
	Range B Secondary Winding		5.8
	Range C Secondary Winding		1.8
	Range D Secondary Winding		Small
P-9A436	"E" Range Interstage R.F. Coil	T4	
	Tap to either side		Small
P-53X85	"B" Power Transformer (115 Volts 60 Cycles)	T12	
	Primary Winding		1.9
	Secondary Winding		
	Center Tap to Inside		48.0
	Center Tap to Outside		53.1
P-50X25	Audio Input Transformer	T13	
	Primary Winding		
	Tap to Plate of 6F7		6600.
	Tap to Tone Control and Plate of 6B7		4650.
	Secondary Winding		
	Center Tap to Inside		2840.
	Center Tap to Outside		3260.
P-51X33	Audio Output Transformer	T14	
	Primary Winding		
	Center Tap to Inside		19.7
	Center Tap to Outside		22.4
	Secondary Winding		0.4
P-12A206	12" Dynamic Speaker		
	Speaker Voice Coil		6.3
	Speaker Field	L7	4500.
P-12A213	12" Dynamic Speaker		
	Speaker Voice Coil		6.3
	Speaker Field	L8	4500.
P-9A391	"E" Range Interstage Plate Reactor	L1	1.0
P-9A450	2nd I.F. Plate Isolating Reactor	L2	35.0
P-9A391	High Frequency Oscillator Tracking Coil	L3	1.0
P-52X35	Filter Reactor	L4	51.6
P-52X36	Filter Reactor	L6	11.2
P-48X201	Block Condenser & 10 KC Reactor Assembly	B1	
	10 KC Reactor	L5	0.6
P-9A430	2nd Interstage R.F. Coils	T5	
	Range B Section		
	Long Portion		5.6
	Short Portion		0.2
	Range C Section		
	Long Portion		1.9
	Short Portion		0.2
	Range D Section		Small
P-9A432	1st I.F. Transformer	T6	
	Primary Winding		4.4
	Coupling Winding		0.3
	Secondary Winding		
	Tap to Condenser Side		3.0
	Tap to Switch Side		1.3
P-9A433	2nd I.F. Transformer	T7	
	Primary Winding		4.4
	Coupling Winding		0.3
	Secondary Winding		
	Tap to Condenser Side		3.0
	Tap to Switch Side		1.3
P-9A434	3rd I.F. Transformer	T8	
	Primary Winding (Yellow to Blue)		9.7
	Signal Diode Secondary		12.4
	A.V.C. Secondary (Brown to Green)		7.0
P-9A431	Oscillator Coils	T9	
	Range B Grid Coil		
	Red-White tap to White		3.0
	Red-White tap to Black-Yellow		0.8
	Range C Grid Coil		
	Green-White tap to Green		1.7
	Green-White tap to Black-Yellow		0.5
	Range D Grid Coil		
	Black-White tap to Black		Small
	Black-White tap to Black-Yellow		Small
	Oscillator Range D Plate Coil		0.2
P-9A437	"E" Range Oscillator Coils	T10	
	Range E Grid Coil		Small
	Range E Plate Coil		.4
	Range E Series Grid Coil		Small
P-53X88	Filament Transformer (115 Volts 60 Cycles)	T11	
	Primary Winding		4.4
	Filament Transformer Secondaries, below		
	Red to Red		Small
	Black to Black		Small
	Yellow to Yellow		Small
	Green to Green		Small
	Black to White		22.8
	Red-White to Red		32.9

MODEL CG Series
Schematic, Trimmers

WELLS-GARDNER & CO.

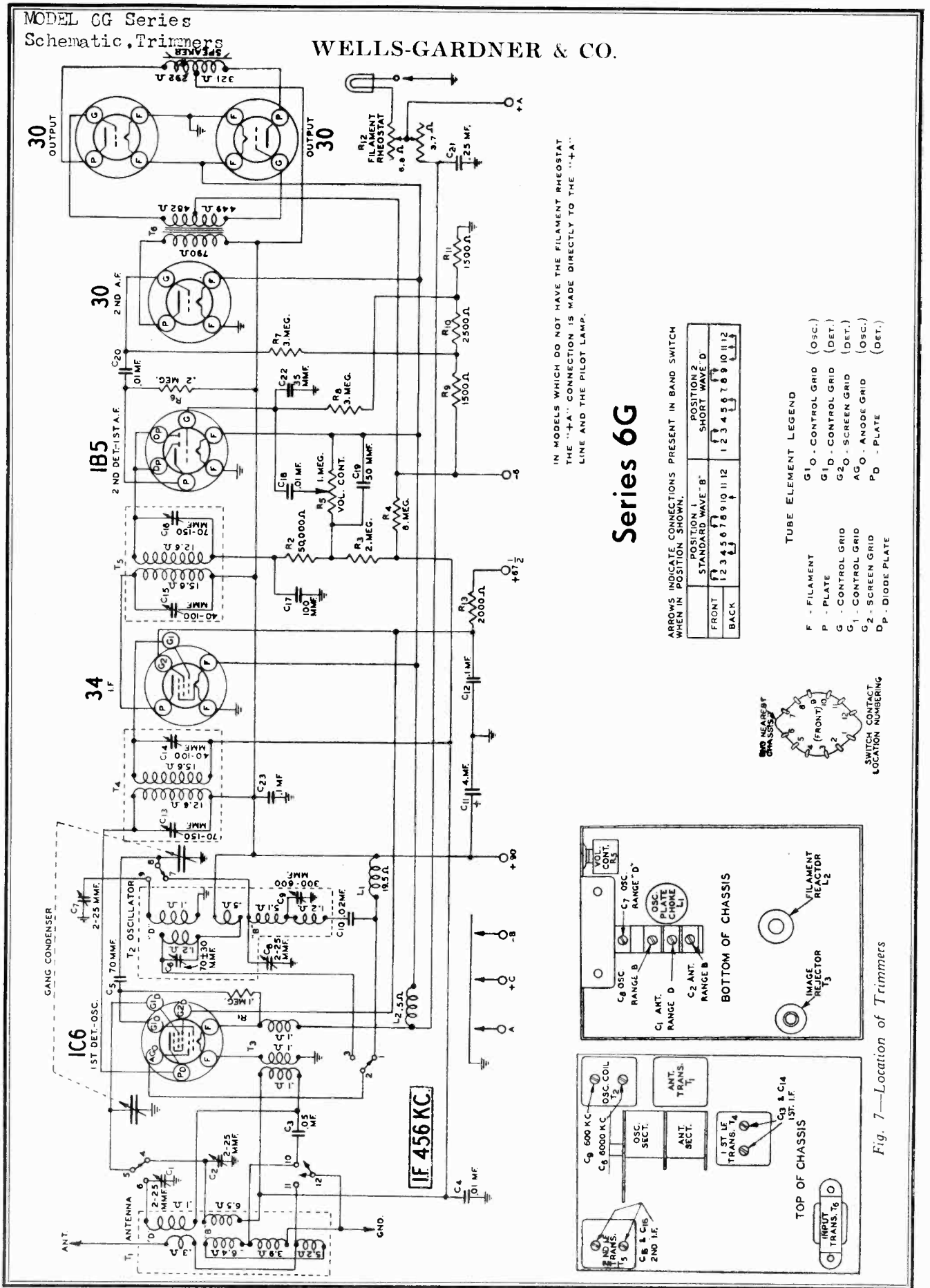


Fig. 7—Location of Trimmers

WELLS-GARDNER & CO., INC.

MODEL 6G Series
Voltage, Alignment
Socket, Coil Data
Parts List

Standard and Short Wave Battery Radio July 1936

Series 6G

6 Tube - 2 Band

Tubes

The tubes used in this receiver are of the 2 volt series. All of them are of the filament or directly heated types. All of them have a 2 volt filament and should not be connected to a power supply not intended for this type of tube. **Maximum filament voltage range is 1.8 to 2.0 volts. Operation of the tubes at under or over this value will be injurious to the tubes and may affect operation of the receiver.**

VOLTAGES AT SOCKETS
Volume Control at Maximum Antenna Shorted to Ground
Band Switch in Standard Wave Position

Type of Tube	Function	Across Filament	Plate to Ground	Screen to Ground	Grid to Ground
1C6	1st Det.-Osc.	2.0	90 90(1)	60	6(2)
34	I.F.	2.0	90	60	6(2)
1B5	2nd Det.-1st A.F.	2.0	30(3)		1.5(4)
30	2nd A.F.	2.0	90		4.0(5)
30	Power	2.0	90		6

(1) Anode Grid to ground.
(2) As read at "C" Battery.
(3) As read with 500,000 ohm meter.
(4) As read from negative end of R11 to ground.
(5) As read from negative end of R10 to ground.

Alignment Procedure

Correct alignment is extremely important in connection with all wave receivers. The receivers are all properly aligned at the factory with precision instruments and re-alignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment.

A signal generator that will provide an accurately calibrated signal at 456, 1730, 1500, 600, 16,000, 15,000 and 6000 KC and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator through a .1 mf. condenser to the grid of the 1st detector.

Connect the ground lead of the radio to the ground post of the signal generator.

Turn the band switch to the Range B position (standard wave band).

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the AVC.

Then adjust the four I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 7.

Range B Alignment

After the procedure for the alignment of each range, as explained below, is completed, it is advisable to repeat the procedure as a final check.

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Keep the band switch in the standard wave position.

Connect the antenna lead of the radio through a 200 mmf. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent AVC action.

Adjust the oscillator Range B trimmer (C8) until maximum output is obtained. The location of this trimmer is shown in Fig. 7.

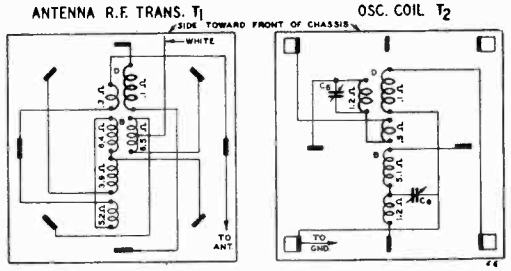


Fig. 8—R.F. and Oscillator Coil Base Terminal Arrangement and D.C. Resistance of Windings

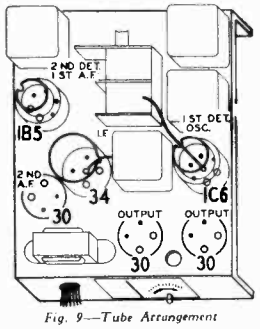


Fig. 9—Tube Arrangement

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Loosen the pointer screw and set the pointer at the 1500 KC mark on the standard wave band scale. Retighten the screw.

Adjust the antenna Range B trimmer (C2) to maximum.

Do not change the setting of the oscillator Range B trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 600 KC trimmer (C9) until the peak of greatest intensity is obtained. See Fig. 7 for location of this trimmer.

Range D Alignment

CAUTION—When aligning the short wave band be sure NOT to adjust at the image frequency. This can be checked as follows: Let us say the signal generator is set for 15,000 KC. The signal will then be heard at 15,000 on the dial of the radio. The image signal, which is much weaker, will be heard at 15,000 less 912 KC, or 14,088 KC. It may be necessary to increase the input signal to hear the image.

16,000 KC Adjustment

Set the signal generator for 16,000 KC.

Connect the antenna lead of the radio through a 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band switch to the Range D position (short wave band).

Adjust the oscillator Range D trimmer (C7) until maximum output is obtained. See Fig. 7 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the antenna Range D trimmer (C1) to maximum. When adjusting this trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Do not change the setting of the oscillator Range D trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC (C6) trimmer until the peak of greatest intensity is obtained. See Fig. 7 for location of this trimmer.

Replacement Parts

NOTICE—There is a large letter on the chassis which identifies the set as to major part changes. When ordering parts, please be sure to mention the series number and this large letter.

Part No.		Description	List Price
ELECTROLYTIC			
P-45X212	C11	4.0 mf. 100 Dry	.65
MOLDED			
P-47X62	C5	70 mmf.	.10
P-47X57	C17	100 mmf.	.10
P-47X56	C19	50 mmf.	.10
P-47X53	C22	35 mmf.	.10
TRIMMER			
P-17A52	C1	2-25 mmf. Range "D" Antenna Trimmer	.45
	C2	2-25 mmf. Range "B" Antenna Trimmer	
	C7	2-25 mmf. Range "D" Oscillator Trimmer	
	C8	2-25 mmf. Range "B" Oscillator Trimmer	
P-17A35	C6	40-100 mmf. 6000 KC Trimmer	.45
	C9	300-600 mmf. 600 KC Trimmer	
P-17A51	C13	70-150 mmf. 1st I. F. Trimmer	.35
	C14	40-100 mmf.	
P-17A51	C15	70-150 mmf. 2nd I. F. Trimmer	.35
	C16	40-100 mmf.	
MISCELLANEOUS			
P-14A54		2 Gang Condenser less Drive Drum and Dial Assembly	$2.50
P-A95104	R1	100,000 Ohm 0.2	$0.10
P-A95503	R2	50,000 Ohm 0.2	.10
P-A94205	R3	2.0 Megohm 0.2	.15
P-A94805	R4	8.0 Megohm 0.2	.15
P-A95204	R6	200,000 Ohm 0.2	.10
P-A95306	R7	3.0 Megohm 0.2	.10
P-A95305	R8	3.0 Megohm 0.2	.10
P-A94152	R9	1,500 Ohm 0.2	.15
P-A94252	R10	2,500 Ohm 0.2	.15
P-A94152	R11	1,500 Ohm 0.2	.15
P-A95202	R13	2,000 Ohm 0.2	.10
P-46X80	C3	.05 mf. 180	$0.15
P-46X188	C4	.01 mf. 180	.15
P-46X187	C10	.02 mf. 180	.15
P-46X98	C12	.1 mf. 180	.20
P-46X124	C18	.01 mf. 180	.15
P-46X124	C20	.01 mf. 180	.15
P-46X197	C21	.25 mf. 180	.25
P-46X98	C23	.1 mf. 180	.20
P-5A32		Drive Bracket Assembly, less Drive Drum and Pointer Shaft	$0.30
P-24X225		Drive Drum and Pointer Shaft (Mounted on Tuning Condenser Shaft)	.45
		20" Black Tuning Drive Cord doz.	.45
P-28X27		Tuning Drive Cord Tension Spring	.10
		8" On-Off Indicator Drive Cord doz.	.20
P-29X20		Brass Collar with Set Screw for Securing above Cord to Shaft	.10
P-28X44		On-Off Indicator Cord Tension Spring	.10
P-36X218	R5	1.0 Megohm Volume Control and On-Off Switch	1.05
*P-43X55	R12	3.7 Ohm / 6.8 Ohm Filament Rheostat	.50
P-3A44	30	Tube Socket	$0.10
P-3A45	34	Tube Socket	.10
P-3A230	1B5	Tube Socket	.10
P-3A203	1C6	Tube Socket	.10
SPEAKERS			
P-12A217		6" Magnetic Speaker	4.35
P-12A218		8" Magnetic Speaker	4.90
P-13X212		Speaker Cable and Socket Assembly	.40
KNOBS			
Specify Name and Model of Receiver		Volume Control Knob / Tuning Control Knob / Band Switch Knob	.15 / .15 / .15
GENERAL			
P-8X23		Rubber Chassis Mounting Cushions	.10
P-32X49		Tube Shield—Large	.20
P-32X32		Tube Shield—Small	.15
P-32X18		Tube Shield Base—Large	.10
P-32X30		Tube Shield Base—Small	.10
P-2X38		Felt Washers (Used behind Knobs) ea.	.10
P-17X16		Glass Dial Crystal	.20
P-28X67		Crystal Retaining Ring	.10
P-2A55		1 Section, 2 Position, Band Change Switch	.75
P-4A49		Single Lug Terminal Strip (Mounting Hole Used)	.10
P-30X14		Grid Clip only	.10
P-13X214		Antenna and Ground Lead Assembly	.30
P-13X266		A, B and C Battery Cable	1.05
P-9A640	T1	Antenna Trans. and Can Assembly	$2.05
P-9A641	T2	Oscillator Coil and Can Assembly	2.45
P-9A548	T3	Image Rejector	.35
P-9A642	T4	1st I. F. Trans. and Can Assembly	1.40
P-9A643	T5	2nd I. F. Trans. and Can Assembly	1.40
P-50X33	T6	Input Transformer	1.30
P-9A547	L1	Oscillator Plate Choke	.35
P-9A612	L2	Filament Choke Coil	.20
P-15A75		Dial Bracket Assembly, Less Pilot Lamp, Pilot Light Socket and Spring Clip, Pointer, and On-Off Indicator Assembly	$1.45
P-15X48		Pointer	.10
P-25A77		On-Off Indicator Disc Assembly	.15
P-7A40		Pilot Lamp	.10
P-7A8		Pilot Light Socket and Spring Clip	.10
P-25A94		Pilot Light Spring Contact Assembly (on drive shaft)	.20

*Used only on models with filament rheostat.

MODEL 6K Series
Schematic, Socket
Coil Data

WELLS-GARDNER & CO.

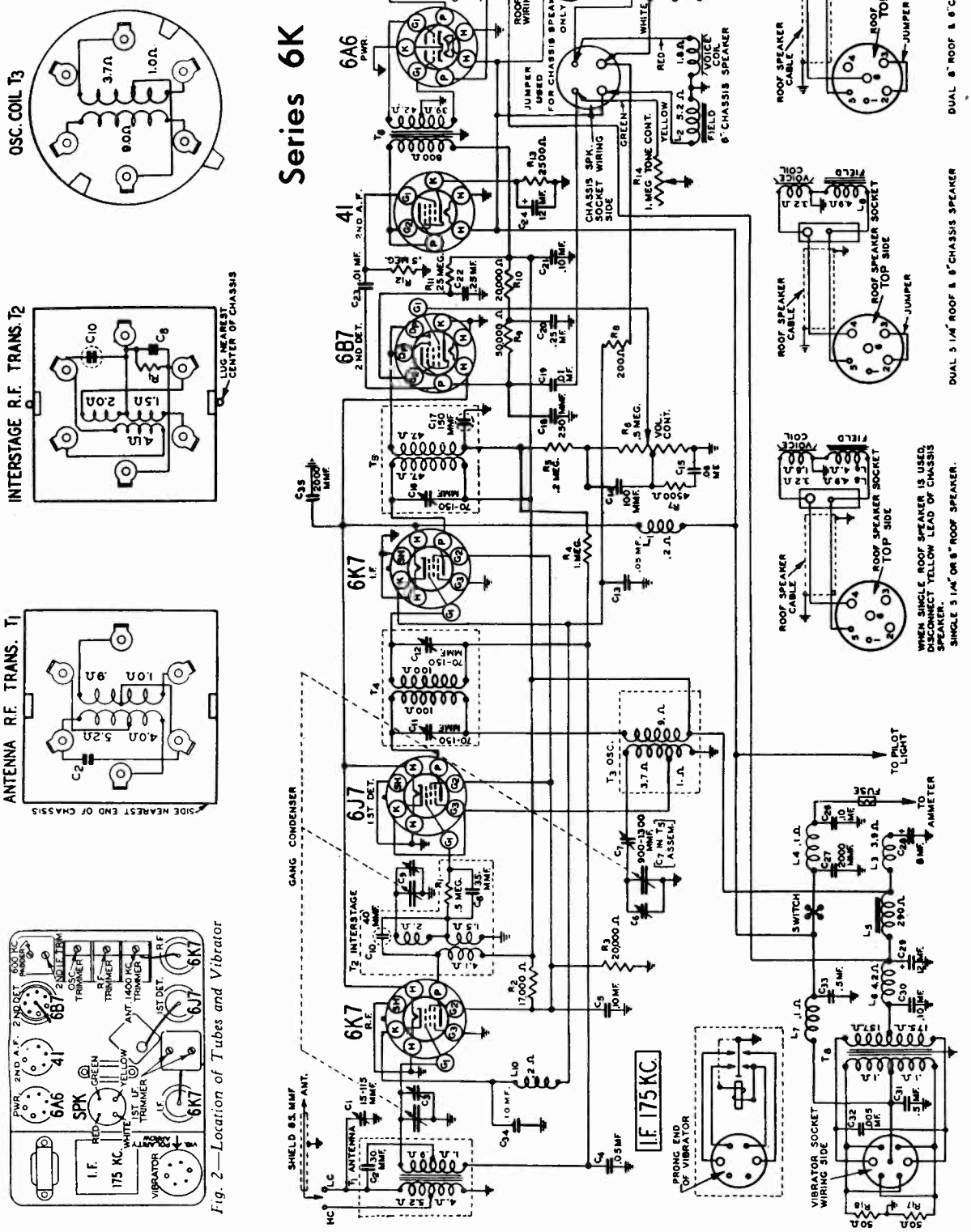


Fig. 2—Location of Tubes and Vibrator

Series 6K

June 1936

6 Tube Synchronous Vibrator Automobile Radio

VOLTAGES AT SOCKETS

Antenna Plug Withdrawn — L-D Switch in Distant Position — Battery 6.2 Volts under Load

Type of Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground
6K7	R.F.	5.6	260	110	3
6J7	1st Det.	5.6	260	110	
6K7	I.F.	5.6	260	110	3
6B7	2nd Det.	5.6	55	50	
41	2nd A.F.	5.7	255	55	30
6A6	Pwr.	5.7	275		

I. F. Adjustment

Set the signal generator for a signal of 175 KC.

Connect the output of the signal generator through a .05 mf. condenser to the stator of the R.F. interstage section of the tuning condenser. (See Fig. 2 for location of this section.)

Connect the ground lead of the signal generator to the chassis ground.

Turn the Local-Distance switch to the Distance position and keep it in this position for all adjustments.

Set the volume control at the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the AVC.

Then adjust the three I.F. trimmers until maximum output is obtained. The location of these trimmers is shown in Fig. 2.

1575 KC Adjustment

Set the signal generator for 1575 KC.

Turn the rotor of the tuning condenser to the full open position.

If a low capacity antenna is used, connect the shielded antenna lead from the chassis through a 150 mmf. condenser to the antenna post of the signal generator. (If high capacity, use 1500 mmf.) The antenna plug must be correctly inserted, dependent on the capacity of the antenna used.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent AVC action.

Adjust the trimmer of the oscillator section of the three gang condenser until maximum output is obtained—see Fig. 2 for location of this trimmer.

1400 KC Adjustment

Set the signal generator for 1400 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the R.F. interstage and antenna 1400 KC trimmers for maximum output.

Do not change the setting of the oscillator trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Connect the output of the signal generator through a .05 mf. condenser to the control grid of the 6K7 R.F. tube.

Turn the tuning condenser rotor until maximum output is obtained. Then turn the tuning condenser rotor back and forth, at the same time adjusting the 600 KC padder (see Fig. 2) until the peak of greatest intensity is obtained.

Re-connect the output of the signal generator to the shielded antenna lead through a 150 mmf. condenser (1500 mmf. if antenna is high capacity).

Adjust the 600 KC antenna trimmer to **maximum**. This trimmer is reached from the outside of the case

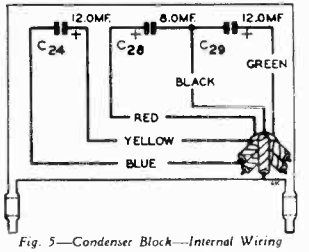


Fig. 5—Condenser Block—Internal Wiring

Adjusting Antenna 600 KC Trimmer

After the receiver is installed and the car antenna is connected, it will be necessary to adjust the antenna trimmer. Tune in a weak signal at approximately 600 KC with the volume control about three-fourths on. Turn the adjusting screw of the antenna 600 KC trimmer up or down until maximum output is obtained. See Fig. 3 for location of this trimmer.

As shown in this illustration, the antenna plug is inserted in one of two ways, depending on whether the car has a high or low capacity antenna. Full instructions are in the installation manual packed with each radio.

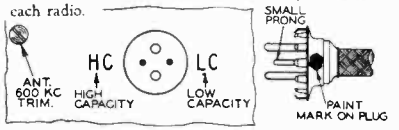


Fig. 3—Antenna Plug Insertion

Calibrating the Radio

To calibrate the radio, tune in a station of known frequency. At the back of the control head is the calibration screw. Remove the pilot lamp assembly. Insert a fine blade screwdriver and turn this screw until the pointer on the dial scale is at the frequency of the station being received. The knob must be held during this adjustment.

If the control head is inaccessible it may be calibrated by setting the pointer from the front. Remove the crystal by inserting a knife blade under the lower edge. Loosen the pointer screw, set the pointer and retighten.

Replacement Parts

There is a large letter on the chassis which identifies the set as to major part changes. When ordering parts please be sure to mention the series number and this large letter

Part No.		Description	List Price
P-3A223	6J7	Tube Socket	$0.15
P-3A211	6K7	Tube Socket	.15
P-3A205	6A6	Tube Socket	.15
P-3A116	41	Tube Socket	.10
P-3A120	6B7	Tube Socket	.15
P-3A229		6 Prong Socket (External Speaker)	.15
P-3A226		Antenna Socket	.10
P-3A228		Vibrator Socket	.15
P-3A231		4 Prong Socket (Internal Speaker)	.10

SPEAKER

P-12A242		6" Dynamic Speaker	$4.35

Part No.	Code	Description	List Price
P-9A588	L4	"A" Line Reactor	.20
P-52X45	L5	"B" Reactor	.80
P-9A585	L6	"B" Reactor	.30
P-9A587	L7	Vibrator Reactor	.50
P-9A614	L10	Filament Choke	.20

RESISTORS

CARBON

Part No.	Code	Resistance	Wattage		List Price
P-A94504	R1	500,000 Ohms	0.2		$0.15
P-C94173	R2	17,000 Ohms	1.0		.15
P-B94203	R3	20,000 Ohms	0.5		.15
P-A95105	R4	1 Megohm	0.2		.10
P-A95204	R5	200,000 Ohms	0.2		.15
P-A94452	R7	4,500 Ohms	0.2		.15
P-A94201	R8	200 Ohms	0.2		.10
P-B95503	R9	50,000 Ohms	0.5		.10
P-A95203	R10	20,000 Ohms	0.2		.10
P-A95254	R11	250,000 Ohms	0.2		.10
P-A95204	R12	500,000 Ohms	0.2		.10
P-B94252	R13	2,500 Ohms	0.5		.15
P-B95101	R15	500 Ohms	0.5		.10
P-C95303	R16	30,000 Ohms	1.0		.10
P-B94500	R17	50 Ohms	0.5		.15
P-B94500	R18	50 Ohms	0.5		.15

VARIABLE

P-36X217	R6	500,000 Ohms	Volume Control & Switch	1.00
P-40X212	R14	1 Megohm	Tone Control	.70

CONDENSERS

TUBULAR

Part No.	Code	Capacitance		Voltage	List Price
P-46X80	C4	.05	mf.	180	$0.15
P-46X181	C5	.10	mf.	240	.15
P-46X88	C13	.05	mf.	180	.15
P-46X185	C15	.06	mf.	180	.15
P-46X161	C19	.01	mf.	400	.15
P-46X189	C20	.25	mf.	360	.30
P-46X105	C21	.10	mf.	360	.20
P-46X143	C22	.25	mf.	360	.30
P-46X120	C23	.01	mf.	360	.15
P-46X101	C25	.004	mf.	600	.15
P-46X98	C26	.10	mf.	180	.20
P-46X105	C27	.10	mf.	360	.20
P-46X135	C31	.5	mf.	180	.40
P-46X183	C32	.0055	mf.	1,600	.20
P-46X135	C33	.5	mf.	180	.40
P-46X98	C34	.10	mf.	180	.20

ELECTROLYTIC

P-45X211	C24	12 mf.	25	Electrolytic Block	2.70
	C28	8 mf.	450		
	C29	12 mf.	450		

MOLDED

P-47X44	C2	30 mmf.		.15
P-47X53	C8	35 mmf.		.10
P-47X57	C14	100 mmf.		.10
P-47X45	C18	250 mmf.		.15
P-47X41	C27	2,000 mmf.		.20
P-47X41	C35	2,000 mmf.		.20

TRIMMER

P-17A48	C1	25-115 mmf.	Antenna Trimmer	.20
	C3		Antenna Trimmer—Part of Gang Condenser	
	C6		Oscillator Trimmer—Part of Gang Condenser	
P-17A44	C7	900-1,300 mmf.	600 KC Oscillator Padding Cond.	.55
	C16	70-150 mmf.	2nd I. F. Primary Trimmer	
	C9		Interstage Trimmer Part of Gang Condenser	
P-17A33	C11	70-150 mmf.	1st I. F. Trimmer	.40
	C12	70-150 mmf.		

MISCELLANEOUS

	C10	40 mmf.	Integral Part of Interstage Transformer Assembly
	C17	150 mmf.	Integral Part of 2nd I. F. Transformer Assembly
P-14A51		Three Section Gang Condenser Assembly complete with Drive Gears	$4.50

Part No.		Description	List Price
P-19A26		Vibrator Unit	$4.10
Specify Name and Model of Receiver		Chassis Case Only	3.80
		Chassis Case Cover Only	3.05
		Spring Clamp Button	.10
		Tone Control Knob	.10
		Local-Distance Switch Knob	.10
P-30X14		8-32 x 3/16" Headless Cup Point Set Screw	Doz. .15
P-30X44		Grid Clip only—Glass Tube	.10
P-32X30		Grid Clip only—Metal Tube	.10
P-32X58		Tube Shield Base	.10
P-2A54		Tube Shield	.15
		Local-Distance Switch	.40

TRANSFORMERS AND COILS

Part No.	Code	Description	List Price
P-9A580	T1	Antenna Transformer & Can Assembly	$1.60
P-9A581	T2	Interstage Transformer & Can Assembly	1.55
P-9A582	T3	Oscillator Coil & Can Assembly	.85
P-9A583	T4	1st I. F. Coil & Can Assembly	1.45
P-9A584	T5	2nd I. F. Coil & Can Assembly	1.80
P-50X32	T6	Input Transformer	1.30
P-51X43	T7	Output Transformer	1.60
P-53X124	T8	Power Transformer	3.10
P-9A586	L1	Filament Reactor } One Assembly	.55
	L3	R.F. "B" Reactor }	

CABLE AND FLEXIBLE SHAFT ASSEMBLIES

Part No.	Quan. Used	Description	List Price
P-18A40	2	20" Volume Control or Tuning Control Flexible Drive Shaft	ea. $1.10
P-18A42	2	25" Volume Control or Tuning Control Flexible Drive Shaft	ea. 1.30
P-18A44	2	34" Volume Control or Tuning Control Flexible Drive Shaft	ea. 1.65
P-13X252	1	Pilot Light Cable less Lamp	.65
P-13X253	1	48" Antenna Cable & Plug	.95
P-13X227	1	Battery Cable (long section with fuse receptacle)	.35
P-13X234	1	"A" Cable—Short Section Connected to Chassis (Part of Chassis Assembly)	.35

MOUNTING BOLT ASSEMBLY

Part No.	Quan. Used	Description	List Price
P-20X59	3	Double End Hex Bolts for Mounting Chassis to Dash	ea. .10
	3	5/16"—18 Spring Locknut for above Mounting Assembly	doz. .10
P-19X18	6	Flat Washers for above Mounting Assembly	doz. .15
	6	5/16"—18 Hex Nuts for above Mounting Assembly	doz. .15
	1	5/16" Shakeproof Lockwasher to Ground Chassis Case to Metal Dash Surface on Engine Side	doz. .10

MISCELLANEOUS MOUNTING ITEMS

Part No.	Quan. Used	Description	List Price
P-7A32	1	Pilot Light Bulb	.20
P-16X14	1	20 Ampere Fuse	.10
P-16X3	1	Fuse Shield	.10
P-21A4	1	Distributor Suppressor	.35
P-48X227	1	Generator Condenser	.65
P-21A5	1	Choke Condensor Unit (Not Shipped with Set)	1.50
P-21A7		Spark Plug Suppressors (Not Shipped with Set)	ea. .35

CONTROL HEAD AND PLATE ASSEMBLY

Part No.	Quan. Used	Description	List Price
*P-20A27	1	No. 4 Control Head only with ¾" Hex Nut	3.00
*†P-20A28	1	Volume Control Fitting complete with Retaining Spring, ¾" Hex Nut and Lock Washer	.25
*	1	Dial Scale (Specify Name and Model of Radio)	.10
*P-15X45	1	Pointer	.10
*		Pointer Screw 3-48 x 5/16"	doz. .10
†P-17X13	1	Dial Crystal	.25
†		Control Knobs—Specify Car, Year and Model	ea. .25

NOTE: Prices of Instrument Panel Plate Kits are shown in Chart on Page 5.

* Shipped with each Set
†Shipped with Panel Kit

ROOF MOUNTING SPEAKER KITS

1936 BUICK, CHEVROLET, PONTIAC, OLDSMOBILE

Part No.	Description	List Price
P-21A27	SPEAKER KIT ASSEMBLY COMPLETE Includes	$5.35
P-12A234	5¼" Dynamic Speaker	3.05
P-23A56	Mounting Kit—Includes Trim Ring, Speaker Housing, Self Tapping Screws & Clamp Springs	2.00
P-13X248	Speaker Cable Assembly Complete	1.05
P-21A28	SPEAKER KIT ASSEMBLY COMPLETE Includes	9.65
P-12A233	8" Dynamic Speaker	6.65
P-23A57	Mounting Kit—Includes Trim Ring and Self Tapping Screws	3.00
P-13X248	Speaker Cable Assembly Complete	1.05

1936 FORD—STANDARD AND DELUXE

Part No.	Description	List Price
P-21A29	SPEAKER KIT ASSEMBLY COMPLETE Includes	4.15
P-12A234	5¼" Dynamic Speaker	3.05
P-23A58	Mounting Kit—Includes Hex Nuts, Lockwashers and Bolts	.40
P-13X248	Speaker Cable Assembly Complete	1.05

MODEL 6L Series
Schematic, Socket
Coil Data

WELLS-GARDNER & CO.

Series 6L

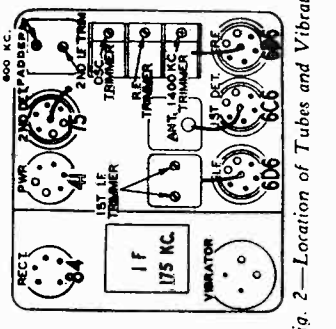
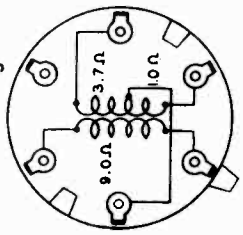
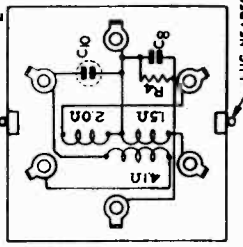
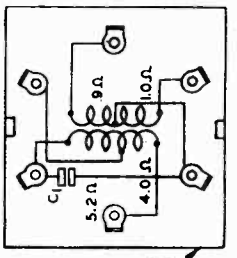


Fig. 2—Location of Tubes and Vibrator







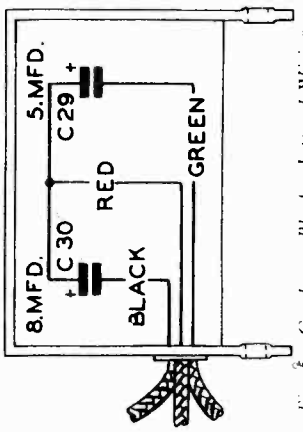
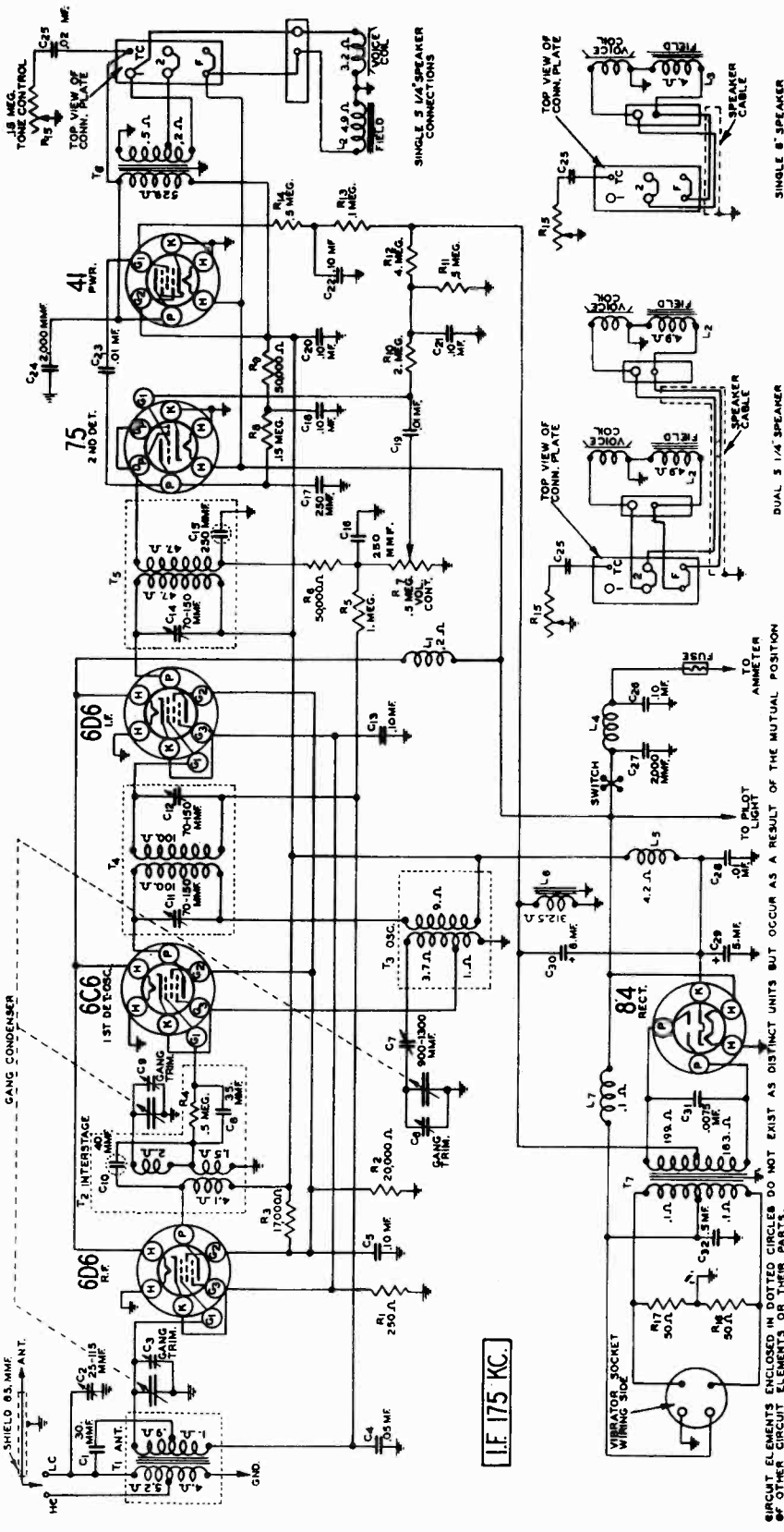


Fig. 3—Condenser Block—Internal Wiring



WELLS-GARDNER & CO., INC.

MODEL 6L Series
Alignment, Voltage
Parts List

Series 6L

6 Tube

Automobile Radio

June 1936

I. F. Adjustment

Set the signal generator for a signal of 175 KC.

Connect the output of the signal generator through a .05 mf. condenser to the stator of the R. F. interstage section of the tuning condenser. (See Fig. 2 for location of this section.)

Connect the ground lead of the signal generator to the chassis ground.

Set the volume control at the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the AVC.

Then adjust the three I.F. trimmers until maximum output is obtained. The location of these trimmers is shown in Fig. 2.

1575 KC Adjustment

Set the signal generator for 1575 KC.

Turn the rotor of the tuning condenser to the full open position.

If a low capacity antenna is used, connect the shielded antenna lead from the chassis through a 150 mmf. condenser to the antenna post of the signal generator. (If high capacity, use 1500 mmf.)

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent AVC action.

Adjust the trimmer of the oscillator section of the three gang condenser until maximum output is obtained—see Fig. 2 for location of this trimmer.

1400 KC Adjustment

Set the signal generator for 1400 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the R.F. interstage and antenna 1400 KC trimmers for maximum output.

Do not change the setting of the oscillator trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Connect the output of the signal generator through a .05 mf. condenser to the control grid of the 6D6 R.F. tube.

Turn the tuning condenser rotor until maximum output is obtained. Then turn the tuning condenser rotor back and forth, at the same time adjusting the 600 KC padder (see Fig. 2) until the peak of greatest intensity is obtained.

Re-connect the output of the signal generator to the shielded antenna lead.

Adjust the 600 KC antenna trimmer to maximum. This trimmer is reached from the outside of the case —see Fig. 3.

Adjusting Antenna 600 KC Trimmer

After the receiver is installed and the car antenna is connected, it will be necessary to adjust the antenna trimmer. Tune in a weak signal at approximately 600 KC with the volume control about three-fourths on. Turn the adjusting screw of the antenna 600 KC trimmer up or down until maximum output is obtained. See Fig. 3 for location of this trimmer.

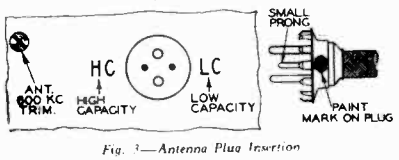


Fig. 3—Antenna Plug Insertion

Antenna Disconnected		Battery 6 Volts Under Load			
Type of Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground
6D6	R.F.	6	233	103	4.0
6C6	1st Det. & Osc.	6	233	103	
6D6	I.F.	6	233	103	4.0
75	2nd Det.	6	130		
41	Power	6	215	233	16.0(1)
84	Rectifier	6	560(2)		

(1) Grid bias read across filter choke L6
(2) Plate to Plate A.C. voltage

Calibrating the Receiver

To calibrate the receiver, tune in a station of known frequency. At the back of the control head is the calibration screw. Remove the pilot lamp assembly. Insert a fine blade screwdriver and turn this screw until the pointer on the dial scale is at the frequency of the station being received. The knob must be held during this adjustment.

If the control head is inaccessible it may be calibrated by setting the pointer from the front. Remove the crystal by inserting a knife blade under the lower edge. Loosen the pointer screw, set the pointer and retighten.

Replacement Parts

MISCELLANEOUS

SOCKETS

Part No.	Description	List Price
P-3A113	Type 6D6 Tube Socket	$0.10
P-3A114	Type 6C6 Tube Socket	.10
P-3A99	Type 75 Tube Socket	.10
P-3A116	Type 41 Tube Socket	.10
P-3A128	Type 84 Tube Socket	.10
P-3A125	Vibrator Socket	.10
P-3A227	Speaker Socket (in chassis)	.20
P-3A226	Antenna Cable Socket	.10

SPEAKER

P-12A234	5½" Dynamic Speaker	$3.05
P-13X261	Red Chassis Speaker Lead	.10
P-13X262	Green Chassis Speaker Lead	.10
P-13X263	White Tone Control Lead	.10

GENERAL

P-19A25	Vibrator Unit	$3.90
P-34X214	Chassis Case Only	3.05
P-28X47	Spring Clamp Buttons	.10
P-34X215	Chassis Case Cover Only	1.30
	8-32 x 3/16" Set Screws to Secure Flexible Shafts in Chassis Anchor Bushings—Doz.	.15
P-10A58	Tone Control Knob	.10
P-30X14	Grid Clip Only	.10
P-32X30	Tube Shield Base	.10
P-32X58	Tube Shield	.15
P-4A50	Two Lug Terminal Strip (Both lugs insulated—Center mounting hole not used)	.10
P-4A61	Single Lug Terminal Strip (Mounting foot to Right of Lug)	.10
P-4A38	Single Lug Terminal Strip (Mounting foot to Left of Lug)	.10

TRANSFORMERS AND COILS

Part No.	Code	Description	List Price
P-9A561	T1	Antenna Transformer and Can Assembly	$1.45
P-9A562	T2	Interstage Transformer and Can Assembly	1.55
P-9A561	T3	Oscillator Coil and Can Assembly	.80
P-9A564	T4	1st I.F. Transformer and Can Assembly	1.45
P-9A565	T5	2nd I.F. Transformer and Can Assembly	1.80
P-51X42	T6	Output Transformer	1.10
P-53X121	T7	Power Transformer	2.95
P-9A568	L1	Filament Reactor } One Assembly	.55
	L3	R.F. "B" Plate Reactor }	
P-9A566	L4	Motor Noise Reactor	.25
P-52X42	L6	Filter Choke	.90
P-9A567	L7	Vibrator Reactor	.50

TRIMMER

Part No.		Description	List Price
P-17A48	C2	25-115 mmf. Antenna 600 KC Trimmer	$0.20
	C3	Antenna Trimmer—Part of Gang Condenser	
	C6	Oscillator Trimmer—Part of Gang Condenser	
	C9	Interstage Trimmer—Part of Gang Condenser	
P-17A33	C11	70-150 mmf. } 1st I.F. Trimmers	.40
	C12	70-150 mmf. }	
P-17A46	C14	70-150 mmf. 2nd I.F. Primary Trimmer	.55
	C7	900-1700 mmf. 600 KC Oscil. Pad. Cond.	

MISCELLANEOUS

C10	40 mmf. Integral Part of Interstage Transformer Assembly	
C15	250 mmf. Integral Part of 2nd I.F. Transformer	
P-14A51	Three Section Gang Condenser Assembly Complete with Drive Gears	4.50

INSTALLATION ITEMS

CABLE AND FLEXIBLE SHAFT ASSEMBLIES

Part No.	Quan. Used	Description	List Price
P-18A40	1	20" Volume Control Flexible Drive Shaft	$1.10
P-18A40	1	20" Tuning Control Flexible Drive Shaft	1.10
P-18A42	1	25" Volume Control Flexible Drive Shaft	1.30
P-18A42	1	25" Tuning Control Flexible Drive Shaft	1.30
P-18A44	1	36" Volume Control Flexible Drive Shaft	1.65
P-18A44	1	36" Tuning Control Flexible Drive Shaft	1.65
P-13X252	1	Pilot Light Cable Assembly less Lamp	.65
P-13X253	1	48" Antenna Cable and Plug	.95
P-13X227	1	Battery Cable (Long Section with Fuse Re-ceptacle)	.35
P-13X234	1	"A" Cable—Short Section Connected to Chassis (Part of Chassis Assembly)	.55

MOUNTING BOLT ASSEMBLY

Part No.	Quan. Used	Description	List Price
P-20X50	3	Double End Hexagon Bolts for Mounting Chassis to Dash	$0.10
	3	5/16"-18 Spring Locknut for above Mounting Assembly	.10
P-19X18	6	Flat Washers for above Mounting Assembly—Doz.	.15
	6	5/16"-18 Hexagon Nuts for above Mounting Assembly—Doz.	.15
	1	5/16" Shakeproof Lockwasher for Ground Chassis Case to Metal Dash Surface on Engine Side—Doz.	.10

MISCELLANEOUS MOUNTING ITEMS

P-7A32	1	Pilot Light Bulb	$0.20
P-16X14	1	20 Ampere Fuse	.10
P-16X3	1	Fuse Shield	.10
P-21A6	1	Distributor Suppressor	.35
P-48X27	1	Generator Condenser	.45
P-21A5	1	Choke-Condenser Unit (Not Shipped With Set)	1.50
P-21A7	1	Spark Plug Suppressor (Not Shipped With Set)	.35

RESISTORS

CARBON

Part No.	Code	Resistance	Wattage	List Price
P-A94251	R1	250 Ohms	0.2	$0.15
P-B94203	R2	20,000 Ohms	0.5	.15
P-C94173	R3	17,000 Ohms	1.0	.35
P-A94504	R4	500,000 Ohms	0.2	.15
P-A95105	R5	1 Megohm	0.2	.10
P-A95503	R6	50,000 Ohms	0.2	.10
P-A95154	R8	150,000 Ohms	0.2	.10
P-A95503	R9	50,000 Ohms	0.2	.10
P-A95205	R10	2 Megohms	0.2	.10
P-A94504	R11	500,000 Ohms	0.2	.15
P-A94405	R12	4 Megohms	0.2	.15
P-A94104	R13	100,000 Ohms	0.2	.15
P-A95504	R14	500,000 Ohms	0.2	.10
P-B94500	R16	50 Ohms	0.5	.15
P-B94500	R17	50 Ohms	0.5	.15

VARIABLE

P-36X216	R7	.5 Megohm Vol. Control and Switch	$0.95
P-40X207	R15	.15 Megohm Tone Control	.70

CONDENSERS

TUBULAR

Part No.	Code	Capacitance	Voltage	List Price
P-46X80	C4	.05 mf.	180	$0.15
P-46X98	C5	.10 mf.	180	.20
P-46X98	C13	.10 mf.	180	.20
P-46X105	C18	.10 mf.	360	.20
P-46X120	C19	.02 mf.	360	.15
P-46X105	C20	.10 mf.	360	.20
P-49X4	C21	.10 mf.	180	.35
	C22	.10 mf.	180	.35
P-46X120	C23	.01 mf.	360	.15
P-46X100	C25	.02 mf.	600	.15
P-46X98	C26	.10 mf.	180	.20
P-46X130	C28	.01 mf.	360	.15
P-46X177	C31	.0075 mf.	1600	.20
P-46X135	C32	.50 mf.	180	.40

ELECTROLYTIC

P-45X210	C29	5.0 mf. }	Electrolytic Block	$1.70
	C30	8.0 mf. }		

MOULDED

P-47X66	C1	30 mmf.		$0.15
P-47X53	C8	35 mmf.		.10
P-47X52	C16	250 mmf.		.15
P-47X52	C17	250 mmf.		.15
P-47X41	C24	2000 mmf.		.20
P-47X41	C27	2000 mmf.		.20

CONTROL HEAD AND PLATE ASSEMBLY

Part No.	Description	List Price
*20A27	No. 4 Control Head Only with ¾" Hex. Nut	$3.00
*20A28	Volume Control Fitting complete with Retaining Spring, ¾" Hex. Nut and Lock Washer	.25
	Dial Scale (Specify Name and Model Number)	.10
*15X45	Pointer	.10
	Pointer Screw 3-48 x 5/16"—Doz.	.10
†17X13	Dial Crystal	.25
†	Control Knobs—Specify Car, Year and Model	.25

Note: Prices of Instrument Panel Plate Kits are shown in Chart on Page 5.

* Shipped with each set.
† Shipped with Panel Kit.

ROOF SPEAKER MOUNTING KITS

1936 BUICK, CHEVROLET, PONTIAC, OLDSMOBILE

Part No.	Description	List Price
P-21A27	Speaker Kit Assembly Complete Includes	$5.35
P-12A234	5½" Dynamic Speaker	3.05
P-23A56	Mounting Accessories—Includes Trim Ring, Speaker Housing, Self Tapping Screws and Clamp Springs	2.00
P-13X248	Speaker Cable Assembly Complete	1.05
P-21A42	Single Roof Speaker Kit less Speaker	2.30
P-9X19	Cardboard Disc—to replace Speaker removed from Chassis Cover	.10
	For Mounting Accessories and Roof Speaker See Kit No. 21A27 above.	
P-21A28	Speaker Kit Assembly Complete Includes	9.05
P-12A233	7" Dynamic Speaker	6.65
P-23A57	Mounting Accessories—Includes Trim Ring and Self Tapping Screws	2.15
P-13X348	Speaker Cable Assembly Complete	1.05

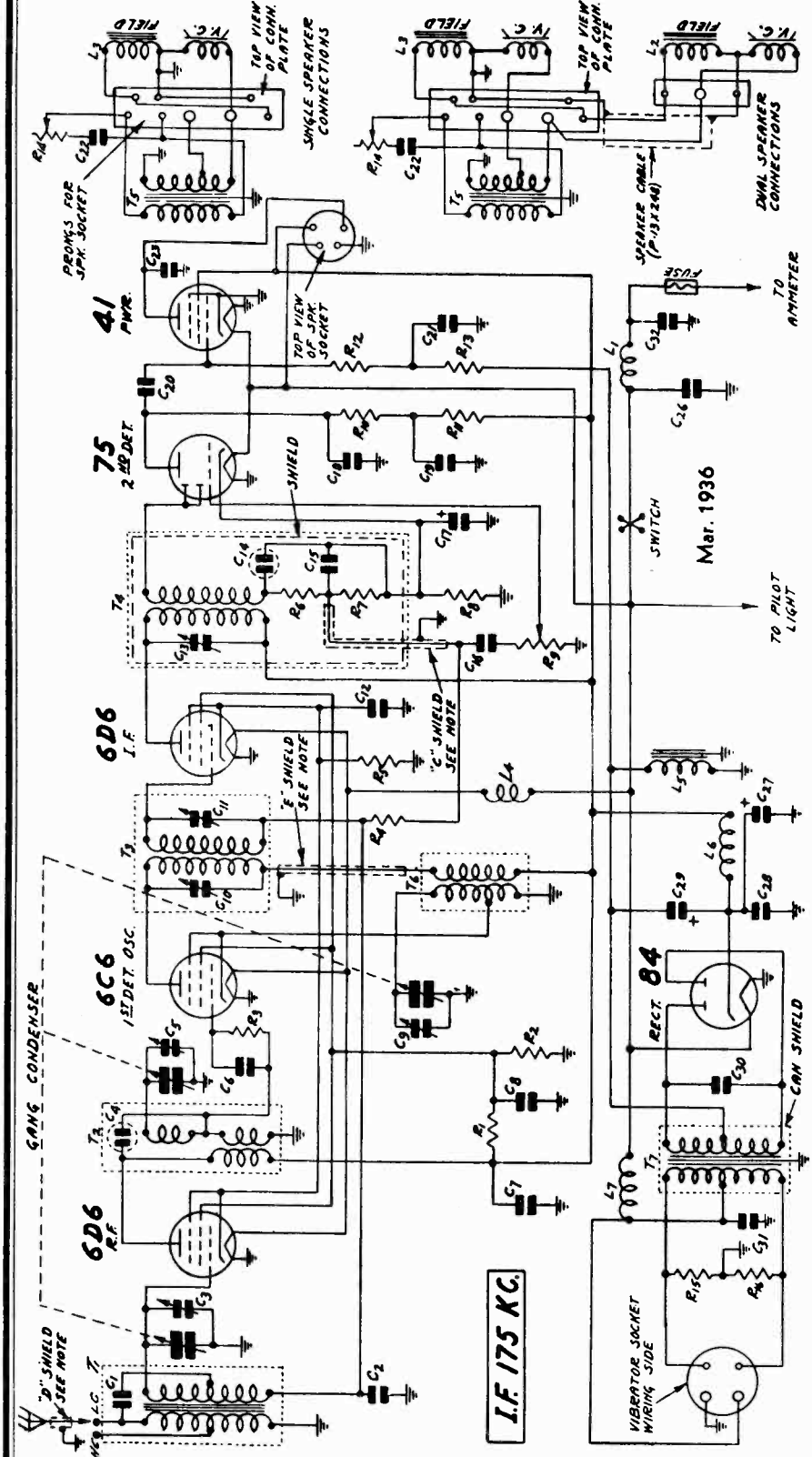
1936 FORD—STANDARD AND DE LUXE

Part No.	Description	List Price
P-21A29	Speaker Kit Assembly Complete Includes	$4.15
P-12A234	5½" Dynamic Speaker	3.05
P-23A58	Mounting Accessories — Includes Hex. Nuts, Lock Washers and Bolts	.40
P-13X248	Speaker Cable Assembly Complete	1.05
P-21A43	Single Roof Speaker Kit less Speaker	1.10
P-9X19	Cardboard Disc—to replace Speaker removed from Chassis Cover	.10
	For Mounting Accessories and Roof Speaker Cable See Kit No. 21A29 above.	

MODEL 6N Series
Schematic, Socket
Trimmers

WELLS-GARDNER & CO.

Power Consumption	7.0 Amperes at 6.0 Volts	Tuning Frequency Range	530 to 1650 KC
Power Output	3 Watts Undistorted	Intermediate Frequency	175 KC
Sensitivity	1.0 Microvolt Absolute	Speaker	6 inch Dynamic
Selectivity	45 KC Broad at 1000 Times Signal		



GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES. CIRCUIT ELEMENTS ENCLOSED IN DOTTED CIRCLES DO NOT EXIST AS DISTINCT UNITS BUT OCCUR AS A RESULT OF THE MUTUAL POSITION OF OTHER CIRCUIT ELEMENTS OR THEIR PARTS.

THE CAPACITY OF "C" SHIELD IS .37 MMF, THE CAPACITY OF "D" SHIELD IS 85 MMF AND THE CAPACITY OF "E" SHIELD IS 15 MMF.

C 1	10 mmf.	C22	.02 mf. 600 V.	R12	.50 Megohm .2 W.
C 2	.05 mf. 180 V.	C23	.002 mf. 600 V.	R13	100000 ohm .2 W.
C 3	Gang Trimmer	C25	2000 mmf.	R14	150000 ohm Tone Control
C 4	40 mmf.	C28	2000 mmf.	R15	50 ohm .5 W.
C 5	Gang Trimmer	C30	.0075 mf. 1600 V.	R16	50 ohm .5 W.
C 6	35 mmf.	C31	.50 mf. 180 V.	T 1	Antenna Trans.
C 7	.10 mf. 360 V.	C32	2000 mmf.	T 2	R.F. Inter. Trans.
C 8	.10 mf. 180 V.	C17	4.0 mf. 25 V. } Electrolytic	T 3	1st I.F. Trans.
C 9	Gang Trimmer	C27	5.0 mf. 350 V. } Block	T 4	2nd I.F. Trans.
C10	70-150 mmf. } Dual	C29	8.0 mf. 350 V. }	T 5	Output Trans.
C11	70-150 mmf. }	R 1	17000 ohm 1.0 W.	T 6	Osc. Inductor
C12	.10 mf. 180 V.	R 2	20000 ohm .5 W.	T 7	Power Trans.
C13	70-150 mmf.	R 3	.50 Megohm .2 W.	L 1	Motor Noise Reactor
C14	250 mmf.	R 4	1.0 Megohm .2 W.	L 2	Speaker Field 4.9 ohm
C15	250 mmf.	R 5	350 ohm .2 W.	L 3	Speaker Field 5.3 ohm
C16	.01 mf. 360 V.	R 6	50000 ohm .2 W.	L 4	Filament Reactor
C18	250 mmf.	R 7	500000 ohm .2 W.	L 5	Filter Reactor
C19	.10 mf. 360 V.	R 8	6000 ohm .2 W.	L 6	"B" Reactor
C20	.01 mf. 360 V.	R 9	2.0 Megohm Vol. Control	L 7	Vibrator Reactor
C21	.25 mf. 180 V.	R10	150000 ohm .2 W.		
		R11	50000 ohm .2 W.		

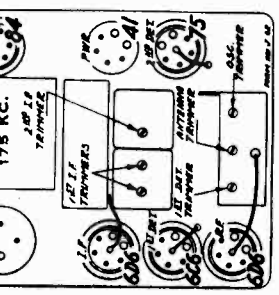


Fig. 2—Location of Tubes and Trimmers

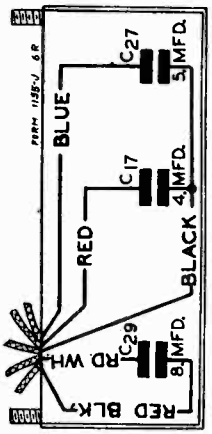


Fig. 4—Condenser Block—Internal Wiring

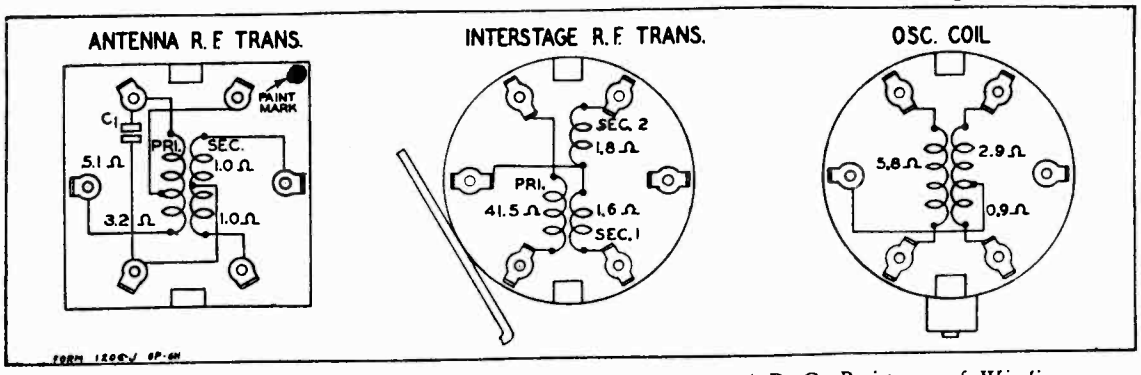


Fig. 3—R. F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

D. C. Resistance of Windings

Following are the D. C. resistances of the various windings in the chassis. The values given below will vary slightly in different sets.

Code	Winding	D. C. Resistance in Ohms
T1	Antenna Transformer	
	Primary Winding	
	Long Portion	5.1
	Short Portion	3.2
	Secondary Winding—Either Portion	1.0
T2	Interstage Transformer	
	Primary Winding	41.5
	Secondary Winding	
	No. 1	1.6
	No. 2	1.8
T3	1st I. F. Transformer	
	Primary Winding	88.0
	Secondary Winding	87.0
T4	2nd I. F. Transformer	
	Primary Winding	43.0
	Secondary Winding	48.2
T5	Dynamic Speaker Output Transformer	
	Primary	416.6
	Secondary	Small
L3	Speaker Field	5.3
	Speaker Voice Coil	Small
T6	Oscillator Coils	
	Grid Coil	
	Long Portion	2.9
	Short Portion	0.9
	Plate Coil	5.8
T7	Power Transformer	
	Primary Winding	
	Center Tap to Inside	Small
	Center Tap to Outside	Small
	Secondary Winding	
	Center Tap to Inside	200.0
	Center Tap to Outside	200.0
L1	Motor Noise Reactor	Small
L4	Filament Reactor	.22
L5	Filter Choke	300.0
L6	R. F. "B" Plate Reactor	4.0
L7	Vibrator Filter Reactor	Small

VOLTAGES AT SOCKETS

Antenna Disconnected Battery 6 Volts Under Load

Type of Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground	Cathode Current M. A.
6D6	R. F. Amp.	5.6	245	105	5.2	7.5
6C6	1st Det. Osc.	5.6	245	105	0	2.9
6D6	I. F. Amp.	5.6	245	105	5.2	7.5
75	2nd Det.	5.8	120(1)		1.4	0.14
41	Power	5.8	235	245	15.0(2)	30.0
84	Rectifier	5.8				52.0

(1) With 250,000 Ohm Meter
(2) Read Across Filter Choke

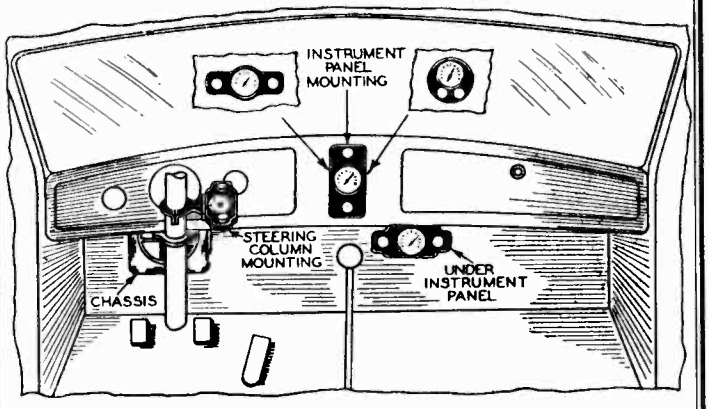


Fig. 1—Various Control Head Mountings

Antenna

IMPORTANT—If the car antenna is of high capacity (600 mmf. or higher) insert the antenna plug with the mark on the HC side—See Fig. 10. If it is a low capacity antenna, insert the plug with the mark on the LC side.

The General Motors cars have steel roofs, and a running board or other under car antenna must be used. These are low capacity antennas. The Chrysler motor cars (except Plymouth) have a steel roof separated from the body proper, which is used as an antenna. These are high capacity antennas. Other cars without steel roofs such as Ford and Plymouth have a built-in roof antenna which is of low capacity.

If a running board or under-car antenna is used, it must be one which is covered with a suitable insulation, to prevent short circuiting in wet weather.

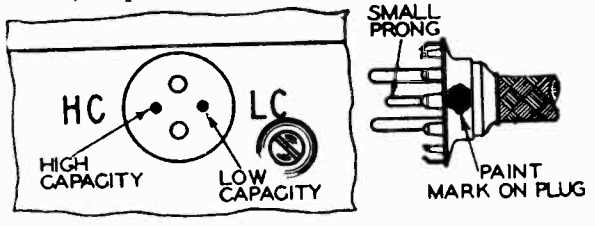


Fig. 10—Antenna Plug Insertion

Alignment and Calibration

Misalignment or mistracking of condensers generally manifests itself as broad tuning and lack of volume at portions or all of the standard wave band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment.

A signal generator that will provide accurately calibrated signals over the standard wave band and at the intermediate frequency, and an output meter are required for indicating the effect of adjustments.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

I. F. Adjustment

Set the signal generator for a signal of 175 KC.

Connect the antenna lead of the signal generator thru a .05 mf. condenser to the stator of the 1st detector section of the tuning condenser. (See Fig. 2 for location of this section.) This can be done by pushing a wire or conductor between the stator plates or by extending an insulated wire thru the hole in the shield over the stator and pushing the wire thru the hole in the lug which extends up from the insulated stator assembly.

Connect the ground lead of the signal generator to the chassis ground.

Short out the oscillator section of the tuning condenser.

Set the volume control at the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the AVC.

Then adjust the three I.F. trimmers until maximum output is obtained. The location of these trimmers is shown in Fig. 2.

1650 KC Adjustment

Set the signal generator for 1650 KC.

Turn the rotor of the tuning condenser to the full open position.

If a low capacity antenna is used connect the shielded antenna lead from the chassis through a 150 mmf. condenser to the antenna post of the signal generator. (If high capacity, use 1500 mmf.)

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent AVC action.

Adjust the trimmer of the oscillator section of the three gang condenser until maximum output is obtained—see Fig. 2 for location of this trimmer.

1400 KC Adjustment

Set the signal generator for 1400 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the 1st detector and antenna trimmers for maximum output.

Do not change the setting of the oscillator trimmer.

Adjusting Antenna Trimmer

After the receiver is installed and the car antenna is connected it will be necessary to adjust the antenna trimmer. Tune in a weak signal between 1200 and 1400 KC with the volume control about three-fourths on. Remove the cover of the chassis case. **The antenna trimmer is on the center tuning condenser section—see Fig. 2.** Turn the adjusting screw of this condenser up or down until maximum output is obtained. CAUTION—Do not turn any of the other trimmer adjusting screws for this adjustment.

Calibrating the Receiver

To calibrate the receiver, tune in a station of known frequency. At the back of the control head is the calibration screw. Remove the pilot lamp assembly. Insert a fine blade screwdriver and turn this screw until the pointer on the dial scale is at the frequency of the station being received. The knob must be held during this adjustment.

If the control head is inaccessible it may be calibrated by setting the pointer from the front. Remove the crystal by inserting a knife blade under the lower edge. Loosen the pointer screw, set the pointer and retighten.

Suppression of Ignition and Generator Noise

The two units mentioned below must be used in every case:

Distributor Suppressor—Remove the high tension lead to the distributor. Insert a distributor suppressor and connect the wire to the other end of the suppressor (see Fig. 13). If this is not practical, cut the high tension lead *close to the distributor* and use a wood screw end type distributor suppressor in this line.

Generator Condenser—The generator condenser is installed at the cut-out as shown in Fig. 13. The lead from the condenser goes to the terminal on the cut-out.

In some of the new cars the cut-out relay is on the front of the dash or in some other location. It will be most convenient to mount this generator condenser at the relay.

Withdraw Antenna Cable Plug

Turn on the receiver and start the engine.

If motor noise is heard, proceed as follows:

Shielding High Tension Lead—In some cars when the coil is mounted on the dash, the high tension lead from the coil to within about four inches of the distributor must be covered with braided shielding and the shield grounded to the motor block or frame.

Bypass Condenser—Try a .25 or .5 mfd. condenser from the ammeter to ground. Try a condenser from the car fuse to ground, switch to ground, windshield wiper connections and various other 6 volt connections to ground noting what effect these condensers have on the noise pick-up.

Try a .25 or .5 mfd. condenser from the "Hot" side of the coil primary to ground. In some cases this condenser may not help. It can be tried out, however, experimentally.

Spark Plug Suppressors—If motor noise persists, spark plug suppressors must be installed. One suppressor is put on each plug as shown in Fig. 13. These are not regularly supplied with the receiver and must be purchased extra. Seventy percent of all cars will not require spark plug suppressors.

Care should be taken that a good mechanical and electrical connection is made between the spark plugs, suppressors and plug wires.

Then Reinsert Antenna Cable Plug

If motor noise is heard when the antenna cable is reconnected, proceed as follows until the noise is satisfactorily reduced:

Dome Light Lead—To determine the amount of noise due to the dome light lead, disconnect this lead at the ammeter, block, or where it is connected, coil it up, and tuck it as far as possible up in the column at which it comes down. Then, with the engine running, ground the end of this wire. If this is found to reduce the noise noticeably, interference is being radiated by the dome light lead. Reconnect the dome light lead and try a .25 or .5 mfd. condenser from the connecting point of the lead to ground. If this does not cure the noise, disconnect the lead and encase it in braided copper shield from the point where it leaves the column post to the point of connection. Keep the lead as far away as possible from car ignition wires and ground the shield.

If the noise due to the dome light lead still persists, disconnect this lead and remove it from the front corner post, at which point it is generally run down. Run the lead down one of the side posts in back of the door and direct to the storage battery. If done in this manner this lead should be fused.

Bonding Cables—Try grounding to the dash all cables and tubing which pass through it, such as oil lines, gas lines, etc. By means of a file, contact can be established between any of the lines and the dash, in order to determine whether such a ground will reduce the noise. To bond the cables to the dash, clean the point of contact, wrap a length of braided shielding around the cable and solder the connection. Then solder the end of the shielding to the dash or ground it under a screw head if one is convenient.

Sufficient play should be left in the bonding shielding so that movement of the cables or tubing will not loosen this shielding from the dash.

High and Low Tension Leads—In some cases, the high and low tension leads between the coil and distributor are run close together. In some cars they are in the same conduit. If this is the case, remove the low tension lead from this conduit. In any event, keep the high and low tension leads as far apart from each other as possible. Shield and ground the shield of the low tension lead, if separating the two leads is not sufficient.

Steering Column, Etc.—It is possible for the steering column, foot pedals and brake lever to carry interference to the back of the dash at which point it may affect the radio receiver. See if each of these items are well grounded to the frame of the car. By means of a file or a braided shielding jumper, contact can be established between any of these items and the frame in order to determine whether such a ground will reduce the noise. A piece of one inch braided shielding should be used if such a ground is necessary and this shielding may be grounded under a screw head, nut or may be soldered in position.

Grounding Engine and Other Parts—The engine must, in every case, be well grounded to the frame of the car. If it is not, use a very heavy braided lead for this purpose, similar to a storage battery ground lead. In like manner it may be necessary to check the grounding of the metal dash, instrument panel, radiator and hood to the frame of the automobile.

Weak Pick-up—Noise, on occasion, may be due to weak pick-up caused by the automobile being in a shielded location or by a faulty antenna system. The action of the automatic volume control, due to the low pick-up, causes the set to operate at its maximum sensitivity, thereby increasing noisy reception, due both to external pick-up and internal conditions.

Loose Parts in Car—Noisy operation is also caused in some instances by loose parts in the car body or frame. These loose parts rubbing together affect the grounding and cause noises, due to the rubbing or wiping action. Tightening up the frame and body at all points and in some cases, the use of a copper jumper will eliminate noise of this nature.

Making Final Adjustments and Bolting Chassis in Place

Battery Cable

The battery connection is made at the ammeter. The end of the battery cable with the connecting lug is secured to one of the posts at the back of the ammeter in the instrument panel.

The other end of the battery cable has a fuse receptacle with bayonet fitting. **Insert the fuse shield** and fuse into the receptacle and connect it to the bayonet pin connector in the end of the battery lead coming from the chassis case as shown in Fig. 11.

Fuse

A 20 ampere automobile fuse is used in the battery cable. This fuse is placed in an insulating shield and is in the receptacle provided for it at the chassis end of the battery cable. **CAUTION—Be sure the fuse shield is on the fuse before the latter is inserted in the receptacle.** *If a fuse blows, do not replace it without first investigating the cause.*

Bolting Chassis in Place

Place the nuts and flat washers on the mounting bolts and put the chassis in place on the dash, extending the mounting bolts through the drilled holes in the dash.

On one of the mounting bolts assemble the extra shakeproof lockwasher as shown in Fig. 9. Then complete the assembly to the dash as illustrated.

After the chassis is in place, secure the flexible shafts and electrical cables into position at the nearest convenient point.

Advancing Generator Charging Rate

The installation of the automobile radio imposes an additional drain on the car storage battery. This can be compensated for by advancing the charging rate of the car generator. Check the state of charge of the storage battery about a week after the installation of the automobile radio is made and have the charging rate adjusted accordingly.

Readjusting Flexible Shafts

When the receiver is in position on the dash, loosen the flexible shaft casing set screws on the chassis. Allow the casing to position itself so that it does not bind. Then retighten the set screws.

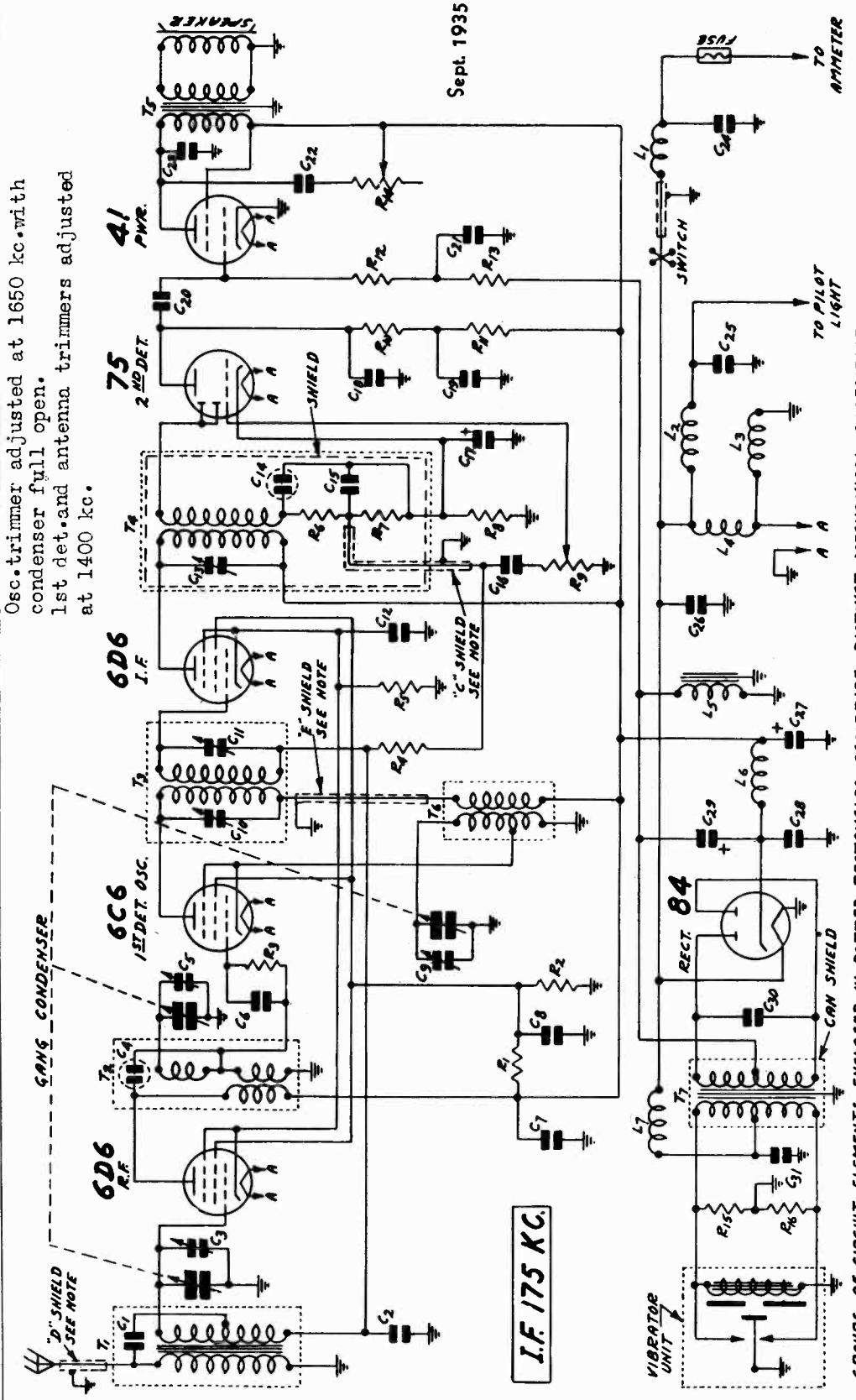
MODEL 6R Series
Schematic, Alignment

WELLS GARDNER & CO.

Power Consumption - - 6.5 Amperes at 6.3 Volts
Power Output - - - - - 3 Watts Undistorted

Tuning Frequency Range - - - - - 530-1650 KC

Sept. 1935



GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES. CIRCUIT ELEMENTS ENCLOSED IN DOTTED CIRCLES DO NOT EXIST AS DISTINCT UNITS BUT OCCUR AS A RESULT OF THE MUTUAL POSITION OF OTHER CIRCUIT ELEMENTS OR THEIR PARTS.
THE CAPACITY OF "C" SHIELD IS 37 MMF, THE CAPACITY OF "D" SHIELD IS 85 MMF AND THE CAPACITY OF "E" SHIELD IS 15 MMF.

C 1	21 mmf.	C12	.10 mf. 180 V.	C22	.02 mf. 600 V.	R 1	17000 ohm 1.0 W.	R12	.50 Megohm .2 W.
C 2	.05 mf. 180 V.	C13	70-150 mmf.	C23	.002 mf. 600 V.	R 2	20000 ohm ohm .5 W.	R13	100000 ohm .2 W.
C 3	Gang Trimmer	C14	250 mmf.	C24	.50 mf. 180 V.	R 3	.50 Megohm .2 W.	R14	150000 ohm Tone Control
C 4	40 mmf.	C15	250 mmf.	C25	2000 mmf.	R 4	1.0 Megohm .2 W.	R15	50 ohm .5 W.
C 5	Gang Trimmer	C16	.01 mf. 360 V.	C26	2000 mmf.	R 5	350 ohm .2 W.	R16	50 ohm .5 W.
C 6	35 mmf.	C18	250 mmf.	C28	.01 mf. 360 V.	R 6	50000 ohm .2 W.		
C 7	.10 mf. 360 V.	C19	.10 mf. 360 V.	C30	.0075 mf. 1600 V.	R 7	500000 ohm .2 W.	T 1	Antenna Trans.
C 8	.10 mf. 180 V.	C20	.01 mf. 360 V.	C31	.50 mf. 180 V.	R 8	600 ohm .2 W.	T 2	R. F. Interstage Trans.
C 9	Gang Trimmer	C17	4.0 mf. 25 V.	C27	5.0 mf. 350 V.	R 9	2.0 Megohm Volume Control	T 3	1st I. F. Trans.
C10	70-150 mmf. } One	C20	.01 mf. 360 V.	C27	5.0 mf. 350 V. } Electrolytic	R10	150000 ohm .2 W.	T 4	2nd I. F. Trans.
C11	70-150 mmf. } Unit	C21	.25 mf. 180 V.	C29	8.0 mf. 350 V. } Block	R11	50000 ohm .2 W.	T 5	Output Trans.
								T 6	Osc. Inductor
								T 7	Power Trans.
								L 1	Motor Noise Reactor
								L 2	Pilot Light Reactor
								L 3	Speaker Field 5.3
								L 4	Filament Reactor
								L 5	Filter Choke
								L 6	"B" Reactor
								L 7	Vibrator Reactor

MODEL 6R Series
Voltage, Socket

WELLS - GARDNER & CO.

Trimmers, Coil Data
Resistance

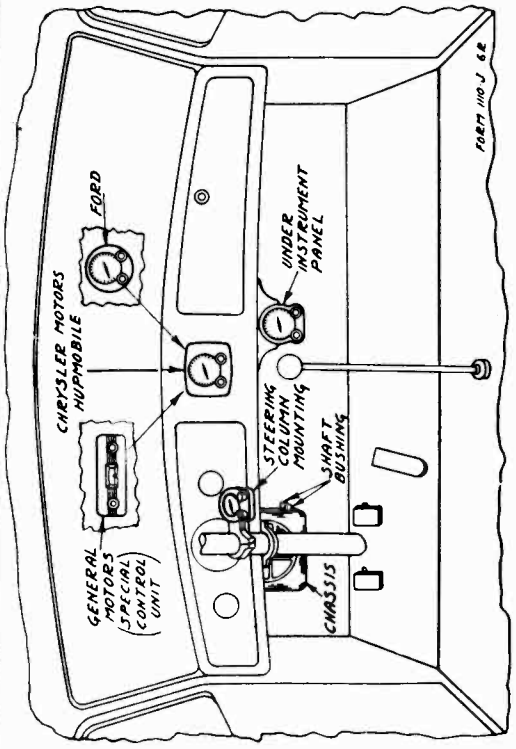


Fig. 5—Various Control Unit Mountings

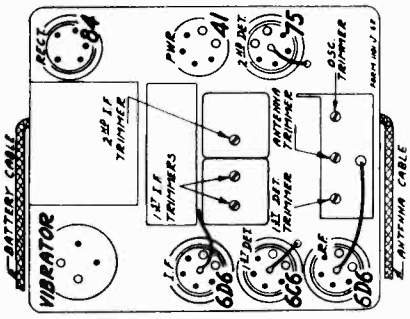


Fig. 2—Location of Tubes and Trimmers

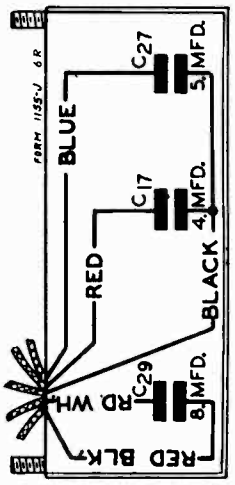


Fig. 4—Condenser Block—Internal Wiring

VOLTAGES AT SOCKETS

Antenna Disconnected **Battery 6 Volts Under Load**

Type of Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground	Cathode Current M. A.
6D6	R. F. Amp.	5.8	220	90	4.5	6.3
6C6	1st Det. Osc.	5.8	220	90	0	2.4
6D6	I. F. Amp.	5.8	220	90	4.5	6.3
75	2nd Det.	5.8	130(1)		1.2	0.3
41	Power	5.8	210	220	16(2)	25.3
84	Rectifier	5.8				50.0

(1) With 250,000 Ohm Meter
(2) As read across filter choke.

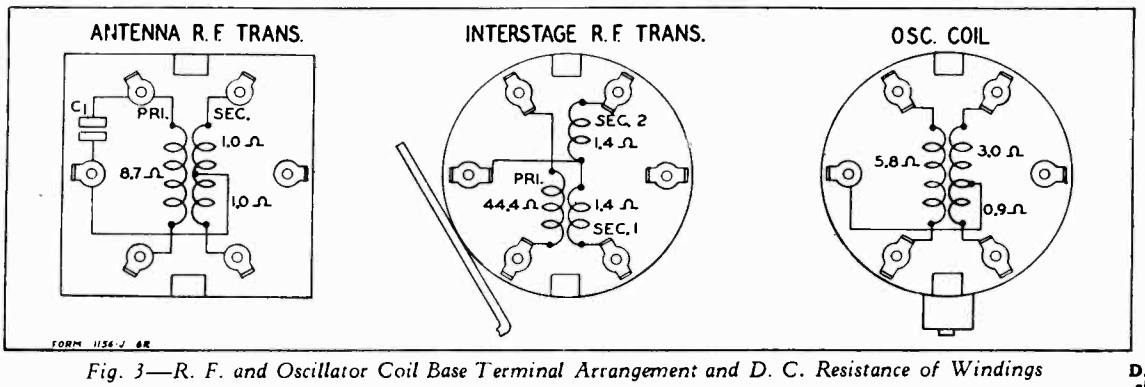


Fig. 3—R. F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

D. C. Resistance of Windings

Following are the D. C. resistances of the various windings in the chassis. The values given below will vary slightly in different sets.

Part No.	Winding	Code	D. C. Resistance in Ohms
P-9A443	Antenna Transformer	T1	
	Primary Winding		3.7
	Secondary Winding--Either Portion		1.0
P-9A439	Interstage Transformer	T2	
	Primary Winding		44.4
	Secondary Winding—Either Portion		1.4
P-9A441	1st I. F. Transformer	T3	
	Primary Winding		93.5
	Secondary Winding		97.6
P-9A442	2nd I. F. Transformer	T4	
	Primary Winding		44.1
	Secondary Winding		49.6
P-12A227	Dynamic Speaker		
	Output Transformer Primary	T5	416.6
	Output Transformer Secondary	T5	Small
	Speaker Field	L3	5.3
	Speaker Voice Coil		Small
P-9A440	Oscillator Coils	T6	
	Grid Coil		
	Long Portion		3.0
	Short Portion		0.9
	Plate Coil		5.8
P-53X108	Power Transformer	T7	
	Primary Winding		
	Center Tap to Inside		Small
	Center Tap to Outside		Small
	Secondary Winding		
	Center Tap to Inside		200.
	Center Tap to Outside		200.
P-9A444	Motor Noise Reactor	L1	Small
P-9A448	Pilot Light Line Reactor	L2	Small
P-9A446	Filament Reactor	L4	Small
P-52X42	Filter Choke	L5	312.5
P-9A447	R. F. "B" Plate Reactor	L6	4.1
P-9A445	Vibrator Filter Reactor	L7	Small

WELLS-GARDNER & CO.

MODEL 7K Series
Schematic

Tuning Frequency Range

A Range - - - - - - - - - - 148 to 380 KC.
B Range - - - - - - - - - - 535 to 1730 KC.
D Range - - - - - - - - - - 5750 to 18300 KC.

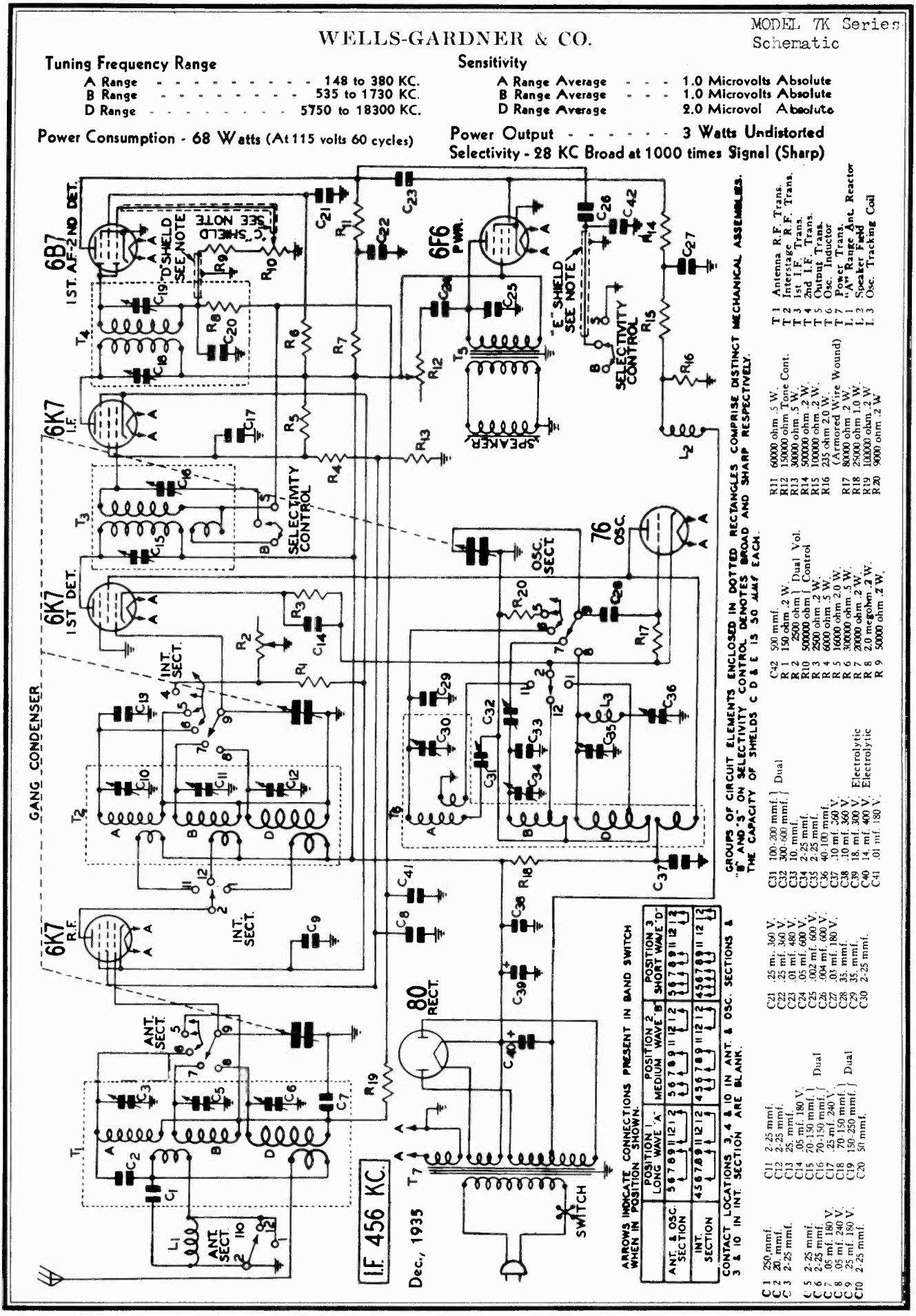
Sensitivity

A Range Average - - - 1.0 Microvolts Absolute
B Range Average - - - 1.0 Microvolts Absolute
D Range Average 2.0 Microvol Absolute

Power Consumption - 68 Watts (At 115 volts 60 cycles)

Power Output - - - - - - - 3 Watts Undistorted

Selectivity - 28 KC Broad at 1000 times Signal (Sharp)



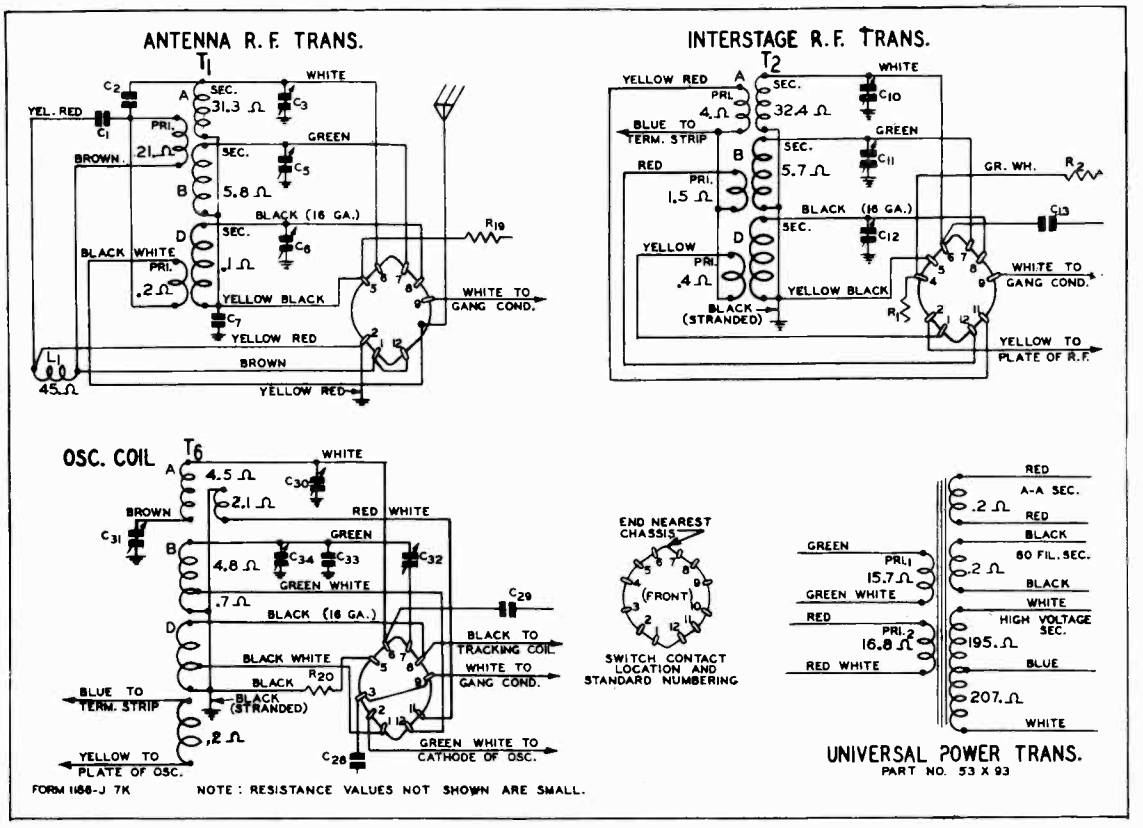


Fig. 4 —Color Coding of Coil Wires and D. C. Resistance of Windings (Also see complete D. C. Resistance List in this Manual)

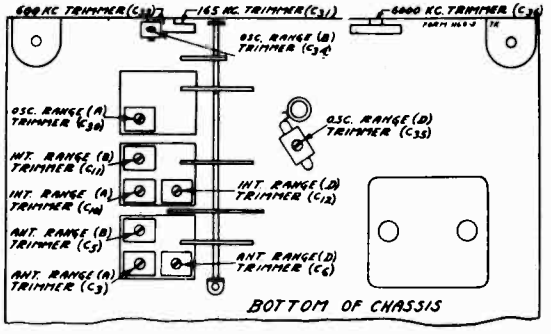


Fig. 3—Location of Trimmers

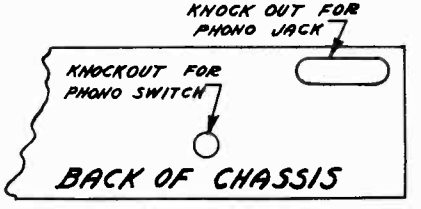


Fig. 8——Location of Phono Knockouts

Intermediate Frequency - - - - - - - 456 KC.

Speaker - - - - - - - - - 6" and 8" Dynamic

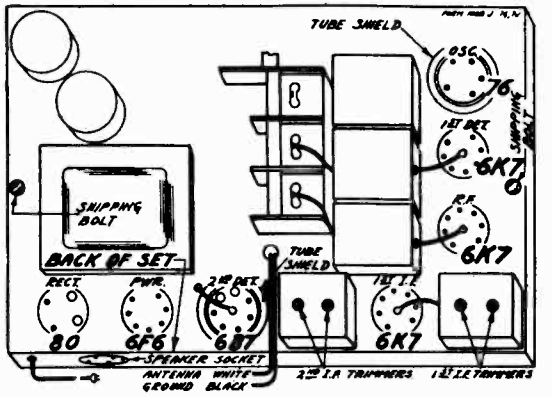


Fig. 5 —Location of Tubes

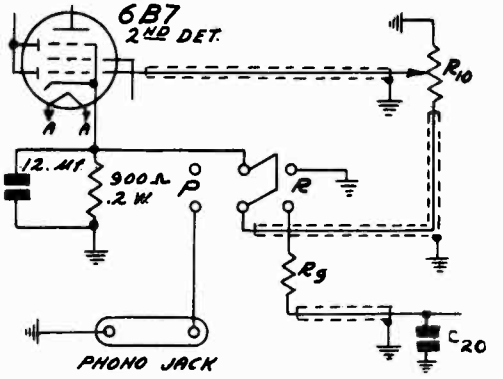


Fig. 7 —Phonograph Connections

VOLTAGES AT SOCKETS
Line Voltage, 115 - Volume Control at Maximum
Antenna Shorted to Ground

Type of Tube	Function	Heater or Filam't	Plate to Ground	Screen to Ground	Cathode to Ground	Cathode Current M. A.
6K7	R.F.	6.0	250	110	3.0	9.0
6K7	1st Det.	6.0	250	100	8.3	3.3
76	Osc.	6.0	100			5.0
6K7	I.F.	6.0	250	137	3.0	11.0
6B7	2nd Det. & 1st A.F.	6.0	50(1)	40(1)		3.2
6F6	Power	6.0	230	250	16.5(2)	36.0
80	Rectifier	4.8				72.0

(1) 500 volt scale (1000 ohms per volt) (2) Measured across R16.

MODEL 7K Series
Alignment, Phono.
Resistance

WELLS-GARDNER & CO.

Alignment and Calibration

Correct alignment is extremely important in connection with all wave receivers. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment.

A signal generator that will provide an accurately calibrated signal at 456, 380, 350, 165, 1730, 1500, 600, 18,300, 15,000 and 6000 KC and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used. If a station is tuned in with the selectivity control in the broad position and this control is then turned to the sharp position, the station may disappear. This is not an indication that the receiver is out of alignment.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator through a .1 mf. condenser to the grid of the 1st detector.

Connect the ground lead of the receiver to the ground post of the signal generator.

Turn the band selector to the Range B position (medium wave band—green dial color).

Turn the selectivity control to the sharp position and keep it in this position for all adjustments.

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the A. V. C.

Then adjust the four I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 5.

Range A Alignment

380 KC Adjustment

Set the signal generator for 380 KC.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range A position (long wave band—purple dial color).

Connect the antenna lead of the receiver through a 200 mmf. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range A trimmer (C30) until maximum output is obtained. The location of this trimmer is shown in Fig. 3

350 KC Adjustment

Set the signal generator for 350 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range A trimmer (C10) and antenna Range A trimmer (C3) to maximum.

Do not change the setting of the oscillator Range A trimmer.

165 KC Adjustment

Set the signal generator for 165 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 165 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Range B Alignment

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range B position (medium wave band—green dial color).

Keep the antenna lead of the receiver connected through the 200 mmf. condenser to the output of the signal generator.

Adjust the oscillator Range B trimmer (C34) until maximum output is obtained. The location of this trimmer is shown in Fig. 3.

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Loosen the pointer set screw and set the large pointer at the 1500 KC mark on the medium wave band scale. Retighten the set screw.

Adjust the interstage Range B trimmer (C11) and antenna Range B trimmer (C5) to maximum.

Do not change the setting of the oscillator Range B trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 600 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Range D Alignment

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

Connect the antenna lead of the receiver through a 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range D position (short wave band—red dial color).

Adjust the oscillator Range D trimmer (C35) until maximum output is obtained. See Fig. 3 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range D trimmer (C12) and antenna Range D trimmer (C6) to maximum.

When adjusting the interstage Range D trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Then go back and repeat the procedure as given for the 18,300 KC adjustment. If it is found necessary to make any appreciable change in the setting of the oscillator Range D trimmer, the 15,000 KC adjustment must be repeated.

Do not make any further change in the setting of the oscillator Range D trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC trimmer until the peak of greatest intensity is obtained. See Fig. 3 for location of this trimmer.

Servicing R. F. Coil Assemblies

The R. F transformers and oscillator coil assemblies in this receiver are sold complete with can. This is due to the fact that the trimmers are soldered to the can, and cannot be easily disassembled.

The lead colors and resistances of the various windings in each assembly are shown in Fig. 4.

If it is ever necessary to remove one of coil assemblies from the can, proceed as follows: First remove the nuts from the screws at the top of the can. The outside lug on the trimmer condenser is inserted in a slot in the coil can, and this lug is soldered into position.

Apply a soldering iron to the can at the point of the soldered connection. Then with a screw driver lift up on the outside edge of the trimmer (edge soldered to can) until the trimmer is clear of the can. After the trimmers are all unsoldered, the coil can be taken out.

Twenty-five Cycle Receivers

The twenty-five cycle receiver can be operated satisfactorily from a sixty cycle power supply. However, the reverse is not true, the sixty cycle receiver cannot be operated from a twenty-five cycle power supply.

A 115-230 Volt, 40 to 60 cycle as well as other power transformers with special power ratings are also available for this model.

Phonograph Connections

Phonograph connections can be made as shown in Fig. 7. The parts required are shown in the parts list. Knockouts are provided in the back panel of the chassis for mounting the phono jack and phono switch—See Fig. 8.

For mounting the 12 mfd. 25 volt dry electrolytic condenser, two No. 27 drill holes should be drilled in the side of the chassis directly below the wet electrolytic condensers. These holes are 1¼" from the bottom, ⅞" and 3¼" from the front of chassis. The ground lug which extends out from the side of the chassis should be bent back into the chassis wall.

Mount the single lug insulated terminal strip (P-4A49) on the mounting bolt of the double lug insulated terminal strip (located on the rear panel, directly in back of the band selector switch).

The connections are made by opening the diode return circuit at the volume control. Unsolder the 50,000 ohm resistor R9 from the lug at the volume control and the terminal strip. Also unsolder from this terminal strip the shielded lead which runs to the 2nd I.F. transformer. Cut this shielded lead to length and connect it to the lug on the new terminal strip (P-4A49). Connect one side of the 50,000 ohm resistor R-9 to the same lug and the other side to the phono switch — see Fig. 7.

The extra shielded lead which is provided should be connected from the volume control to the phono switch as shown in Fig. 7. Be sure to remove the shielding from the portion of this lead that passes over the volume control.

Remove the ground from the cathode terminal of the 6B7 2nd detector tube socket by bending the chassis ground lug away from this terminal. Be sure to solder back to this lug any leads that were connected to it (not including the cathode connection).

Connect one side of the 12 mfd. 25 volt electrolytic condenser to ground and the other side of this condenser to the cathode of the 6B7 2nd detector tube socket and to the phono switch as shown in Fig. 7. To this same terminal on the phono switch connect the 900 ohm resistor. The other side of the resistor is connected to ground. Complete the other connections as illustrated in Fig. 7.

A high impedance pickup should be used. If a low impedance pickup is used a step-up transformer will be required for sufficient volume. The volume control and tone control of the set will regulate the phono volume and tone.

D. C. Resistance of Windings

Refer to Fig. 4.

Part No.	Item	Code	D.C. Resistance in Ohms
P-9A457	Antenna R.F. Transformer	T1	
	Range "A" and "B" Primary Winding		21.0
	Range "D" Primary Winding		0.2
	Range "A" Secondary Winding		31.1
	Range "B" Secondary Winding		5.8
	Range "D" Secondary Winding		0.1
P-9A458	Interstage R.F. Transformer	T2	
	Range "A" Primary Winding		4.0
	Range "B" Primary Winding		1.5
	Range "D" Primary Winding		0.4
	Range "A" Secondary Winding		32.4
	Range "B" Secondary Winding		5.7
	Range "D" Secondary Winding		Small
P-9A459	Oscillator Coils	T6	
	Range "A" Grid Coil		
	White to Brown		4.5
	Range "A" Cathode Coil		
	Red White to Ground		2.1
	Range "B" Grid Coil		
	Green White tap to Green		4.8
	Green White tap to Ground		0.7
	Range "D" Grid Coil		
	Black White tap to Black		Small
	Black White tap to Ground		Small
	Oscillator Plate Coil		0.2
P-9A460	1st I.F. Transformer	T3	
	Primary Winding		11.5
	Secondary Winding		11.0
	Coupling Winding		0.5
P-9A461	2nd I.F. Transformer	T4	
	Primary Winding		11.5
	Secondary Winding		4.3
P-12A211	Dynamic Speaker (8")		
	Speaker Field	L2	1050.0
	Speaker Voice Coil		4.1
	Output Transformer	T5	
	Primary Winding		510.0
	Secondary Winding		1.0
P-53X93	115-230 Volt; 40-60 Cycle Power Transformer	T7	
	Primary Windings (Separately)		
	Red White to Red		16.8
	Green White to Green		15.7
	Primary Windings in Parallel (115 Volt Operation)		
	Green White and Red White to Green and Red		8.1
	Primary Windings in Series (230 Volt Operation)		
	Red White to Green		32.5
	Secondary Windings		
	Tube Filament Winding (A-A)		0.2
	80 Filament Winding		0.2
	High Voltage Winding		
	Center Tap to Inside		195.0
	Center Tap to Outside		207.0
P-9A462	"A" Range Antenna Reactor	L1	45.0
P-9A391	High Frequency Oscillator Tracking Coil	L3	1.1

Switch Contact Location Numbering

A standard arrangement for switch contact location numbering has been adopted. This numbering is illustrated in Fig. 4. In contact locations not used, the number applying to that particular location is not employed.

MODEL 9C Series
Schematic

WELLS - GARDNER & CO.

Input Voltages

"A" Battery	2 Volts (0.74 Amperes)
"B" Batteries	135 Volts
"C" Batteries	4½, 9 and 16½ Volts

Power Output - - - - - - 1.5 Watts Undistorted

Selectivity - 20 KC Broad at 1000 times Signal (Sharp)

Intermediate Frequency - - - - - - - - 456 KC.

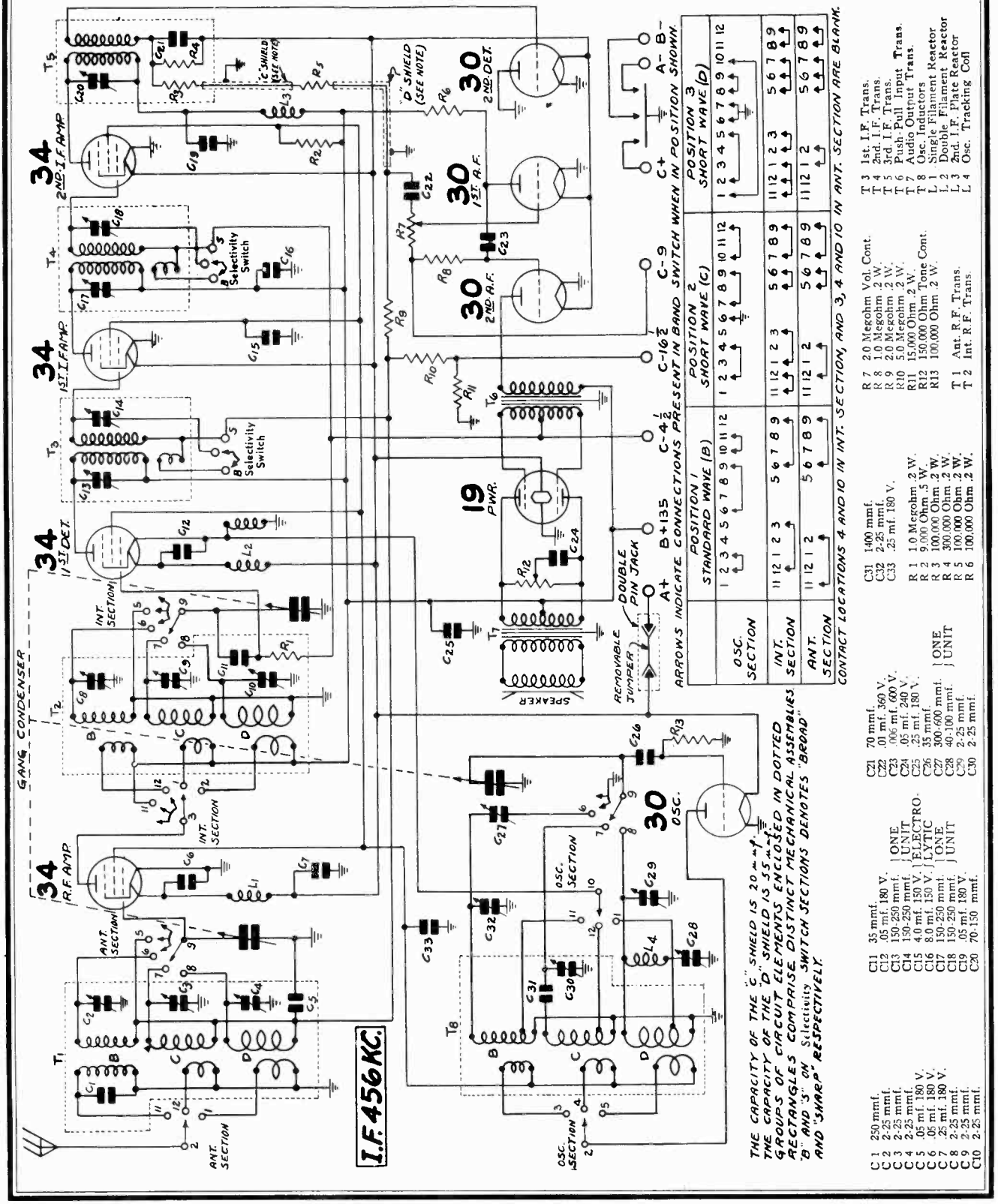
Speaker - - - - 8" Permanent Magnet Dynamic

Tuning Frequency Range

B Range	535 to 1730 KC.
C Range	1680 to 4800 KC.
D Range	5650 to 16000 KC.

Sensitivity

B Range Average	1.0 Microvolts Absolute
C Range Average	4.0 Microvolts Absolute
D Range Average	7.0 Microvolts Absolute



C1 250 mmf.
C2 2-25 mmf.
C3 2-25 mmf.
C4 2-25 mmf.
C5 .05 mf. 180 V.
C6 .05 mf. 180 V.
C7 .25 mf. 180 V.
C8 2-25 mmf.
C9 2-25 mmf.
C10 2-25 mmf.
C11 35 mmf.
C12 .05 mf. 180 V.
C13 150-250 mmf.
C14 150-250 mmf.
C15 4.0 mf. 150 V.
C16 8.0 mf. 150 V.
C17 150-250 mmf.
C18 150-250 mmf.
C19 .05 mf. 180 V.
C20 70-150 mmf.
C21 70 mmf.
C22 .01 mf. 360 V.
C23 .006 mf. 600 V.
C24 .05 mf. 240 V.
C25 .25 mf. 180 V.
C26 35 mmf.
C27 300-600 mmf.
C28 40-100 mmf.
C29 2-25 mmf.
C30 2-25 mmf.
C31 1400 mmf.
C32 2-25 mmf.
C33 .25 mf. 180 V.
R 1 1.0 Megohm .2 W.
R 2 9,000 Ohm .5 W.
R 3 100,000 Ohm .2 W.
R 4 300,000 Ohm .2 W.
R 5 100,000 Ohm .2 W.
R 6 100,000 Ohm .2 W.
R 7 2.0 Megohm Vol. Cont.
R 8 1.0 Megohm .2 W.
R 9 2.0 Megohm .2 W.
R10 5.0 Megohm .2 W.
R11 15,000 Ohm .2 W.
R12 150,000 Ohm Tone Cont.
R13 100,000 Ohm .2 W.
T 1 Ant. R.F. Trans.
T 2 Int. R.F. Trans.
T 3 1st I.F. Trans.
T 4 2nd. I.F. Trans.
T 5 3rd. I.F. Trans.
T 6 Push-Pull Input Trans.
T 7 Audio Output Trans.
T 8 Osc. Inductors
L 1 Single Filament Reactor
L 2 Double Filament Reactor
L 3 2nd. I.F. Plate Reactor
L 4 Osc. Tracking Coil

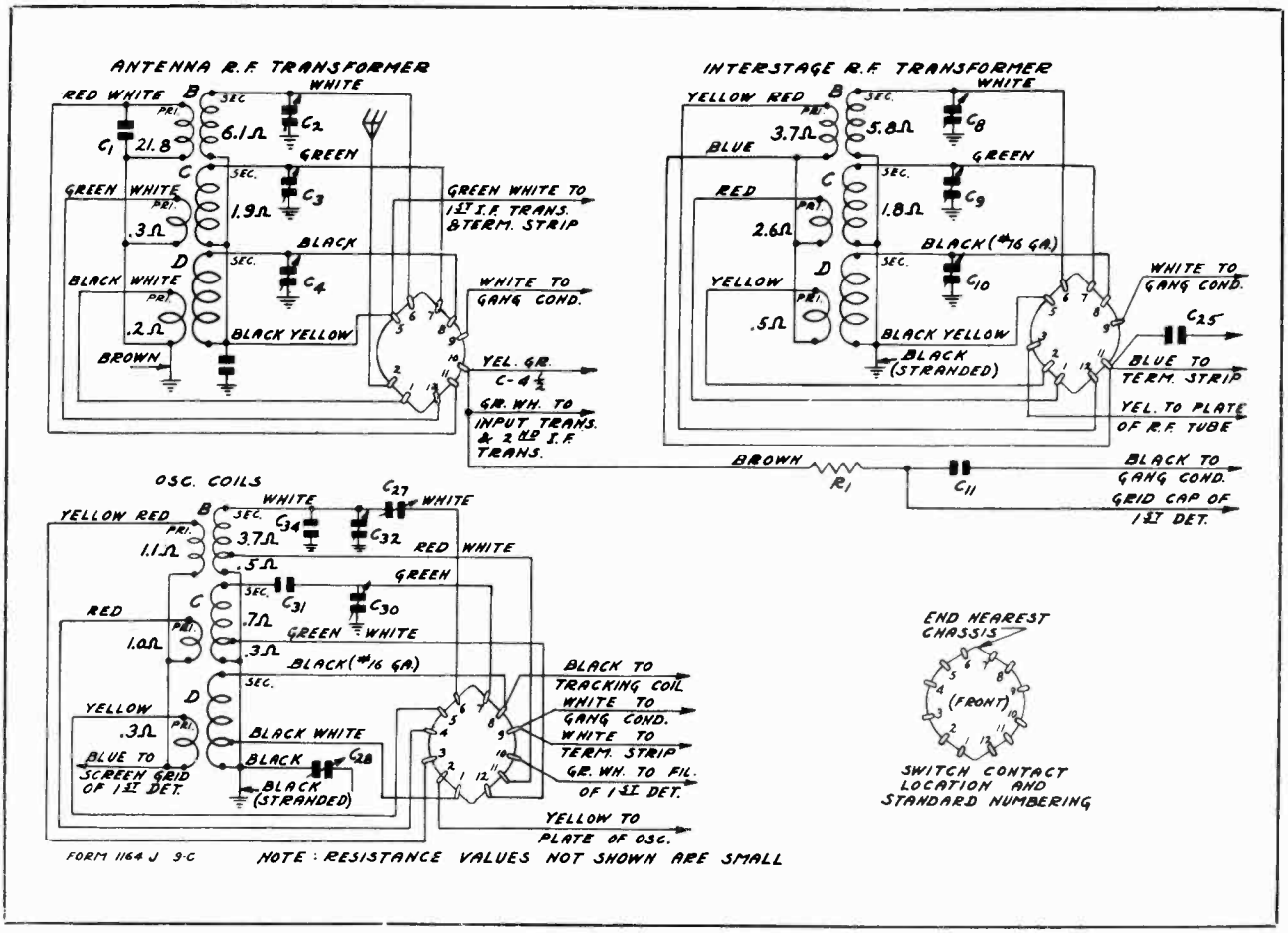


Fig. 10—Color Coding of Coil Wires and D. C. Resistance of Windings. (Also See Complete D. C. Resistance List Below)

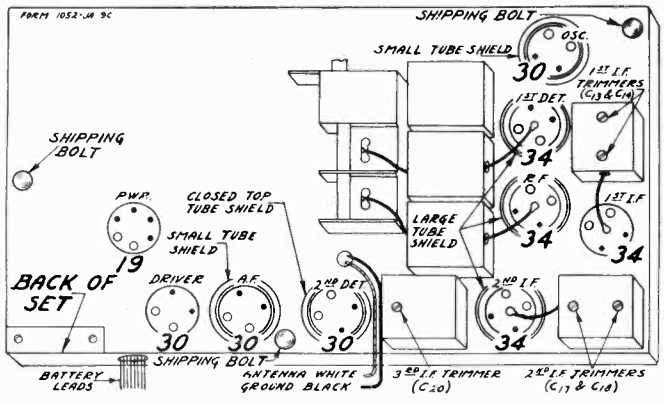


Fig. 11—Location of Tubes

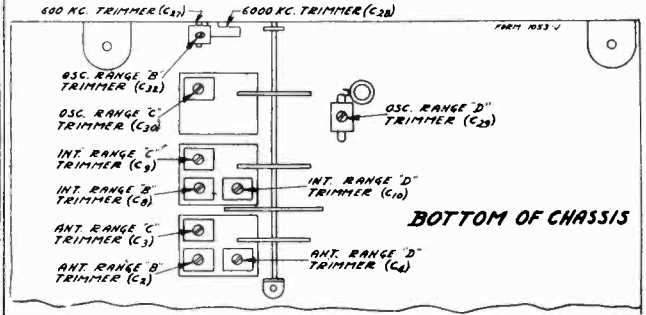


Fig. 9—Location of Trimmers

VOLTAGES AT SOCKETS

Antenna Shorted to Ground

Type of Tube	Function	Across Filament	Plate to Ground	Screen to Ground	Control Grid to Ground	Normal Plate M. A.
34	R. F.	2.0	135	80	4.7(1)	2.4
34	1st. Det.	2.0	135	80	4.5(2)	2.2
30	Oscillator	2.0	80			3.4
34	1st I. F.	2.0	135	80	4.7(1)	2.4
34	2nd I. F.	2.0	135	80	4.5	2.2
30	2nd Det.	2.0				
30	1st Audio	2.0	90		9.0(3)	0.17
30	2nd Audio	2.0	132		9.0(4)	2.5
19	Power	2.0	135		4.5	1.5 (per plate)

(1) Computed figure—cannot be read with ordinary voltmeter.

(2) As read at 4½ volt tap on "C" battery.

(3) Volume Control at minimum.

(4) As read at 9 volt tap on "C" battery.

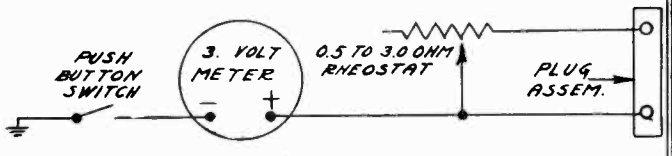


Fig. 6—Schematic Diagram of Voltage Regulator

Alignment and Calibration

A signal generator that will provide an accurately calibrated signal at 456, 1730, 1500, 600, 4800, 4200, 16,000, 15,000 and 6000 KC and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used. If a station is tuned in with the selectivity control in the broad position and this control is then turned to the sharp position, the station may disappear. This is not an indication that the receiver is out of alignment.

Use a non-metallic screwdriver for the adjustments. The complete procedure is as follows:

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the output of the signal generator through a 0.1 mf. condenser to the switch end of condenser C11—see Fig. 2. There is a lead which goes to the lug on top of the center stator section of the tuning condenser—see Fig. 11. The connection can be made at this lug.

Connect the ground lead of the receiver to the ground post of the signal generator.

Turn the band selector to the Range B position (standard wave band—purple dial color).

Turn the selectivity control to the sharp position and keep it in this position for all adjustments.

Turn the volume control to the maximum position.

Attenuate the signal from the signal generator to prevent the levelling-off action of the A.V.C.

Then adjust the five I.F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 11.

Range B Alignment

1730 KC Adjustment

Set the signal generator for 1730 KC.

Turn the rotor of the tuning condenser to the full open position.

Keep the band selector in the standard wave position.

Connect the antenna lead of the receiver through a 200 mmf. condenser to the output of the signal generator.

For this and all subsequent adjustments keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range B trimmer (C32) until maximum output is obtained. The location of this trimmer is shown in Fig. 9.

1500 KC Adjustment

Set the signal generator for 1500 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Loosen the pointer set screw and set the large pointer at the 1500 KC mark on the standard wave band scale. Retighten the set screw.

Adjust the interstage Range B trimmer (C8) and antenna Range B trimmer (C2) to maximum.

Do not change the setting of the oscillator Range B trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 600 KC trimmer until the peak of greatest intensity is obtained. See Fig. 9 for location of this trimmer.

Be sure to use a non-metallic screwdriver for this adjustment.

Range C Alignment

4800 KC Adjustment

Set the signal generator for 4800 KC.

Connect the antenna lead of the receiver through a 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector in the Range C position (1st short wave band—green dial color).

As mentioned above, keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range C trimmer (C30) until maximum output is obtained. See Fig. 9 for location of this trimmer.

4200 KC Adjustment

Set the signal generator for 4200 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range C trimmer (C9) and antenna Range C trimmer (C3) to maximum.

Do not change the setting of the oscillator Range C trimmer.

Range D Alignment

16,000 KC Adjustment

Set the signal generator for 16,000 KC.

Keep the antenna lead of the receiver connected through the 400 ohm resistor to the output of the signal generator.

Turn the rotor of the tuning condenser to the full open position.

Turn the band selector to the Range D position (2nd short wave band—red dial color).

As mentioned above, keep the volume control at the maximum position and attenuate the signal from the signal generator to prevent A.V.C. action.

Adjust the oscillator Range D trimmer (C29) until maximum output is obtained. See Fig. 9 for location of this trimmer.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

Turn the rotor of the tuning condenser carefully until maximum output is obtained.

Adjust the interstage Range D trimmer (C10) and antenna Range D trimmer (C4) to maximum.

When adjusting the interstage Range D trimmer, it will be necessary at the same time to turn the tuning condenser rotor slowly back and forth until the peak of greatest intensity is obtained.

Then go back and repeat the procedure as given for the 16,000 KC adjustment. If it is found necessary to make any appreciable change in the setting of the oscillator Range D trimmer, the 15,000 KC adjustment must be repeated.

Do not make any further change in the setting of the oscillator Range D trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC trimmer until the peak of greatest intensity is obtained. See Fig. 9 for location of this trimmer.

Use a non-metallic screwdriver for this adjustment.

Testing Batteries

If the receiver does not operate satisfactorily test the batteries under load. A high resistance meter is required for the "B" and "C" voltages. If any of the batteries are considerably below their rated voltage, new ones should be used. When the "B" batteries are replaced the "C" batteries should also be replaced. The reason for this is that the "C" drain is such that the "C" batteries are run down in about the same time as the "B" batteries.

"A" Battery and Regulator

This receiver is designed to operate with a 2 volt storage cell, but may be operated with a 3 volt dry "A" battery if used with a voltage regulator. The receiver may also be used with an air cell "A" battery provided a series resistor is used to reduce the voltage to the proper level of 2 volts for the tube filaments. Although the voltage regulator mentioned above can be used, the series resistor is cheaper and is satisfactory as the voltage of one of these batteries drops very little during the useful life of the battery.

D. C. Resistance of Windings

Refer to Figs. 10 & 2

Following are the D. C. resistances of the various coil windings in the chassis. The values given below will vary slightly in different sets.

Part No.	Item	Code	D. C. Resistance in Ohms
P-9A417	Antenna R. F. Transformer	T1	
	Range B Primary Winding		21.8
	Range C Primary Winding		0.3
	Range D Primary Winding		0.2
	Range B Secondary Winding		6.1
	Range C Secondary Winding		1.9
	Range D Secondary Winding		Small
P-9A449	Interstage R. F. Transformer	T2	
	Range B Primary Winding		3.7
	Range C Primary Winding		2.6
	Range D Primary Winding		0.5
	Range B Secondary Winding		5.8
	Range C Secondary Winding		1.8
	Range D Secondary Winding		Small
P-9A406	Oscillator Inductors	T8	
	Range B Plate Coil		1.1
	Range C Plate Coil		1.0
	Range D Plate Coil		0.3
	Range B Grid Coil		
	Red White Tap to White		3.7
	Red White Tap to Ground		0.5
	Range C Grid Coil		
	Green White Tap to Green		0.7
	Green White Tap to Ground		0.3
P-9A406	Oscillator Inductors cont'd	T8	
	Range D Grid Coil		
	Black White Tap to Black		Small
	Black White Tap to Ground		Small
P-9A407	1st I. F. Transformer	T3	
	Primary Winding		8.9
	Secondary Winding		8.9
	Coupling Winding		0.5
P-9A408	2nd I. F. Transformer	T4	
	Primary Winding		8.9
	Secondary Winding		8.9
	Coupling Winding		0.5
P-9A409	3rd I. F. Transformer	T5	
	Primary Winding		9.9
	Secondary Winding		27.3
P-50X11	Audio Input Transformer	T6	
	Primary Winding		1005.0
	Secondary Winding		
	Center Tap to Inside		580.0
	Center Tap to Outside		630.0
P-12A224	Permanent Magnet Dynamic Speaker		
	Speaker Voice Coil		1.6
	Audio Output Transformer	T7	
	Primary Winding		
	Center Tap to Inside		199.2
	Center Tap to Outside		224.3
	Secondary Winding		Small
P-9A281	Single Filament Reactor	L1	Small
P-9A410	Double Filament Reactor—Either Section	L2	Small
P-9A400	2nd I. F. Plate Isolating Reactor	L3	35.9
P-9A391	High Frequency Oscillator Tracking Coil	L4	1.0

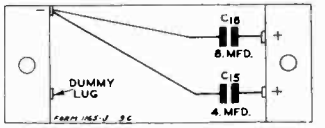
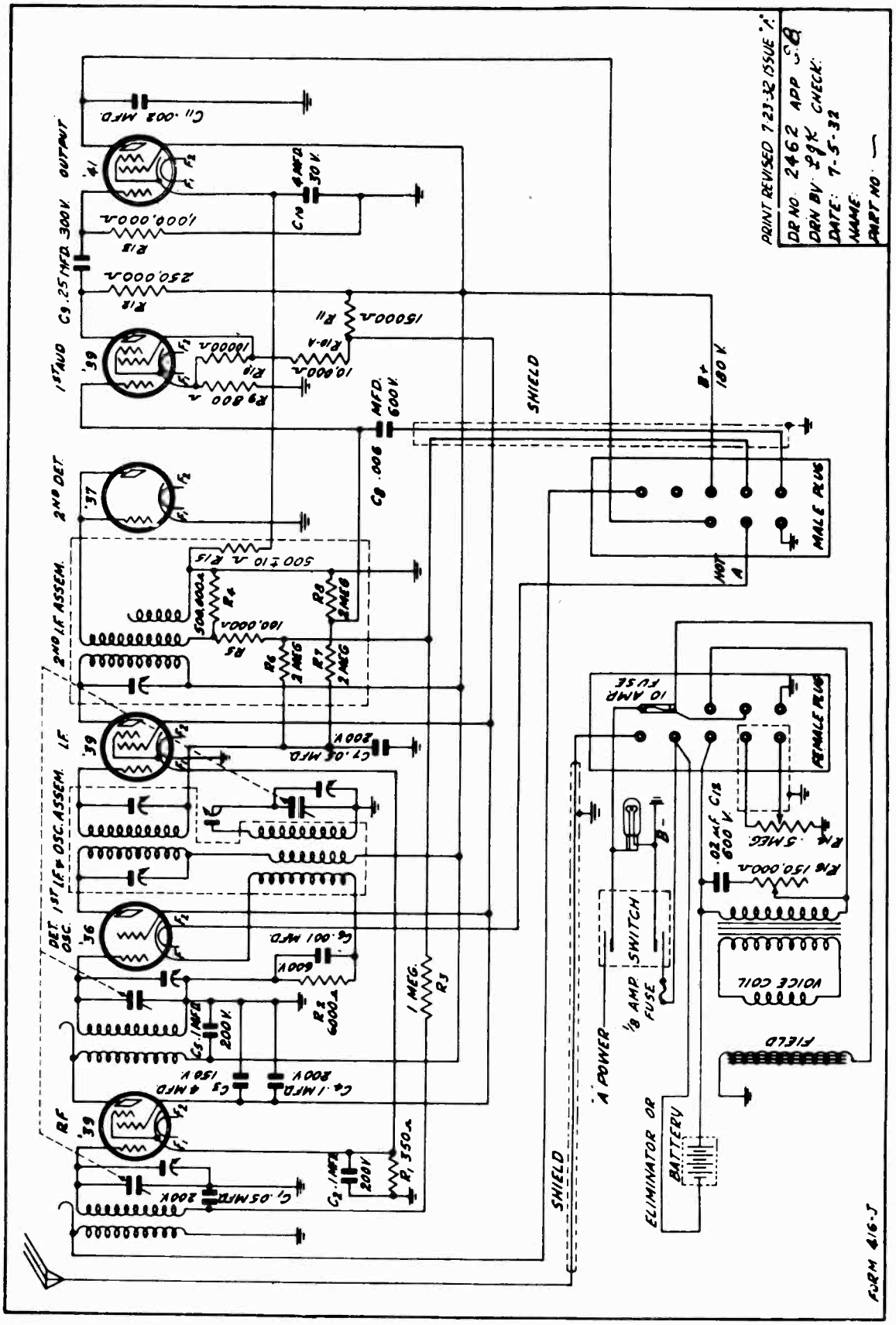


Fig. 12—Condenser Block—Internal Wiring

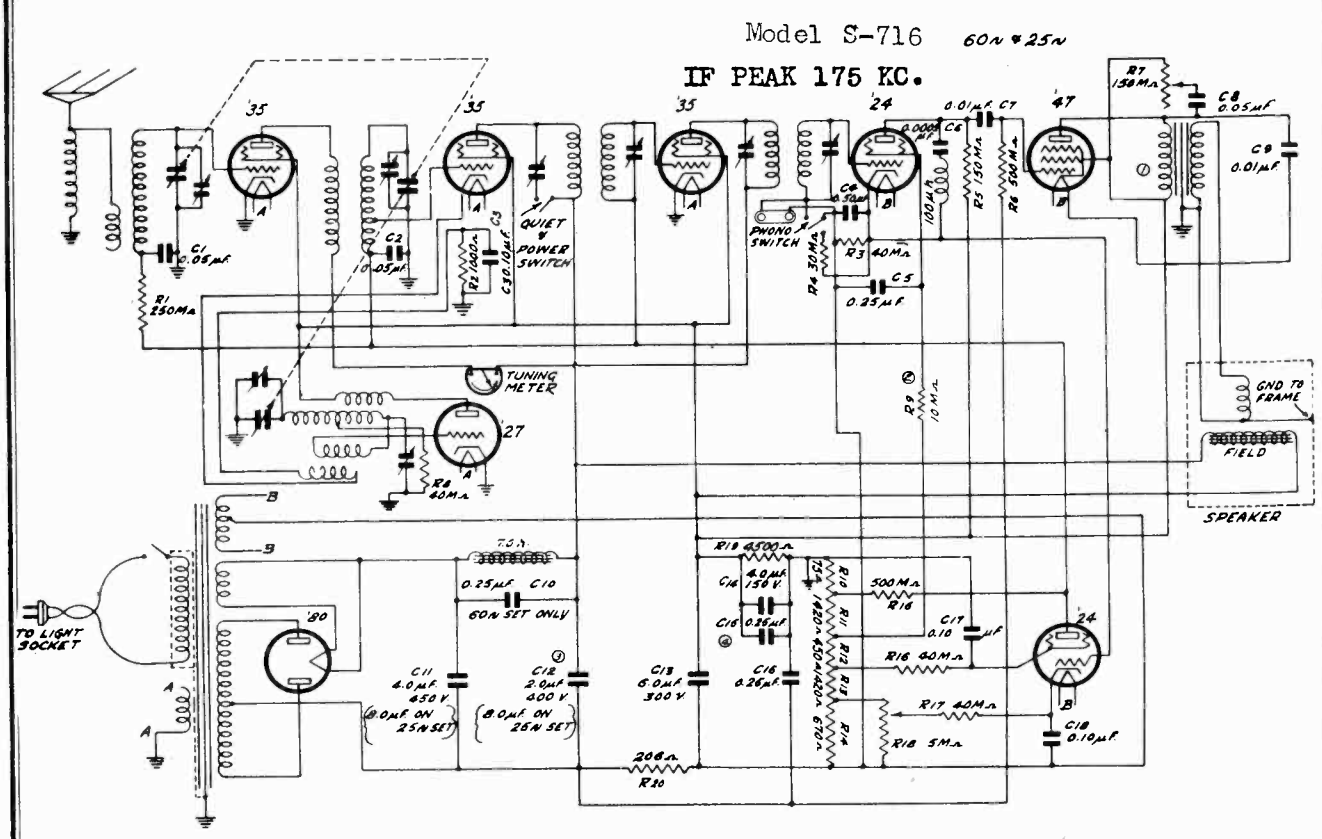
MODEL S-691
Schematic

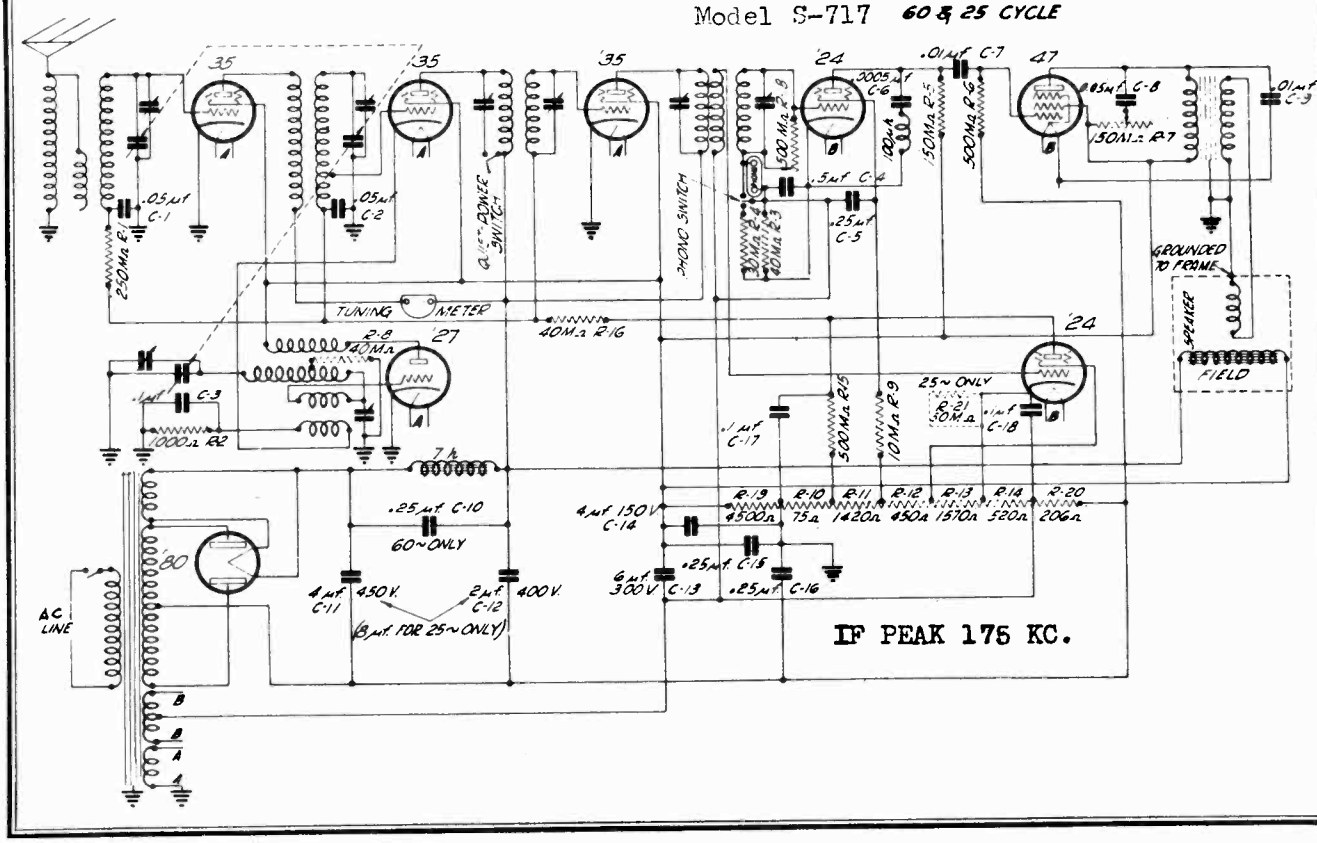
WESTERN AUTO SUPPLY CO.



MODEL S-716
MODEL S-717
Schematics

WESTERN AUTO SUPPLY CO.





WESTERN AUTO SUPPLY CO.

MODEL S-716
MODEL S-717
Voltage, Socket
Alignment

A modulated test oscillator and an output meter MUST be used when aligning this receiver to insure accurate alignment. It is important that the oscillator deliver a signal at exactly 175 K.C. in addition to frequencies in the broadcast band.

The adjustable condensers which tune the primaries and secondaries of the I.F. transformers are adjusted by inserting a screw driver through the holes in the chassis base directly below the I.F. transformer assemblies.

A trimmer condenser is mounted over each section in the gang and is adjusted by turning the screw located under the hole in the top of the gang shield.

The oscillator 600 K.C. tracking condenser is on the back of the chassis near the "QUIET-POWER" switch.

Make each adjustment in the order given below or the receiver may be thrown further out of alignment and it will then be a difficult task to align it properly.

The receiver and test oscillator must be well grounded and the output kept within the range of the output meter at all times.

All shields must be in place when making the adjustments.

INTERMEDIATE CIRCUITS.—Tune the test oscillator to exactly 175 K.C., and connect its output to the grid of the first detector tube after removing the clip on the tip of the tube. Connect the output meter across the secondary of the speaker coupling transformer and then adjust all four condensers which tune the intermediate transformers, for the greatest deflection on the output meter. Check the settings of all four condensers to make certain the maximum output has been obtained.

When the above instructions have been followed remove the test oscillator coupling and replace the grid clip on the tip of the first detector tube.

GANG CONDENSERS.—Turn the gang condenser plates all the way in and see that the dial pointer is on the first dial division point below 550 K.C.

Tune the test oscillator to 1,400 K.C., turn the dial to read 1,400 K.C., and then adjust each gang condenser trimmer for maximum output.

OSCILLATOR.—Tune the test oscillator to 600 K.C., and tune the receiver to the signal. Disconnect the output meter and then rotate the adjusting screw on the oscillator 600 K.C. tracking condenser. Rock the gang condenser back and forth across the signal at the same time, and listen closely until the maximum volume is obtained. The tracking condenser is then properly adjusted and remains fixed thereafter.

The gang condenser trimmers only must then be adjusted again at 1,400 K.C. for maximum output.

The receiver should be accurately aligned if the above instructions have been followed and no further adjustments need be made.

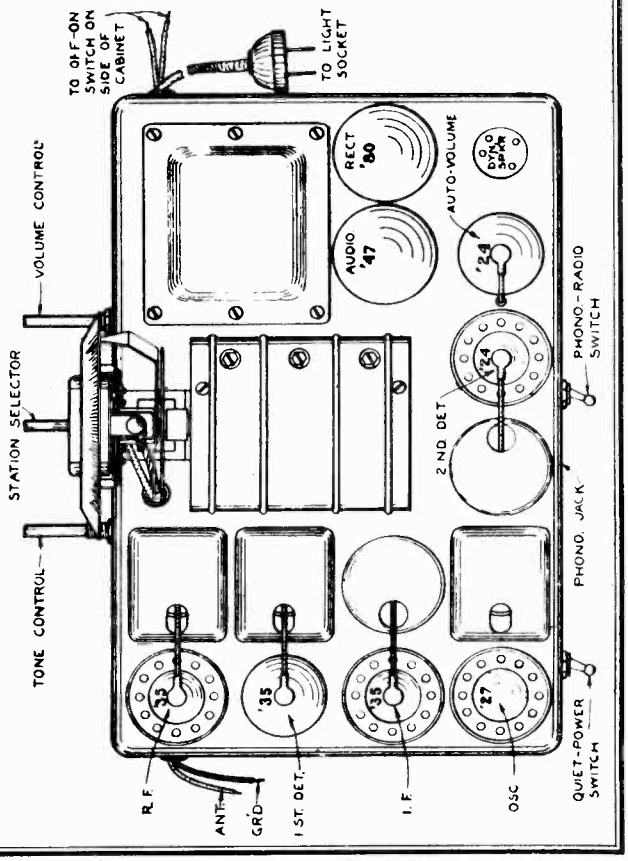
The blue lead on the filter block is common for condensers C4, C5, and C18, and the black lead is common for condensers C3, C15, C16, and C17. The second detector plate filter choke is also contained in the block and is connected by two yellow leads, C8, (white-red leads) and C10 (red leads) are connected as shown in Fig. 1 schematic wiring diagram.

Voltages at Sockets

The voltages shown in the chart were taken with a 1,000 ohm per volt voltmeter; voltage measurements taken with a voltmeter having a different resistance will, of course, differ from those shown.

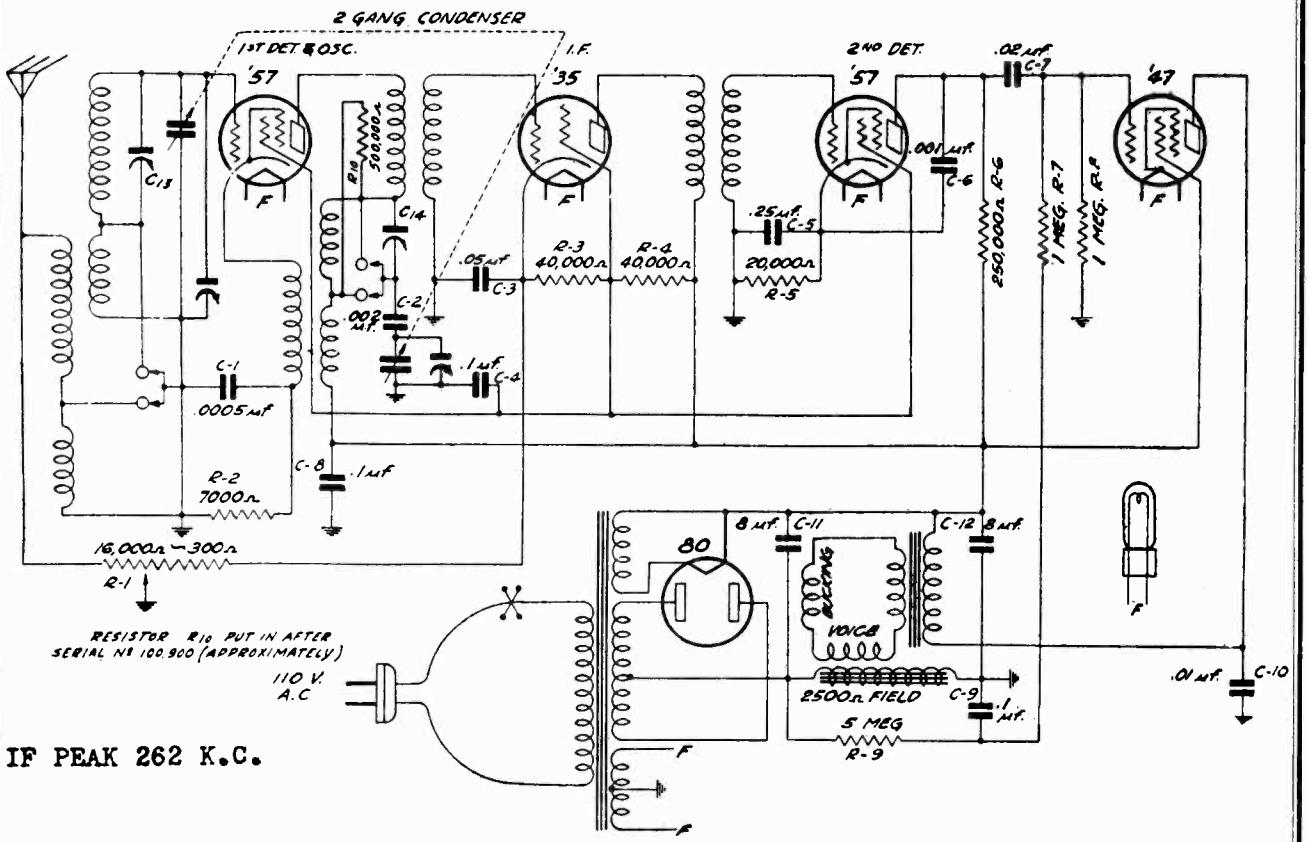
Turn the volume control all the way on, connect the antenna and ground leads together and turn the gang condenser plates all the way out. Check the line voltage.

Tube	Circuit	LINE VOLTAGE 90 V.	100 V.	110 V.	120 V.	130 V.
R. F. '35	Screen-Grid	70	78	85	92	100
	Plate	143	159	175	191	207
1st Det. '35	Screen-Grid	70	78	85	92	100
	Plate	143	159	175	191	207
I. F. '35	Screen-Grid	70	78	85	92	100
	Plate	143	159	175	191	207
Oscillator '27	Plate	70	78	85	92	100
2nd Det. '24	Screen-Grid	66	73	80	87	94
	Plate	127	134	141	148	155
A. V. C. '24	Grid	14	15.5	17	18.5	20
	Screen-Grid	24	26	28	30	32
Audio '47	Accelerating-Grid	199	221	244	267	289
	Plate	171	190	210	230	250
Rectifier '80	Current (both plates)	67 MA	75 MA	82 MA	89 MA	96 MA
	Plate to Plate Volt.	512	569	625	682	739

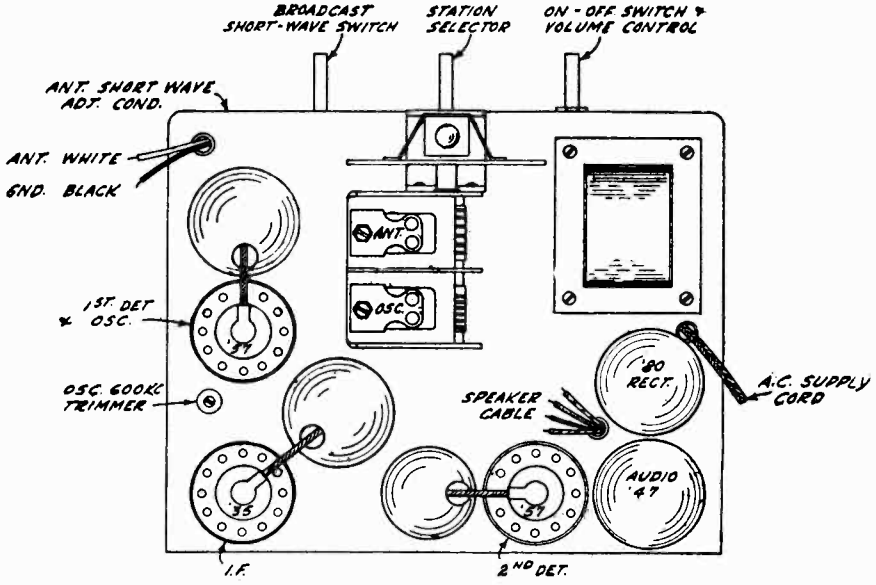


MODEL S-719
Schematic, Socket Trimmers, Voltage

WESTERN AUTO SUPPLY CO.



IF PEAK 262 K.C.



Tube	Fil.	Plate to Cathode	Screen to Cathode	Grid to Cathode	Plate Crnt.
1st Det	2.15	225	90	4.	.5
IF Amp	2.15	230	90	3.2*	6.2
2nd Det	2.15	170	90	4.3	.2
Audio	2.15	225	240	14.**	23.
Rect.	4.75	620 volts AC from plate to plate			

* When read with cord and plug, ground the control grid.
** High resistance interferes with correct reading.

WESTERN AUTO SUPPLY CO.

MODELS S-725, S-726
Schematic, Socket
Trimmers, Alignment

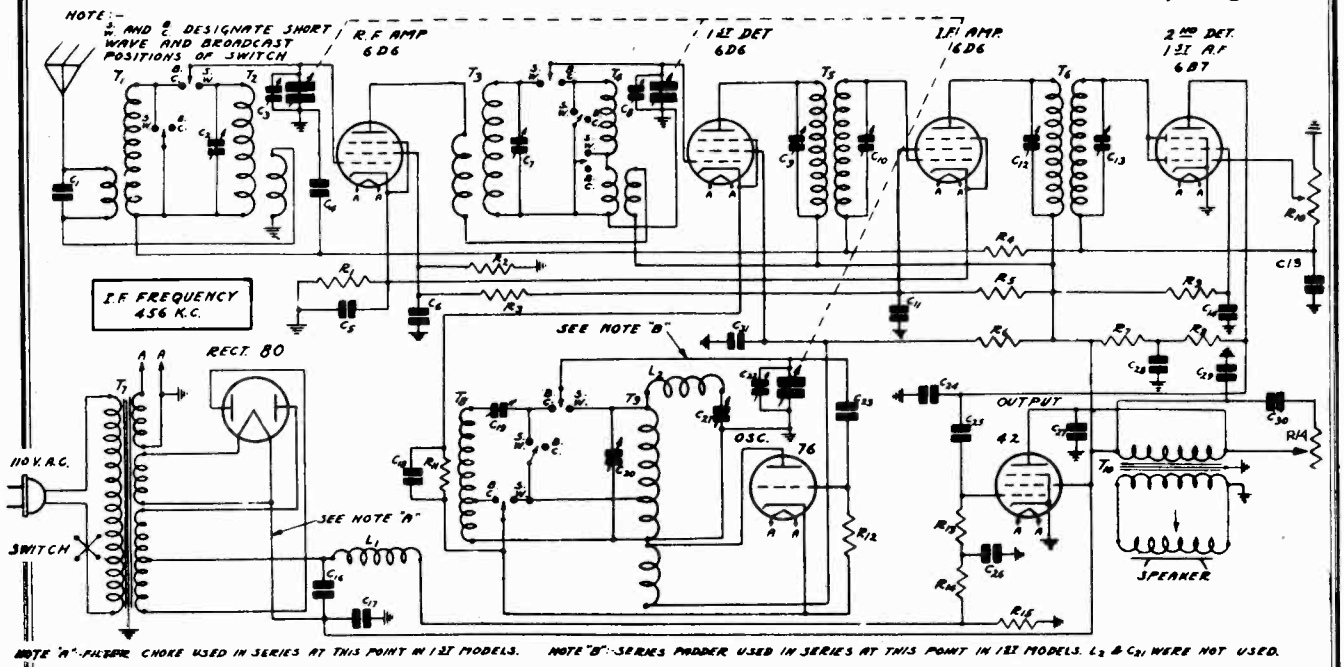


Fig. 1—Schematic Circuit Diagram

Condenser Alignment

Correct alignment is extremely important in connection with all wave receivers. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide an accurately calibrated signal of 456 K. C. and accurately calibrated signals over the broadcast and short wave bands, 530-1740 K. C. and 5.8-18.3 M. C., is required. An output indicating meter is also necessary. It will be practically impossible to align the receiver if unsatisfactory apparatus is used.

Use a non-metallic screw driver for the adjustments. The complete procedure is as follows:

Intermediate Frequency Adjustment

Set the signal generator for 456 K. C. Connect the antenna lead of the signal generator to the grid of the 1st detector through a .05 mfd. condenser. Turn the tuning condenser rotor until the plates are completely out. The ground lead from the signal generator goes to the ground lead of the receiver. The volume control should be at the maximum position. Attenuate the signal so that A. V. C. action is not obtained.

Then adjust the four I. F. trimmer condensers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis and are in the round I. F. cans—See Fig. 2. The openings to the trimmer condensers are covered over by a small cover plate which is held in position by a screw. Loosen these screws until the cover plates can be swung around.

Broadcast Band Adjustment

The broadcast short wave switch should be in the broadcast position. Set the signal generator for 1740 K. C. Turn the rotor to the full open position. The antenna lead from the signal generator is in this instance connected to the antenna lead of the receiver. Attenuate the signal so that A. V. C. action is not obtained. Adjust the oscillator broadcast trimmer until maximum output is obtained. This trimmer is on the tuning condenser and its location is shown in Fig. 2.

Then set the signal generator for 1500 K. C. Turn the rotor until maximum output is obtained. Loosen the pointer screw and set the pointer at the 1500 K. C. mark on broadcast band scale. Retighten pointer screw. Then adjust the antenna and 1st detector broadcast trimmers until maximum output is obtained.

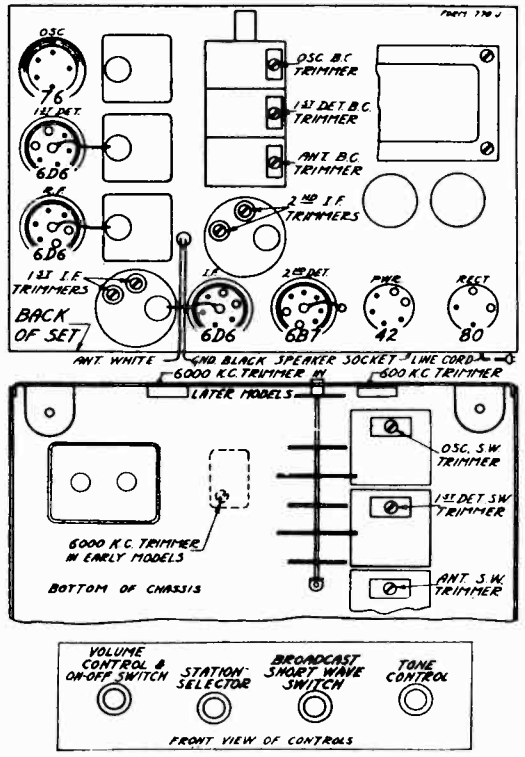


Fig. 2—Tube Arrangement and Location of Trimmers

Next set the signal generator for 600 K. C. and adjust the 600 K. C. trimmer. The adjusting screw is reached through a hole in the front panel of the chassis as shown in Fig. 2. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over

this setting at the same time adjusting the 600 K. C. trimmer screw until the highest output is obtained.

Short Wave Band Adjustment

CAUTION—After the broadcast band alignment as described above has been made, do not change the adjustment of any of the broadcast band trimmers.

Turn the broadcast short wave switch to the short wave position. Turn the rotor to the full open position. As explained above, the volume control should be at the maximum position and the signal should be attenuated to prevent A. V. C action. Set the signal generator for 18,300 K. C. Then adjust the oscillator short wave trimmer for maximum output. This trimmer is reached from under the chassis and its position is shown in Fig. 2.

Next set the signal generator for 15,000 K. C. Turn the rotor until the dial pointer is at the 15,000 K. C. mark on the short wave portion of the dial scale. Then adjust the antenna and 1st detector short wave trimmers until maximum output is obtained.

In aligning the short wave band of the receiver, it will be noted that the signal will be heard with the signal generator set at two points 912 K. C. apart. That is, if the receiver is tuned to 15,000 K. C. a signal will be heard when the signal generator is set at 15,000 K. C. and again at approximately 15,912 K. C. This is due to image reception or the fact that a 456 K. C. beat is obtained when the signal is 456 K. C. lower than the receiver oscillator and also when the signal is 456 K. C. higher than the receiver oscillator. Care should be taken to see that the receiver is tracked with the signal generator adjusted to the lower of the two frequencies at which a signal is heard, in order that the oscillator in the receiver will be 456 K.C. higher in frequency than the signal.

Next set the signal generator for 6000 K. C. and adjust the 6000 K. C. trimmer. In the first models of this receiver, this condenser was located at the point shown in Fig. 2 in dashed lines. In the later models it is reached through a hole in the front panel of the chassis as shown in the same illustration. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 6000 K. C. trimmer screw until the highest output is obtained. In the early models this adjustment is broad while in the later models it is more critical.

Caution

The can of electrolytic condenser C16 is not at ground potential. Therefore in any work on the chassis, care should be taken not to touch this can and any other grounded point such as the other electrolytic condenser can

Replacing Drive Cord

Remove chassis from cabinet.

Take off the pilot light assembly by lifting off the two sockets and spring clips.

Detach the large pointer by removing the screw at the center of the dial.

Loosen the dial assembly by taking out the two screws which secure the bottom of this assembly to the chassis.

Then lay the complete dial assembly face downward in front of the chassis. It is not necessary to remove the volume control and tone control collars which hold the indicator cords of these two controls in position.

Turn the drive drum until the opening in this drum is approximately vertical and with the hole at the top as shown in Fig. 3.

Remove the tension spring and the old drive cord.

See that the eyelet is in the hole in the drive drum as shown in Fig. 3. Insert one end of the drive cord from the outside through the hole in the eyelet in the drive drum.

Voltages at Sockets

LINE VOLTAGE — 115
ANTENNA SHORTED TO GROUND

Type of Tube	Function	Across Fila. or Heater	Plate to Cath.	Screen to Cath.	Control Grid to Cath.	Normal Plate M. A.
6D6	R. F.	6.3	246	100	3.6(1)	5.3
6D6	1st Det.	6.3	237	97	8.0(2)	3.4
76	Osc.	6.3	115		0	4.8
6D6	I. F.	6.3	246	130	3.6(1)	8.3
6B7	2nd Det.	6.3	50(3)	40(3)	0	2.7
42	Power	6.3	230	245	17.0(4)	33.0
80	Rectifier	5.0				37.0 per plate

(1) Cathode to ground
(2) Subject to variation
(3) Read with 1,000,000 ohm meter
(4) As read across R15

Tie the end of the cord which has been inserted in the hole to one end of the tension spring.

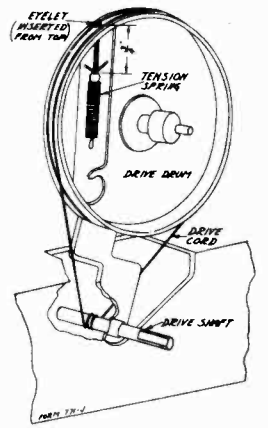


Fig. 3—Drive Cord Replacement

Wrap the cord in a clockwise direction (facing front of chassis) around the drive drum approximately one-half turn.

Then tilt the chassis up on its back panel and bring the cord mentioned in the previous paragraph down to the drive shaft. Wrap it two and one-half times around the drive shaft as shown in Fig. 3.

Then bring this cord up from the drive shaft and wrap it around the drive drum approximately one and one fifth turns in a clockwise direction until it is up to the hole in this drum as illustrated.

Insert the free end of the cord through the hole in the eyelet and tie it to the end of the tension spring. The end of the spring, when hanging free, should be approximately ¾" from the flange of the drum as shown in Fig. 3. Cut off the surplus length of cord after it is knotted.

Then secure the other end of the tension spring over the spur on the drive drum.

Replace the dial assembly and pointer.

Replace the pilot light assembly after which the chassis may be reinstalled in the cabinet.

Changes in Early Models

There are two points at which the early models of this receiver differ from the present models. These points are indicated in Fig. 1 and described below.

Power Unit

In the early models a separate filter choke was used in series at the point indicated in note A in Fig. 1. The values of the two filter condensers C16 and C17 were less than as used at present. The values of the old and new condensers are shown in the parts list. A different power transformer was also used with the early filter system and this is likewise shown in the parts list.

The two power transformers are not interchangeable and care must be taken in ordering for replacement purposes to order the correct one. The original chassis can be identified by the separate filter choke.

Short Wave Oscillator

Referring to Fig. 1 it will be noted that there is a tracking coil L2 and a trimmer condenser C21 connected in series between the short wave oscillator coil and ground. In the first models of this receiver these two units, which are required for tracking the short wave oscillator, are not used. Instead a series padding condenser was used at the point in the circuit indicated by note B in Fig. 1.

At the time this change was made a change was also made in the oscillator assembly and care must be taken in ordering for replacement purposes to order the correct one. Early models with the original oscillator assembly have no spot of paint or a green spot of paint on the 80 socket rivet. Later models with the new oscillator assembly and new tracking system have a red spot of paint on the 80 socket rivet.

Twenty-five Cycle Receivers

The twenty-five cycle receiver differs from the sixty-cycle receiver, only in the fact that a different power transformer is used. The correct power transformer is shown in the parts list.

The twenty-five cycle chassis can be operated satisfactorily from a sixty-cycle power supply. However, the reverse is not true, the sixty-cycle receiver cannot be operated from a twenty-five cycle power supply.

A 110-220 Volt, 40-60 cycle Power Transformer is also available for this model.

REPAIR PARTS LIST FOR 7 TUBE BROADCAST AND SHORT WAVE RECEIVER

When ordering parts be sure and give the part number. Also give the series number which will be found in the License Notice label. If there is a spot of paint on the chassis, give this color.

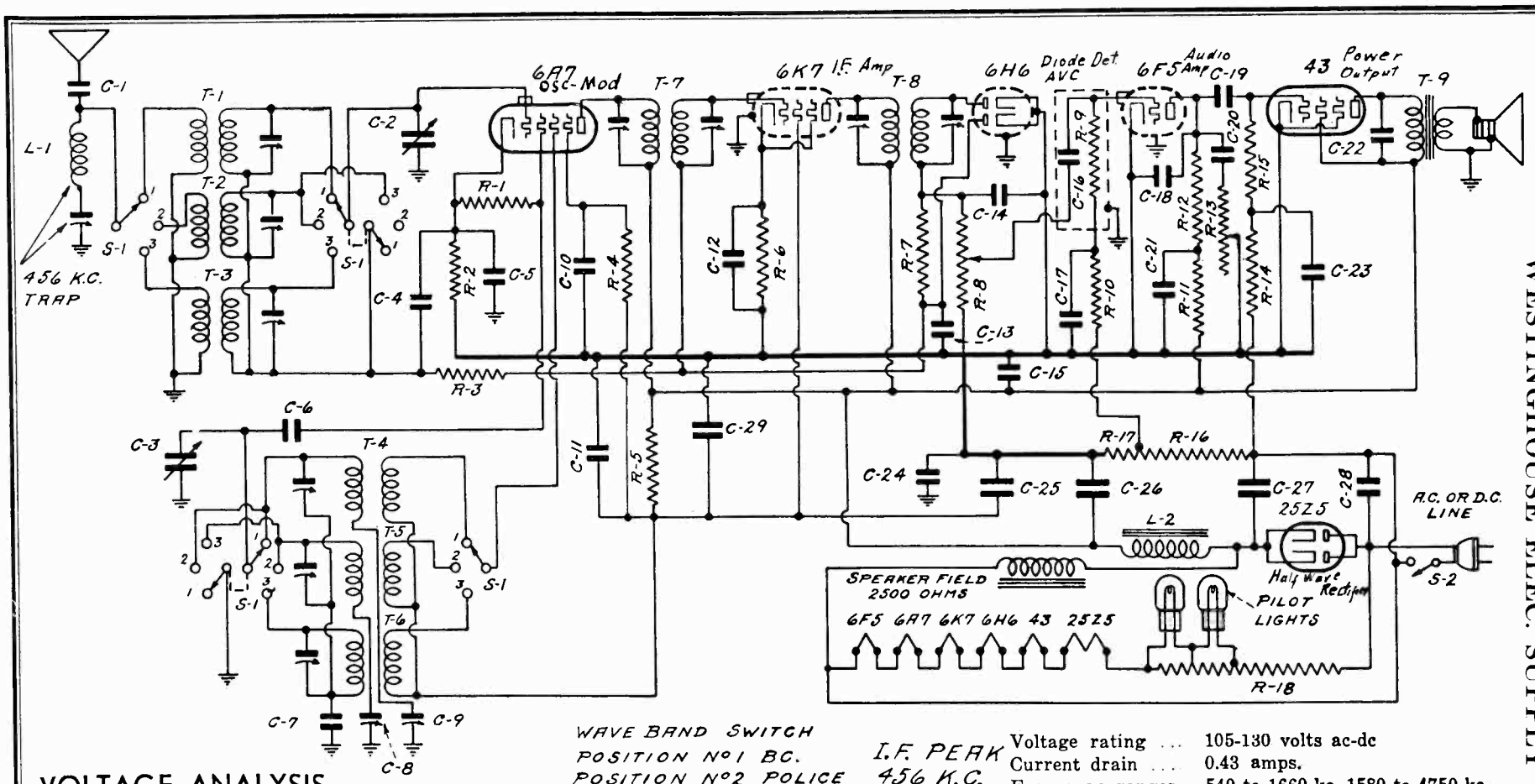
Part No.	Item	List Price
P-1441	Double Mounting Strip	.10
P-1421	Single Mounting Strip	.10
P-2060	Knob Small	.20
P-20b2	Knob Large	.20
P-10337	Small Tone & Volume Control Disc	.10
P-20912	Pointer, Large	.20
P-2012	Pilot Light Bulb 6-8 volt	.15
P-10272	Rubber Mounting Feet	.10
P-10470	Glass Crystal	.15
P-20873	Crystal Retainer Ring	.10
P-2090	6" Speaker Mantel Sets Ll - 1250 ohm	6.00
P-2091	8" Speaker Console Sets Ll - 1250 ohm	6.75
	8" Black Drive Cord (V. C or T. C. Ind.)	.05
	29" Black Drive Cord (Cond. Drive)	.10
P-2136	Pilot Lamp Socket & Clip Assembly	.10
P-2101	Broadcast-Short Wave Switch	1.88

Part No.	Item	List Price
P-1885	No. 6D6 Socket	$ .15
P-2022	No. 76 Socket	.15
P-1944	No. 6B7 Socket	.15
P-1864	No. 42 Socket	.15
P-2025	No. 80 Socket	.15
P-1635	Speaker Socket	.10
P-40445	Tube Shield for 6D6 & 6B7 Tubes	.15
P-40444	Tube Shield for 76 Tube	.15
P-40443	Tube Shield Bases	.10
*P-30634	Power Transformer 115 Volts, 60 Cycles	3.00
*P-30633	Power Transformer 115 Volts 25 Cycles	4.50
*P-30636	Power Transformer 115-230 Volts, 40-60 Cycles	3.25
†P-30646	Power Transformer 115 Volts, 60 Cycles	3.25
†P-30647	Power Transformer 115 Volts, 25 Cycles	4.50
†P-30648	Power Transformer 115-230 Volts, 40-60 Cycles	3.75
*P-30637	Filter Reactor	.85
P-30599 A	Output Transformer T 10	1.15
P-3176	Antenna R.F. Trans. less can T1 & T2	1.80
P-3177	Inter-Stage R. F. Trans. less can T3 & T4	1.75
*P-3178	Oscillator Coil Assembly Less can T8 & T9	1.70
†P-3183	Oscillator Coil Assembly Less can T9 & T9	1.70
P-30435	Cans for the above Assemblies	.15
†P-3190	High Frequency Oscillator Tracking Coil L2	.35
P-3179	1st I. F. Assembly Complete with Can T5	2.15
P-3180	2nd I. F. Assembly Complete with Can T6	1.75
P-30342-A	Grid Cap Only	.10
P-70702	AC Cord & Plug	.70
P-1504	8 Terminal Mounting Strip	.10

Part No.	Code	Resistance	Watts	Type	List Price
P-98016	R1	200 ohm	.2	Flex. Wire Wound	$ .15
P-B93303	R2	30,000 ohm	.5	Carbon	.20
P-B94602	R3	6,000 ohm	.5	Carbon	.15
P-A95205	R4	2.0 megohm	.2	Carbon	.15
P-98020	R5 16,000 ohm 1.5 R6 25,000 ohm 1.0			Armored wire wound	.65
P-A94203	R7	20,000 ohm	.2	Carbon	.15
P-B94603	R8	60,000 ohm	.5	Carbon	.15
P-B94254	R9	250,000 ohm	.5	Carbon	.15
P-96014	R10	500,000 ohm		Vol. Control & Switch	1.06
P-A94252	R11	2,500 ohm	.2	Carbon	.15
P-A94104	R12	100,000 ohm	.2	Carbon	.15
P-A95504	R13	500,000 ohm	.2	Carbon	.20
P-A94104	R14	100,000 ohm	.2	Carbon	.15
P-98015	R15	235 ohm	2.0	Flex. Wire Wound	.15
P-97011	R16	150,000 ohm		Tone Control	.75

Part No.	Code	Capacity	Volts	Type	List Price
P-80919	C1	.00025 mfd.		Moulded	$ .20
P-2102	C2	3-40 mmfd.		Ant. S.W. Trimmer	.15
	C3	(See 3 Gang Cond.)		Gang Trimmer	
P-80862	C4	.05 mfd.	200V.	Tubular	.15
P-80888	C5	.25 mfd.	200V.	Tubular	.25
P-80890	C6	.05 mfd.	400V.	Tubular	.20
P-2102	C7	3-40 mmfd.		1st Det.S.W. Trim.	.15
	C8	(See 3 Gang Cond.)		Gang Trimmer	
P-1386-B	C9 90±30 mmfd. C10 90±30 mmfd.			Dual Trimmer Part of I. F. Assem.	
P-81034	C11	.25 mfd.	300V	Tubular	.30
P-1386-B	C12 90±30 mmfd. C13 90±30 mmfd.			Dual Trimmer Part of I. F. Assem.	
P-81040	C14	.25 mfd.	400V.	Tubular	.35
P-80977	C15	.0001 mfd.		Moulded	.20
†P-81043	C16	18.0 mfd.	300V.	Electrolytic Wet	1.30
*P-80916	C16	8.0 mfd.	450V.	Electrolytic Wet	1.25
*P-81032	C17	8.0 mfd.	500V.	Electrolytic Wet	1.30
†P-81042	C17	14.0 mfd.	400V.	Electrolytic Wet	1.45
P-80862	C18	.05 mfd.	200V.	Tubular	.15
P-2112	C19	300-500 mmfd.		600 K.C. Trimmer	.45
P-2102	C20	3-40 mmfd.		Osc. S.W. Trimmer	.15
†P-1685	C21	70±30 mmfd.		6000 K.C. Trimmer	.35
	C22	(See 3 Gang Cond.)		Gang Trimmer	
P-81005	C23	.000035 mfd.		Moulded	.15
P-80914	C24	.002 mfd.	600V.	Tubular	.20
P-80981	C25	.01 mfd.	400V.	Tubular	.20
P-81044	C26	.03 mfd.	400V.	Tubular	.15
P-80914	C27	.002 mfd.	600V.	Tubular	.20
P-81033	C28	.25 mfd.	400V.	Tubular	.35
P-80887	C29	.1 mfd.	400V.	Tubular	.20
P-80890	C30	.05 mfd.	400V.	Tubular	.20
P-80887	C31	.1 mfd.	400V.	Tubular	.20
P-81027-B	3 Gang Condenser				3.35
*P-2113	600-1300 mmfd			6000 K.C. Trimmer	.61

* Used in early Models. See Article on changes in this Manual
† Used in Later Models. See Article on changes in this Manual



WAVE BAND SWITCH
POSITION N°1 BC.
POSITION N°2 POLICE
POSITION N°3 S.W.

I.F. PEAK 456 K.C.

Voltage rating ...	105-130 volts ac-dc
Current drain ...	0.43 amps.
Frequency ranges	540 to 1660 kc, 1580 to 4750 kc, 5.5 to 16 mc.

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to the cathode of the 43 tube (B minus). Line voltage for these readings was 117.5 volts, 60 cycles, a.c.

Tube	*Plate*	*Screen*	*Cathode*	*Osc. Plate*	*Fil.*
6A7	99	43	1.1	80	6.3
6K7	99	80	1.8	—	6.3
6H6	—	—	0	—	6.3
6F5	50	—	0	—	6.3
43	87	99	0	—	24

Voltage across speaker field (black and yellow leads)—120

Voltage across filter choke—9.5

The 250 ohm bias resistor, R16 and R17 on schematic diagram, is located underneath the chassis deck near the volume control.

Voltage across the two outside terminals of this resistor—11.5

Voltage from cathode of 43 tube to central terminal of resistor—1.0

Fil. drop.res. 2LR-212 is a cyl. plug-in type and is located at chassis top bet. 6H6 & 25Z5 tubes. O.P. Transf. 2LT-221 (T9 on schematic) and filter choke 2CT-207A (L2 on schematic) are located in square can on chassis top to left of speaker.

MODEL WR-101
Chassis U6F
Alignment, Parts

WESTINGHOUSE ELEC. SUPPLY CO.

ADJUSTMENTS

An oscillator with frequencies of 456, 600, 1600, 1700, 4500 and 15,000 kc should be used. In addition, an output meter should be used across the voice coil or output transformer for observing maximum response.

I-f and Wave-trap Alignment

The i-f transformers are located on the top of the chassis. The four trimmers, two for each i-f transformer, are located at the tops of the cans. Set the wave-band switch to broadcast (extreme clockwise position) and rotate variable condenser to minimum capacity. Feed 456 kc to grid of the 6A8 tube and adjust the four i-f trimmers for maximum response. Then feed 456 kc through the antenna and adjust the wave-trap trimmer for *minimum response.* The trimmer is on the wave-trap, which is located on top of the chassis behind the speaker. This reduces telegraphic code interference.

Location of Coils

The antenna coils for the three bands are wound on one form and mounted on the top of the chassis to the right of the speaker. The three trimmers for these coils are mounted on the bakelite strip fastened to the coil form. The upper trimmer is for the short-wave coil, the central trimmer for the police coil and the lower trimmer for the broadcast coil.

The oscillator coils for the three bands are wound on one form and mounted underneath the chassis deck on the right-hand wall with the trimmers facing out. The trimmer screws are available through three holes in the chassis wall. The trimmer closest to front is for the broadcast oscillator coil, the central trimmer is for the police oscillator coil and the trimmer furthest from front is for the short-wave oscillator coil.

The adjusting screws for the dual padder are also available at the right-hand chassis wall. The screw closer to the front is for the broadcast band and the other is for the police band. The short-wave band has no adjustable padder.

Broadcast Alignment

Set the wave-band switch to broadcast position (extreme clockwise) and dial pointer to 600. Feed 600 kc through antenna lead and adjust broadcast padder (lower row on right wall, closest to front) for maximum response. Set pointer to 1600, feed 1600 kc and adjust the broadcast oscillator trimmer (top row on right wall, closest to front) for maximum response, and then the broadcast antenna trimmer (on antenna coil, lower trimmer). Return pointer to 600 and rock the variable condenser (rotate condenser back and forth through small arc) while adjusting the broadcast padder for maximum response. If a readjustment is necessary return to 1600 and realign the antenna and oscillator trimmers.

Police Alignment

Set the wave-band switch to police (central position), pointer to 1700 and feed 1700 kc through antenna lead. Adjust police band padder (furthest from front on right wall, lower row) for maximum response. Set pointer to 4500 and feed 4500 kc. Adjust police band oscillator trimmer (central trimmer on right wall, upper row) for maximum response. If two peaks are heard, select the one of minimum capacity (see General Instructions below). Then adjust police band antenna trimmer (central one on top) for maximum response, selecting the peak of maximum capacity. Again feed 1700 kc, with pointer at 1700, rock variable condenser and adjust police band padder for maximum response. Realign at 4500 if necessary.

Short-wave Alignment

Set wave-band switch to short-wave (counter-clockwise) position and pointer at 15 megacycles. Feed 15,000 kc through antenna. Adjust short-wave oscillator trimmer (furthest from front on right wall, top row) for maximum response. If two peaks are obtained, select the one of minimum capacity. Adjust the short-wave antenna trimmer (upper trimmer on antenna coil) for maximum response while rocking the variable condenser.

Check all three bands for dead spots or incorrect image responses.

General Instructions

The set's oscillator is higher in frequency than the signal on all three bands. Images, therefore, should be observed on the low-frequency side of the signals.

Always choose the minimum capacity peak on oscillator trimmers and maximum capacity peak on the antenna trimmers. The last motion in adjusting trimmers should always be a tightening one.

Never leave a trimmer with the outside plate so loose that there is no tension on the screw. Either bend the plate up or remove the screw entirely. Loose screws are a source of noise, frequency drift and microphonism.

In aligning antenna trimmers on the high-frequency signals there is usually a tendency for the oscillator to drift, due to interlocking. To compensate for this, always keep re-tuning the variable condenser.

REPLACEMENT PARTS LIST

Item	Part No.	DESCRIPTION	Price
L1	MMT-149	456 kc adjustable wave trap	$ .35
L2	2CT-207A	Filter choke—200 ohms	.60
T1, T2, T3	2LT-219	Three-band antenna coil	1.80
T4, T5, T6	2LT-220	Three-band oscillator coil	1.80
T7	2LT-224	456 kc first i-f transformer	1.15
T8	2LT-225	456 kc second i-f transformer	1.15
T9	2LT-221	Speaker output transformer	1.00
R1	KR-53	50,000 ohm ¼ watt carbon resistor	.16
R2, R6	CCR-140	350 ohm ½ watt wire-wound resistor	.16
R3	KR-55	250,000 ohm ¼ watt carbon resistor	.16
R4	ZZR-196	30,000 ohm ¼ watt carbon resistor	.16
R5	LR-64	5,000 ohm ¼ watt carbon resistor	.16
R7	KR-57	1 megohm ¼ watt carbon resistor	.16
R8, S2	ZZR-190A	Volume control with line switch—0.5 megohm.	.75
R9, R10, R15	KR-56	0.5 megohm ¼ watt carbon resistor	.16
R11	KR-54	100,000 ohm ¼ watt carbon resistor	.16
R12	LR-61	200,000 ohm ¼ watt carbon resistor	.16
R13	ZZR-191A	Tone control—250,000 ohms	.55
R14	OR-73	25,000 ohm ¼ watt carbon resistor	.16
R16, R17	2CR-211	250 ohm, one watt, wire-wound tapped resistor R16—230 ohms R17—20 ohms	.25
R18	2LR-212	Plug-in type ballast resistor	.85
C1, C22	AAC-114	0.001 mf mica condenser	.16
C2, C3	ZZC-184	Two-gang variable condenser	1.80
C4, C5	2LC-225	0.05 mf, 200 volt tubular high-frequency condenser	.16
C6	EC-24A	0.0001 mf mica condenser	.16
C7	ZZC-206	0.005 mf mica condenser	.16
C8, C9	JJC-144C	Dual adjustable padding condenser C8—800 to 1400 mmf C9—250 to 550 mmf	.60
C10, C11, C12 C13, C15, C24	2LC-223	Six-section condenser block C10—0.1 mf, 200 v. C11—0.1 mf, 200 v. C12—0.1 mf, 200 v. C13—0.05 mf, 200 v. C15—0.1 mf, 200 v. C24—0.2 mf, 200 v.	1.10
C14, C18	AC-7A	0.00025 mf mica condenser	.16
C16, C19	CCC-127A	0.01 mf, 200 volt tubular condenser	.16
C17, C21, C23	AC-6	0.1 mf, 200 volt tubular condenser	.16
C20	HC-34	0.006 mf, 600 volt tubular condenser	.16
C25, C26, C27	2LC-224	Multiple 4, 8 and 16 mf electrolytic condenser C25—4 mf, 150 volts C26—8 mf, 150 volts C27—16 mf, 150 volts	2.10
C28	LC-64	0.05 mf, 400 volt tubular condenser	.16
C29	YC-98A	Tubular 4 mf, 150 volt electrolytic condenser	.70
S1	2LS-142	Dynamic speaker (without output transformer)	3.75
	ZZS-129A	Wave-band switch	1.05
	XL-9	Pilot light, 6.3 volts, .25 amp. Mazda No. 46	.15
	ZZD-26A	Airplane dial	1.85
	ZZZ-209	Escutcheon	.20

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

WESTINGHOUSE ELEC. SUPPLY CO.

MODEL WR-208
Schematic
Voltage, Color Coding

The color coding of the i-f transformers is as follows:

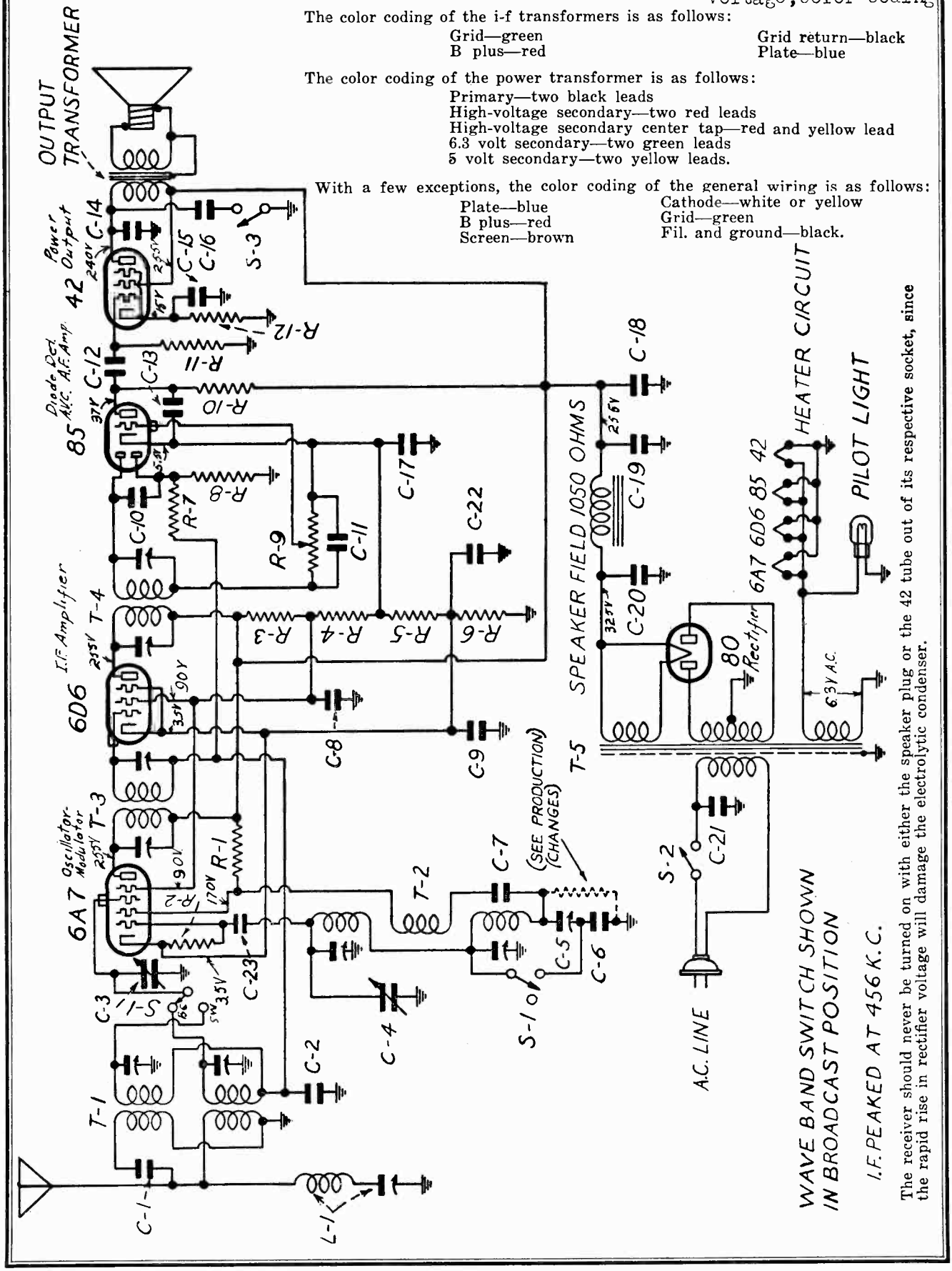
Grid—green
B plus—red
Grid return—black
Plate—blue

The color coding of the power transformer is as follows:

Primary—two black leads
High-voltage secondary—two red leads
High-voltage secondary center tap—red and yellow lead
6.3 volt secondary—two green leads
5 volt secondary—two yellow leads.

With a few exceptions, the color coding of the general wiring is as follows:

Plate—blue
B plus—red
Screen—brown
Cathode—white or yellow
Grid—green
Fil. and ground—black.



The receiver should never be turned on with either the speaker plug or the 42 tube out of its respective socket, since the rapid rise in rectifier voltage will damage the electrolytic condenser.

MODEL WR-208
Alignment, Changes
Parts

WESTINGHOUSE ELEC. SUPPLY CO.

REPLACEMENT PARTS

*Item	Part No.	DESCRIPTION	List Price Effective as of Sept. 1st, 1935 PRICE
L1	MMT-149	456 kc adjustable wave trap	$ .35
T1	2NT-226	Two-band antenna coil	1.10
T2	2NT-227	Two-band oscillator coil	.90
T3	2NT-230	456 kc first i-f transformer	.90
T4	2NT-231	456 kc second i-f transformer	.90
T5	2NT-233	Power transformer	2.70
R1	LR-60	20,000 ohm ¼ watt carbon resistor	.16
R2	KR-53	50,000 ohm ¼ watt carbon resistor	.16
R3	BR-12	25,000 ohm 1 watt carbon resistor	.16
R4	2NR-217	40,000 ohm 1 watt carbon resistor	.16
R5	FFR-126	500 ohm ½ watt wire-wound resistor	.16
R6	IIR-130	150 ohm ½ watt wire-wound resistor	.16
R7, R8	KR-57	1 megohm ¼ watt carbon resistor	.16
R9, S2	2NR-214	Volume control with line switch—250,000 ohms	.80
R10	KR-54	100,000 ohm ¼ watt carbon resistor	.16
R11	KR-56	500,000 ohm ¼ watt carbon resistor	.16
R12	CCR-118	450 ohm 1 watt wire-wound resistor	.16
C1, C23	AAC-106A	0.00005 mf mica condenser	.16
C2, C8	BC-12	0.05 mf, 200 volt tubular condenser	.16
C3, C4	2NC-228	Two gang variable condenser	2.00
C5	2NC-231	Single adjustable padding condenser Range—300 to 600 mmf	.35
C6	2NC-230	0.00135 mf mica condenser	.20
C7	KC-58	0.01 mf, 400 volt tubular condenser	.16
C9	BC-13	0.25 mf, 200 volt tubular condenser	.16
C10, C11, C22	AC-7A	0.00025 mf mica condenser	.16
C12	LC-65	0.02 mf, 400 volt tubular condenser	.16
C13	IC-47	0.0005 mf mica condenser	.16
C14	ZC-115	0.006 mf, 1000 volt tubular condenser	.16
C15	IC-43A	Tubular 5 mf, 25 volt dry electrolytic condenser	.60
C16	2TC-189	0.015 mf, 1000 volt tubular condenser	.16
C17	AC-6	0.1 mf, 200 volt tubular condenser	.16
C18	EEC-132	0.1 mf, 400 volt tubular condenser	.16
C19	2NC-247	16 mf, 405 volt wet electrolytic condenser (regulating type)	.80
C20	2NC-246	16 mf, 450 volt wet electrolytic condenser	.80
C21	2NC-250	0.01 mf, 250 volt a-c condenser in tubular metal container	.20
	2NS-122	6½" dynamic speaker	3.75
S1	TTS-111E	Wave-band switch	.40
S3	2TS-145B	Tone control switch	.25
	XL-9	Pilot light, 6.3 volt, .25 amp. Mazda No. 46	.15
	2ND-34B	Airplane dial	1.30
	2NZ-306	Escutcheon with crystal	.50
	2TM-211	Escutcheon reflector ring	.10

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

PRODUCTION CHANGES

In early production:

a. Airplane dial was part number 2ND-34 and had a grey dial face. Later dial, part number 2ND-34B, has a black dial face.

b. C19 and C20 were each 12 mf, 450 volt electrolytics.

c. R2 was originally in position indicated by dotted lines. It was later placed across the oscillator grid and cathode of the 6A7 tube (as now shown in the schematic) and at the same time C23 was added and C22 omitted.

ADJUSTMENTS

An oscillator with frequencies of 456, 600, 1600 and 6000 kc should be used.
An output meter should be used across the voice coil or output transformer for observing maximum response.
If the circuit is at all disturbed, both the broadcast and short-wave bands must be realigned.

Location of Coils and Trimmer Adjustments

The two i-f transformers are located on top of the chassis deck. The second i-f is the one directly behind the variable condenser. The four trimmers, two for each transformer, are accessible through holes in the tops of the cans.

The 456 kc wave trap is located on top of the chassis deck between the 6A7 tube and the first i-f transformer.

The adjustable padding condenser for the broadcast band is mounted underneath the chassis (in the corner near the 6A7 tube) with the screw adjustment accessible through a hole in the top of the chassis.

The antenna coils for the broadcast and short-wave bands are wound on one form and mounted underneath the chassis deck directly behind the adjustable padding condenser. The trimmers for these coils are also accessible through holes in the top of the chassis. The trimmer nearest the front of the chassis is the short-wave antenna trimmer. The trimmer farthest from the front of the chassis is the broadcast antenna trimmer.

The oscillator coils for the broadcast and short-wave bands are wound on one form and mounted underneath the chassis deck near the variable condenser. The trimmers for these coils are accessible through holes in the top of the chassis. The trimmer nearest the front of the chassis is for the short-wave oscillator coil and the trimmer farthest from the front is for the broadcast oscillator coil.

I-f and Wave-trap Alignment

Rotate the wave-band switch to the broadcast position, clockwise. Set the variable condenser at the minimum capacity position and feed 456 kc to the grid cap of the 6A7 tube. Adjust the four i-f trimmers for maximum response. Feed 456 kc to the antenna lead and adjust the wave-trap trimmer (mounted on wave-trap) for *minimum response.*

Short-wave Alignment (Alignment of the short-wave band should precede broadcast alignment)

Use a 400 ohm dummy antenna (a 400 ohm resistor in series with the test oscillator antenna lead) in aligning the short-wave coils. Rotate the wave-band switch to the short-wave position (counter-clockwise) and set the dial pointer exactly at 6 megacycles. Feed 6000 kc and adjust the short-wave oscillator trimmer (closest to front beside the variable condenser) for maximum response and then adjust the antenna trimmer (left side of top of chassis, closest to front). Be very careful to choose the minimum capacity peak on the oscillator trimmer. (See General Instructions below.)

Broadcast Alignment

Use a standard dummy antenna in aligning the broadcast coils. (A .0002 condenser may be used as a substitute.) Rotate the wave-band switch to the broadcast position, clockwise. Set the dial pointer at 600 and feed 600 kc. Adjust the broadcast series padder (in corner near 6A7 tube) for maximum response. Move the dial pointer to 1600 and feed 1600 kc. Adjust the broadcast oscillator trimmer (farthest from front beside the variable condenser) for maximum response and then adjust the broadcast antenna trimmer (farthest from front at left side of chassis). Return pointer to 600, feed 600 kc and readjust the broadcast series padder, rocking the variable condenser (rotate the variable condenser shaft back and forth through a small arc) for maximum response.

GENERAL INSTRUCTIONS

The set's oscillator is higher in frequency than the signal, so images should be observed on the low frequency side of the signals.

Always choose the minimum capacity peak on oscillator trimmers and maximum capacity peaks on antenna trimmers. The last motion in adjusting trimmers should always be a tightening one, not a loosening one.

Never leave a trimmer with the outside plate so loose that there is no tension on the screw. Either bend the plate up or remove the screw entirely.

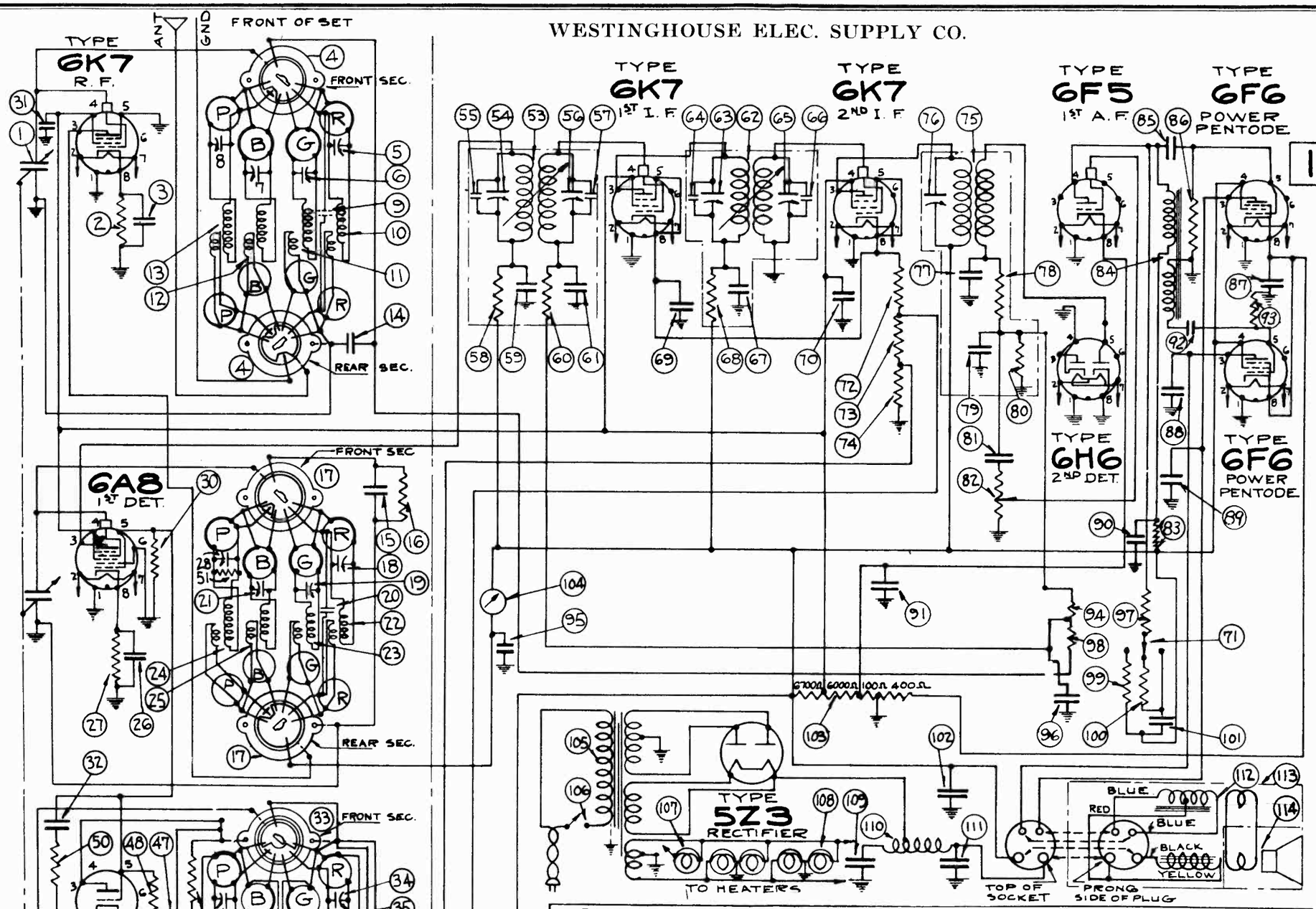
Always use as weak a test signal as possible during alignment.

The adjustable padding condenser for the broadcast band is mounted underneath the chassis (in the corner near the wave-band switch) with the screw adjustment accessible through a hole in the top of the chassis. The short-wave band has a fixed padder which is a 1350 mmf molded mica condenser. (Note that this condenser is coded 1300 mmf.) When replacing this fixed padder be careful to use a condenser which has a capacity within 2% of 1350 mmf, otherwise the short-wave coils may not track.

WESTINGHOUSE ELEC. SUPPLY CO.

MODEL WR-306
Schematic, Voltage
Resistance

INT. FREQ. 465 K.C.



D.C. RESISTANCE — MEASURED WITH WAVE-CHANGE SWITCH IN CORRESPONDING BAND POSITION			
COIL	DIA.№	PRIM.	SEC.
P-ANT.	13	130 ohms	25 ohms
P-RF.	24	38 "	25 "
P-OSC.	38	8.0 "	13.5 "
B-ANT.	12	22 "	4 "
B-RF.	25	.5 "	4.5 "
B-OSC.	39	1.5 "	3 "
G-ANT.	11	3.2 "	1 "
G-RF.	23	1.5 "	1 "
G-OSC.	40	.5 "	1 "
R-ANT.	10	1 "	.4 "
R-RF.	22	2 "	.4 "
R-OSC.	41	.5 "	.4 "
1ST. IF.	53	3.5 "	3.5 "
2ND. IF.	62	3.5 "	3.5 "
3RD. IF.	75	11.5 "	11.5 "
CHOKE	110	350 "	
1ST. AF.			
TRANS.	84	3200"	3800"
OUTPUT		265 "	
TRANS.	112	312 "	.03"
SPKR.			
FIELD		1900 "	
VOICE			
COIL	114	2.6 "	

SOCKET VOLTAGES — LINE = 115 VOLTS — TAKEN FROM BOTTOM OF SOCKETS
MEASUREMENTS MADE WITH A 1000 OHMS PER VOLT VOLTMETER AND WITH WAVE-CHANGE SWITCH IN BROADCAST BAND POSITION

TUBE	STAGE	FIL.	PIN NOS.	PLATE	PIN NOS.	SCREEN	PIN NOS	CATHODE	PIN NOS.
6K7	RF	6.2	2 - 7	245	3 - 1	100	4 - 1	2.5	1 - 8
6A8	1ST. DET.	6.2	2 - 7	240	3 - 1	100	4 - 1	2.2	1 - 8
6C5	OSC	6.2	2 - 7	200	3 - 1				
6K7	1ST IF	6.2	2 - 7	240	3 - 1	100	4 - 1	8.0	1 - 8
6K7	2ND IF	6.2	2 - 7	255	3 - 1	100	4 - 1	8.0	1 - 8
6H6	2ND. DET	6.2	2 - 7						
6F5	1ST. AF.	6.2	2 - 7	250	4 - 1			1.75	1 - 8
6F6	OUTPUT	6.2	2 - 7	350	3 - 1	255	4 - 1	19.5	1 - 8
6F6	OUTPUT	6.2	2 - 7	350	3 - 1	255	4 - 1	19.5	1 - 8
5Z3	RECT.	5.1		720					

MODEL WR-306
Alignment, Parts

WESTINGHOUSE ELEC. SUPPLY CO.

WESTINGHOUSE
RADIO
MODEL WR-306

LINE-UP CAPACITOR ADJUSTMENTS

CAUTION: DO NOT INTERFERE WITH THE I.F. ADJUSTMENTS EXCEPT WHEN IT HAS BEEN ABSOLUTELY DETERMINED THAT IT IS THE CAUSE OF THE TROUBLE AND ONLY WHEN HIGH GRADE TESTING EQUIPMENT IS TO BE USED.

To align the circuits of this receiver it is necessary to have available a test oscillator, the output of which can be continuously varied, with absence of harmonics, over the frequency range of the receiver, are brought into alignment. A conventional output meter can be connected across the voice coil to indicate when the circuits are aligned. The sensitivity of the output meter should be adjusted to give a satisfactory reading with a low input signal.

Before attempting to align the receiver, the service man should familiarize himself with the location of the various adjustments, the tubes and various assemblies in the receiver. Top and bottom plates are provided for convenience in aligning the r-f and oscillator circuits. The chassis should be carefully studied before the actual work is started.

ADJUSTMENT OF I.F. (465 K.C.)

NOTE: BECAUSE OF THE VARIABLE SELECTIVITY INCORPORATED IN THIS RECEIVER, IT IS IMPERATIVE THAT THE FOLLOWING PROCEDURE BE FOLLOWED IN ORDER TO OBTAIN ACCURATE ALIGNMENT.

THE I.F. TRIMMERS ARE ACCESSED ONLY WHEN THE VARIABLE SELECTOR COILS ARE PLACED IN A TWO-THIRDS MECHANICAL POSITION.

TO PROPERLY SET THE I.F. TRANSFORMERS, TURN THE VARIABLE SELECTOR KNOB FULLY CLOCKWISE OR COUNTER-CLOCKWISE TO OBTAIN ACCURATE ALIGNMENT.

THE I.F. TRANSFORMERS ARE ADJUSTED FOR MAXIMUM SENSITIVITY AT THE FACTORY AND SHOULD NOT BE DISTURBED UNLESS THEY ARE AGAINST THE STOPS. THIS IS USUALLY INDICATIVE OF TROUBLE IN THE CIRCUITS OPERATED. THE FOLLOWING:

THE CIRCUITS ARE SO DESIGNED THAT THE SENSITIVITY OF THE RECEIVER CHANGES VERY LITTLE FROM MAXIMUM SELECTIVITY TO MAXIMUM SELECTIVITY. IT IS NECESSARY TO HAVE THIS VARIABLE SELECTIVITY IN ORDER TO OPERATE PROPERLY, IT IS NECESSARY TO HAVE LESS COUPLING BETWEEN THE I.F. TRANSFORMER WINDINGS WHEN THE RECEIVER IS TUNED TO THE MAXIMUM SELECTIVITY POSITION THAN WHEN IT IS TUNED TO THE MINIMUM SELECTIVITY POSITION. WITH THE CONTROL IN THIS POSITION THE I.F. STAGES ARE FOLLOWED:

1. Set volume control on full and connect output meter across voice coil.
2. Set wave-change switch to the Purple Band position. Connect test oscillator to 1400 K.C. and adjust #1 and #2 for maximum output.
3. Set test oscillator to 1360 K.C. and adjust #3 and #4 for maximum output.
4. Return to 1400 K.C. setting and make readjustment of #1, #2, #3 and #4.

ADJUSTMENT OF BROADCAST BAND

1. Set wave-change switch to White or Broadcast Band position.
2. Set test oscillator and dial indicator to 1500 K.C. and adjust #5, #21 and #22 to maximum output.
3. Set test oscillator and dial indicator to 600 K.C. and adjust #14 to maximum output.
4. Return to 1500 K.C. setting and make readjustment of #5, #21 and #22.

ADJUSTMENT OF GREEN BAND

Note: In adjusting the Green and Red Bands, a resistor of 10,000 ohms (10 M.) should be inserted in the high side of the test oscillator connected to the receiver. This combination is the approximate equivalent of a short wave antenna.

1. Set wave-change switch to the Green Band position.
2. Set test oscillator and dial indicator to 5500 K.C. and adjust #35, #19 and #6 to maximum output.
3. Set test oscillator and dial indicator to 1900 K.C. and adjust #45 to maximum output.
4. Return to 5500 K.C. setting and make readjustment of #35, #19 and #6.

ADJUSTMENT OF RED BAND

1. Set wave-change switch to Red Band position.
2. Set test oscillator and dial indicator to 9600 K.C. and adjust #36, #18 and #8 to maximum output.
3. Set test oscillator and dial indicator to 7000 K.C. and adjust #47 to maximum output.
4. Return to 9600 K.C. setting and make readjustment of #36, #18 and #8.

Note: The adjustment of the two short-wave oscillator leg condensers (#48 and #49) is very critical. Make them fast. This is done as follows:

Tune the receiver with the left hand by means of the tuning knob and adjust the leg condenser in either direction and then tune the receiver with the right hand by means of the tuning knob and adjust the leg condenser in either direction and then back to the left hand. Repeat this operation until the maximum point is obtained. The adjustment made when either the left or right hand condenser are changed. While this operation requires a few minutes, it can be easily acquired by practice and the operation requires only a few minutes.

IMPORTANT: WHEN TURNING ON, MAKING REPAIRS ON THIS RECEIVER, THE CHASSIS SHOULD NOT BE TURNED UPSIDE DOWN OR ON ITS SIDE. IF IT IS TURNED ON ITS SIDE, THE POWER SWITCH IS TURNED ON AND THE CHASSIS IS STRUCK SHARPLY, THE CONDENSER WILL COME IN CONTACT WITH THE CHASSIS AND BE DAMAGED. THIS POSITION TOO LONG THE CONDENSER MAY BE INJURED.

SERVICE PARTS LIST

Description of Parts	List Price
MAIN ASSEMBLIES	
Cabinet	◆ 10.75
Speaker	
BRACKETS AND CLIPS	
Tension clip for expander cable	.05
Bracket and switch assembly (tone control)	.35
Bracket assembly dial scale	.80
CABLE AND CORD ASSEMBLIES	
Line cable with plug	.50
Expander and dial drive cord - 81" long	.05
DIAL OSCILLATOR TRIM CONDENSERS	
Dual trim condenser (Black Band)	.65
Dual trim condenser (Purple Band)	.90
Dual trim condenser (Red Band)	.75
Dual trim condenser (Green Band)	
TUBE SOCKETS	
Tube socket - 8 prong	.20
Tube socket - 7 prong	.15
Speaker socket	.10
SCREWS AND WASHERS	
Screws chassis mounting 5/8"	.05
Screws chassis mounting 5/16"	.05
Self tapping screws # 7 x 1/4"	.05
Self tapping screws # 8 x 3/8"	.05
Flat washer for chassis mounting screw	.05
Lock washer for chassis mounting screw	.05
SPEAKER PARTS	
Diaphragm and coil assembly	1.25
Copper ring	.20
Steel plate	.40
Speaker field coil	1.85
Cone and frame assembly	.85
Cone and frame assembly and frame	.85
Cable clamp - plastic screw	.05
Cable clamp - plastic screw	.05
Speaker output transformer	2.00
Fastening screw - output transformer	.05
Speaker plug - 4 prong	.10
Speaker plug cover	.10
Baffle ring (metal)	1.25
Steel ring	
MISCELLANEOUS	
Knob - tuning large	.20
Knob - volume control and wave change switch	.20
Knob - tuning small	.15
Rubber gasket for dial	.30
Dial glass - complete	.80
Terminal strip with 3 antenna and ground	.10
Vernier drive shaft assembly	.70
Wave change switch assembly	.65
MISCELLANEOUS (cont'd)	List Price
Dial indicator	.85
Dial light	.15
Spring for dial cable	.80
Dial scale - glass	.70
Dial lamp socket assembly	.10
Spring clip on I.F. coil assembly	.05
Spring clip for expander cable	.05
Large pulley for I.F. expander	.25
Spring hook for expander cable (1 used)	.10
Cable pulley for expander cable	.25
Calibrated gear and pinion assembly (second hand)	.10
Dial indicator (second hand)	.05
Dial scale - glass (second hand)	.05
Shield for dial lamp	.05
Spring clip used with GR 9538	.05
Calibrated dial - opt. on tuning	

Variable condenser assembly	Part #
365 mmf. 2 gang condenser	CD 9829
.05 mfd. 200 V. condenser	CD 9830
Antenna section "Precision Tuner" assembly	SA 106586
4 to 25 mmf. antenna trim condenser (Red Band)	CD 9511
4 to 25 mmf. antenna trim condenser (Purple Band)	CD 9511
4 to 25 mmf. antenna trim condenser (White Band)	CD 9511
4 to 25 mmf. antenna trim condenser (Green Band)	CD 9511
Antenna coil assembly (Red Band)	RC 9571
Antenna coil assembly (Green Band)	RC 9574
Antenna coil assembly (Purple Band)	RC 9575
Antenna coil assembly (White Band)	RC 9580
Choke coil assembly R.F. section	CW 9513
Choke coil assembly R.F. section	CW 9513
5000 ohms 1 W. resistor	RE 9527
R.F. section "Precision Tuner" assembly	SW 9625
4 to 25 mmf. R.F. trim condenser (Red Band)	CD 9511
4 to 25 mmf. R.F. trim condenser (Purple Band)	CD 9511
4 to 25 mmf. R.F. trim condenser (White Band)	CD 9511
4 to 25 mmf. R.F. trim condenser (Green Band)	CD 9511
R.F. coil assembly (Red Band)	RC 9576
R.F. coil assembly (Green Band)	RC 9577
R.F. coil assembly (Purple Band)	RC 9581
R.F. coil assembly (White Band)	RC 9582
.05 mfd. 200 V. condenser (Red Band)	CD 9512
.05 mfd. 200 V. condenser (Green Band)	CD 9512
.05 mfd. 200 V. condenser (Purple Band)	CD 9512
Plate with switch, coils and trimmers	106587
Oscillator section "Precision Tuner" assembly	SA 106588
Band switch assembly (Red Band)	RE 9529
Band switch assembly (Green Band)	RE 9534
Band switch assembly (Purple Band)	SA 106596
Band switch assembly (White Band)	SA 106597
Oscillator section "Precision Tuner" assembly	SW 9566
Plate with switch, coils and trimmers	
1.5 to 15 mmf. trim condenser-part of CS 9511	
1.5 to 15 mmf. trim condenser-part of CS 9512	
1.5 to 10 mmf. R.F. trim condenser-part of CS 9512	
1.5 to 10 mmf. R.F. trim condenser-part of CS 9513	
R.F. coil assembly (Red Band)	RC 9572
R.F. coil assembly (Green Band)	RC 9573
R.F. coil assembly (Purple Band)	RC 9578
R.F. coil assembly (White Band)	RC 9579
1.5 to 15 mmf. trim condenser-part of CS 9511	
1.5 to 15 mmf. trim condenser-part of CS 9512	
1.5 to 10 mmf. R.F. trim condenser-part of CS 9512	
1.5 to 10 mmf. R.F. trim condenser-part of CS 9513	
1040.35 mmf. trim condenser-part of CS 9511	
Band switch assembly (Purple Band)	RE 9528
Band switch assembly (White Band)	RE 9533
Oscillator coil assembly (Purple Band)	RC 9576
Oscillator coil assembly (Green Band)	RC 9577
Oscillator coil assembly (White Band)	RC 9578
5 to 15 mmf. trim condenser-part of CS 9511	
5 to 15 mmf. trim condenser-part of CS 9512	
5 to 15 mmf. trim condenser-part of CS 9513	
1040.35 mmf. trim condenser-part of CS 9511	
Band switch assembly (Purple Band)	RE 9528
Band switch assembly (White Band)	RE 9533
Oscillator coil assembly (Purple Band)	RC 9576
Oscillator coil assembly (Green Band)	RC 9577
Oscillator coil assembly (White Band)	RC 9578
800 to 1800 mmf. lag condenser-part of CS 9511	
Band switch assembly (Red Band)	RE 9529
1400 mmf. lag condenser-part of CS 9511	
800 to 1800 mmf. lag condenser-part of CS 9511	
5 to 15 mmf. trim condenser-part of CS 9511	
5 to 15 mmf. trim condenser-part of CS 9512	
5 to 15 mmf. trim condenser-part of CS 9513	
1040.35 mmf. trim condenser-part of CS 9511	
Band switch assembly (Red Band)	RE 9529
Oscillator coil assembly (White Band)	RC 9579
Oscillator coil assembly (Green Band)	RC 9580
Oscillator coil assembly (Red Band)	RC 9581
60 to 150 mmf. lag condenser-part of CS 9511	
5000 ohms 1 W. resistor	RE 9526
.05 mfd. 200 V. condenser	CW 9513
50 ohms 1 W. resistor	RE 9524
80 ohms 1 W. resistor	RE 9537
150 ohms 1 W. resistor	RE 9538
250 to 560 mmf. I.F. trim condenser-part of CS 9511	
.0001 mfd. mica condenser	SA 106417
.0002 mfd. mica condenser	
.0003 mfd. mica condenser	SA 106417
.0008 mfd. 400 V. condenser	SA 103569
100,000 ohms 1 W. resistor	RE 9534
1,000,000 ohms 1 W. resistor	SA 106569
2nd I.F. transformer assembly	SA 106417
250 to 560 mmf. I.F. trim condenser-part of CS 9511	
.0001 mfd. mica condenser	SA 106417
250 to 560 mmf. I.F. trim condenser-part of CS 9511	
.0001 mfd. mica condenser	SA 106417
5000 ohms 1 W. resistor	RE 9527
.05 mfd. 200 V. condenser	SA 106586
1st I.F. transformer assembly	SA 106587
Tone control switch	VR 9511
1000 ohms 1 W. resistor	SA 106587
4500 ohms 1 W. resistor	SA 106588
4500 ohms 1 W. resistor	RE 9535
1st I.F. transformer-trim condenser-part of CS 9511	
.0001 mfd. mica condenser-part of CS 9511	
.0002 mfd. mica condenser-part of CS 9511	
.0001 mfd. mica condenser-part of CS 9511	
250,000 ohms 1 W. resistor	SA 106588
1,000,000 ohms 1 W. resistor	SA 106589
Volume control (1 meg.)	VR 9510
1,000,000 ohms 1 W. resistor	SA 106589
5000 ohms 1 W. resistor	RE 9527
.08 mfd. 400 V. condenser	SA 106590
.08 mfd. 400 V. condenser	SW 9512
3 meg. 1 W. resistor	SA 106592
.002 mfd. 600 V. condenser	SA 103682
.002 mfd. 600 V. condenser	SA 103682
.10 mfd. 200 V. condenser	CW 9512
.10 mfd. 200 V. elect. condenser-part of CS 9511	
1 meg. 1 W. resistor	SA 106595
1 meg. 1 W. resistor	SA 106596
1 meg. 1 W. resistor	SA 106597
250,000 ohms 1 W. resistor	SA 103274
250,000 ohms 1 W. resistor	SA 103274
75,000 ohms 1 W. resistor	SA 103277

MODEL WR-306
Circuit Data
Socket, Trimmers
Chassis

WESTINGHOUSE ELEC. SUPPLY CO.

GENERAL DESCRIPTION

This model is a ten tube, four band superheterodyne receiver designed for world wide reception including the U.S. Weather Band and employs the new all-metal tubes.

The circuit employs a high frequency amplifier using the new type 6X7 tube. This is followed by the first detector circuit employing a 6A8 tube and a separate oscillator (type 6C5). These tubes with their associated circuits (coils, variable condensers, trim condensers for R.F. and detector stages, and trim and lag condensers for the oscillators) comprise a complete assembly in compact form separately cushioned from the main chassis. This assembly is known as the "Precision Tuner". In addition the set includes a new and novel development of intermediate frequency circuits which allows the adjustment of the band width of the amplifier to be varied over a wide range. At one end of the range is the most selective condition which allows single channel reception even under the influence of powerful nearby stations. At the other end the transmission characteristic of the amplifier is so changed as to allow transmission without attenuation of frequencies up to 7000 cycles on either side of the carrier. As a matter of fact, the amplifier is overcoupled to such a degree that frequencies in the neighborhood of five thousand cycles on either side of the carrier are transmitted at greater efficiency than frequencies close to the carrier. This design is necessary since radio frequency circuits give rise to some side band attenuation, which must be compensated for in the I.F. amplifier. The net result is a smooth transmission curve over the entire band.

From the oscillator the energy passes thru a variable selector I.F. transformer and to a 6X7 amplifier tube. Then thru another variable selector I.F. transformer and to an additional 6X7 amplifier tube. From here further selection takes place in the 3rd I.F. transformer where the energy is passed on to the 2nd detector and A.V.C. diode (type 6H6). After detection there follows a first audio amplifier (type 6F5) and by means of an audio transformer the energy is sent to the power output stage comprising two 6P6 pentode in push-pull. A 5Z5 rectifier supplies the necessary direct current for the tubes.

REMOVING INDIVIDUAL COIL AND SWITCH SECTIONS OF "PRECISION TUNER"

If a component part located underneath the switch and coil assemblies of the "Precision Tuner" has to be replaced or a section of the unit has to be removed for inspection, each section can easily be removed separately. To do this proceed with care as follows:

1. Remove the three coil shields.
2. Remove the two self-tapping screws which fasten the mounting plate of the wave-change switch shaft to the chassis frame. Pull switch shaft straight out.
3. Unsolder the stator and rotor leads from the gang condenser.
4. The fastening screws for the switch sections are located on top of the "Precision Tuner" and are indicated by X,Y, and Z in Figure #3. Remove the corresponding screw.
5. Each individual section can then be pulled out straight.

Note: On the R.F. section, the plate lead from the 6X7 socket will have to be unsoldered from the switch terminal before the section can be removed.

On the oscillator section, the plate lead will have to be unsoldered from the 6C5 socket.

6. After repairs have been made resolder the plate leads mentioned above and replace the section being careful to observe that the slotted holes in the switch bracket line up with the round guide pins on the base plate of the "Precision Tuner". This is IMPORTANT as the switch shaft cannot be inserted if the switch brackets do not line up.
7. Replace the section fastening screws.
8. Resolder the stator and rotor leads on gang condenser.
9. Replace the switch shaft and the mounting fastening screws. When inserting the switch shaft, be careful that all the switch discs are in the same position. Otherwise the switch shaft will not slide in. NEVER force the shafts into the switch discs. If shaft does not slide in freely, examine the position of the slot in each switch disc.
10. Before replacing the coil shields, it might be advisable to bend the shields slightly to assure that positive contact is made. To do this hold the shield with your two hands using the thumbs and first two fingers as shown in figure #1. Pull out the ends of the shield slightly and at the same time apply a little pressure on the sides of the shield as indicated by the arrows in the drawing. Then replace the shields and observe that they fit tightly. In addition to assuring positive contacts, this will also prevent the shields from rattling.

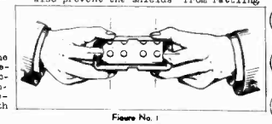


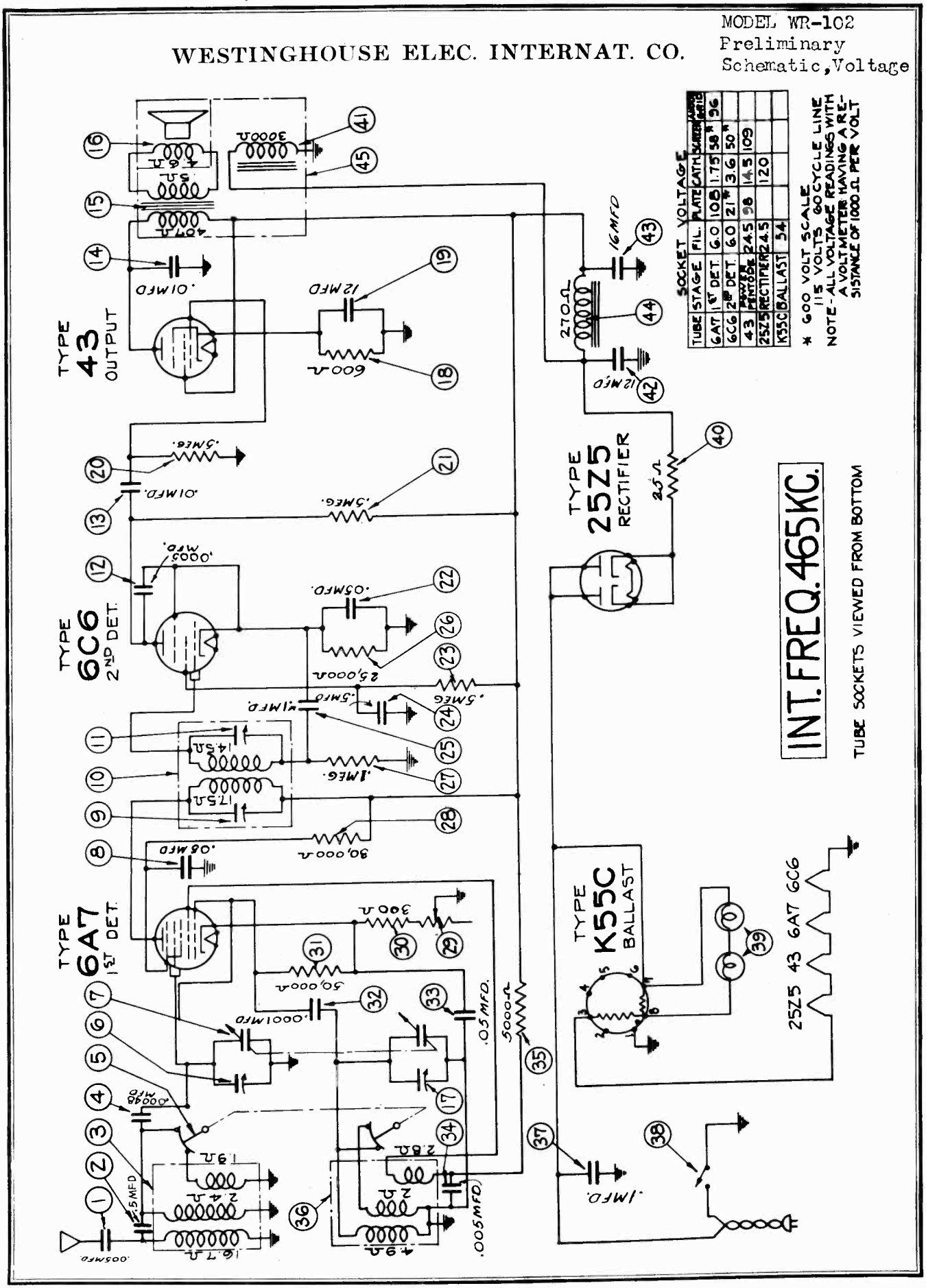
Figure No. 1

ELECTRICAL SPECIFICATIONS

Type and Number of Tubes --- 3@6K7, 1@6A8, 1@6C5, 1@6H6, 1@6F5, 2@6P6, 1@5Z3 - Total 10
Power Supply ---------- 105 to 125 volts, 50 to 60 cycles
Power Consumption ---------- 90 Watts
Maximum Undistorted Output ---------- 8 Watts
Maximum Output ---------- 10 Watts
Tuning Ranges ---------- (Purple Band 120 K.C. to 350 K.C.
(White Band 540 K.C. to 1800 K.C.
(Green Band 1800 K.C. to 6000 K.C.
(Red Band 6000 K.C. to 18500 K.C.
Line-Up Frequencies ------- I.F. 465K.C., 350K.C., 130K.C., 1600K.C., 570K.C., 5500 K.C. 1900K.C., 17000K.C. and 6000 K.C.

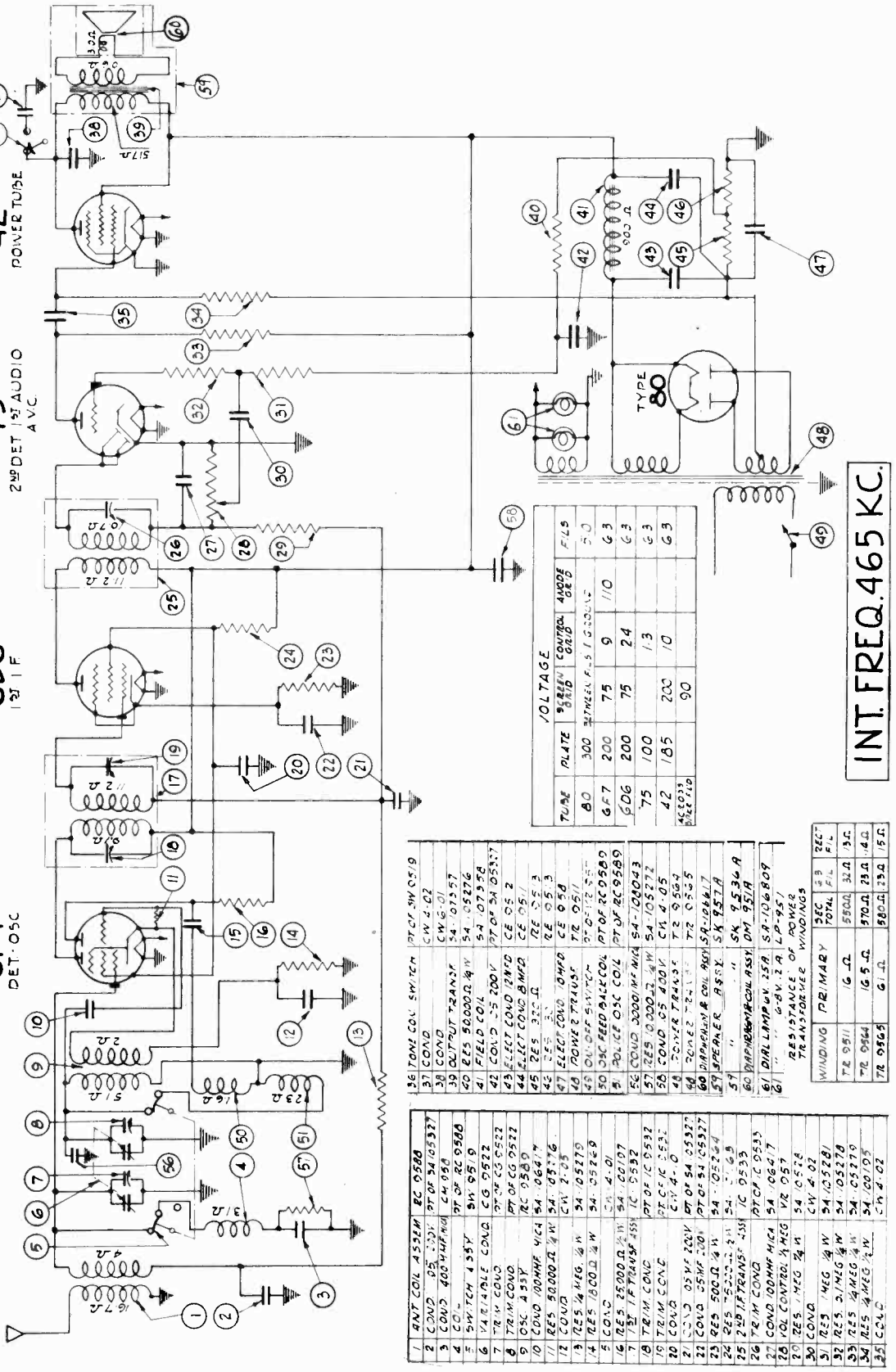
WESTINGHOUSE ELEC. INTERNAT. CO.

MODEL WR-102
Preliminary
Schematic, Voltage



MODEL WR-209
Preliminary
Schematic, Voltage

WESTINGHOUSE ELEC. INTERNAT. CO.

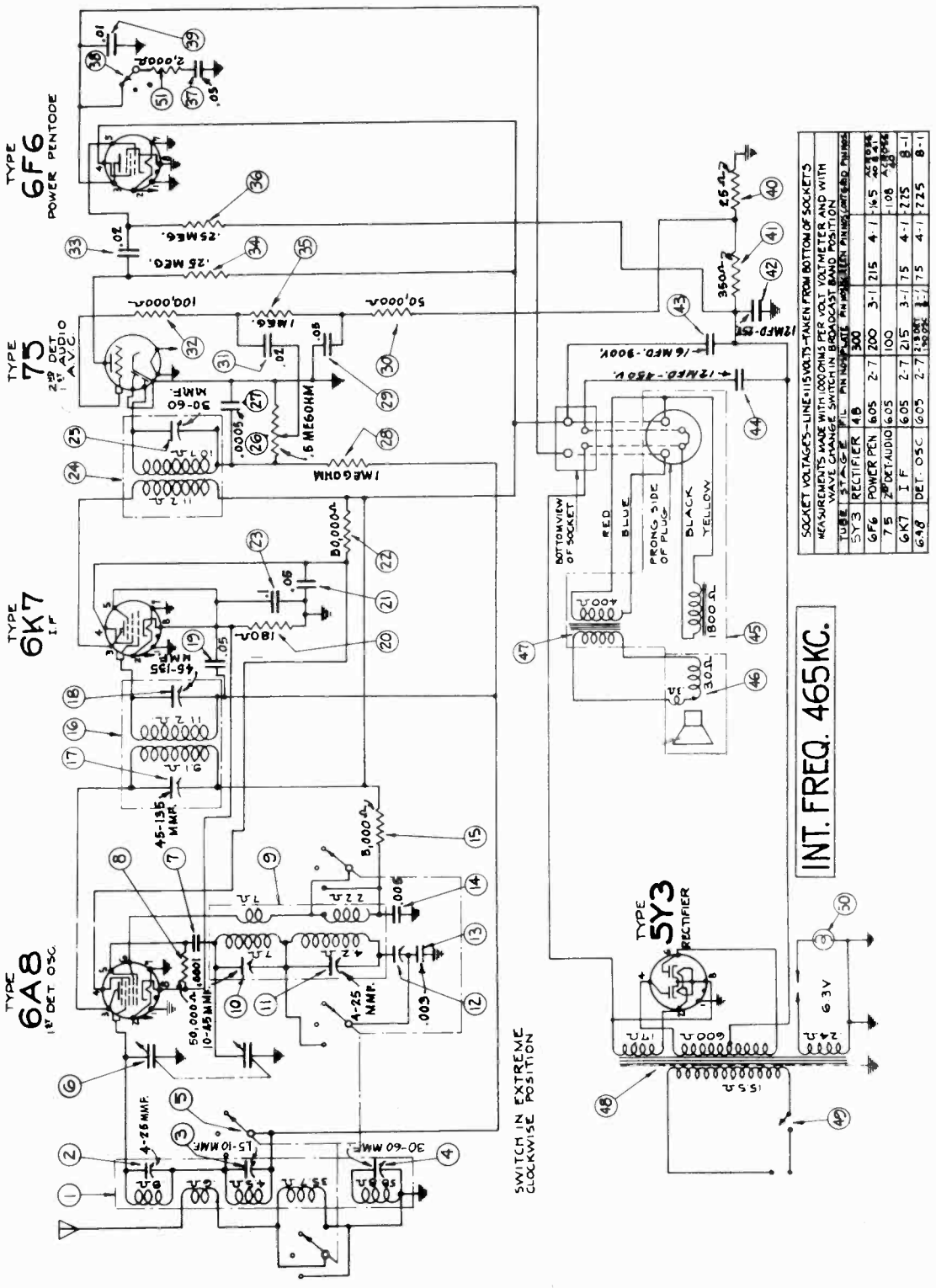


MODELS WR-210, WR-310

WESTINGHOUSE ELEC. INTERNAT. CO. Schematic, Voltage

WESTINGHOUSE RADIO MODELS WR-210 AND WR-310

PRELIMINARY

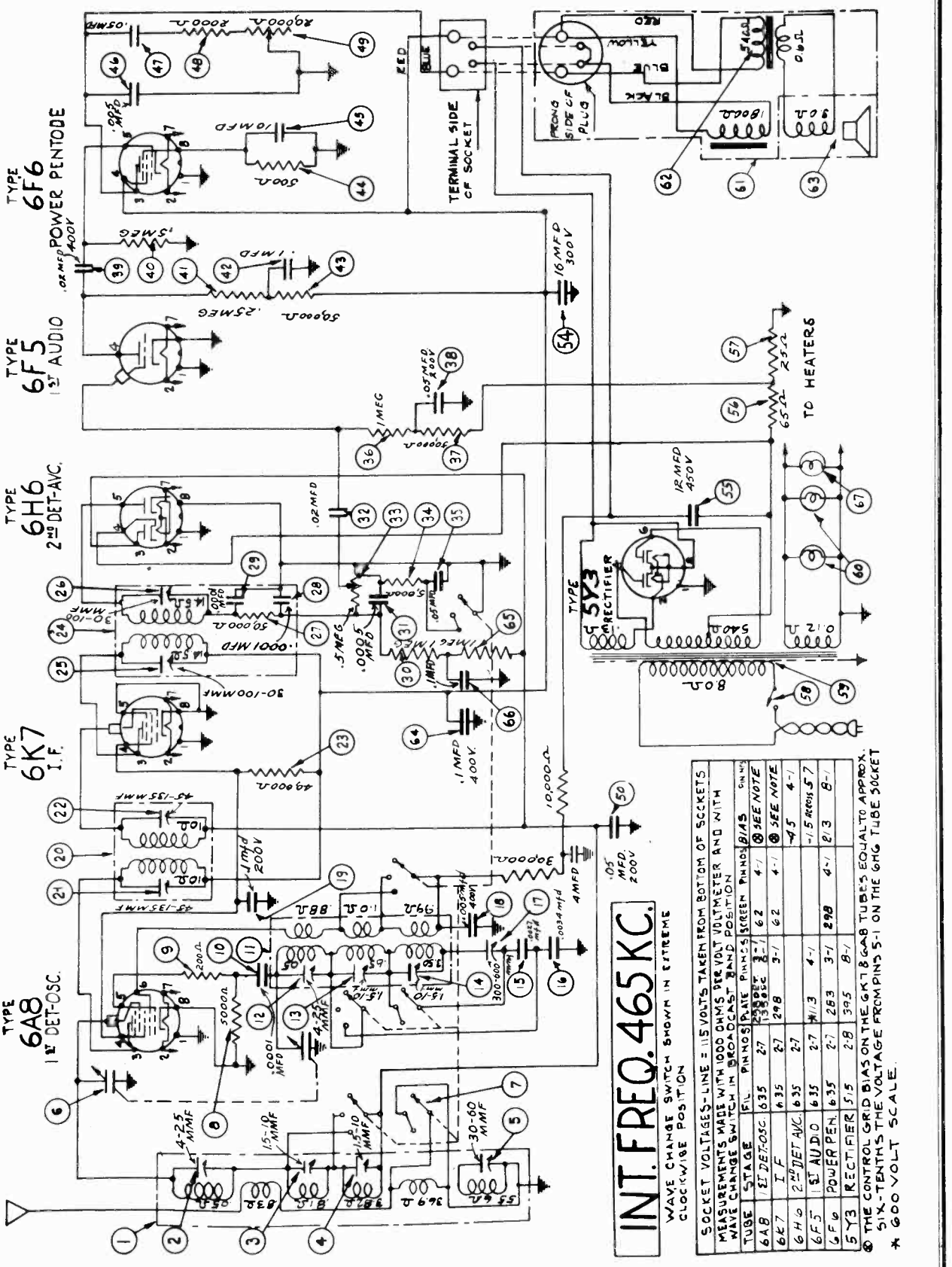


SOCKET VOLTAGES—LINE=115 VOLTS—TAKEN FROM BOTTOM OF SOCKETS
MEASUREMENTS MADE WITH 1000 OHMS PER VOLT VOLTMETER AND WITH WAVE CHANGE SWITCH IN BROADCAST BAND POSITION

TUBE	SERVICE	FIL.	PIN NO.	VOLTS	PIN NO.	VOLTS	PIN NO.	VOLTS	PIN NO.	VOLTS	PIN NO.	VOLTS	PIN NO.	VOLTS	PIN NO.	VOLTS
5Y3	RECTIFIER	4-8	300													
6F6	POWER PEN	6.05	2-7	200	3-1	215	4-1	145	5	285						
75	2ND DET AUDIO	6.05		100						1.08						
6K7	I F	6.05	2-7	215	3-1	175	4-1	225	5	1.25	8-1					
6A8	DET. OSC	6.05	2-7	215	3-1	175	4-1	225	5	1.25	8-1					

MODEL WR-311
Schematic, Voltage

WESTINGHOUSE ELEC. INTERNAT. CO.



SOCKET VOLTAGES-LINE = 115 VOLTS TAKEN FROM BOTTOM OF SOCKETS
MEASUREMENTS MADE WITH 1000 OHMS PER VOLT VOLTMETER AND WITH WAVE CHANGE SWITCH IN BROADCAST BAND POSITION

TUBE	STAGE	FIL.	PIN NOS	PLATE	PIN NOS	SCREEN	PIN NOS	BIAS	PIN NOS
6A8	1ST DET-OSC.	6.35	2-7	250 DCET 135 OSC	3-1	62	4-1	@ SEE NOTE	
6K7	I.F.	6.35	2-7	298	3-1	62	4-1	@ SEE NOTE	
6H6	2ND DET AVC.	6.35	2-7					-45	4-1
6F5	1ST AUDIO	6.35	2-7	241.3	4-1			-1.5 VOLTS	5-7
6F6	POWER PEN.	6.35	2-7	283	3-1	298	4-1	21.3	8-1
5Y3	RECTIFIER	5.15	2-8	395	8-1				

@ THE CONTROL GRID BIAS ON THE 6K7 & 6A8 TUBES EQUALTO APPROX. SIX-TENTHS THE VOLTAGE FROM PINS 5-1 ON THE 6H6 TUBE SOCKET
* 600 VOLT SCALE.

WILCOX-GAY CORP.

MODEL 3JC5
MODEL 3JE5
Schematics, Socket, Parts

MODEL 3JE5

PART CODE NO.		RESISTORS
R1	20-1125	130 Ohm Resistor in Power Cord
R2	19-1296	10,000 Ohm Volume Control & Switch
R3	53-922	75,000 Ohm Resistor I.F. Cathode Feed
R4	53-898	50,000 Ohm Resistor Oscillator Grid
R5	53-1062	250 Ohm Resistor 6A7 Cathode
R6	53-1063	500 Ohm Resistor I.F.Cathode
R7	53-941	20,000 Ohm Resistor 77 Cathode
R8	53-921	40,000 Ohm Resistor Screen Feed
R9	53-1308	20 Ohm Resistor Pilot Light Shunt
R10	53-923	100,000 Ohm 77 Plate Hum Resistor
R11	53-924	250,000 Ohm Resistor 77 Plate
R12	53-925	500,000 Ohm Resistor Output Grid
R13	53-1063	500 Ohm Resistor Output Cathode

		CONDENSERS
C1	77-833	336 MMFD. Oscillator Section of 3 Gang
C2	77-833	371 MMFD. Preselector Section of 3 Gang
C3	77-833	371 MMFD. Preselector Section of 3 Gang
C4	78-2010	Foreign Band Preselector Trimmer
C5	78-2008	First I.F. Primary Trimmer
C6	78-2007	First I.F. Secondary Trimmer
C7	78-2009	Second I.F. Trimmer
C8	76-265	.001 Mfd. Mica 77 Plate By-Pass
C9	76-269A	.01 Mfd. 400 Volt Audio Feed Condenser
C10	76-343A	.004 Mfd. Paper Output Plate By-Pass
C11	18-928	25 Mfd. 25 Volt Output Cathode
C12	75-272A	.1 Mfd. 200 Volt 77 Plate Hum Filter
C13	75-267A	5. Mfd. 200 Volt 77 Cathode By-Pass
C14	75-272A	.1 Mfd. 200 Volt 78 Cathode By-Pass
C15	75-272A	.1 Mfd. 200 Volt 6A7 Cathode By-Pass
C16	76-264	.00005 Mfd. Mica Oscillator Grid Condenser
C17	76-265	.001 Mfd. Mica Antenna Series Cond.
C18	75-272A	.1 Mfd. 200 Volt Screen By-Pass
C19	75-269A	.5 Mfd. 200 Volt B Supply By-Pass
C20	75-272A	.1 Mfd. 200 Volt 110 volt Line By-Pass
C21	18-1085	10 Mfd. 150 Volt Dry Electrolytic Cond.
C22	18-1085	4 Mfd. 150 Volt Dry Electrolytic Cond.
C23	18-1085	4 Mfd. 150 Volt Dry Electrolytic Cond.

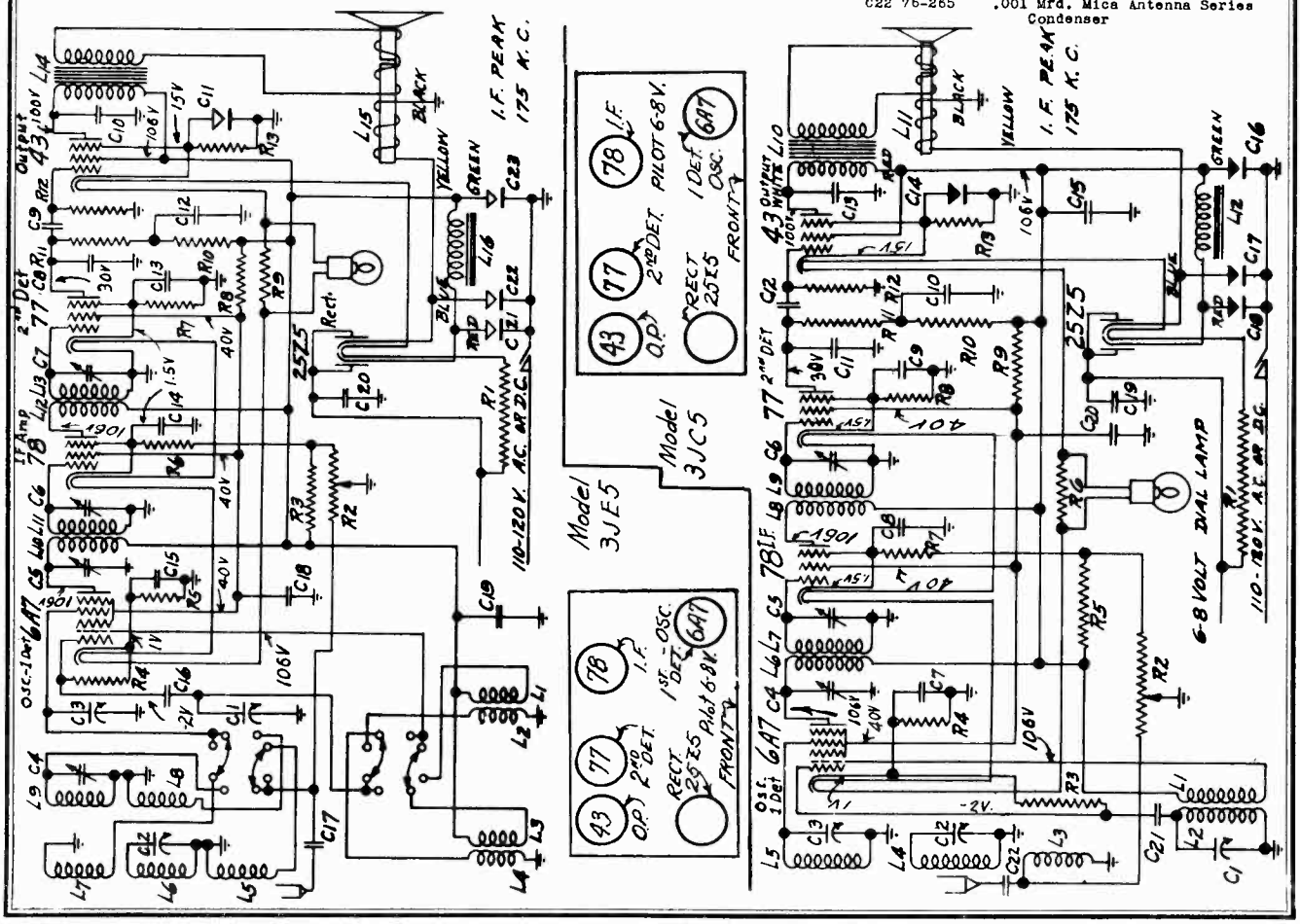
L15	64-1260	3000 Ohm Speaker Field
L16	14-940	20 Henry Filter Choke

MODEL 3JC5

R1	20-1125	130	Ohm Resistor in Power Cord
R2	19-1296	10,000	Ohm Volume Control & Switch
R3	53-898	50,000	Ohm Resistor Oscillator Grid
R4	53-1062	250	Ohm Resistor 6A7 Cathode
R5	53-922	75,000	Ohm Resistor I.F.Cathode Feed
R6	53-1308	20	Ohm Resistor Pilot Light Shunt
R7	53-1063	500	Ohm Resistor I.F.Cathode
R8	53-941	20,000	Ohm Resistor Second Detector Cathode
R9	53-921	40,000	Ohm Resistor Screen Feed
R10	53-923	100,000	Ohm 77 Plate Hum Resistor
R11	53-924	250,000	Ohm Resistor 77 Plate
R12	53-925	500,000	Ohm Resistor Output Grid
R13	53-1063	500	Ohm Resistor Output Cathode

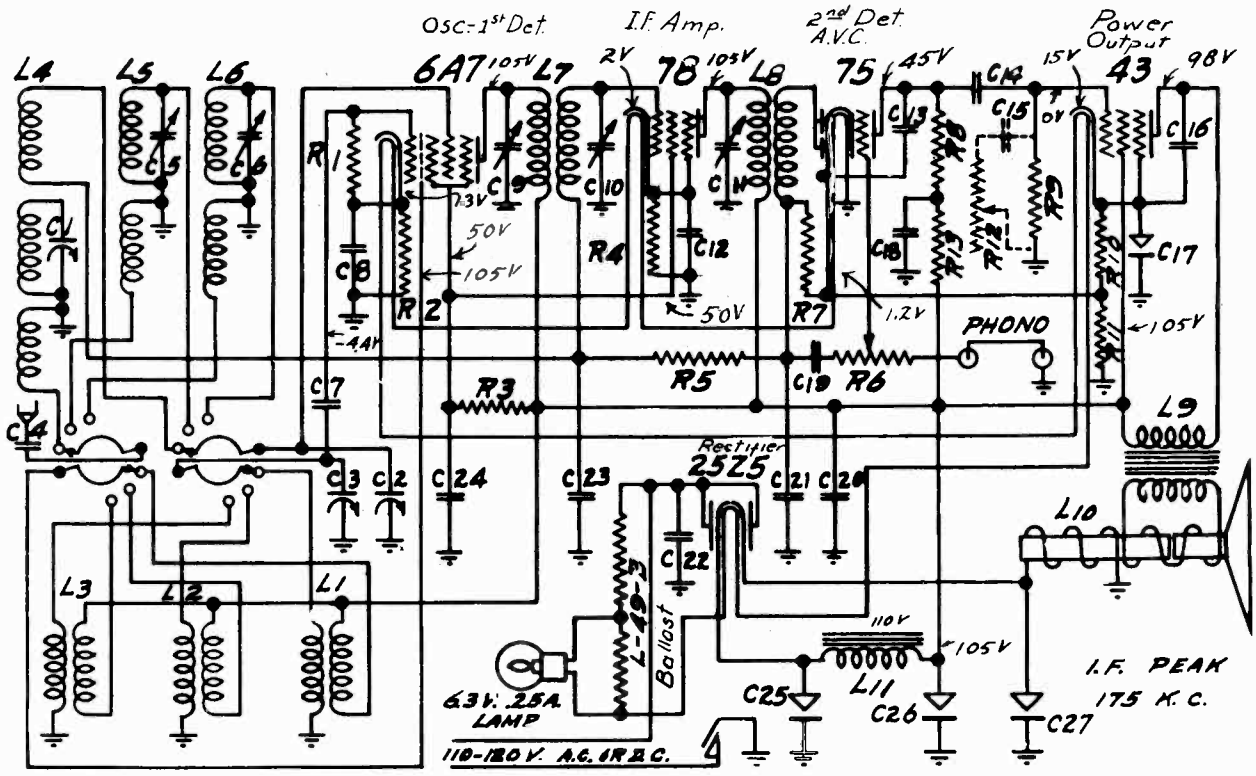
C1	77-833	336	MMFD. Oscillator Section 3 Gang
C2	77-833	371	MMFD. Preselector Section 3 Gang
C3	77-833	371	MMFD. Preselector Section 3 Gang
C4	78-2008		First I.F. Primary Trimmer
C5	78-2007		First I.F. Secondary Trimmer
C6	78-788		Second I.F. Trimmer
C7	75-272A		.1 Mfd. 200 Volt 6A7 Cathode
C8	75-272A		.1 Mfd. 200 Volt 78 Cathode
C9	75-267A		5. Mfd. 200 Volt 77 Cathode
C10	75-272A		.1 Mfd. 200 Volt 77 Plate Hum Filter
C11	76-265		.001 Mfd. Mica 77 Plate By-Pass
C12	75-269A		.01 Mfd. 400 Volt Audio Feed Condenser
C13	75-343A		.004 Mfd. Paper Output Plate By-Pass
C14	18-928		25 Mfd. 25 Volt Output Cathode
C15	75-267A		.5 Mfd. 200 Volt B Supply By-Pass
C16	18-1085		4 Mfd. 150 Volt Dry Electrolytic Condenser
C17	18-1085		4 Mfd. 150 Volt Dry Electrolytic Condenser
C18	18-1085		10 Mfd. 150 Volt Dry Electrolytic Condenser
C19	75-272A		.1 Mfd. 200 Volt 110 Volt Line By-Pass
C20	75-272A		.1 Mfd. 200 Volt Screen By-Pass
C21	76-264		.00005 Mfd. Mica Oscillator Grid Condenser
C22	76-265		.001 Mfd. Mica Antenna Series Condenser

L11	64-1260	3000 Ohm	Speaker Field
L12	14-940	20 Henry	Choke



MODELS 3JM6, 3JQ6
Schematic, Voltage
Socket, Parts

WILCOX-GAY CORP.



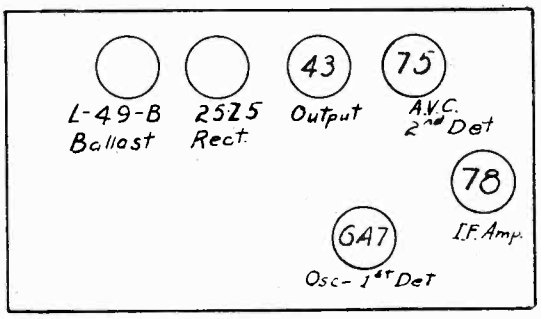
CODE	PART NO.	RESISTORS
R1	53-898	50,000 Ohm Oscillator Grid Resistor
R2	53-1062	250 Ohm Oscillator Cathode Resistor
R3	53-1042	25,000 Ohm 6A7 & 78 Screen Resistor
R4	53-1063	500 Ohm 78 Cathode Resistor
R5	53-926	1 Meg Ohm A.V.C. Network Resistor
R6	19-1291	500,000 Ohm Volume Control & Switch
R7	53-925	500,000 Ohm Diode Resistor
R8	53-924	250,000 Ohm 75 Plate Resistor
R9	53-925	500,000 Ohm 43 Grid Resistor
R10	53-1062	500 Ohm 43 Cathode Resistor
R11	53-1122	40 Ohm 75 Cathode Resistor
R12	19-1317	250,000 Ohm Tone Control on Model A-17
R13	53-898	50,000 Ohm 75 Plate Hum Resistor

INDUCTANCES

L1	17-2106	Broadcast Oscillator Coil Assembly
L2	17-2105	Police Band Oscillator Coil Assembly
L3	17-2095	Foreign Band Oscillator Coil Assembly
L4	17-2100	Broadcast Preselector Coil Assembly
L5	17-2104	Police Band Preselector Coil Assembly
L6	17-2096	Foreign Band Preselector Coil Assembly
L7	68-2012	First I. F. Transformer Assembly
L8	17-2102	Second I. F. Transformer Assembly
L9	64-1260	6½" Speaker 43 Output Trans. on L10
L10	64-1260	6½" Speaker 3000 Ohm Field
L11	14-940	20 Henry Filter Choke

CONDENSERS

C1	77-833	366 MMFD. Preselector Section of 3 Gang
C2	77-833	366 MMFD. Preselector Section of 3 Gang
C3	77-833	328 MMFD. Oscillator Section of 3 Gang
C4	75-2003	.01 Mfd. 400 V. Paper Antenna Series Cond.
C5	78-2010	3-30 MMFD. Police Band Preselector Trimmer
C6	78-2010	3-30 MMFD. Foreign Band Preselector Trimmer
C7	76-2002	.00005 Mfd. Mica Oscillator Grid Condenser
C8	75-2005	.1 Mfd. 200 V. Paper Oscillator Cathode Cond.
C9	78-2008	First I. F. Primary Trimmer
C10	78-2011	First I. F. Secondary Trimmer
C11	78-2009	Second I. F. Primary Trimmer
C12	75-2005	.1 Mfd. 200 V. Paper 78 Cathode By-Pass Cond.
C13	76-265	.001 Mfd. Mica 75 Plate Filter Condenser



CONDENSERS

C14	75-2003	.01 Mfd. 400 V. Paper Audio Feed Cond.
C15	75-2003	.01 Mfd. 400 V. Paper Tone Control Cond. on A-17
C16	75-2002	.004 Mfd. 600 V. Paper Output Plate Filter Cond.
C17	18-928	25 Mfd. 25 V. Elect. Output Cathode By-Pass Cond.
C18	75-2005	.1 Mfd. 200 V. Paper 75 Plate Hum Filter Cond.
C19	75-2003	.01 Mfd. 400 V. Paper Audio Feed Condenser
C20	78-2011	.5 Mfd. 200 V. Paper B Supply By-Pass Cond.
C21	76-307	.0005 Mfd. Mica Diode Filter Condenser
C22	75-2005	.1 Mfd. 200 V. Paper Line By-Pass Condenser
C23	75-2005	.1 Mfd. 200 V. Paper A.V.C. Network By-Pass Cond.
C24	75-2005	.1 Mfd. 200 V. Paper Screen By-Pass Condenser
C25	18-2003	11 Mfd. 150 W.V. Dry Electrolytic Filter Cond.
C26	18-2003	4 Mfd. 150 W.V. Dry Electrolytic Filter Cond.
C27	18-2003	4 Mfd. 150 W.V. Dry Electrolytic Filter Cond.

(3JQ6 is 3JM6 with Addition of a Tone Control.)

ALIGNMENT- MODELS 3JM6, A15, A16, 3JQ6, A17

APPARATUS:

Signal Generator having output frequencies of from 20 megacycles to 150 kilocycles.
Output Meter.
Small tools such as screwdriver, 1/4" wrench, etc.

GANGING OF INTERMEDIATE FREQUENCY AMPLIFIER:

The signal generator should be adjusted to 175 kilocycles and its output connected directly (no dummy antenna being used) to the grid of the first detector, which is the tube immediately to the right of the variable condenser when facing chassis. With the volume control in its full-on position, the output of the signal generator should be so adjusted that a medium signal is indicated on the output meter not to exceed 50 volts across the output transformer. The last intermediate frequency transformer should now be adjusted and this adjustment is located on the right rear chassis skirt. After peaking this transformer, care being used to see that the output at no time goes to 50 volts across the primary of the output transformer, the first intermediate frequency transformer, which is that transformer on the right hand front side of chassis, should be trimmed, trimming first the secondary side and then the primary side, which adjustments are the left and right adjustments respectively as facing front of receiver. After ganging the three intermediate frequency adjustments in this manner, they should again be gone over and very carefully peaked.

GANGING OF OSCILLATOR AND PRESELECTOR CIRCUITS:

(Broadcast Band)

The signal generator and scale reading of the receiver should now be set at 1400 kilocycles. The wave change switch, which is the control on the left hand front chassis skirt of the receiver should be turned to its furthest counterclockwise position. The output of the signal generator should be connected to a standard dummy antenna to the frame and antenna lead of the receiver. The oscillator circuit should now be trimmed, which adjustment may be found above the rear gang of the variable condenser until the signal is peaked. The output of the signal generator should be regulated so that this voltage does not exceed 50 volts across the output transformer terminals The signal generator should now be adjusted to 600 kilocycles and the tuning control of the receiver varied in the vicinity at a scale reading of 600 kilocycles to check the reading of the receiver. In the event this reading is off, the slotted plates of the oscillator condenser gang should be bent in or out until the scale reading is 600 kilocycles. Again adjusting the scale reading and signal generator to 1400 kilocycles, the oscillator adjustment should again be checked to compensate for any change the previous adjustment may have had and the two preselector circuits trimmed to resonance, which adjustments are the center and front adjustments of the variable condenser.

(Foreign Band)

The signal generator should now be adjusted to 15 megacycles and the wave change switch should be turned to its furthest clockwise position. By varying the tuning adjustment of the receiver back and forth in the vicinity of 15 megacycles as indicated on the red scale, the signal should be found in this immediate vicinity. There is no trimming adjustment for this band on the oscillator coil because it was the desire during design to extend the high frequency portion of the tuning range as far as possible. After again peaking in the above manner, the preselector on the foreign band should be adjusted, which adjustment is to be found at the center of the front chassis skirt and is the left adjustment of the two occupying this place. Intermediate points on this band should be checked at 10 and 6 megacycles respectively and any departure from ganging or alignment should be found negligible because after tracking is accomplished on the broadcast band the inductors are held to such a standard that tracking, after alignment at 15 megacycles is achieved. should be very nearly perfect.

(Police Band)

The signal generator should be adjusted to 4 megacycles and the wave change switch adjusted to its middle position. The set should now be tuned in the vicinity of 4 megacycles and the signal centered until peak output obtains. The preselector trimmer which is the right hand adjustment of the two in the center of the front chassis skirt, should be adjusted until a peaked condition of the signal is shown by the output meter.

ALIGNMENT - MODEL 3J4

GANGING OF THE I.F. AMPLIFIER:

The signal generator should be adjusted to 175 kilocycles and its output connected directly (no dummy antenna being used) to the grid of the first detector tube, which is the first tube on the right hand side of the chassis when facing front of chassis. With this connection made and the volume control turned on, the output of the signal generator should be adjusted so that some medium value of output is obtained not to exceed 50 volts across the primary of the output transformer. The last intermediate frequency transformer should now be trimmed to resonance which is accomplished by trimming the adjustment on the left hand rear chassis skirt of the receiver when facing front of chassis. This adjustment should be peaked, being careful to always keep the output of the set so that it is below the above mentioned 50 volts across the primary of the output transformer After peaking this adjustment, the secondary circuit of the first intermediate frequency transformer should be trimmed, which adjustment is the left hand adjustment on the first intermediate frequency transformer, which is that transformer on the rear right hand side of the chassis when facing front of chassis. After peaking this adjustment, the primary circuit of this transformer should be adjusted, which is the right hand adjustment on the transformer just referred to. After peaking the three intermediate frequency transformer adjustments in this manner, they should be again gone over and very carefully peaked.

GANGING OF OSCILLATOR AND PRESELECTOR CIRCUITS:

The frequency of the signal generator and the scale reading of the receiver should be adjusted to 1400 kilocycles. The output of the signal generator should now be adjusted for some medium value and the oscillator section of the variable condenser peaked, which adjustment is the rear adjustment on the variable condenser. While this peaking operation is progressing, the output reading should at no time exceed 50 volts. The two preselector circuits should now be adjusted, which adjustments are the center and front adjustments occurring on the variable condenser, for maximum amplitude, the same care being exercised in keeping the output voltage to a medium value as mentioned above.

GENERAL:

With this receiver, which is a battery receiver, care should be exercised in keeping all terminal voltages very close to specified values. The voltage to the tubes should now exceed two volts by more than 10%, for the tubes used in this receiver are particularly critical to this type of misuse.

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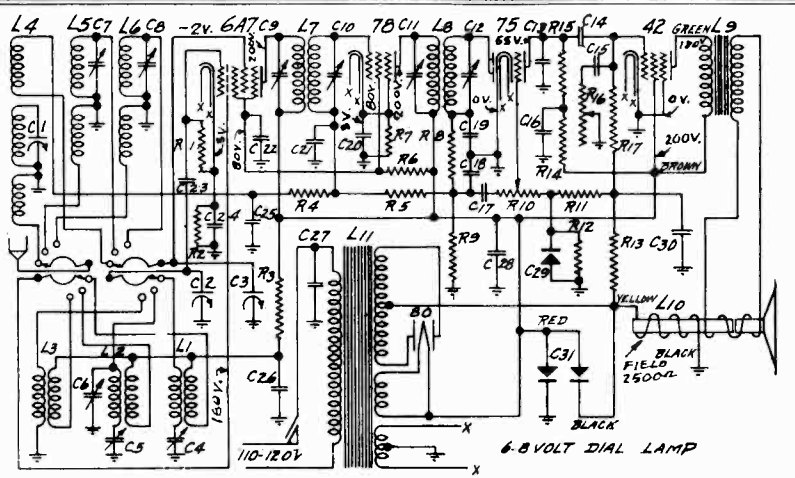
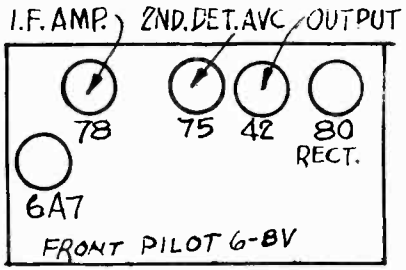
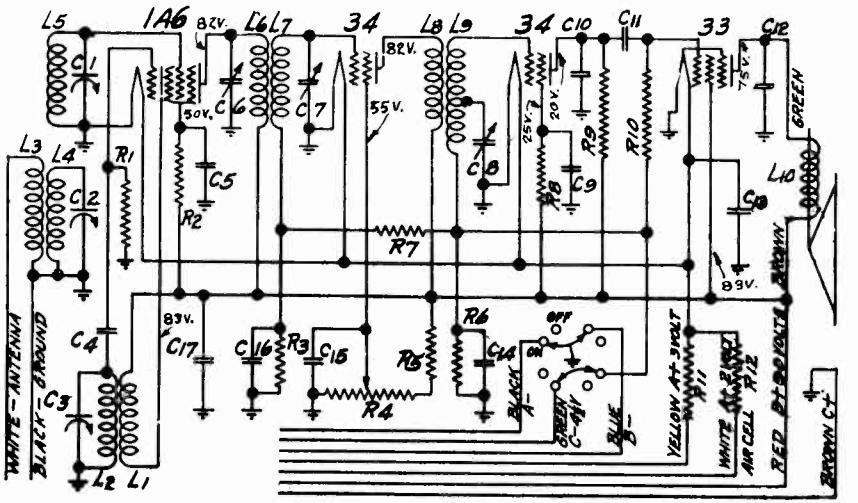


		CONDENSERS	
C1	77-1581	16-366 MMFD. Third Section of 3 Gang Condenser	
C2	77-1581	16-366 MMFD. First Section of 3 Gang Condenser	
C3	77-1581	16-366 MMFD. Second Section of 3 Gang Condenser	
C4	78-1572	600 MMFD. Broadcast Oscillator Series Trimmer	
C5	78-1572	1600 MMFD. Police Band Oscillator Series Trimmer	
C6	78-1588	3-30 MMFD. Police Band Oscillator Parallel Trimmer	
C7	78-1588	3-30 MMFD. Police Band Preselector Trimmer	
C8	78-1588	3-30 MMFD. Foreign Band Preselector Trimmer	
C9	78-2005	80 MMFD. First I.F. Primary Trimmer	
C10	78-2005	80 MMFD. First I.F. Secondary Trimmer	
C11	78-2005	80 MMFD. Second I.F. Primary Trimmer	
C12	78-2005	80 MMFD. Second I.F. Secondary Trimmer	
C13	76-265	.001 Mfd. Mica 75 Plate R.F. By-pass condenser	
C14	75-2003	.01 Mfd. 400 Volt Audio Feed Condenser	
C15	75-2003	.01 Mfd. 400 Volt Tone Control Condenser	
C16	75-2007	.1 Mfd. 400 Volt 75 Plate Hum Condenser	
C17	75-2003	.01 Mfd. 400 Volt Audio Feed Condenser	
C18	76-2001	.0001 Mfd. Mica Diode Filter Condenser	
C19	76-2001	.0001 Mfd. Mica Diode Filter Condenser	
C20	75-2005	.1 Mfd. 200 Volt I.F. Cathode By-pass Condenser	
C21	75-2005	.1 Mfd. 200 Volt A.V.C. Network By-pass Condenser	
C22	75-2005	.1 Mfd. 200 Volt Screen By-pass Condenser	
C23	76-2002	.00005 Mfd. Mica Oscillator Grid Condenser	
C24	75-2005	.1 Mfd. 200 Volt 6A7 Cathode By-Pass Condenser	
C25	75-2005	.1 Mfd. 200 Volt A.V.C. Network By-Pass Condenser	
C26	75-2003	.01 Mfd. 400 Volt Oscillator Plate By-Pass Condenser	
C27	75-2003	.01 Mfd. 400 Volt Line By-Pass Condenser	
C28	75-2013	1. Mfd. 400 Volt B Supply By-Pass Condenser	
C29	18-928	25 Mfd. 25 Volt C. Bias Network By-Pass Condenser	
C30	75-2008	.2 Mfd. 200 Volt C Bias NetworkBy-Pass Condenser	
C31	18-2002	4-4 Mfd. 450 Volt Dry Electrolytic Condenser	
		RESISTORS	
R1	53-941	20,000 Ohm Oscillator Grid Resistor	
R2	53-1062	250 Ohm Oscillator Cathode Resistor	
R3	53-277	10,000 Ohm Oscillator Plate Resistor	
R4	53-923	100,000 Ohm A.V.C. Network Resistor	
R5	53-926	1 Meg Ohm A.V.C. Network Resistor	
R6	53-1042	20,000 Ohm R.F. & I.F. Screen Resistor	
R7	53-1063	500 Ohm I.F. Cathode Resistor	
R8	53-898	50,000 Ohm Diode Filter Resistor	
R9	53-925	500,000 Ohm Diode Load Resistor	
R10	19-1291	500,000 Ohm Volume Control & Switch	
R11	53-923	100,000 Ohm C Bias Network Resistor	
R12	53-919	5,000 Ohm C Bias Network Resistor	
R13	53-926	1 Meg Ohm C Bias Network Resistor	
R14	53-923	100,000 Ohm 75 Plate Hum Resistor	
R15	53-924	250,000 Ohm 75 Plate Resistor	
R16	19-1317	250,000 Ohm Tone Control	
R17	53-925	500,000 Ohm 42 Grid Resistor	

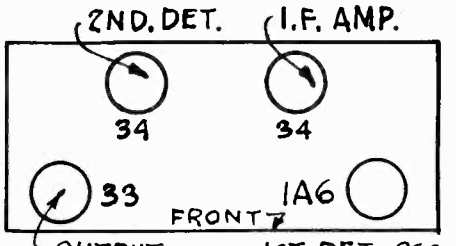


TUBE SOCKET LAYOUT
MODELS 5B5,5BC5

MODELS 5B5,5BC5 INTERMEDIATE FREQUENCY 456 K.C.



CODE	PART NO.		
		RESISTORS	
R1	53-923	100,000	Ohm Resistor Oscillator Grid
R2	53-921	40,000	Ohm Resistor 1A6 Screen
R3	53-898	50,000	Ohm Resistor I.F. Grid Isolation
R4	19-1315	500,000	Ohm Volume Control
R5	53-1042	25,000	Ohm Resistor I.F. Screen
R6	53-1065	1,000	Ohm Resistor C Bias Network
R7	53-898	50,000	Ohm Resistor C Bias Network
R8	53-925	500,000	Ohm Resistor Second Detector Screen
R9	53-924	250,000	Ohm Resistor Second Detector Plate
R10	53-925	500,000	Ohm Resistor Output Grid
R11	53-2005	2.25	Ohm Resistor Filament Series
R12	53-2001	.4	Ohm Resistor Filament Series
		CONDENSERS	
C1	77-833	366 MMFD.	First Preselector Section of 3 Gang
C2	77-833	366 MMFD.	Second Preselector Section of 3 Gang
C3	77-833	328 MMFD.	Oscillator Section of 3 Gang
C4	76-2004	.00025 Mfd.	Mica Oscillator Grid Condenser
C5	75-2005	.1 Mfd.	200 Volt 1A6 Screen By-Pass
C6	78-2008	First I.F. Primary Trimmer Condenser	
C7	78-2011	First I.F. Secondary Trimmer Condenser	
C8	78-2009	Second I.F. Trimmer Condenser	
C9	75-2005	.1 Mfd.	200 Volt Second Detector Screen By-Pass
C10	76-662	.002 Mfd.	Mica Second Detector Plate Filter
C11	75-2003	.01 Mfd.	400 Volt Audio Feed Condenser
C12	75-2002	.004 Mfd.	600 Volt Output Plate Filter
C13	75-2013	1. Mfd.	400 Volt Filament By-Pass Condenser
C14	75-2005	.1 Mfd.	200 Volt C Bias Network By-Pass
C15	75-2005	.1 Mfd.	200 Volt I.F. Screen By-Pass Condenser
C16	75-2005	.1 Mfd.	200 Volt I.F. Grid Isolation By-Pass
C17	75-2005	.1 Mfd.	200 Volt B By-Pass Condenser



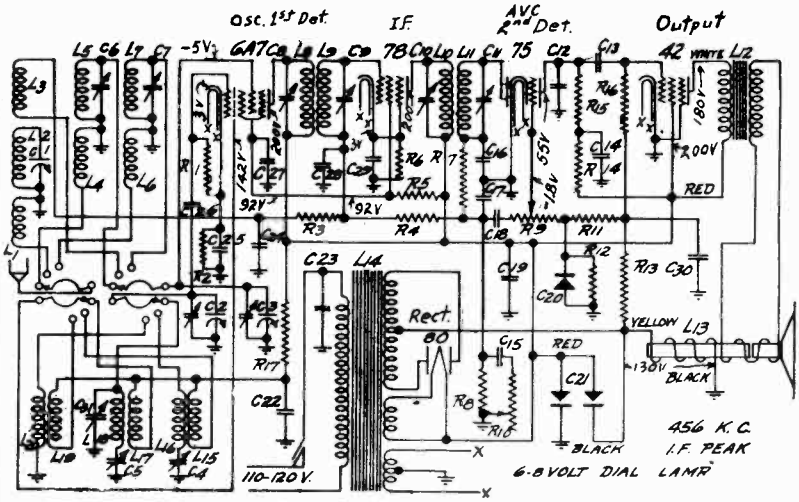
TUBE SOCKET LAYOUT
MODEL 3J4

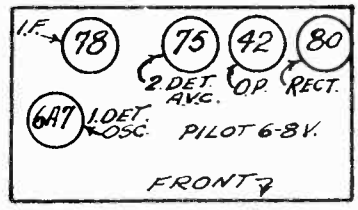
MODEL 3J4 INTERMEDIATE FREQUENCY 175 K.C.

Schematics, Socket Parts

WILCOX-GAY CORP.

MODEL 5BA5
MODELS 5E8, 5E9

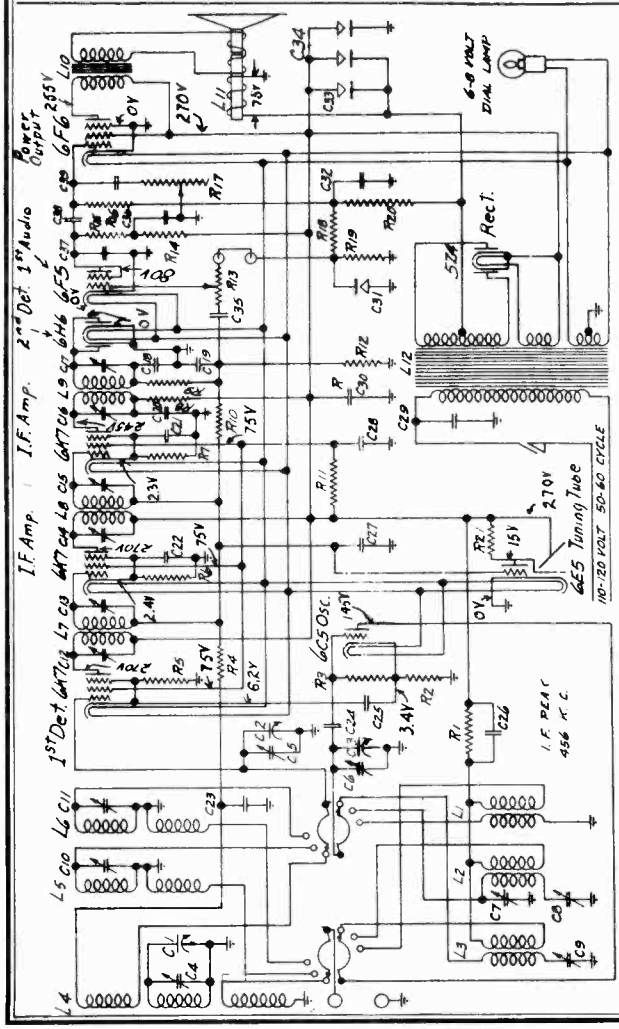


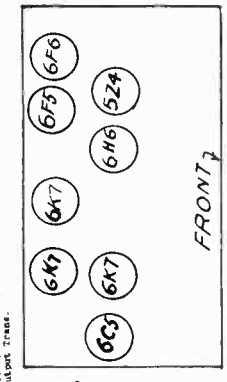


INDUCTANCES

L1	17-2031	Broadcast Preselector Primary
L2	17-2031	Broadcast Preselector First Second ary
L3	17-2031	Broadcast Preselector Second Secondary
L4	17-2031	Long Wave Band Preselector Primary
L5	17-2031	Long Wave Band Preselector Secondary
L6	17-2017	Foreign Band Preselector Primary
L7	17-2017	Foreign Band Preselector Secondary
L8	17-2016	First I.F. Primary
L9	17-2016	First I.F. Secondary
L10	17-2016	Second I.F. Primary
L11	17-2016	Second I.F. Secondary
L12	64-2003	Single 42 Output Transformer
L13	-2003	2500 Ohm Speaker Field

MODEL 5BA5





MODELS 5E8 & 5E9

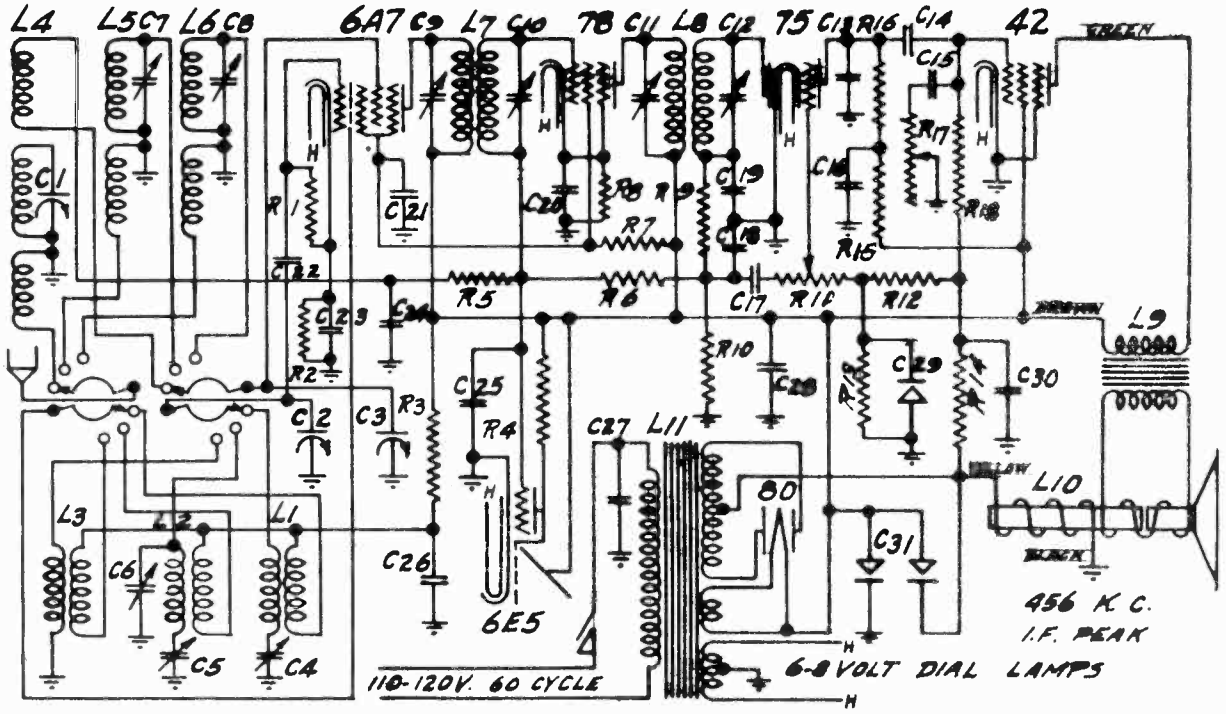
Third I.F. Trans. Coil sind-ge 17-2062
8" Speaker 42 Output Trans. 64-2017

CODE	PART NO.	RESISTORS
R1	53-941	20,000 Ohm Oscillator Grid Resistor
R2	53-1062	250 Ohm Oscillator Cathode Resistor
R3	53-923	100,000 Ohm A.V.C. Network Resistor
R4	53-926	1 Megohm A.V.C. Network Resistor
R5	53-1042	25,000 Ohm Screen Feed Resistor
R6	53-1063	500 Ohm I.F. Cathode Resistor
R7	53-898	50,000 Ohm Diode Filter Resistor
R8	53-925	500,000 Ohm Diode Load Resistor
R9	19-1291	500,000 Ohm Volume Control & Switch
R10	19-1317	250,000 Ohm Tone Control
R11	53-923	100,000 Ohm C Bias Network Resistor
R12	53-919	5,000 Ohm C Bias Network Resistor
R13	53-926	1 Megohm C Bias Network Resistor
R14	53-923	100,000 Ohm 75 Plate Hum Resistor
R15	53-924	250,000 Ohm 75 Plate Resistor
R16	53-925	500,000 Ohm 42 Grid Resistor
R17	53-277	10,000 Ohm Oscillator Plate Resistor
		CONDENSERS
C1	77-1581	16-366 MMFD. Third Section of 3 Gang Condenser
C2	77-1581	16-366 MMFD. Oscillator Section of 3 Gang Condenser
C3	77-1581	16-366 MMFD. Second Section of 3 Gang Condenser
C4	78-1569	450 MMFD. Broadcast Oscillator Trimmer
C5	78-1569	140 MMFD. Long Wave Band Oscillator Trimmer
C6	78-1568	3-30 MMFD. Long Wave Band Preselector Trimmer
C7	78-1568	3-30 MMFD. Skip Band Preselector Trimmer
C8	78-2005	80 MMFD. First I.F. Primary Trimmer
C9	78-2005	80 MMFD. First I.F. Secondary Trimmer
C10	78-2005	80 MMFD. Second I.F. Primary Trimmer
C11	78-2005	80 MMFD. Second I.F. Secondary Trimmer
C12	76-265	.001 MFD. Mica Second Detector Plate
C13	75-269A	.01 MFD. 400 Volt Audio Feed Condenser
C14	75-1326A	.1 MFD. 400 Volt 75 Plate Hum Filter
C15	75-269A	.01 MFD. 400 Volt Tone Control Condenser
C16	76-339	.0001 MFD. Mica Diode Filter Network
C17	76-339	.0001 MFD. Mica Diode Filter Network
C18	75-269A	.01 MFD. 400 Volt Audio Feed Condenser
C19	75-266	1. MFD. 400 Volt B. Supply By-Pass
C20	18-928	25 MFD. 25 Volt C Bias
C21	18-1274	4-4 MFD. 450 Volt Dry Electrolytic Condenser
C22	75-269A	.01 MFD. 400 Volt Oscillator Plate By-Pass
C23	75-269A	.01 MFD. 400 Volt 110 Volt Line By-Pass
C24	75-272A	.1 MFD. 200 Volt A.V.C. Network By-Pass
C25	75-272A	.1 MFD. 200 Volt 6A7 Cathode By-Pass
C26	76-264	.00005 MFD. Mica Oscillator Grid Condenser
C27	75-272A	.1 MFD. 200 Volt Screen By-Pass
C28	75-272A	.1 MFD. 200 Volt A.V.C. Network By-Pass
C29	75-272A	.1 MFD. 200 Volt 78 Cathode By-Pass
C30	75-183A	.2 MFD. 200 Volt C Bias Network By-Pass
C31	78-1568	3-30 MMFD. Long Wave Band Oscillator Trimmer

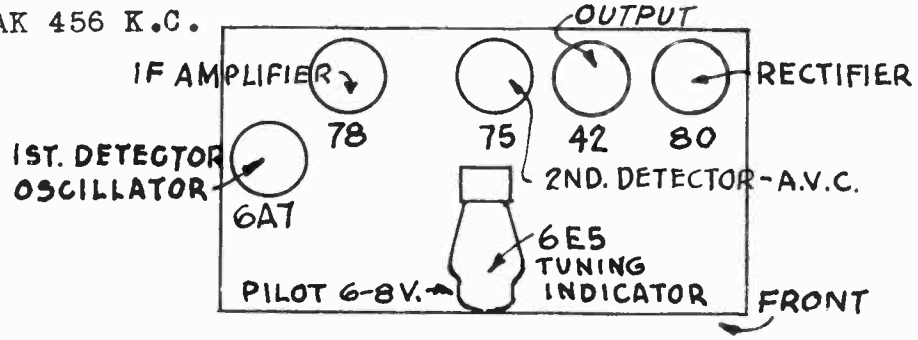
(5E9 is 5E8 with Addition of Tuning Tube.)

MODEL 5BE6
Schematic
Socket, Parts

WILCOX-GAY CORP.



I.F. PEAK 456 K.C.



CONDENSERS

C1	77-1581	16-366 MMFD. Third Section of 3 Gang Condenser
C2	77-1581	16-366 MMFD. First Section of 3 Gang Condenser
C3	77-1581	16-366 MMFD. Second Section of 3 Gang Condenser
C4	78-1572	600 MMFD. Broadcast Oscillator Series Trimmer
C5	78-1572	1600 MMFD. Police Band Oscillator Series Trimmer
C6	78-1588	3-30 MMFD. Police Band Oscillator Parallel
C7	78-1588	3-30 MMFD. Police Band Preselector Trimmer
C8	78-1588	3-30 MMFD. Foreign Band Preselector Trimmer
C9	78-2005	80 MMFD. First I.F. Primary Trimmer
C10	78-2005	80 MMFD. First I.F. Secondary Trimmer
C11	78-2005	80 MMFD. Second I.F. Primary Trimmer
C12	78-2005	80 MMFD. Second I.F. Secondary Trimmer
C13	76-265	.001 Mfd. Mica 75 Plate R.F. By-Pass Condenser
C14	75-2003	.01 Mfd. 400 Volt Paper Audio Feed Condenser
C15	75-2003	.01 Mfd. 400 Volt Paper Tone Control Condenser
C16	75-2007	.1 Mfd. 400 Volt Paper 75 Plate Hum Condenser
C17	75-2003	.01 Mfd. 400 Volt Paper Audio Feed Condenser
C18	76-2001	.0001 Mfd. Mica Diode Filter Condenser
C19	76-2001	.0001 Mfd. Mica Diode Filter Condenser
C20	75-2006	.1 Mfd. 200 Volt Paper I.F. Cathode By-Pass Cond.
C21	75-2006	.1 Mfd. 200 Volt Paper Screen By-Pass Condenser
C22	76-2002	.00006 Mfd. Mica Oscillator Grid Condenser
C23	75-2006	.1 Mfd. 200 Volt Paper 6A7 Cathode By-Pass Cond.
C24	75-2006	.1 Mfd. 200 Volt Paper A.V.C. Network By-Pass Cond.
C25	75-2006	.1 Mfd. 200 Volt Paper A.V.C. Network By-Pass Cond.
C26	75-2003	.01 Mfd. 400 Volt Paper Oscillator Plate By-Pass Cond
C27	75-2003	.01 Mfd. 400 Volt Paper Line By-Pass Condenser
C28	75-2013	1. Mfd. 400 Volt Paper B Supply By-Pass Condenser
C29	18-928	25 Mfd. 25 Volt C Bias Network By-Pass Condenser
C30	75-2006	.2 Mfd. 200 Volt C Bias Network By-Pass Condenser
C31	18-2002	4-4 Mfd. 450 Volt Dry Electrolytic Condenser

RESISTORS

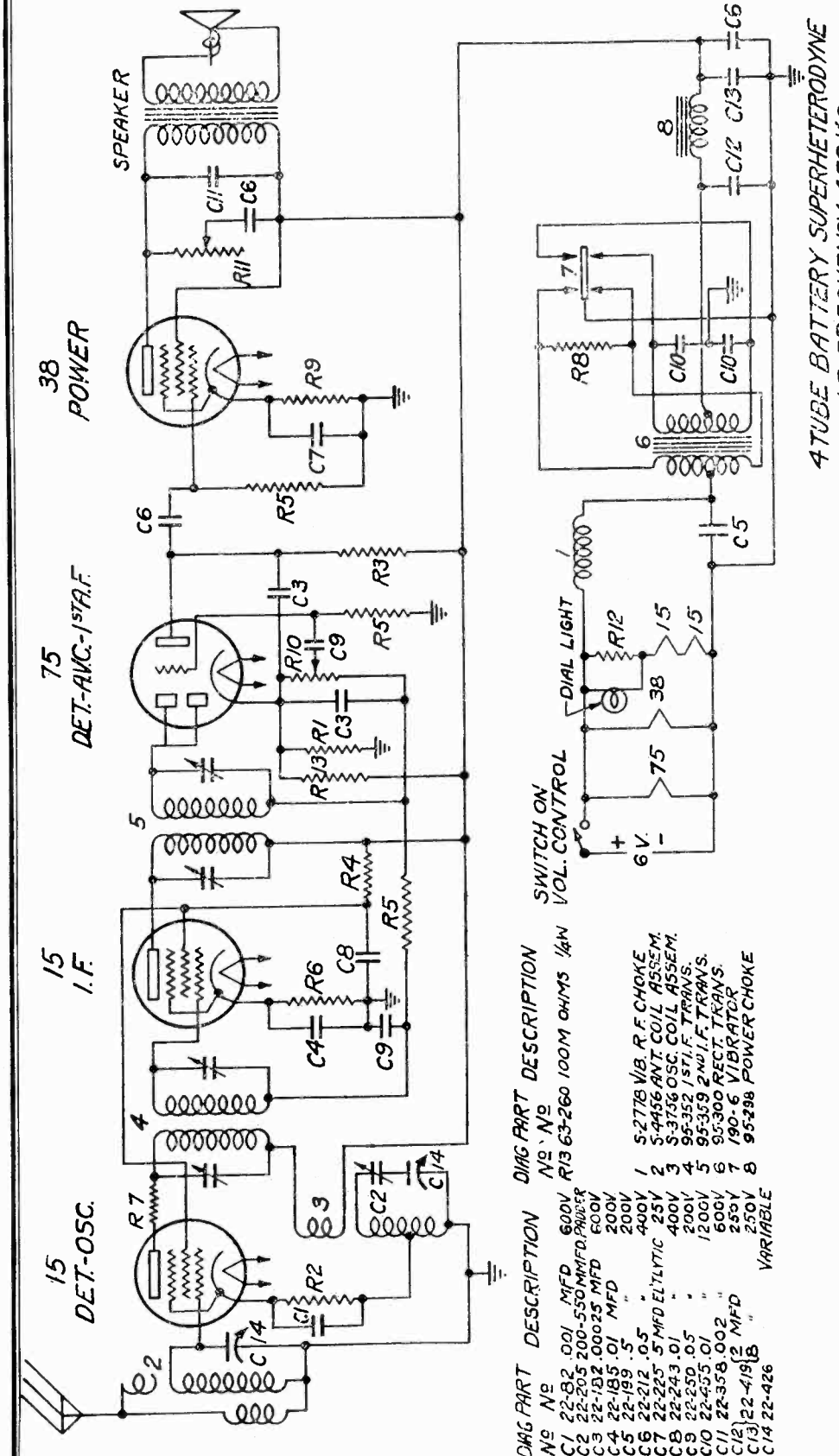
R1	53-941	20,000 Ohm Oscillator Grid Resistor
R2	53-1062	250 Ohm Oscillator Cathode Resistor
R3	53-277	10,000 Ohm Oscillator Plate Resistor
R4	53-926	1 Meg Ohm 6E5 Triode Grid Resistor
R5	53-923	100,000 Ohm A.V.C. Network Resistor
R6	53-926	1 Meg Ohm A.V.C. Network Resistor
R7	53-1042	20,000 Ohm R.F. & I.F. Screen Resistor
R8	53-1063	500 Ohm I.F. Cathode Resistor
R9	53-898	50,000 Ohm Diode Filter Resistor
R10	53-925	500,000 Ohm Diode Load Resistor
R11	19-1291	500,000 Ohm Volume Control & Switch
R12	53-923	100,000 Ohm C Bias Network Resistor
R13	53-920	10,000 Ohm C Bias Network Resistor
R14	53-926	1 Meg Ohm C Bias Network Resistor
R15	53-923	100,000 Ohm 75 Plate Hum Resistor
R16	53-924	250,000 Ohm 75 Plate Resistor
R17	19-1317	250,000 Ohm Tone Control
R18	53-925	500,000 Ohm 42 Grid Resistor

INDUCTANCES

L1	17-1646	Broadcast Oscillator Coil Assembly
L2	17-1667	Police Band Oscillator Coil Assem
L3	17-2018	Foreign Band Oscillator Coil Assem
L4	17-2060	Broadcast Preselector Coil Assem
L5	17-1668	Police Band Preselector Coil Assem
L6	17-2017	Foreign Band Preselector Coil Assem
L7	68-2007	First I.F. Trans. Assembly
L8	68-2008	Second I.F. Trans. Assembly
L9	64-2018	10" Speaker 42 Tube Output Transf
L10	64-2018	10" Speaker 2500 Ohm Field
L11	80-1068	Power Transformer (Unless Special)

ZENITH RADIO CORP.

MODELS 4-B-106, 4-B-131
4-B-132
Chassis 5406
Schematic



DIAG. No.	PART No.	DESCRIPTION
C1	22-182	.001 MFD 600V
C2	22-205	200-550 MMFD. PADDER
C3	22-182	.00025 MFD 600V
C4	22-185	.01 MFD 200V
C5	22-193	.5 " 200V
C6	22-212	.05 " 400V
C7	22-225	.5 MFD ELYTIC 25V
C8	22-243	.01 " 400V
C9	22-250	.05 " 200V
C10	22-455	.01 " 1200V
C11	22-358	.002 " 600V
C12	22-419	(2 MFD 250V
C13		(8 " 250V
C14	22-426	VARIABLE

DIAG. No.	PART No.	DESCRIPTION
R13	63-260	100M OHMS 1/4W
1	5-2778	V/B R.F. CHOKE
2	5-4456	ANT. COIL ASSEM.
3	5-3736	OSC. COIL ASSEM.
4	95-352	1ST I.F. TRANS.
5	95-359	2ND I.F. TRANS.
6	95-300	RECT. TRANS.
7	190-6	VIBRATOR
8	95-298	POWER CHOKE

			SPEAKER	MODELS
R1	63-238	1M OHMS	1/4W	
R2	63-499	5M "	1/4W	
R3	63-258	490M "	1/4W	49-153 6" P.M. 4-B-131, 4-B-132
R4	63-281	29M "	1/4W	
R5	63-293	990M "	1/4W	49-159 6" P.M. 4-B-106
R6	63-303	700 "	1/4W	
R7	63-357	300 "	1/2W	
R8	63-394	200 "	1/2W	
R9	63-415	1500 "	1/2W	
R10	63-534	400M " VOL. CONTROL		
R11	63-469	100M " TONE "		
R12	63-536	30 " WIRE WOUND		

CIRCUIT DIAGRAM—Models 4-B-105, 4-B-131, 4-B-132. (Chassis No. 5406)

MODELS
4-B-106, 4-B-131, 4-B-132

CHASSIS No. 5406

SOCKET VOLTAGES

Tube	Position	Ef	Ek	Eg^1	Eg^2	Eg^3	Ep
15	1st Det. Osc.	2	8	0	115	—	155
15	I. F.	2	3.5	0	115	—	155
75	2nd Det. A.V.C.	6	1.5	0	—	—	30
38	PWR	6	14	0	155	—	148

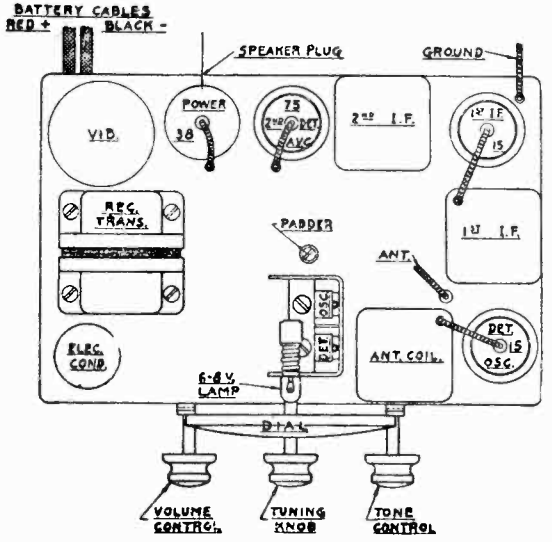
f—filament; k—cathode; g^1—control grid; g^2—screen grid; g^3—suppressor grid; p—plate.

All measurements taken from point indicated to ground using a 1000 ohm per volt D. C. meter with antenna and ground disconnected.

Battery Voltage 6V.

Battery Drain 1.7 amperes.

Power Output 1 watt.



TUBE POSITION

CAUTION: Reversal of the battery polarity will damage the filter condensers. The storage battery must be connected as shown above.

MODELS
5-S-119, 5-S-126, 5-S-127, 5-S-150, 5-S-151, 5-S-161

CHASSIS No. 5516

SOCKET VOLTAGES

Tube	Position	1	2	3	4	5	6	7	8	9
6A8	1st Det. Osc.	0	0	240	85	-1	166	6ac	4	0
6K7	I. F.	0	0	240	85	3	—	6ac	3	0
6Q7	2nd Det. A.V.C.	0	0	75	.1	.1	—	6ac	1.5	0
6F6	Power	0	0	230	240	-5	—	6ac	0	—
5Y3 5W4	Rectifier	0	240	—	AC	—	AC	—	240	—

BOTTOM VIEW OF SOCKET

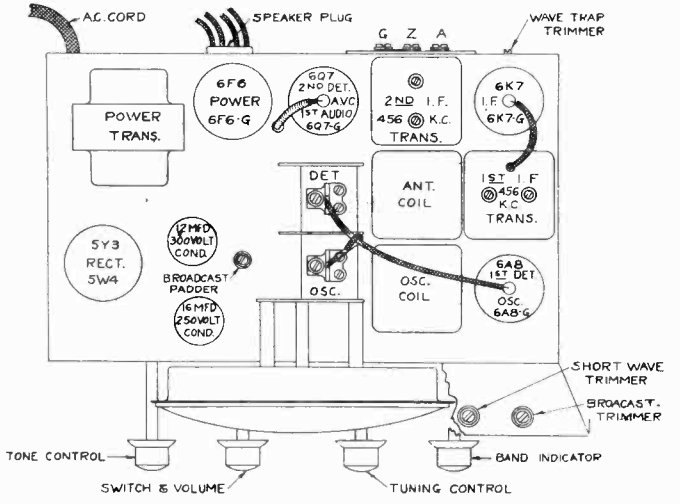
All voltages measured from point indicated to ground, using a 1000 ohm per volt meter with antenna and ground disconnected.

Line Voltage 112V.

Current Consumption 55 watts.

Power Output 3 watts.

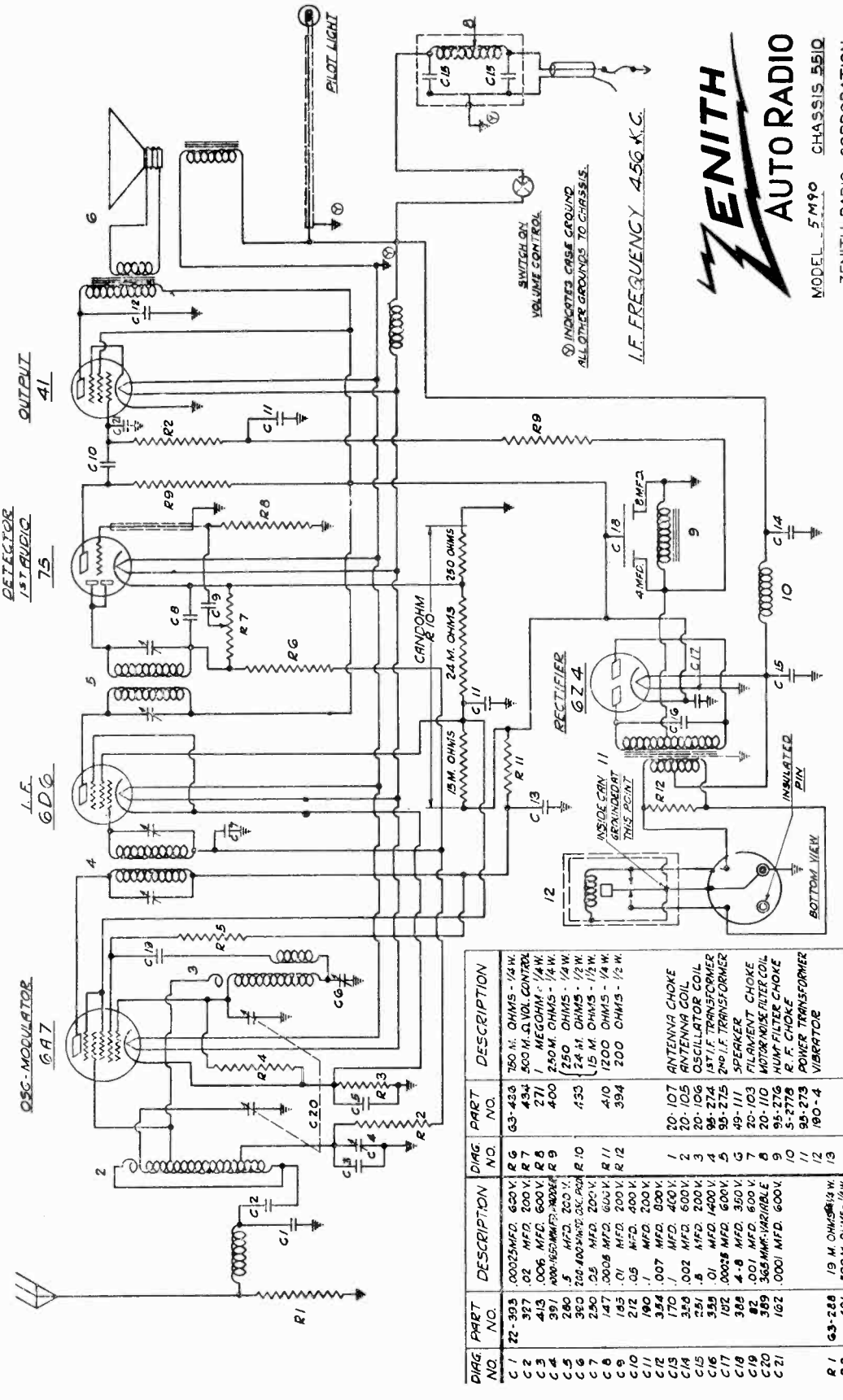
For other data see index



TUBE POSITION

ZENITH RADIO CORP.

MODEL 5-M-90
Chassis 5510
Schematic, Partr



DIAG. NO.	PART NO.	DESCRIPTION
C 1	22-395	.00025 MFD. 600 V.
C 2	327	.02 MFD. 200 V.
C 3	413	.006 MFD. 600 V.
C 4	391	100-365 MMFD. VARIABLE
C 5	280	.5 MFD. 200 V.
C 6	390	100-400 MMFD. OSC. PADDER
C 7	250	.25 MFD. 200 V.
C 8	147	.0008 MFD. 600 V.
C 9	165	.01 MFD. 200 V.
C 10	212	.05 MFD. 400 V.
C 11	190	.1 MFD. 200 V.
C 12	334	.007 MFD. 800 V.
C 13	170	.1 MFD. 400 V.
C 14	356	.002 MFD. 600 V.
C 15	251	.5 MFD. 200 V.
C 16	355	.01 MFD. 1400 V.
C 17	182	.0025 MFD. 600 V.
C 18	386	4-8 MFD. 350 V.
C 19	82	.001 MFD. 600 V.
C 20	389	365 MMF. VARIABLE
C 21	162	.0001 MFD. 600 V.
R 1	63-228	19 M. OHMS - 1/4 W.
R 2	401	500 M. OHMS - 1/4 W.
R 3	357	300 OHMS - 1/4 W.
R 4	260	100 M. OHMS - 1/4 W.
R 5	263	30 M. OHMS - 1/2 W.

DIAG. NO.	PART NO.	DESCRIPTION
R 6	63-436	750 M. OHMS - 1/4 W.
R 7	434	.500 M. Ω VOL. CONTROL
R 8	271	1 MEGOHM - 1/4 W.
R 9	400	2.50 M. OHMS - 1/4 W.
R 10	433	250 OHMS - 1/4 W.
		24 M. OHMS - 1/2 W.
		.15 M. OHMS - 1/2 W.
R 11	410	1200 OHMS - 1/4 W.
R 12	394	200 OHMS - 1/2 W.
1	20-107	ANTENNA CHOKE
2	20-105	ANTENNA COIL
3	20-106	OSCILLATOR COIL
4	95-274	1ST I.F. TRANSFORMER
5	95-275	2ND I.F. TRANSFORMER
6	49-111	SPEAKER
7	20-103	FILAMENT CHOKE
8	20-110	MOTOR NOISE FILTER COIL
9	95-276	HUM FILTER CHOKE
10	5-2778	R. F. CHOKE
11	95-273	POWER TRANSFORMER
12	190-4	VIBRATOR
13		

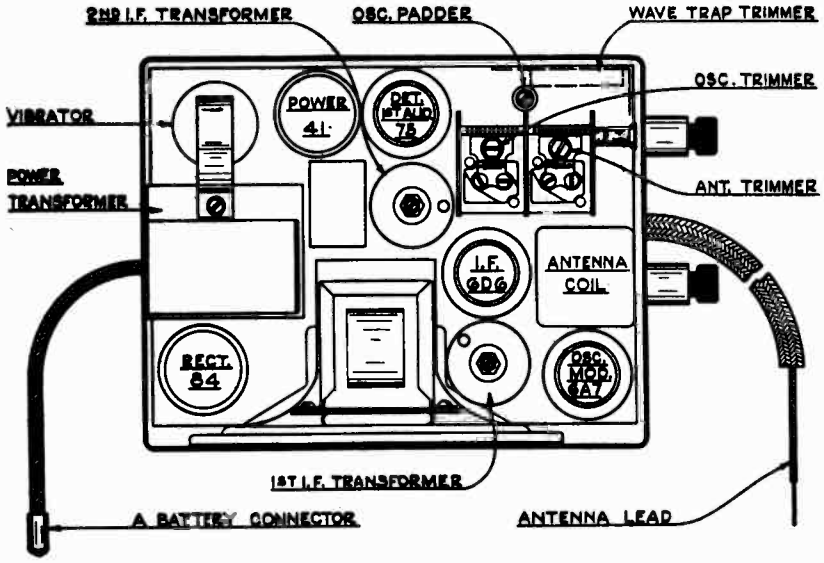
SOCKET VOLTAGES 5-M-90

Tube	Position	Ef	Ek	Eg¹	Eg²	Eg³	Ep
6A7	1st Det.	5.8	4	0	97	—	205
	Osc.			0	—	—	175
6D6	I. F.	5.8	4	0	97	4	217
75	2nd Det. A. V. C. 1st Audio	5.8	1.1	0	—	—	160
41	PWR.	5.8	0	—15	225	—	215
6Z4	RECT.	5.8	—	225	—	—	—

Line Voltage —6V.

Ef—heaters; Ek—cathode; Eg1—control grid; Eg2—screen grid; Eg3—suppressor grid; Ep—plate.

All measurements taken from point indicated to ground, using a 1000 ohm per volt. D. C. meter.



Tube Position. 5-M-90

ALIGNMENT

Every Zenith receiver is balanced, and the sensitivity measured on accurate crystal controlled signal generators before leaving the factory, and unless a part is changed, or the receiver otherwise altered, the adjustment should not be tampered with.

When alignment is thus required, an accurately calibrated service oscillator and output meter are essential.

The proper procedure is as follows:

MODEL 5M90

"A" Connect the service oscillator output leads to the control grid of the 6A7 tube, and to the chassis. If the oscillator output is a single shielded lead the shield should connect to the chassis.

Connect the output meter across the primary of the speaker transformer.

Set the service oscillator at 456 K.C., and adjust the trimmers on the I F transformers to the point giving the greatest reading on the output meter. These, as well as the following adjustments should be made using as small an output from the signal generator as possible so that the A.V.C. action will be least effective.

"B" Change the service oscillator connection from the grid of the 6A7 to the antenna wire, leaving the other lead attached to the chassis.

Set the service oscillator at 1600 K.C. and rotate the gang condenser until the plates are entirely out of mesh. Adjust the oscillator section trimmer until the 1600 K.C. signal is tuned in.

Change the service oscillator to 1400 K.C. Rotate the gang condenser until this signal is tuned in, and then adjust the ANTENNA trimmer on the gang condenser to the point given the greatest output reading.

"C" Set the service oscillator to 600 K.C., and rock the gang condenser slowly to and fro past the point where this signal is received, meanwhile adjusting the padder condenser for a setting which gives the greatest output reading.

"D" Repeat operation "B".

"E" Reset the service oscillator to 456 K.C., leaving it connected to antenna, and adjust the wave trap trimmer to the point giving the MINIMUM output reading.

MODELS 6-M-90, 6-M-91, 6-M-92

"A" Connect the service oscillator to the control grid of the 6A8 tube and the chassis.

Connect the output meter across the primary of the speaker transformer.

Set the service oscillator to 252.5 K.C., and adjust the trimmers on the I. F. transformers for the greatest output reading. These adjustments should be repeated several times using as weak an input signal as possible so as to obtain greater accuracy.

"B" Change the service oscillator lead from the grid of the 6A8 to the antenna connection. A male Delco Remy connector may be used in making a connection to the antenna lead.

Set the service oscillator at 1400 K.C.

Rotate the gang condenser one and one fourth turns from the minimum setting. At the proper position eight teeth on the tuning gear will be visible past the gear bracket.

Adjust the oscillator, R.F. and antenna trimmers in that order to the point giving the greatest output.

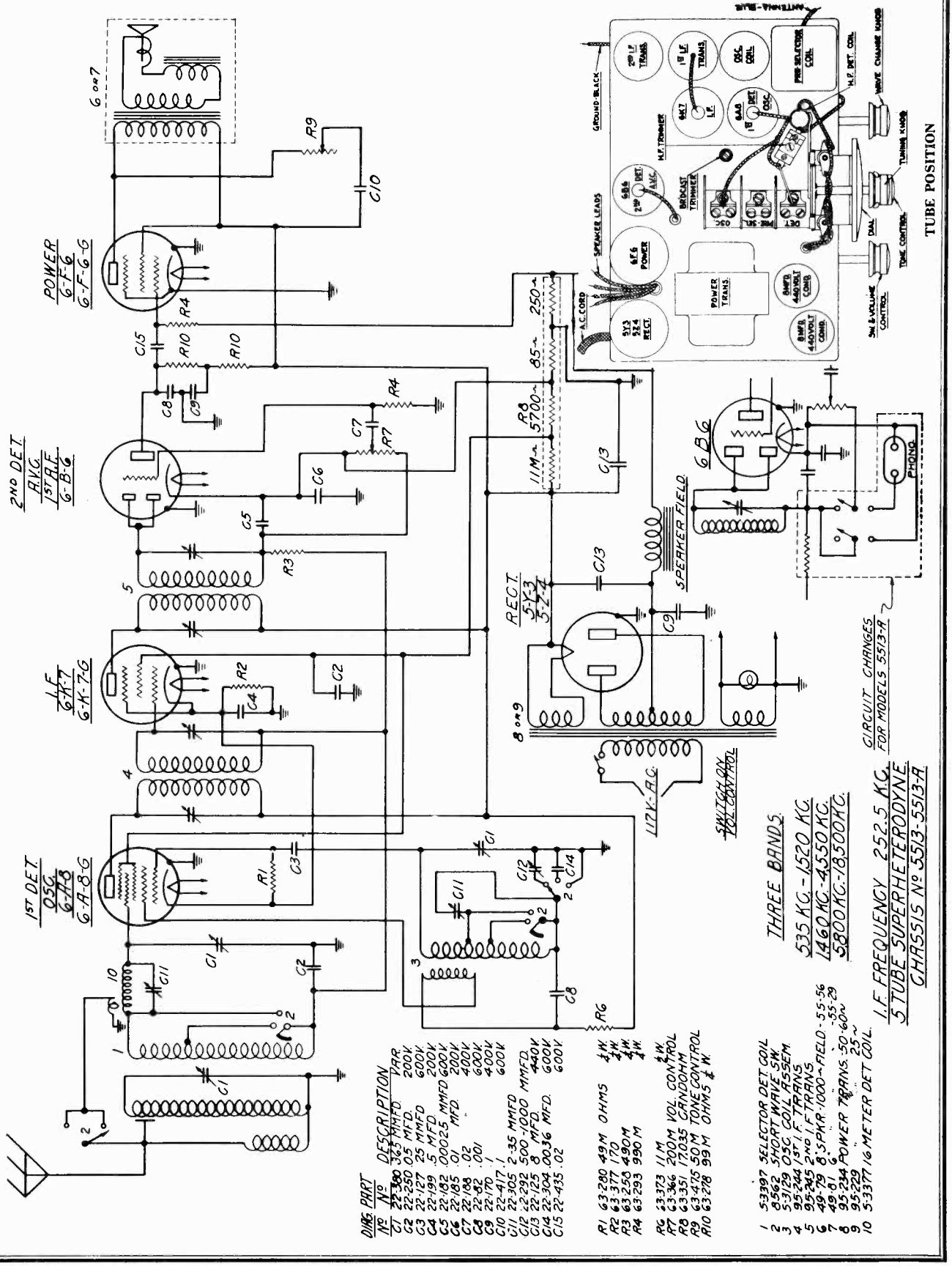
"C" Set the service oscillator at 600 K.C. and rotate the gang condenser to tune in this signal. Move the gang condenser to and fro past the signal meanwhile adjusting the oscillator padder condenser until the combination of adjustments giving the greatest reading of the output meter is obtained.

"D" Repeat operation "B."

For other data see index

ZENITH RADIO CORP.

MODELS 5-S-29, 5-S-56
Chassis 5513, 5513A
Schematic, Socket
Trimmers, Parts



DWG Nº	PART Nº	DESCRIPTION	
C1	23380	365 MMFD	VAR
C2	22-250	.05 MFD.	600V
C3	22-127	.25 MMFD	200V
C4	22-199	.5 MFD	200V
C5	22-182	.00025 MMFD	600V
C6	22-185	.01 MFD	200V
C7	22-188	.02	400V
C8	22-82	.001	400V
C9	22-170	.1	600V
C10	22-417	.1	
C11	22-305	2-35 MMFD	
C12	22-232	500-1000 MMFD	440V
C13	22-125	.8 MFD.	600V
C14	22-304	.0036 MFD.	600V
C15	22-435	.02	
R1	63-280	49M OHMS	½W.
R2	63-377	170	½W.
R3	63-256	490M	½W.
R4	63-293	990M	½W.
R5	63-373	11M	½W.
R7	63-366	200M VOL CONTROL	
R8	63-351	17035 CANOOHM	
R9	63-475	50M TONE CONTROL	
R10	63-278	99M OHMS	½W.

1	53397	SELECTOR DET. COIL
2	8562	SHORT WAVE SW.
3	53129	OSC COIL ASSEM
4	95244	1ST I.F. TRANS
5	95245	2ND I.F. TRANS
6	49-79	8.5 MA R-1000-FIELD-55-56
7	49-81	6 MA R-1000-FIELD-55-29
8	95234	POWER TRANS. 50-60~
9	95229	25~
10	53377	16 METER DET COIL

MODELS 5-S-56
MODELS 663,664
Voltage,Alignment

ZENITH RADIO CORP.

SOCKET VOLTAGES FOR MODELS 663, 664, Chassis #5510

TUBE	POSITION	Ef	Ek	Eg1	Eg2	Eg3	Ep
6A7	1st Det.	5.8	4	0	97	-	205
	Osc.			0	-	-	175
6D6	I. F.	5.8	4	0	97	4	217
75	2nd Det. A. V. C. 1st Audio	5.8	1.1	0	-	-	160
41	PWR.	5.8	0	-15	225	-	215
6Z4	RECT.	5.8		225	-	-	-

Line Voltage 6 Volts. All measurements taken with a 1000 ohm per volt meter.

ALIGNMENT MODELS 663, 664, Chassis #5510

(1) Balance I. F. transformers at 456 K. C. with signal generator connected to grid of 6A7 and ground.
(2) Connect signal generator to antenna and ground. Adjust oscillator trimmer on gang for correct dial reading at 1400 K.C. Adjust detector trimmer for greatest output.
(3) Adjust oscillator padder while rocking pointer forward and backward past 600 K.C. to combination giving greatest output.
(4) Realign 1400 K.C. trimmers on gang.
(5) Set signal generator at 456 K.C. and gang at 600 K.C.Adjust wave trap trimmer for minimum signal. For other data see index

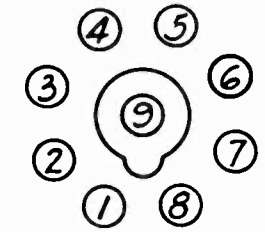
SOCKET VOLTAGES FOR MODELS 5-S-29, 5-S-56, Chassis #5513, #5513-A

TUBE	POSITION	1	2	3	4	5	6	7	8	9
6A8	1st Det. Osc.	0	5.8_{ac}	260	80	-.1	210	0	4	0
6K7	I. F.	0	5.8_{ac}	260	80	0	-	0	5.2	0
6B6	2nd Det. A.V.C.	0	5.8_{ac}	135	0	0	-	0	1.5	0
6F6	PWR	0	5.8_{ac}	240	260	-.7	-	0	0	-
5Y3	Rect.	0	260	-	270_{ac}	-	270_{ac}	-	260	-

Line Voltage 110 Volts. All measurements taken with a 1000 ohm per volt meter.

ALIGNMENT MODELS 5-S-29, 5-S-56, Chassis #5513, #5513-A

Alignment



BOTTOM VIEW OF SOCKET

1. Balance I.F. transformers at 252.5 K.C. with test oscillator connected to control grid of 6A8 and ground.
2. Turn band switch to C band. Connect test oscillator to antenna and ground leads. Set test oscillator at 15 Megacycles. Adjust oscillator trimmer on gang condenser for correct dial reading.
3. Adjust detector trimmer (located on top of chassis between front section of gang condenser and coil) for maximum output.
4. Turn band switch to A band. Adjust oscillator trimmer (located on right side underneath chassis) for correct dial reading at 1400 K.C. also adjust preselector and detector trimmers on gang for maximum output.
5. Adjust oscillator padder (next to oscillator section of gang on top of chassis) while rocking pointer back and forth past 600 K.C. to the combination giving greatest output.
6. Recheck 1400 K.C.
7. Repeat entire procedure.

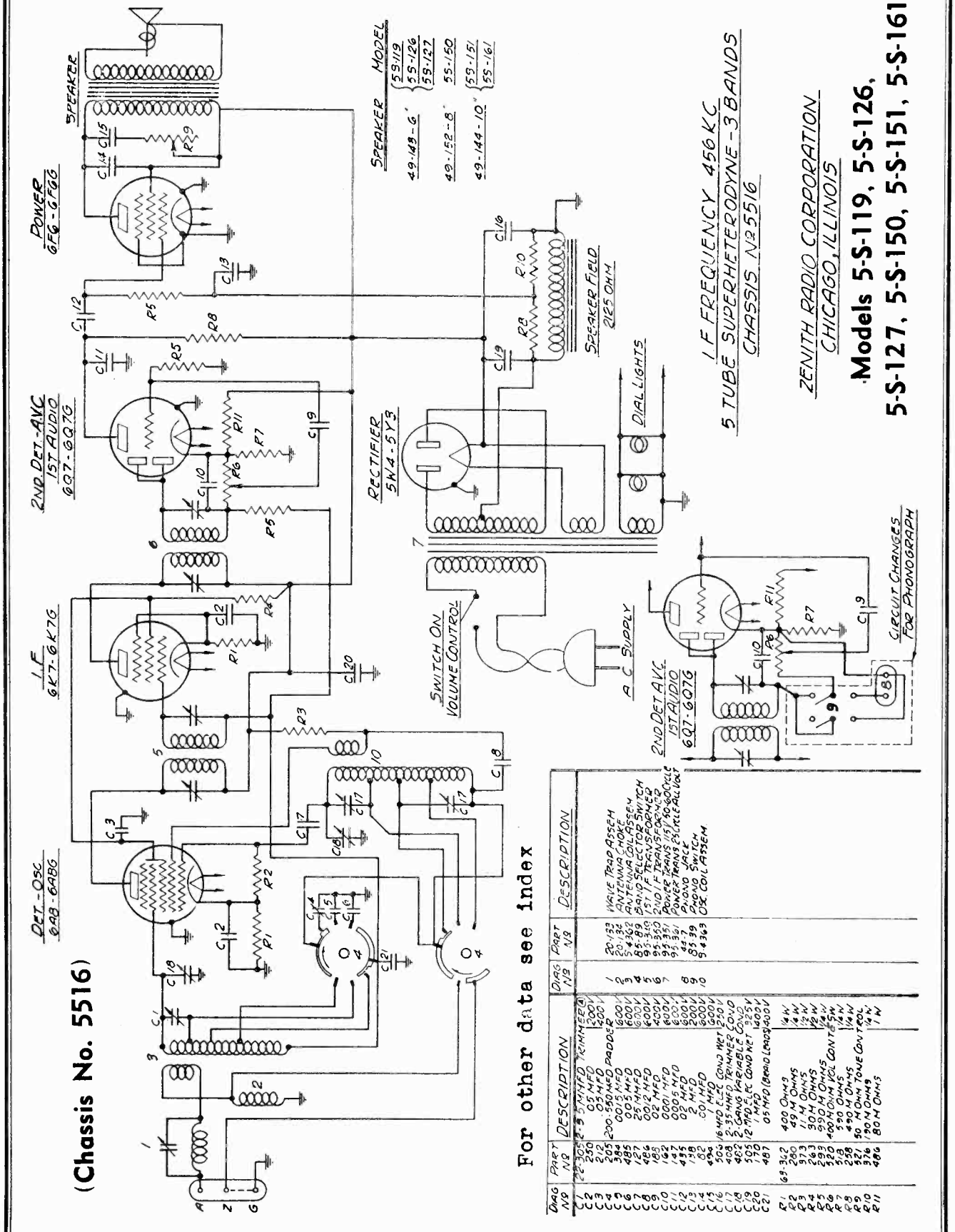
Chassis 5516
Schematic, Parts

MODELS 5-S-119, 5-S-126
5-S-127, 5-S-150
5-S-151, 5-S-161

Models 5-S-119, 5-S-126, 5-S-127, 5-S-150, 5-S-151, 5-S-161

ZENITH RADIO CORPORATION
CHICAGO, ILLINOIS

I.F. FREQUENCY 456 KC
5 TUBE SUPERHETERODYNE - 3 BANDS
CHASSIS № 5516



SPEAKER MODEL

SPEAKER	MODEL
49-149-6"	5S-119 / 5S-126 / 5S-127
49-152-8"	5S-150
49-144-10"	5S-151 / 5S-161

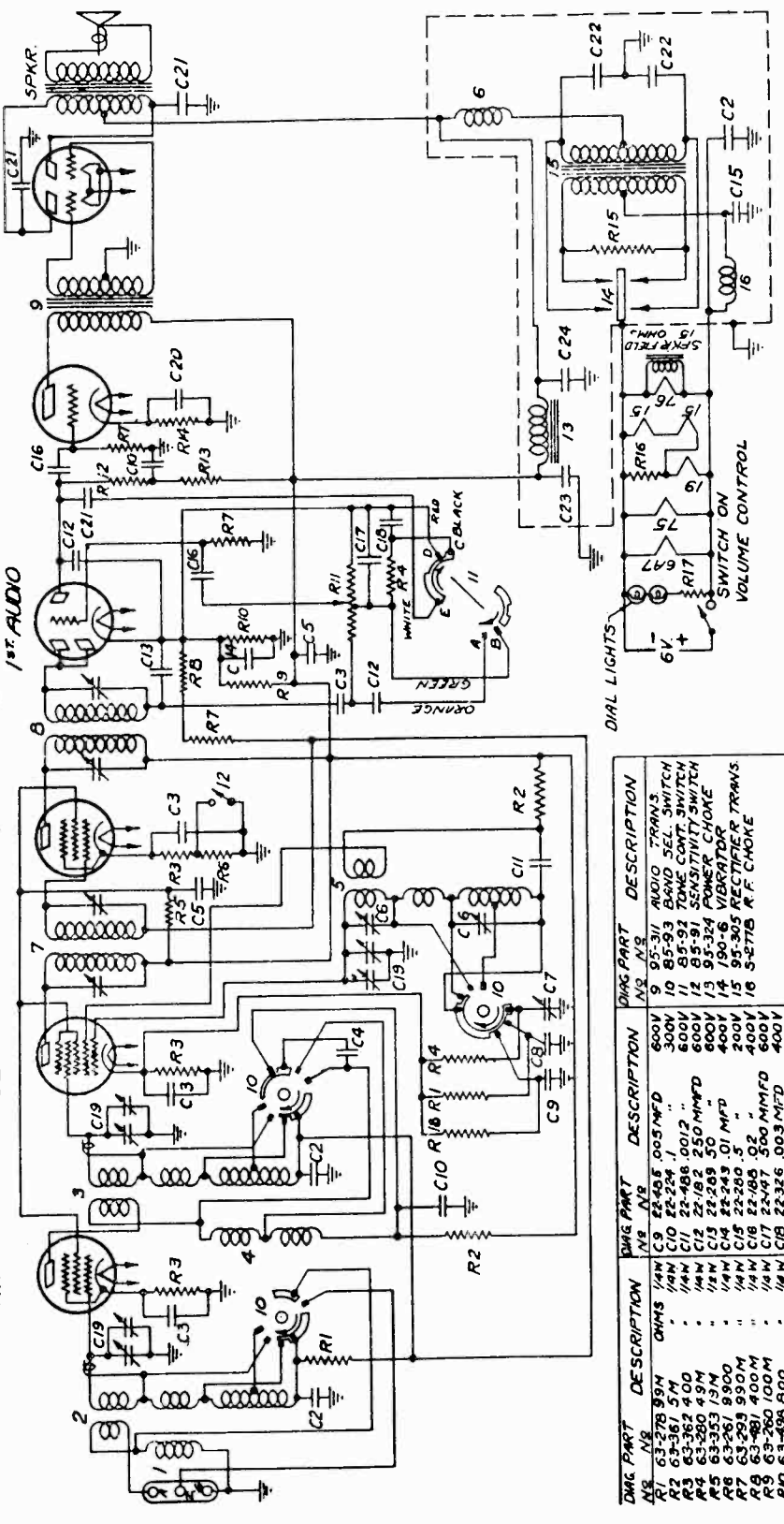
For other data see Index

DIAG NO	PART NO	DESCRIPTION
C1	22-305	2-5 MMFD TRIMMER (A)
C2	256	.05 MFD 200 V
C3	212	.05 MFD 400 V
C4	265	200-390 MMFD PADDER
C5	484	.0015 MFD 600 V
C6	485	.005 MFD 600 V
C7	127	25 MMFD 600 V
C8	486	.01 MFD 400 V
C9	162	.0001 MFD 600 V
C10	147	.0005 MFD 600 V
C11	495	.02 MFD 600 V
C12	138	.1 MFD 200 V
C13	82	.01 MFD 600 V
C14	496	16 MFD ELEC. COND. WET 250 V
C15	509	2-35 MMFD TRIMMER COND.
C16	408	2 GANG PADDABLE COND.
C17	402	2 MFD ELEC. COND. WET 325 V
C18	395	.1 MFD 600 V
C19	190	.05 MFD (BRAID LEADS) 400 V
C20	481	
R1	63-342	400 OHMS 1/4 W
R2	280	49 M OHMS 1/4 W
R3	273	11 M OHMS 1/2 W
R4	263	30 M OHMS 1/2 W
R5	293	990 M OHMS 1/4 W
R6	520	400 OHM VOL CONT. & SW. 1/4 W
R7	518	590 OHMS 1/4 W
R8	258	490 M OHMS 1/4 W
R9	521	50 M OHM TONE CONTROL 1/4 W
R10	376	120 M OHMS 1 W
R11	486	80 M OHMS

DIAG NO	PART NO	DESCRIPTION
1	20-132	WAVE TRAP ASSEM.
2	20-132	ANTENNA CHOKE
3	54-362	ANTENNA COIL ASSEM.
4	85-89	BAND SELECTOR SWITCH
5	95-340	1ST I.F. TRANSFORMER
6	95-340	2ND I.F. TRANSFORMER
7	95-336	POWER TRANS. 115 V. 60 CYCLE
8	95-339	POWER TRANS. 105/115 V. 25 CYCLE
9	44-39	PHONO JACK
10	85-39	PHONO SWITCH
	94-363	OSC. COIL ASSEM.

MODELS 6-B-107, 6-B-129
6-B-164
Chassis 5635
Schematic, Parts

ZENITH RADIO CORP.



DIAG. NO.	PART NO.	DESCRIPTION		DIAG. NO.	PART NO.	DESCRIPTION	
R1	63-278	99M	½W	C9	23-458	.005 MFD	600V
R2	63-361	5M	"	C10	22-224	.1 "	300V
R3	63-362	400	"	C11	22-466	.0012 "	600V
R4	63-280	49M	"	C12	22-182	250 MMFD	600V
R5	63-353	13M	"	C13	22-269	.50 "	600V
R6	63-261	9900	"	C14	22-243	.01 MFD	400V
R7	63-293	990M	"	C15	22-280	.5 "	200V
R8	63-481	400M	"	C16	22-186	.02 "	400V
R9	63-260	100M	"	C17	22-447	500 MMFD	600V
R10	63-498	800	"	C18	22-326	.003 MFD	400V
R11	63-522	2 MEG. VOL. CONT.		C19	22-488	VARIABLE COND.	
R12	63-258	490M	OHMS ½W	C20	22-225	5 MFD ELECTRIC	25V
R13	63-290	260M	" ½W	C21	22-492	.002 MFD	600V
R14	63-360	2M	" ½W	C22	22-455	.01 "	1200V
R15	63-394	200	" 2W	C23	22-459	8 MFD	250V
R16	63-477	100Δ FLEX. WIRE WND.		C24		2 "	
R17	63-533	13 " " "	"				
R18	63-288	19M	OHMS ½W				

C2	22-487	.05 MFD	400V
C3	22-490	.05 MFD	200V
C4	22-477	25 MMFD	600V
C5	22-477	.25 MFD	400V
C6	22-402	9-35 MMFD TRIMMER	
C7	22-205	200-550 " PADDER	
C8	22-384	.0015 MFD	600V

1	20-71	ANTENNA CHOKE
2	3-4480	ANT. COIL ASSEM.
3	3-4481	DET. COIL ASSEM.
4	20-135	R.F. PLATE CHOKE
5	3-4482	OSC. COIL ASSEM.
6	20-88	R.F. CHOKE
7	95-371	1ST I.F. TRANS.
8	95-372	2ND I.F. TRANS.

DIAG. NO.	PART NO.	DESCRIPTION
9	95-311	AUDIO TRANS.
10	85-93	BAND SEL. SWITCH
11	85-92	TONE CONT. SWITCH
12	85-91	SENSITIVITY SWITCH
13	95-324	POWER CHOKE
14	190-6	VIBRATOR
15	95-305	RECTIFIER TRANS.
16	5-2778	R.F. CHOKE

SPEAKER		MODEL
49-165	8" P.M.	6-B-129
49-157	12" DYNAMIC	6-B-164
49-160	8" P.M.	6-B-107

CIRCUIT DIAGRAM — Models 6-B-107, 6-B-129, 6-B-164. (Chassis No. 5635)

MODELS
6-B-107, 6-B-129, 6-B-164

CHASSIS No. 5635

SOCKET VOLTAGES

Tube	Position	Ef	Eg	Eg¹	Eg²	Eg³	Ep
15	R. F.	2	1.5	0	65	—	115
6A7	Det. Osc.	6	2.5	0 −5	75 —	— —	115 135
15	I. F.	2	3.5	0	75	—	130
75	2nd Det. A.V.C.	6	1.2	0	—	—	35
76	1st Audio	6	6		—	—	125

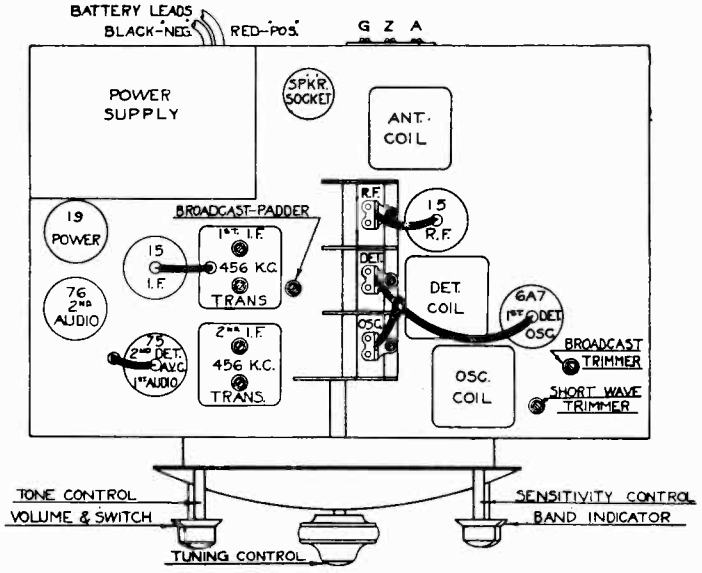
f—filament; k—cathode; g¹—control grid; g²—screen grid; g³—suppressor grid; p—plate.

All voltages measured from socket contacts to ground with 1000 ohm per volt D. C. meter. Antenna and ground disconnected.

Battery Voltage 6V.

Battery Drain 2.2 amperes.

Power Output 2 watts.



TUBE POSITION

CAUTION: Reversal of the battery polarity will damage the filter condensers. The storage battery must be connected as shown above.

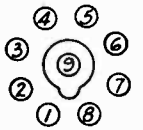
NOTE: See bottom page 18 for details of antenna connector strip.

MODELS
6-S-128, 6-S-137, 6-S-147, 6-S-152, 6-S-157

CHASSIS No. 5634

SOCKET VOLTAGES

Tube	Position	1	2	3	4	5	6	7	8	9
6A8	1st Det Osc.	0	6AC	280	80	−4	175	0	0	0
6K7	I F	0	6AC	280	80	0	—	0	Local 7	0
6H6	2nd Det A.V.C.	0	6AC	−2	−2	−2	—	0	−2	—
6F5	1st Audio	0	6AC	—	75	—	—	0	−2	−2
6F6	Power	0	6AC	260	280	−2	—	0	−2	—
5Y3 5W4	Rectifier	0	320	—	AC	—	AC	—	320	—



BOTTOM VIEW OF SOCKET

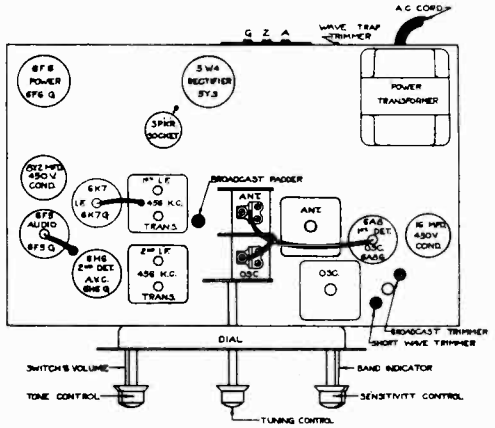
All voltages measured from point indicated to ground, using a 1000 ohm per volt meter. Antenna and ground disconnected.

Line Voltage 112V.

Current Consumption 75 watts.

Power Output 4 watts.

For other data see index

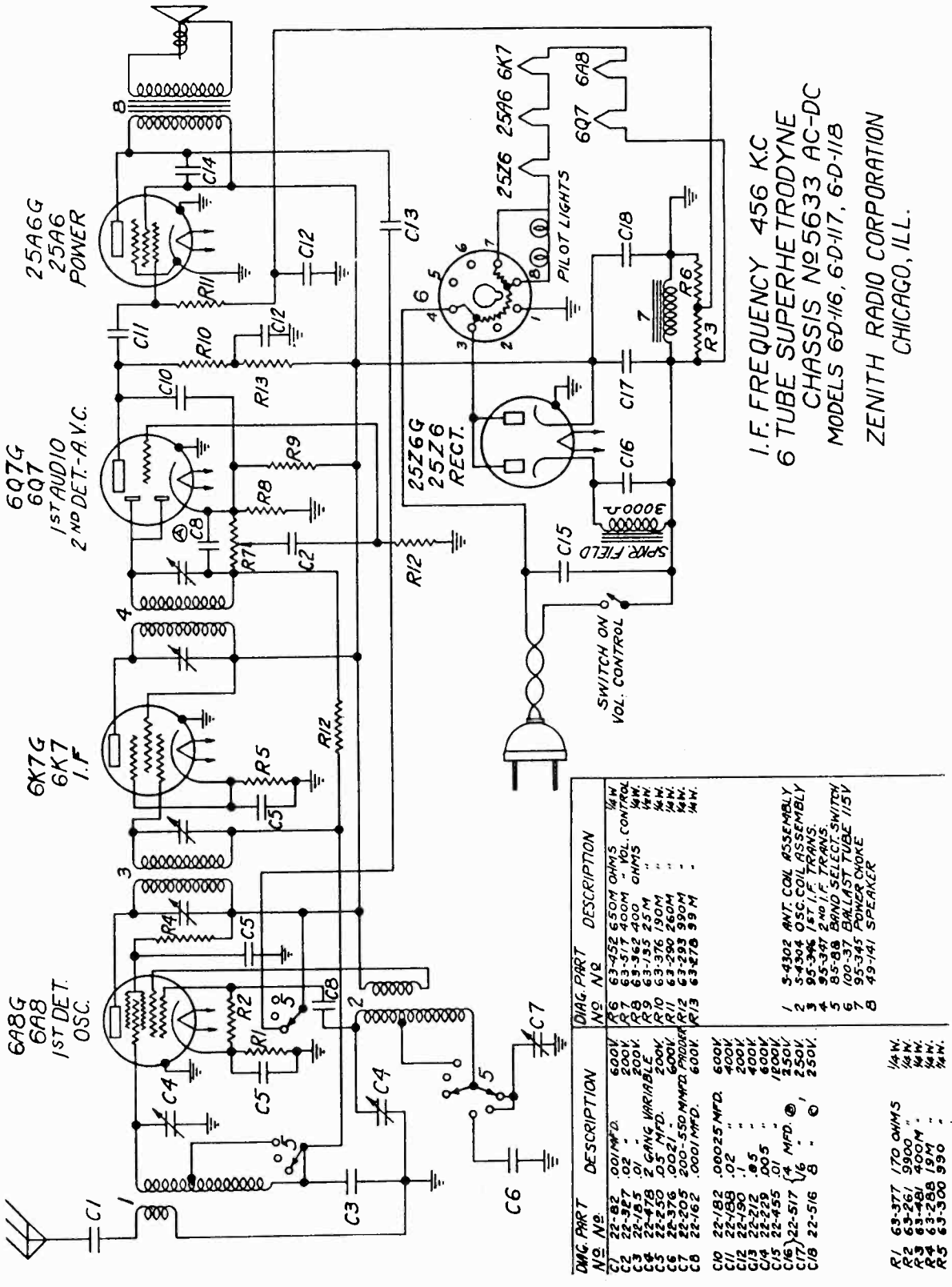


TUBE POSITION

NOTE: See bottom page 18 for details of antenna connector strip.

MODELS 6-D-116, 6-D-117
6-D-118
Chassis 5633
Schematic, Parts

ZENITH RADIO CORP.



DWG. PART Nº	Nº	DESCRIPTION	
C1	22-182	.001 MFD.	600V
C2	22-327	.02 "	200V
C3	22-185	.01 "	200V
C4	22-478	2 GANG VARIABLE	
C5	22-230	.05 MFD.	200V
C6	22-376	.0021 "	600V
C7	22-205	200-550 MMFD. PADDER	
C8	22-162	.0001 MFD.	600V
C10	22-182	.00025 MFD.	600V
C11	22-188	.02 "	400V
C12	22-190	.1 "	200V
C13	22-212	.05 "	400V
C14	22-229	.005 "	600V
C15	22-455	.01 "	1200V
C16	22-517	.4 MFD. ⑧, ⑦	250V
C17		16 " ⑧ " ⑥	250V
C18	22-516	8 " ⑧ " ⑥	250V
R1	63-377	170 OHMS	1/4 W.
R2	63-261	9900 "	1/4 W.
R3	63-481	400M "	1/4 W.
R4	63-288	19M "	1/4 W.
R5	63-300	990 "	1/4 W.

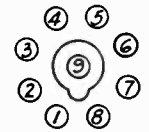
DWG. PART Nº	Nº	DESCRIPTION	
R6	63-452	650M OHMS	1/4 W
R7	63-317	400M - VOL. CONTROL	
R8	63-362	400 OHMS	1/4 W.
R9	63-155	25M "	1/4 W.
R10	63-376	190M "	1/4 W.
R11	63-290	260M "	1/4 W.
R12	63-293	990M "	1/4 W.
R13	63-278	99 M "	1/4 W.
1	3-4302	ANT. COIL ASSEMBLY	
2	3-4304	OSC. COIL ASSEMBLY	
3	95-346	1ST I.F. TRANS.	
4	95-347	2ND I.F. TRANS.	
5	85-88	BAND SELECTOR SWITCH	
6	100-37	BALLAST TUBE 115V	
7	95-345	POWER CHOKE	
8	49-141	SPEAKER	

MODELS
6-D-116, 6-D-117, 6-D-118

CHASSIS No. 5633

SOCKET VOLTAGES

Tube	Position	1	2	3	4	5	6	7	8	9
6A8	1st Det. Osc.	0	AC	100	50	-5	100	AC	1	-1
6K7	I. F.	0	AC	100	100	5	—	AC	5	0
6Q7	2nd Det. A.V.C.	0	AC	50	0	0	—	AC	1	0
25A6	Power	0	AC	90	100	1	—	AC	0	—
25Z6	Rectifier	0	AC	AC	AC	100	—	AC	125	—
100-37	115 Volt Ballast	—	—	—	—	—	—	—	—	—



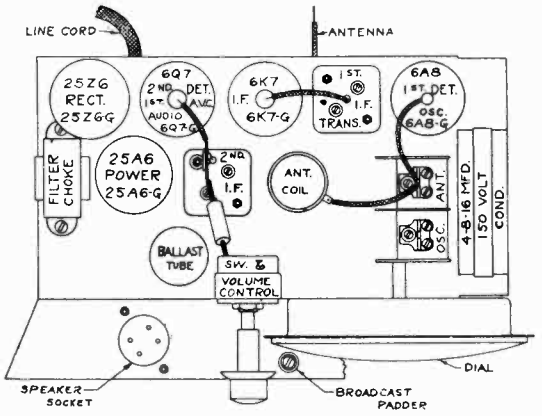
BOTTOM VIEW OF SOCKET

All voltages measured from point indicated to ground, using a 1000 ohm per volt meter. Antenna and ground disconnected.

Line Voltage 112V. (A.C.)

Current Consumption 44 watts.

Power Output 1.5 watts.



TUBE POSITION

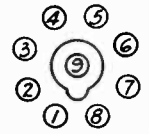
CAUTION: Do not ground chassis while testing or during operation, otherwise filter choke will be short circuited.

MODELS
7-D-119, 7-D-126, 7-D-127, 7-D-138, 7-D-151, 7-D-148, 7-D-162, 7-D-168

CHASSIS No. 5707

SOCKET VOLTAGES

Tube	Position	1	2	3	4	5	6	7	8	9
6A8	1st Det. Osc.	0	AC	125	80	20	100	AC	25	15
6K7	I. F.	0	AC	125	125	25	—	AC	25	10
6H6	2nd Det. A.V.C.	0	AC	10	25	10	—	AC	25	—
6F5	1st Audio	0	AC	—	60	—	—	AC	25	5
25A6	Power	0	AC	110	125	1	—	AC	25	—
25Z6	Rectifier	0	0	AC	AC	105	—	AC	125	—
	Ballast	—	—	—	—	—	—	—	—	—



BOTTOM VIEW OF SOCKET

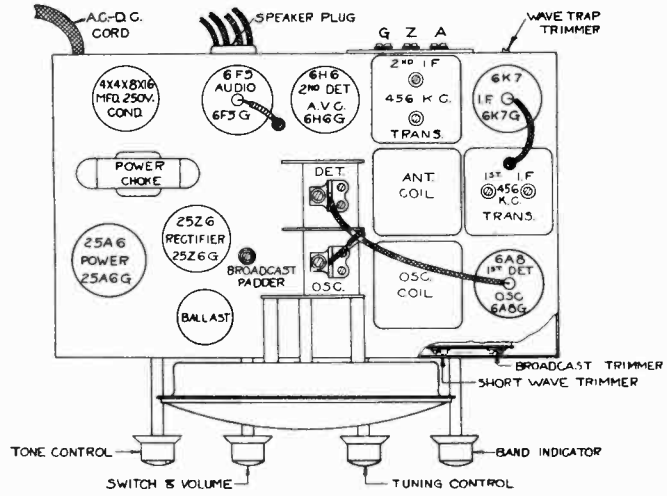
Measured from point indicated to junction of filter choke and speaker field using a 1000 ohm per volt meter.

Line Voltage 112 (A.C.)

Current Consumption 44 watts.

Power Output 1.5 watts.

For other data see index

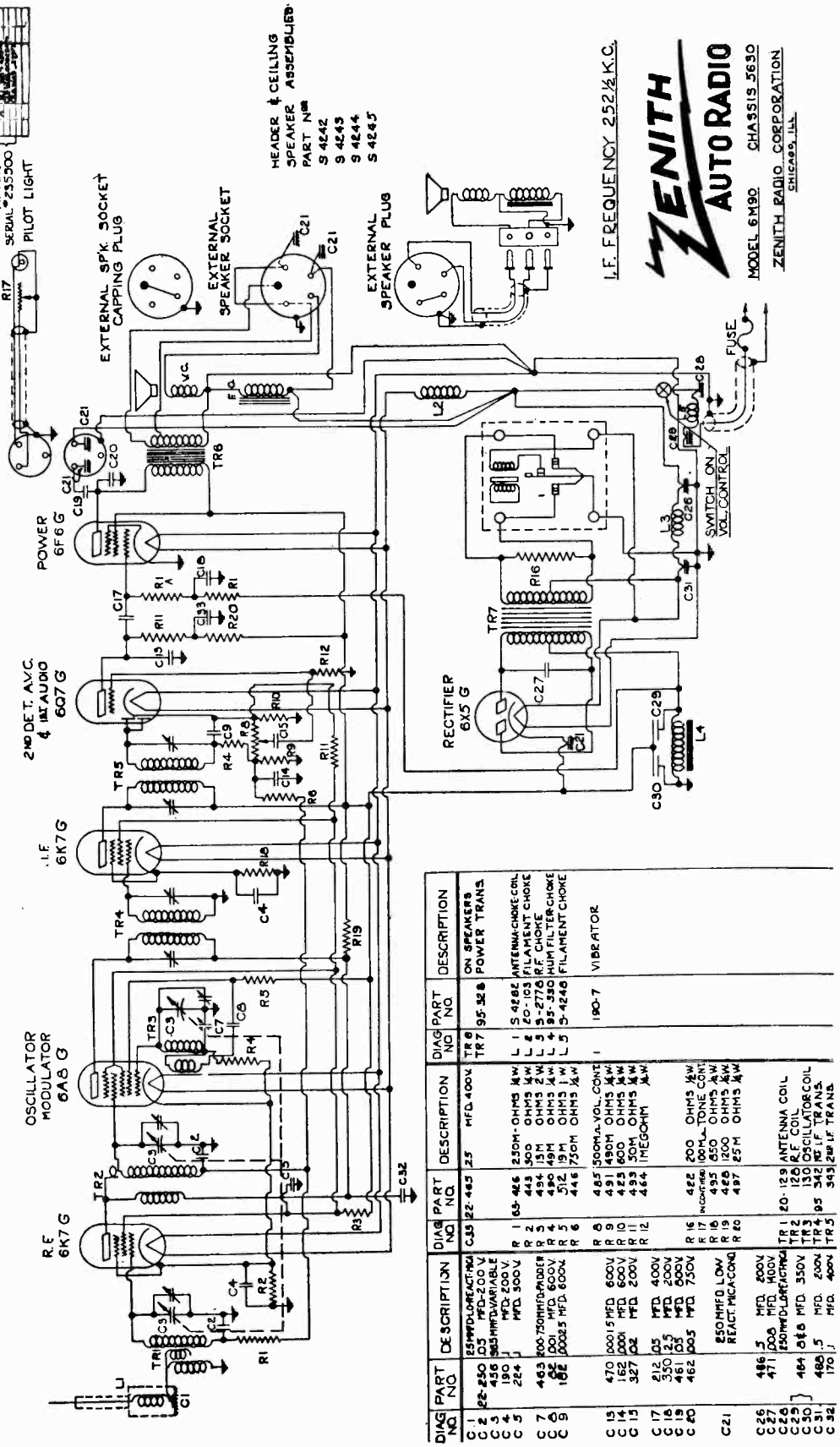


TUBE POSITION

NOTE: See bottom page 18 for details of antenna connector strip.

MODELS 6-M-90S, 6-M-90D
Chassis 5630
Schematic, Parts List

ZENITH RADIO CORP.



DIAG NO	PART NO	DESCRIPTION
C1	22-230	25MMFD REACTANCE
C2	230	.05 MFD 200 V.
C3	456	365 MMFD VARIABLE
C4	190	MFD 200 V.
C5	224	MFD 300 V.
C7	463	800-750MMFD PADDER
C8	.02	.001 MFD 600 V.
C9	182	.00025 MFD 600 V.
C15	470	.00015 MFD 600 V.
C14	162	.0001 MFD 600 V.
C13	327	.02 MFD 200 V.
C17	212	.05 MFD 400 V.
C18	350	2.5 MFD 200 V.
C19	461	.03 MFD 600 V.
C20	462	.005 MFD 750 V.
C21		250 MMFD LOW REACT. MICA-COND
C26	486	.5 MFD 400 V.
C27	471	.008 MFD 400 V.
C28		250MMFD-LAMP MICA
C29	464	.068 MFD 350 V.
C30	485	.5 MFD. 200 V.
C31	170	.1 MFD. 400 V.
C32		

DIAG NO	PART NO	DESCRIPTION
C33	22-445	.25 MFD 400 V.
R 1	63-426	250M-OHMS ½W
R 2	443	300 OHMS ½W
R 3	434	1.5M OHMS 2W.
R 4	490	49M OHMS ½W.
R 5	512	1.9M OHMS 1 W.
R 6	446	750M OHMS ½W
R 8	485	500M A. VOL. CONT
R 9	491	490M OHMS ½W.
R 10	423	800 OHMS ½W.
R 11	493	50M OHMS ½W.
R 12	464	1 MEGOHM ½W.
R 16	422	200 OHMS ½W.
R 17	MOUNTED	100M A. TONE CONT.
R 18	495	850 OHMS ½W.
R 19	426	1200 OHMS ½W.
R 20	497	2.5M OHMS ½W.
TR 1	20-129	ANTENNA COIL
TR 2	126	R.F. COIL
TR 3	130	OSCILLATOR COIL
TR 4	342	1ST I.F. TRANS.
TR 5	343	2ND I.F. TRANS.

DIAG NO	PART NO	DESCRIPTION
TR 6	S 4242	ANTENNA-CHOKE COIL
TR 7	20-103	FILAMENT CHOKE
L 2	9-2776	R.F. CHOKE
L 3	93-330	HUM FILTER CHOKE
L 4	9-4246	FILAMENT CHOKE
L 5	190-7	VIBRATOR

DIAG NO	PART NO	DESCRIPTION
		ON SPEAKERS
		POWER TRANS.

For other data see Index

MODELS 215,216,225
Socket,Trimmers,Voltage

ZENITH RADIO CORP.

MODELS 6-M-90S,6-M-90D
6-M-91-D,6-M-91-S
MODEL 6-M-92

Socket Voltages

Models 215-216-225

Tube Type	Position	Fil. Volt.	Plate Volt.	Cath. Volt.	Screen Volt.	Supp. Volt.	Plate Current
Z-56	R.F.	2.5	270	8	107	8	5.8
Z-56	1st Det.	2.5	270	10	107	10	4.7
Z-56	Osc.	2.5	140	0	-	-	4.8
Z-56	I.F.	2.5	170	8	107	8	5.5
Z-55	2nd Det. AVC	2.5	70	7	-	-	1.4
Z-59	Power	2.5	250	0	250	0	26
Z-80	Rect.	5.	360ea	-	-	-	34.ea.

All Controls Maximum
Line 115 Volts

(All readings, with exception of heaters and rectifier plates taken from socket connections to ground. Use 1,000 ohm per volt D.C. meter. Antenna disconnected).

BALANCE I.F. frequency at 175 K.C. Condenser gang at 1500 K.C. and oscillator padder at 600 K.C.

For other data see index

MODELS 215, 216, 225 (Chassis #2044)

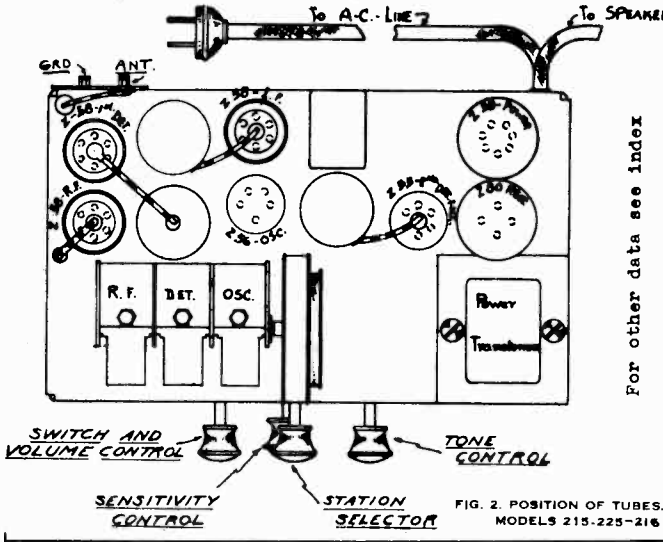


FIG. 2. POSITION OF TUBES. MODELS 215-225-216

For other data see index

SOCKET VOLTAGES 6-M-92

Tube	Position	1	2	3	4	5	6	7	8	9
6K7	R.F. Amp.	0	5.8	175	84	4.6	—	0	4.6	0
6A8	1st Det. Osc.	0	0	175	84	—16	110	5.8	4.6	0
6K7	I. F. Amp.	0	5.8	180	84	3.6	—	0	3.6	0
6Q7	2nd Det. A. V. C. 1st Audio	0	5.8	130	.3	.3	—	0	1.3	0
6F6	Power	0	0	170	180	—3.4	—	5.8	0	—
6X5	RECT.	0	5.8	AC	—	AC	—	0	180	—

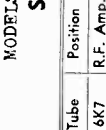
Voltage at Battery 6V.
Voltage at Switch 5.8 V.
Antenna disconnected.
All voltages measured with 1000 ohms per volt D. C. meter.
Total current consumption 6 Amperes.
Sensitivity at one watt output 4 Mv.
Maximum undistorted power output 4 Watts.

MODELS 6-M-90S, 6-M-90D, 6-M-91D 6-M-91 S

SOCKET VOLTAGES

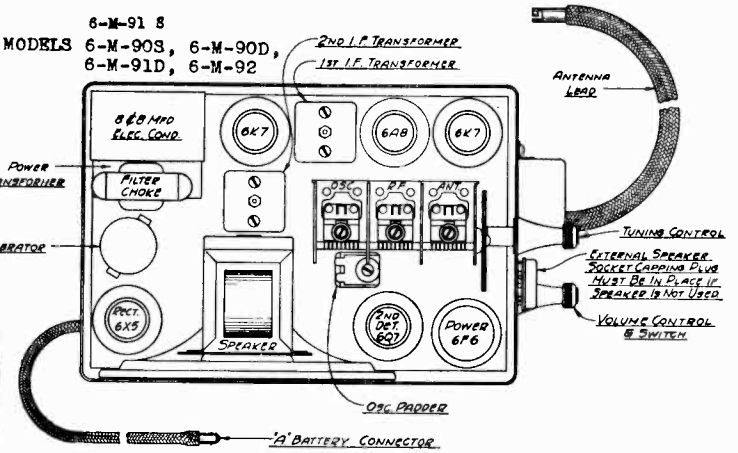
Tube	Position	1	2	3	4	5	6	7	8	9
6K7	R.F. Amp.	0	5.8	215	100	5.7	—	5.7	5.7	0
6A8	1st Det. Osc.	0	0	215	100	—26	150	5.8	5.9	0
6K7	I.F. Amp.	0	5.8	225	100	5.4	—	0	5.4	0
6Q7	2nd Det. A. V. C. 1st Audio	0	5.8	150	—.2	—.2	—	0	2	0
6F6	Power	0	0	210	220	—.3	—	5.8	0	—
6X5	RECT.	0	5.8	AC	—	AC	—	0	220	—

Voltage at Battery 6V.
Voltage at Switch 5.8V.
All voltages measured with 1000 ohms per volt D. C. meter.
Total current consumption 6.5 Amperes.
Sensitivity at one watt output 1.5 Mv.
Maximum undistorted power output 4.5 Watts.



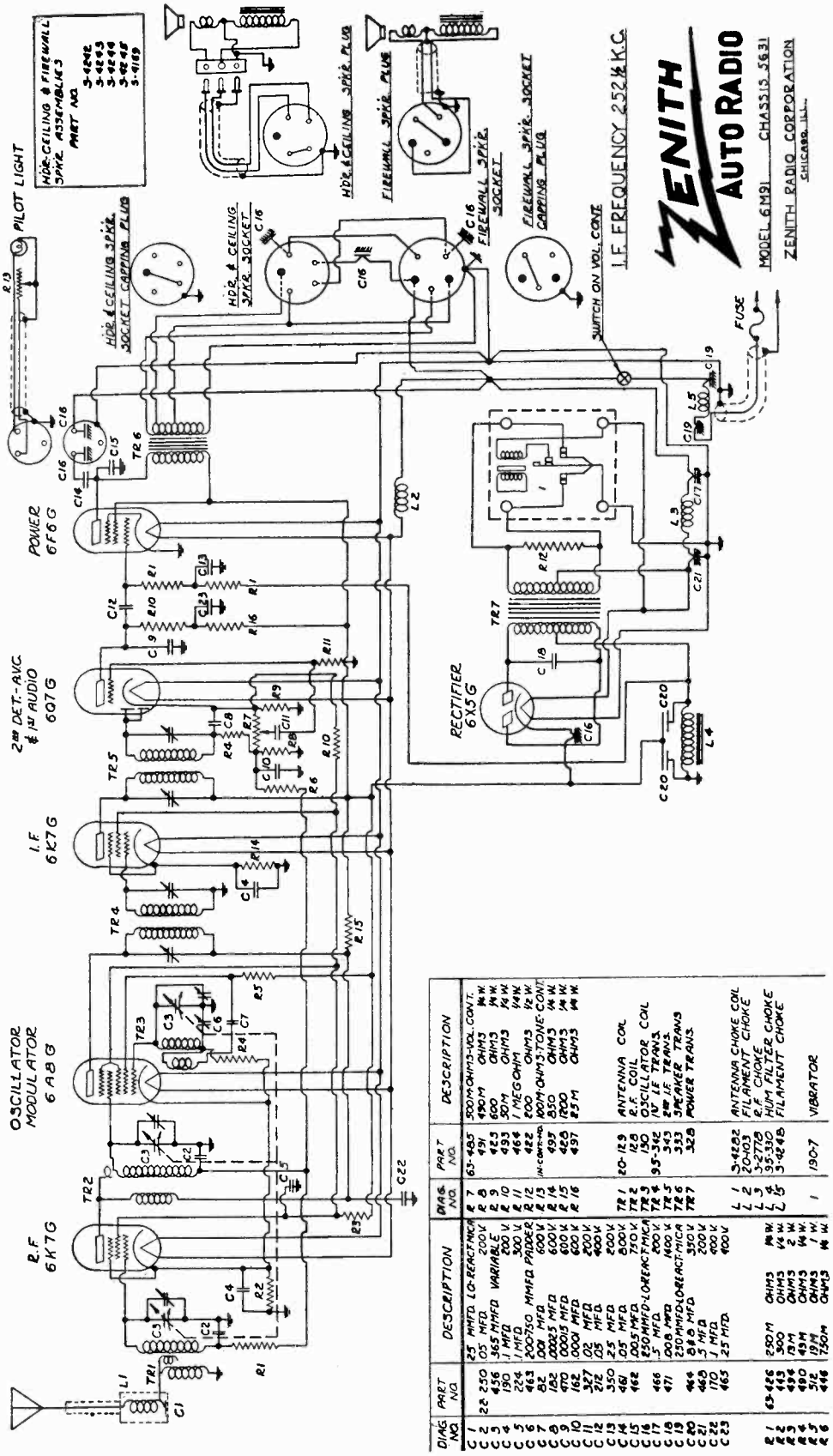
BOTTOM VIEW OF SOCKET

6-M-91 S
MODELS 6-M-90S, 6-M-90D, 6-M-91D, 6-M-92



MODELS 6-M-91S, 6-M-91D
Chassis 5631
Schematic, Parts

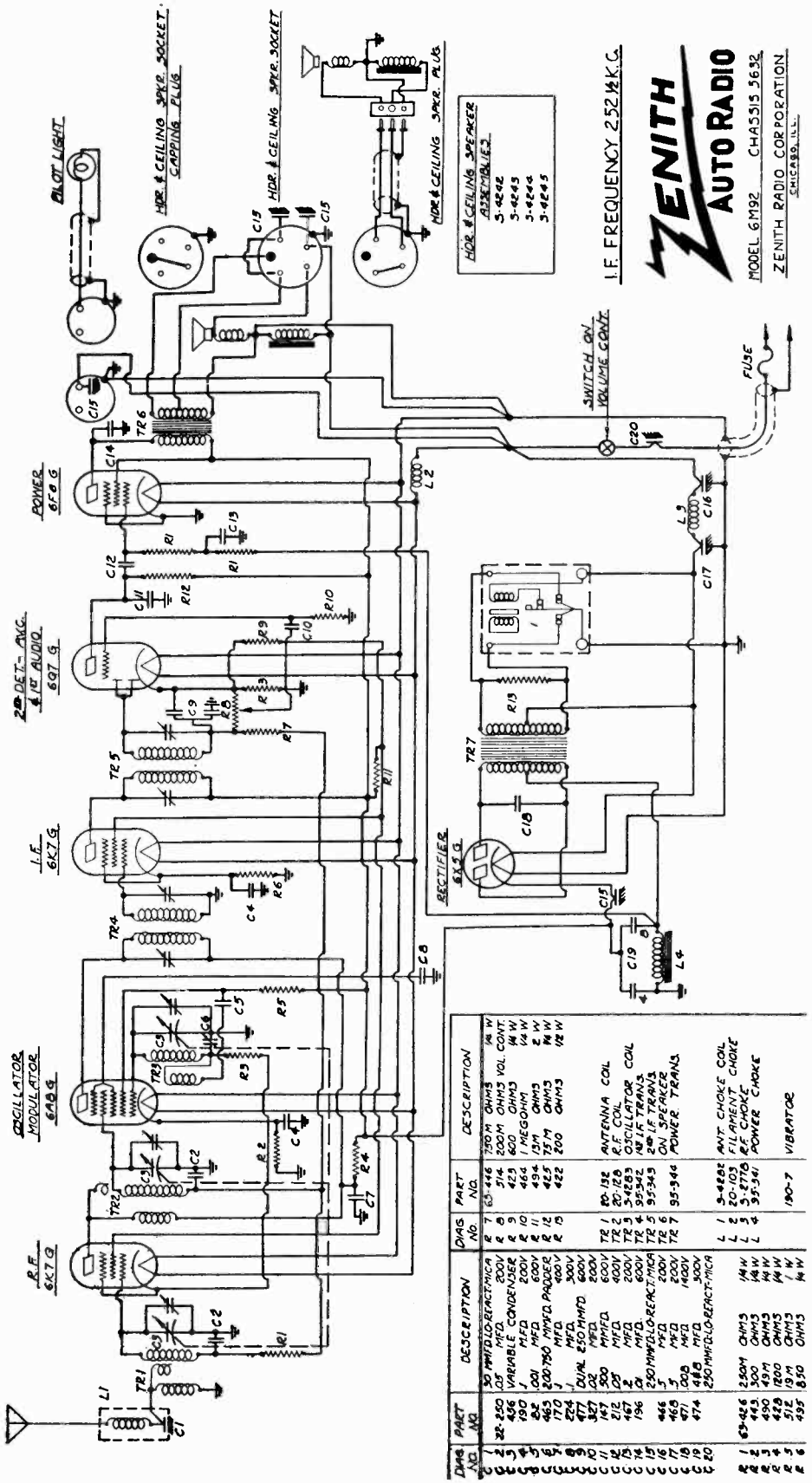
ZENITH RADIO CORP.



DIAG. NO.	PART NO.	DESCRIPTION	DIAG. NO.	PART NO.	DESCRIPTION
C 1		25 MMFD. LO-REACTANCE	R 7	63-485	500 OHMS-VOL. CONT.
C 2	22-250	.05 MFD. 200 V.	R 8	191	190 M OHMS ½ W.
C 3	456	365 MMFD VARIABLE	R 9	423	600 OHMS ½ W.
C 4	190	.1 MFD. 200 V.	R 10	493	.5 M OHMS ½ W.
C 5	224	.1 MFD. 300 V.	R 11	464	1 MEGOHM ½ W.
C 6	463	200-250 MMFD PADDER	R 12	422	200 OHMS ½ W.
C 7	82	.001 MFD. 600 V.	R 13	IN CONT. NO.	100 M OHMS-TONE CONT.
C 8	182	.0025 MFD. 600 V.	R 14	493	850 OHMS ½ W.
C 9	470	.0015 MFD. 600 V.	R 15	426	1200 OHMS ½ W.
C 10	162	.0001 MFD. 600 V.	R 16	497	.85 M OHMS ½ W.
C 11	327	.02 MFD. 400 V.			
C 12	212	.05 MFD. 400 V.			
C 13	350	.25 MFD. 200 V.	TR 1	20-129	ANTENNA COIL
C 14	461	.05 MFD. 800 V.	TR 2	128	R.F. COIL
C 15	462	.005 MFD. 750 V.	TR 3	130	OSCILLATOR COIL
C 16		250 MMFD-LOREACT-MICA	TR 4	95-342	1ST I.F. TRANS.
C 17	466	.5 MFD. 200 V.	TR 5	343	2ND I.F. TRANS.
C 18	471	.008 MFD. 400 V.	TR 6	323	SPEAKER TRANS.
C 19		250 MMFD-LOREACT-MICA	TR 7	328	POWER TRANS.
C 20	446	8-8 MFD. 350 V.			
C 21	460	.1 MFD. 400 V.	L 1	3-4282	ANTENNA CHOKE COIL
C 22	170	.1 MFD. 400 V.	L 2	20-103	FILAMENT CHOKE
C 23	463	.25 MFD. 400 V.	L 3	3-2778	R.F. CHOKE
			L 4	95-330	HUM FILTER CHOKE
R 1	63-426	250 M OHMS ½ W.	L 5	3-4248	FILAMENT CHOKE
R 2	443	300 OHMS ½ W.			
R 3	494	.1 M OHMS 2 W.	I	1907	VIBRATOR
R 4	490	.5 M OHMS ½ W.			
R 5	512	1 M OHMS 1 W.			
R 6	446	1500 OHMS ½ W.			

MODEL 6-M-92
Chassis 5632
Schematic, Parts

ZENITH RADIO CORP.



DIAG NO.	PART NO.	DESCRIPTION
C1	32-250	30 MMFD.-REACT.-MICA
C2	436	.07 MFD. 200V
C3	190	VARIABLE CONDENSER
C4	82	.1 MFD. 600V
C5	465	.001 MMFD. PADDER
C6	170	.1 MFD. 400V
C7	224	.1 MFD. 300V
C8	477	DUAL .250 MMFD.
C9	327	.02 MFD. 600V
C10	147	500 MMFD. 400V
C11	212	.05 MFD. 200V
C12	467	.2 MFD. 600V
C13	196	.01 MFD. 600V
C14		250 MMFD.-REACT.-MICA
C15	466	.1 MFD. 200V
C16	468	.5 MFD. 200V
C17	471	.25 MFD. 1400V
C18	474	.1 MFD. 400V
C19		250 MMFD.-REACT.-MICA
C20		
R1	63-426	2.5 M. OHMS 1/4 W.
R2	415	300 OHMS 1/4 W.
R3	490	4.9 M. OHMS 1/4 W.
R4	419	1200 OHMS 1/4 W.
R5	512	1.9 M. OHMS 1/4 W.
R6	495	850 OHMS 1/4 W.

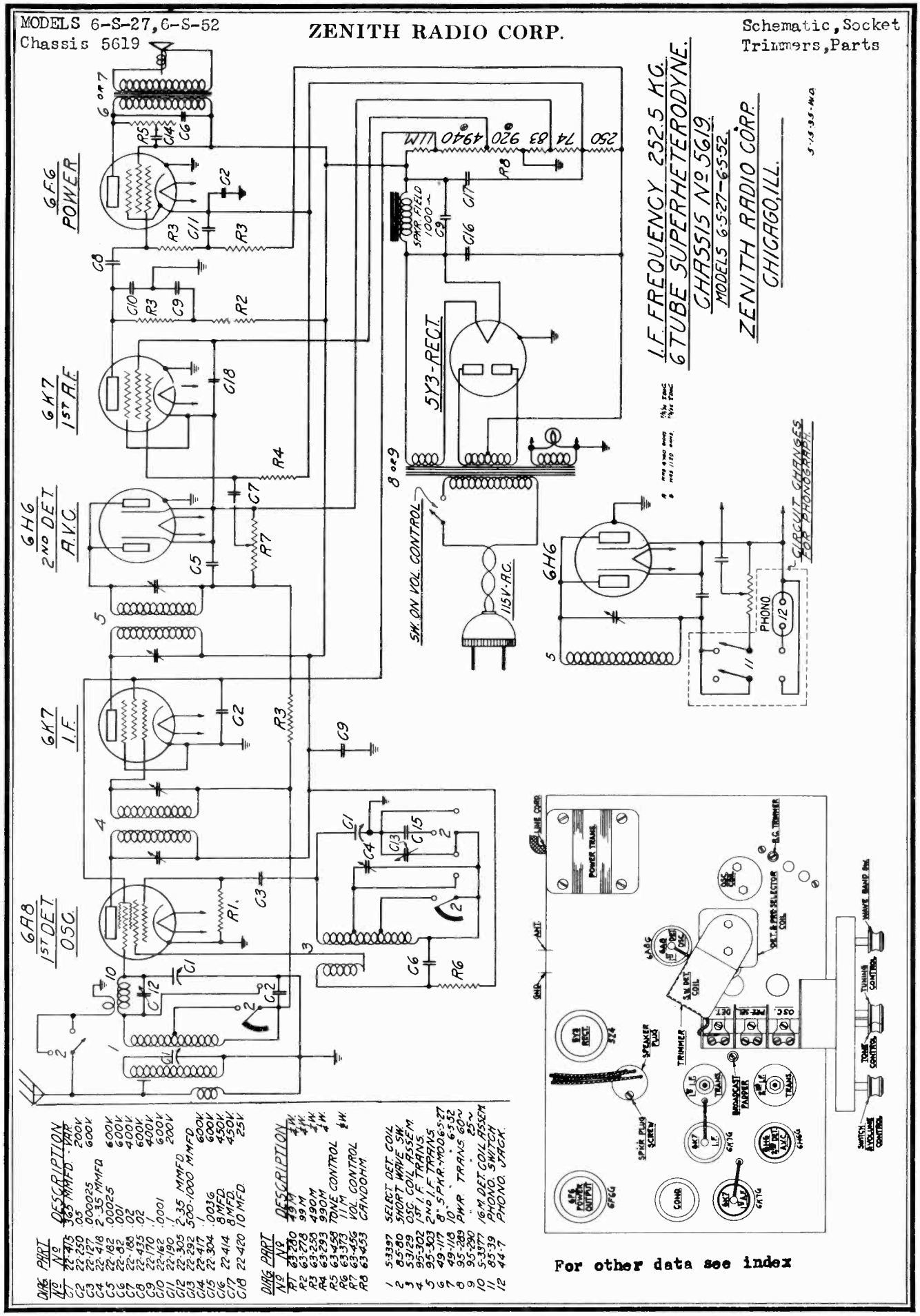
DIAG NO.	PART NO.	DESCRIPTION
R7	63-446	2.50 M. OHMS 1/4 W.
R8	514	200 M. OHMS VOL. CONT. 1/4 W.
R9	423	600 OHMS 1/4 W.
R10	464	1 MEGOHM 1/4 W.
R11	494	.5 M. OHMS 2 W.
R12	425	75 M. OHMS 1/4 W.
R13	422	200 OHMS 1/2 W.
TR1	80-132	ANTENNA COIL
TR2	80-128	R.F. COIL
TR3	3-4283	OSCILLATOR COIL
TR4	95-342	1st I.F. TRANS.
TR5	95-343	2nd I.F. TRANS.
TR6		ON SPEAKER
TR7	95-344	POWER TRANS.
L1	3-4282	ANT. CHOKE COIL
L2	20-103	FILAMENT CHOKE
L3	3-4276	R.F. CHOKE
L4	95-341	POWER CHOKE
	190-7	VIBRATOR

MODELS 6-S-27, 6-S-52
Chassis 5619

ZENITH RADIO CORP.

Schematic, Socket Trimmers, Parts

I.F. FREQUENCY 252.5 KC.
6 TUBE SUPERHETERODYNE.
CHASSIS No. 5619
MODELS 6-S-27-6-S-52.
ZENITH RADIO CORP.
CHICAGO, ILL.



DWG. No.	PART No.	DESCRIPTION
C1	22-415	365 MMFD. VAR.
C2	22-230	.05 200V
C3	22-127	.00025 600V
C4	22-418	2.35 MMFD
C5	22-182	.00025 600V
C6	22-82	.001 600V
C7	22-185	.02 400V
C8	22-435	.02 600V
C9	22-170	.1 400V
C10	22-162	.0001 600V
C11	22-190	.1 200V
C12	22-305	2.35 MMFD.
C13	22-292	500-1000 MMFD.
C14	22-417	.1 600V
C15	22-304	.0036 600V
C16	22-414	8 MFD. 450V
C17	22-414	8 MFD. 450V
C18	22-420	10 MFD. 25V

DWG. No.	PART No.	DESCRIPTION
R1	63-280	49 M ½W
R2	63-278	99 M ½W
R3	63-258	490M ½W
R4	63-293	990M ½W
R5	63-458	TONE CONTROL 1 M ½W
R6	63-373	VOL. CONTROL
R7	63-456	CANOHM
R8	63-453	

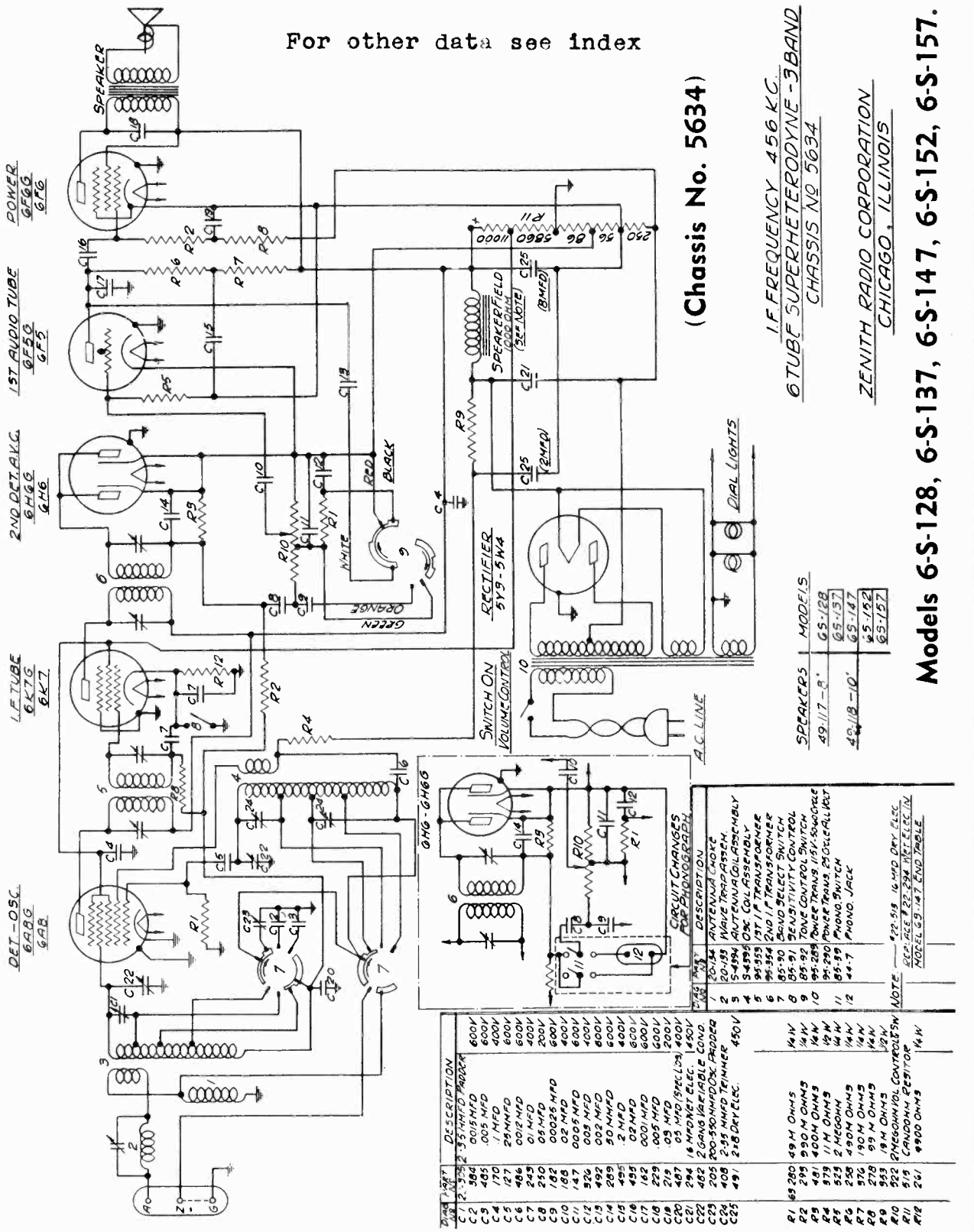
DWG. No.	PART No.	DESCRIPTION
1	53397	SELECT. DET. COIL
2	85-80	SHORT WAVE SW.
3	53129	OSC. COIL ASSEM.
4	95-302	1ST I.F. TRANS.
5	95-303	2ND I.F. TRANS.
6	49-117	8". S.PWR.-MOD 6-S-27
7	49-118	10". " " 6-S-52
8	95-289	PWR. TRANS 60~
9	95-290	" " 25~
10	53877	16 M. DET. COIL ASSEM.
11	85-39	PHONO. SWITCH
12	44-7	PHONO. JACK.

For other data see index

ZENITH RADIO CORP.

MODELS 6-S-128, 6-S-137
6-S-147, 6-S-152
6-S-157
Chassis 5634
Schematic, Parts

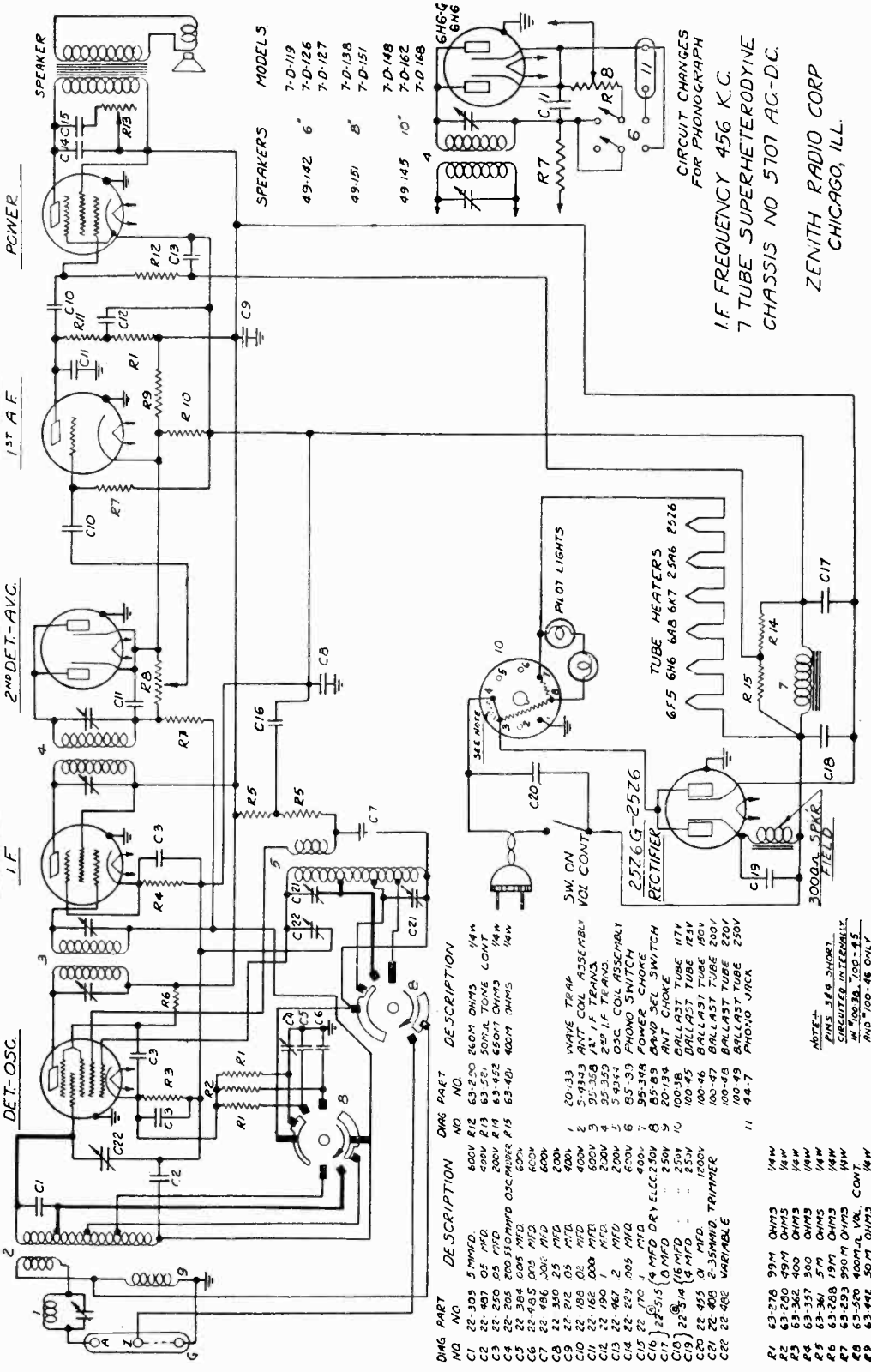
For other data see index



MODELS 7-D-119, 7-D-126
7-D-127, 7-D-138
7-D-151, 7-D-148

ZENITH RADIO CORP.

7-D-162, 7-D-168
Chassis 5707
Schematic, Parts



DIAG NO	PART NO	DESCRIPTION
C1	22-303	5 MMFD. 600V
C2	22-497	.05 MFD. 400V
C3	22-250	.05 MFD. 200V
C4	22-205	200-510 MMFD OSC. PADDER
C5	22-384	.005 MFD. 600V
C6	22-485	.005 MFD. 600V
C7	22-486	.01 MFD. 600V
C8	22-350	.25 MFD. 200V
C9	22-212	.05 MFD. 400V
C10	22-188	.02 MFD. 400V
C11	22-162	.000 MFD. 600V
C12	22-190	.1 MFD. 200V
C13	22-467	.2 MFD. 200V
C14	22-229	.005 MFD. 600V
C15	22-170	.1/4 MFD DRY ELEC. 250V
C16	22-515	.1/8 MFD. 250V
C17		.1/8 MFD. 250V
C18	22-514	.1/4 MFD. 250V
C19		.1/4 MFD. 250V
C20	22-455	.01 MFD. 1200V
C21	22-408	2-35 MMFD. TRIMMER
C22	22-482	VARIABLE

DIAG NO	PART NO	DESCRIPTION
R1	63-278	99M OHMS 1/4W
R2	63-280	49M OHMS 1/4W
R3	63-362	400 OHMS 1/4W
R4	63-357	300 OHMS 1/4W
R5	63-361	575 OHMS 1/4W
R6	63-288	19M OHMS 1/4W
R7	63-293	990 M OHMS 1W
R8	63-520	400M Ω VOL. CONT.
R9	63-442	50M OHMS 1/4W
R10	63-518	590 OHMS 1/4W
R11	63-376	180M OHMS 1/4W

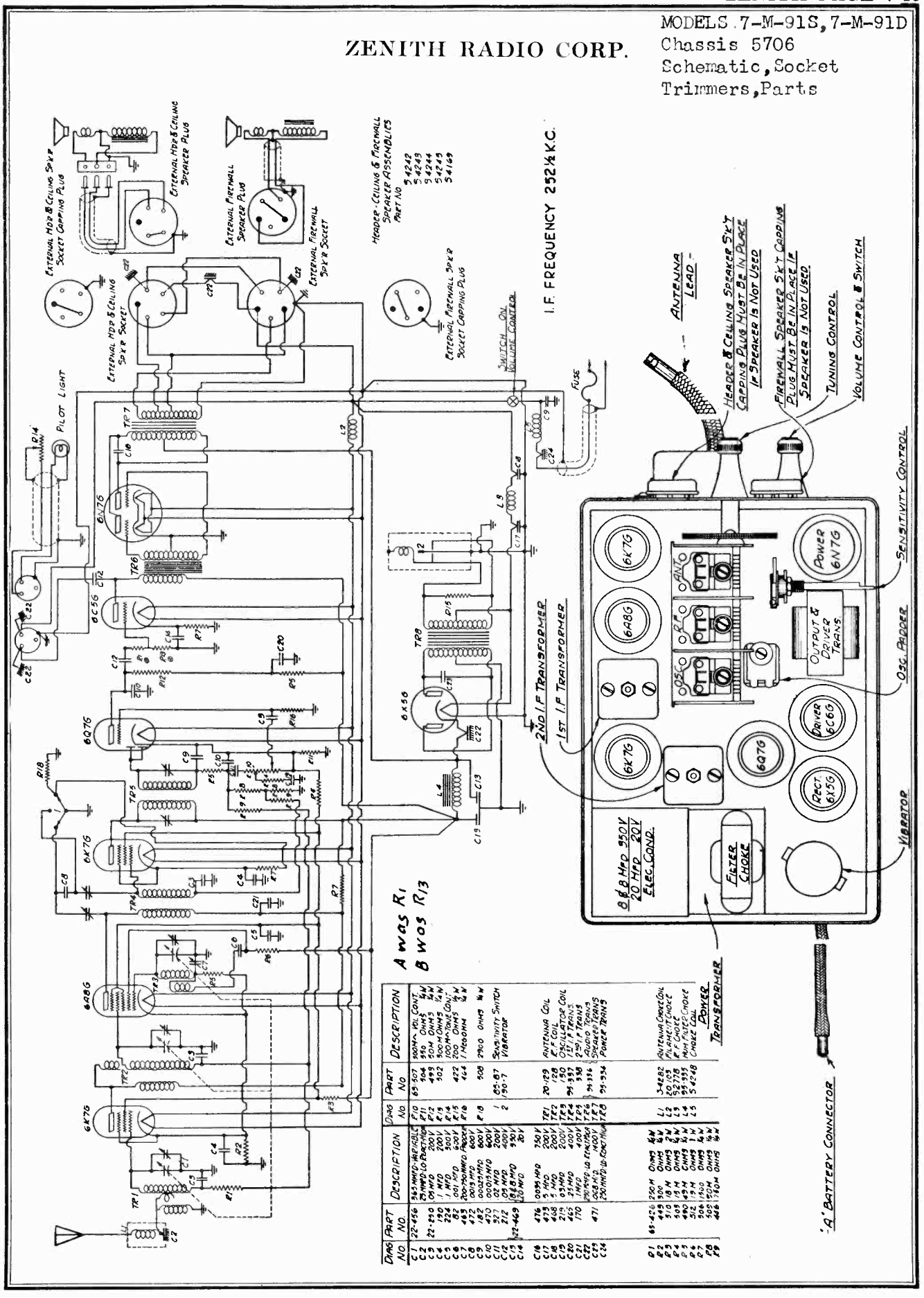
DIAG NO	PART NO	DESCRIPTION
R12	63-290	260M OHMS 1/4W
R13	63-521	500Ω TONE CONT
R14	63-452	650Ω OHMS 1/4W
R15	63-401	400Ω OHMS
1	20-133	WAVE TRAP
2	5-9333	ANT COIL ASSEMBLY
3	95-358	1ST I.F. TRANS.
4	95-359	2ND I.F. TRANS.
5	5-9334	OSC. COIL ASSEMBLY
6	85-339	PHONO SWITCH
7	95-398	POWER CHOKE
8	85-89	BAND SEL. SWITCH
9	20-134	ANT CHOKE
10	100-38	BALLAST TUBE 117V
	100-45	BALLAST TUBE 125V
	100-46	BALLAST TUBE 150V
	100-47	BALLAST TUBE 200V
	100-48	BALLAST TUBE 220V
	100-49	BALLAST TUBE 250V
11	44-7	PHONO JACK

NOTE: PINS 3 & 8 SHORT CIRCUITED INTERNALLY ON #100-30, 100-45 AND #100-46 ONLY

CIRCUIT DIAGRAM—Models 7-D-119, 7-D-126, 7-D-127, 7-D-138, 7-D-151, 7-D-148, 7-D-162, 7-D-168. (Chassis No. 5707)

ZENITH RADIO CORP.

MODELS 7-M-91S, 7-M-91D
Chassis 5706
Schematic, Socket
Trimmers, Parts



DWG NO	PART NO	DESCRIPTION
C1	22-456	.25 MMFD-MICA-TRIMMER
C2		25 MMFD-LO TEMP COEF
C3	22-250	.05 MFD 200V
C4	150	.1 MFD 200V
C5	243	.01 MFD 400V
C6	165	200-250 MMFD PAPER
C7	172	.002 MFD 600V
C8	182	.0025 MFD 600V
C9	170	.0005 MFD 600V
C10	211	.05 MFD 200V
C11	212	.05 MFD 200V
C12	22-465	.015 MFD 350V
C13		.120 MFD 25V
C14		
C15	176	.0095 MFD 750V
C16	173	.1 MFD 200V
C17	213	.05 MFD 200V
C18	215	.03 MFD 200V
C19	165	.25 MFD 400V
C20	170	.1 MFD 200V
C21		250 MMFD 1% TEMP COEF
C22	171	.006 MFD 400V
C23		250 MMFD 1% TEMP COEF
C24		
R1	65-476	750 M OHMS ½ W
R2	473	2 M OHMS ½ W
R3	510	1.8 M OHMS ½ W
R4	503	1.5 M OHMS ½ W
R5	490	470 M OHMS ½ W
R6	506	1.2 M OHMS 1 W
R7	512	3.3 M OHMS ½ W
R8	466	1 MEGOHM ½ W

DWG NO	PART NO	DESCRIPTION
R9	65-507	100 M. VOL CONT. ½ W
R10	504	350 OHMS ½ W
R11	493	500 OHMS ½ W
R12	502	900 OHMS ½ W
R13		200 M OHMS COMP. ½ W
R14	422	200 OHMS ½ W
R15	464	1 MEGOHM ½ W
R16		
R17	508	2900 OHMS ½ W
R18		
S1	65-87	SENSITIVITY SWITCH
S2	1150-7	VIBRATOR
T1	20-129	ANTENNA COIL
T2	148	OSCILLATOR COIL
T3	95-337	1ST I.F. TRANS
T4	95-337	2ND I.F. TRANS
T5	338	AUDIO TRANS
T6	95-334	SPEAKER TRANS
T7		
T8	95-334	POWER TRANS
L1	54282	ANTENNA CHOKE COIL
L2	20-109	FILAMENT CHOKE
L3	52778	R.F. CHOKE
L4	95-335	R.F. FILTER CHOKE
L5	54248	HUM FILTER CHOKE COIL

MODELS 6-S-27, 6-S-52
MODELS 7-M-91S, 7-M-91D
MODELS 7-S-28, 7-S-53
Alignment, Voltage

ZENITH RADIO CORP.

Models 7-M-91S and 7-M-91D. (Chassis No. 5706)

The sensitivity switch should be in the clockwise or sensitive position during adjustment. The output meter may be connected across the voice coil connections at the speaker socket.

"A" Connect the service oscillator to the control grid of the 6A8 tube and the chassis.

Connect the output meter across the primary of the speaker transformer.

Set the service oscillator to 252.5 K.C., and adjust the trimmers on the I. F. transformers for the greatest output reading. These adjustments should be repeated several times using as weak an input signal as possible so as to obtain greater accuracy.

"B" Change the service oscillator lead from the grid of the 6A8 to the antenna connection. A male Delco Remy connector may be used in making a connection to the antenna lead.

Set the service oscillator at 1400 K.C.

Rotate the gang condenser one and one fourth turns from the minimum setting. At the proper position eight teeth on the tuning gear will be visible past the gear bracket.

Adjust the oscillator, R.F. and antenna trimmers in that order to the point giving the greatest output.

"C" Set the service oscillator at 600 K.C. and rotate the gang condenser to tune in this signal. Move the gang condenser to and fro past the signal meanwhile adjusting the oscillator padder condenser until the combination of adjustments giving the greatest reading of the output meter is obtained.

"D" Repeat operation "B."

SOCKET VOLTAGES 7-M-91S, 7-M-91D

Tube	Position	1	2	3	4	5	6	7	8	9
6K7	R.F. Amp.	0	5.8	250	100	5.2	—	0	5.2	0
6A8	1st Det. Osc.	0	0	250	100	—23	165	5.8	5.2	0
6K7	I.F. Amp.	0	5.8	240	100	6.7	—	0	6.7	0
6Q7	2nd Det. A. V. C. 1st Audio	0	0	145	—.2	—.2	—	5.8	1.6	0
6C5	Driver	0	0	240	0	0	—	5.8	8.2	—
6N7	Class B Power	0	0	250	0	0	250	5.8	0	—
6X5	RECT.	0	0	AC	—	AC	—	5.8	250	—

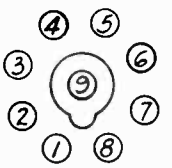
All voltages measured with 1000 ohms per volt D. C. meter. Voltage at Battery 6V.
Total current consumption 8.2 Amperes. Voltage at Switch 5.8V.
Sensitivity at one watt output 1Mv. Antenna disconnected.
Maximum power output 9 watts at 6 volts.

Socket Voltages

MODELS 7-S-28, 7-S-53
CHASSIS #5704

TUBE	POSITION	1	2	3	4	5	6	7	8	9
6K7	R.F.	0	6_{ac}	250	75	0	-	0	0	-.1
6A8	1st.Det. Osc.	0	6_{ac}	250	75	-1	195	0	0	-.1
6K7	I. F.	0	6_{ac}	250	75	0	-	0	0	-.1
6H6	2nd Det. A.V.C.	0	6_{ac}	-2	-2.5	-2	-	0	-2.5	-
6K7	1st Audio	0	6_{ac}	65	14	-1	-	0	- 1	-.1
6F6	PWR.	0	6_{ac}	235	250	-10	-	0	-5	-
5Y3	Rect.	0	310	-	250_{ac}	-	250_{ac}	-	310	-

Line Voltage 115 Antenna and Ground Disconnected



BOTTOM VIEW OF SOCKET

All voltages measured from point indicated to ground, using a 1000 ohm per volt D.C.meter (unless marked otherwise).

Alignment

The use of an accurately calibrated service oscillator is imperative in the alignment of modern superheterodynes. The alignment procedure is as follows:

(1) Connect service oscillator to grid of 6A8 and ground. Balance I.F. trimmers at 456 K.C.

(2) Connect service oscillator to antenna and ground binding posts and set at 6 megacycles. Adjust trimmer on gang for correct dial reading, (6 megacycles on Band B).

(3) Set service oscillator and pointer to 21 megacycles and adjust S.W. trimmer (through hole in top of chassis) for correct dial reading.

(4) Recheck 6 megacycle adjustment.

(5) Set service oscillator and pointer to 1700 K. C. (Band A) and adjust broadcast trimmer (through hole in top of chassis) for correct dial reading.

(6) Set service oscillator at 600 K.C. Adjust broadcast padder (through hole in top of chassis next to I.F. transformer), meanwhile rocking pointer to and fro past 600 K.C. on dial to combination giving greatest output.

(7) Readjust at 1700 K.C.

Note: These adjustments affect each other slightly and the entire procedure should be repeated to secure maximum results.

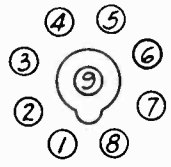
For other data see index

Socket Voltages

MODELS 6-S-27, 6-S-52
CHASSIS #5619

TUBE	POSITION	1	2	3	4	5	6	7	8	9
6A8	1st.Det. Osc.	0	5_{ac}	225	70	-.1	190	0	0	0
6K7	I.F.	0	5_{ac}	225	70	0	-	0	0	0
6H6	2nd Det.	0	5_{ac}	-1	-2.5	-1	-	0	-2.5	-
6K7	1st.Aud.	0	5_{ac}	60	14	-2.5	-	0	-2.5	0
6F6	PWR	0	5_{ac}	220	225	-2.5	-	0	-2.5	-
5Y3	Rect.	0	300	-	305_{ac}	-	305_{ac}	-	300	-

Line voltage 110. Antenna and Ground disconnected.



BOTTOM VIEW OF SOCKET

All voltages measured from point indicated to ground, using a 1000 ohm per volt D.C.meter (unless marked otherwise).

Alignment

(1) Balance I.F. transformers at $252\frac{1}{2}$ K.C. with test oscillator connected to control grid of 6A8 and ground.

(2) Turn band switch to "C" Band. Connect test oscillator to antenna and ground leads and set for 15 megacycles. Adjust oscillator trimmer on gang condenser to secure correct dial reading.

(3) Adjust detector trimmer (located on bracket on top of detector coil) for maximum output.

(4) Turn band switch to "A" Band. Adjust oscillator trimmer (through hole in top of chassis next to oscillator) for correct dial reading at 1400 K.C. Also adjust preselector and detector trimmers on gang for maximum output.

(5) Adjust oscillator padder (next to oscillator section of gang through hole in top of chassis) while rocking pointer back and forth past 600 K.C. to the combination giving greatest output.

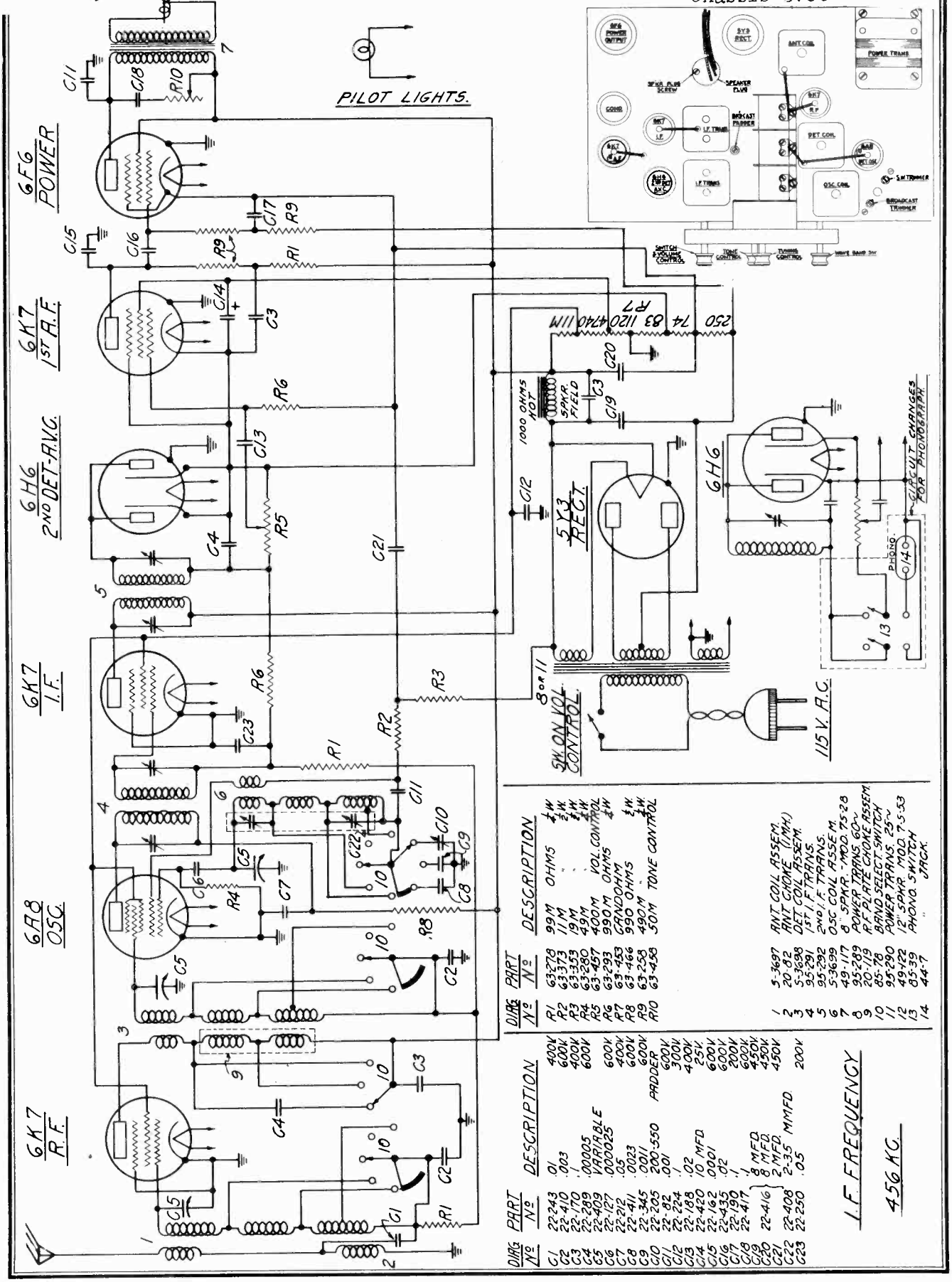
(6) Recheck at 1400 K.C.

(7) Repeat entire procedure.

Schematic, Socket Trimmers, Parts

ZENITH RADIO CORP.

MODELS 7-S-28, 7-S-53
Chassis 5704



DWG. No.	PART No.	DESCRIPTION	
C1	22-243	.01	400V
C2	22-410	.003	600V
C3	22-170	.1	400V
C4	22-289	.00005	600V
C5	22-409	VARIABLE .000025	
C6	22-127	.05	600V
C7	22-212	.0023	400V
C8	22-411	.0011	600V
C9	22-345	200-550	PADDER
C10	22-205	.001	600V
C11	22-82	.1	300V
C12	22-224	.02	400V
C13	22-188	.10 MFD	25V.
C14	22-420	.0001	600V
C15	22-162	.02	600V
C16	22-435	.1	600V
C17	22-190	.1	600V
C18	22-417	.1	600V
C19	22-416	.8 MFD	450V
C20		8 MFD	450V
C21		2 MFD	450V
C22	22-408	2-35 MMFD	
C23	22-250	.05	200V

DWG. No.	PART No.	DESCRIPTION	
R1	63-278	99M OHMS	½W
R2	63-373	1.1M "	½W
R3	63-353	.19M "	½W
R4	63-280	49M "	½W
R5	63-457	400M " VOL. CONTROL	4W
R6	63-293	990M OHMS	½W
R7	63-453	CANDOHM	5W
R8	63-466	990 OHMS	½W
R9	63-258	490M "	½W
R10	63-458	50M " TONE CONTROL	

1	5-3697	ANT. COIL ASSEM.
2	20-82	ANT. CHOKE (1 MH.)
3	5-3698	DET. COIL ASSEM.
4	95-291	1ST I.F. TRANS.
5	95-292	2ND I.F. TRANS.
6	53-639	OSC. COIL ASSEM.
7	49-117	8" SPKR. MOD. 7S-28
8	95-289	POWER TRANS 60~
9	20-119	R.F. PLATE CHOKE ASSEM.
10	85-78	BAND SELECT SWITCH
11	95-290	POWER TRANS. 25~
12	49-122	12" SPKR. MOD. 7-S-53
13	05-39	PHONO. SWITCH
14	44-7	JACK.

I.F. FREQUENCY

456 KC.

MODELS 090,90,V-8
Chassis 2012-4J
MODEL ZE-12
Chassis 5609,5610
Alignment,Socket

ZENITH RADIO CORP.

MODELS 91,92
Notes
MODELS 811,862,865
866,1162

Zenith 090,90,V-8

Chassis 2012-4J is used in Models 090,90 and V-8. This chassis is more or less similar to Chassis 2012 and 2012-J that was used in Models AH, CH, and RH, which are shown on the following pages in *Rider's Manuals: page 1-23 in the revised edition; *674-E, in the early edition, and page 2717 in the Rider-Combination Manual.* The circuit changes that were made in Chassis 2012 to make the Chassis 2012-4J are shown below and it is suggested that you make a notation in your Index about the similarity that exists between these two chassis.

The antenna circuit has been revised, as may be seen by comparing Fig. 1 with the schematic of Chassis 2012 on one of the pages mentioned above. Instead of a three-gang condenser (Part No. 22-116), a four-gang condenser is used with the fourth section tuning the antenna winding. (The part number of the four-gang condenser is 22-134.) The winding in the antenna circuit, which is tuned by the fourth section of the new condenser, has been added to the antenna coil assembly. Note that the condensers and resistors in this part of the circuit are the same as those shown in the schematic for the early chassis.

The padder condenser assembly (Part Nos. 22-120 and 22-82) has been replaced with a single variable condenser, Part No. 22-129. Also the 8-mf. filter condenser (Part No. 22-121) mounted at the side of the con-

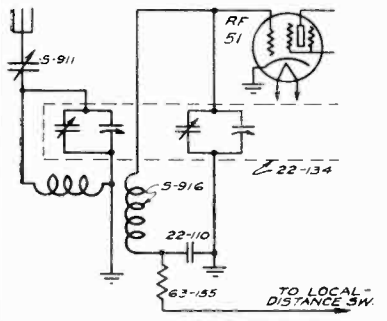


Fig. 1. Antenna circuit of Zenith Chassis 2012-4J shows new connections.

denser gang has been removed and mounted below the chassis. No mounting base is used, and it carries a new part number, 22-136.

Fig. 2 shows the voltage divider, the a.v.c. tube, and the new local-distance switch. Note that the lead marked "To Local-Distance Switch" in Fig. 1 is connected to that lead in Fig. 2 which carries an arrow in the plate circuit of the 24 tube. Note also that the condensers, Part No. 22-99, in the Chassis 2012 have been eliminated, and that the one in the plate circuit of the 24 tube has been replaced with one having a value of 0.03 mf., Part No. 22-111. The value of the resistor connected between the "Local-Distance Switch" and the lead to the tone control (the one at the right of Fig. 2) has a value of 4.5 megohms, Part No. 63-188. The 0.1-mf. condenser, connected between the movable arm of the

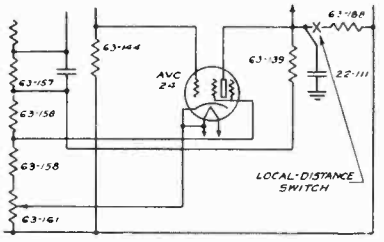


Fig. 2. A "Local-Distance" switch is now included in Zenith Chassis 4012-4J.

volume control and ground, has been eliminated. The part number of this condenser was 22-115.

In other respects the chassis 2012-4J is the same as chassis 2012.

Zenith ZE-12

This power ack, used with Models 39, 39-A, and 40-A, will be found on the following pages in *Rider's Manuals: 1-12 in the revised edition; *665 in the early edition, and 2698 in the Rider-Combination.* The values of some of the resistors and condensers were unavailable at the time of publication and are given below; this data was supplied by a serviceman.

The total resistance of the voltage divider is 7,250 ohms. The resistor designated as Part No. 22-42 is now a part of the voltage divider and a change should be made in your diagram, although the resistor is still connected between the center tap of the 7.5-volt winding and ground. Starting at the top of the diagram, the first section of the divider, *i.e.* down as far as the blue lead, is 1000 ohms. The next section, between the blue and red leads, is 3500 ohms. Between the red lead and ground, 1000 ohms. The section formerly designated as 22-42, is 1750 ohms.

The condenser in the yellow lead to the left of the choke is 2 mf. The one to the right of the choke in the green lead is 4 mf., as is also the one in the blue lead. The condenser in the red lead, shunting the 1000-ohm resistor, is 1 mf.

Zenith 811, 862, 865, 866, 1162

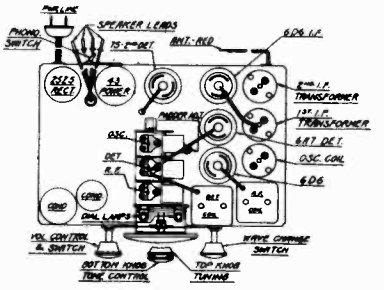
The model 811 (Chassis 5609) employs a 6-inch speaker, Part No. 49-93; models 862 and 1162 (Chassis 5610) use a 12-inch dynamic speaker, Part No. 49-94. The schematic shown on *Zenith page 6-5 in Rider's Volume VI* is used in both of these chassis. Below will be found a sketch showing the locations of the trimmers and the tube sockets.

Alignment:

Balance i-f. transformers at 252.5 kc. with signal generator connected to the grid of the 6A7 and the chassis ground.

Adjust wave-trap padder (located beneath the chassis at rear right side) for weakest signal with 252.5 kc. signal generator connected between antenna and ground.

Turn wave-band switch clockwise to the highest frequency band and set signal



Top view of the Zenith chassis 5609 and 5610, showing tubes and trimmers.

generator to 15 mc., still connected to the antenna and ground. Balance oscillator trimmer on gang condenser for correct dial reading at this frequency.

Turn wave-band switch counter-clockwise to standard broadcast position. Adjust broadcast oscillator trimmer (located beneath the chassis at the right center) for correct dial reading at 1400 kc. and adjust r-f. and 1st detector trimmers on gang condenser for loudest signal.

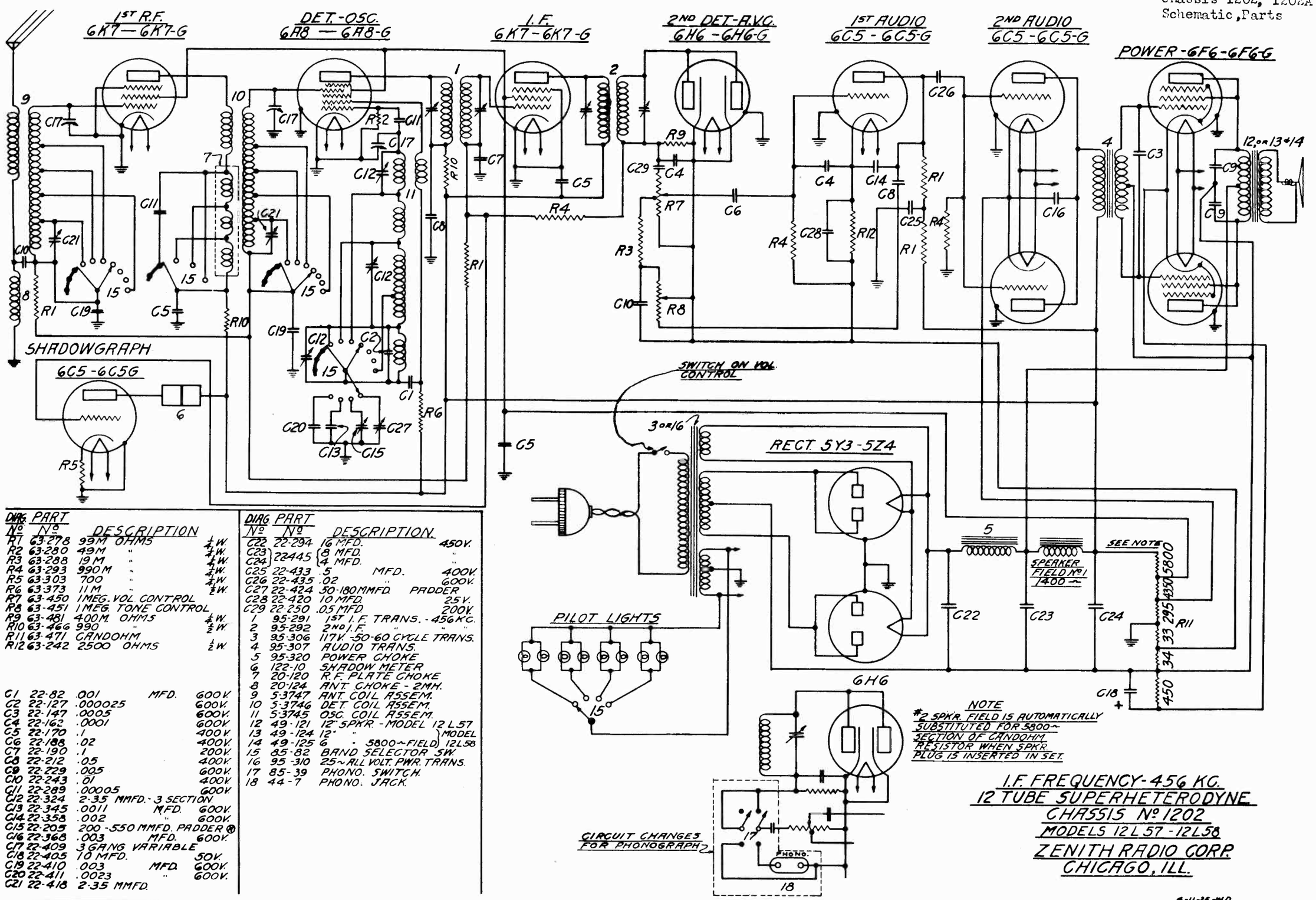
Set signal generator at 600 kc. Adjust oscillator broadcast padder through hole in top of chassis, simultaneously rocking the dial back and forth, for loudest signal.

Zenith 91, 92

The value of the center-tapped resistor, Part No. 63-210, was omitted from the list of parts shown in Rider's Manuals on pages 2-8, 674-N and 2714. The section connected to the junction of the speaker field and the choke is 2,800 ohms and the section connected to Part No. 63-167 is 10,000 ohms. Please make this addition to the schematic diagram of this set in your Volume II Manual.

ZENITH RADIO CORP.

MODELS 12-L-57, 12-L-58
Chassis 1202, 1202A
Schematic, Parts



DIAG. Nº	PART Nº	DESCRIPTION	
R1	63-278	99M OHMS	½ W.
R2	63-280	49M "	½ W.
R3	63-288	19M "	½ W.
R4	63-293	990M "	½ W.
R5	63-303	700 "	½ W.
R6	63-373	11M "	1 W.
R7	63-450	1 MEG. VOL. CONTROL	
R8	63-451	1 MEG. TONE CONTROL	
R9	63-481	400M. OHMS	½ W.
R10	63-466	990 "	1 W.
R11	63-471	CANDOHM	
R12	63-242	2500 OHMS	1 W.

C1	22-82	.001 MFD.	600V.
C2	22-127	.000025	600V.
C3	22-147	.0005	600V.
C4	22-162	.0001	600V.
C5	22-170	.1	400V.
C6	22-188	.02	400V.
C7	22-190	.1	200V.
C8	22-212	.05	400V.
C9	22-229	.005	600V.
C10	22-243	.01	400V.
C11	22-289	.00005	600V.
C12	22-324	2-35 MMFD. - 3 SECTION	
C13	22-345	.0011 MFD.	600V.
C14	22-358	.002 "	600V.
C15	22-205	200-550 MMFD. PADDER (T)	
C16	22-368	.003 MFD.	600V.
C17	22-409	3 GANG VARIABLE	
C18	22-405	10 MFD.	50V.
C19	22-410	.003 MFD.	600V.
C20	22-411	.0023 "	600V.
C21	22-418	2-35 MMFD.	

DIAG. Nº	PART Nº	DESCRIPTION	
C22	22-294	16 MFD.	450V.
C23	22-445	8 MFD.	"
C24	22-445	4 MFD.	"
C25	22-433	.5 MFD.	400V.
C26	22-435	.02 "	600V.
C27	22-424	50-180 MMFD. PADDER	
C28	22-420	10 MFD.	25V.
C29	22-250	.05 MFD.	200V.
1	95-291	1ST I.F. TRANS. - 456 K.C.	
2	95-292	2ND I.F. " "	
3	95-306	117V. -50-60 CYCLE TRANS.	
4	95-307	AUDIO TRANS.	
5	95-320	POWER CHOKE	
6	122-10	SHADOW METER	
7	20-120	R.F. PLATE CHOKE	
8	20-124	ANT. CHOKE - 2MH.	
9	5-3747	ANT. COIL ASSEM.	
10	5-3746	DET. COIL ASSEM.	
11	5-3745	OSC. COIL ASSEM.	
12	49-121	12" SPK'R. - MODEL 12 L 57	
13	49-124	12" "	MODEL
14	49-125	6 - 5800~ FIELD)	12 L 58
15	85-82	BAND SELECTOR SW.	
16	95-310	25~ ALL VOLT. PWR. TRANS.	
17	85-39	PHONO. SWITCH.	
18	44-7	PHONO. JACK.	

NOTE
#2 SPK'R. FIELD IS AUTOMATICALLY SUBSTITUTED FOR 5800~ SECTION OF CANDOHM RESISTOR WHEN SPK'R. PLUG IS INSERTED IN SET.

I.F. FREQUENCY-456 KC.
12 TUBE SUPERHETERODYNE
CHASSIS Nº 1202
MODELS 12 L 57 - 12 L 58
ZENITH RADIO CORP.
CHICAGO, ILL.

6-11-38-W.D.

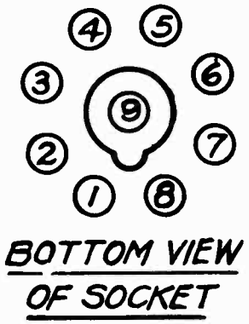
Voltage, Alignment
Socket, Trimmers

ZENITH RADIO CORP.

MODELS 12-L-57, 12-L-58
Chassis 1202, 1202A

Socket Voltages

TUBE	POSITION	1	2	3	4	5	6	7	8	9
6K7	R.F.	0	2.9ac	225	97	0	-	2.9ac	0	- .1
6A8	1st. Det. Osc.	0	2.9ac	225	97	-5	200	2.9ac	0	- .1
6K7	I.F.	0	2.9ac	225	97	0	-	2.9ac	0	- .1
6H6	2nd Det. A. V. C.	0	2.9ac	-2.1	-2.5	-2.5	-	2.9ac	-2.5	-
6C5	Shadow Meter	0	2.9ac	215	-	0	-	2.9ac	8.5	-
6C5	1st. Audio	0	2.9ac	42	-	0	-	2.9ac	0	-
6C5	Driver	0	2.9ac	215	-	0	-	2.9ac	8.5	-
6F6	Power	0	2.9ac	340	340	-4.5	-	2.9ac	25	-
5Y3 524	RECT.	0	350	-	300 a.c.	-	300 a.c.	-	350	-



BOTTOM VIEW OF SOCKET

Line Voltage 115 Antenna and Ground Disconnected
Voltages measured from point indicated to ground, using a 1000 ohm per volt meter, except heaters. (2-7)

Alignment

The bands are as follows:

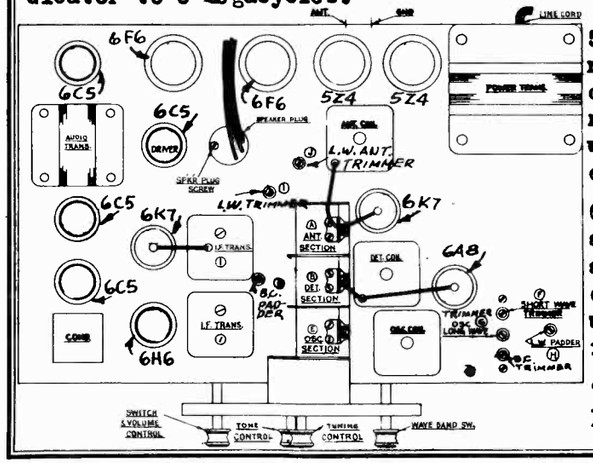
Band	Color	Kilocycles	Megacycles	Meters
A	Green	550-1,740	.55-1.74	545-172
B	"	2,000-7,000	2-7	150-42.8
C	Red	150-370	.15-.37	2,000-800
D	"	7,000-22,500	7-22.5	42.8-13.3

1. Connect service oscillator to grid of 6A8 detector, oscillator tube and peak I.F. trimmers (see diagram Page 3) at 456 K.C.

2. Connect service oscillator to antenna post and set to 1400 K.C. Adjust trimmers A, B and C to resonance with dial indicator to 1400 K.C.

3. Set service oscillator to 600 K.C. and adjust broadcast padder D for maximum gain while rocking dial slowly over 600 K.C.

4. Place band switch on band B (2-7M.C.) and set service oscillator and dial indicator to 6 megacycles.



5. Align D band (7-22.5 megacycles) next by setting service oscillator and dial indicator to 18 megacycles and rocking indicator slowly over that point while adjusting trimmer F to maximum output.

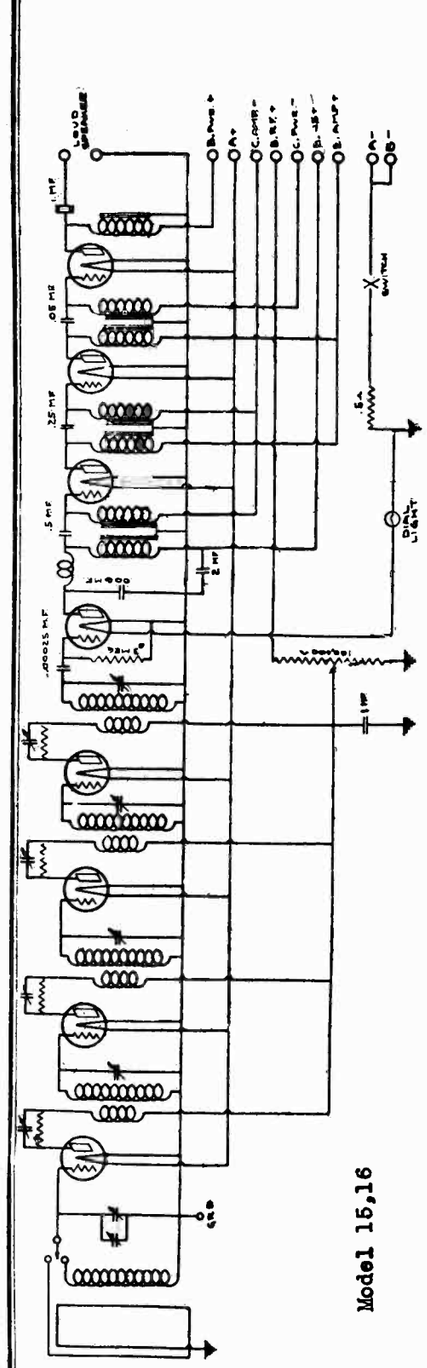
6. Set band switch to C band (long wave and peak at 350 K.C. with trimmers G, I and J. Turn dial indicator and srvice oscillator to 150 K.C. and adjust long wave padder H while slowly rocking dial indicator.

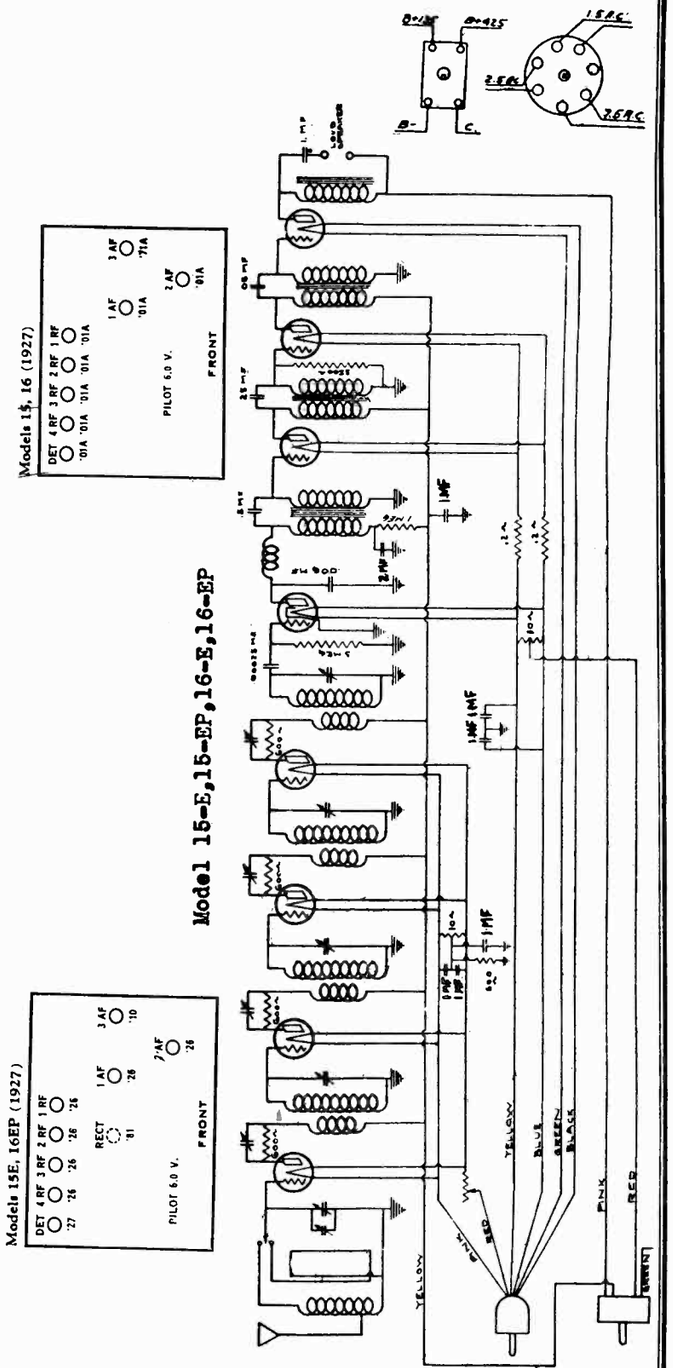
7. Rebalance again at 6 megacycles and 1400 K.C. as in 2 and 4.

MODELS 15,16
MODELS 15-E, 15-EP
16-E, 16-EP
Schematics, Socket

ZENITH RADIO CORP.

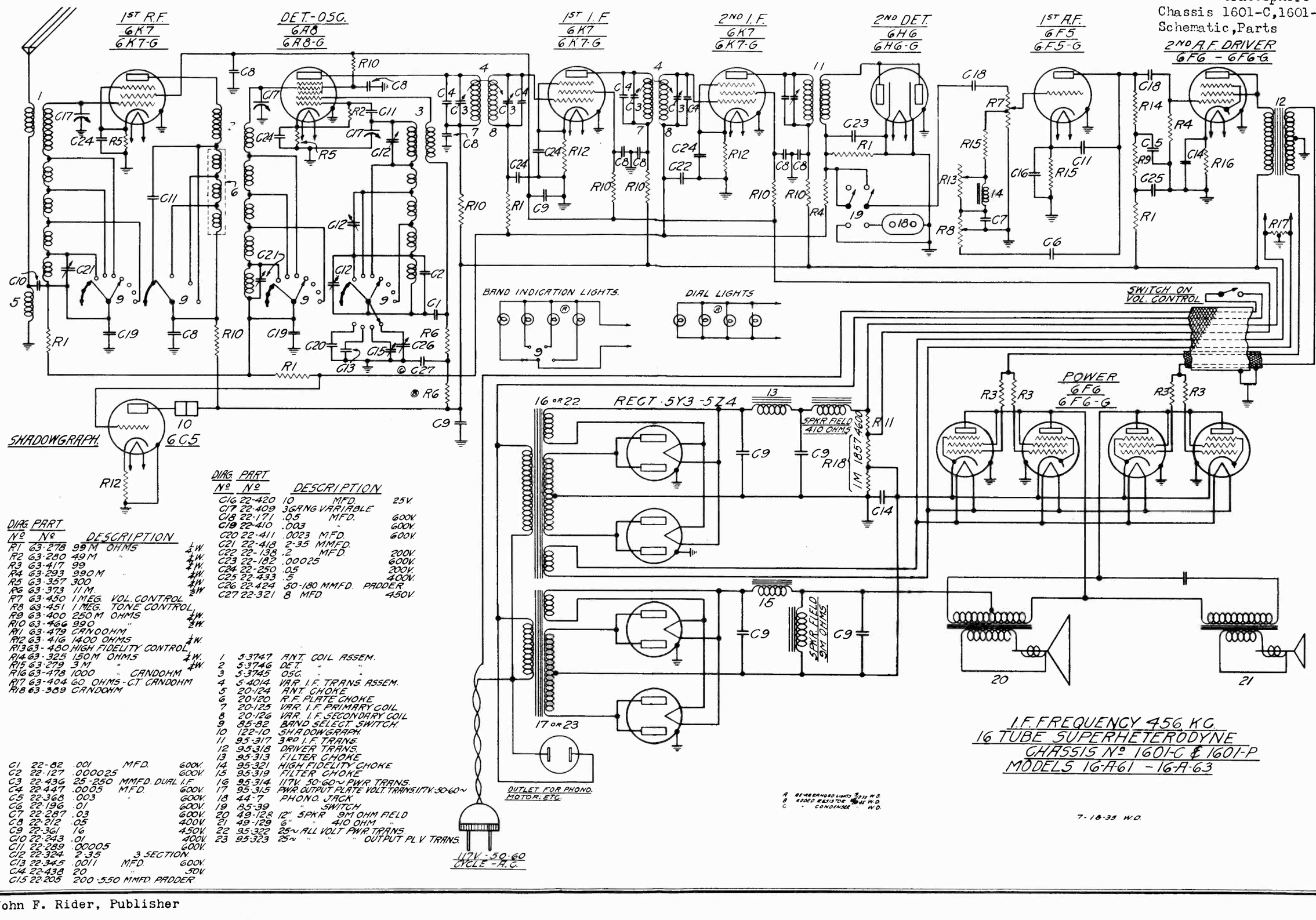
MODEL 15,16
MODEL 15-E, 16-E
Receiver Schematics





ZENITH RADIO CORP.

MODELS 16-A-61, 16-A-63
Stratosphere
Chassis 1601-C, 1601-P
Schematic, Parts



DIAG. PART Nº	Nº	DESCRIPTION	
R1	63-278	99 M OHMS	1/4 W.
R2	63-280	49 M "	1/4 W.
R3	63-417	99 "	1/4 W.
R4	63-293	990 M "	1/4 W.
R5	63-357	300 "	1/4 W.
R6	63-373	11 M. "	1/4 W.
R7	63-450	1 MEG. VOL. CONTROL	
R8	63-451	1 MEG. TONE CONTROL	
R9	63-400	250 M OHMS	1/4 W.
R10	63-466	990 "	1/4 W.
R11	63-479	CANOHM	
R12	63-416	1400 OHMS	1/4 W.
R13	63-480	HIGH FIDELITY CONTROL	
R14	63-325	150 M OHMS	1/4 W.
R15	63-279	3 M "	1/4 W.
R16	63-478	1000 " CANDOHM	
R17	63-404	60 OHMS - C.T. CANDOHM	
R18	63-389	CANDOHM	

DIAG. PART Nº	Nº	DESCRIPTION	
C1	22-82	.001 MFD.	600V.
C2	22-127	.000025	600V.
C3	22-436	25-250 MMFD. DUAL I.F.	
C4	22-447	.0005 MFD.	600V.
C5	22-368	.003 "	600V.
C6	22-196	.01 "	600V.
C7	22-287	.03 "	600V.
C8	22-212	.05 "	400V.
C9	22-361	16 "	450V.
C10	22-243	.01 "	400V.
C11	22-289	.00005	600V.
C12	22-324	2-35 3 SECTION	
C13	22-345	.0011 MFD.	600V.
C14	22-438	20 "	50V.
C15	22-205	200-550 MMFD. PADDER	
C16	22-420	10 MFD.	25V.
C17	22-409	3 GANG VARIABLE	
C18	22-171	.05 MFD.	600V.
C19	22-410	.003 "	600V.
C20	22-411	.0023 MFD.	600V.
C21	22-418	2-35 MMFD.	
C22	22-138	.2 MFD.	200V.
C23	22-182	.00025	600V.
C24	22-250	.05	200V.
C25	22-433	.5	400V.
C26	22-424	50-180 MMFD. PADDER	
C27	22-321	8 MFD.	450V.

1	5-3747	ANT. COIL ASSEM.
2	5-3746	DET. " "
3	5-3745	OSC. " "
4	5-4014	VAR. I.F. TRANS. ASSEM.
5	20-124	ANT. CHOKE
6	20-120	R.F. PLATE CHOKE
7	20-125	VAR. I.F. PRIMARY COIL
8	20-126	VAR. I.F. SECONDARY COIL
9	85-82	BAND SELECT. SWITCH
10	122-10	SHADOWGRAPH.
11	95-317	3RD I.F. TRANS.
12	95-318	DRIVER TRANS.
13	95-313	FILTER CHOKE
14	95-321	HIGH FIDELITY CHOKE
15	95-319	FILTER CHOKE
16	95-314	117V. 50-60~ PWR. TRANS.
17	95-315	PWR OUTPUT PLATE VOLT. TRANS. 117V. 50-60~
18	44-7	PHONO. JACK
19	85-39	" SWITCH
20	49-128	12" SPKR 9M OHM FIELD
21	49-129	6" " " 410 OHM "
22	95-322	25~ ALL VOLT PWR. TRANS.
23	95-323	25~ " " " OUTPUT PL.V. TRANS.

A 85-48 RANGE LIGHTS 7-33 W.O.
B 40000 RESISTOR 8-5 W.O.
C " CONDENSER " W.O.

7-18-33 W.O.

I.F. FREQUENCY 456 K.C.
16 TUBE SUPERHETERODYNE
CHASSIS Nº 1601-C & 1601-P
MODELS 16-A-61 - 16-A-63

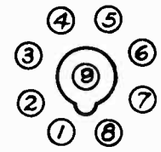
Stratosphere
SERVICE DATA

ZENITH RADIO CORP.

MODELS 16-A-61, 16-A-63
Stratosphere
Chassis 1601-C, 1601-F
Voltage, Socket, Trimmers
Alignment

Socket Voltages

TUBE	POSITION	1	2	3	4	5	6	7	8	9
6K7	R.F.	0	3AC	280	100	3.5	-	3AC	3.5	0
6A8	1st Det.& Osc.	0	3AC	280	100	.4	125	3AC	3.5	0
6K7	1st I.F.	0	3AC	280	100	6.5	-	3AC	6.5	0
6K7	2nd I.F.	0	3AC	280	100	6.5	-	3AC	6.5	0
6H6	2nd Det.	0	3AC	-.2	0	-.2	-	3AC	0	-
6F5	1st Audio	0	3AC	-	3	-	-	3AC	1	0
6F6	2nd Audio Driver	0	3AC	280	280	0	-	3AC	25	-
6C5	Shadowgraph Amp.	0	3AC	280	-	0	-	3AC	11	-
6F6	(4 tubes) Power	0		370	370	0	-		35	-
5Y3	Rectifier Top Chassis	0	390	-	320AC	-	320AC	-	390	-
5Y3	Rectifier Lower Chassis	0	360	-	300AC	-	300AC	-	360	-



BOTTOM VIEW OF SOCKET

Line Voltage 115 Antenna and Ground Disconnected

Voltages measured from point indicated to ground, using a 1000 ohm per volt meter, except heaters (2 - 7)

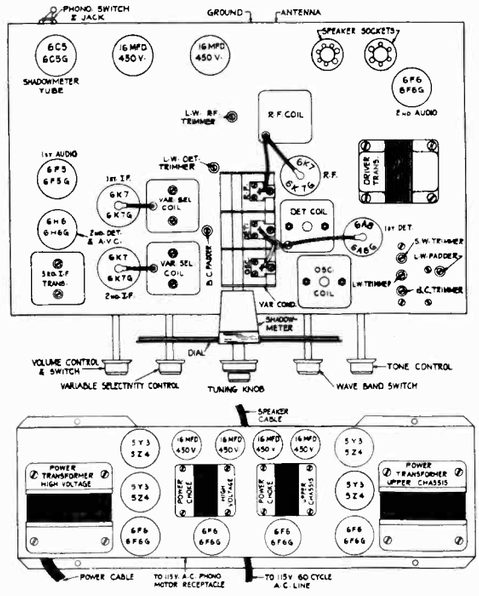
Alignment

1. The diagram on page shows position of major components and aligning adjustments. It should be studied carefully before any attempt is made to adjust the various circuits.

2. Set service oscillator to 456 KC, and connect to the grid of the 6A8 tube. The grid cap should not be removed from the tube as this will remove bias. Tune the I.F. transformers for maximum output. Alignment should always be made with the service oscillator set to as low an output as will give a satisfactory indication on the output meter.

3. Connect the service oscillator to the antenna and ground post. With the band switch in the broadcast position, set the dial pointer to 1700 kilocycles, and adjust the oscillator trimmer on the gang condenser for a maximum output. Align the R.F. and detector condenser trimmers, also located on the gang condenser, for a maximum output.

4. Set the dial pointer to 600 kilocycles, and adjust the B.C. padder meanwhile rocking the gang condenser back and forth across 600 kilocycles until the padder setting for maximum output is obtained.. It may be necessary to go back and make a slight correction of the trimmer at 1700 kilocycles after the padder adjustment is completed.



Power Pack Chassis Drawing

5. Turn the band switch for the "B" band. Rock the gang back and forth across the 6 megacycle readings, meanwhile adjusting the oscillator trimmer on the gang condenser until maximum output is obtained. It will always be found that the dial reading for 6 megacycles is very close to this point. The service oscillator, of course, should be set at 6 megacycles.

6. Align "D" band (7-22.5 megacycles) next by setting service oscillator and dial indicator to 18 megacycles, and rocking indicator slowly over that point while adjusting the S.W. Trimmer to maximum output.

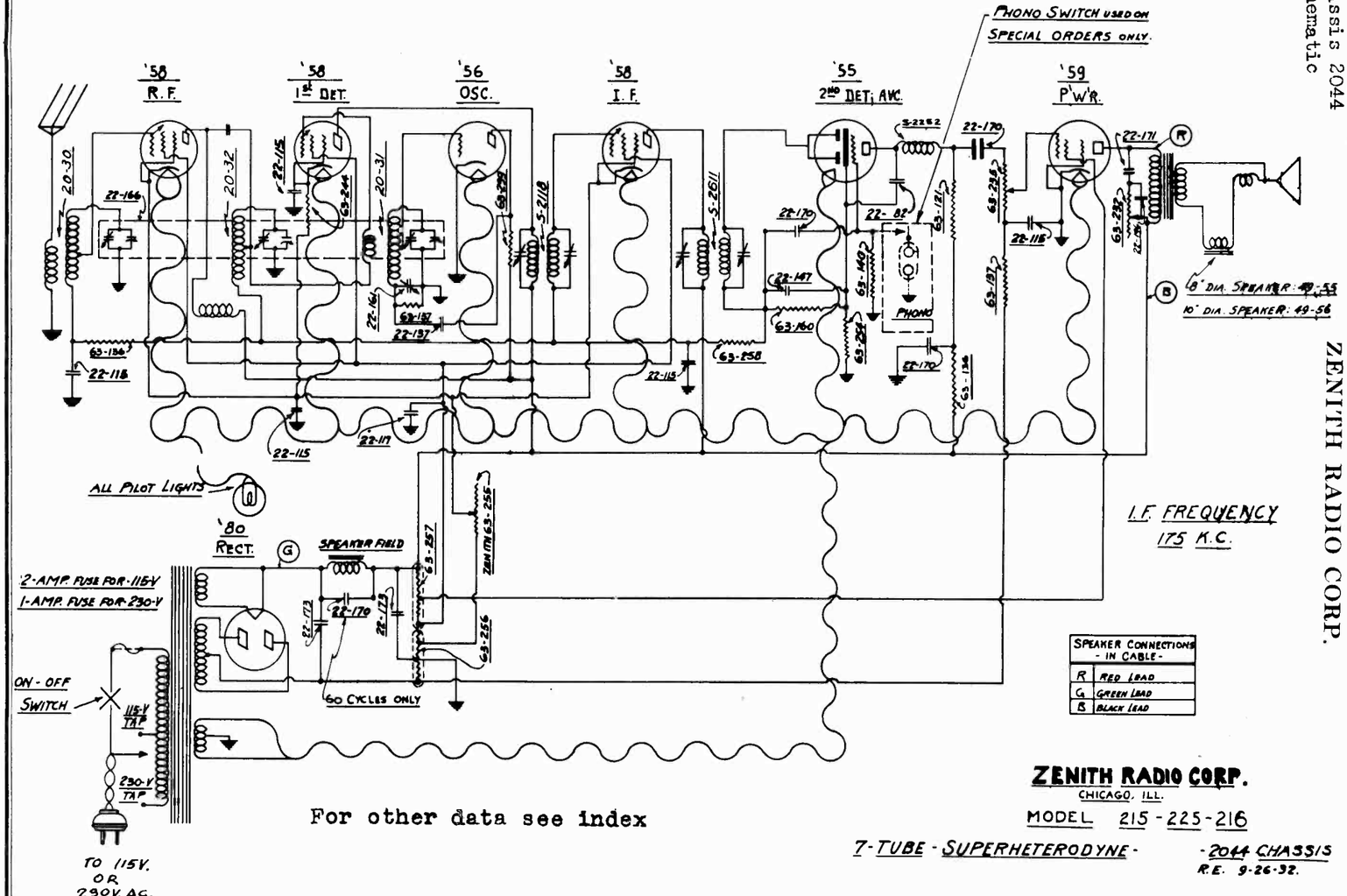
7. Set back to 1700 K.C. Readjust oscillator circuit this time using broadcast trimmer on chassis base.

8. Set band switch to "C" band (long wave) and peak at 350 K.C. with L.W.,R.F.-Det. and Oscillator trimmers. Turn dial indicator and service oscillator to 180 K.C., and adjust long wave padder while slowly rocking dial indicator.

9. Repeat operation #2.

ZENITH RADIO CORP.

MODELS 215, 216, 225
Chassis 2044
Schematic

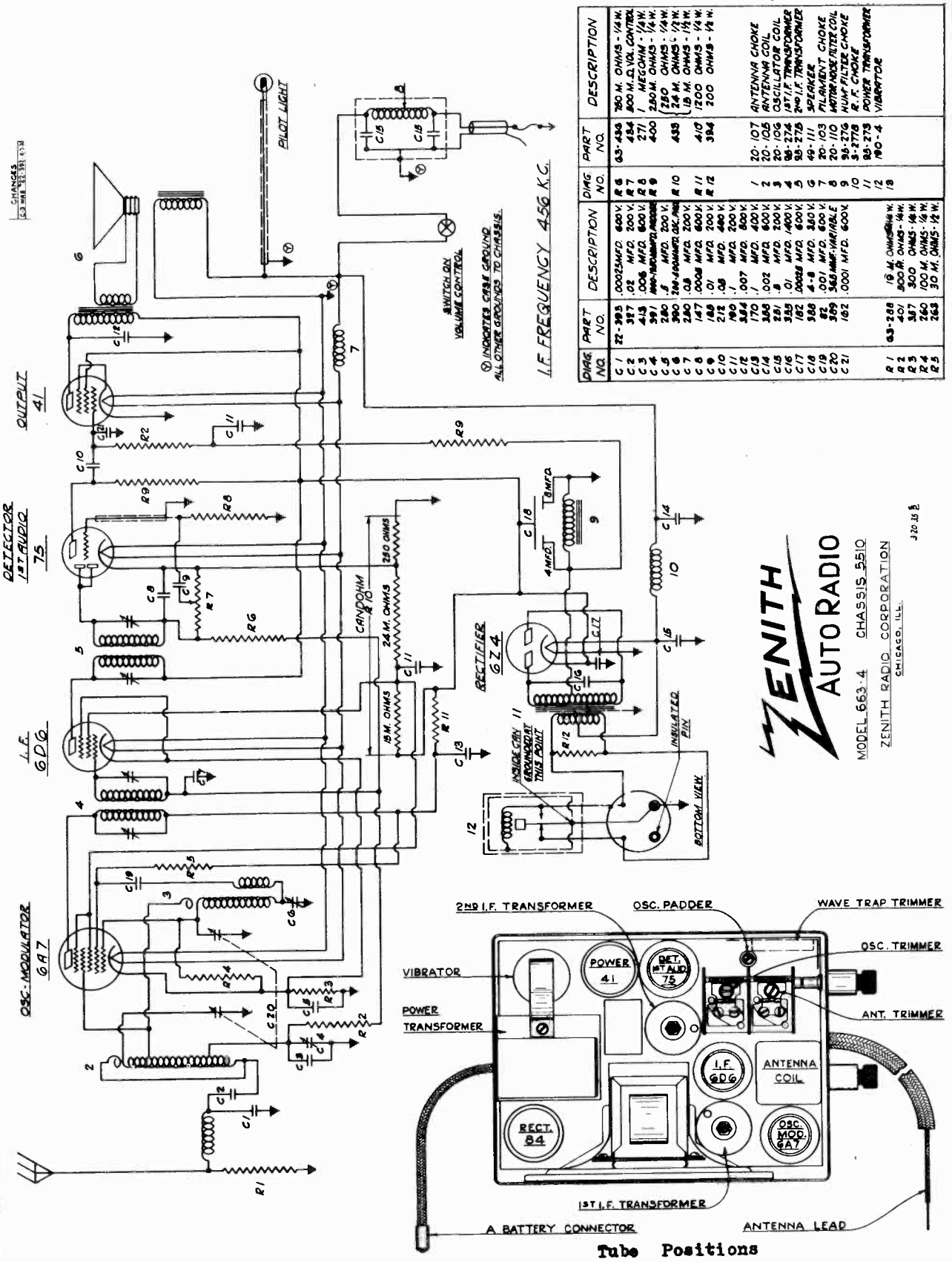


For other data see index

ZENITH RADIO CORP.
CHICAGO, ILL.
MODEL 215 - 225 - 216
7-TUBE - SUPERHETERODYNE - -2044 CHASSIS
R.E. 9-26-32.

MODELS-663,664
Chassis 5510
Schematic, Socket
Trimmers, Parts

ZENITH RADIO CORP.



DIAG. NO.	PART NO.	DESCRIPTION
C 1	22-395	.0002 MFD. 600 V.
C 2	317	.02 MFD. 200 V.
C 3	413	.006 MFD. 600 V.
C 4	391	MMF. VARIABLE
C 5	280	.5 MFD. 200 V.
C 6	390	100 MMFD. DISC. MICA
C 7	280	.05 MFD. 200 V.
C 8	147	.0008 MFD. 600 V.
C 9	148	.01 MFD. 200 V.
C 10	278	.05 MFD. 400 V.
C 11	190	.1 MFD. 200 V.
C 12	384	.007 MFD. 600 V.
C 13	170	.1 MFD. 400 V.
C 14	368	.002 MFD. 600 V.
C 15	281	.5 MFD. 200 V.
C 16	339	.01 MFD. 1400 V.
C 17	182	.0025 MFD. 600 V.
C 18	368	4-8 MFD. 350 V.
C 19	82	.001 MFD. 600 V.
C 20	309	365 MMF. VARIABLE
C 21	182	.0001 MFD. 600 V.
R 1	63-288	10 M. OHMS - 1/4 W.
R 2	401	800 M. OHMS - 1/4 W.
R 3	307	300 OHMS - 1/4 W.
R 4	260	100 M. OHMS - 1/4 W.
R 5	263	30 M. OHMS - 1/4 W.

DIAG. NO.	PART NO.	DESCRIPTION
R 6	63-436	750 M. OHMS - 1/4 W.
R 7	434	800 M. Ω VOL. CONTROL
R 8	271	1 MEGOHM - 1/4 W.
R 9	400	250 M. OHMS - 1/4 W.
R 10	433	250 OHMS - 1/2 W.
		24 M. OHMS - 1/2 W.
		15 M. OHMS - 1/2 W.
R 11	410	1200 OHMS - 1/2 W.
R 12	384	200 OHMS - 1/2 W.
1	20-107	ANTENNA CHOKE
2	20-105	ANTENNA COIL
3	20-106	OSCILLATOR COIL
4	98-274	1ST I.F. TRANSFORMER
5	98-275	2ND I.F. TRANSFORMER
6	49-111	SPEAKER
7	20-103	FILAMENT CHOKE
8	20-110	MOTOR NOISE FILTER COIL
9	98-276	HUM FILTER CHOKE
10	98-277	R.F. CHOKE
11	98-278	POWER TRANSFORMER
12	190-4	VIBRATOR
13		

Tube Positions

For other data see index

MODELS A,B,C,D,Zenette
Changes
MODELS 250,260,272
Alignment,Voltage

Zenith A, B, C, D, Zenette

Several changes have been made in the improved chassis 2004, which is used in these models. These changes are shown in the accompanying schematic; only a portion of which is shown, as the remainder is the same as the early model.

If you will compare this with the original schematic (see *Zenith page 1-26 in the revised edition; *674-C in the early edition, and page* 2722 *in the Rider-Combination*), it will be seen that the green wire connecting the long antenna terminal to the center tap on the antenna coil, now goes to a condenser, Part No. 22-104, having a value of 0.0001 mf. The other side of this condenser is connected now to one side of the volume control, Part No. 63-141. The other side of the volume control is now connected to the 400-ohm resistor (Part No. 63-131) in the cathode circuit of the first 24, instead of to ground.

The 50,000-ohm resistor (Part No. 63-136) has been added in the screen grid circuits of the first two tubes. Also the 0.1-mf. condenser, across the choke in the power supply circuit, has been added in those receivers using 60-cycle supply. This condenser is omitted in 25-cycle sets and the condenser shown dotted is used instead; the value is 2 mf. (Part No. 22-84).

ZENITH RADIO CORP.

Zenith Values

Some of the Zenith wiring diagrams in the early Rider Manuals do not show the electrical equivalents for certain parts numbers. While it is true that these receivers are quite old, we feel certain that this information will be found valuable.

Zenith 430, 440

Below will be found the voltage readings for these models, the schematic of which appears in *Rider's Volume III on Zenith page 3-7 and in the Rider-Combination Manual on page 2737.*

Tube	Position	Plate	Cath.	Screen	Suppr.	Plate Current
Z-58	1st R.F.	175	2.2	75	2.2	5.7
Z-58	1st Det.	190	4.5	75	4.5	2.3
Z-56	Osc.	100	0	—	—	3.5
Z-58	1st I.F.	200	2.2	75	2.2	5.5
Z-56	2nd Det.	110	10	—	—	0.3
Z-56	1st A.F.	170	80	—	—	0.8
Z-57	A.V.C.	—	-85	—	-85	—
Z-57	Q.A.V.C.	30	13	75	13	—
Z-59	Driver	190	20	190	190	13
Z-59	Power	195	-70	195	195	22
Z-80	Rect.	360	—	—	—	65

The filament voltage for all tubes, except the rectifier, is 2.5; that of the 80 is 5.0 volts.

Balance the i-f. stage at 175 kc. Condenser gang at 1500 kc. and oscillator padder at 600 kc.

Voltage Socket,Trimmers MODELS 430,440

Parts	Number	Value	Parts	Number	Value
22-21	.00025	mfd.	63-31	.35	ohm
-23	1.	mfd.	-66	10.	ohms
-27	1.	mfd.	-67	600	ohms
-38	.001	mfd.	-68	2000	ohms
-40	9.	mfd.	-69	2700	ohms
-41	11.	mfd. block	-70	22500	ohms
-42	1.	mfd.	-71	1600	ohms
-43	.25	mfd.	-72	22500	ohms
-44	1.	mfd.	-80	200	ohms
-46	16.	mfd.	-96	10000	ohms
-48	19.	mfd. block	-98	10	ohms
-49	10.	mfd. block	-99	30	ohms
-59	10.5	mfd. block	-100	20	ohms
-61	36.	mfd. Mershon	-101	50	ohms
-64	.03	mfd.	-106	25000	ohms
-65	1.	mfd.			
-66	.2	mfd. quadruple			
-67	1.5	mfd.			
-69	1.	mfd. double			
-70	.001	mfd.			
-71	1.	mfd.			
-72	1.	mfd.			
-73	16.	mfd.			

Zenith 250, 260, 272

Below will be found the socket layout for these models, the schematic for which appears on the following pages in *Rider's Manuals: Zenith* 3-6 *and* 2734 *in the Rider-Combination Manual.*

Socket Voltages

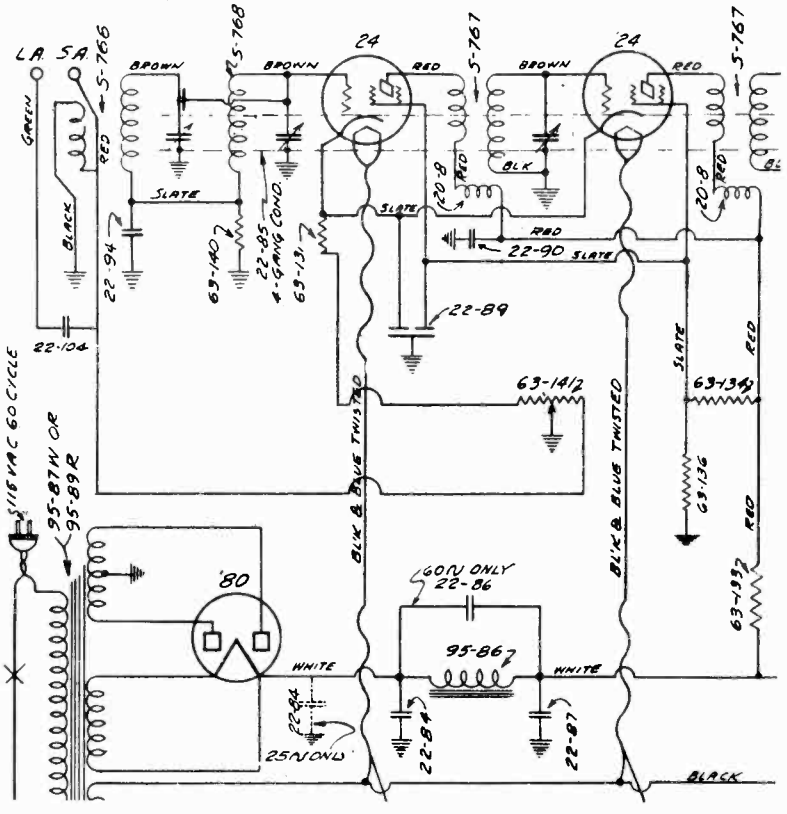
Tube	Position	Plate	Cathode	Screen	Suppressor	Plate MA.
58	R.F.	240	4	110	4	6.2
24	1st Det.	235	8	110	–	.5
57	S-W. 1st Det.	235	6	150	6	.5
27	S-W. Osc.	150	10	—	–	5.
27	Osc.	110	0	—	–	9.
58	I.F.	235	3	110	3	8.
27	2nd Det.	35	4	—	–	1.8
47	O.P.	215	—	230	–	28.
80	Rect.	110 each to ground				34. each

All controls maximum. Line—115 volts. Filament voltage of all tubes 2.4, with exception of 80, which is 5 volts.

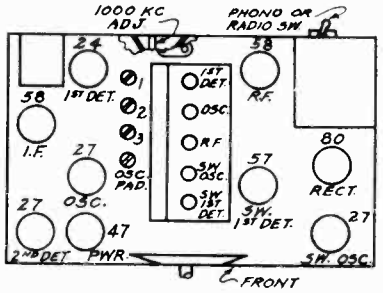
Alignment Data:

Broadcast band. I-f. peak is 175 kc. Tuning condenser (three rear sections) 1500 kc. Oscillator padder 600 kc.

S-W. band. Set 1000 kc. adjustment shaft to the center of its tuning range and balance s-w. i-f. trimmers (1, 2, and 3) to 1000 kc. with s-w. oscillator tube removed. Insert tube and place s-w. tuning on scale by adjusting s-w. oscillator trimmer on condenser gang until a station on the 1.5 to 3.75-mc. band is resonated at its corresponding frequency on the dial.



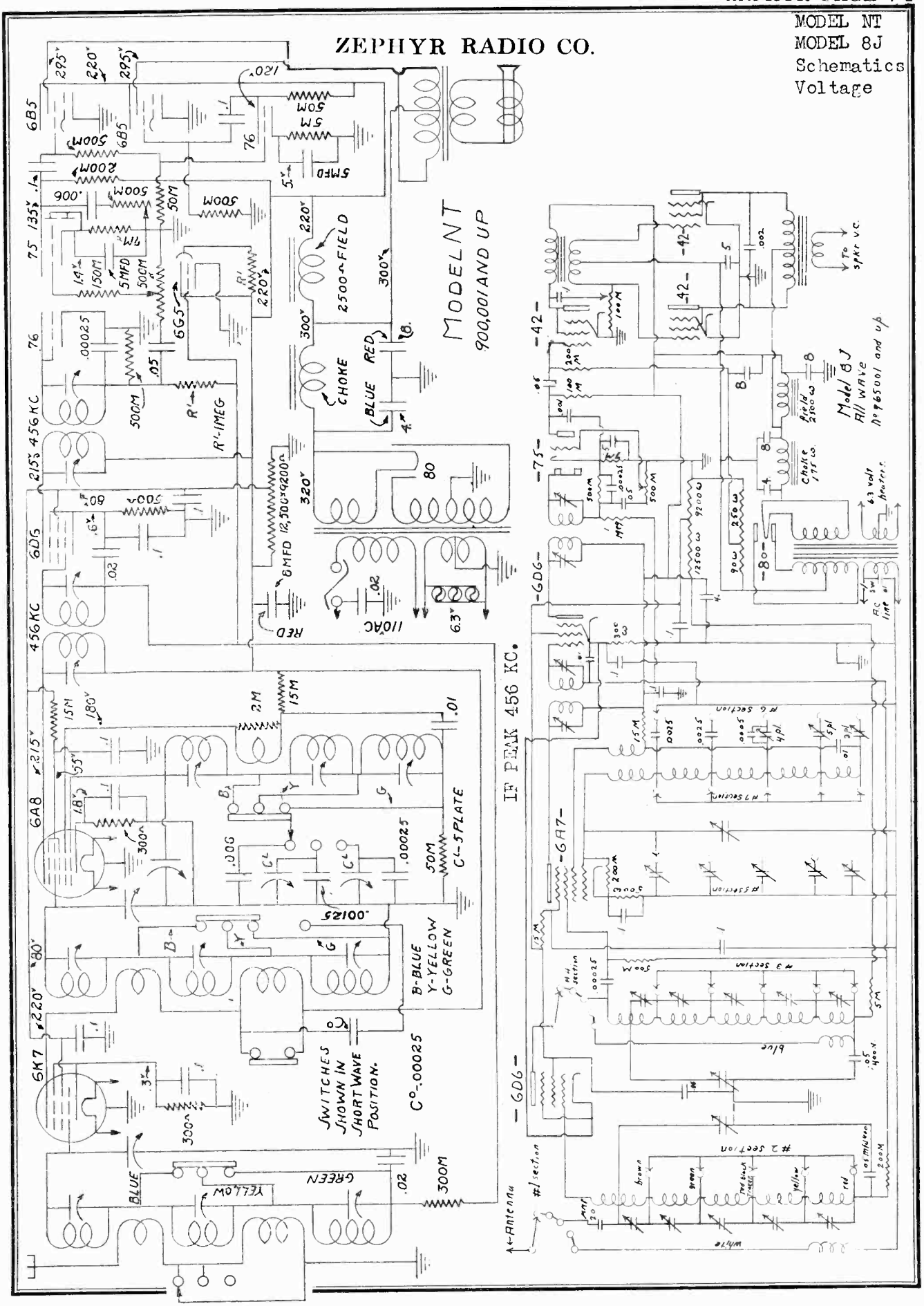
Partial schematic diagram of Zenith A, B, C. D Zenette showing changes in improved chassis 2004



Locations of trimmers and tubes of the Zenith Models 250, 260, and 272.

ZEPHYR RADIO CO.

MODEL NT
MODEL 8J
Schematics
Voltage



MODEL P
MODEL Y
Schematics
Voltage

ZEPHYR RADIO CO.