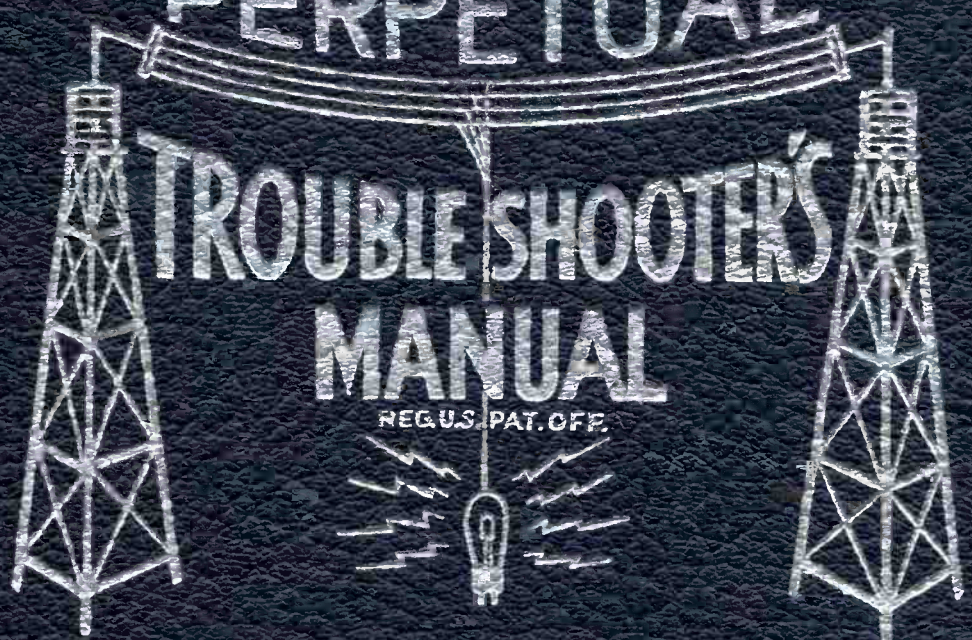
VOLUME X

PERPETUAL TROUBLESHOOTER'S MANUAL

REG. U.S. PAT. OFF.

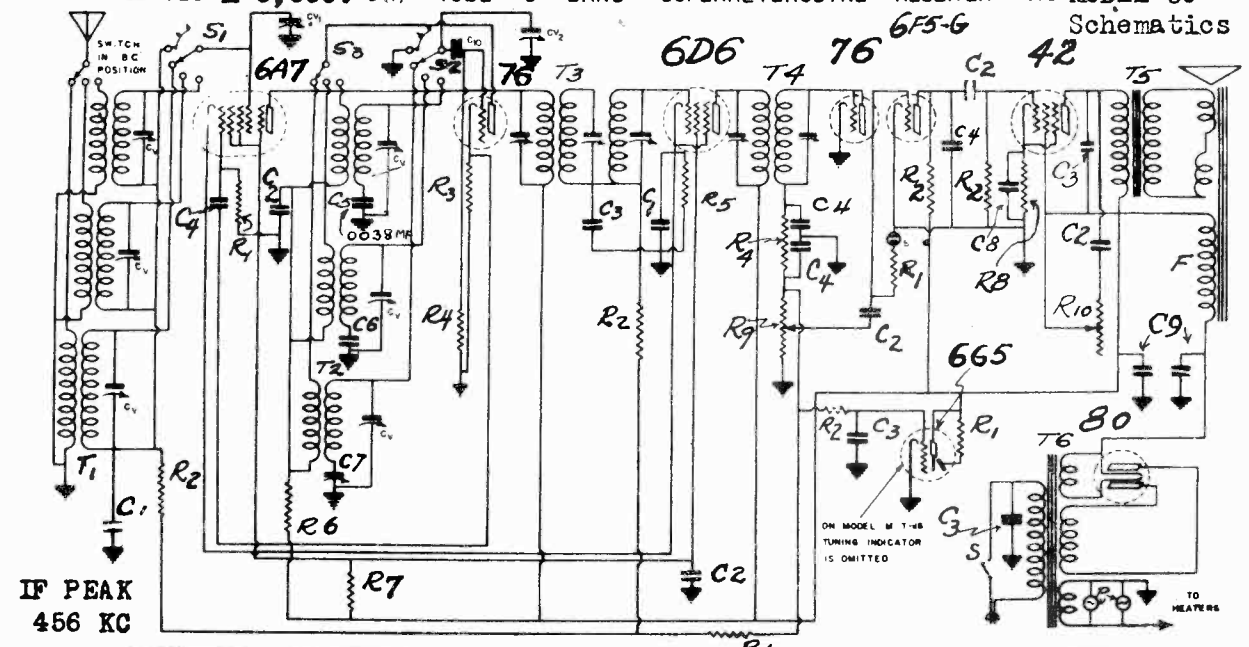


JOHN F. RIDER

MODELS M-8,800
Chassis M,ME
Schematics

WALGREEN CO.

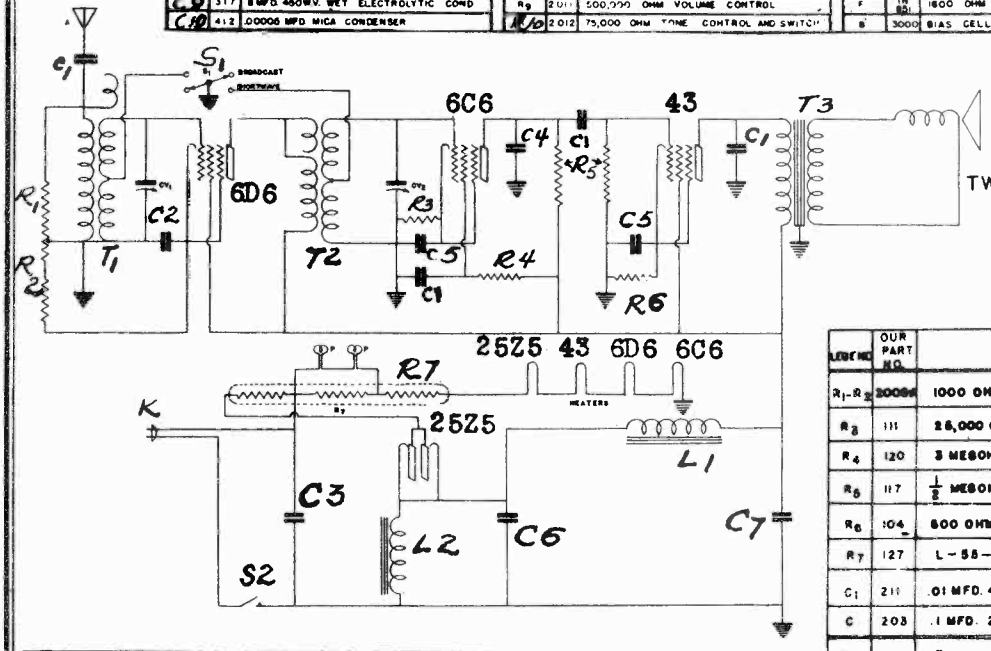
MODELS **M-8,800.** 8(7) TUBE 3 BAND SUPERHETERODYNE RECEIVER - AC MODEL 30



LEGEND	OUR PART NO.	DESCRIPTION
C1	203	.1 MFD - 200V TUBULAR CONDENSER
C2	206	.05 MFD - 400V TUBULAR CONDENSER
C3	211	.01 MFD - 400 V TUBULAR CONDENSER
C4	401	.00025 MICA CONDENSER
C5	418	.0038 MICA CONDENSER
C6	410	.001 MICA CONDENSER
C7	508	8 PLATE PADDING CONDENSER
C8	500	5-30 MFD. TRIMMER CONDENSERS
C9	368	.01 MFD. 25 W.V. TUBULAR ELECTROLYTIC COND.
C10	317	8 MFD. 450 W.V. WET ELECTROLYTIC COND
C11	412	.00006 MFD MICA CONDENSER

LEGEND	OUR PART NO.	DESCRIPTION
C1/C1a	811	2 SECTION VARIABLE CONDENSER
R1	119	1 MEGOHM 1/4 WATT CARBON RESISTOR
R2	117	1/2 MEGOHM 1/4 WATT CARBON RESISTOR
R3	105	1,000 OHMS 1/4 WATT CARBON RESISTOR
R4	113	50,000 OHMS 1/4 WATT CARBON RESISTOR
R5	103	250 OHMS 1/4 WATT CARBON RESISTOR
R6	111	20,000 OHMS 1/4 WATT CARBON RESISTOR
R7	112	25,000 OHMS 1/4 WATT CARBON RESISTOR
R8	122	420 OHMS 2 WATT WIRE WOUND RESISTOR
R9	2011	500,000 OHM VOLUME CONTROL
R10	2012	75,000 OHM TONE CONTROL AND SWITCH

LEGEND	OUR PART NO.	DESCRIPTION
T1	1215	SHIELDED 3 BAND ANTENNA COIL
T2	1406	SHIELDED 3 BAND OSCILLATOR COIL
T3	1508	TRIPLE TUNED I.F. TRANSFORMER
T4	1506	DIODE I.F. TRANSFORMER
T5	IN 851	SPKR TRANSFORMER
T6	1012	POWER TRANSFORMER
S1 S2 S3	1913	3 GANG BAND SWITCH
P	2902	MAZDA #46 PILOT LIGHT
S	—	SWITCH ON TONE CONTROL
F	IN 851	1600 OHM SPEAKER FIELD
B	3000	BIAS CELL



MODEL 30

TWO BAND RECEIVERS *AC-DC* TYPE.

LEGEND	OUR PART NO.	DESCRIPTION
R1-R2	2006	1000 OHM VOLUME CONTROL (275 OHM MIN.)
R3	111	20,000 OHM 1/4 WATT CARBON RESISTOR
R4	120	3 MEGOHM 1/4 WATT CARBON RESISTOR
R5	117	1/2 MEGOHM 1/4 WATT CARBON RESISTOR
R6	104	800 OHM 1/4 WATT CARBON RESISTOR
R7	127	L-55-S2 BALLAST TUBE
C1	211	.01 MFD. 400 VOLT TUBULAR CONDENSER
C	203	.1 MFD. 200 VOLT TUBULAR CONDENSER
T3	804-A	5" DYNAMIC SPEAKER TRANSFORMER
L1	1100	IRON CORE FILTER CHOKE
A	1805	20 FEET INDOOR AERIAL
P	2902	MAZDA #46 POLIT LIGHT
S1	1902	BAND SELECTOR SWITCH
S	—	LINE SWITCH ON VOLUME CONTROL
CV1 CV2	801	TWO GANG VARIABLE CONDENSER
K	1800	RUBBER COVERED LINE CORD

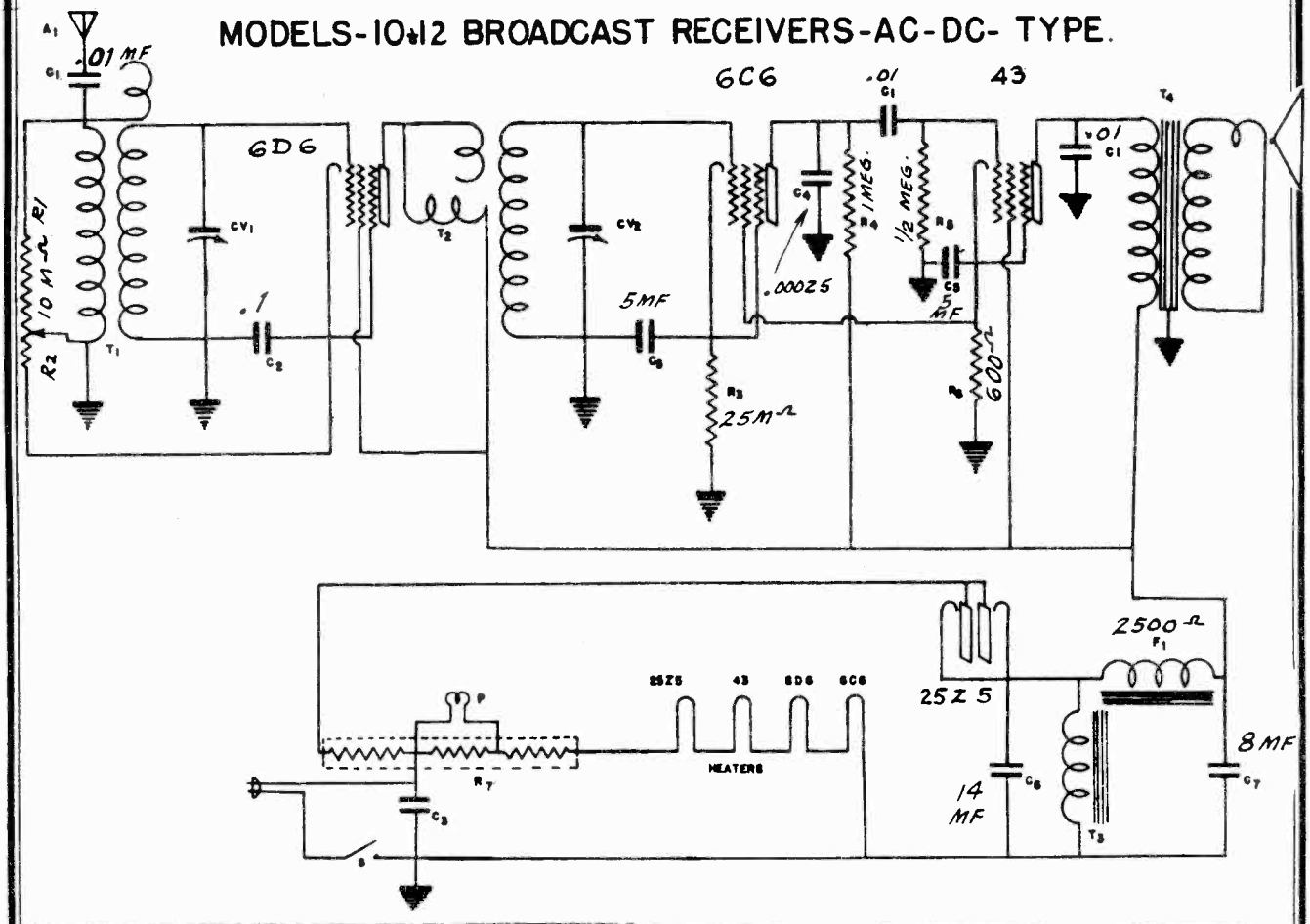
C3	206	.05 MFD. 400 VOLT TUBULAR CONDENSER
C4	401	.00025 MFD. MICA CONDENSER
C5	IN 306	10 MFD. 35 VOLT PEAK ELECTROLYTIC CONDENSER
C6	IN 305	20 MFD. 220 VOLT PEAK ELECTROLYTIC CONDENSER
C7	IN 306	10 MFD. 220 VOLT PEAK ELECTROLYTIC CONDENSER
T1	1205	TWO BAND ANTENNA TRANSFORMER
T2	1305	TWO BAND INTERSTAGE TRANSFORMER
L2	804	SPEAKER FIELD (2500 OHM)

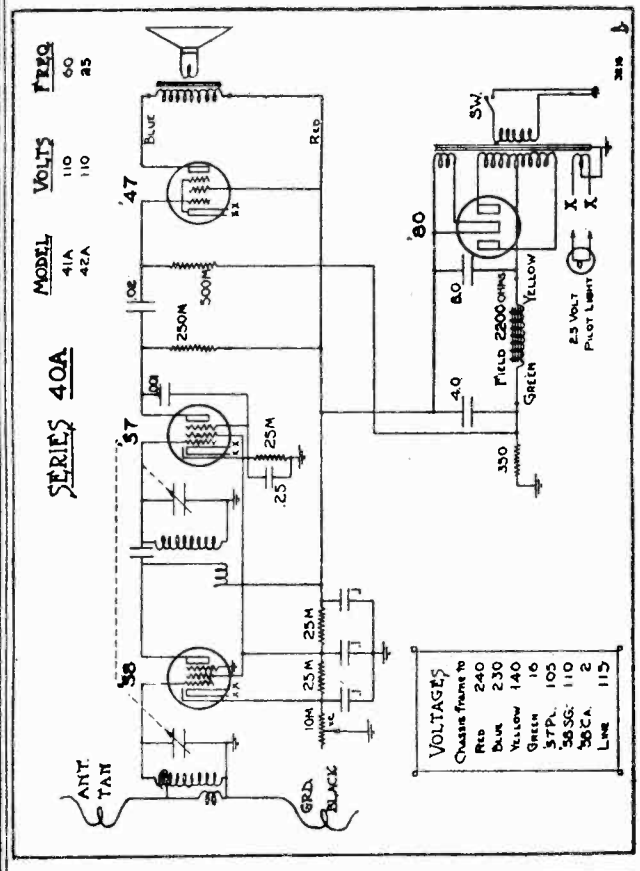
MODELS 10,12
MODELS 41,42

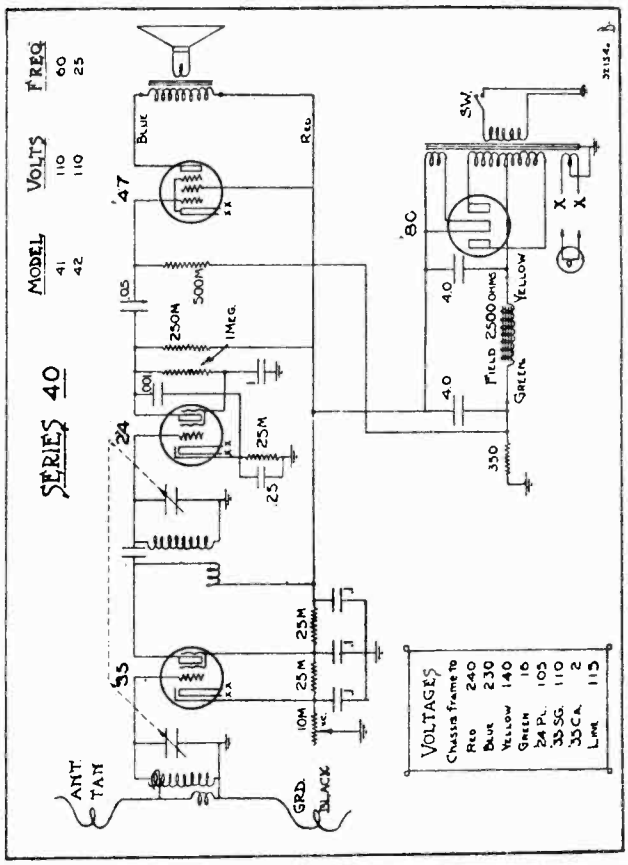
WALGREEN CO.

MODELS 41A,42A
Schematics

MODELS-10-12 BROADCAST RECEIVERS-AC-DC- TYPE.







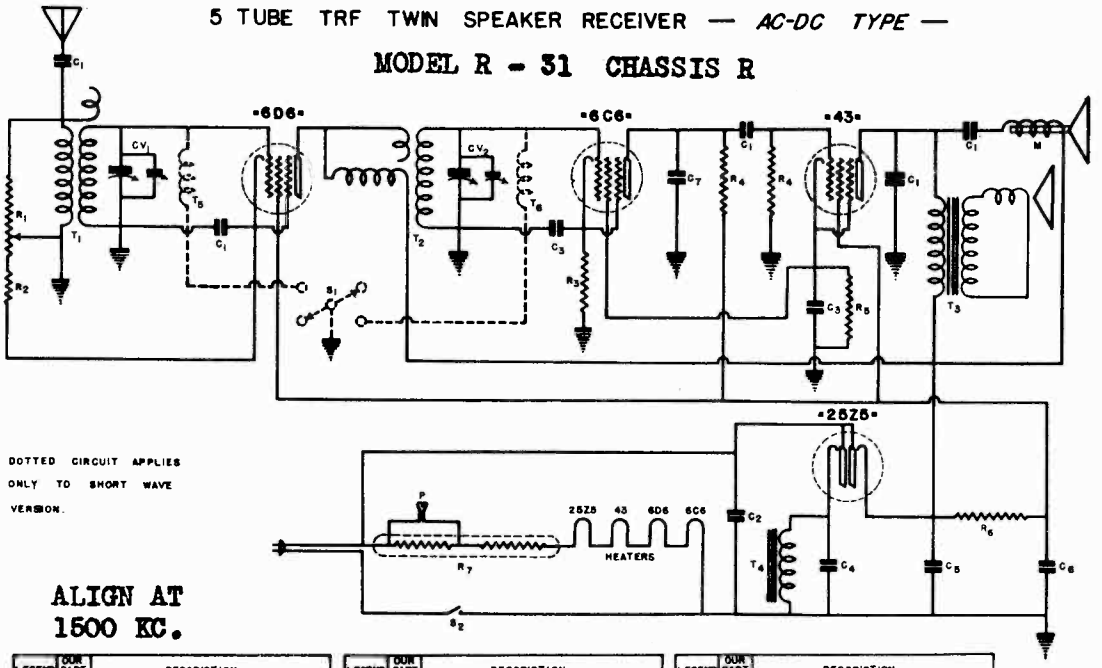
DECIMAL ARE MICROFARADS. WHOLE NUMBERS ARE OHMS.

MODEL R-31, Chassis R
MODEL 360, Chassis HE
Schematics

WALGREEN CO.

5 TUBE TRF TWIN SPEAKER RECEIVER — *AC-DC TYPE* —

MODEL R - 31 CHASSIS R



ALIGN AT 1500 KC.

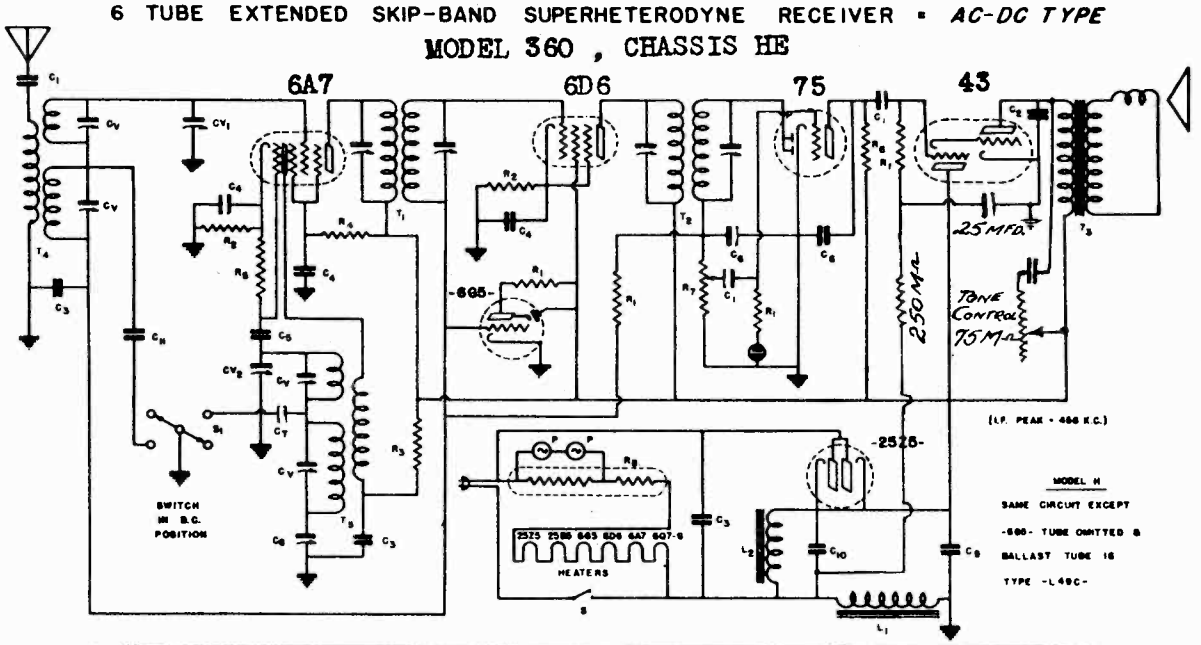
LEGEND	OUR PART NO.	DESCRIPTION
R_1	2008	10,000 OHM VOLUME CONTROL
R_2	—	275 OHM (Minimum on Volume Control)
R_3	111	25,000 OHM ½ WATT CARBON RESISTOR
R_4	117	500,000 OHM ½ WATT CARBON RESISTOR
R_5	104	600 OHM ½ WATT CARBON RESISTOR
R_6	106	5000 OHM ½ WATT CARBON RESISTOR
R_7	2903	L-35-B BALLAST TUBE
P	2902	MAZDA #46 PILOT LIGHT

LEGEND	OUR PART NO.	DESCRIPTION
CV_1 CV_2	610	2 GANG VARIABLE CONDENSER
C_1	211	.01 MFD. 400V. TUBULAR CONDENSER
C_2	210	.1 MFD. 400V. TUBULAR CONDENSER
C_3	IN 316	5MFD. 25W.V. ELECTROLYTIC CONDENSER
C_4	IN 315	4MFD. 150W.V. ELECTROLYTIC CONDENSER
C_5	IN 315	14MFD. 150W.V. ELECTROLYTIC CONDENSER
C_6	IN 316	8MFD. 150W.V. ELECTROLYTIC CONDENSER
C_7	401	.00025 MFD. MICA CONDENSER
M	900	MAGNETIC SPEAKER

LEGEND	OUR PART NO.	DESCRIPTION
S_1	1914	BAND SELECTOR SWITCH
S_2	—	LINE SWITCH ON VOLUME CONTROL
T_1	1200	ANTENNA COIL
T_2	1300	RF COIL
T_3	IN 810	SPEAKER OUTPUT TRANSFORMER
T_4	IN 810	2500 OHM SPEAKER FIELD
T_5	1612	SHORT WAVE ANTENNA SHUNT
T_6	1612	SHORT WAVE RF SHUNT

6 TUBE EXTENDED SKIP-BAND SUPERHETERODYNE RECEIVER - *AC-DC TYPE*

MODEL 360 , CHASSIS HE



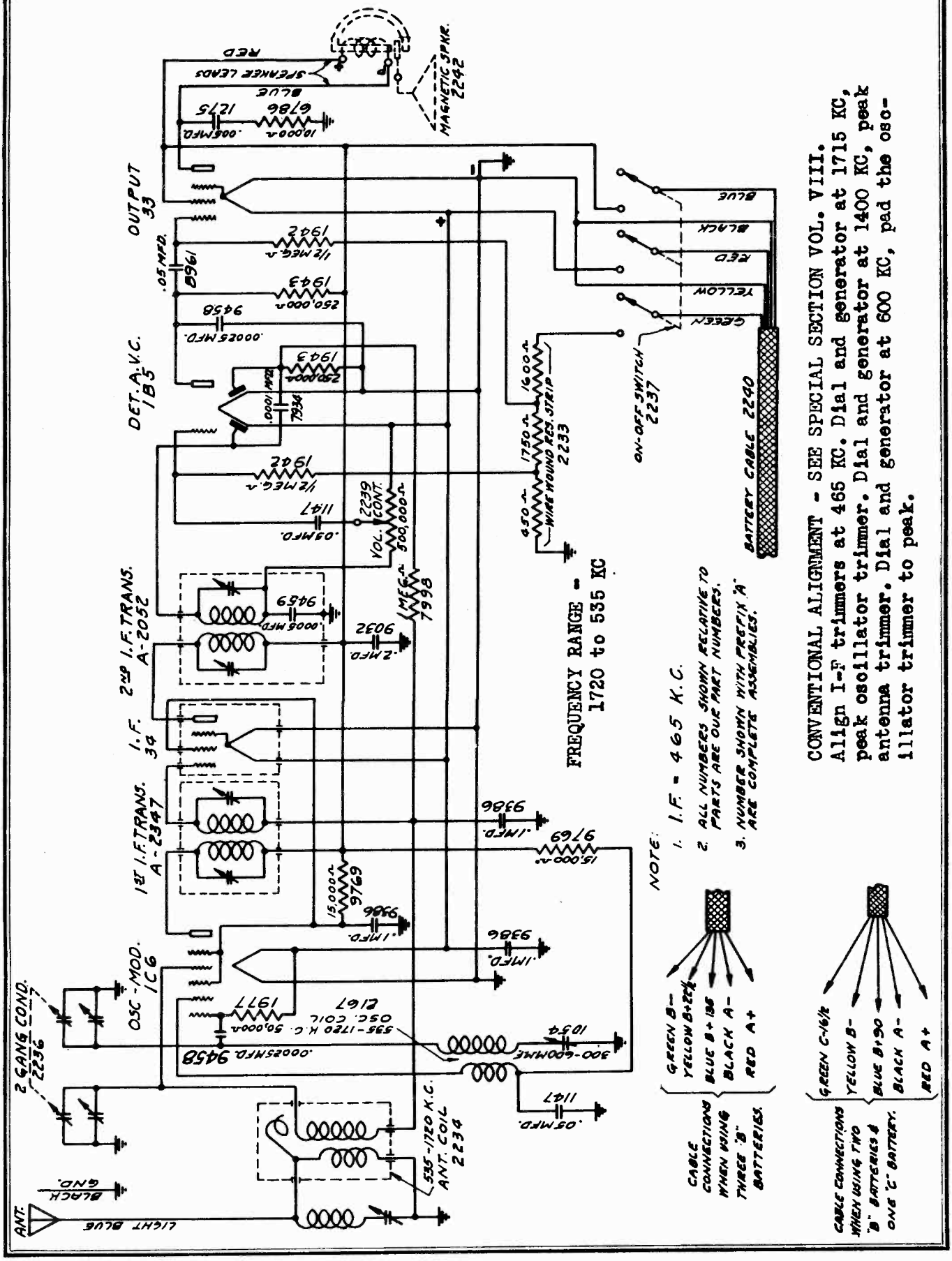
LEGEND	OUR PART NO.	DESCRIPTION
C_1	211	.01 MFD-400V TUBULAR CONDENSER
C_2	206	.05 MFD-400V TUBULAR CONDENSER
C_3	210	.1 MFD-400V TUBULAR CONDENSER
C_4	203	.1 MFD-200V TUBULAR CONDENSER
C_5	400	.0001 MICA CONDENSER
C_6	401	.00025 MICA CONDENSER
C_7	411	.00128 MICA CONDENSER
C_8	507	5 PLATE PADDING CONDENSER
C_9	314	10 MFD 150 W.V. ELECTROLYTIC COND.
C_{10}	311	20 MFD 150 W.V. ELECTROLYTIC COND.

LEGEND	OUR PART NO.	DESCRIPTION
CV_1 CV_2	612	2 GANG VARIABLE CONDENSER
R_1	119	1 MEGOHM ½ WATT CARBON RESISTOR
R_2	103	250 OHMS ½ WATT CARBON RESISTOR
R_3	109	10,000 OHMS ½ WATT CARBON RESISTOR
R_4	111	25,000 OHMS ½ WATT CARBON RESISTOR
R_5	113	50,000 OHMS ½ WATT CARBON RESISTOR
R_6	116	250,000 OHMS ½ WATT CARBON RESISTOR
R_7	2009	50,000 OHMS VOLUME CONTROL & SWITCH
R_8	2905	L-49-C BALLAST TUBE (MODEL H)
R_9	2906	L-42-C BALLAST TUBE (MODEL HE)
C	212	.05 MFD - 200 V TUBULAR CONDENSER

LEGEND	OUR PART NO.	DESCRIPTION
T_1	1503	1st I.F. TRANSFORMER
T_2	1506	DIODE I.F. TRANSFORMER (2500 OHMS)
T_3	IN 805	SPEAKER OUTPUT TRANSFORMER
T_4	1210	ANTENNA COIL
T_5	1404	OSCILLATOR COIL
L_1	1101	CHOKE
L_2	IN 805	SPEAKER FIELD (2500 OHMS)
S_1	1914	BAND SELECTOR SWITCH
S	—	SWITCH ON TONE CONTROL
P	2902	MAZDA #46 PILOT LIGHT

MODEL 32B
Schematic
Alignment

WALGREEN CO.



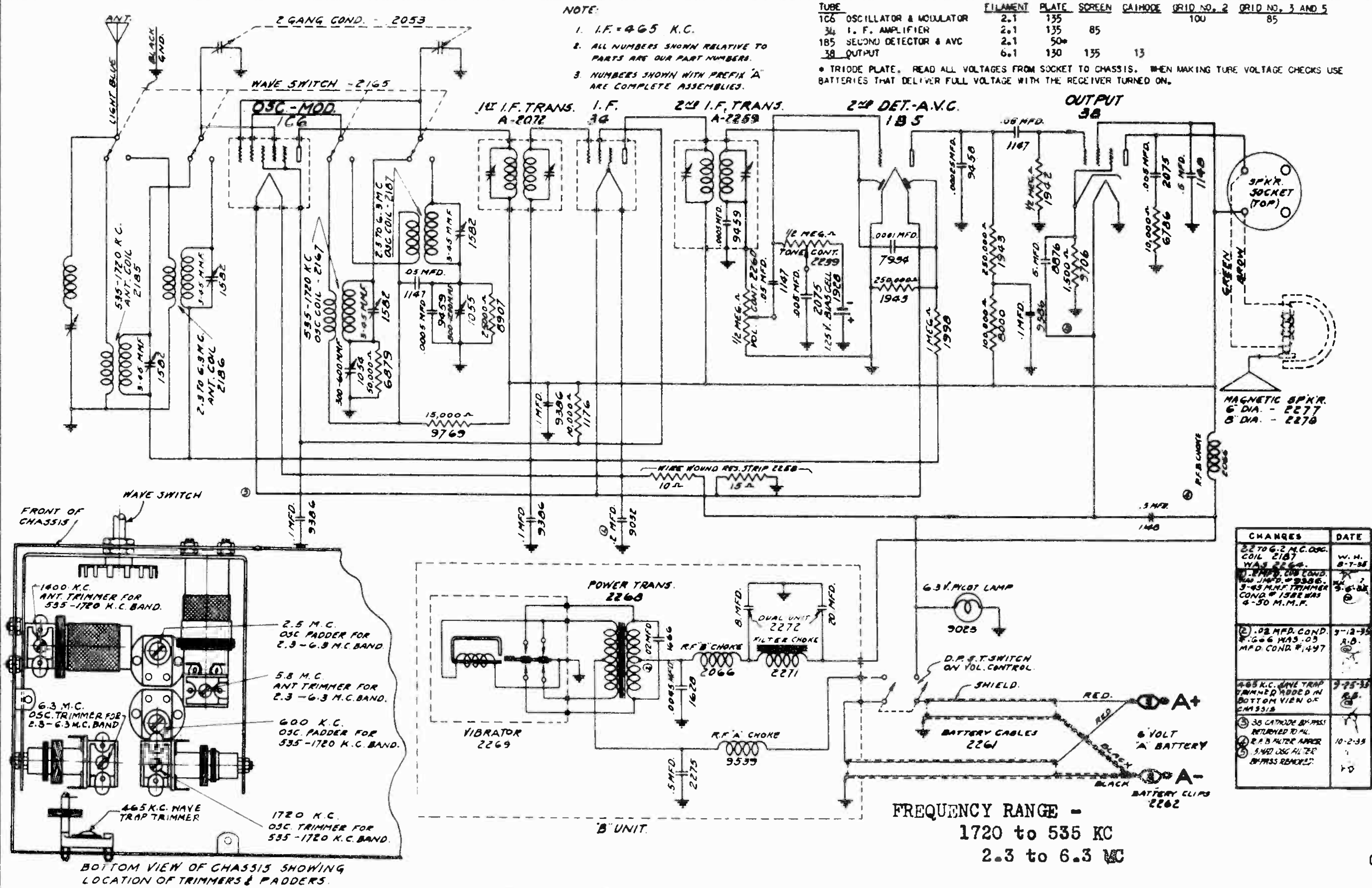
MODEL 34B
Schematic, Voltage
Alignment, Trimmers
Changes

WALGREEN CO.

NOTE:
1. I.F. = 465 K.C.
2. ALL NUMBERS SHOWN RELATIVE TO PARTS ARE OUR PART NUMBERS.
3. NUMBERS SHOWN WITH PREFIX "A" ARE COMPLETE ASSEMBLIES.

TUBE		FILAMENT	PLATE	SCREEN	CATHODE	GRID NO. 2	GRID NO. 3 AND 5
1C6	OSCILLATOR & MODULATOR	2.1	135			100	85
34	I. F. AMPLIFIER	2.1	135	85			
1B5	SECOND DETECTOR & AVC	2.1	50*				
38	OUTPUT	6.1	130	135	13		

* TRIODE PLATE. READ ALL VOLTAGES FROM SOCKET TO CHASSIS. WHEN MAKING TUBE VOLTAGE CHECKS USE BATTERIES THAT DELIVER FULL VOLTAGE WITH THE RECEIVER TURNED ON.

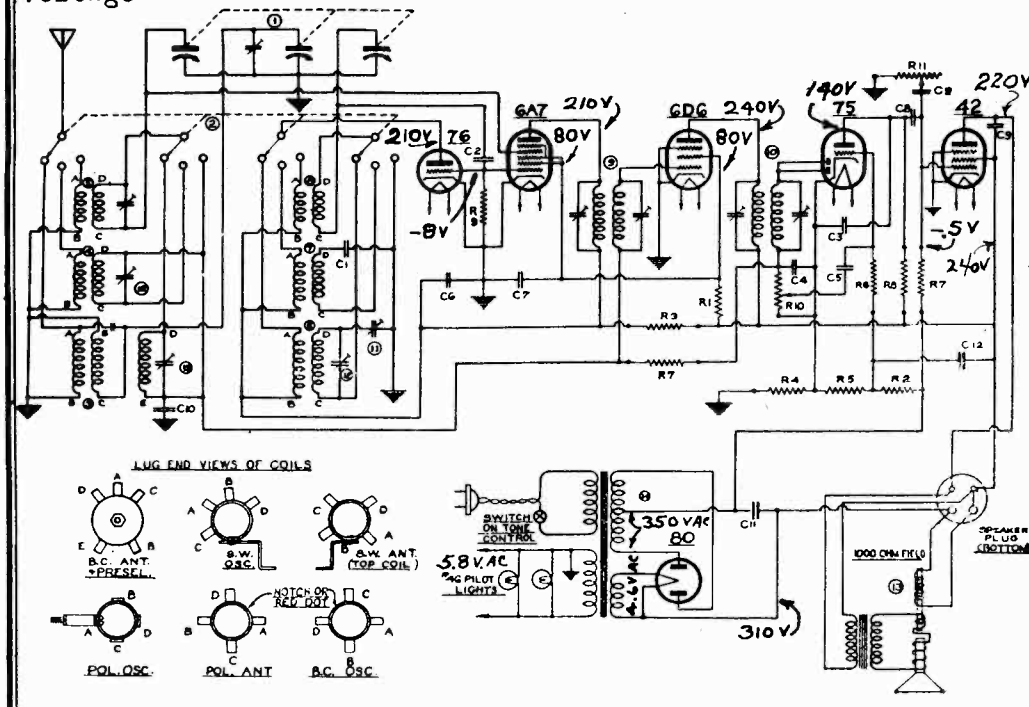


FREQUENCY RANGE -
1720 to 535 KC
2.3 to 6.3 MC

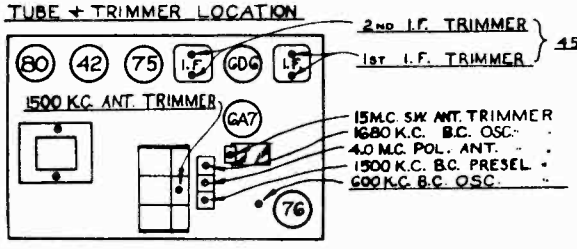
ALIGNMENT - Peak IF trimmers at 465 KC. BROADCAST BAND - Dial and generator to 1720 KC, adjust oscillator trimmer to peak, dial and generator to 1400 KC, then adjust antenna trimmer to peak. Dial and generator to 600 KC, pad oscillator circuit to maximum peak. SHORTWAVE BAND - Dial and generator to 6.3 MC, peak oscillator trimmer. Dial and generator to 5.8 MC, adjust antenna trimmer to peak. Dial and generator to 2.5 MC, pad oscillator circuit to peak. Rock variable condenser during padding adjustments. Repeat adjustments for maximum response. Peak wave trap at 465 KC.

MODEL 166RIS
Schematic, Socket
Trimmers, Alignment
Voltage

WALGREEN CO.



	PART No.	DESCRIPTION
C1	1500c	.0009 MFD. MICA3%
C2	1503	.00005 " " "
C3	1502	.0005 " " "
C4	1504	.00025 " " "
C5	1605	.02 " " 400 v
C6	1602	.1 " " 600 v
C7	1601	.1 " " 400 v
C8	1648	.03 " " 600 v
C9	1651	.004 " " 600 v
C10	1622	.05 " " 200 v
C11	18-202	10.0 ELECTROLYTIC
C12	18-201	12.0 "
R1	6211	15000 OHMS 1W.
R2	60-100	200 " 1W.5%
R3	6115	1000 " ½W.
R4	60-103	30 " 5%
R5	60-104	20 " "
R6	6020	2.0MEG " ⅓W
R7	6018	500,000 OHMS ⅓W
R8	6024	250 000 " "
R9	6025	50000 " "
R10	24-101	500 000 VOL. CONTR.
R11	26-101	500 000 TONE CONTR.
1	19-106	GANG
2	69-103	SWITCH
3	10-137	B.C. ANT.+PRESELECTOR
4	10-135	POL. " COIL
5	10-132	S.W. " "
6	10-134	B.C. OSC. "
7	10-136	POL. " "
8	10-133	S.W. " "
9	1123	1ST I.F. "
10	1124	2ND I.F. "
11	20-100	B.C. OSC. PADDER
12	20-101	TRIMMER GANG
13		SPEAKER
14	80-105	POWER TRANSF.



IF PEAK 456 KC

MODEL NO. 166 RIS

DESCRIPTION

This receiver is a 7 tube alternating current operated superheterodyne. The tubes used are a 76 as oscillator, a 6A7 as modulator, a 6D6 as I.F. amplifier, a 75 as A.V.C. and audio rectifier and audio voltage amplifier, a 42 as power audio amplifier, an 80 as a power rectifier and a 6G5 as tuning indicator.

This receiver is made to cover 3 tuning bands, the broadcast band which ranges from 1680 K.C. to 535 K.C., the middle or police band which has a frequency range of from 5.6 M.C. to 1.7 M.C. and the high frequency or foreign band which is from 20 M.C. to 5.4 M.C.

ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent service men having the proper equipment. Re-alignment is very seldom needed and is usually only required after some major part has been replaced because of damage to the receiver.

The equipment required for re-aligning this receiver is an output meter and a modulated source of radio frequency (a signal generator or microvolter). This source of radio frequency must be accurately calibrated in frequency and must have a method of varying the output.

All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 7000 ohms, to the two small pins of the speaker plug. The output meter remains connected during the entire alignment procedure.

Connect the signal generator to the grid cap of the 6A7 tube through a .1 M.F. condenser. Connect the ground of the generator to the ground post of the receiver. With the wave switch on broadcast position and the dial set to about 1000 K.C., feed in a 456 K.C. signal. Adjust the trimmers on top of the first and second I.F. transformers until the maximum output is obtained. This aligns the I.F.

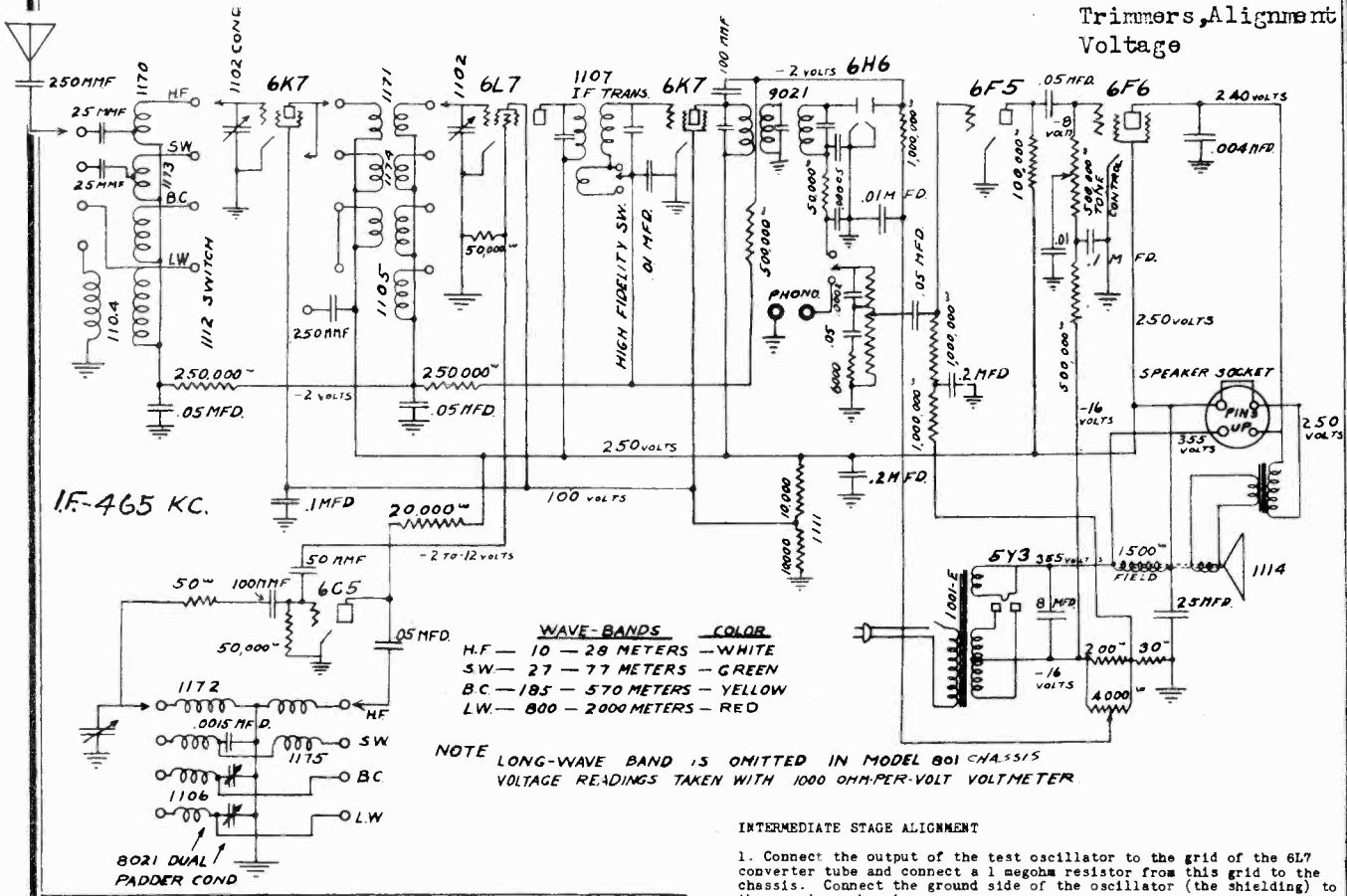
Leaving the wave switch on broadcast position turn the dial to the extreme high frequency end. Feed a 1680 K.C. signal to the receiver antenna post through a .00025 M.F. mica condenser. Adjust the 1680 K.C. broadcast oscillator trimmer for maximum output. Set the generator to 1500 K.C. and tune in this signal on the receiver. Then adjust the 1500 K.C. broadcast antenna trimmer and the 1500 K.C. broadcast preselector trimmer for maximum output. Set the generator to 600 K.C. and adjust the 600 K.C. broadcast oscillator pad to maximum output *while tuning the receiver back and forth across the signal* from the generator. This completes the alignment of the broadcast band.

The police band is aligned by feeding 4.0 M.C. signal to the receiver antenna lead through the .00025 condenser. Turn the wave switch to the center position and tune the receiver to this signal. Adjust the 4.0 M.C. police antenna trimmer for best output.

The short wave band is aligned in the same way using a 15 M.C. signal and adjusting the 15 M.C. short wave antenna trimmer after having turned the wave switch to the right hand position.

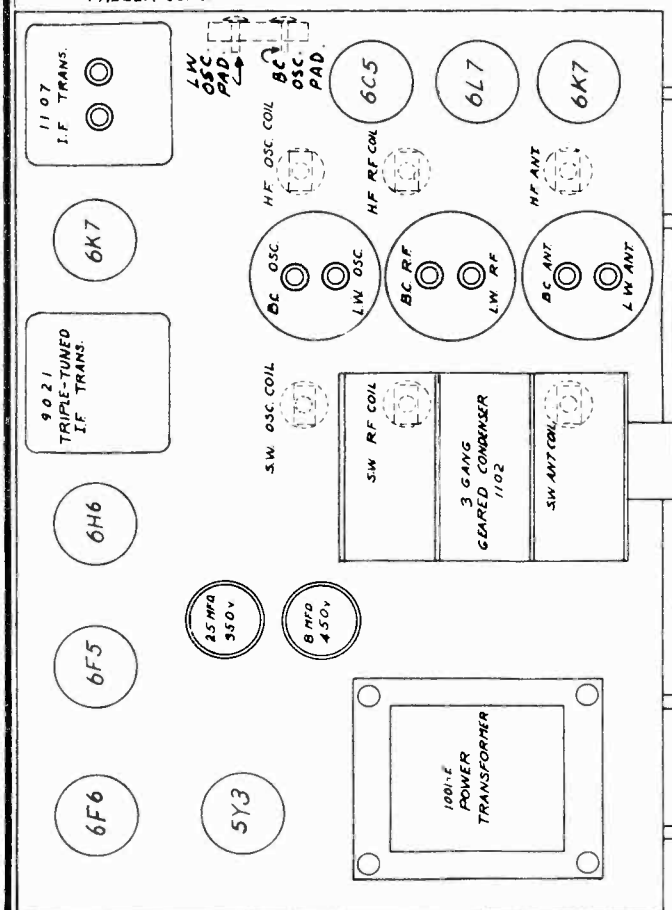
WALGREEN CO.

MODEL 308
Chassis 801,802
Schematic, Socket
Trimmers, Alignment
Voltage



WAVE-BANDS	COLOR
H.F — 10 — 28 METERS	— WHITE
S.W — 27 — 77 METERS	— GREEN
B.C — 185 — 570 METERS	— YELLOW
L.W — 800 — 2000 METERS	— RED

NOTE LONG-WAVE BAND IS OMITTED IN MODEL 801 CHASSIS
VOLTAGE READINGS TAKEN WITH 1000 OHM-PER-VOLT VOLTMETER



INTERMEDIATE STAGE ALIGNMENT

1. Connect the output of the test oscillator to the grid of the 6L7 converter tube and connect a 1 megohm resistor from this grid to the chassis. Connect the ground side of the oscillator (the shielding) to the receiver chassis.

2. Set the test oscillator to 465 K.C. Refer to Curve B on the Calibration chart to obtain the proper setting of the test oscillator.

3. Set the tone control to the left. Align the output intermediate frequency transformer by turning the top screw at the rear of the output I.F. transformer until maximum response is obtained on the output meter. Adjust the other trimmer screws in the same manner.

4. Adjust the input intermediate frequency transformer in the same manner.

ALIGNMENT OF TUNING CIRCUITS

5. Connect the output of the test oscillator to the antenna lead of the receiver through a .00025 M.F.D. condenser and connect the ground side (shielding) to the chassis.

6. Set the wave change switch to the long-wave position (Red). Set the dial and test oscillator to 900 meters. Adjust the long-wave oscillator trimmer until the signal is brought in. If no signal is heard, then adjust the long-wave padder. See diagram of chassis for location of trimmer and padder condensers.

7. Then adjust the long-wave antenna and R.F. trimmers for maximum response. Set the dial and test oscillator to 1800 meters and adjust the long-wave padder for maximum response while rocking the gang condenser. By rocking the gang is meant tuning to a point just above and just below the test oscillator frequency while making some other adjustment. Return to 900 meters and repeat the entire procedure.

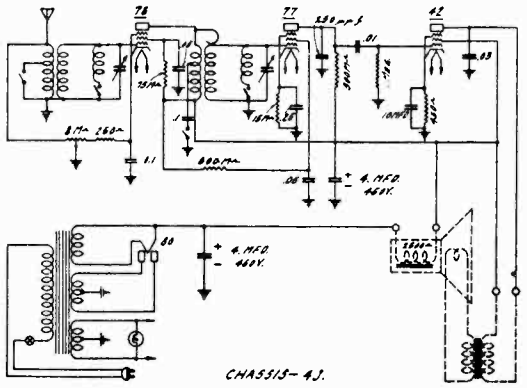
8. Set the wave change switch to the broadcast position (Yellow). Set the dial and test oscillator to 214 meters (1400 K.C.) and adjust the B.C. oscillator, R.F. and antenna trimmers till maximum response is obtained. Set the dial and test oscillator to 600 K.C. and adjust the B.C. padder condenser while rocking the gang till maximum response is obtained.

9. Set the wave change switch to the high frequency band (Short-wave Green). Substitute a 400 ohm resistor for the .00025 M.F.D. condenser in the antenna circuit. Set the dial and test oscillator to 30 meters (10 megacycles). Stand the receiver on end and adjust the 30 meter oscillator coil (located to the right of switch when viewed from bottom) till the signal is brought in. Stop at the first peak. Screwing the trimmer down still more will give another peak which is the image and must not be used. To make certain the set is not tuned to the image, set the test oscillator to 11 megacycles and if another signal is received, then the set is correctly tuned. Reset the test oscillator to 30 meters and adjust the R.F. and antenna trimmers for maximum response, while rocking the gang. Set the dial and test oscillator to 75 meters and check for sensitivity.

10. Set the wave-change switch to the ultra-high frequency band (White). Set the test oscillator and dial to 11 meters (27.3 megacycles). Adjust the oscillator trimmer till the signal is brought in. Continue on through to the second peak. The image signal will now be found at 26.3 megacycles if the oscillator trimmer adjustment is correct. Reset the dial to 11 meters and adjust the R.F. and antenna trimmers for maximum response while rocking the gang.

Set the dial and test oscillator to 26 meters and check for sensitivity.

MODEL 400



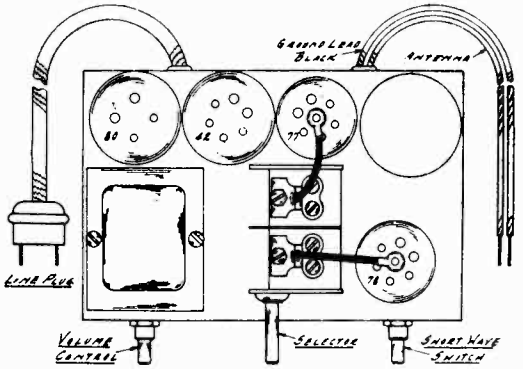
105 to 125 volts. 50-60 cycles. A.C. power supply.

The four tubes used in this set are as follows: 1—No. 280 Full Wave Rectifier; 1—No. 77 Radio Audio Amplifier; 1—No. 78 Detector; 1—No. 42 Audio Amplifier.

Set band switch

In the left-hand position, broadcast stations on frequencies between 550 and 1500 Kilocycles will be received. When the band switch is thrown to the right, stations operating on frequencies ranging from 1500 to 4800 Kilocycles will be heard.

CHASSIS 4J



SERVICE SUGGESTIONS

In changing tubes always remove the plug from light socket. Make sure all tubes are pushed firmly into their proper sockets and that clips are always fastened to caps on tops of tubes.

Be sure that aerial and ground are properly connected. A thirty to fifty-foot aerial is recommended for best operation.

To remove chassis from cabinet, first remove knobs. Then remove four screws from bottom of cabinet holding base. Remove screws holding speaker in cabinet and remove speaker and chassis as a unit.

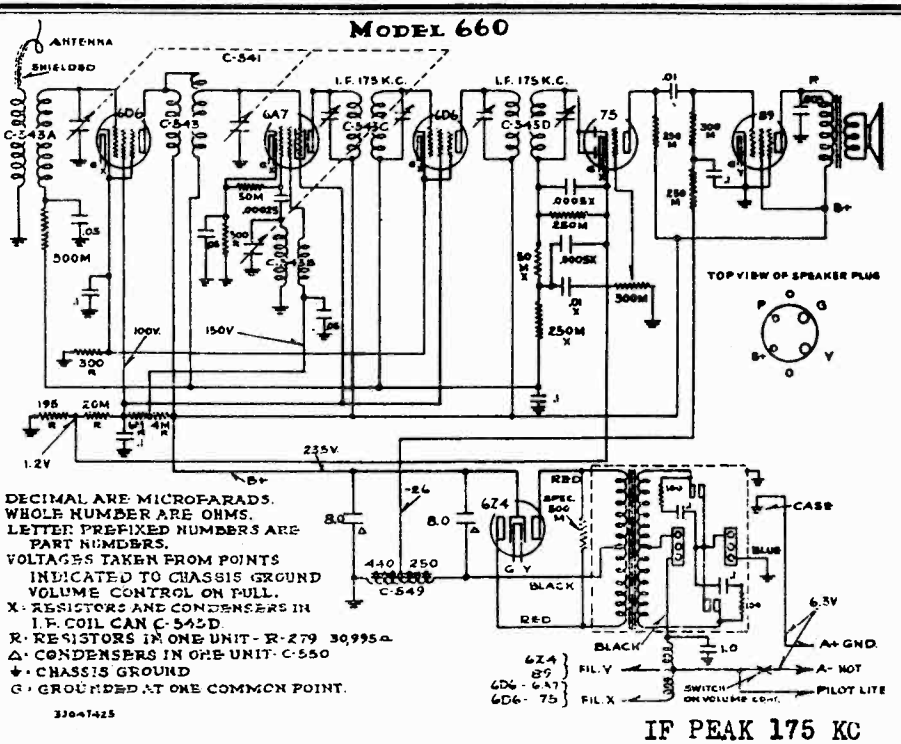
SCHEMATIC CIRCUIT DIAGRAM

MODEL 660 AUTORADIO

PARTS LIST

Part No.	Description	List Price Each
A 660	Battery Cable—Plug Type.	1.75
B 104	Cable Shaft Brackets.....	.35
B 660	Antenna Cable—Plug Type	.80
C 106	Shaft Couplings	.35
C 117	"A" Choke—Small	.25
C 118	"A" Choke—Large	.35
C 144	Dual .1-200 Volt Condenser	.35
C 152	.00025 Mica Condenser...	.20
C 155	.0005 Mica Condenser....	.20
C 522	.01-400 Volt Condenser..	.25
C 531A	Dual .05 Condenser.....	.30
C 535	Dual .1—200 Volt Condenser	.35
C 541B	3 Gang Condenser	3.75
C 543	R.F. Coil	.80
C 543A	Antenna Coil	.80
C 543B	Oscillator Coil	.70
C 543C	Input I.F. Transformer...	1.25
C 543D	Output I.F. Transformer with Parts	2.50
C 547	.1-200 Volt Condenser....	.30
C 549	690 Ohm Choke	1.40
C 550	8-8 Mfd. Electrolytic Condenser	2.25
C 551	1 Mfd.—120 Volt Condenser	.35
C 553	.05-200 Volt Condenser...	.25
C 554	.5 Mfd. Generator Condenser	.50
R 232A	Special 500M Ohm Resistor Identified with 2 Yellow Dots	.35
R 279	30,995 Ohm Resistor.....	.60
R 281	100 Ohm Resistor.....	.20
S 338	18" Volume Control Shaft.	1.25
S 339	18" Selector Control Shaft	1.25
S 338S	Special 24" Volume Control Shaft	1.50
S 339S	Special 24" Selector Control Shaft	1.50
V 660	Complete "B" Unit—OAK	8.00
V 603	Volume Control	1.50
660	Remote Control Head Complete Less Shafts.....	5.00
	20 Ampere Fuses.....	.10
	Mounting Bolts	.10
	All carbon resistors.....	.20
	All sockets	.20
	Dynamic speakers	5.00

MODEL 660



IF PEAK 175 KC

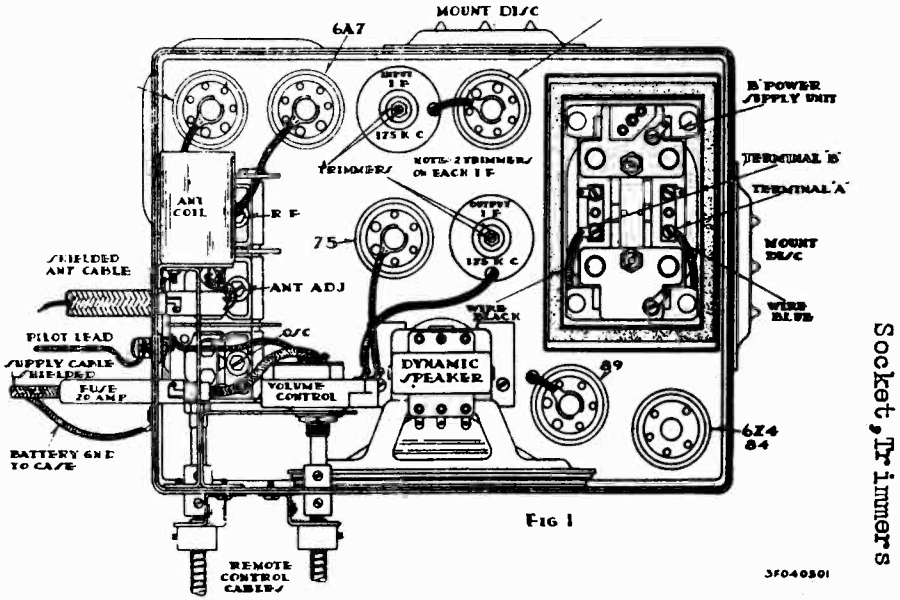


Fig 1

WALGREEN CO.

MODEL 401
Schematic, Voltage
Alignment

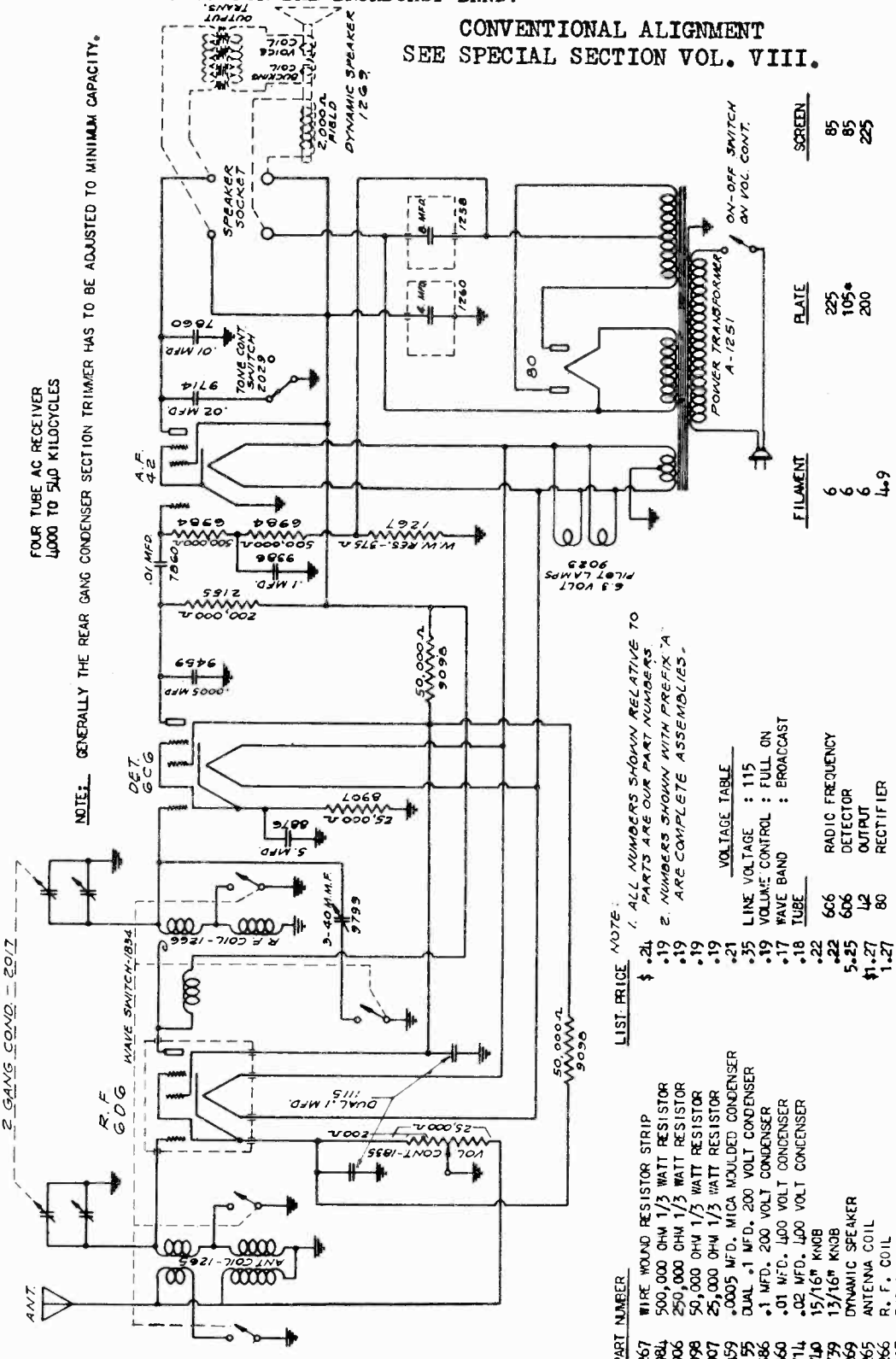
BAND SELECTOR SWITCH

THIS RECEIVER IS DESIGNED FOR TWO FREQUENCY BANDS. BROADCAST BAND FROM 1720 to 540 KC. POLICE, AIRCRAFT AND AMATEUR BAND 1.5 MC. to 4 MC. SWITCH TO LEFT POSITION FOR SHORT WAVE AND TO THE RIGHT FOR THE BROADCAST BAND.

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII.

FOUR TUBE AC RECEIVER
4000 TO 540 KILOCYCLES

NOTE: GENERALLY THE REAR GANG CONDENSER SECTION TRIMMER HAS TO BE ADJUSTED TO MINIMUM CAPACITY.



CATHODE	
	2
	3.5
	1500

SCREEN	PLATE	FILAMENT	
85	225	6	
85	105*	6	
225	200	6	
		4.9	

VOLTAGE TABLE

LINE VOLTAGE	: 115
VOLUME CONTROL	: FULL ON
WAVE BAND	: BROADCAST

TUBE	
6G6	RADIO FREQUENCY
6G6	DETECTOR
42	OUTPUT
80	RECTIFIER

READ ALL VOLTAGES FROM SOCKET PRONG TO GROUND UNLESS OTHERWISE SPECIFIED. (EXCEPT FILAMENT)

** READ FROM 375 OHM RESISTOR #1267 TO GROUND.

* COMPARATIVE VOLTAGE IS NOT TRUE VOLTAGE APPLIED.

TO ALIGN THE VARIABLE CONDENSER: IT IS IMPORTANT WHEN ALIGNING TO FOLLOW THE PROCEDURE CAREFULLY, OTHERWISE THE RECEIVER WILL LACK SENSITIVITY AND THE DIAL CALIBRATION WILL BE INCORRECT.

1. CONNECT THE HIGH OUTPUT SIDE OF THE OSCILLATOR TO THE RECEIVER ANTENNA LEAD AND THE GROUND TO THE CHASSIS.
2. PLACE THE BAND SELECTOR SWITCH FOR OPERATION ON THE BROADCAST BAND, TUNE THE RECEIVER TO EXACTLY 1400 KILOCYCLES ON THE DIAL AND SET THE TEST OSCILLATOR FREQUENCY TO 1400 KILOCYCLES. THEN BRING IN THE 1400 KILOCYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING THE TRIMMER CONDENSERS LOCATED ON TOP OF THE GANG CONDENSER.
3. SET THE BAND SELECTOR SWITCH FOR OPERATION ON THE SHORT WAVE BAND, TUNE THE RECEIVER DIAL TO EXACTLY 4 MEGACYCLES AND SET THE TEST OSCILLATOR TO THIS FREQUENCY. THEN ADJUST THE TRIMMER CONDENSER MOUNTED ON THE COIL LOCATED UNDERNEATH THE CHASSIS FOR MAXIMUM SENSITIVITY. ROCK GANG CONDENSER WHEN MAKING THIS ADJUSTMENT.

NOTE:
1. ALL NUMBERS SHOWN RELATIVE TO PARTS ARE OUR PART NUMBERS.
2. NUMBERS SHOWN WITH PREFIX 'A' ARE COMPLETE ASSEMBLIES.

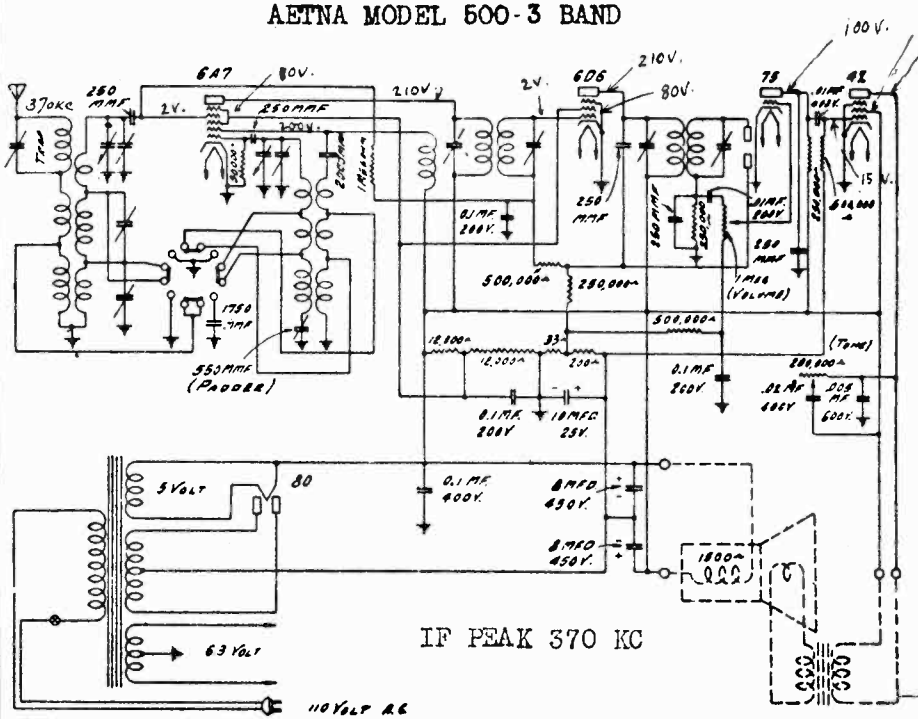
PART NUMBER		LIST PRICE
1267	WIRE WOUND RESISTOR STRIP	$ .24
6984	500,000 OHM 1/3 WATT RESISTOR	.19
8906	250,000 OHM 1/3 WATT RESISTOR	.19
9098	50,000 OHM 1/3 WATT RESISTOR	.19
8907	25,000 OHM 1/3 WATT RESISTOR	.19
9459	.0005 MFD. MICA MOULDED CONDENSER	.21
1155	DUAL .1 MFD. 200 VOLT CONDENSER	.35
9386	.1 MFD. 200 VOLT CONDENSER	.19
7860	.01 MFD. 400 VOLT CONDENSER	.17
9714	.02 MFD. 400 VOLT CONDENSER	.18
1740	15/16" KNOB	.22
1739	13/16" KNOB	.22
1269	DYNAMIC SPEAKER	5.25
1265	ANTENNA COIL	$1.27
1266	R. F. COIL	1.27
2017	TWO GANG CONDENSER	2.25
9799	TRIMMER CONDENSER	.15
2105	DIAL ASSEMBLY (SPECIFY REQUIRED NAME)	2.00
1834	WAVE SWITCH	.47
9023	PILOT LIGHT LAMP BULB 6.3 VOLTS	.19
1251	POWER TRANSFORMER	3.20
1258	8 MFD. WET ELECTROLYTIC CONDENSER	1.16
1260	4 MFD. WET ELECTROLYTIC CONDENSER	1.02
8876	5 MFD. DRY ELECTROLYTIC CONDENSER	.85
1835	VOLUME CONTROL	1.15
2029	TONE CONTROL	.36

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.

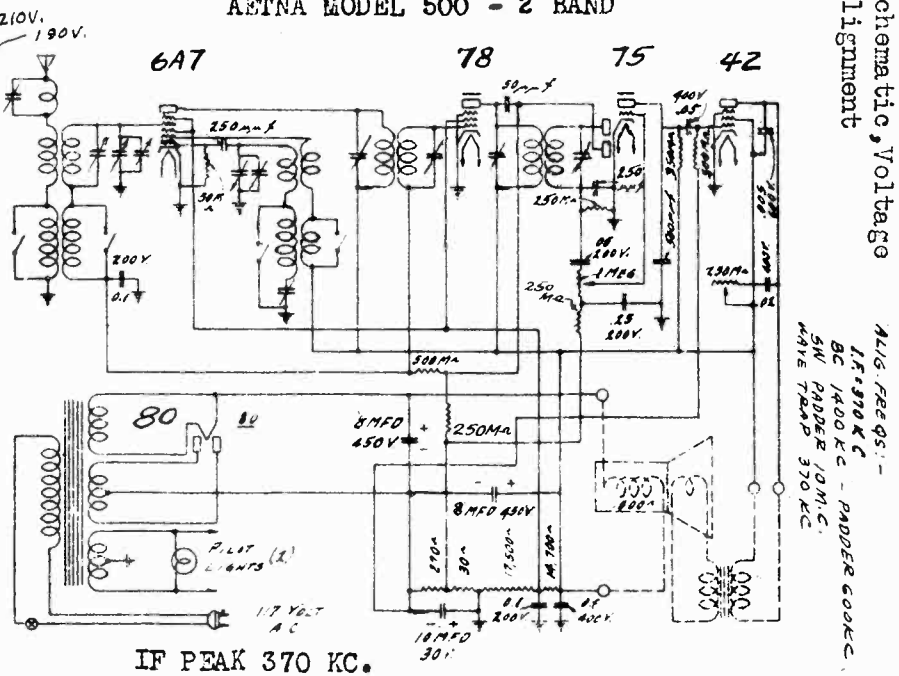
MODEL 500(2 Bands)
MODEL 500(3 Bands)
Schematic, Voltage
Alignment

WALGREEN CO.

AETNA MODEL 500-3 BAND



AETNA MODEL 500 - 2 BAND



To adjust the R. F. circuits: (1) Set pointer on tuning chart to 1400 K. C. with band switch in the broadcasting position. (2) Adjust test oscillator to 1400 K. C. and connect to antenna lead on chassis. (3) Adjust trimmer on the oscillator section of the tuning condenser for maximum reading. (4) Reset dial pointer on receiver and test oscillator to 600 K. C. (5) Adjust 600 K. C. padding condenser for maximum reading moving tuning condenser back and forth slowly while making adjustment (the 600 K. C. padding condenser is mounted on the base at the left of the tuning condenser). (6) Reset oscillator and tuning pointer on the receiver to 1400 K. C. and readjust trimmer on oscillator section of tuning condenser for maximum reading. (7) Reset dial pointer on receiver and test oscillator to 15 megacycles. (8) Set band change switch in the right hand position. (9) Adjust trimmer on first section of tuning condenser for maximum reading. (10) Reset dial pointer on receiver and test oscillator to 3.6 megacycles. (11) Set band change switch in left hand position. (12) Adjust 3.6 megacycle trimmer condenser for maximum reading (the 3.6 megacycle trimmer is mounted under the chassis and directly in front of the band change switch. (13) Reset dial pointer on receiver and test oscillator to 1400 K. C. (14) Set band change switch in broadcasting position and adjust 1400 K. C. trimmer for maximum reading (the 1400 K. C. trimmer is mounted under the chassis directly over the antenna coil).

Tube Number		Control Grid to Cathode	Screen to Cathode	Plate to Cathode	M. A. Plate	Tube Socket Voltages Heater or Filament Voltage
6A7	1st Det.	*1.75	92	225	4	6.3
	OSC.	0	0	225	4	6.3
78—I. F.		*1.75	92	225	7	6.3
75—2nd Det.		*1.75	0	**110	.8	6.3
42—2nd Audio		***17	225	212	34	6.3
80—Rect.						

***Voltage from No. 1 terminal on voltage divider to ground using 250 volt scale.

**Voltage from plate to ground using 250 volt scale.

*Voltage from ground to second terminal on voltage divider using 10 volt scale.

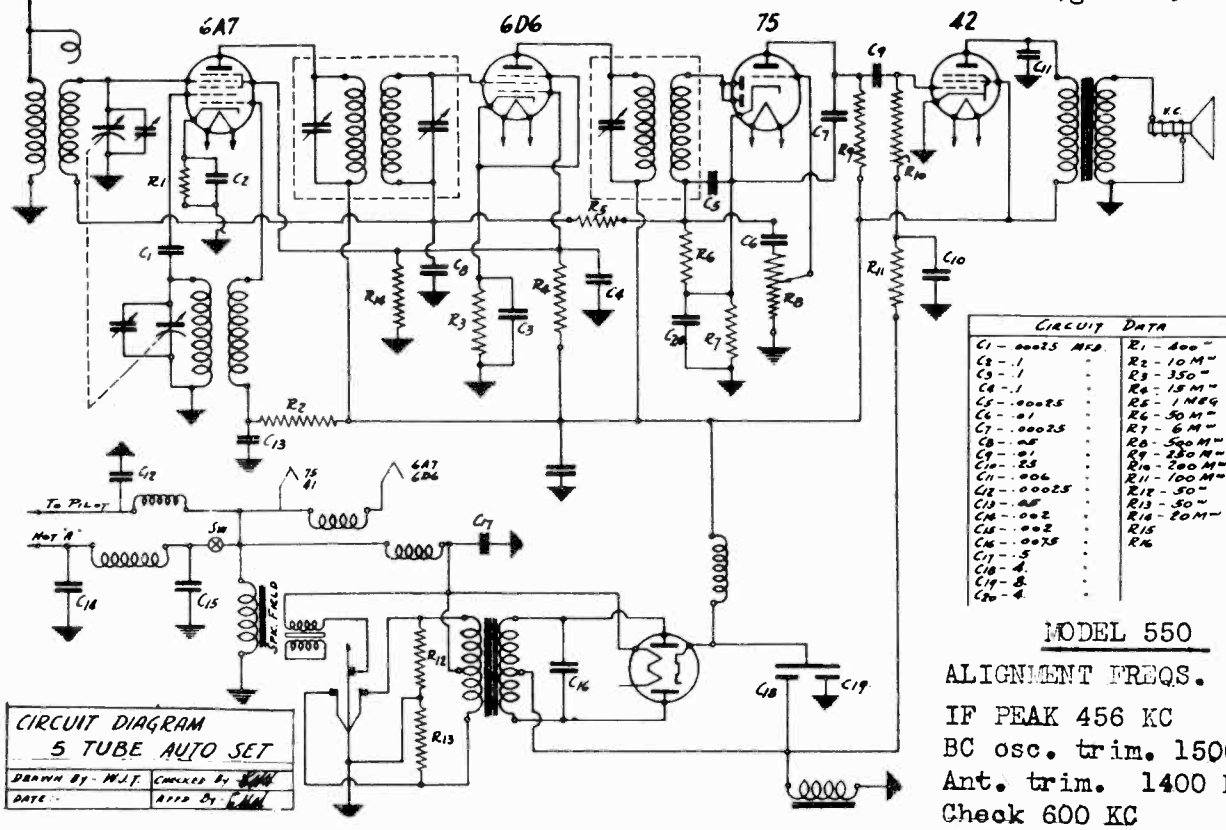
The above voltage readings were taken with 1,000 ohm per volt Volt Meter.

For conventional align. see spec. sect. Vol VIII

MODEL 550 Auto
Schematic, Alignment

WALGREEN CO.

MODEL 540
Schematic, Socket
Alignment, Trimmers



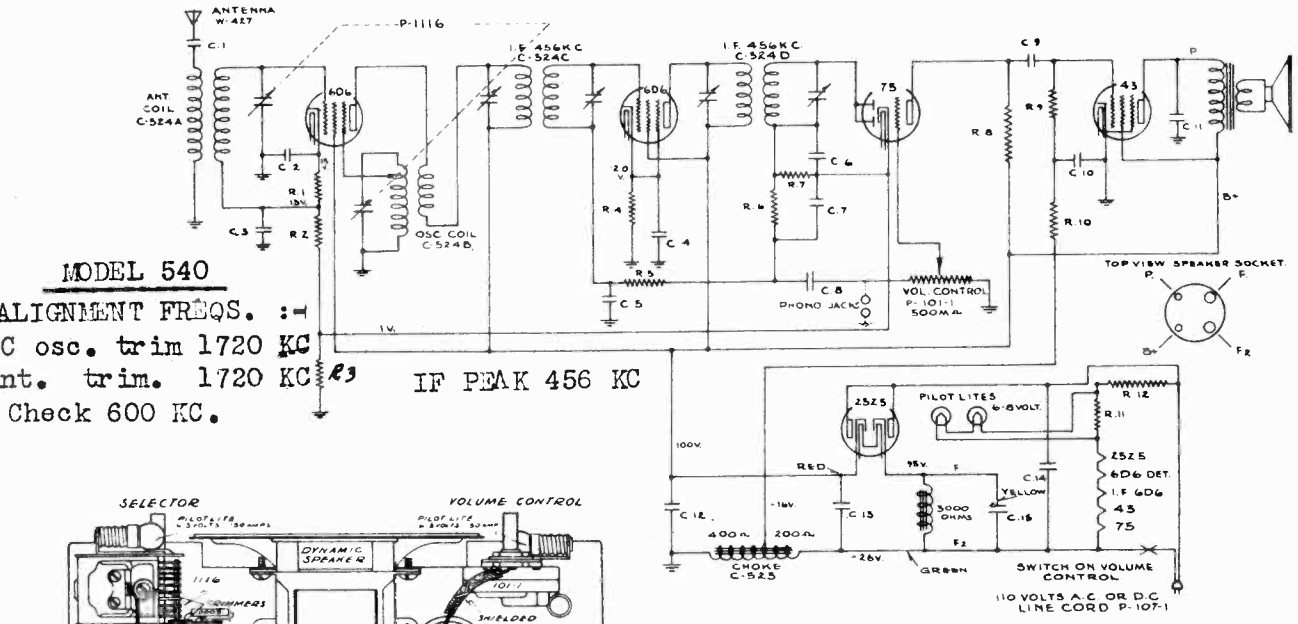
CIRCUIT DATA	
C1 - .00025 MFD.	R1 - 400 Ω
C2 - .1	R2 - 10 MΩ
C3 - .1	R3 - 350 Ω
C4 - .1	R4 - 1.5 MΩ
C5 - .00025	R5 - 1 MEG
C6 - .01	R6 - 50 MΩ
C7 - .00025	R7 - 6 MΩ
C8 - .05	R8 - 500 MΩ
C9 - .01	R9 - 250 MΩ
C10 - .25	R10 - 200 MΩ
C11 - .006	R11 - 100 MΩ
C12 - .00025	R12 - 50 Ω
C13 - .05	R13 - 50 Ω
C14 - .002	R14 - 20 MΩ
C15 - .002	R15
C16 - .0075	R16
C17 - .5	
C18 - .4	
C19 - .8	
C20 - .4	

CIRCUIT DIAGRAM
5 TUBE AUTO SET

DRAWN BY - W.J.T.	CHECKED BY
DATE :-	APPD BY

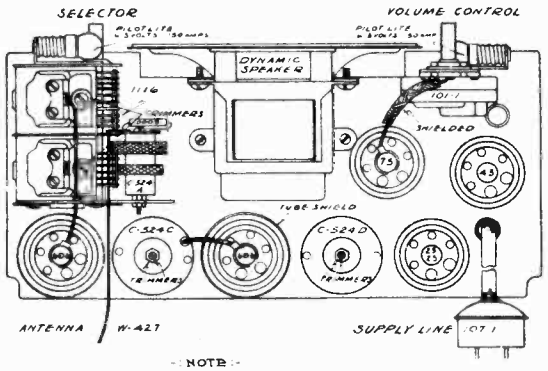
MODEL 550

ALIGNMENT FREQS. :-
IF PEAK 456 KC
BC osc. trim. 1500 KC
Ant. trim. 1400 KC
Check 600 KC



MODEL 540

ALIGNMENT FREQS. :-
BC osc. trim 1720 KC
Ant. trim. 1720 KC
Check 600 KC.



NOTE :-
* R1, R2 & R3 IN ONE UNIT PART NUMBER R-268.
* C.13 AND C. 15 IN ONE UNIT PART NUMBER C-525-C
NUMBERS PREFIXED BY LETTERS ARE PARTS.
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND. VOLUME CONTROL ON FULL MEASURED ON A.C. CURRENT.

LEGEND

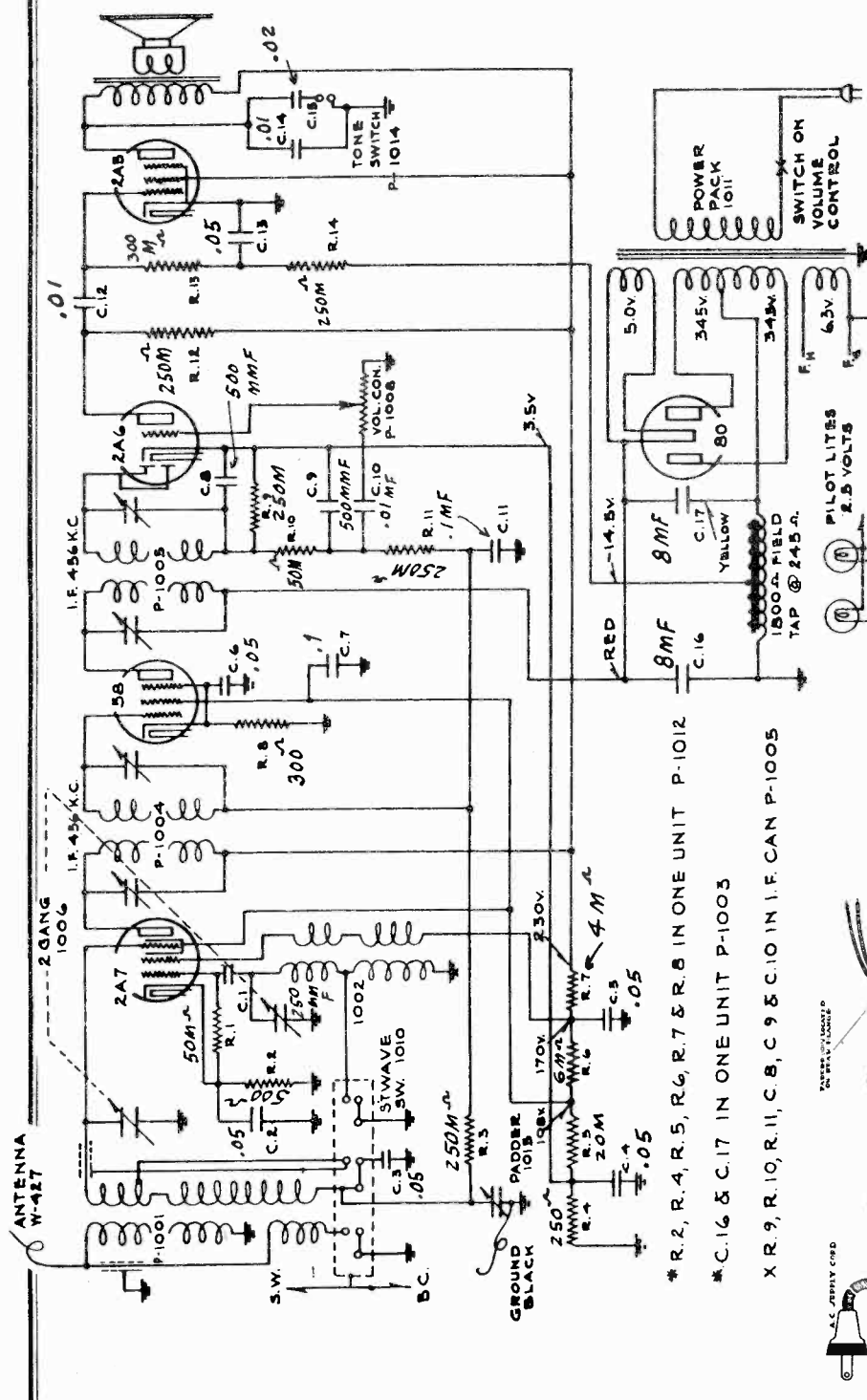
RESISTORS			CONDENSERS		
Nº	VALUE		Nº	VALUE	
R 1 -	300	*	C 1 -	.0005	MICA
R 2 -	2M	*	C 2 -	.05	200V
R 3 -	180	*	C 3 -	.05	200V.
R 4 -	250 R-270		C 4 -	.05	200V
R 5 -	250M		C 5 -	.1	200V
R 6 -	50M		C 6 -	.0005	MICA
R 7 -	250M		C 7 -	.0005	MICA
R 8 -	100M		C 8 -	.01	400V
R 9 -	300M		C 9 -	.01	400V
R 10 -	250M		C 10 -	.1	200V.
R 11 -	40Ω 300M.A. 0.36W.P.106-1		C 11 -	.025	300
R 12 -	126 IN CORD P107-1		C 12 -	5.0 MFD.	C-525D
			C 13 -	25.0 MFD.	*
			C 14 -	.1	400V
			C 15 -	5.0 MFD	*

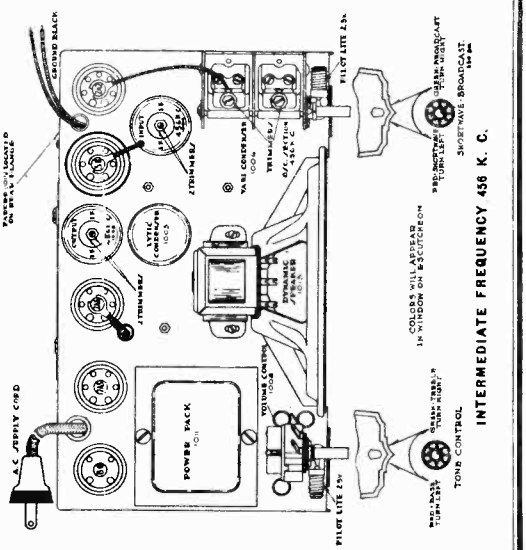
MODEL 550 A-C
Schematic, Socket
Trimmers, Alignment

WALGREEN CO.

105-115 volts alternating current 50-60 cycles - 60 watts.
GREEN (Broadcast band) 530 - 1550 Kilocycles
RED (Short wave band) 1550 - 14,000 Kilocycles

IF PEAK 456 KC





To peak I.F. transformers connect oscillator (set at 456 KC) to grid of 2A7 tube and (Black) ground wire. With variable condenser set at minimum capacity, (extreme left of its rotation) adjust four trimmers (one nut and one screw on each transformer trimmer) to resonance (maximum deflection on an output meter connected across the primary of the speaker input transformer).

To align Broadcast band, set wave changing switch to Green (right turn) and with variable condenser at minimum capacity disconnect antenna wire and connect 1550 KC oscillator to antenna coil in series with a 75 MMFD condenser. Adjust oscillator (front) section trimmer to resonance. Set oscillator to 1400 KC, rotate variable condenser until signal is tuned in, then adjust R.F. (rear) section trimmer to resonance. Check output at 1200, 1000, 800, and 600 Kilocycles if necessary bend plates (of rear R.F. section of variable only).

To align Short wave band, set wave changing switch to RED (left turn) and with input oscillator connected as above and set at 1720 KC, tune in signal, adjust padding condenser on rear of chassis to resonance. Check for output at 1550 KC and at harmonics of 1000 KC (2000 KC), of 1200 KC (2400 KC), of 1400 KC (2800 KC), and of 1720 KC (3440 KC). DO NOT BEND PLATES.

For failure to operate over both bands check 2A7 tube and connections to and contacts of wave changing switch.

MODEL 575
Schematic, Socket
Alignment. Trimmers
Voltage

WALGREEN CO.

Service Notes

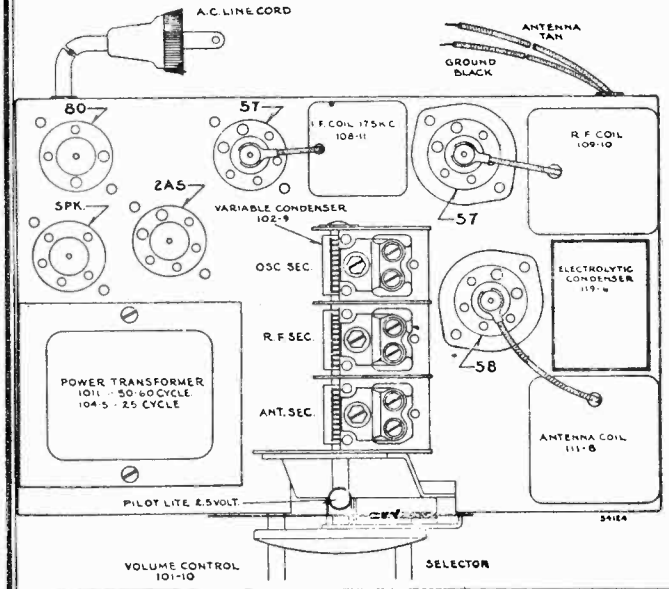
Voltages taken from different points of circuit to chassis are measured with volume control full on, using a voltmeter having a resistance of 1000 ohms per volt. These voltages are indicated on the schematic circuit diagram.

Part No. 145-2

Common Black to Brown	—.003	x 600 Volts
Common Black to Green	—.1	x 200 Volts
Common Black to Red	—.1	x 200 Volts
Common Black to Orange	—.25	x 200 Volts
Blue to Blue	—.05	x 400 Volts

Part No. 145-3

Common Black to Brown	—.1	x 200 Volts
Common Black to Green	—.05	x 200 Volts
Common Black to Orange	—.05	x 200 Volts
Common Black to Yellow	—.05	x 200 Volts



Aligning I. F. Transformer

1. With volume control full on, at extreme right of its rotation, and with variable condenser at its maximum capacity position (extreme right of its rotation) make the following adjustments:

(a) Connect an external oscillator adjusted to 175 kilocycles, in series with a .1 mfd. condenser, to the control grid cap of the type 57 tube located between the R. F. coil (part numbers 109-10) and the I. F. transformer (part number 108-11) and chassis.

(b) Adjust trimming condensers of I. F. transformer (part number 108-11) to resonance. See top view of chassis. Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or between the plate and screen terminals of the type 2A5 tube, by means of an adapter. Maximum deflection of the meter indicates resonance. Care must be taken to use only enough signal to give a readily readable output, as excessive input will result in overload and a false resonance point.

NOTE: The two trimmer condensers which tune the primary and secondary of the I. F. transformer are adjusted by set screws accessible from the back of the chassis.

Aligning R. F. and Oscillator Circuits

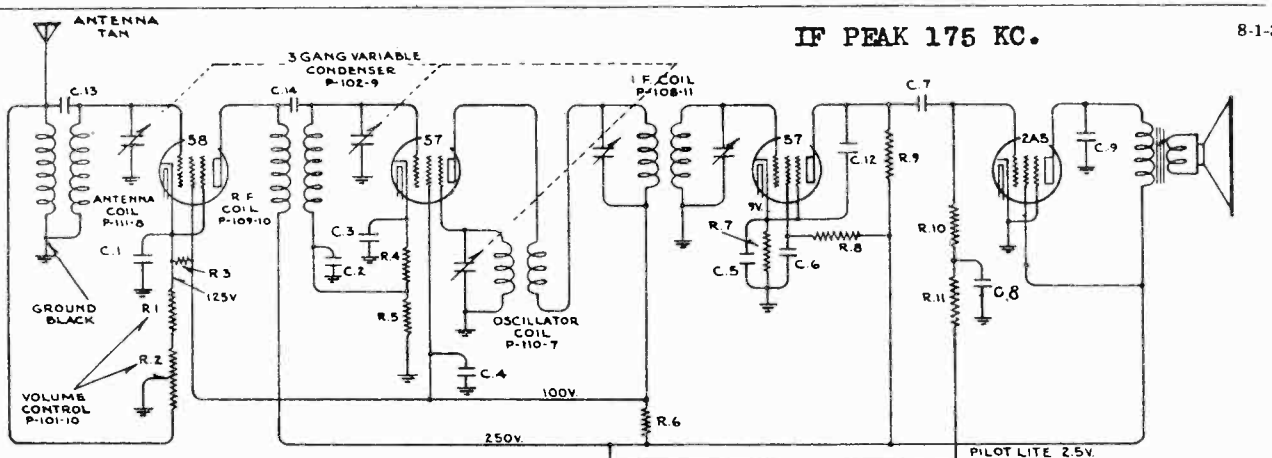
1. Connect the external oscillator set at 1720 kilocycles and in series with a 200 Mfd. condenser, between the antenna (tan) and ground (black) leads.

(a) With volume control full on and variable condenser plates in minimum capacity position, plates entirely out of mesh (extreme left of its rotation), adjust trimmer of rear oscillator section of variable condenser to resonance.

(b) Shift external oscillator frequency from 1720 to 1400 kilocycles, pick up signal by rotating variable condenser and peak R. F. (center) and antenna (front) section trimmers of variable condenser to resonance.

(c) Check tracking at 1500, 1200, 1000, 800, 600 and 530 kilocycles by changing external oscillator frequency and rotating variable condenser to pick up signal. Adjust slotted end plates of R. F. (center) and antenna (front) sections to increase output, if necessary. DO NOT BEND OSCILLATOR PLATES.

IF PEAK 175 KC. 8-1-34



MODEL 575 SUPERHETERODYNE 530 to 1720 Kilocycles
FIVE TUBES: 1-58, 1-2A5, 1-80, 2-57

~LEGEND~

CONDENSERS

No	VALUE
C.1	.05X200V.
C.2	.05X200V.
C.3	.05X200V.
C.4	.1X200V.
C.5	.25X200V.
C.6	.1X200V.
C.7	.05X200V.
C.8	.1X200V.
C.9	.003X600V.
C.10	8.0MFD X 400V.
C.11	8.0MFD X 400V.
C.12	.001 MICA.
C.13	10 μμf. GIMMICK
C.14	4 μμf. GIMMICK

RESISTORS

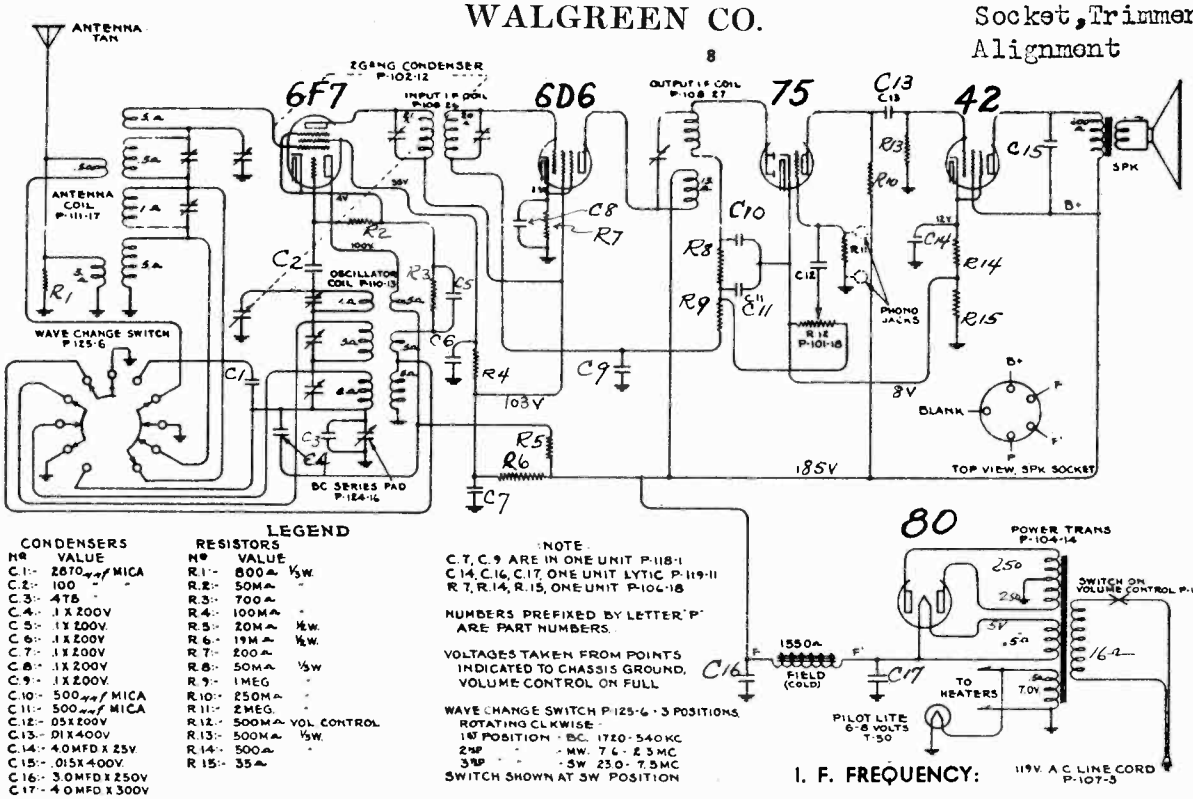
No	VALUE
R.1	100
R.2	75M
R.3	50M 1/3W.
R.4	450
R.5	5M
R.6	19M
R.7	50M 1/3W.
R.8	1MEG. 1/3W.
R.9	250M 1/3W.
R.10	200M 1/3W.
R.11	300M 1/3W.

~NOTE~
CONDENSERS C.10, C.11, IN ONE UNIT P-119-6.
CONDENSERS C.1, C.2, C.3, C.4 IN ONE UNIT P-145-3
RESISTORS R.4, R.5, IN ONE UNIT P-106-10
NUMBERS PREFIXED BY LETTER 'P' ARE PART NUMBERS.
PHRASE GIMMICK IS A WIRE WOUND AROUND ANOTHER WIRE.
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND, VOLUME CONTROL ON FULL.
CONDENSERS C.5, C.6, C.7, C.8, C.9 IN ONE UNIT P-145-2.

MODEL 585, Series A

WALGREEN CO.

Schematic, Voltage
Socket, Trimmers
Alignment



LEGEND

CONDENSERS		RESISTORS	
N°	VALUE	N°	VALUE
C.1:-	2870 μμf MICA	R.1:-	800Ω ½W.
C.2:-	100 "	R.2:-	50MΩ "
C.3:-	475 "	R.3:-	700Ω "
C.4:-	.1 X 200V	R.4:-	100MΩ "
C.5:-	.1 X 200V.	R.5:-	20MΩ ½W.
C.6:-	.1 X 200V	R.6:-	19MΩ ½W.
C.7:-	.1 X 200V	R.7:-	200Ω "
C.8:-	.1 X 200V	R.8:-	50MΩ ½W
C.9:-	.1 X 200V.	R.9:-	1 MEG "
C.10:-	500 μμf MICA	R.10:-	250MΩ "
C.11:-	500 μμf MICA	R.11:-	2 MEG. "
C.12:-	.05 X 200V	R.12:-	500MΩ VOL CONTROL
C.13:-	.01 X 400V	R.13:-	500MΩ ½W.
C.14:-	40 MFD X 25V	R.14:-	500Ω "
C.15:-	.015 X 400V.	R.15:-	35Ω "
C.16:-	3.0 MFD X 250V		
C.17:-	40 MFD X 300V		

NOTE:
C.7, C.9 ARE IN ONE UNIT P-118-1
C.14, C.16, C.17 ONE UNIT LYTIC P-119-11
R.7, R.14, R.15, ONE UNIT P-106-18

NUMBERS PREFIXED BY LETTER "P" ARE PART NUMBERS.

VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND, VOLUME CONTROL ON FULL

WAVE CHANGE SWITCH P-125-6 - 3 POSITIONS, ROTATING CLKWISE -
1ST POSITION - BC. 1720 - 540 KC
2ND " - MW. 7.6 - 2.5 MC
3RD " - SW 23.0 - 7.5 MC
SWITCH SHOWN AT SW POSITION

I. F. FREQUENCY: 370 K.C.

ALIGNING INSTRUCTIONS—

Description of various dummy antennas used and referred to in these instructions:

(1) I.F. Dummy—Consists of a .1 mfd. condenser connected in series with the external oscillator.

(2) Broadcast Dummy—Consists of a 200 mmfd. condenser and a 20 ohm resistor connected in series with each other and in series with the external oscillator.

(3) Intermediate and Short Wave Dummy—Consists of a .1 mfd. condenser and a 400 ohm resistor connected in series with each other and in series with the external oscillator.

Resonance Indicator:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the plate and screen terminals of the type 42 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range volt meter should be used.

SERIES A

Alignment

No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low line voltages, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary. No aligning adjustments should be attempted with the chassis in the cabinet. To remove the knobs, pull them off and to take the chassis out of the cabinet, remove the three bolts by which it is fastened and the speaker plug which you will find on the front flange of the chassis.

Aligning I. F. Transformers

1. With volume control full on, the extreme right of its rotation, and with wave changing switch in the broadcast position, extreme left of its rotation, and with variable condenser at its minimum capacity position, plates, entirely out of mesh, adjust the I.F. transformers (adjustments at the top of parts number 108-26 and 108-27—see top view).

(a) Connect external oscillator in series with I.F. dummy antenna. With external oscillator adjusted to 370 kilocycles, in series with I.F. dummy antenna to the control grid cap of the type 6D6 tube and chassis ground, adjust output I.F. transformer, part number 108-27, to resonance.

Note: Output I.F. transformer, part number 108-27, has only one adjustment.

(b) Move generator output clip from grid of 6D6 to grid cap of type 6F7 tube and align input I.F. transformer, part number 108-26, to resonance. NOTE: IT IS EXTREMELY NECESSARY TO ALIGN BOTH I.F. STAGES SEPARATELY.

Broadcast Band Alignment—
(540 - 1720 Kilocycles)

1. With wave changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with broadcast dummy antenna to tan antenna lead and black ground lead, make the following adjustments:

(a) Set external oscillator to 1720 kilocycles and adjust oscillator trimmer to resonance. This adjustment is the rear adjustment of a group of three located next to the variable condenser.

(b) Readjust external oscillator to 600 kilocycles and adjust broadcast series pad to resonance by rotating condenser to approximately 600 kilocycles, rocking it slowly to and fro until by adjusting pad maximum output is attained. This adjustment is located at the front of the chassis next to the variable condenser and wave changing switch.

(c) Check for tracking and sensitivity at 1400 and 1000 kilocycles. NOTE: It is extremely necessary in making all of the above adjustments that the fundamental signal of the oscillator be tuned in and not the image frequency, which will fall below the fundamental.

Short Wave Band Alignment—
(7.5 - 23.0 Megacycles)

1. This band is aligned after the I.F. adjustments have been completed. Set wave selector switch in the short wave position, extreme right of its rotation, set pointer of dial to 21 megacycles.

(a) With external oscillator set at 21 megacycles, and connected to the tan antenna lead in series with the short wave dummy and to the black ground lead, adjust the oscillator short wave trimmer until generator signal is picked up. This trimmer is the one closest to the front of the chassis of the group of three trimmers located next to the gang condenser (see top view of chassis).

(b) Adjust short wave antenna trimmer to resonance. This adjustment is to the right of the 6F7 tube and is the one closest to the front of the chassis (see top view).

(c) Re-set external oscillator to 9 megacycles and pick up oscillator signal by rotating variable condenser, moving dial pointer. Check for tracking and sensitivity and do not bend plates. NOTE: It is extremely necessary in making all of the above adjustments that the fundamental signal of the oscillator be tuned in and not the image frequency, which will fall below the fundamental.

Intermediate Band Alignment—
(2.3 - 7.6 Megacycles)

1. With wave selector switch in the center position and with dial pointer set to 7 megacycles, makes the following adjustments:

(a) With external oscillator set at 7 magacycles and connected in series with the short wave dummy antenna to the tan antenna lead and black ground lead, same as for short wave adjustments, adjust center trimmer of oscillator coil, part number 110-13, until 7 magacycle signal is picked up. This is the center adjustment of a group of three located next to the gang condenser (see top view).

(b) Adjust antenna trimmer to resonance, this adjustment is the rear of a group of two located at the right of the chassis next to the 6F7 tube (see top view).

(c) Re-set external oscillator to 2.5 magacycles (2500 kilocycles), pick up signal by rotating condenser and moving dial pointer. Check for tracking and sensitivity. Do not bend plates. NOTE: It is extremely necessary in making all of the above adjustments that the fundamental signal of the oscillator be tuned in and not the image frequency, which will fall below the fundamental.

Service Notes

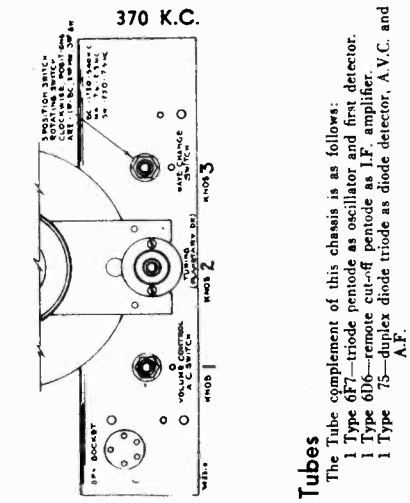
To check for open by-pass condensers, shunt each condenser with another of similar capacity and of the same voltage rating, which is known to be good, until the defective unit is located. Open by-pass condensers frequently cause oscillation and distorted tone. Defective and shorted electrolytic filter condensers cause excessive bum, motor-boating, low volume and a reduction in all D.C. voltages. Open or shorted electrolytic and by-pass condensers (across bias resistor of type 42 tube) will cause low volume and distorted tone.

Should the planetary vernier dial drive mechanism fail to function properly, it will probably be found to be due to a cracked or broken compression spring. The drive may be disassembled to replace the compression spring (part number 112-31) by removing the two screws which fasten it to the dial bracket. Before reassembling all parts should be carefully cleaned and a small amount of vaseline applied to the ball bearings. All other dial parts are hardened and should cause no trouble.

Notes

25 Cycle chassis differ from regular 60 cycle and 40 cycle chassis in that a larger electrolytic filter condenser is used. The regular condenser is part number 119-11 and the larger unit for the 25 cycle chassis is part number 119-12.

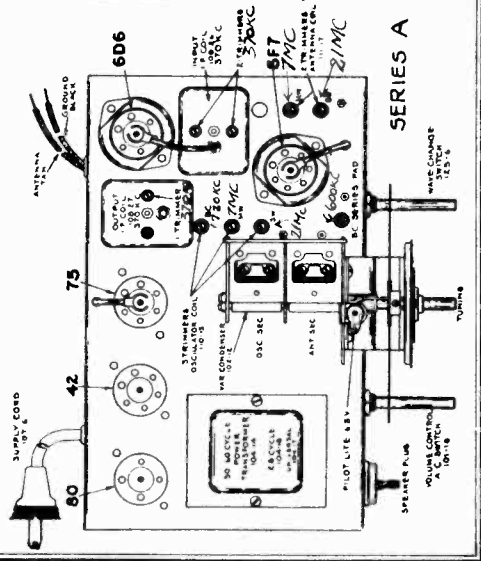
Part number 106-18, a metal clad resistor, consists of the following sections with resistances and wattages as noted: one, 500 ohms; one, 35 ohms, one, 200 ohms, all 1/3 watt, plus or minus 10%.



Tubes

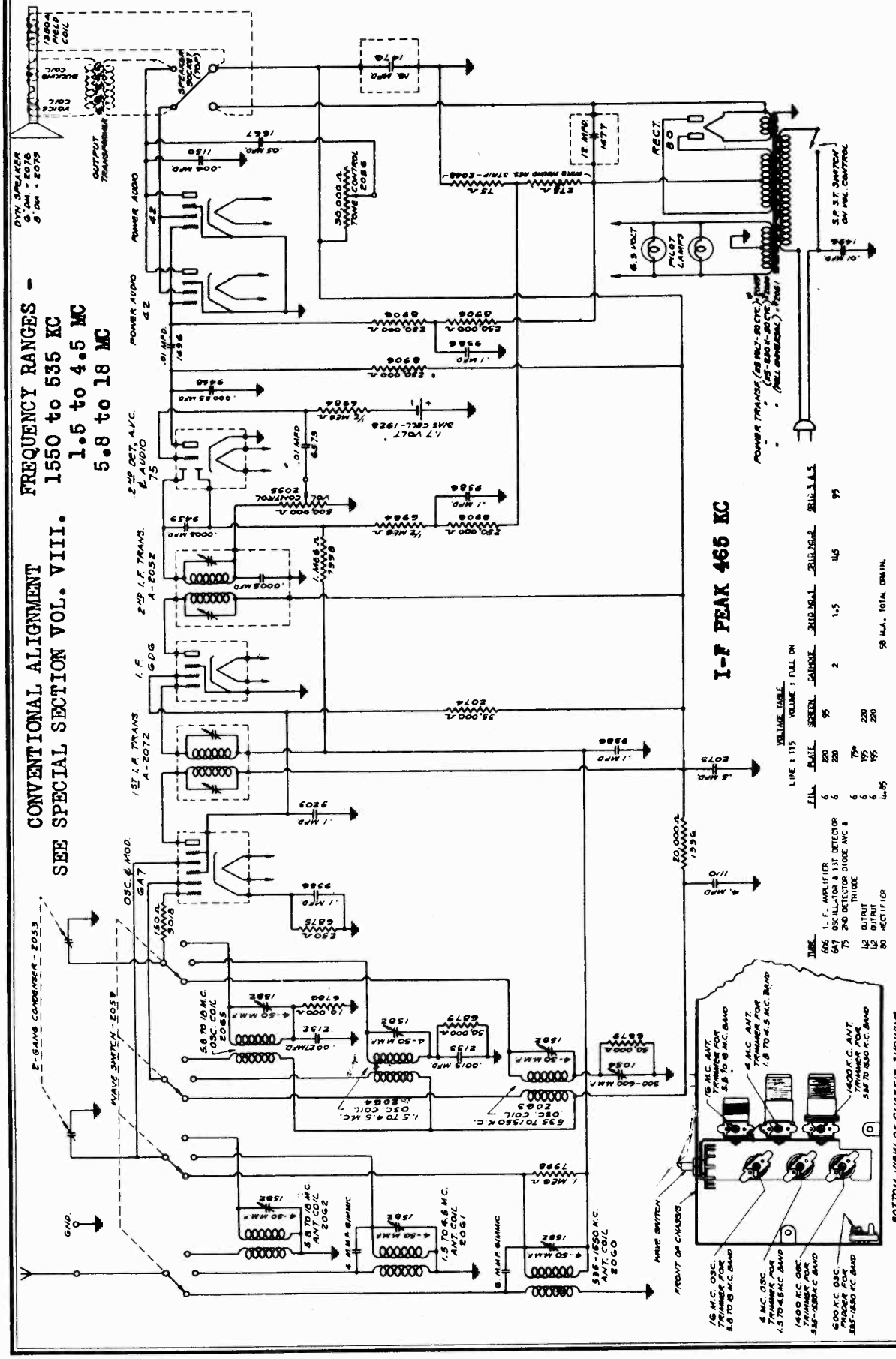
The Tube complement of this chassis is as follows:

1 Type 6F7—triode pentode as oscillator and first detector.
1 Type 6D6—remote cut-off pentode as I.F. amplifier.
1 Type 75—duplex diode triode as diode detector, A.V.C. and A.F.
1 Type 42—pentode output tube.
1 Type 80—high vacuum rectifier.



WALGREEN CO.

MODEL 651
Schematic, Voltage
Alignment, Trimmers



Align I-F transformer trimmers to 465 KC. BROADCAST - Dial and generator to 1400 KC, peak the oscillator and antenna trimmers. Dial and generator to 600 KC, pad the oscillator circuit to maximum peak while rocking variable condenser. POLICE - Dial and generator to 4 MC, peak oscillator trimmer and antenna trimmer. SHORTWAVE - Dial and generator to 16 MC, peak oscillator and antenna trimmers.

MODEL 675

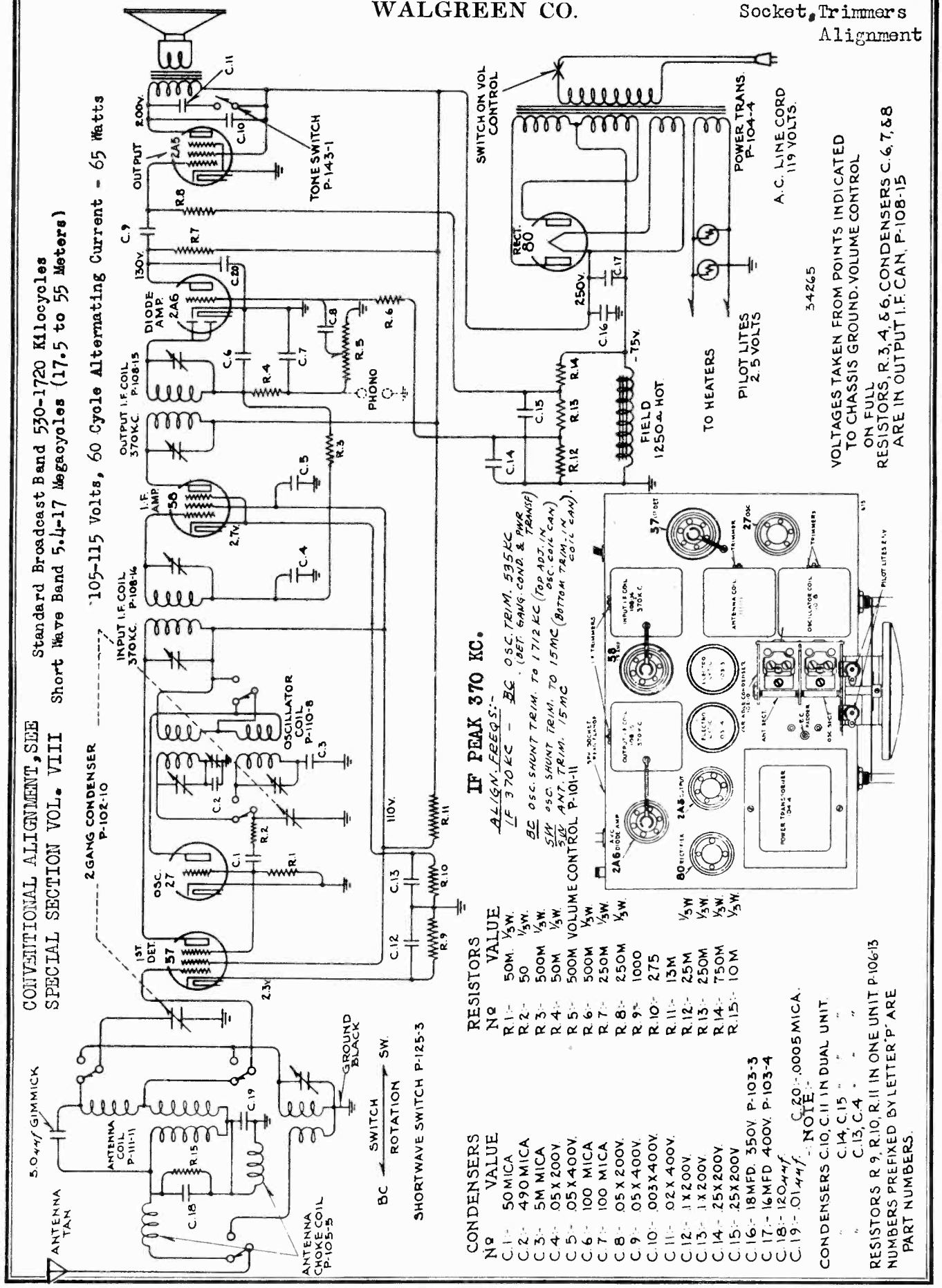
WALGREEN CO.

Schematic, Voltage
Socket, Trimmers
Alignment

CONVENTIONAL ALIGNMENT, SEE
SPECIAL SECTION VOL. VIII

Standard Broadcast Band 530-1720 Kilocycles
Short Wave Band 5.4-17 Megacycles (17.5 to 55 Meters)

105-115 Volts, 60 Cycle Alternating Current - 65 Watts



IF PEAK 370 KC.

ALIGN FREQS:-
IF 370 KC - BC OSC. TRIM. 535 KC. (SET GANG COND. & PWR TRANSF)
BC OSC. SHUNT TRIM. TO 1712 KC (TOP ADJ. IN OSC. COIL CAN)
SW OSC. SHUNT TRIM. TO 15 MC (BOTTOM TRIM. IN COIL CAN).
SW ANT. TRIM. 15 MC

VOLUME CONTROL P-101-11

RESISTORS

No	VALUE
R.1 -	50M. 1/3W.
R.2 -	50 1/3W.
R.3 -	500M 1/3W.
R.4 -	50M 1/3W.
R.5 -	500M VOLUME CONTROL P-101-11
R.6 -	500M 1/3W.
R.7 -	250M 1/3W.
R.8 -	250M 1/3W.
R.9 -	1000
R.10 -	275
R.11 -	13M
R.12 -	25M 1/3W
R.13 -	250M 1/3W
R.14 -	750M 1/3W.
R.15 -	10 M 1/3W.

CONDENSERS

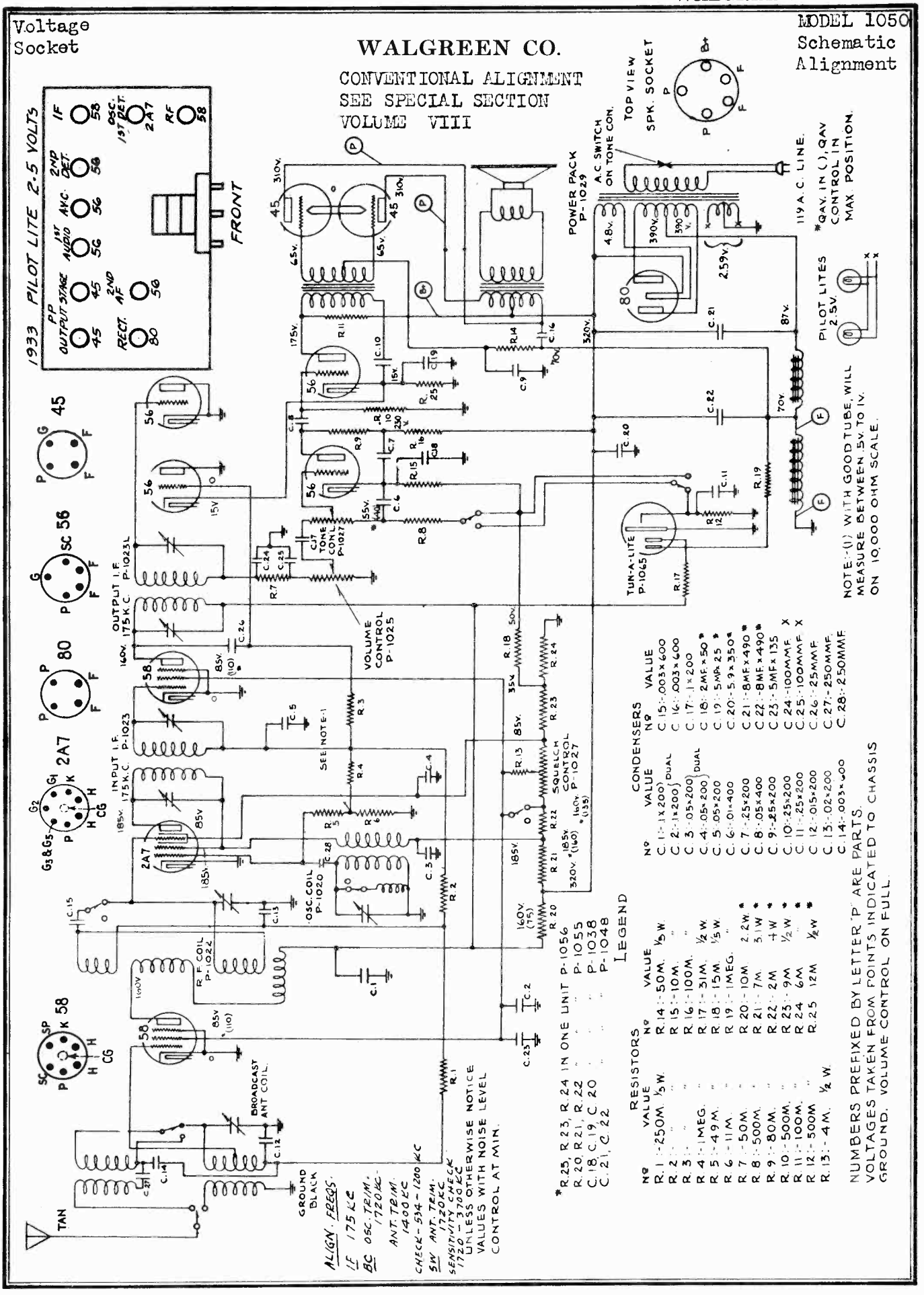
No	VALUE
C.1 -	50 MICA
C.2 -	490 MICA
C.3 -	5M MICA
C.4 -	05 X 200V
C.5 -	.05 X 400V.
C.6 -	100 MICA
C.7 -	100 MICA
C.8 -	.05 X 200V.
C.9 -	.05 X 400V.
C.10 -	.003 X 400V.
C.11 -	.02 X 400V.
C.12 -	1 X 200V.
C.13 -	1 X 200V.
C.14 -	.25 X 200V.
C.15 -	.25 X 200V
C.16 -	18 MFD. 350V. P-103-3
C.17 -	16 MFD 400V. P-103-4
C.18 -	.02 mf.
C.19 -	.01 mf.
C.20 -	.0005 MICA.

NOTE:-
CONDENSERS C.10, C.11 IN DUAL UNIT.
" C.14, C.15 " "
" C.13, C.4 - "

RESISTORS R.9, R.10, R.11 IN ONE UNIT P-106-13
NUMBERS PREFIXED BY LETTER 'P' ARE PART NUMBERS.

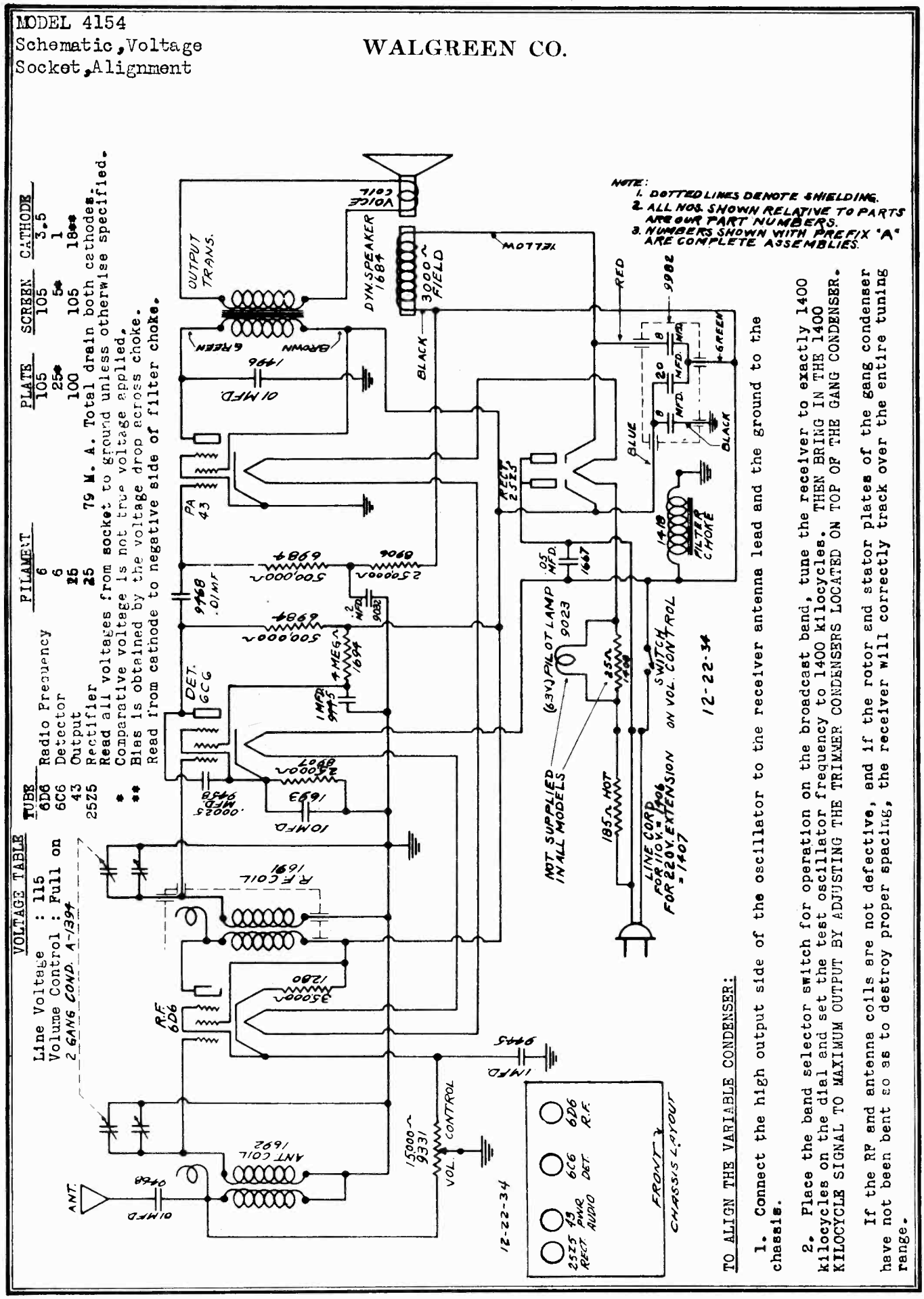
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND. VOLUME CONTROL ON FULL
RESISTORS, R.3, 4, & 6, CONDENSERS C.6, 7, & 8 ARE IN OUTPUT I.F. CAN, P-108-15

34265



MODEL 4154
Schematic, Voltage
Socket, Alignment

WALGREEN CO.



TO ALIGN THE VARIABLE CONDENSER:

1. Connect the high output side of the oscillator to the receiver antenna lead and the ground to the chassis.

2. Place the band selector switch for operation on the broadcast band, tune the receiver to exactly 1400 kilocycles on the dial and set the test oscillator frequency to 1400 kilocycles. THEN BRING IN THE 1400 KILOCYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING THE TRIMMER CONDENSERS LOCATED ON TOP OF THE GANG CONDENSER.

If the RF and antenna coils are not defective, and if the rotor and stator plates of the gang condenser have not been bent so as to destroy proper spacing, the receiver will correctly track over the entire tuning range.

DESCRIPTION

This receiver is a portable, four (4) tube, battery operated superheterodyne with self-contained loop antenna and batteries.

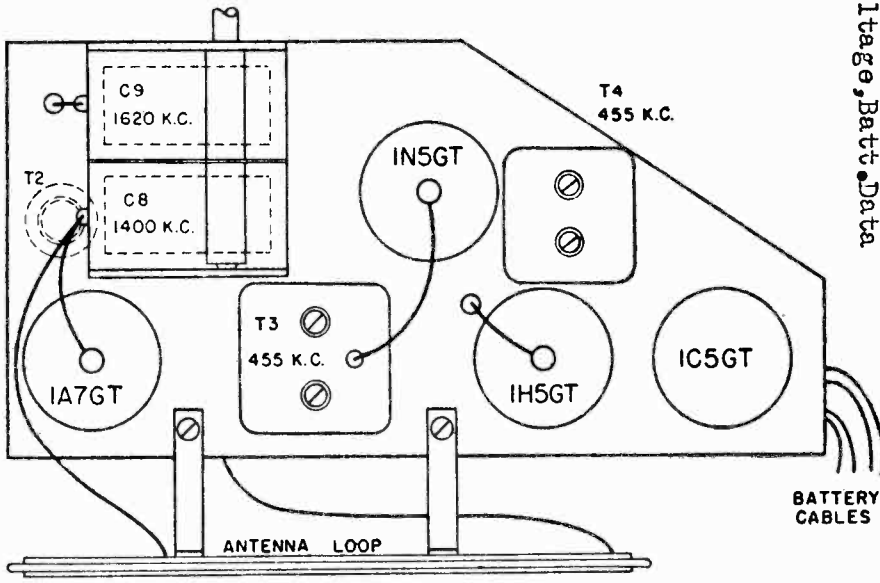
The tubes used are a 1A7GT as an oscillator convertor; a 1N5GT as an I. F. amplifier; a 1H5GT as an A.V.C. detector and audio amplifier; and a 1C5GT as a power output.

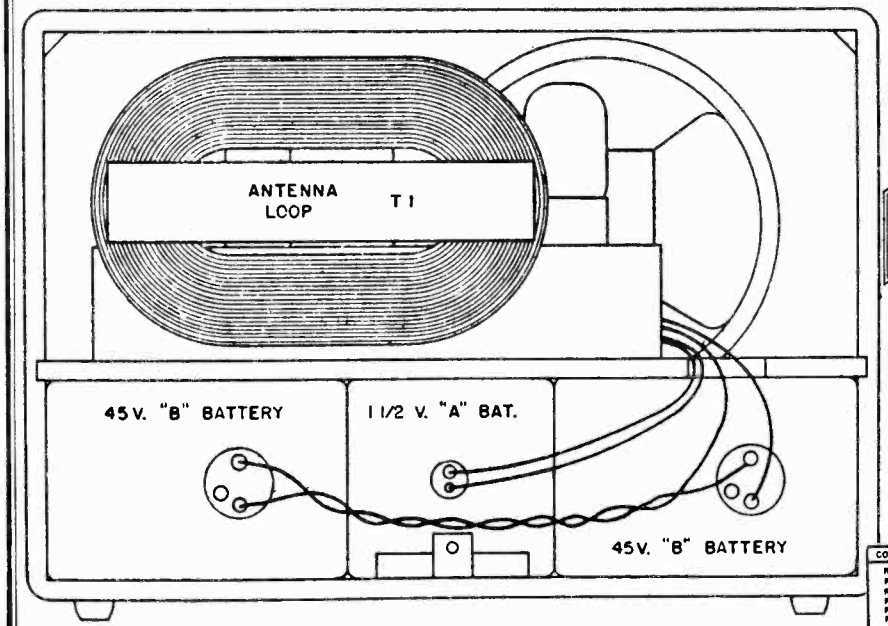
This receiver is made to cover the standard broadcast band from 1620 K.C. to 535 K.C.

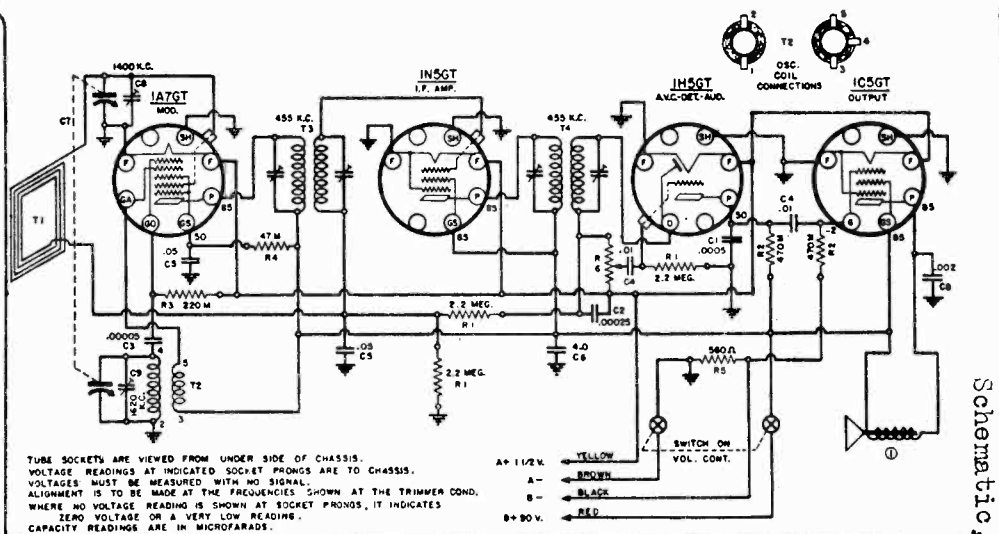
BATTERIES

Listed below are various manufacturers of batteries and their part numbers that may be used to make up the combination of batteries to be used with this receiver.

(Batteries)		Their Part No.
Burgess:	B Battery	B30
	A Battery	4F
Ray-O-Vac:	B Battery	P-5303
	A Battery	P-94A
Ever-Ready:	B Battery	762
	A Battery	742
General:	B Battery	V30B
	A Battery	4F1







TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS.
VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO CHASSIS.
VOLTAGES MUST BE MEASURED WITH NO SIGNAL.
ALIGNMENT IS TO BE MADE AT THE FREQUENCIES SHOWN AT THE TRIMMER COND.
WHERE NO VOLTAGE READING IS SHOWN AT SOCKET PRONGS, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.
CAPACITY READINGS ARE IN MICROFARADS.

CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION 0-40
R1	60-179	2.2 MEGOHM 1/3 WATT RESISTOR	C1	15-112	.0005 MFD. MICA CONDENSER	T1	82-2	ANTENNA LOOP
R2	60-178	470 M OHM " " "	C2	1504	.00025 " " "	T2	10-294	OSCILLATOR COIL
R3	60-180	220 M " " "	C3	1503	.00005 " " "	T3	10-293	1 ST. I.F. TRANSFORMER
R4	60-177	47 M " " "	C4	16-121	.01 MFD. 200 V. TUBULAR CONDENSER	T4	10-291	2 ND. "
R5	60-201	540 Ω " " "	C5	1622	.05 " 200 V. " "			
R6	24-138	1 MEGOHM VOLUME CONTROL	C6	16-250	4.0 " 150 W.V. " "	1	78-272	5" SPEAKER
			C7	19-149	2 GANG VARIABLE COND. ALSO C8 & C9			
			C8	1608	.002 MFD. 500 V. TUBULAR CONDENSER			

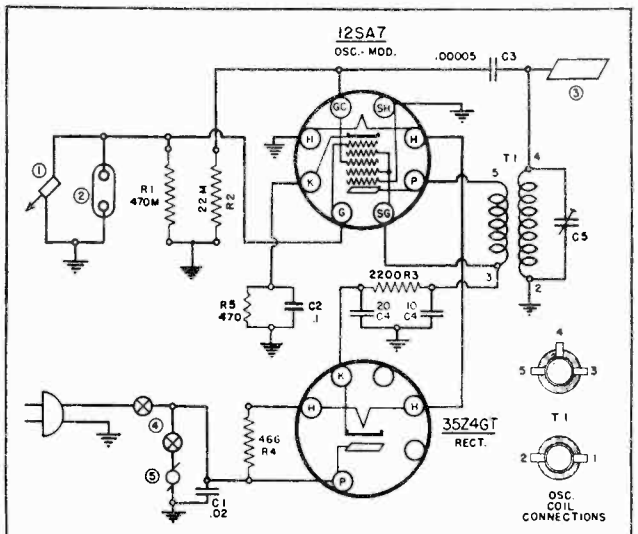
MODEL 9-23
Wireless Record Player
Schematic, Data

WARWICK MFG. CORP.

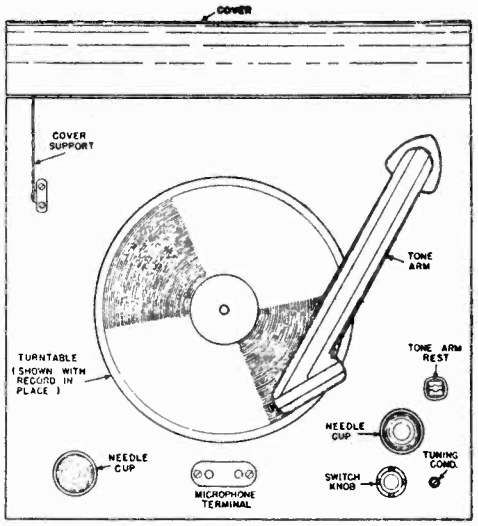
ATTACHMENT

There is incorporated in this Phono-Oscillator unit a tip jack terminal strip microphone connection. The microphone is supplied as an attachment and can be purchased under the part No. 79-263 from your dealer. In its attachment to the receiver, plug in the ends of the microphone cord into the tip jacks (see pictorial) and have switch in the first position. That is, in the positon to operate the oscillator but not the phono-motor.

Note:—Be sure to shut off the record player completely when it is not in use by turning the switch to the "off position".



CODE	PART NO.	DESCRIPTION	CODE	PART NO	DESCRIPTION 9-23
R1	60-178	470 M OHM 1/3 W. RES.	C1	1605	.02 MFD. 400 V. TUB. COND.
R2	60-185	22 M " " "	C2	16-115	.1 " 200 V. "
R3	60-234	2200 " " "	C3	1503	.00005 MFD. MICA "
R4	60-231	466 " 10 1/2 W. "	C4	18-241	20 X 10 " 150 V. ELECT.
R5	60-216	470 " 1/3 W "	C5	20-119	3 PLATE TRIMMER
1	83-130	PICKUP			
2	12-1	MICROPHONE TERMINAL	T1	10-240	OSCILLATOR COIL
3	82-1	ANTENNA PLATE			
4	69-129	SWITCH (DUAL)	5	59-3	PHONOGRAPH MOTOR



PARTS PRICE LIST

Part No.	DESCRIPTION	Price
83-130	Tone Arm Assem	$ 8.25
59-3	Motor Assem	7.00
42-213	Cabinet and Cover Assem	8.75
12-1	Microphone Jack	.40
79-263	Microphone Supplied as an Attachment	5.00
69-129	Switch Dual	.75
10-240	Oscillator Trans.	.75
20-119	Trimmer	.25
18-241	Electrolytic Cond. 20x10 mf. 150 V.	1.00
60-231	Res. 466 Ohms	.50

Prices subject to change without notice.

PHONO-OSCILLATOR

DESCRIPTION

This unit is a Two Tube Phono-Oscillator. The tubes used are a 12SA7 as an oscillator and a 35Z4GT as a power rectifier.

This unit should be operated between 1500 K.C. and 1700 K.C. and is so designed that the playing of a record on the unit makes it possible that you receive this same recording from any radio set within a nearby vicinity.

INSTALLATION

This Phono-Oscillator is designed to operate from a 105-130 volt 60 cycle A.C. current supply only; do not connect this to any other source unless so specified. If in doubt about your power supply, your local power company will give you this information.

There are no connections needed between the Radio Receiver and the Phono-Oscillator. The only needed connection is the power supply line cord to an electric outlet.

For best results it would be advisable to use medium or soft needles. They will assure you longer record life and are not as severe on the tone arm as other types of needles.

The tone arm is a sensitive unit and precaution should be taken in handling. It would be injurious to drop or rest the tone arm on the point of the needle. Always use arm rest when the Phono-Oscillator is not in use.

OPERATION

Place the Phono-Oscillator near an electric outlet and within a distance of about 30 feet of the Radio Receiver which you intend to use. Do not set this unit near a radiator or other heater since the cabinet may be damaged.

Attach line cord plug to the nearest outlet.

Adjust your radio receiver to maximum volume and set tuning dial to a point at the high frequency end between 1500 K.C. and 1700 K.C. where minimum interference from outside stations is noticed.

Allowing the Radio Receiver to remain at that adjustment, turn switch knob on the Phono-Oscillator (see pictorial diagram) in a clockwise direction until the first click is noticed. This will turn the oscillator section of the unit on, and about ½ minute should be allowed for tubes to heat up. With a record in the proper position on the turn table turn the same switch knob further toward the right (in a clockwise direction) until another click is heard. This will turn the Phono-Motor on and when the record has reached its proper speed of rotation, set the pick-up arm with its needle lightly upon the record.

The Phono-Oscillator is now operating and if it is not being heard over the radio it will indicate that it is oscilleting at a different frequency than that set up on the Radio Receiver. In order to set the oscillator to the same position as the radio receiver there is incorporated a tuning condenser, (see pictorial layout). Turn this condenser with a screw driver in a clockwise rotation, slowly and carefully until the response of the record is picked up by the Radio Receiver. If when turning the tuning condenser as mentioned above you do not get a response after 3 or 4 turns it will indicate that you have gone past the point. It will be necessary to turn in the opposite direction (counter clockwise) until the response is obtained.

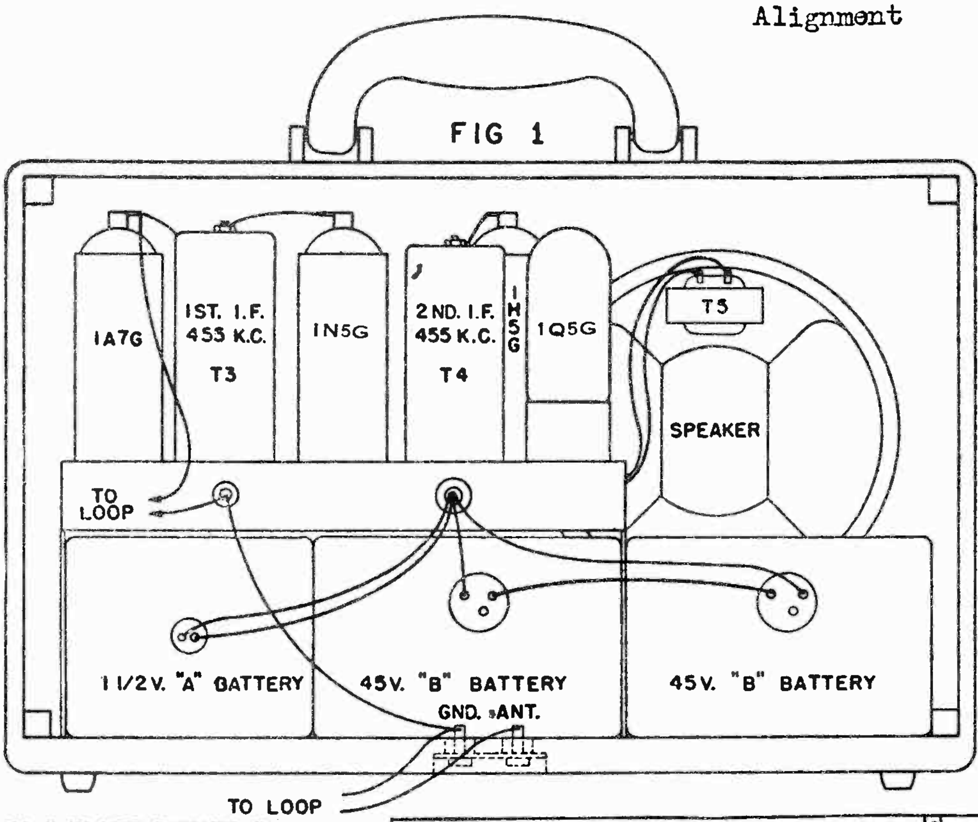
In order to get maximum volume and clarity it would be advisable to tune your radio a few degrees one way or the other until the best result is obtained.

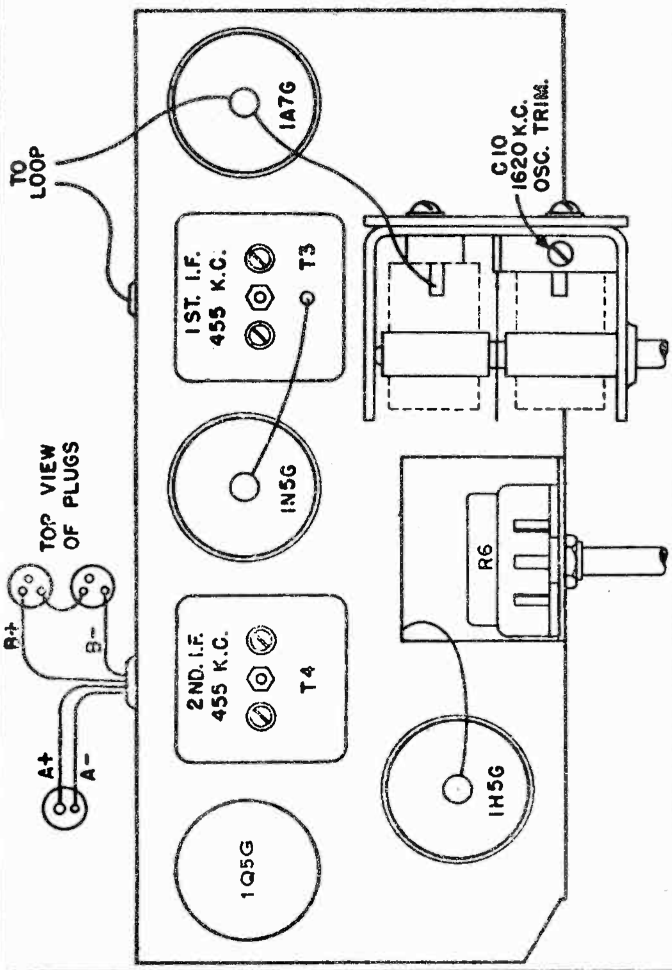
WARWICK MFG. CORP.

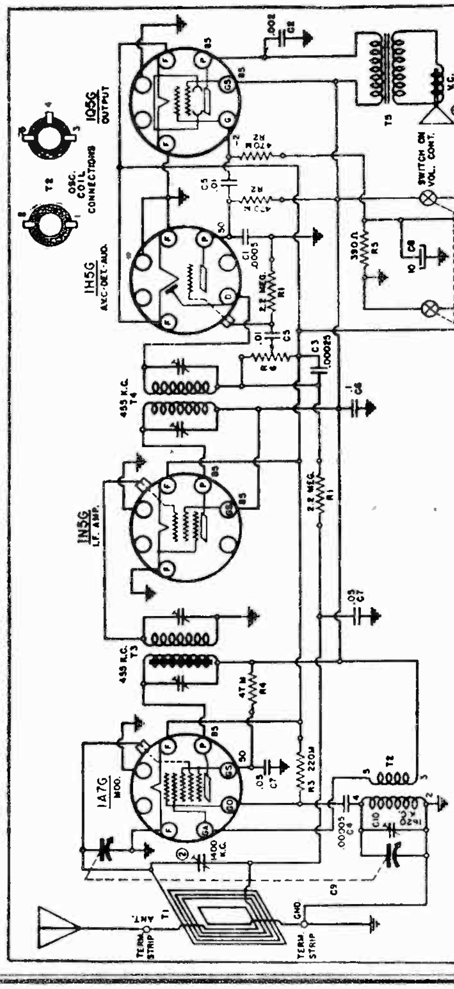
MODELS 9-43, 9-45
Schematic, Voltage
Socket, Trimmers
Alignment

FOR CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL VIII

This receiver is made to cover the standard broadcast band from 1620 K. C. to 535 K. C.







TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS.
VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO CHASSIS.
VOLTAGES MUST BE MEASURED WITH NO SIGNAL.
ALIGNMENT IS TO BE MADE AT THE FREQUENCIES SHOWN AT THE TRIMMER COND.
WHERE NO VOLTAGE READING IS SHOWN AT SOCKET PRONGS, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.
CAPACITY READINGS ARE IN MICROFARADS.

CODE	PART NO.	DESCRIPTION
R1	60-178	2.2 MEGOHM 1/3 WATT RESISTOR
R2	[illegible]-178	470 M OHM " " "
R3	60-180	220 M " " " "
R4	[illegible]	47 M " " " "
R5	[illegible]	390 Ω " " " "
R6	24-120	VOLUME CONTROL 1 MEGOHM

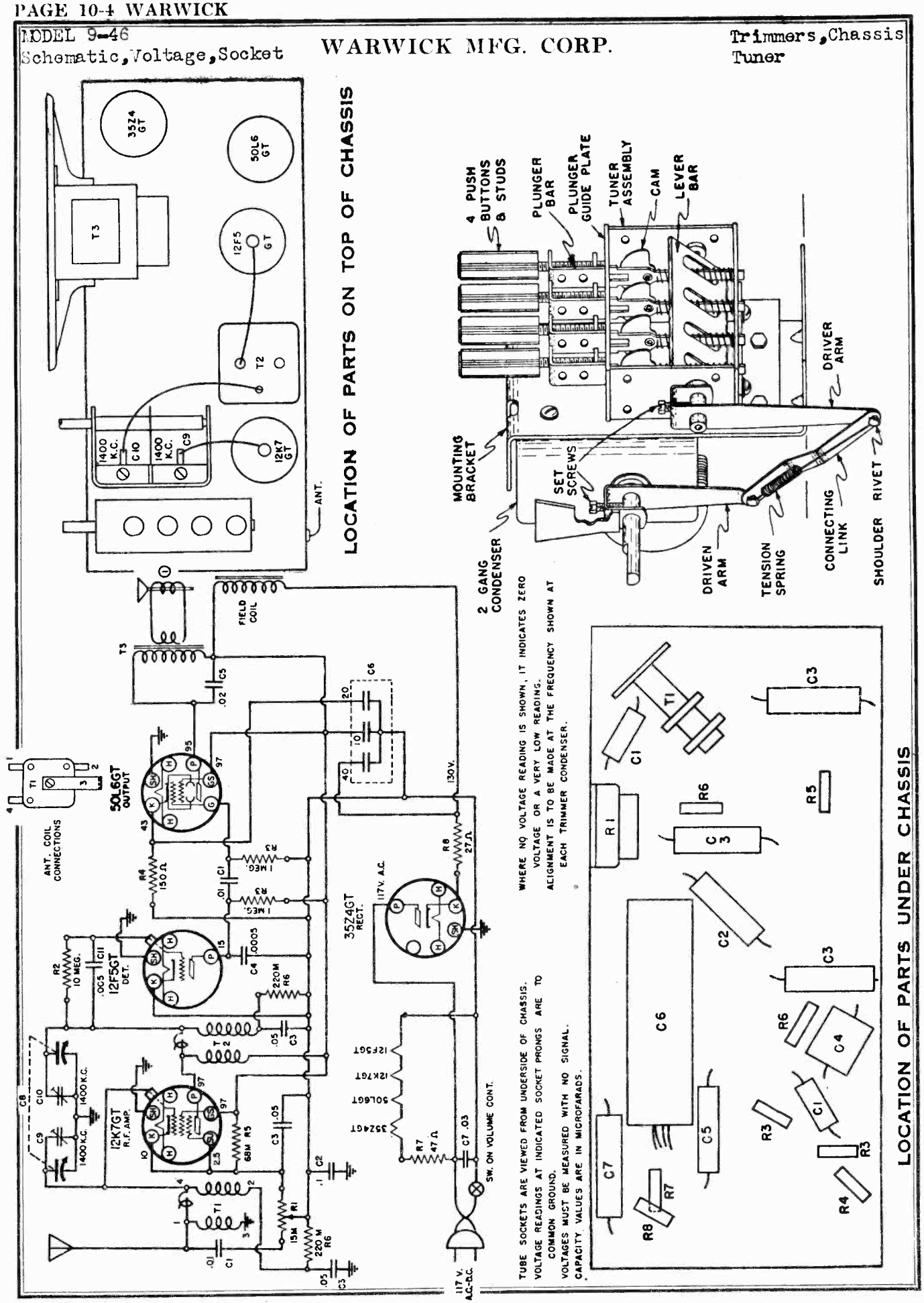
CODE	PART NO.	DESCRIPTION
C1	15-112	.0005 MFD. MICA CONDENSER
C2	15-114	.002 " " "
C3	1504	.00025 " " "
C4	1503	.00005 " " "
C5	16-113	.01 MFD. 400 V. TUBULAR CONDENSER
C6	16-115	.1 " 200 V. " "
C7	1622	.05 " " " "
C8	18-243	10 " 25 V. ELECTROLYTIC [illegible]
C9	19-137	[illegible] VARIABLE [illegible]

CODE	PART NO	DESCRIPTION 9-45
T1		ANTENNA LOOP
T2	10-257	OSCILLATOR TRANS.
T3	10-251	1ST. I.F. TRANSFORMER
T4	10-261	2ND. " "
T5		OUTPUT TRANS. ON SPKR.
1	79-262	5" P.M. SPEAKER
2	20-123	ANT. LOOP TRIMMER

MODEL 9-46
Schematic, Voltage, Socket

WARWICK MFG. CORP.

Trimmers, Chassis
Tuner



ALIGNMENT PROCEDURE

PRELIMINARY Model 9-46

Output Meter Connections	Across Loud Speaker Voice Coil
Output Meter Reading to Indicate 1 Watt	1.95 Volts
Generator Ground Lead Connection	Receiver Chassis
Dummy Antenna Value to Be in Series with Generator Output	See Chart Below
Connection of Generator Output Lead	See Chart Below
Generator Modulation	30%, 400 Cycles
Position of Volume Control	Fully On

POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTIONS	TRIMMER ADJUSTMENT (In Order Shown)	TRIMMER FUNCTION
1400 KC	1400 Kc.	.0002 mfd.	Antenna Conn.	C10	F. Trimmer
1400 KC	1400 KC	.0002 mfd.	Antenna Conn.	C9	Ant. Trimmer

Model 9-58

POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTIONS	TRIMMER ADJUSTMENT (In Order Shown)	TRIMMER FUNCTION
Closed	455 Kc.	.1 mfd.	12A8GT	T4-T5	I. F.
Closed	455 Kc.	.0002 mfd.	Antenna Conn.	T1 (Min. Output)	Wave Trap
Fully Open	1760 K.C.	.0002 mfd.	Antenna Conn.	C13	Osc. Trimmer
Fully open	1450 K.C.	.0002 mfd.	Antenna Conn.	C12	Ant. Trimmer

INDEX TABS Model 9-46

Cut the call letters of your four (4) selected stations from the list supplied with your receiver and slip them into the top of the Push-buttons. Arrange the call letters in the buttons with the call letter of the highest frequency station, the one that comes in closest to the number 160 on the tuning knob, toward the rear of the receiver and work progressively toward the front so that the lowest frequency station, the one that comes closest to the number 60 on the tuning knob, would be toward the front.

SETTING PUSH-BUTTONS

1. By means of the Station Selector Knob, tune in WITH THE RIGHT HAND AS ACCURATELY AS POSSIBLE the station having the highest frequency—that is, your selected station which is tuned in nearest number 160 on the Station Selector Knob.

2. After the station has been tuned in accurately with the right hand, continue to hold it in its exact position firmly, and with the left hand loosen the Push-Button to be set up for that station by unscrewing the Push-Button about one turn to the left (counter-clockwise).

3. Continuing to hold the Station Selector Knob in its exact position, PUSH THE PUSH-BUTTON IN ALL THE WAY with the left hand.

4. After the Push-Button has been depressed all the way, tighten it gently toward the right (clockwise). Release Push-Button slowly and when in normal position grip button and tighten firmly.

The Push-Button tuning system is now correctly set up for your first selected station of highest frequency and the Call Letter Tab for this station should be in the Push-button nearest the rear of the receiver.

Follow through with this same procedure, setting up the other 3 stations in the order of their frequency—that is, the second station set up will be second highest in frequency and the third station set up will be third highest in frequency.

INDEX TABS: Model 9-58

Cut the call letters of your four (4) selected stations from the list supplied with your receiver and slip them into the Tab Holder from the front, with the clear celluloid in front of the call letters, to protect them. Arrange the call letters in the Buttons from right to left. Have the call letters of the lowest frequency station, that is, the station that comes in nearest to the top of the dial scale, at the extreme right-hand button and work progressively to the left so that the highest frequency call letters will be in the extreme left-hand button.

SETTING PUSH-BUTTONS:

1. By means of the Station Selector Knob, tune in WITH THE RIGHT HAND AS ACCURATELY AS POSSIBLE the station having the lowest frequency—that is, your selected station which is tuned in nearest the top of the dial.

2. After the station has been tuned in accurately with the right hand, continue to hold it in its exact position firmly, and with the left hand loosen the Push-Button to be set up for that station by unscrewing the Push-Button about one turn to the left (counter-clockwise).

3. Continuing to hold the Station Selector Knob in its exact position, PUSH THE PUSH-BUTTON IN ALL THE WAY with the left hand.

4. After the Push-Button has been depressed all the way, tighten it gently toward the right (clockwise). Release Push-Button slowly and when in normal position grip button and tighten firmly.

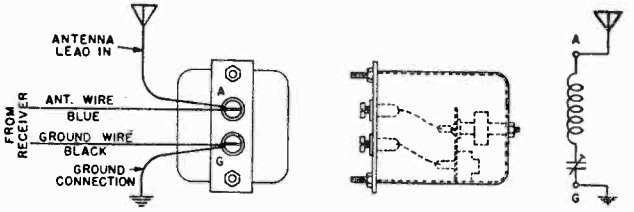
The Push-Button tuning system is now correctly set up for your first selected station of lowest frequency and the Call Letter Tab for this station should be at the extreme right of the Call Letter Holder.

Follow through with this same procedure, setting up the other 3 stations in the order of their frequency—that is, the second station set up will be second lowest in frequency and the third station set up will be third lowest in frequency.

Carefully check each Push-Button for the accuracy of its setting. If, when tuning in any station with its Automatic Push-Button it does not have equal volume or clarity to that obtained with manual tuning, this may indicate the automatic adjustment for that station was not made accurately. Should there be any inaccuracy in any one of the Push-Button adjustments, correction can be made by repeating the above procedure for that button only. Do not reset those Push-Buttons that are accurately adjusted.

No further adjustments are necessary to operate your radio automatically or manually. To receive any one of your selected stations for automatic operation, merely push in ALL THE WAY the Button set up for that station.

To receive all other stations in the regular manner turn the tuning knob to the frequency of the station desired.



Model 9-46

WAVE TRAP:

In localities where particular interference is noticed from code transmitters it would be advisable to attach to the receiver an antenna wave trap. Connect the antenna wire from the receiver (blue lead) and the antenna lead-in from your antenna to the binding post marked "A" on the wave trap. Connect the ground wire of your receiver (black lead) and the ground lead coming from your ground connection to the binding post designated as "G" on the wave trap. This antenna wave trap can be obtained under the part No. 1016310255 as a service part.

This wave trap is supplied tuned to a frequency of 455 K.C. If there is only one interfering station it would be advisable to tune the wave trap to the frequency of the interference. Where there are more than one interference it would be advisable to have the wave trap tuned to a frequency of 455 K.C. to keep the interference at a minimum.

HOW THE AUTOMATIC PUSH-BUTTON TUNER FUNCTIONS: Model 9-46

This unit is mechanically operated by means of a proven cam and lever action, designed to rotate a shaft 90 degrees. Since the variable gang condenser must rotate 180 degrees, a 2 to 1 step up mechanical lever action is incorporated to give full rotation to the gang condenser. Three links are used to transmit the operation of the push-button to the variable gang condenser, one a driver lever or link connected to the tuner shaft, second, a driven lever connected to the gang condenser shaft and third a connecting link, connecting the two levers together mechanically.

The plunger bar that retains the screw type push-buttons, also holds a cam to itself by a shoulder rivet. This cam floats on the rivet proper and is locked into position with a small square plate, floating in the plunger bar. To lock cam into position, screw the push-button knob toward the right (clock-wise). The end of the push-button screw will then force a small square plate known as a brake shoe against the periphery of the cam. The push-button must be tightened firmly after the position of the station selection is determined. To change the setting of the cam, the push-button knob must be loosened by rotating it toward the left (counter-clockwise). When this push-button screw is loosened, it will automatically release the brake shoe from the cam, leaving the cam free to rotate and set its new position to the setting of the lever bar.

If it becomes necessary to realign the tuner in relation to the gang condenser, the following procedure should be followed to assure perfect tuning operation:

1. Slip driver arm on to the tuner shaft and the driven arm on to the variable condenser shaft. Do not tighten set screws.

2. Connect these two lever arms by slipping the connecting link over the heads of the shoulder rivets. This link has a slight offset and precaution should be taken when assembling to see that it is installed in the proper manner as illustrated in the Pictorial. It will be necessary to tilt the link slightly in order to slip it over the head of the shoulder rivets. Then attach spring as shown.

3. In making the final adjustment, that of setting the condenser in relation to the tuner, set the condenser at minimum capacity (opened completely) and the front edge of the lever bar raised as high as possible (see Pictorial). With the lever arms in a vertical position as shown tighten set screws.

It is essential that all set screws be tightened securely so as to prevent a variation from original setting.

If, for some reason, a replacement is necessary for some particular item on the tuner proper, such as a lever bar, cam, plunger bar or brake shoe, it would be advisable to return the complete tuner proper for replacement.

HOW THE AUTOMATIC PUSH-BUTTON TUNER FUNCTIONS: Model 9-58

This unit is mechanically operated by means of a proven cam and lever action, designed to rotate a shaft 90 degrees. Since the variable gang condenser shaft must rotate 180 degrees, a 2 to 1 step up mechanical lever action is incorporated to give full rotation to the gang condenser. Three links are used to transmit the operation of the push-button to the variable gang condenser; first, a driver lever or link connected to the tuner lever bar, (see Pictorial); second, a driven lever arm connected to the gang condenser shaft; and third, a connecting link, connecting the two lever arms together mechanically.

If it becomes necessary to realign the tuner in relation to the gang condenser, the following procedure should be followed to assure perfect tuning operation:

1. Attach driver arm to the lever bar by means of two machine screws, making sure that they are assembled with lockwashers and tightened securely.

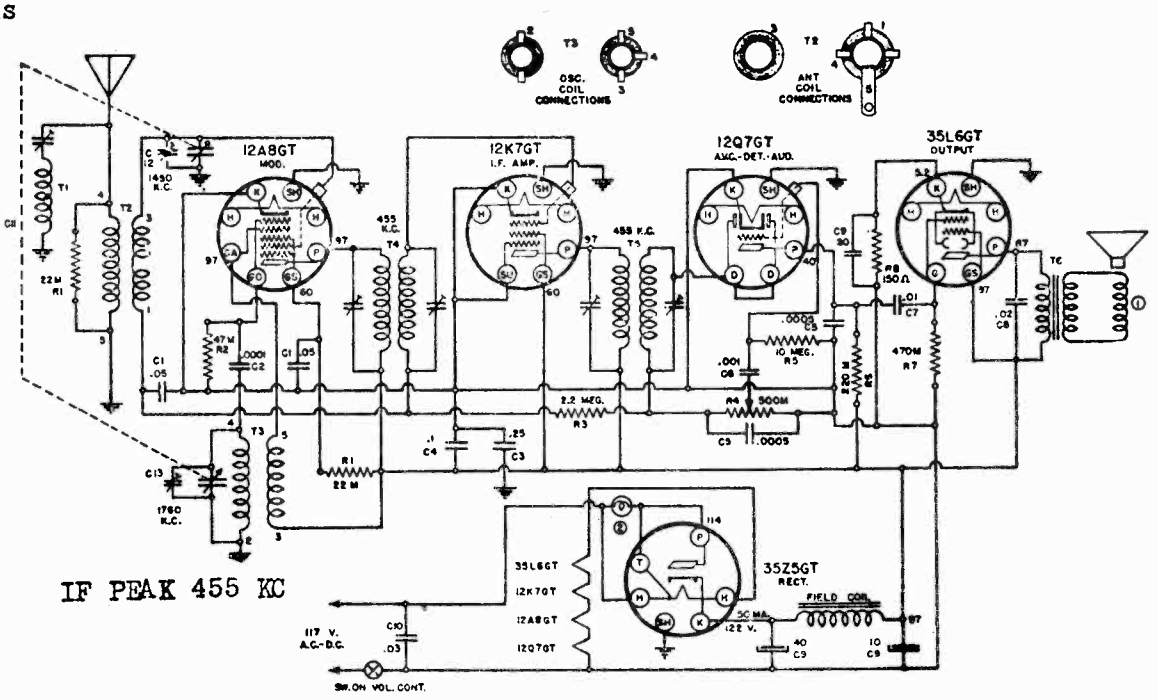
2. Slip the drum assembly, which consists of the drum, drum hub, and the driven arm, over the variable condenser shaft but do not tighten set screws.

3. Connect these two lever arms by slipping the connecting link over the heads of the shoulder rivets. This link has a slight bend (offset) about 1/3 of its length and is to be installed with the shorter end towards the top and the offset towards the rear when looking at it from the drum end. Attach the tension spring between the two shoulder rivets. This spring is incorporated to take up all the unnecessary slack in the drive.

4. In making the final adjustment, that of setting the condenser in relation to the tuner, close the condenser completely to maximum capacity and rotate drum with the left hand in a clock-wise rotation, until the driver arm comes gradually down to within 1/8 of an inch of the variable condenser shaft. When in this position, tighten set screws in the drum hub with the right hand.

MODEL 9-58
Schomatic, Voltage
Socket, Trimmers
Chassis

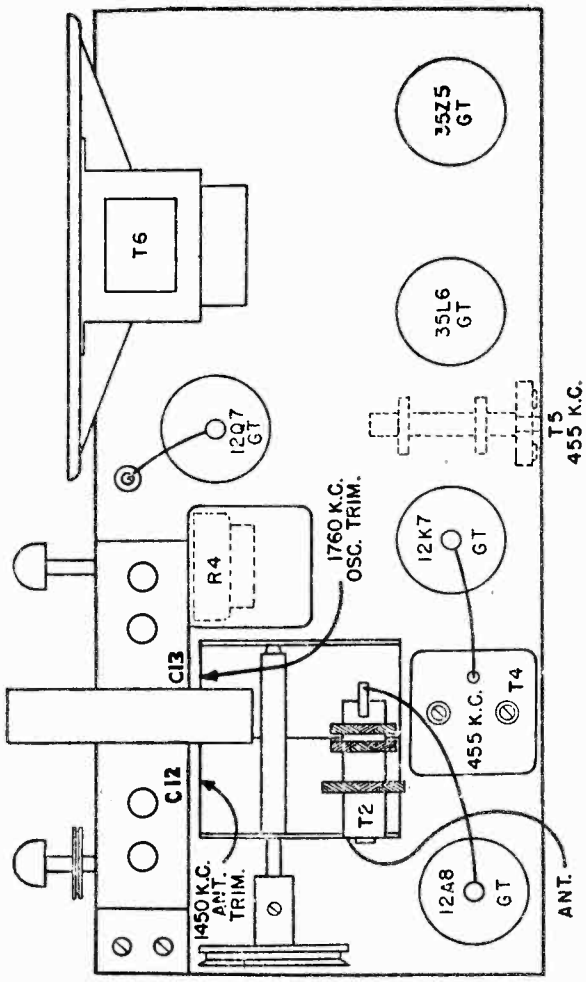
WARWICK MFG. CORP.



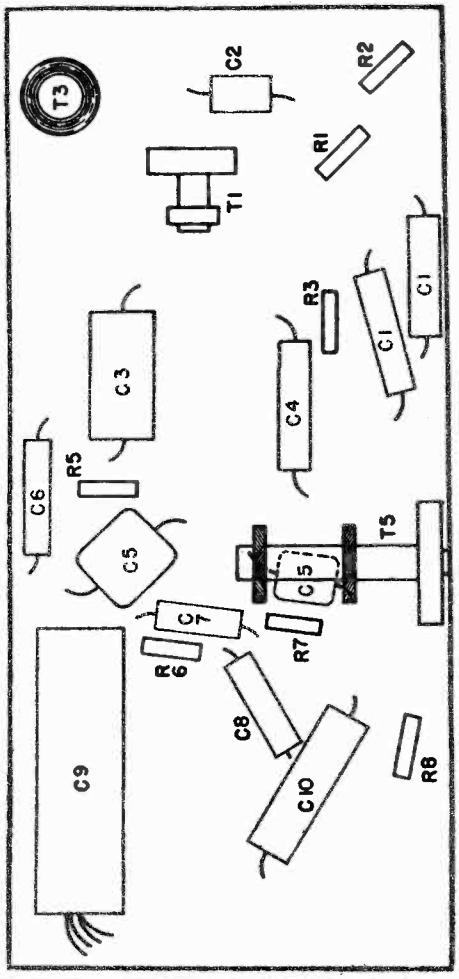
IF PEAK 455 KC

TUBE SOCKETS ARE VIEWED FROM UNDERSIDE OF CHASSIS.
VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO COMMON GROUND.
VOLTAGES MUST BE MEASURED WITH NO SIGNAL.
CAPACITY VALUES ARE IN MICROFARADS.

ALIGNMENT IS TO BE MADE AT THE FREQUENCY SHOWN AT EACH TRIMMER CONDENSER.
WHERE NO VOLTAGE READING IS SHOWN, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.



LOCATION OF PARTS ON TOP OF CHASSIS

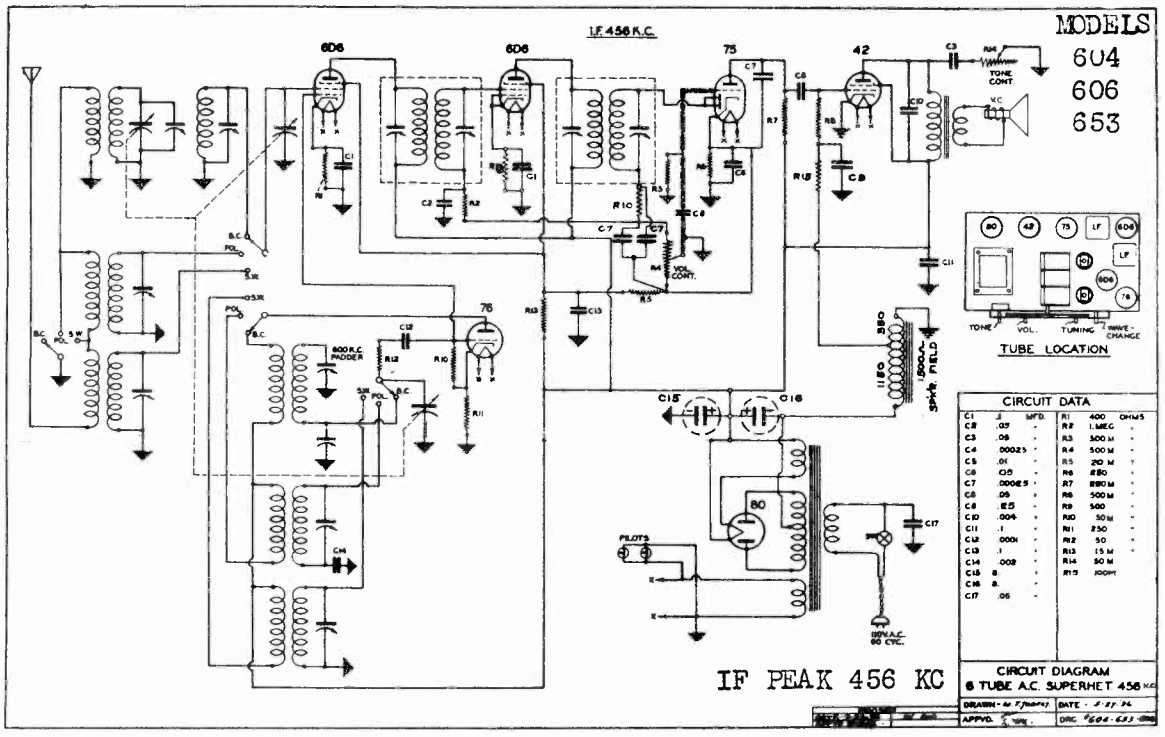


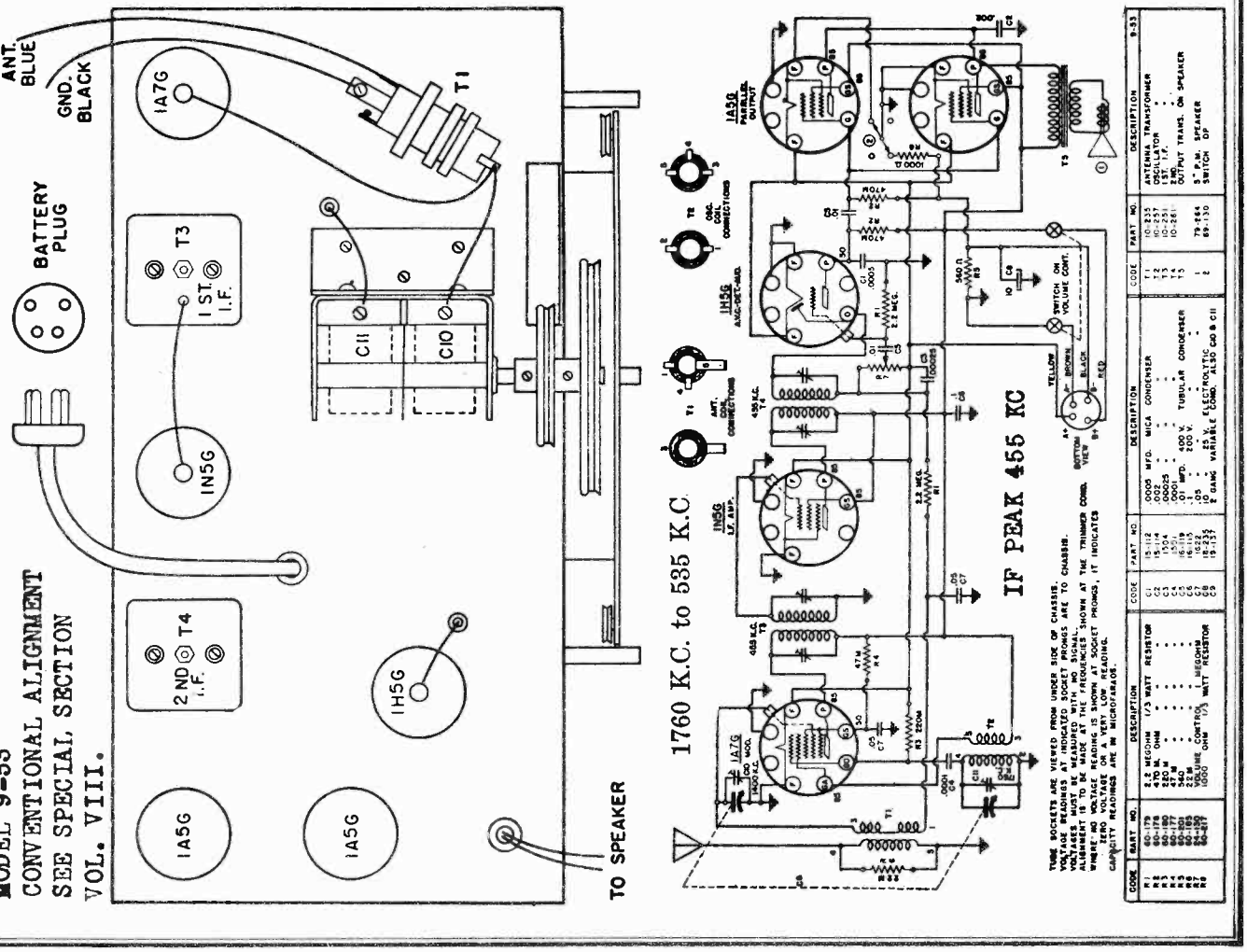
LOCATION OF PARTS UNDER CHASSIS

MODELS 604,606,653
Schematic,Socket

WARWICK MFG. CORP.

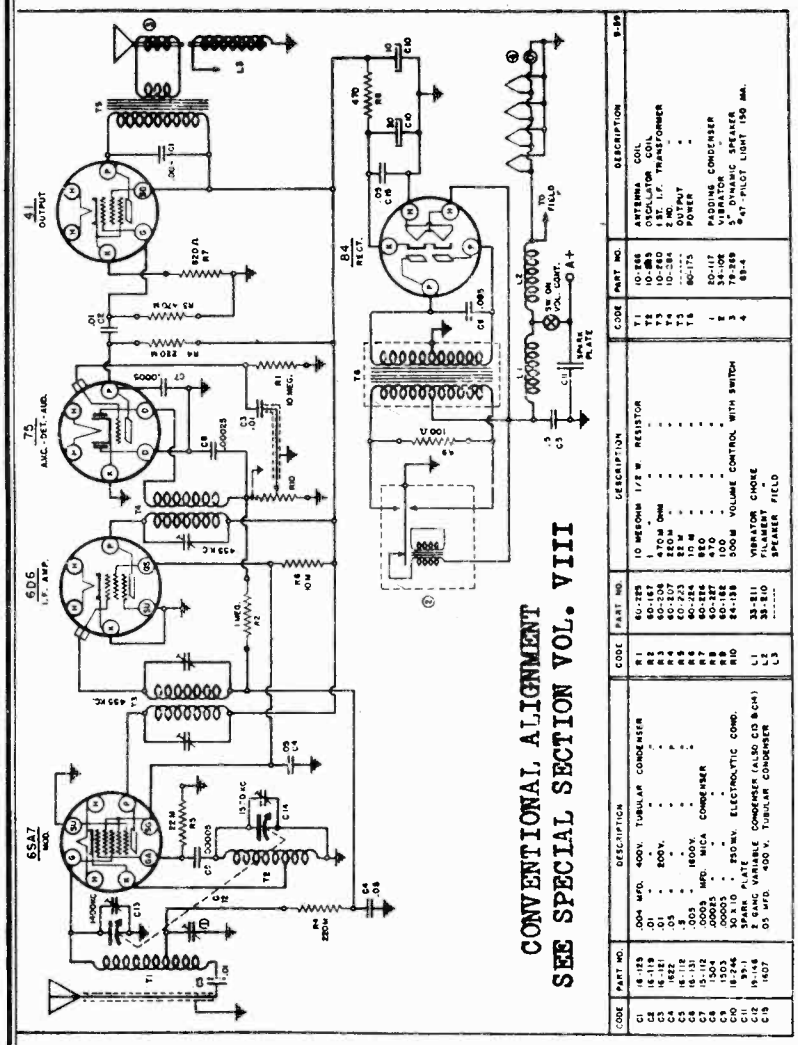
MODEL 9-53
Schematic,Voltage,Socket
Trimmers,Alignment





MODEL 9-59 Auto
Schematic, Socket
Trimmers, Alignment

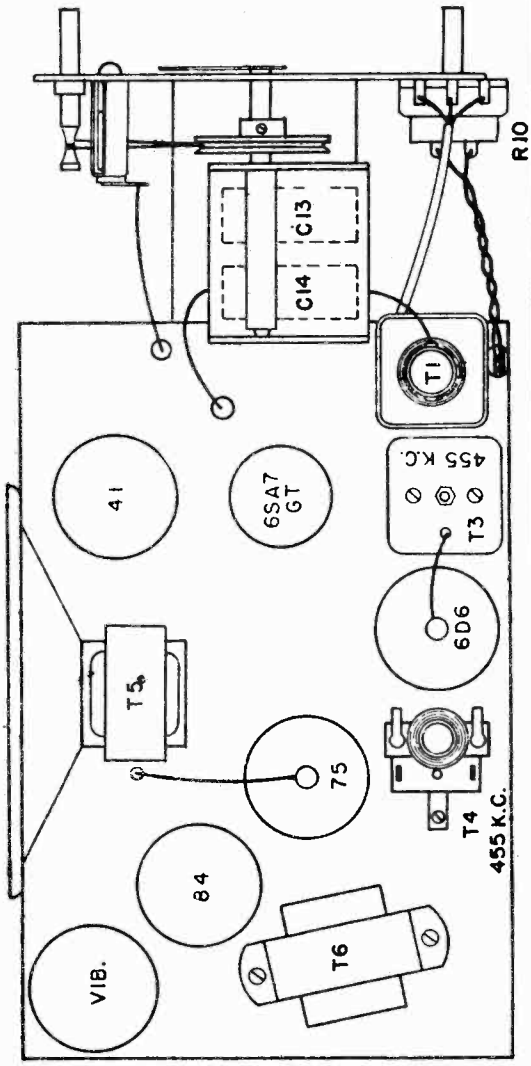
WARWICK MFG. CORP.



CODE	PART NO.	DESCRIPTION
C1	16-125	.004 MFD. 400V. TUBULAR CONDENSER
C2	16-119	.01 " " " " "
C3	16-121	.01 " " 200V. " "
C4	1622	.05 " " " " "
C5	16-122	.1 " " " " "
C6	16-131	.005 " 1800V. " "
C7	15-112	.0003 MFD. MICA CONDENSER
C8	1504	.00025 " " "
C9	1503	.0005 " " "
C10	18-246	30 X 10 " 250V. ELECTROLYTIC COND.
C11	19-1	SPARK PLATE
C12	19-114	2 GANG VARIABLE CONDENSER (ALSO C13 & C14)
C13	1607	.05 MFD. 400 V. TUBULAR CONDENSER

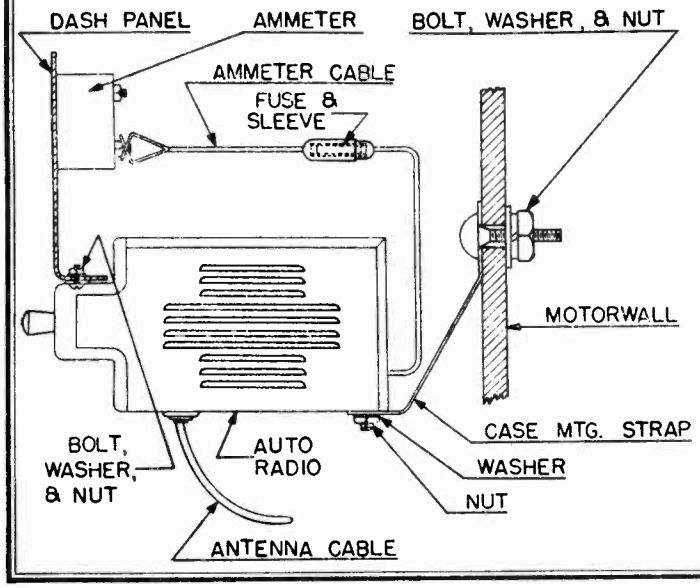
CODE	PART NO.	DESCRIPTION
R1	60-225	10 MEGOHM 1/2 W. RESISTOR
R2	60-167	1 " " " "
R3	60-208	470 M OHM " "
R4	60-207	220 M " "
R5	60-227	47 M " "
R6	60-226	10 M " "
R7	60-224	850 " " "
R8	60-187	100 " " "
R9	60-188	300 M VOLUME CONTROL WITH SWITCH
R10	84-185	100 " "
L2	33-811	VIBRATOR CHOKE
L3	33-810	FILAMENT CHOKE
----	-----	SPEAKER FIELD

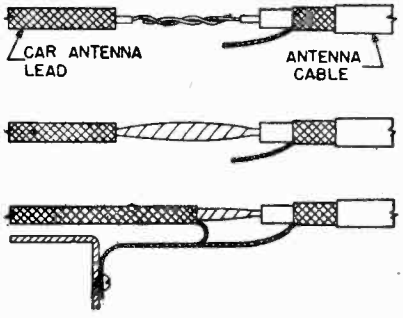
CODE	PART NO.	DESCRIPTION
T1	10-288	ANTENNA COIL
T2	10-289	OSCILLATOR COIL
T3	10-290	1ST. I.F. TRANSFORMER
T4	10-286	2ND. " "
T5	10-291	OUTPUT
T6	80-175	POWER
-	30-117	PADDING CONDENSER
3	34-105	VIBRATOR
4	79-269	5" DYNAMIC SPEAKER
	88-4	47 PILOT LIGHT 150 MA.

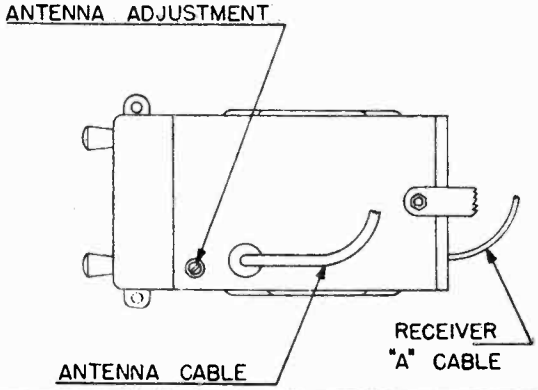


Automobile Receiver

Frequency Range 540-1520 Kilocycles







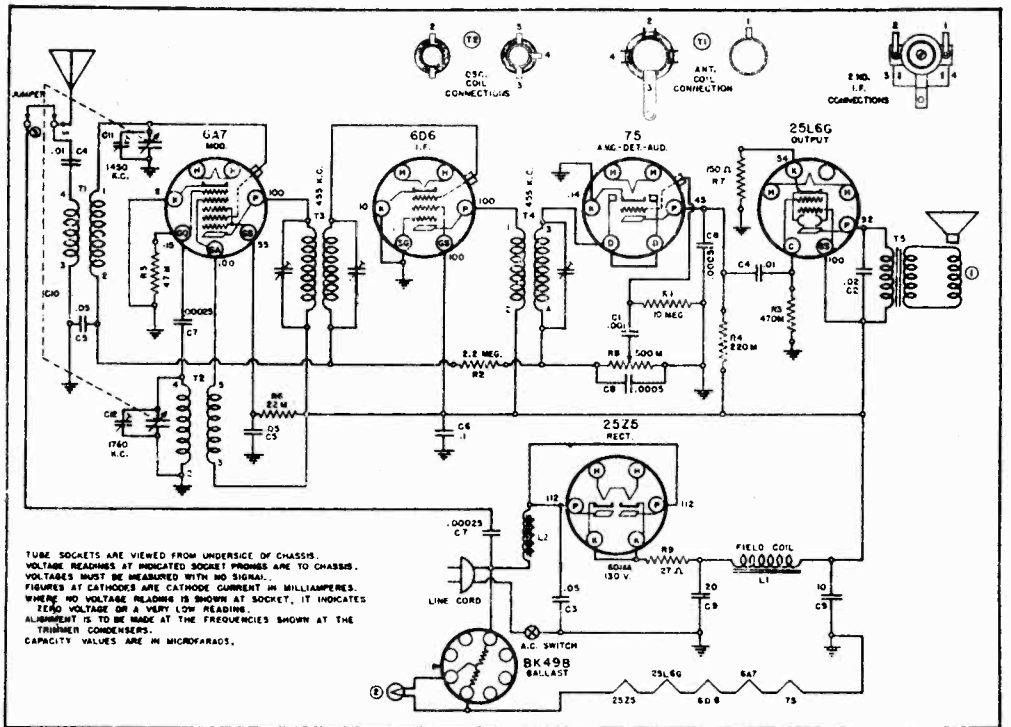
WARWICK MFG. CORP.

MODEL 9-66
Schematic, Voltage
Socket, Trimmers
Alignment

This receiver is a 6-tube AC/DC current operated Superheterodyne.

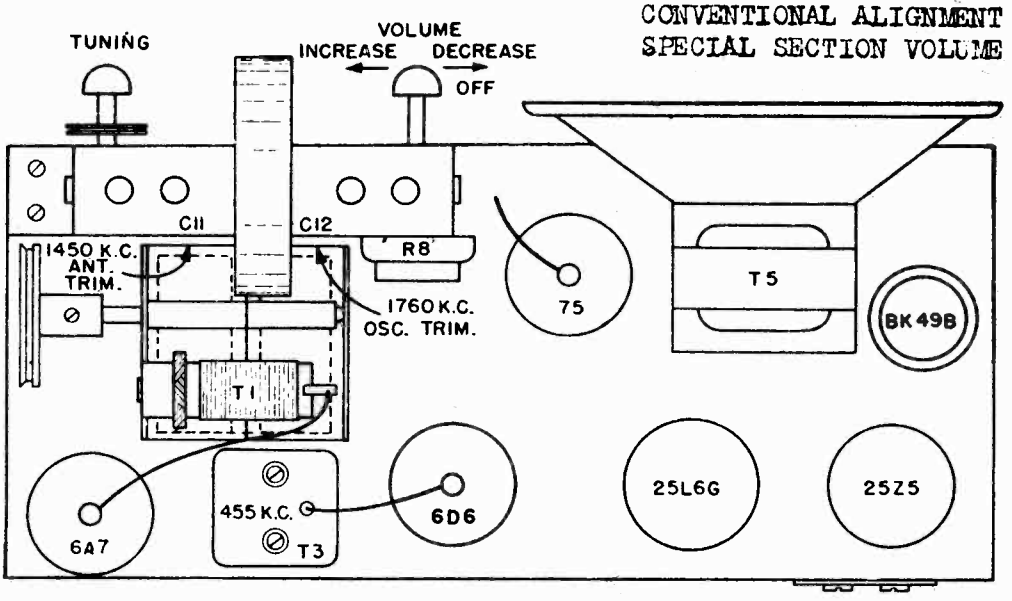
The tubes used are: a 6A7 as an oscillator-converter; a 6D6 as an I. F. amplifier; a 75 as an A.V.C. detector and audio amplifier; a 25L6G as a beam output; a 25Z5 as a power rectifier; and a BK49B as a voltage divider.

This receiver is made to cover from 1750 KC. to 535 KC., which covers the standard broadcast band and the first police band.



CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION 9-66
C1	16-124	.001 MFD. 400 V. TUBULAR COND.	R1	60-193	10 MEGOHM 1/3W. RESISTOR	T1	10-277	ANTENNA COIL
C2	1605	.02 " " " "	R2	60-179	2.2 " " "	T2	10-240	OSCILLATOR COIL
C3	1607	.05 " " " "	R3	60-178	470 M OHM " "	T3	10-278	1ST. I.F. TRANSFORMER
C4	16-121	.01 " 200 V. " "	R4	60-180	220 " " "	T4	10-271	2 ND. I.F. "
C5	1622	.05 " " " "	R5	60-177	47 M " "	T5	------	OUTPUT " (ON SPEAKER)
C6	16-115	.1 " " " "	R6	60-185	22 M " "			
C7	1504	.00025 MFD. MICA CONDENSER	R7	60-184	150 " " "	L1	------	FIELD COIL (ON SPEAKER)
C8	15-112	.0005 " " "	R8	24-124	500M " VOLUME CONTROL & SW.	L2	33-220	R.F. CHOKE
C9	18-241	20 M.D. " 150 WV. ELECTROLYTIC	R9	60-220	27 " 1/3 W. RESISTOR	I	79-268	9" DYNAMIC SPEAKER
C10	19-152	2 GANG VARIABLE COND. ALSO CH & C12				E	8901	PILOT LIGHT #40
						3	22-117	ANT. TERM.

CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII

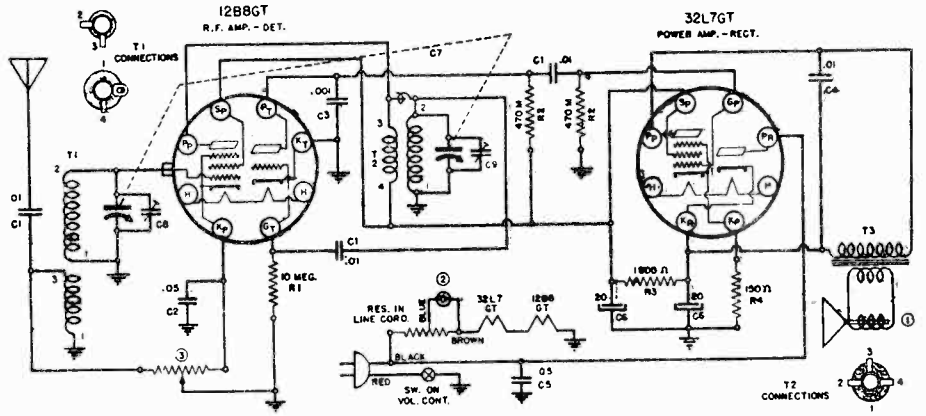


STANDARD BROADCAST RECEIVER

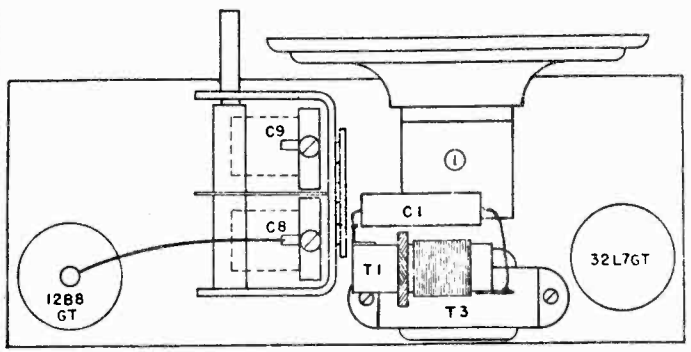
Model No. 9-22 is a 2-tube T.R.F. radio receiver for operation on a 117 Volt A.C. 60 cycle or 117 Volt D.C. supply. The tubes used are a 12B8GT as an R.F. Amplifier and Detector and a 35L7GT as a Power Amplifier and Rectifier.

This receiver covers a frequency range from 540 Kilocycles to 1760 Kilocycles (K.C.).

The scale is calibrated in kilocycles (less the final zero). Standard broadcast stations are listed in kilocyclyes in most station lists.

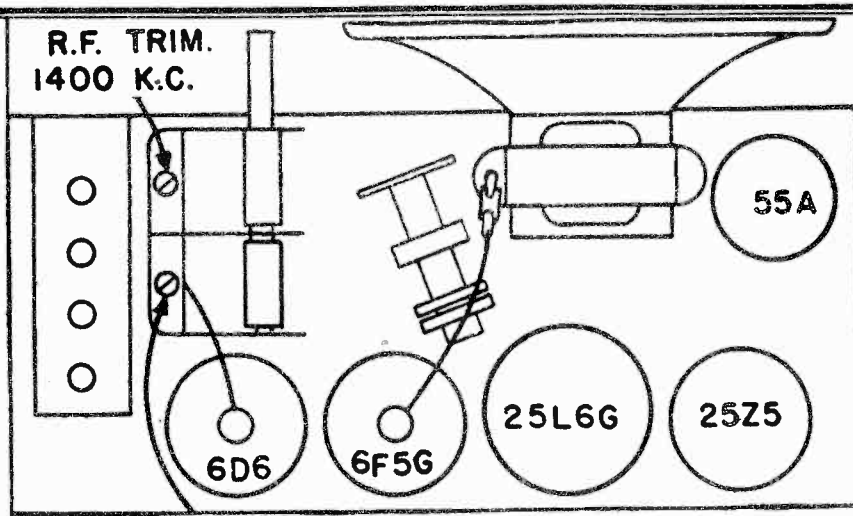


CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION	CODE	PART NO	DESCRIPTION 9-22
C1	16-121	.01 MFD. 200 V. TUBULAR COND.	R1	60-193	10 MEGOHM 1/3 W RESISTOR	T1	10-286	ANTENNA COIL
C2	1622	.05 " " "	R2	60-178	470 M OHMS " "	T2	10-289	R.F. COIL "
C3	16-124	.001 " 400 V. "	R3	60-229	1800 " " "	T3	80-176	OUTPUT TRANSFORMER
C4	16-119	.01 " " " "	R4	60-184	150 " " "			
C5	1607	.05 " " " "				1	79-270	P.M. SPEAKER
C6	18-243	20 X 20 MFD. 150V. ELECTROLYTIC				2	99-4	#47 PILOT LIGHT 150 MA.
C7	19-147	2 GANG VAR. COND. (ALSO C8 & C9)				3	24-136	VOLUME CONTROL WITH SWITCH



LOCATION OF PARTS ON TOP OF CHASSIS

MODEL No. 9-220 to 9-229, inclusive



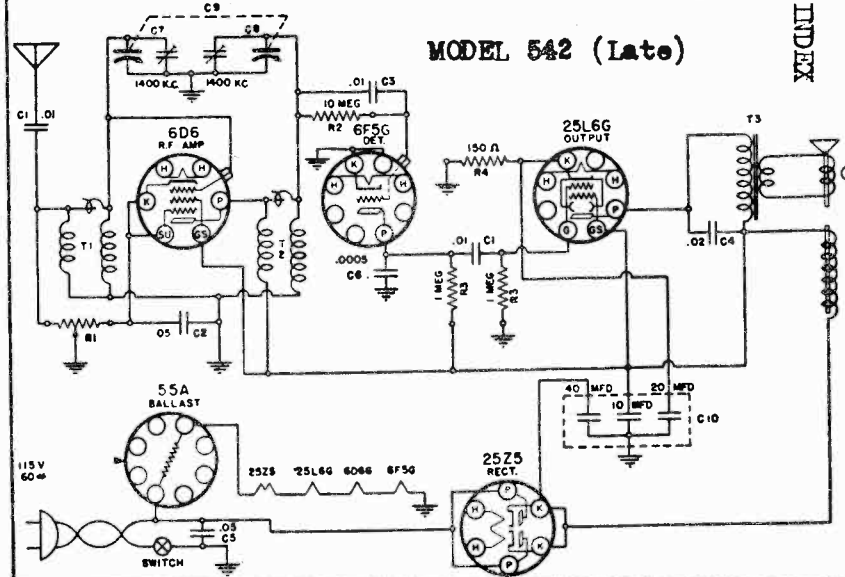
ANT. TRIM. 1400 K.C.

CODE	PART NO.	DESCRIPTION	CODE	PART NO.	DESCRIPTION 542
C1	1604	.01 MFD. 600 V. TUBULAR CONDENSER	R1	24-127	VOLUME CONTROL & SWITCH
C2	1622	.05 MFD. 200 V. " "	R2	60-193	10 MEGOHM 1/3 W. RESISTOR
C3	16-119	.01 MFD. 400 V. " "	R3	60-195	1 " "
C4	16-108	.02 MFD. 600 V. " "	R4	60-184	150 OHMS " "
C5	1607	.05 MFD. 400 V. " "			
C6	15-112	.0005 MFD. MICA CONDENSER	T1	10-249	ANTENNA COIL
C7, C8, C9	19-135	ANTENNA VARIABLE COND.	T2	10-250	R.F. COIL
		OSCILLATOR VARIABLE COND.	T3		OUTPUT TRANSFORMER
C10	18-234	FILTER CONDENSER 40 X 10 MF-400WV 20 MF - 25 WV	1	79-251	SPEAKER

FOR TUNER SEE INDEX

This receiver is a 5 tube AC/DC current operated T.R.F. This receiver is made to cover from 1750K.C. to 535K.C.

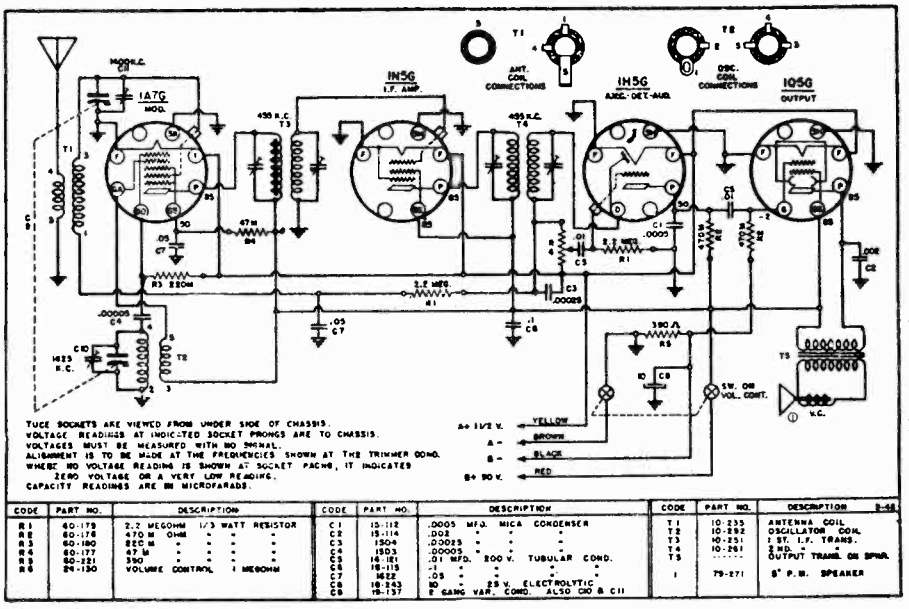
MODEL 542 (Late)



WARWICK MFG. CORP.

MODELS 9-480 to 9-489 inc.
MODELS 9-680 to 9-689 inc.
Schematics, Voltage, Socket Trimmers, Alignment

CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII



CODE	PART NO.	DESCRIPTION
R1	60-178	2.7 MEGOHM 1/3 WATT RESISTOR
R2	60-178	470 M OHM " " "
R3	60-180	220 M " " "
R4	60-177	47 M " " "
R5	60-221	390 " " "
R6	24-130	VOLUME CONTROL 1 MEGOHM

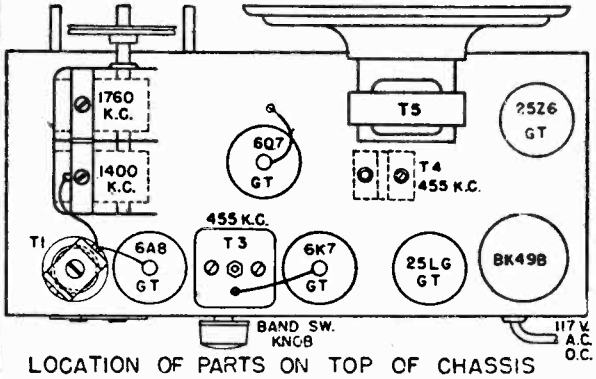
CODE	PART NO.	DESCRIPTION
C1	15-112	.0005 MFD. MICA CONDENSER
C2	15-114	.002 " " "
C3	1504	.00025 " " "
C4	1503	.00005 " " "
C5	16-181	.01 MFD. 200 V. TUBULAR COND.
C6	16-115	.1 " " " "
C7	1622	.05 " " " "
C8	18-243	10 " 25 V. ELECTROLYTIC
C9	19-157	2 GANG VAR. COND. ALSO C10 & C11

CODE	PART NO.	DESCRIPTION
T1	10-235	ANTENNA COIL
T2	10-192	OSCILLATOR COIL
T3	10-251	1 ST. I.F. TRANS.
T4	10-261	2 ND. " "
T5	------	OUTPUT TRANS. ON SPKR.
1	79-271	8" P.M. SPEAKER

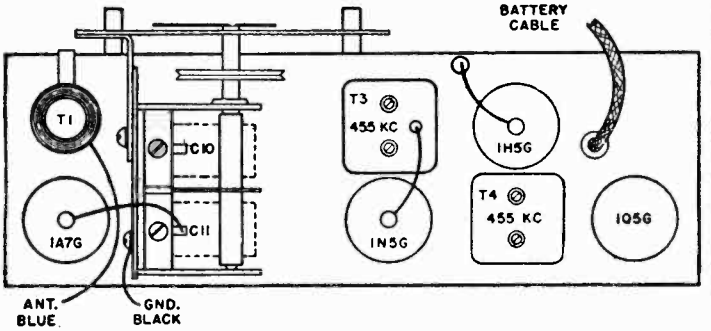
Models 9-480 to 9-489 inclusive

One of the following batteries may be used with this receiver and is to be put inside and towards the rear of the cabinet.

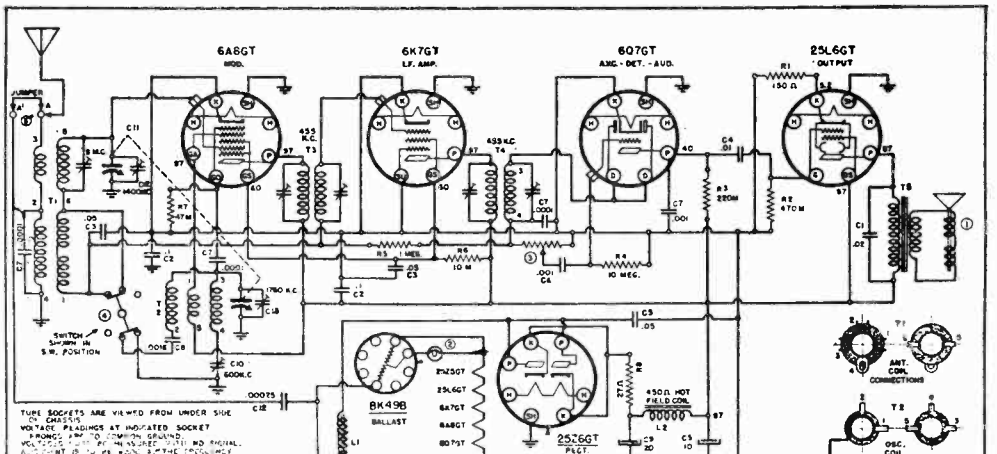
Ray-O-Vac..No."AB" 82
Burgess..No.17G-D60
General..No.60DL11L



LOCATION OF PARTS ON TOP OF CHASSIS
Models 9-680 to 9-689



LOCATION OF PARTS ON TOP OF CHASSIS
Models 9-480 to 9-489



CODE	PART NO.	DESCRIPTION
C1	15-123	.02 MFD. 200 V. TUBULAR CONDENSER
C2	16-115	.1 " " " " "
C3	1622	.05 " " " " "
C4	16-107	.01 " " " " "
C5	16-47	.05 " " 400 V. " "
C6	16-124	.001 " " 200 V. " "
C7	1501	.0001 " " MICA CONDENSER
C8	15-116	.0016 " " " "
C9	18-241	20 X 10 MFD. 150 V. ELECTROLYTIC CONDENSER
C10	20-117	TRIMMING CONDENSER 300-600 MFD.
C11	19-145	2 GANG VARIABLE CONDENSER ALSO C12 & C13

CODE	PART NO.	DESCRIPTION
R1	60-184	150 OHM 1/3 W. RESISTOR
R2	60-178	470 M. " " "
R3	60-180	220 M. " " "
R4	60-193	10 MEG. " " "
R5	60-193	1 " " " "
R6	60-215	10 M. " " "
R7	60-177	4.7 M. " " "
R8	60-220	27 " " "
L1	33-220	R.F. CHOKE
L2	------	FIELD COIL (ON SPKR.)
C12	1504	.00025 MFD. MICA CONDENSER

CODE	PART NO.	DESCRIPTION 9-68
T1	10-268	ANTENNA TRANSFORMER
T2	10-247	OSCILLATOR "
T3	10-288	1 ST. I.F. "
T4	10-281	2 ND. I.F. "
T5	------	OUTPUT TRANS. (ON SPKR.)
1	79-266	5" DYNAMIC SPEAKER
2	89-4	PILOT LIGHT #47
3	24-132	VOLUME CONTROL & SWITCH
4	69-133	BAND SWITCH
5	22-117	ANT. TERM.

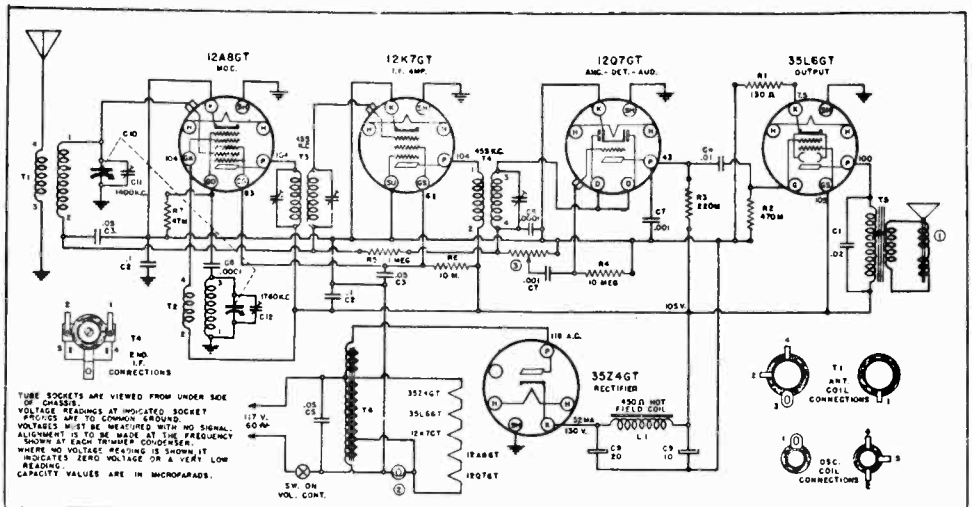
Models 9-680 to 9-689 inclusive

Tuning Ranges:
Broadcast
536 - 1760 KC
Short-Wave
2.35 - 7.4 MC

MODELS 9-550 to 9-559 inc
MODELS 9-670 to 9-679 inc. Schematics, Voltage, Socket Alignment, Trimmers

WARWICK MFG. CORP.

FOR CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII



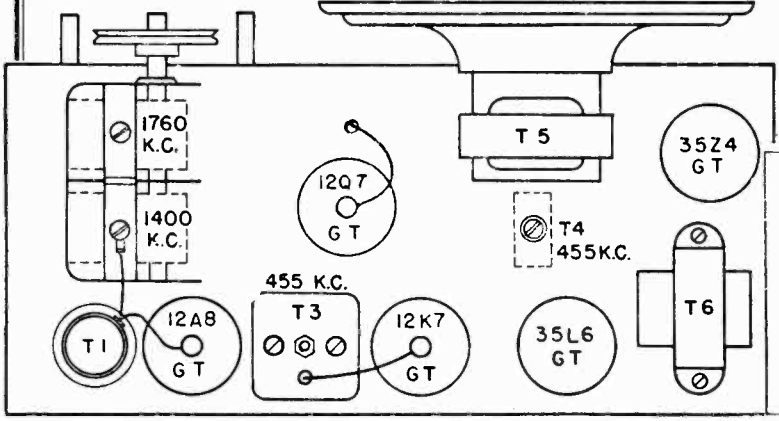
CODE	PART NO.	DESCRIPTION
C1	16-123	.02 MFD. 200 V. TUBULAR CONDENSER
C2	16-115	.1 " " " " "
C3	1622	.05 " " " " "
C4	16-121	.01 " " " " "
C5	1607	.05 " 400 V. " "
C6	16-124	.001 " 200 V. " "
C7	1501	.0001 " MICA CONDENSER
C8	18-241	20 X 10 MFD. ELECTROLYTIC COND. 150 V.
C10	19-144	2 GANG VARIABLE CONDENSER, ALSO C11 & C12

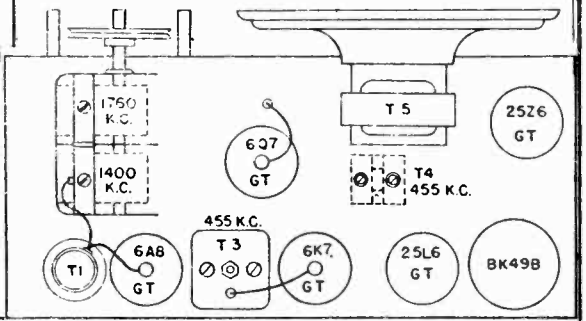
CODE	PART NO.	DESCRIPTION
R1	60-184	150 OHM 1/3 W. RESISTOR
R2	60-178	470 M. " " "
R3	60-190	220 M. " " "
R4	60-193	10 MEG " " "
R5	60-195	1 " " " "
R6	60-215	10 M. " " "
R7	60-177	47 M. " " "
L1		FIELD COIL (ON SPEAKER)

CODE	PART NO	DESCRIPTION 9-55
T1	10-270	ANTENNA TRANSFORMER
T2	10-272	OSCILLATOR "
T3	10-269	1ST. I.F. "
T4	10-271	2 ND. I.F. "
T5		OUTPUT TRANS. (ON SPKR.)
T6	90-172	POWER TRANSFORMER
1	79-266	5" DYNAMIC SPEAKER
2	69-4	PILOT LIGHT #47
3	24-132	VOLUME CONTROL & SWITCH

Models 9-550 to 9-559

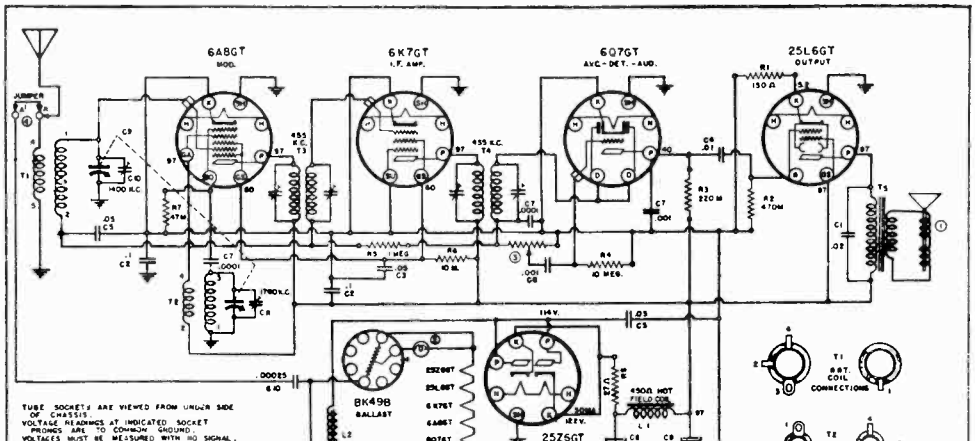
Left: Models 9-550 to 9-559
Below: Models 9-670 to 9-679





LOCATION OF PARTS ON TOP OF CHASSIS

LOCATION OF PARTS ON TOP OF CHASSIS



CODE	PART NO	DESCRIPTION
C1	16-123	.02 MFD. 200 V. TUBULAR CONDENSER
C2	16-115	.1 " " " " "
C3	1622	.05 " " " " "
C4	16-121	.01 " " " " "
C5	1607	.05 " 400 V. " "
C6	16-124	.001 " 200 V. " "
C7	1501	.0001 " MICA CONDENSER
C8	18-241	20 X 10 MFD. 150 V. ELECTROLYTIC COND.
C9	19-144	2 GANG VARIABLE CONDENSER, ALSO C10 & C11
C10	1904	.00025 MFD. MICA CONDENSER

CODE	PART NO	DESCRIPTION
R1	60-184	150 OHM 1/3 W. RESISTOR
R2	60-178	470 M. " " "
R3	60-190	220 M. " " "
R4	60-193	10 MEG " " "
R5	60-195	1 " " " "
R6	60-215	10 M. " " "
R7	60-177	47 M. " " "
R8	60-220	27 " " " "
L1	------	FIELD COIL (ON SPEAKER)
L2	33-220	R.F. CHOKE

CODE	PART NO	DESCRIPTION 9-67
T1	10-270	ANTENNA TRANSFORMER
T2	10-272	OSCILLATOR "
T3	10-269	1ST. I.F. "
T4	10-281	2 ND. I.F. "
T5	------	OUTPUT TRANS. (ON SPKR.)
1	79-266	5" DYNAMIC SPEAKER
2	69-4	PILOT LIGHT #47
3	24-132	VOLUME CONTROL & SWITCH
4	22-117	ANT. TERMINAL

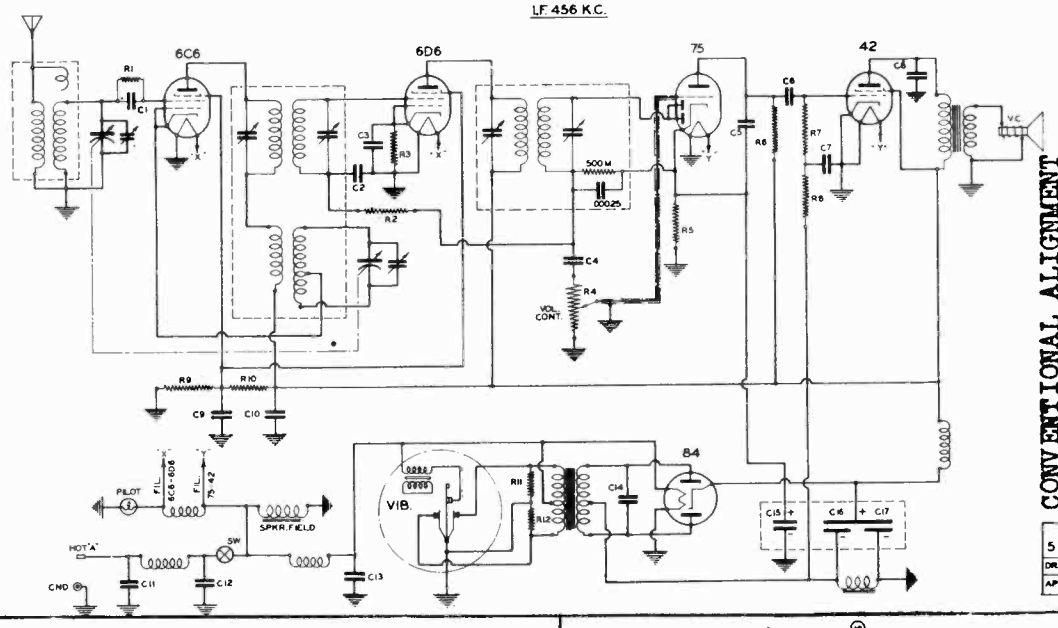
Models 9-670 to 9-679

Schematics, Socket Alignment, Trimmers

WARWICK MFG. CORP.

MODEL 401
MODEL 401LW
MODEL 550-C

I.F. 456 K.C.



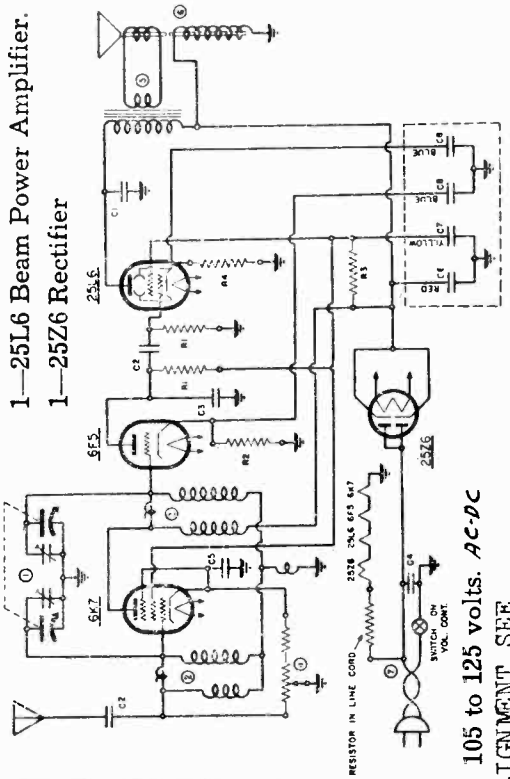
CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL VIII.

TUBE LOCATION

CIRCUIT DATA		
C1	00025	MFD.
C2	05	"
C3	-	"
C4	01	"
C5	00025	"
C6	01	"
C7	25	"
C8	004	"
C9	-	"
C10	-	"
C11	002	"
C12	002	"
C13	5	"
C14	0075	"
C15	4	"
C16	4	"
C17	8	"
R1	500 M	OHMS
R2	1 MEG.	"
R3	300	"
R4	1 MEG.	"
R5	2 M	"
R6	250 M	"
R7	250 M	"
R8	100 M	"
R9	25 M	"
R10	20 M	"
R11	50	"
R12	50	"

CIRCUIT DIAGRAM
5 TUBE SUPER AUTO SET.
DRAWN - G.J. MACK | DATE - 5 25 36
APPVD. EHH | DRG. NO. 550-C

1—6K7 R. F. Amplifier
1—6F5 Detector
1—25L6 Beam Power Amplifier.
1—25Z6 Rectifier

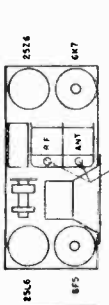


105 to 125 volts. AC-DC

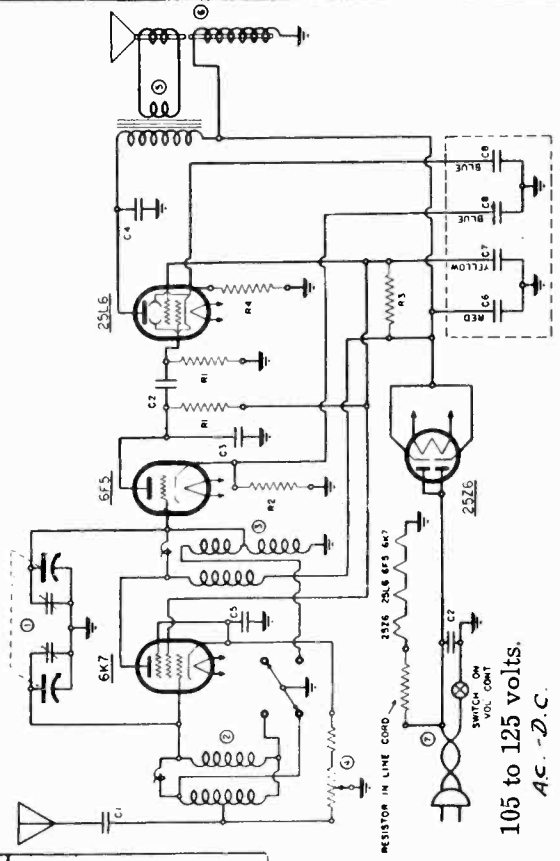
MODEL 401

FOR CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII

PART NO	DESCRIPTION	401
R1	60-137 1 MEG OHM 1/2W CARBON RES.	-
R2	60-155 3000 " " "	-
R3	60-154 4700 " " "	-
R4	60-156 220 " " "	-
C1	16-108 .02 MFD. BLOCK TUBULAR COND.	-
C2	16-110 .01 " " "	-
C3	16-106 .004 " 400V "	-
C4	16-107 .05 " 400V "	-
C5	16-109 .03 " 400V "	-
C6	40	150V FILTER
C7	18-213 40	150V COND
C8	5.0	25V BLOCK
C9	5.0	25V
-	19-124 2 GANG CONDENSER	-
2	10-217 ANT. COIL	-
3	10-216 OSC. COIL	-
4	24-119 VOLUME CONT. WITH SWITCH	-
5	80-148 OUTPUT TRANSFORMER	-
6	79-238 SPEAKER	-
7	23-117 LINE CORD	-



1—6K7 R. F. Amplifier
1—6F5 Detector
1—25L6 Beam Power Amplifier.
1—25Z6 Rectifier

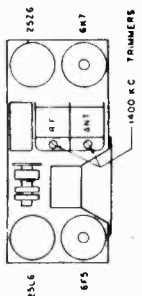


105 to 125 volts.
AC.-D.C.

MODEL 401LW

FOR CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOL. VIII

PART NO	DESCRIPTION	401LW
R1	60-157 1 MEG OHM 1/2W CARBON RES	-
R2	60-155 3000 " " "	-
R3	60-154 4700 " " "	-
R4	60-156 220 " " "	-
C1	16-102 .0005 MFD MICA CONDENSER	-
C2	16-110 .01 " 400 V TUBULAR COND	-
C3	16-106 .004 " 400 V "	-
C4	16-108 .02 " 400 V "	-
C5	16-109 .03 " 200 V "	-
C6	40	150 V FILTER
C7	18-213 40	150 V COND
C8	5.0	25 V BLOCK
C9	5.0	25 V
-	19-124 2 GANG CONDENSER	-
2	10-231 ANT COIL	-
3	10-232 OSC COIL	-
4	24-119 VOLUME CONT WITH SWITCH	-
5	80-148 OUTPUT TRANSFORMER	-
6	79-238 SPEAKER	-
7	23-117 LINE CORD	-



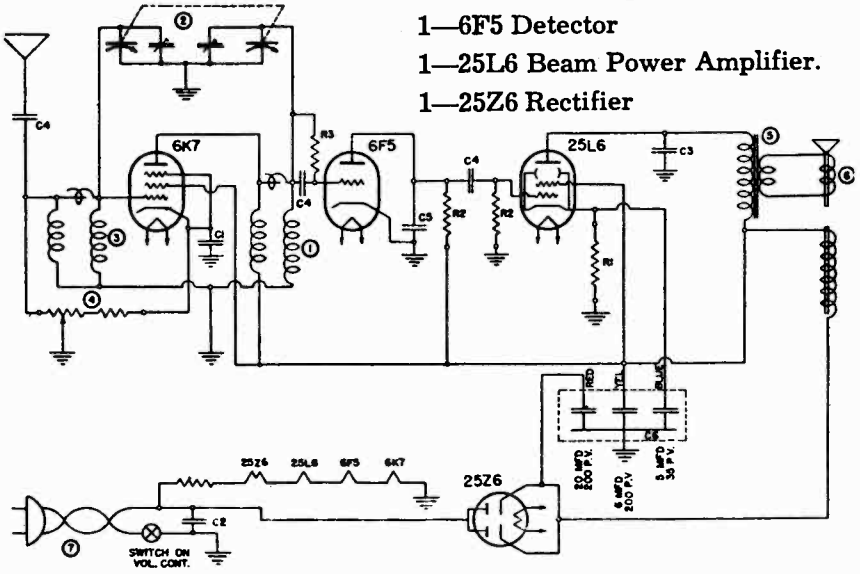
MODEL 404
MODEL 510-C
Schematics, Socket
Alignment, Trimmers

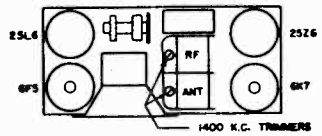
WARWICK MFG. CORP.

MODEL 404

This receiver will operate on either alternating or direct current, from a power supply of 105 to 125 volts. Do not connect it to any other source.

1—6K7 R. F. Amplifier
1—6F5 Detector
1—25L6 Beam Power Amplifier.
1—25Z6 Rectifier



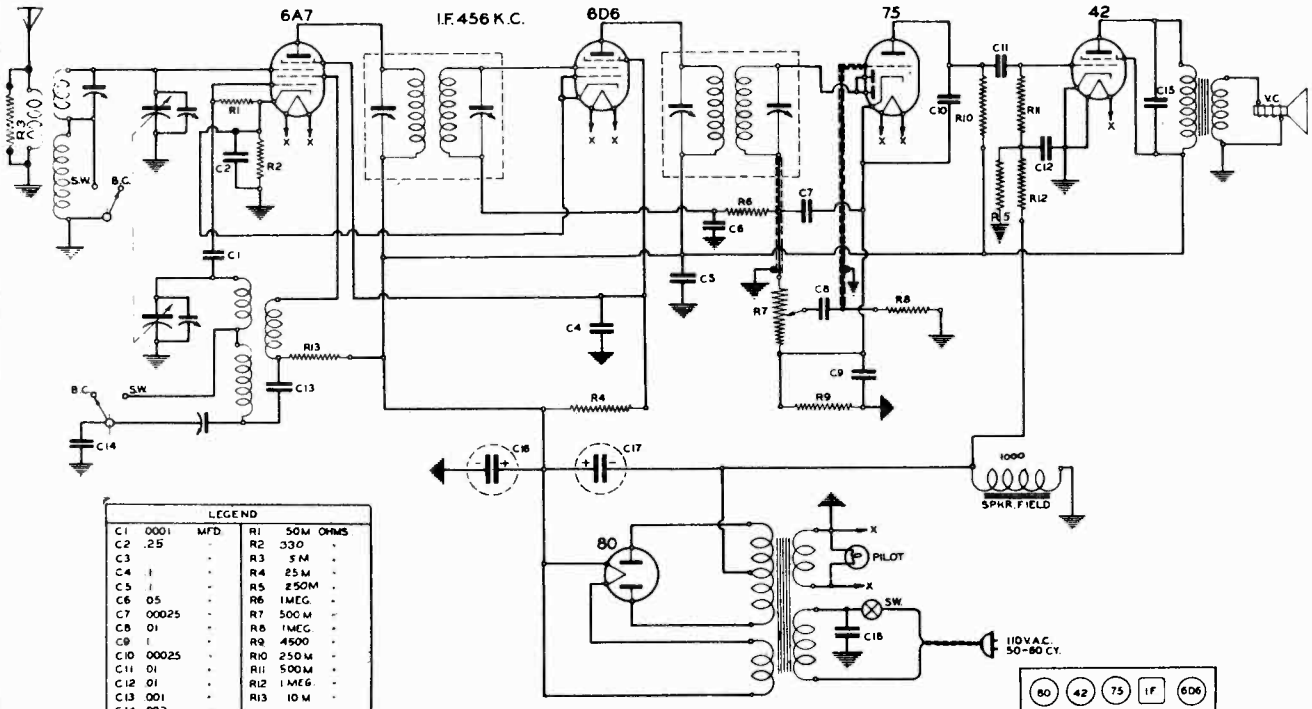


CODE	PART NO.	DESCRIPTION 404
1	10-234	R.F. COIL
2	19-124	2 GANG CONDENSER
3	10-233	ANTENNA COIL
4	24-117	VOLUME CONTROL & SWITCH
5	80-148	OUTPUT TRANSFORMER
6	79-244	SPEAKER
7	83-117	LINE CORD

CODE	PART NO.	DESCRIPTION
R1	60-184	150 OHM 1/2 WATT RESISTOR
R2	60-157	1 MEGOHM 1/2 WATT "
R3	60-183	6.8 MEGOHM 1/2 WATT "
C1	16-109	.05 MFD 200 V TUBULAR CONDENSER
C2	16-107	.05 MFD 400 V " "
C3	16-108	.02 MFD 600 V " "
C4	16-110	.01 " " "
C5	1504	.00025 MFD MICA CONDENSER
C6	18-230	FILTER CONDENSER

CONVENTIONAL ALIGNMENT: SEE SPECIAL SECTION VOL. VIII.

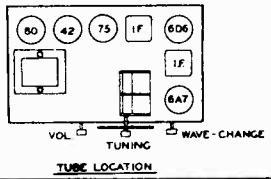
MODEL 510C



LEGEND					
C1	.0001	MFD.	R1	50M	OHMS
C2	.25	"	R2	330	"
C3		"	R3	5M	"
C4	.1	"	R4	85M	"
C5	.1	"	R5	250M	"
C6	.05	"	R6	1MEG.	"
C7	.00025	"	R7	500M	"
C8	.01	"	R8	1MEG.	"
C9	.1	"	R9	4500	"
C10	.00025	"	R10	250M	"
C11	.01	"	R11	500M	"
C12	.01	"	R12	1MEG.	"
C13	.001	"	R13	10M	"
C14	.002	"			
C15	.004	"			
C16	.8	"			
C17	.8	"			
C18	.1	"			

CIRCUIT DIAGRAM
5 TUBE A.C. SUPERHET.

DRAWN - W.J.	DATE - 6-6-36
APPD.	DRG. # 510-C



TUBE LOCATION

DESCRIPTION

This receiver is a 4 tube, 6 volt storage battery operated superheterodyne.

The tubes used are 6D86 as oscillator modulator, 6S7G as I.F. amplifier, a 6T7G as A. V. C. and audio rectifier and audio voltage amplifier and a 1F5G as power audio amplifier.

This receiver is made to cover the standard broadcast band, from 1730 K.C. to 535 K.C.

ALIGNMENT PROCEDURE

All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 10,000 ohms, to the two plate and screen pins of the 1F5G tube.

Connect the signal generator to the grid cap of the 6D8G tube through a .1 M.F. condenser. Connect the ground of the generator to the ground lead of the receiver. Set the dial to about 1000 K.C., feed in a 456 K.C. signal Adjust the first and second I.F. trimmers until the maximum output is obtained. This aligns the I.F.

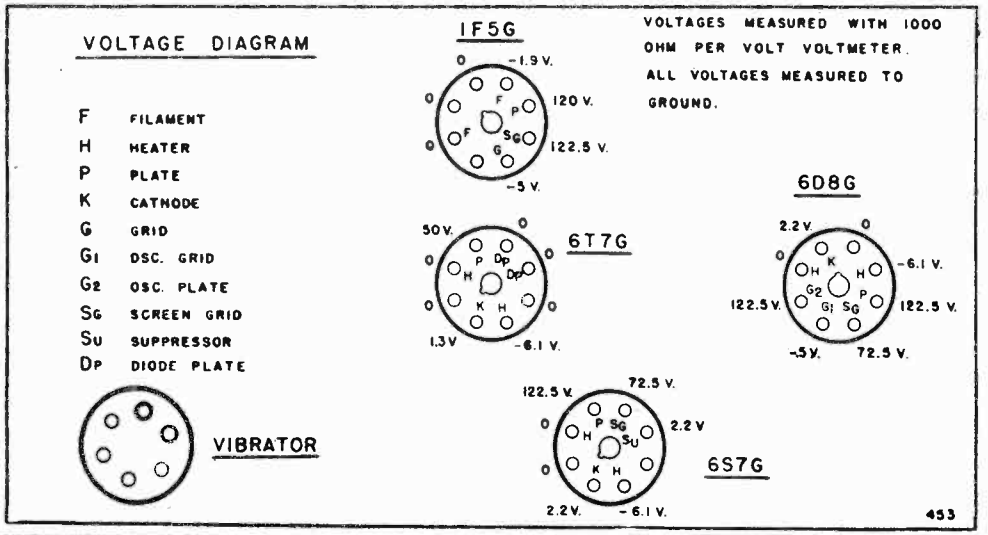
Turn the dial to the extreme high frequency end. Feed a 1740 K.C. signal to the receiver antenna lead through a .00025 M.F. mica condenser. Adjust the 1740 K.C. oscillator trimmer until maximum output is shown. Set the generator to 1400 K.C. and tune in this signal on the receiver. Then adjust the 1400 K.C. antenna trimmer to maximum output. This completes the alignment.

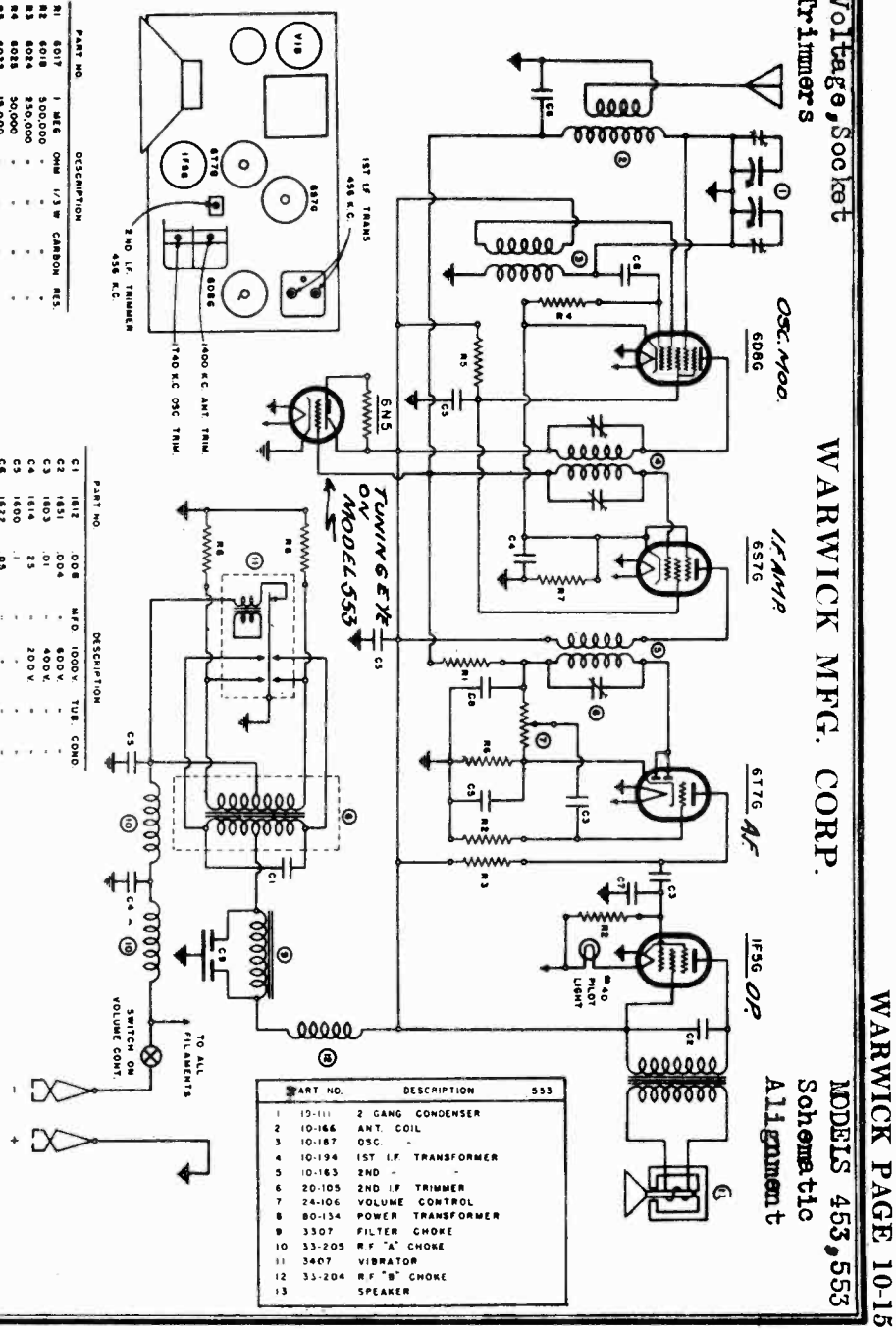
PART NO.	DESCRIPTION	
R1	6017	1 MEG
R2	6018	500,000
R3	6024	250,000
R4	6085	50,000
R5	6022	15,000
R6	6023	10,000
R7	6013	300
R8	6011	100

OHM 1/3 W CARBON RES.

PART NO.	DESCRIPTION	
C1	1812	.008
C2	1851	.004
C3	1803	.01
C4	1814	.25
C5	1800	.05
C6	1822	.25
C7	1504	.00025
C8	1501	.0001
C9	1845	DUAL 8

MFD 1000 V. TUB. COND.
400 V.
400 V.
200 V.
MICA CONDENSER
150 V. ELECTROLYTIC





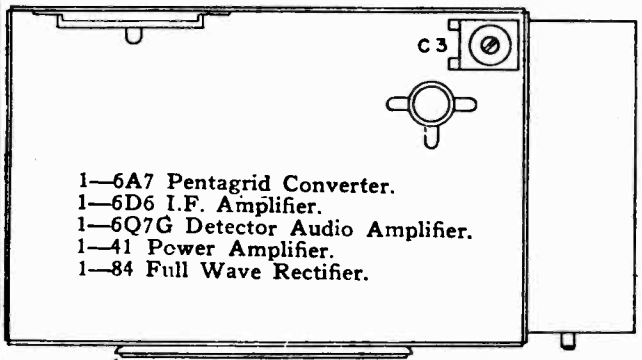
PART NO.	DESCRIPTION	553
1	15-111	2 GANG CONDENSER
2	10-166	ANT. COIL
3	10-167	OSC. -
4	10-194	IST I.F. TRANSFORMER
5	10-163	2ND - -
6	20-105	2ND I.F. TRIMMER
7	24-106	VOLUME CONTROL
8	80-134	POWER TRANSFORMER
9	3307	FILTER CHOKE
10	33-205	R.F. "A" CHOKE
11	3407	VIBRATOR
12	33-204	R.F. "B" CHOKE
13		SPEAKER

MODELS 559,579 with 150-Cycle Vibrator

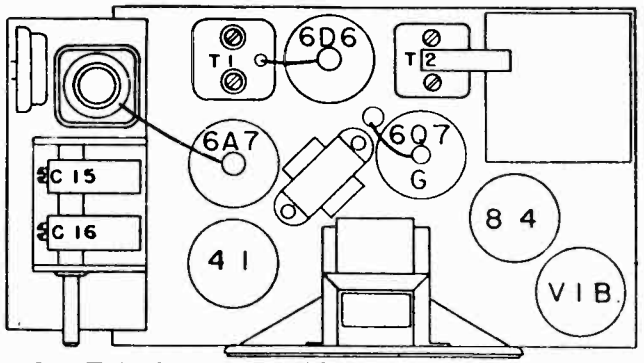
WARWICK MFG. CORP.

Schematic, Voltage, Socket Trimmers, Alignment

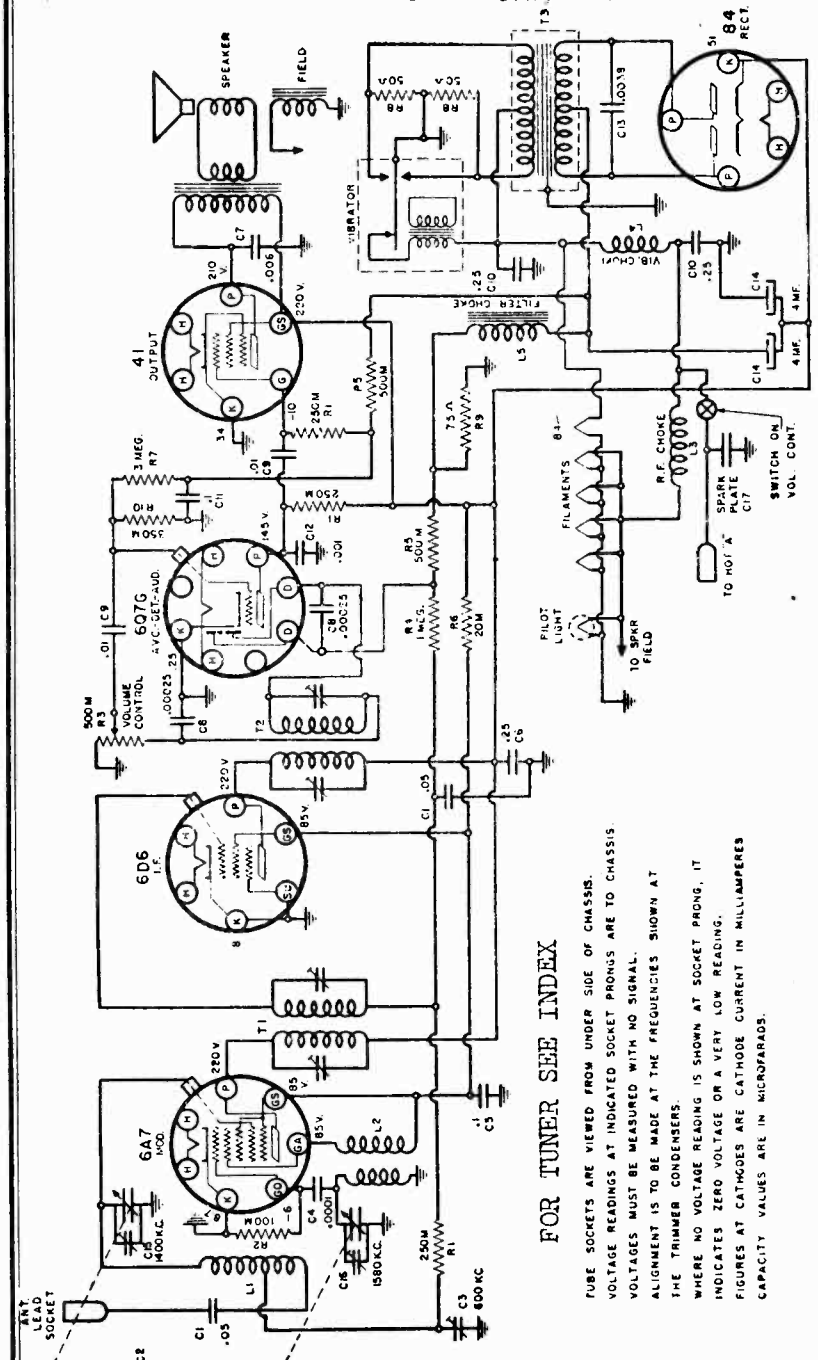
1—6A7 Pentagrid Converter.
1—6D6 I.F. Amplifier.
1—6Q7G Detector Audio Amplifier.
1—41 Power Amplifier.
1—84 Full Wave Rectifier.



LOCATIONS OF PARTS UNDER CHASSIS



LOCATIONS OF PARTS ON TOP OF CHASSIS



FOR TUNER SEE INDEX

TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS.
VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO CHASSIS
VOLTAGES MUST BE MEASURED WITH NO SIGNAL.
ALIGNMENT IS TO BE MADE AT THE FREQUENCIES SHOWN AT THE TRIMMER CONDENSERS.
WHERE NO VOLTAGE READING IS SHOWN AT SOCKET PRONG, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.
FIGURES AT CATHODES ARE CATHODE CURRENT IN MILLIAMPERES
CAPACITY VALUES ARE IN MICROFARADS.

ALIGNMENT PROCEDURE

PRELIMINARY

Output Meter Connections ..... Across Loud Speaker Voice Coil
Output Meter Reading to Indicate 1 Watt ..... 1.85 Volts
Generator Ground Lead Connection ..... Receiver Chassis
Dummy Antenna Value to Be in Series with Generator Output ..... See Chart Below
Connection of Generator Output Lead ..... See Chart Below
Generator Modulation ..... 30%, 400 Cycles
Position of Volume Control ..... Fully On

Position of Variable	Generator Frequency	Dummy Antenna	Generator Connection	Trimmer Adjustments (In Order Shown)	Trimmer Function
Closed	456 KC	.1 mfd.	6A7 Grid	T2, T1	I. F.
Fully Open	1580 KC	.0002 mfd.	Antenna Conn.	C16	Oscillator Trimmer
1400 KC	1400 KC	.0002 mfd.	Antenna Conn.	C15	Antenna Trimmer
600 KC	600 KC	.0002 mfd.	Antenna Conn.	C3	Antenna Padder

The variable condenser should be at 600 k.c. for antenna adjustment.

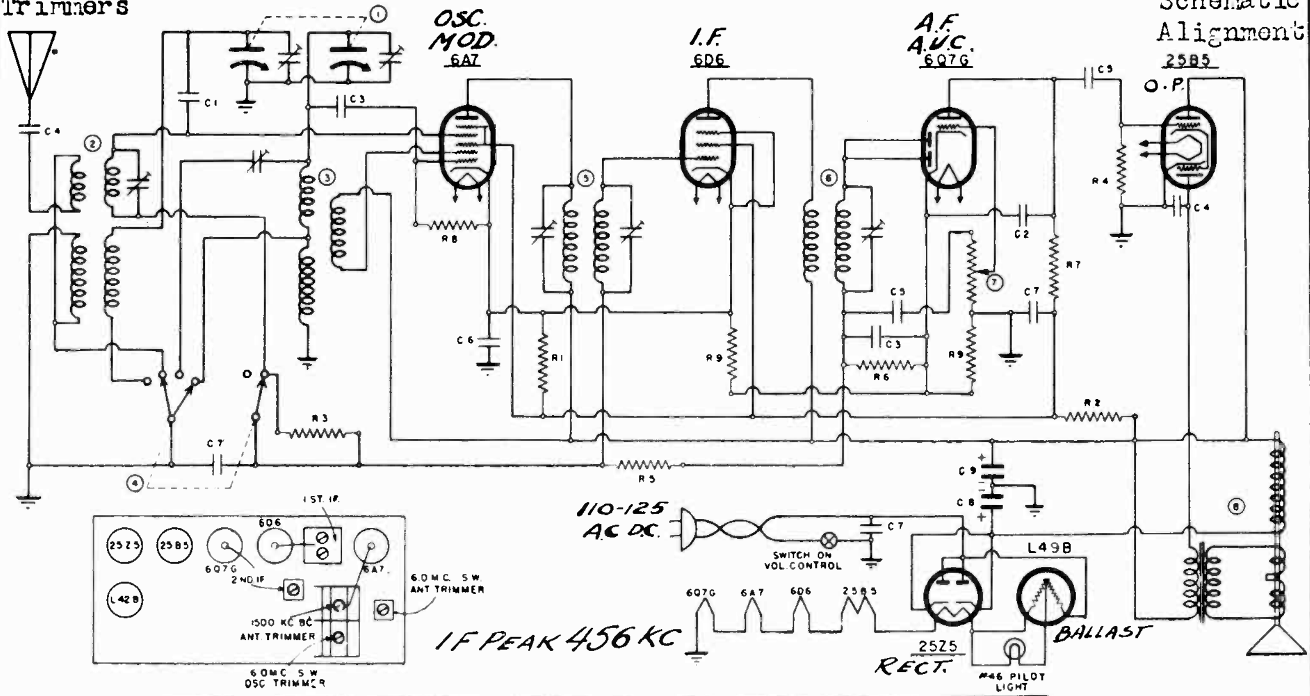
The alignment procedure should be repeated in the original order, step by step, to insure greater accuracy. A final adjustment of antenna padder condenser C3 is always made after the receiver is installed in the car, in order to match the car antenna.

Always keep the output power from the generator at its lowest possible value to prevent the A.V.C. of the receiver from interfering with accurate alignment.

Voltage, Socket
Trimmers

WARWICK MFG. CORP.

MODEL 610
Schematic
Alignment



PART NO		DESCRIPTION
R1	6104	5,000 OHM 1/2 WATT CARBON RES
R2	60-131	3,000 " " " " "
R3	6020	2 MEG " 1/3 " " "
R4	6017	1 M- " " " " "
R5	6018	500,000 " " " " "
R6	6024	250,000 " " " " "
R7	6056	200,000 " " " " "
R8	6025	50,000 " " " " "
R9	60093	50 " " " " " ±10%

PART NO		DESCRIPTION
C1	15-105	.00056 MFD MICA CONDENSER ±3%
C2	1504	.00025 " " "
C3	1501	.0001 " " "
C4	1651	.004 " 600V TUBULAR CONDENSER
C5	1603	.01 " 400V " "
C6	1614	.25 " 200V " "
C7	1622	.05 " " " "
C8	18-211	30 " " ELECTROLYTIC CONDENSER
C9	18-211	8 " " " "

PART NO		DESCRIPTION 610
1	19-114	2 GANG VARIABLE CONDENSER
2	10-174	ANT COIL
3	10-178	OSC COIL
4	69-109	WAVE BAND SWITCH
5	10-177	1ST IF TRANSFORMER
6	10-163	2ND IF TRANSFORMER
7	24-106	VOL. CONTROL WITH SWITCH
8	79-221	DYNAMIC SPEAKER

The two tuning bands covered are
1720 K.C. to 540 K.C.
6.2 M.C. to 2.28 M.C.

ALIGNMENT PROCEDURE

All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

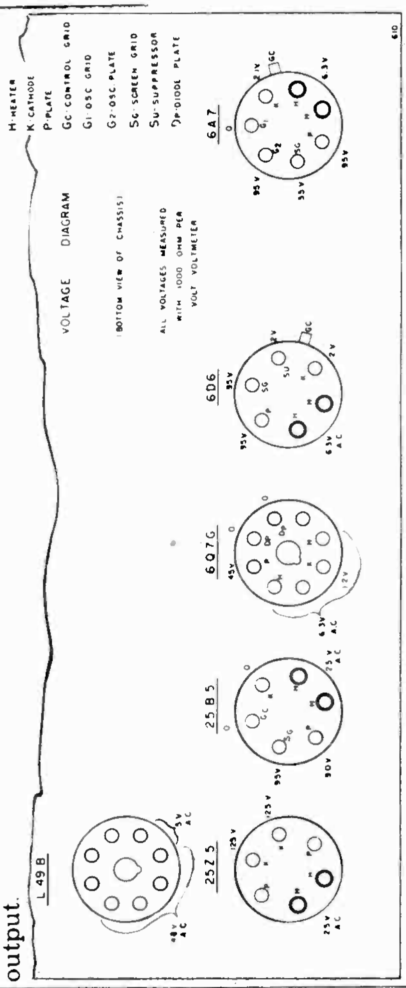
Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 7000 ohms, to the two small pins of the speaker plug. The output meter remains connected during the entire alignment procedure.

Connect the signal generator to the grid cap of the 6A7 tube through a .1 M.F. condenser. Connect the ground of the generator to the receiver chassis through another .1 M.F. condenser. With the wave switch on broadcast position and the dial set to about 1000 K.C., feed in a 456 K.C. signal. Adjust the trimmers of the first and second I.F. transformers until the maximum output is obtained. This aligns the I.F.

Turn the wave switch to the short wave position and set the dial to 6.0 M.C. Feed a 6.0 M.C. signal to the receiver antenna lead through a .00025 M.F. mica condenser. Tune the 6.0 M.C. Oscillator trimmer to give resonance. Two points may be found where this signal can be heard. The correct setting is the one where the trimmer is screwed the loosest. This may also be checked by turning the dial to about 5.0 M.C. where the signal should again be heard.

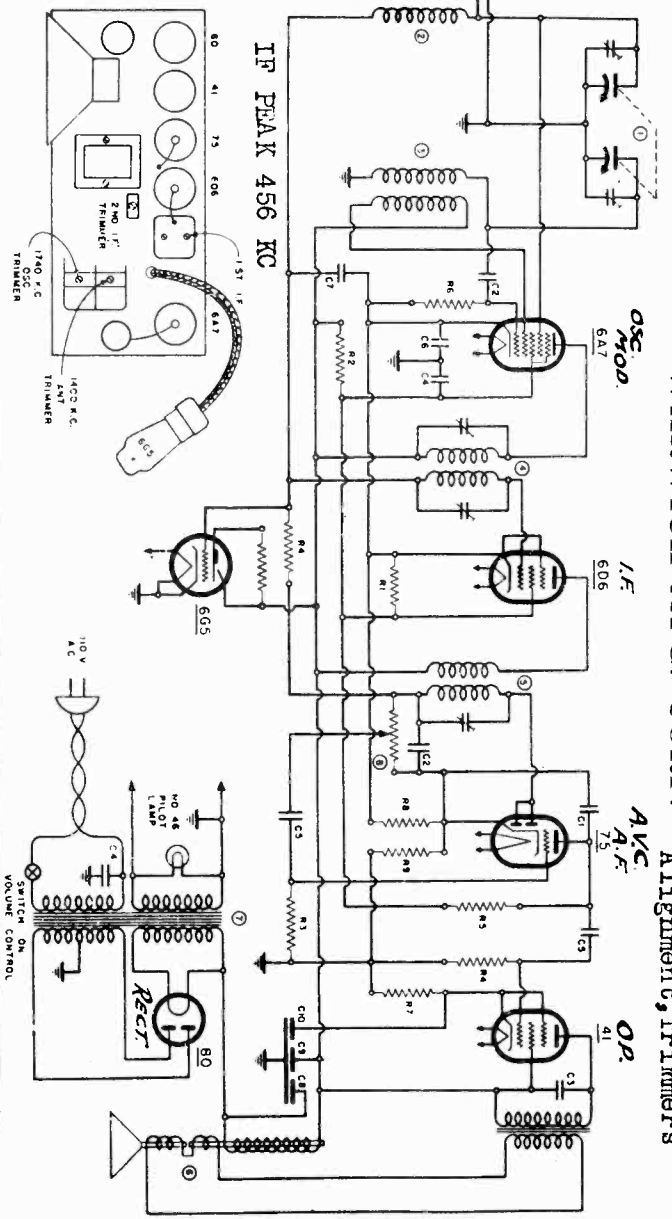
Then turn the wave switch to broadcast position and turn the dial to the extreme high frequency end. Feed in a 1720 K.C. signal and adjust the broadcast oscillator trimmer, which is located under the receiver at the wave switch, to resonance. Then set the signal generator to 1500 K.C. and tune in this signal on the receiver. Adjust the 1500 K.C. antenna trimmer for maximum output.

Again turn the wave switch to short wave position and tune in a 6.0 M.C. signal from the generator. Adjust the 6.0 M.C. antenna trimmer to maximum output.



WARWICK MFG. CORP. Schematic, Voltage, Socket Alignment, Trimmers

IF PEAK 456 KC



This receiver is made to cover from 1740 K.C. to 535 K.C.

PART NO.		DESCRIPTION
R1	6117	25,000 OHM 1/2 WATT CARBON RES
R2	6103	10,000 " " " "
R3	6017	1 MEG. " " " "
R4	6018	500,000 " " " "
R5	6036	200,000 " " " "
R6	6025	50,000 " " " "
R7	6032	600 " " " "
R8	60-122	175 " " " "
R9	60038	50 " " " "
C1	1504	.00025 MFD. MICA CONDENSER
C2	1501	.0001 " " "
C3	1651	.004 " " " 600 V PAPER CONDENSER
C4	1607	.05 " " " 400 V " "
C5	1603	.01 " " " " " "
C6	1614	.25 " " " 200 V " "
C7	1622	.05 " " " " " "
C8		80 " " " 250 V ELECTROLYTIC COND.
C9	18-102	40 " " " " " "
C10		50 " " " 25 V. " "

PART NO.		DESCRIPTION
1	19-111	2 GANG VARIABLE CONDENSER
2	10-166	ANTENNA COIL
3	10-167	OSCILLATOR COIL
4	10-162	1ST I.F. TRANSFORMER
5	10-163	2ND I.F. TRANSFORMER
6	75-239	SPEAKER
7	80-104	POWER TRANSFORMER
8	24-104	VOLUME CONTROL WITH SWITCH

ALIGNMENT PROCEDURE

All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 7000 ohms, to plate and screen pins of output tube, or a low voltage A.C. meter may be used connected across speaker voice coil. The output meter remains connected during the entire alignment procedure.

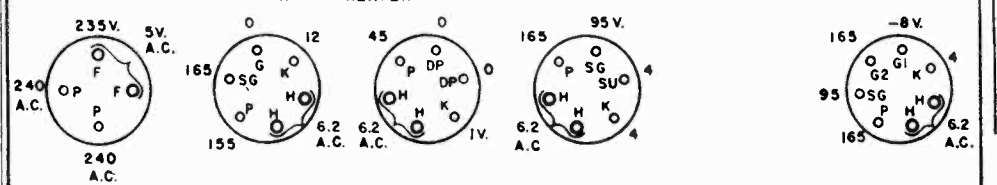
Connect the signal generator to the grid cap of the 6A7 tube through a .1 M.F. condenser. Connect the ground of the generator to the ground lead of the receiver. Set the dial to about 1000 K.C., feed in a 456 K.C. signal. Adjust first and second I.F. trimmers for maximum output. Refer to chassis lay-out for location of trimmers.

Turn the dial to the extreme high frequency end. Feed a 1740 K.C. signal to the receiver antenna lead through a .00025 M.F. mica condenser. Adjust the 1740 K.C. oscillator trimmer until maximum output is shown. Set the generator to 1400 K.C. and tune in this signal on the receiver. Then adjust the 1400 K.C. antenna trimmer to maximum output. This completes the alignment.

VOLTAGES MEASURED WITH 1000 OHM PER VOLT VOLTMETER.
ALL VOLTAGES EXCEPT HEATERS MEASURED TO GROUND.

G - - - GRID
G1 - - OSCILLATOR GRID
G2 - - OSCILLATOR PLATE
SG - - SCREEN GRID
SU - - SUPPRESSOR GRID
P - - - PLATE
DP - - DIODE PLATE
K - - CATHODE
H - - HEATER

(BOTTOM VIEW OF CHASSIS)



WARWICK MFG. CORP.

MODELS 648, 648B, 655B
Schematic, Voltage
Socket, Trimmers
Alignment

ALIGNMENT PROCEDURE

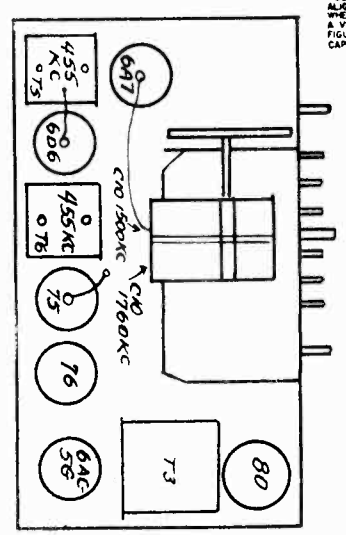
All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 7000 ohms, to plate of output tube and B+, or a low voltage A. C. meter may be used connected across speaker voice coil. The output meter remains connected during the entire alignment procedure.

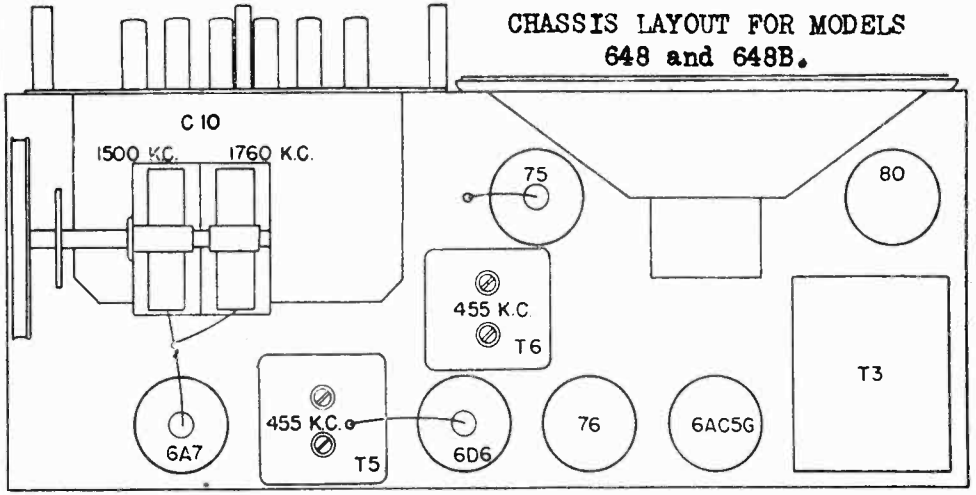
Connect the signal generator to the grid cap of the 6A7 tube through a .1 M.F. condenser. Connect the ground of the generator to the ground lead of the receiver. Set the dial to about 1000 K.C., feed in a 455 K.C. signal. Adjust first and second I.F. trimmers for maximum output. Refer to chassis lay-out for location of trimmers.

Turn the dial to the extreme high frequency end. Feed a 1760 K.C. signal to the receiver antenna lead through a .00025 M.F. mica condenser. Adjust the 1760 K.C. oscillator trimmer until maximum output is shown. Set the generator to 1500 K.C. and tune in this signal on the receiver. Then adjust the 1500 K.C. antenna trimmer to the maximum output. This completes the alignment.

CHASSIS LAYOUT FOR MODEL 655B.



CHASSIS LAYOUT FOR MODELS 648 and 648B.



CODE	PART NO	DESCRIPTION
R1	60-185	22M OHM 1/3 WATT RESISTOR
R2	60-178	470M " " "
R3	60-186	33M " " "
R4	60-180	220M " " "
R5	60-179	2.2 MEGOHM 1/3 WATT RESISTOR
R6	60-177	47 M OHM 1/3 WATT RESISTOR
R7	60-187	45 " 1/2 " " ±10%
R8	60-121	90 " " " ±10%
R9	24-121	1 MEGOHM VOLUME CONTROL & SW
R10	26-117	500M OHM TONE CONTROL

CODE	PART NO	DESCRIPTION
C1	1501	100 MMF MICA CONDENSER
C2	16-116	1 MFD 400 V TUBULAR CONDENSER
C3	1604	.04 MFD 600V " "
C4	1622	.05 " 200V " "
C5	1651	.004 MFD 600V " "
C6	16-108	.02 " " " "
C7	1607	.05 " 400V " "
C8	16-123	.02 " 200V " "
C9	18-226	10 X 10 MFD 400 W.V. ELECTROLYTIC CONDENSER
C10	19-131	2 GANG VARIABLE CONDENSER

CODE	PART NO	DESCRIPTION
T1	10-235	ANTENNA COIL
T2	20-236	OSCILLATOR COIL
T3	80-159	POWER TRANSFORMER
T5	10-227	1ST I.F. "
T6	10-228	2ND I.F. "
		SPEAKER

FOR TUNER SEE INDEX

This receiver is made to cover from 1740 K.C. to 540 K.C.

MODEL 654 WARWICK MFG. CORP. Trimmers, Alignment
Schematic, Voltage, Socket

This receiver is made to cover 3 tuning bands, the standard broadcast band which ranges from 1680 K.C. to 535 K.C., the middle or police band which has a frequency range of from 5.4 M.C. to 1.7 M.C. and high frequency or foreign band which is from 19 M. C. to 5.0 M.C.

This receiver is a 6 tube, 6 volt storage battery operated superheterodyne.

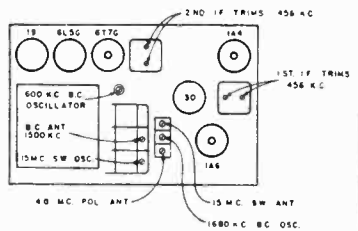
ALIGNMENT PROCEDURE

All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

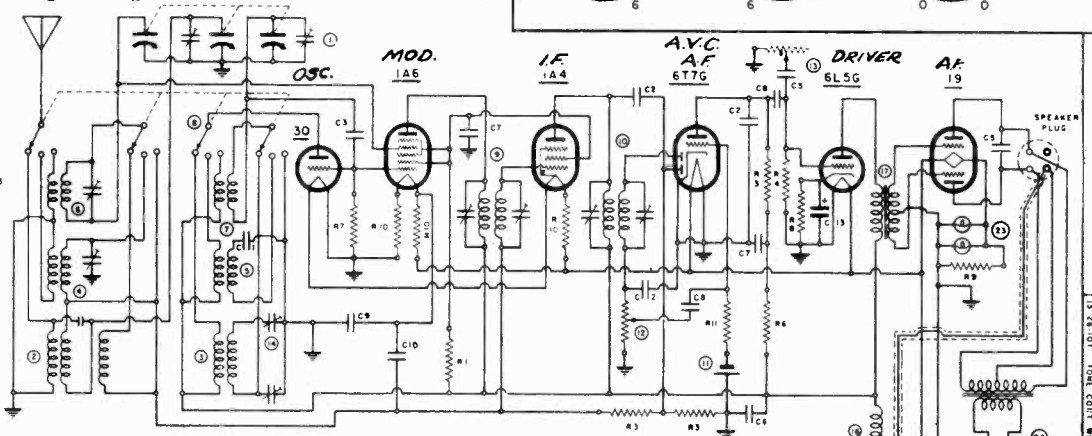
Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 10,000 ohms, to the two small pins of the speaker plug. The output meter remains connected during the entire alignment procedure.

Connect the signal generator to the grid cap of the 1A6 tube through a 1 M.F. condenser. Connect the ground of the generator to the ground post of the receiver. With the wave switch on broadcast position and the dial set to about 1000 K.C., feed in a 456 K.C. signal. Adjust the trimmers on top of the first and second I.F. transformers until the maximum output is obtained. This aligns the I.F.

Leaving the signal generator connected to the grid cap of the 1A6, turn the wave switch to the right hand (short wave) position. Set the dial and the signal generator to 15.0 M.C. Tune in the signal by adjusting the 15.0 M.C. oscillator trimmer. The signal will be heard at two different settings of the trimmer. The proper setting is the one where the signal is heard when the trimmer is the loosest. Also when the dial of the receiver is turned the signal will be heard again at about 14.0 M.C. If the signal is heard at about 16.0 M.C. on the dial instead of 14.0 M.C. the wrong setting has been used and should be corrected.

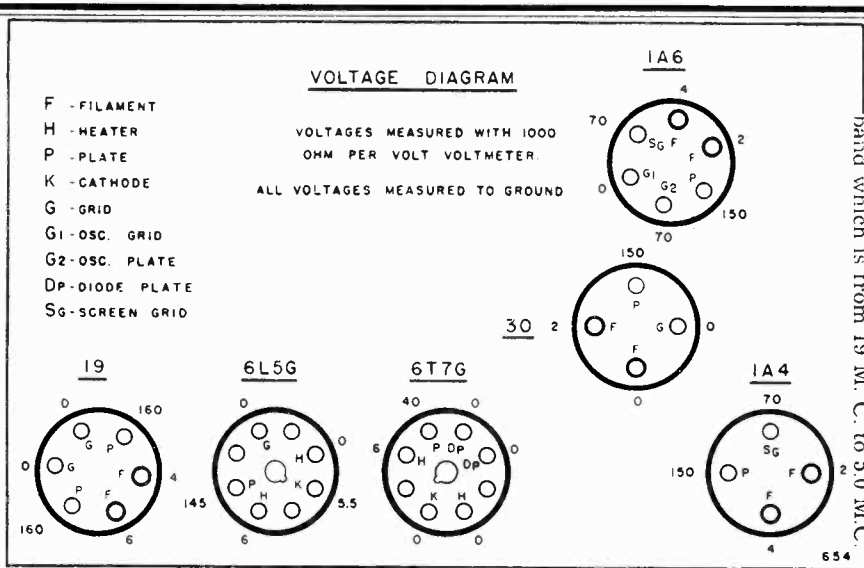


IF PEAK 456 KC



Set the wave switch on broadcast position and turn the dial to the extreme high frequency end. Feed a 1680 K.C. signal to the receiver antenna post through a .00025 M.F. mica condenser. Adjust the 1680 K.C. broadcast oscillator trimmer for maximum output. Set the generator to 1500 K.C. and tune in this signal on the receiver. Then adjust the 1500 K.C. broadcast antenna trimmer for maximum output. Set the generator to 600 K.C. and adjust the 600 K.C. broadcast oscillator pad to maximum output **while tuning the receiver back and forth across the signal** from the generator. This completes the alignment of the broadcast band.

The police band is aligned by feeding a 4.0 M.C. signal to the receiver antenna lead through the 00025 condenser. Turn the wave switch to the center position and tune the receiver to this signal. Adjust the 4.0 M.C. police antenna trimmer for best output.



The short wave band is aligned in the same way using a 15 M.C. signal and adjusting the 15 M.C. short wave antenna trimmer after having turned the wave switch to the right hand position.

PART NO	DESCRIPTION
C1	15-106 .0001 MFD MICA CONC +5%
C2	1504 .00025 " " "
C3	1503 .00025 " " "
C4	1604 .01 MFD 600V TUBULAR COND
C5	1611 .006 " " "
C6	1616 .25 " 400V "
C7	1603 .01 " " "
C8	1603 " " "
C9	1602 .25 " 200V "
C10	1400 " " "
C11	1655 .5 " 150V "
C12	1845 8 " 150V ELECTROLYTIC
C13	15-100 10 " 25V TUB ELECT

PART NO	DESCRIPTION
R1	6101 15000 OHM 1/2W CARBON RES
R2	6101 " " " "
R3	6017 1 MEG " 1/3W "
R4	6018 500000 " " "
R5	6624 250000 " " "
R6	6026 100000 " " "
R7	6025 50000 " " "
R8	6006 1500 " " "
R9	6005 1000 " " "
R10	60-102 3300 " " "
R11	6020 2 MEG " 1/3W CARBON RES

PART NO	DESCRIPTION
	1/2W WIRE WOUND RES
11	4600
12	24-105 VOLUME CONTROL
13	26-107 TONE CONT WITH SWITCH

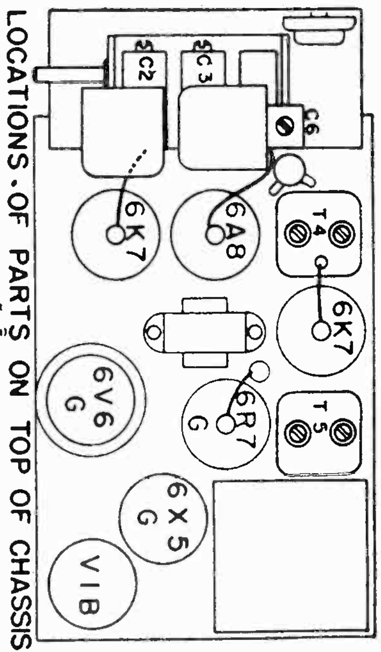
PART NO	DESCRIPTION
1	10-121 3 GANG CONDENSER
2	10-104 OSC. COIL
3	10-180 B.C. OSC. COIL
4	10-182 POL ANT COIL
5	10-181 POL OSC COIL
6	10-183 SW ANT COIL
7	10-184 S.W. OSC COIL
8	69-107 WAVE SWITCH
10	10-145 2ND I.F. TRANSFORMER
	B+&S CELL

PART NO	DESCRIPTION
14	20-100 B.C. OSC. PAD
15	33-204 R.F. CHOKE
16	33-204 " " "
17	8010 P.P. AUDIO TRANS
18	3307 FILTER CHOKE
19	8061 POWER TRANS
20	3407 VIBRATOR
21	R3-103 BATTERY CABLE
22		SPEAKER
23		NO. 40 DIAL LIGHT

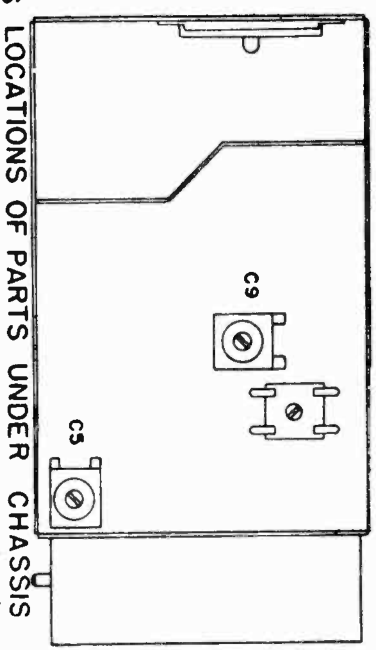
PART NO	DESCRIPTION 654

WARWICK MFG. CORP.

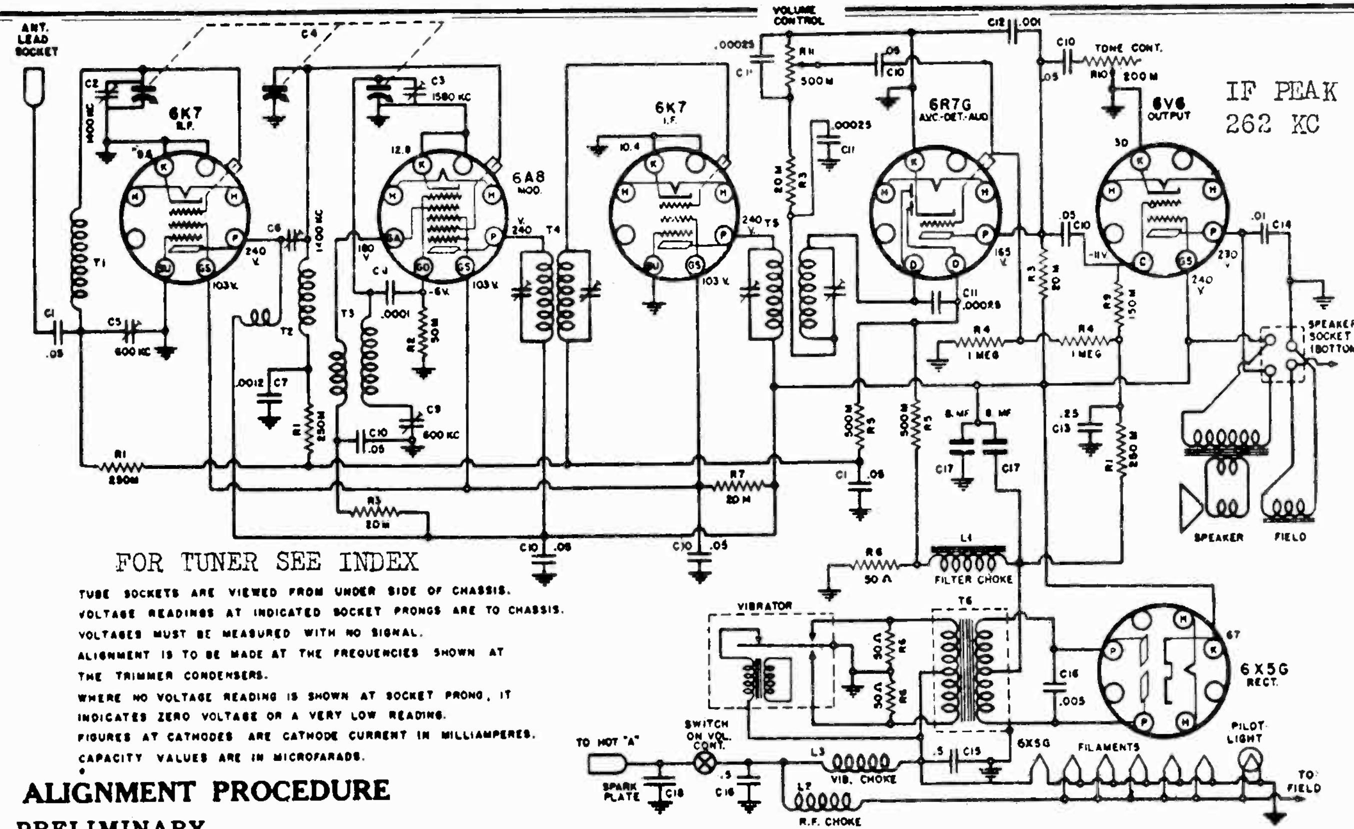
MODEL 659
Schematic, Voltage, Socket
Alignment, Trimmers



LOCATIONS OF PARTS ON TOP OF CHASSIS



LOCATIONS OF PARTS UNDER CHASSIS



FOR TUNER SEE INDEX

TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS.
VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO CHASSIS.
VOLTAGES MUST BE MEASURED WITH NO SIGNAL.
ALIGNMENT IS TO BE MADE AT THE FREQUENCIES SHOWN AT THE TRIMMER CONDENSERS.
WHERE NO VOLTAGE READING IS SHOWN AT SOCKET PRONG, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.
FIGURES AT CATHODES ARE CATHODE CURRENT IN MILLIAMPERES.
CAPACITY VALUES ARE IN MICROFARADS.

ALIGNMENT PROCEDURE

PRELIMINARY

Output Meter Connections	Across Loud Speaker Voice Coil
Output Meter Reading to Indicate 1 Watt	1.85 Volts
Generator Ground Lead Connection	Receiver Chassis
Dummy Antenna Value to Be in Series with Generator Output	See Chart Below
Connection of Generator Output Lead	See Chart Below
Generator Modulation	30%, 400 Cycles
Position of Volume Control	Fully On

Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Trimmer Adjustment (In Order Shown)	Trimmer Function
Closed	262 KC	.1 mfd.	6A8 Grid	T5, T4	I.F.
Fully Open	1580 KC	.0002 mfd.	Antenna Conn.	C3	Oscillator Trimmer
1400 KC	1400 KC	.0002 mfd.	Antenna Conn.	C2, C6	Ant. & R.F. Trimmer
600 KC (Rock)	600 KC	.1 mfd.	6K7 R.F. Grid	C9	Padder Oscillator
600 KC	600 KC	.0002 mfd.	Antenna Conn.	C5	Padder Antenna

The variable condenser should be rocked back and forth a degree or two while making the 600 K.C. adjustment on oscillator padder only.

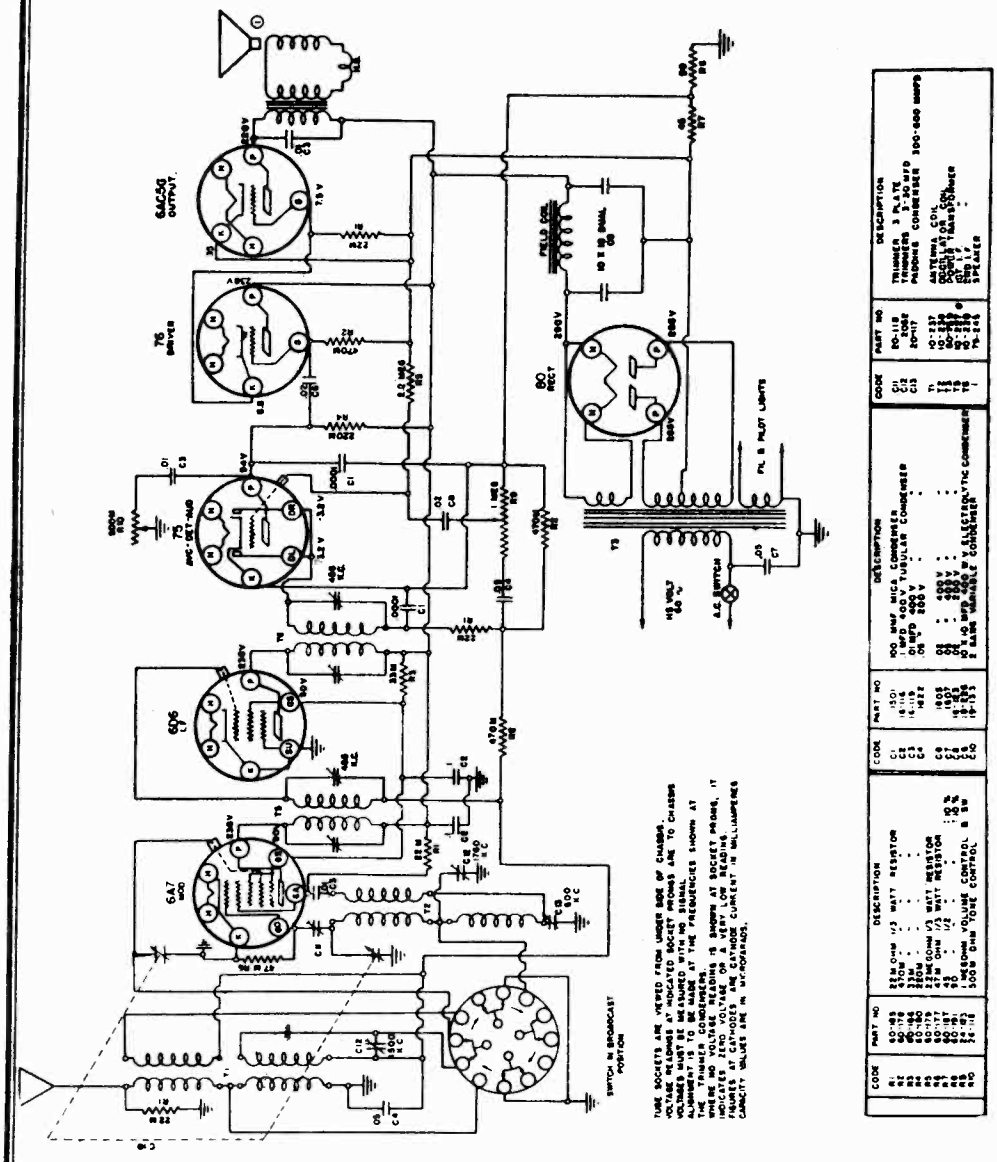
The alignment procedure should be repeated in the original order, step by step, to insure greater accuracy.

A final adjustment of the antenna padder condenser C5 is always made after the receiver is installed in the car, in order to match the car antenna.

Always keep the output power from the generator at its lowest possible value to prevent the A.V.C. of the receiver from interfering with accurate alignment.

MODELS 668,668B
Schematic,Voltage,Socket Alignment,Trimmers

WARWICK MFG. CORP.

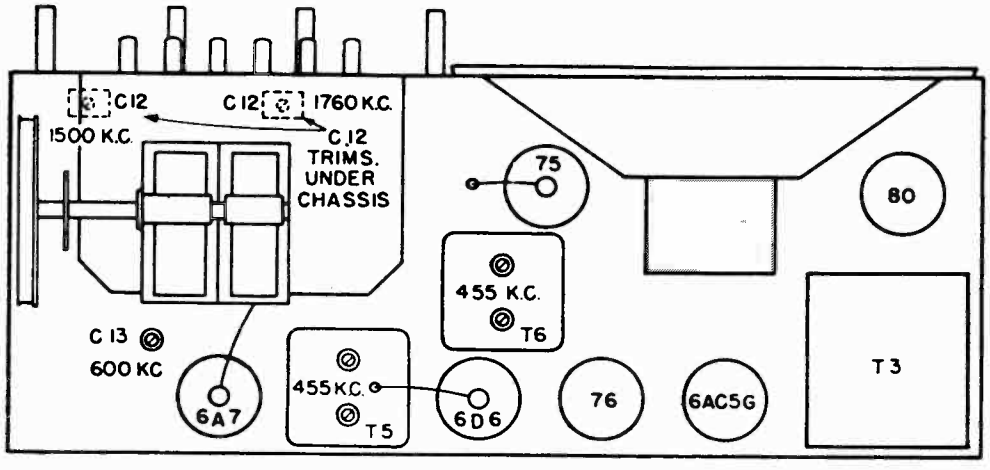


DESCRIPTION

This receiver is a 6-tube alternating current operated superheterodyne.

The tubes used are—a 6A7 as oscillator modulator, a 6D6 as I. F. amplifier, a 75 as A. V. C. and audio rectifier and audio voltage amplifier, a 76 as a direct coupled driver, a 6AC5G as a power audio amplifier, and a 80 as a power rectifier.

This receiver is made to cover two tuning bands—the standard broadcast band which ranges from 1740 KC to 540 KC, and the short wave band which has a freugency range of from 24 MC to 5.9 MC.



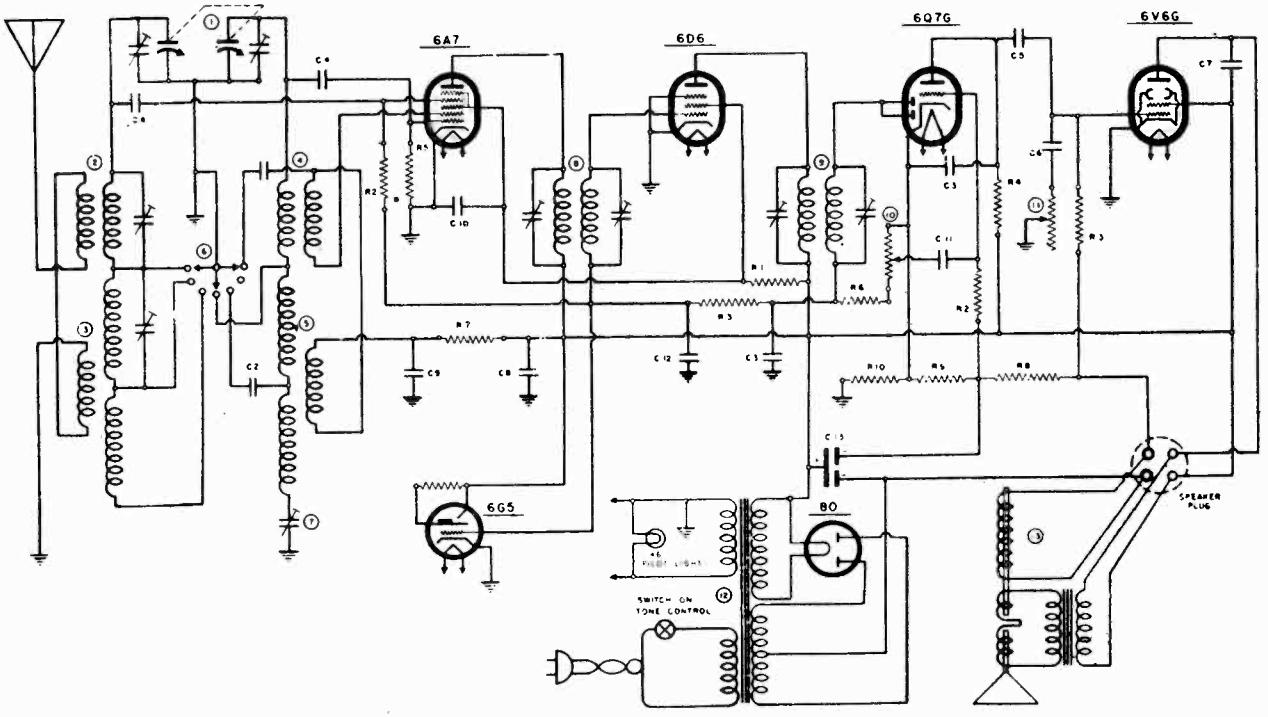
FOR TUNER SEE INDEX

ALIGNMENT

FOLLOW PROCEDURE AS FOR MODEL 648 BUT ALIGN OSC-PAD,(C13 shown on chassis layout above) AT 600 KC as a final adjustment.

WARWICK MFG. CORP.

MODEL 683
Schematic, Voltage, Socket
Trimmers, Alignment



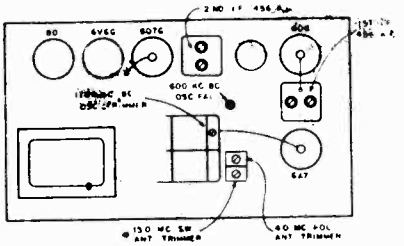
ALIGNMENT

IF Through 0.1 mfd. dummy antenna, adjust trimmers at 456 KC.

BC Adjust osc. trimmer at 1760 KC through 0.0025 dummy. Adjust padders at 600 KC.

POLICE Through 0.00025 mfd. dummy, adjust antenna trimmer at 4 MC.

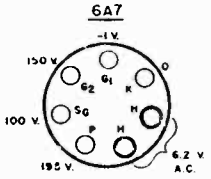
Short Wave Adjust antenna trimmer at 15 MC.

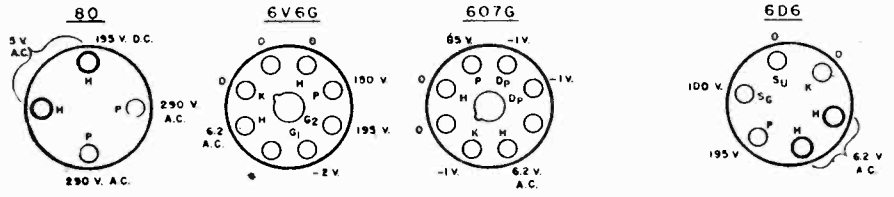


VOLTAGE DIAGRAM

H HEATER
K CATHODE
P PLATE
Gc CONTROL GRID
G1 OSC. GRID
Gp OSC. PLATE
Sg SCREEN GRID
Su SUPPRESSOR
Dp DIODE PLATE

(BOTTOM VIEW OF CHASSIS)
ALL VOLTAGES MEASURED WITH 1000 OHM PER VOLT VOLTMETER





683

1	19-115	2 GANG CONDENSER	
2	10-126	S.W. ANT. COIL	
3	10-128	B.C. & POL. ANT. COIL	
4	10-127	S.W. OSC. COIL	
5	10-129	B.C. & POL. OSC. COIL	
6	69-196	WAVE BAND SWITCH	
7	20-100	B.C. OSC. PADDING COND.	
8	10-175	1ST I.F. TRANSFORMER	
9	10-176	2ND I.F. TRANSFORMER	
10	24-105	VOL. CONTROL	
11	26-108	TONE CONTROL WITH SWITCH	
12	80-137	POWER TRANSFORMER	
13		SPEAKER	

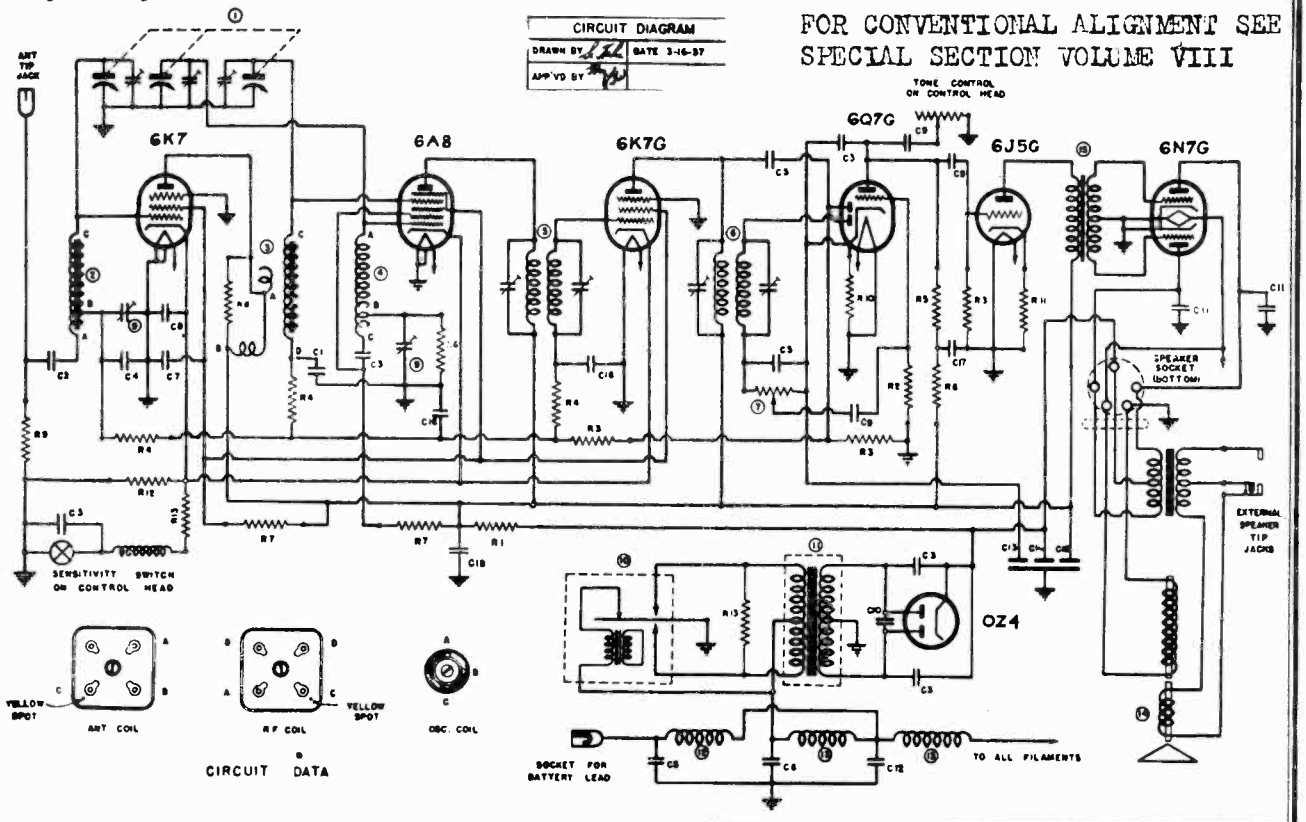
R1	6821	20,000 OHMS	W. CARBON RES.
R2	6020	2 MEG.	
R3	6018	500,000	
R4	6024	250,000	
R5	6026	40,000	
R6	6050	20,000	
R7	6021	10,000	
R8	60-140	150	1 W. WIRE
R9	60-103	50	1/2 W.
R10	60-126	16	

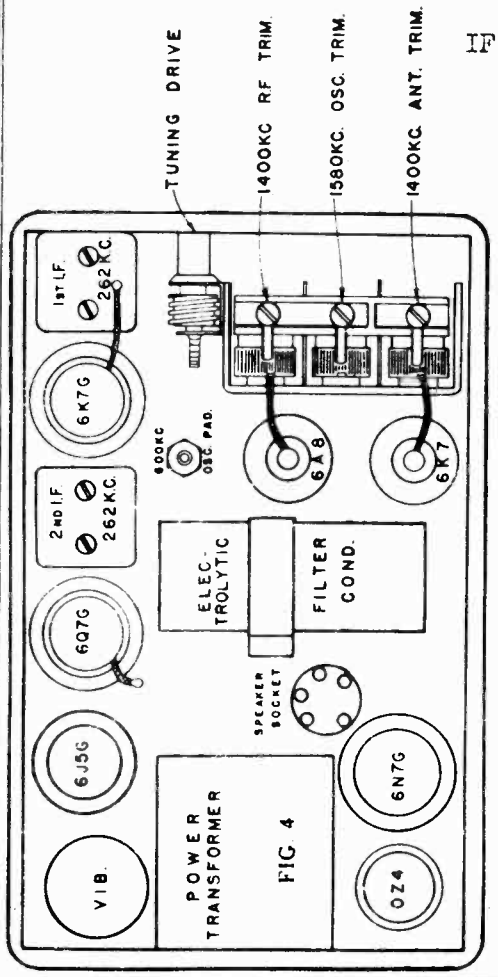
C1	1509	002 MFD. MICA CONDENSER	±5%
C2	15-100	00025 " " "	"
C3	1584	00025 " " "	"
C4	1501	0001 " " "	"
C5	1604	.01 " PAPER COND.	600 V.
C6	1811	.006 " " "	"
C7	1851	.008 " " "	"
C8	1616	.25 "	400 V.
C9	1601-A	1 " "	"
C10	1607	.05 " "	"
C11	1603	.01 " "	"
C12	1622	.05 "	200 V.
C13	10-213	8 "	300 V. DUAL ELECTROLYTIC

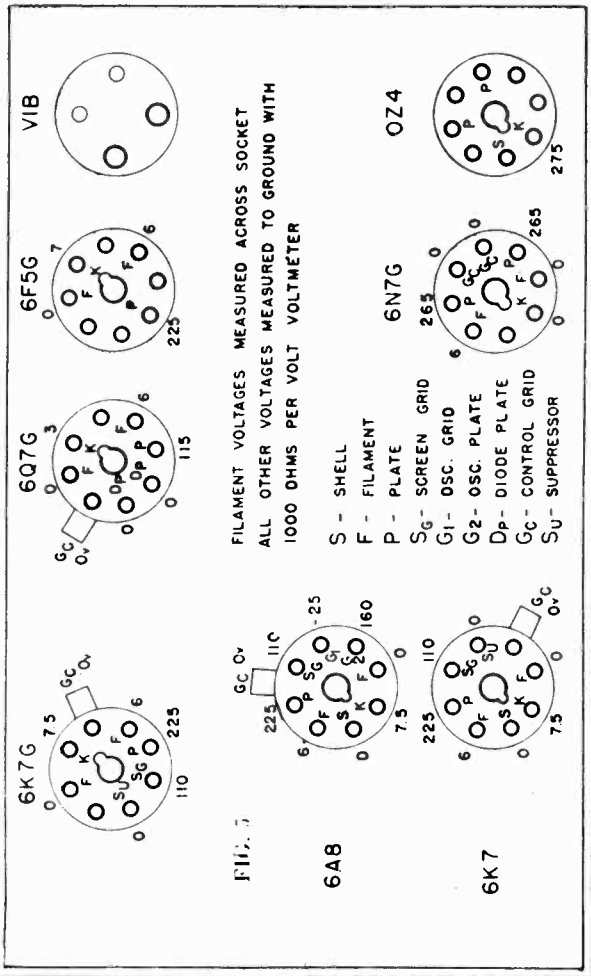
MODEL 746
Schematic, Voltage, Socket Alignment, Trimmers

WARWICK MFG. CORP.

FOR CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOLUME VIII

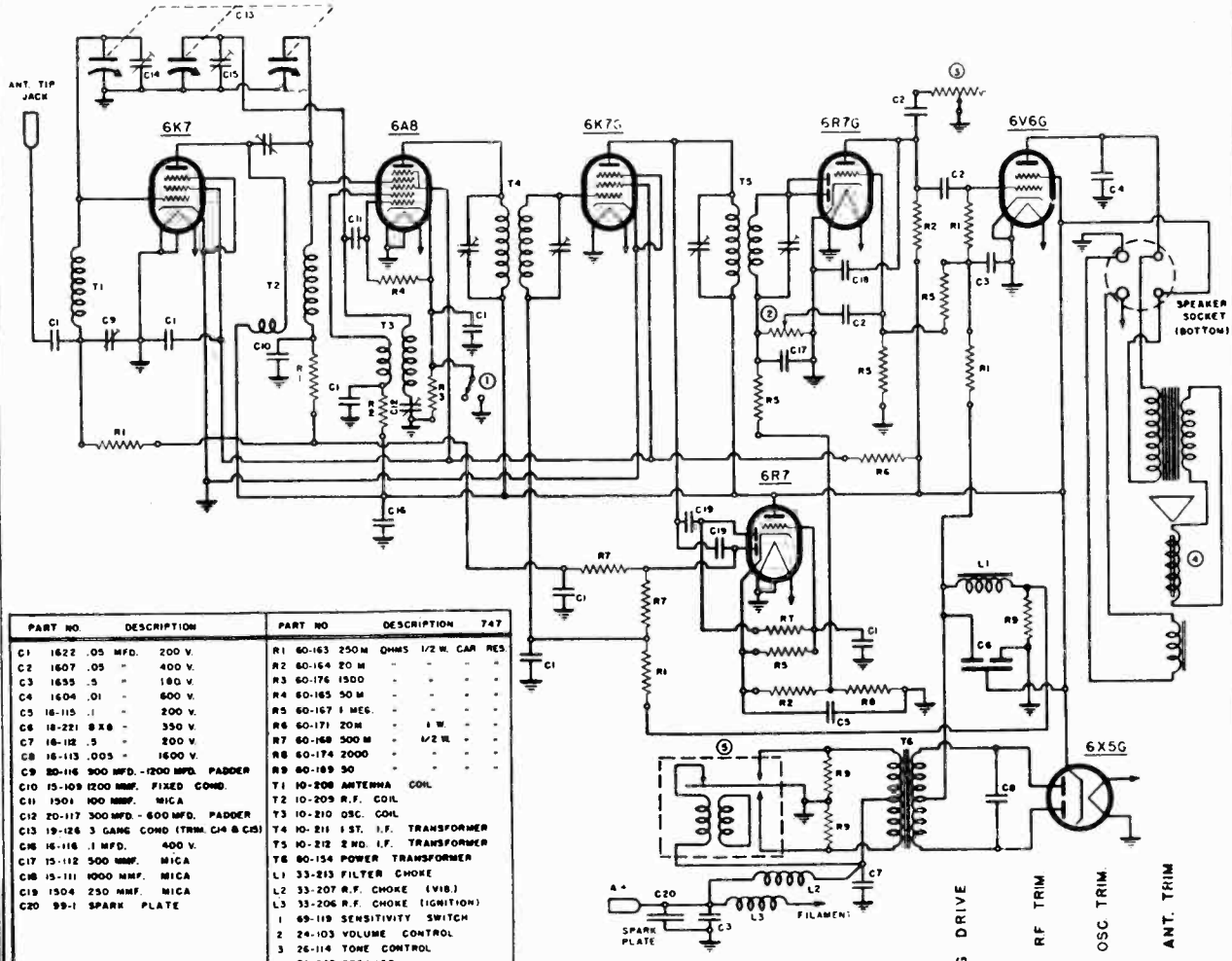






WARWICK MFG. CORP.

MODEL 747
Schematic, Voltage, Socket
Alignment, Trimmers



PART NO.	DESCRIPTION
C1 1622 .05 MFD. 200 V.	
C2 1607 .05 " 400 V.	
C3 1655 .5 " 180 V.	
C4 1604 .01 " 600 V.	
C5 16-115 .1 " 200 V.	
C6 18-221 8 X 8 " 350 V.	
C7 16-112 .5 " 200 V.	
C8 16-113 .005 " 1600 V.	
C9 20-116 900 MFD. - 1200 MFD. PADDER	
C10 15-109 1200 MMF. FIXED COND.	
C11 1501 100 MMF. MICA	
C12 20-117 300 MFD. - 600 MFD. PADDER	
C13 19-126 3 GANG COND (TRIM. C14 & C15)	
C16 16-116 .1 MFD. 400 V.	
C17 15-112 500 MMF. MICA	
C18 15-111 1000 MMF. MICA	
C19 1504 250 MMF. MICA	
C20 99-1 SPARK PLATE	

PART NO	DESCRIPTION 747
R1 60-163 250 M OHMS 1/2 W. CAR RES.	
R2 60-164 20 M " " " "	
R3 60-176 1500 " " " "	
R4 60-165 50 M " " " "	
R5 60-167 1 MEG. " " " "	
R6 60-171 20M " 1 W. " "	
R7 60-168 500 M " 1/2 W. " "	
R8 60-174 2000 " " " "	
R9 60-189 50 " " " "	
T1 10-208 ANTENNA COIL	
T2 10-209 R.F. COIL	
T3 10-210 OSC. COIL	
T4 10-211 1 ST. I.F. TRANSFORMER	
T5 10-212 2 ND. I.F. TRANSFORMER	
T6 80-154 POWER TRANSFORMER	
L1 33-213 FILTER CHOKE	
L2 33-207 R.F. CHOKE (VIB.)	
L3 33-206 R.F. CHOKE (IGNITION)	
1 69-119 SENSITIVITY SWITCH	
2 24-103 VOLUME CONTROL	
3 26-114 TONE CONTROL	
4 79-242 SPEAKER	
5 34-101 VIBRATOR	

ALIGNMENT

IF Through 0.1 mfd. dummy antenna, adjust trimmers at 262 KC.

BC Through 0.00025 dummy, adjust osc. trimmer at 1580 KC. Adjust antenna trimmer at 1400 KC. Adjust padder at 600 KC. Adjust antenna compensator at 600 KC. for best sensitivity with signal.

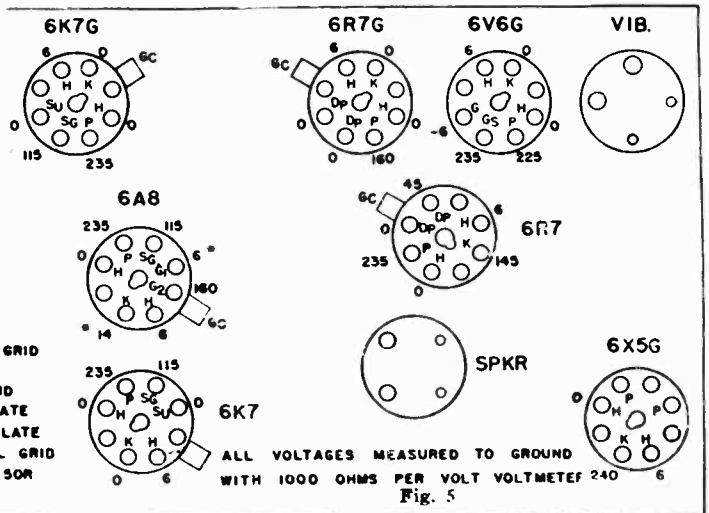


Fig. 5

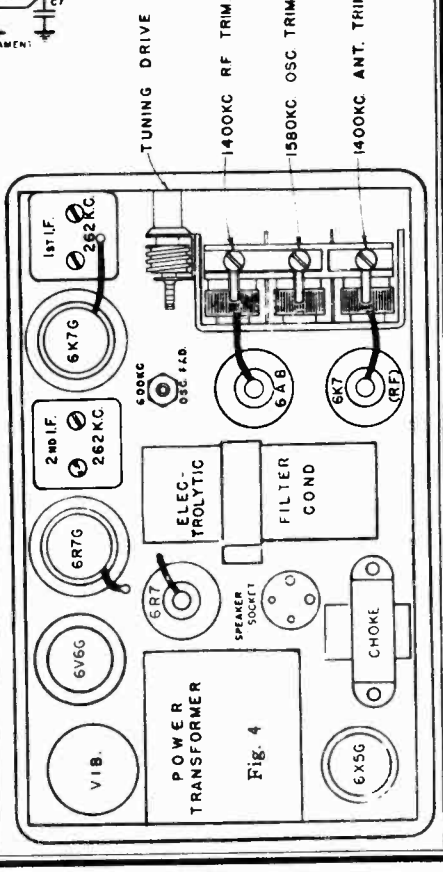


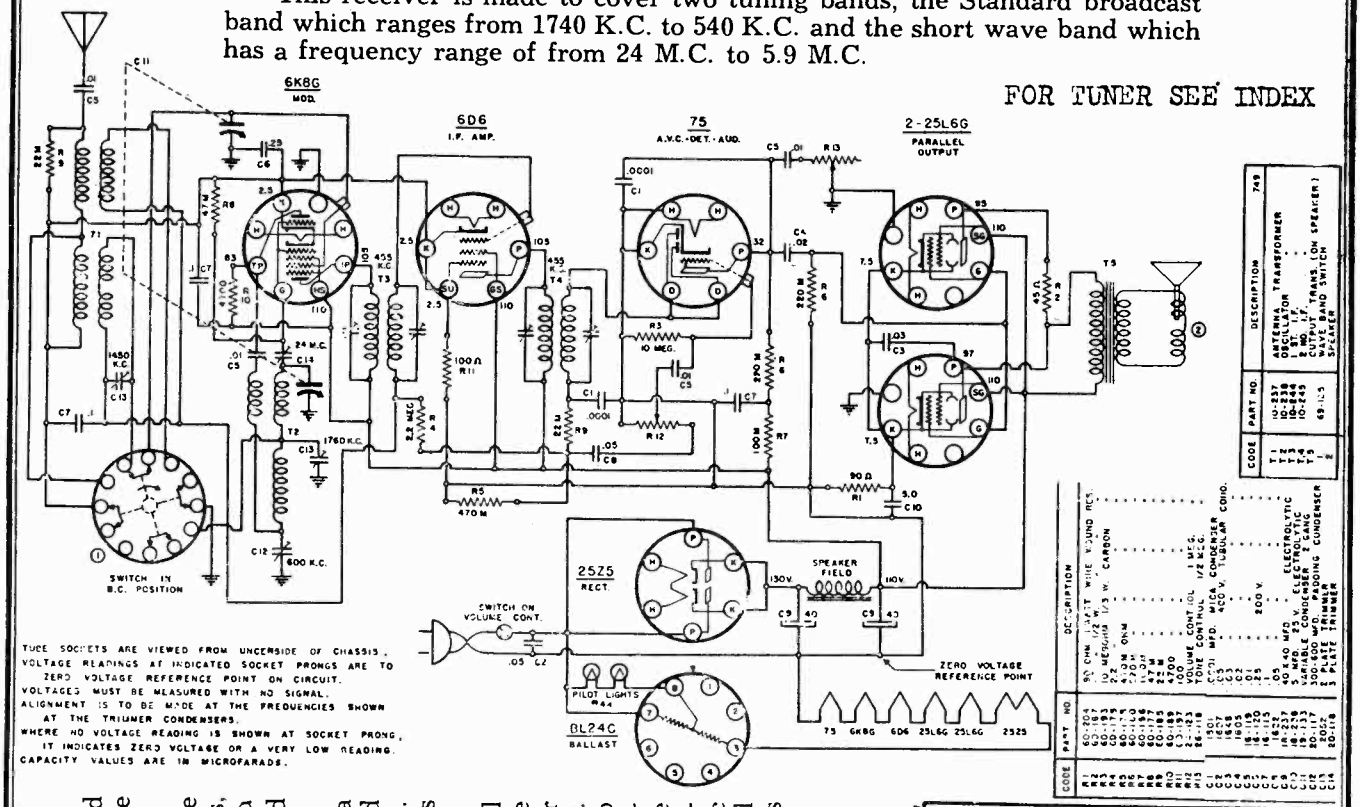
Fig. 4

MODELS 749,749B Late
Schematic,Voltage,Socket
Alignment,Trimmers

WARWICK MFG. CORP.

This receiver is made to cover two tuning bands, the Standard broadcast band which ranges from 1740 K.C. to 540 K.C. and the short wave band which has a frequency range of from 24 M.C. to 5.9 M.C.

FOR TUNER SEE INDEX



CODE	PART NO	DESCRIPTION
R1	60-204	50 OHM 1 UNIT WIRE WOUND RES.
R2	60-187	2.2 MEGOHM 1/2 W. CARBON
R3	60-193	10 MEGOHM 1/2 W. CARBON
R4	60-119	470 OHM
R5	60-160	4700 OHM
R6	60-119	470 OHM
R7	60-177	47 M
R8	60-185	2.2 M
R9	60-193	10 M
R10	60-193	10 M
R11	60-197	100
R12	60-193	VOLUME CONTROL 1/2 MEG.
R13	60-193	TONE CONTROL 1/2 MEG.
C1	1501	.0001 MFD. MICA CONDENSER
C2	1607	400 V. TUBULAR COND.
C3	1605	
C4	1607	
C5	1605	
C6	18-119	200 V.
C7	18-120	
C8	1607	
C9	18-237	40-40 MFD. 450 V. ELECTROLYTIC
C10	18-133	8 MFD. 450 V. ELECTROLYTIC
C11	18-131	VARIABLE CONDENSER 2 GANG
C12	20-117	300-600 MFD. PADDING CONDENSER
C13	20-118	1 PLATE TRIMMER
C14	20-119	3 PLATE TRIMMER

CODE	PART NO	DESCRIPTION	749
T1	10-237	ANTENNA TRANSFORMER	
T2	10-238	OSCILLATOR "	
T3	10-239	2 ND. I.F. "	
T4	10-240	1 ST. I.F. "	
T5	49-115	OUTPUT TRANS. (ON SPEAKER)	
S		WAVE BAND SWITCH	

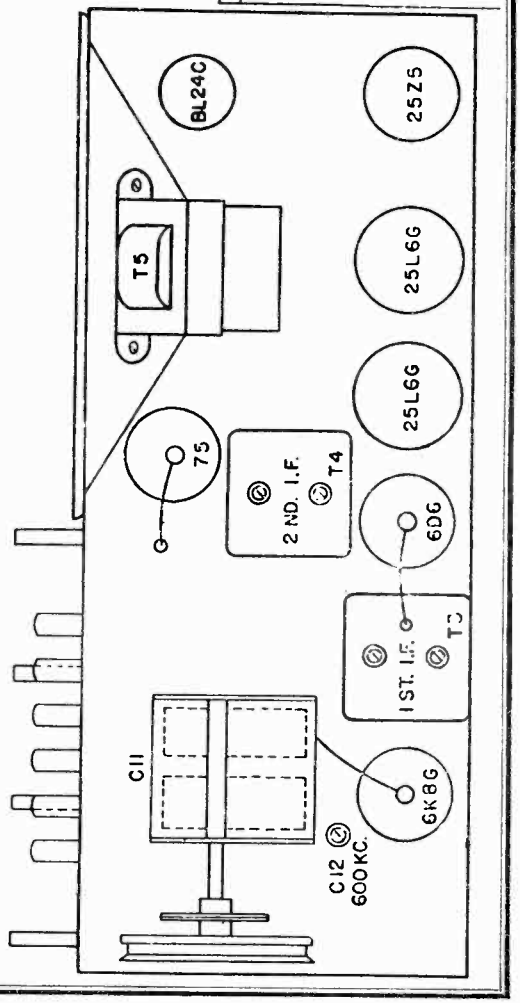
ALIGNMENT PROCEDURE

All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 10,000 ohms, to plate of output tube and B+, or a low voltage A. C meter may be used connected across speaker voice coil. The output meter remains connected during the entire alignment procedure.

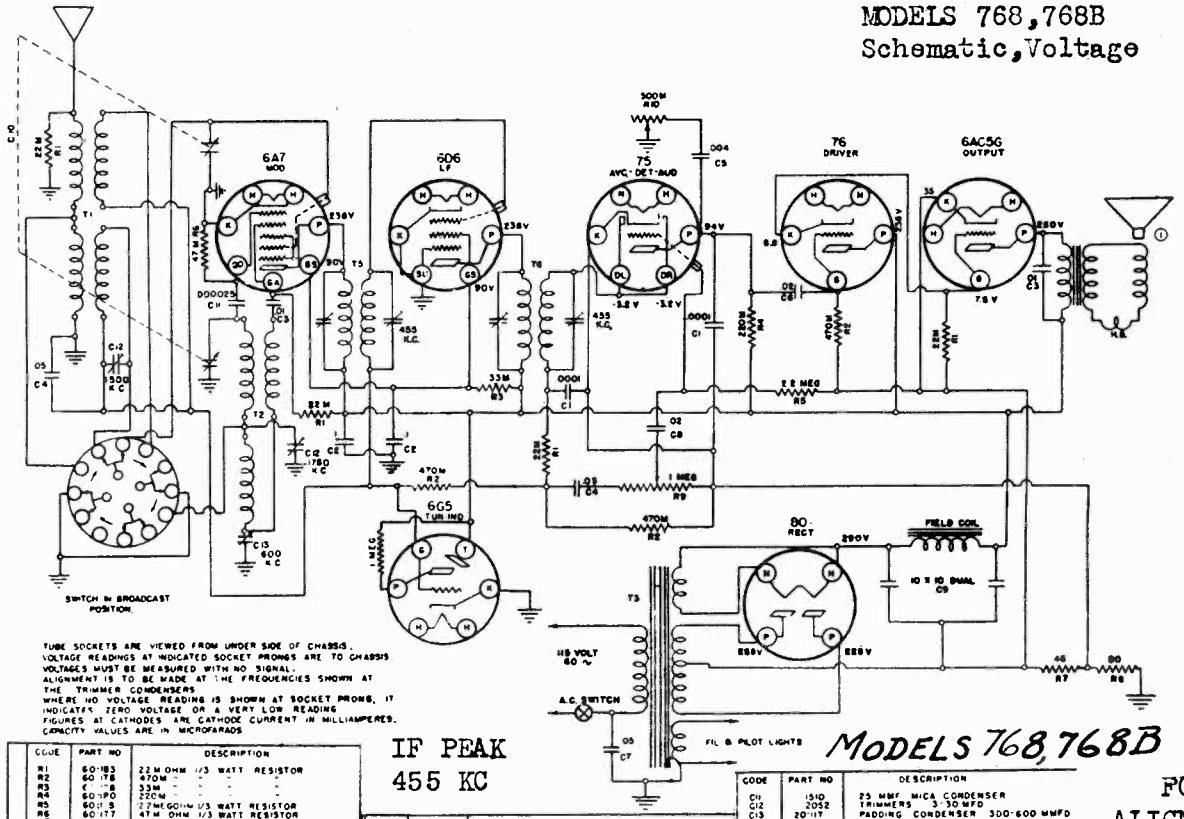
Connect the signal generator to the grid cap of the 6A7 tube through a .1 M.F. condenser. Connect the ground of the generator to the ground lead of the receiver. Set the dial to about 1000 K.C., feed in a 455 K.C. signal. Adjust first and second I.F. trimmers for maximum output. Refer to chassis lay-out for location of trimmers.

Turn the dial to the extreme high frequency end. Feed a 1760 K.C. signal to the receiver antenna lead through a .00025 MF mica condenser. Adjust the 1760 K.C. oscillator trimmer until maximum output is shown. Set the generator to 1500 K.C. and tune in this signal on the receiver. Then adjust the 1500 K.C. antenna trimmer to the maximum output. Then impress a 600 K.C. signal into the receiver antenna lead and tune in this signal on the receiver. Adjust oscillator padding condenser to the maximum output. For the alignment of the short wave band open variable condenser to minimum capacity. With an impressed signal of 24 M.C. adjust trimmer designated as C14 in schematic diagram for maximum output. Follow through with this procedure several times in order to obtain the best alignment adjustment possible. This completes the alignment.



WARWICK MFG. CORP.

MODEL 761
Schematic, Socket, Trimmers
MODELS 768, 768B
Schematic, Voltage



IF PEAK
455 KC

MODELS 768, 768B

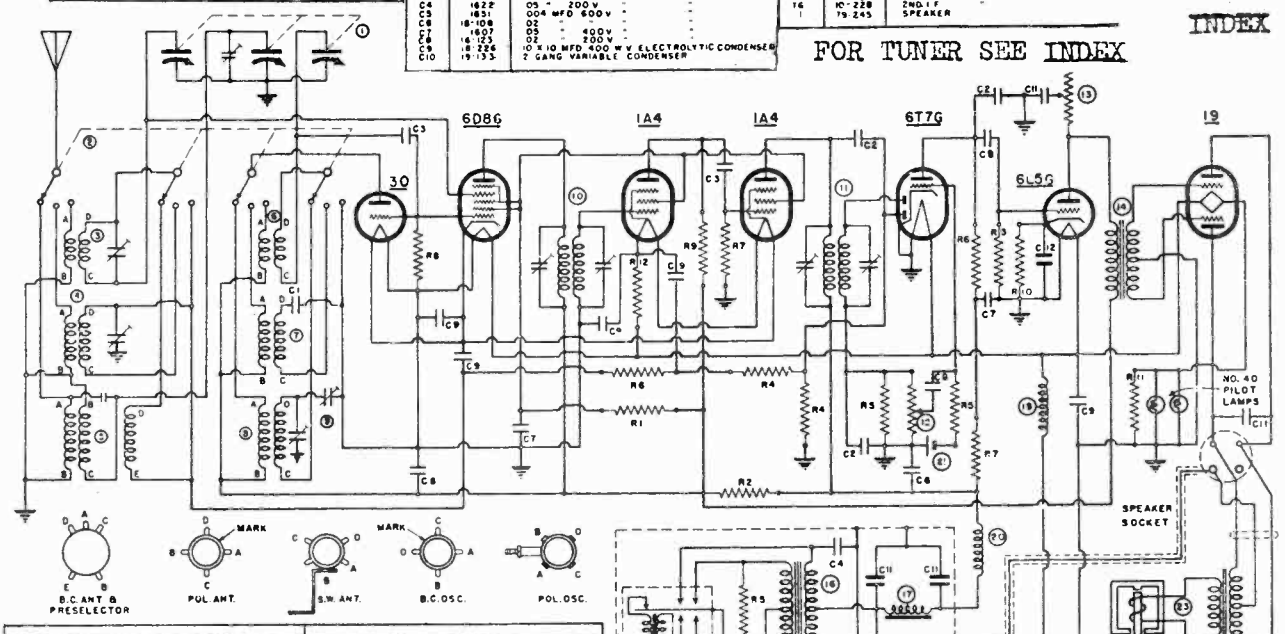
CODE	PART NO	DESCRIPTION
R1	60-183	22 M OHM 1/3 WATT RESISTOR
R2	60-178	470M " " " "
R3	60-178	33M " " " "
R4	60-190	220M " " " "
R5	60-183	2.7 MEGOHM 1/3 WATT RESISTOR
R6	60-177	47 M OHM 1/3 WATT RESISTOR
R7	60-187	45 " " 1/2 " " ±10%
R8	60-191	90 " " 1/2 " " ±10%
R9	60-173	1 MEGOHM VOLUME CONTROL B 5W
R10	76-187	500M OHM TONE CONTROL

CODE	PART NO	DESCRIPTION
C1	1501	180 MMF MICA CONDENSER
C2	16-116	1 MFD 400 V TUBULAR CONDENSER
C3	1604	.01 MFD 600 V " "
C4	1622	.05 " 200 V " "
C5	1851	.004 MFD 600 V " "
C6	18-108	.02 " " " " "
C7	1607	.05 " 400 V " "
C8	16-123	.02 " 200 V " "
C9	18-226	10 X 10 MFD 450 W V ELECTROLYTIC CONDENSER
C10	19-135	2 GANG VARIABLE CONDENSER

CODE	PART NO	DESCRIPTION
C11	1510	25 MMF MICA CONDENSER
C12	2052	TRIMMERS 3-30 MFD
C13	20-117	PADDING CONDENSER 300-600 MMFD
T1	10-237	ANTENNA COIL
T2	10-238	OSCILLATOR COIL
T3	10-239	POWER TRANSFORMER
T5	No. 227	1ST I.F. "
T6	10-228	2ND I.F. "
1	79-245	SPEAKER

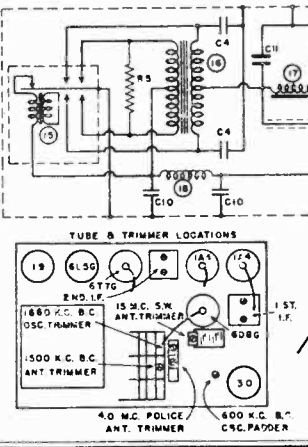
FOR ALIGNMENT SEE INDEX

FOR TUNER SEE INDEX



R1	6105	10,000	OHM	1/2 W.	CARBON	RES.	
R2	6102	400	"	"	"	"	
R3	6101	100	"	"	"	"	
R4	6017	1 MEG	"	1/3W.	"	"	
R5	6016	500,000	"	"	"	"	
R6	6024	250,000	"	"	"	"	
R7	6026	100,000	"	"	"	"	
R8	6025	50,000	"	"	"	"	
R9	6022	15,000	"	"	"	"	
R10	6005	1500	"	"	"	"	
R11	6007	200	"	"	"	"	
R12	60-128	8 OHM	1/2 W.	WIRE	RES.	5%	
C1	1509C	.007	MFD.	MICA	COND.	5%	
C2	1504	.00025	"	"	"	"	
C3	15108	.000025	"	"	"	10%	
C4	1604	.01	"	PAPER	"	600 V.	
C5	1611	.006	"	"	"	"	
C6	1616	.25	"	"	"	400 V.	
C7	1601	.1	"	"	"	"	
C8	1603	.01	"	"	"	"	
C9	1600	.1	"	"	"	200 V.	
C10	1655	.5	"	"	"	150 V.	
C11	1845	8.0	MFD.	ELECTROLYTIC		150 V.	
C12	16-100	10.0	"	"		25 V.	

1	19-106	3 GANG VARIABLE CONDENSER
2	69-103	WAVE BAND SWITCH
3	10-140	S.W. ANTENNA COIL
4	10-135	POLICE BAND ANTENNA COIL
5	10-137	B.C. ANT. & PRESELECTOR COIL
6	10-139	S.W. OSCILLATOR COIL
7	10-138	POLICE BAND OSCILLATOR COIL
8	10-134	B.C. OSCILLATOR COIL
9	20-100	B.C. OSC. PADDING CONDENSER
10	10-145	1 ST I.F. TRANSFORMER
11	10-146	2ND. I.F. TRANSFORMER
12	24-101	VOLUME CONTROL
13	26-102	TONE CONTROL WITH SWITCH
14	8010	P.P. INPUT TRANSFORMER
15	3407	VIBRATOR
16	8041	VIBRATOR POWER TRANSFORMER
17	3307	FILTER CHOKE
18	3313	R.F. "A" CHOKE
19	33-204	R.F. "A" CHOKE
20	3303	R.F. "B" CHOKE
21	4600	BIAS CELL
22	23-103	BATTERY CABLE
23		SPEAKER

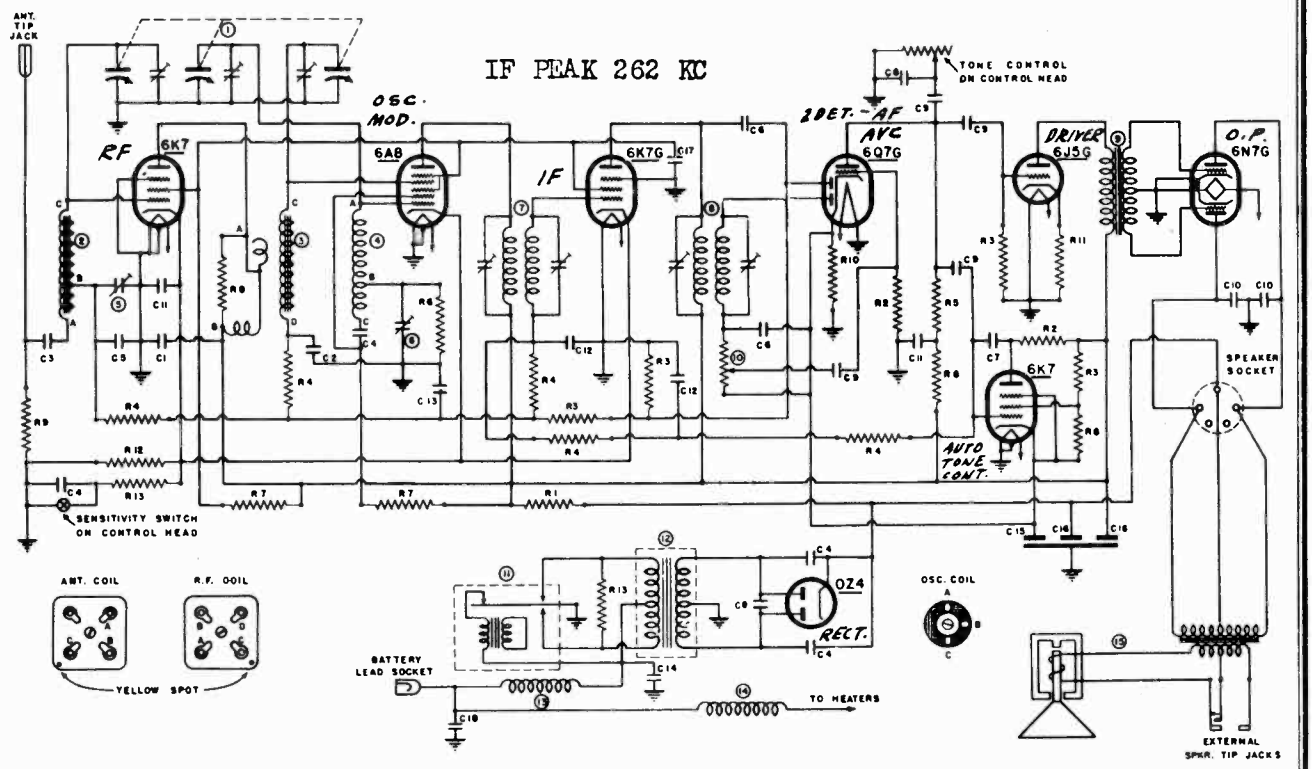


MODEL 761

IF PEAK
456 KC

MODEL 846
Schematic, Socket
Alignment, Trimmers

WARWICK MFG. CORP.



For Conventional Alignment See Special Section Vol. VIII

FREQUENCY CALIBRATION ADJUSTMENT

While a station of known frequency is tuned in, remove the pilot light socket. In the tuning control head, immediately in front of position from which the dial light socket has been removed, will be seen a small screw head. This is the calibration adjustment screw. By turning this screw with a small screw driver, the frequency indicated by the dial may be made to correspond to the frequency of the station tuned in. After adjusting calibration by this means the dial light socket is replaced.

After the receiver is installed the 600 K.C. antenna compensator condenser is adjusted to give best sensitivity while the receiver is tuned to as weak a station as can be heard near 600 K.C. The volume control should be turned full on while making this adjustment.

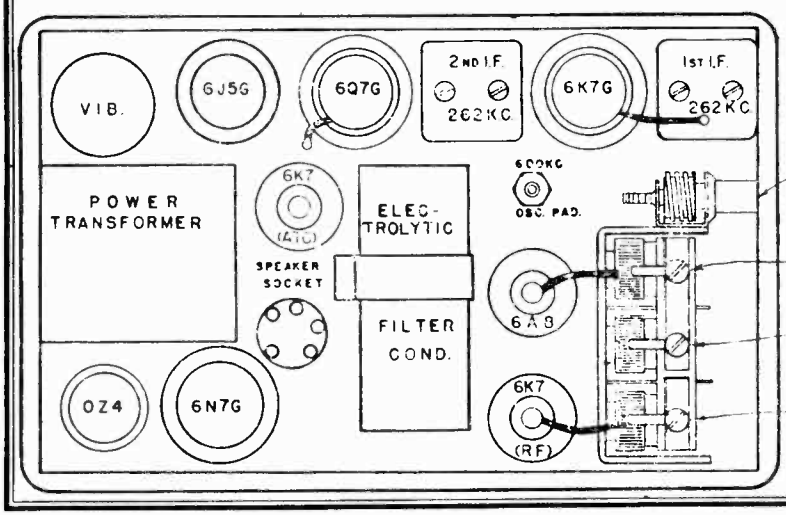


FIG. 4

C1	1505	.004	MICA CONDENSER		
C2	1511	.0027	"	"	5%
C3	1508	.002	"	"	"
C4	1500	.001	"	"	"
C5	1500C	.001	"	"	"
C6	1504	.00025	"	"	"
C7	1501	.0001	"	"	"
C8	16-102	.008 MFD.	PAPER CONDENSER		1500V
C9	1604	.01	"	"	600V
C10	1651	.004	"	"	"
C11	1601	.1	"	"	400V
C12	1600	.1	"	"	200V
C13	1622	.05	"	"	"
C14	1655	.5	"	"	150V
C15		4.0	"		
C16	18-204	8.0	ELECTROLYTIC CONDENSER		
C17	18-205	8.0	"	"	"
C18	105-1	.00025	SPARK PLATE		

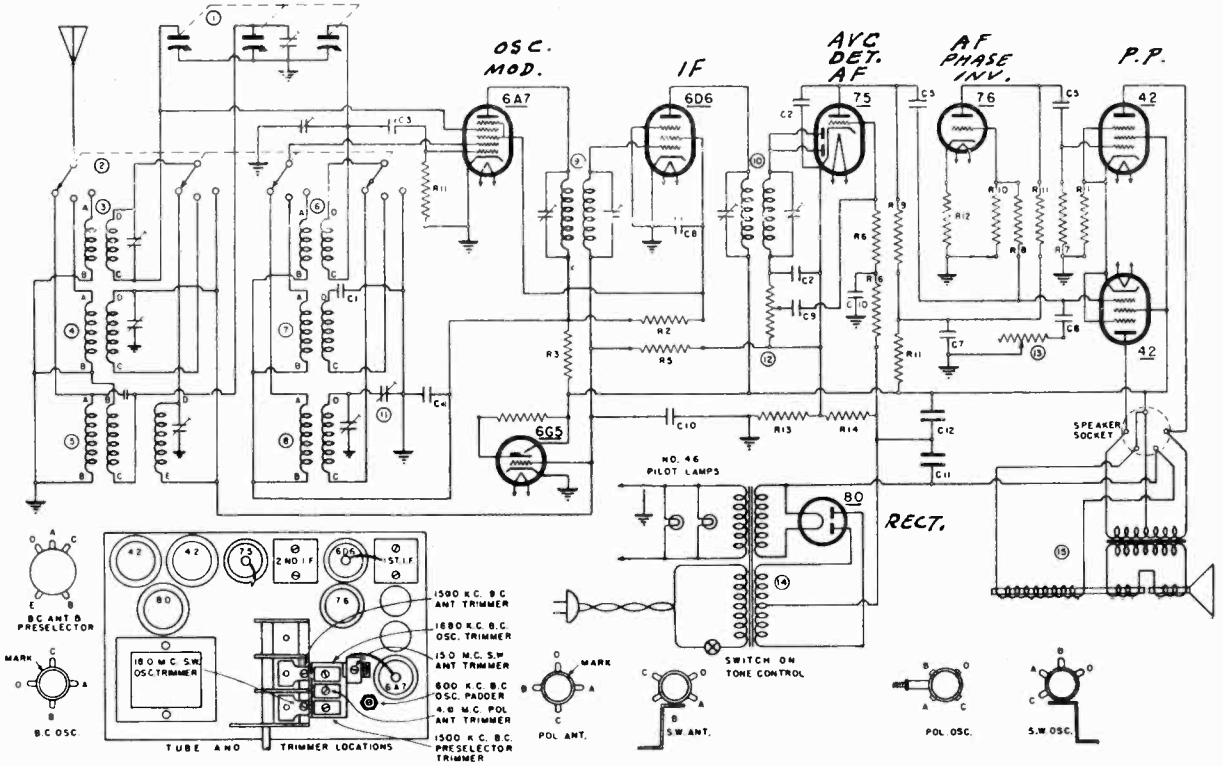
R1	60-120	2000	OHM	1 WATT	CARBON RES.	
R2	60-107	1 MEG	"	1/2	"	"
R3	60-108	500,000	"	"	"	"
R4	60-109	250,000	"	"	"	"
R5	60-110	100,000	"	"	"	"
R6	60-111	50,000	"	"	"	"
R7	60-113	20,000	"	"	"	"
R8	60-117	15,000	"	"	"	"
R9	60-114	10,000	"	"	"	"
R10	60-129	1800	"	"	"	"
R11	60-116	800	"	"	"	"
R12	60-118	400	"	"	"	"
R13	60-115	200	"	"	"	"

1	18-102	3 GANG VARIABLE CONDENSER
2	10-113	ANTENNA COIL
3	10-114	R.F. COIL
4	10-110	OSCILLATOR COIL
5	20-100	ANTENNA COMPENSATOR CONDENSER
6	20-100	OSCILLATOR PADDING CONDENSER
7	10-171	1 ST. I.F. TRANSFORMER
8	10-172	2 ND. "
9	80-119	P.P. AUDIO INPUT TRANSFORMER
10	24-103	VOLUME CONTROL
11	30-100	VIBRATOR
12	80-111	VIBRATOR POWER TRANSFORMER
13	33-200	R.F. "A" CHOKE
14	33-203	" " "
15	79-217	DYNAMIC SPEAKER

WARWICK MFG. CORP.

MODEL 872
Schematic, Voltage, Socket
Alignment, Trimmers

This receiver is made to cover 3 tuning bands, the standard broadcast band which ranges from 1680 K.C. to 535 K.C., the middle or police band which has a frequency range of from 5.6 M.C. to 1.7 M.C. and high frequency or foreign band which is from 20 M.C. to 5.4 M.C.



ALIGNMENT

IF Adjust at 456 KC through a 0.1 mfd. condenser.

SW Proper adjustment is loose trimmer setting at 15 MC, as signal is heard at 2 settings. Signal must be heard only at about 14 MC dial setting and not at 16 MC.

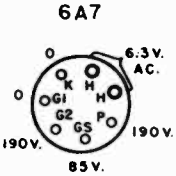
BC Adjust oscillator trimmer at 1680 KC through 0.00025 mfd. condenser. Adjust antenna trimmer at 1500 KC. Adjust padder at 600 KC.

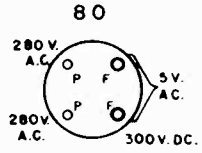
Police Adjust antenna trimmer at 4 MC., through 0.00025 condenser.

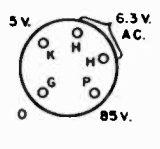
VOLTAGES MEASURED WITH 1000 OHM PER VOLT VOLTMETER.

ALL VOLTAGES EXCEPT HEATERS MEASURED TO GROUND.

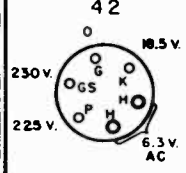
F - - - FILAMENT
H - - - HEATER
K - - - CATHODE
SU - - SUPPRESSOR
GS - - SCREEN GRID
G1 - - OSC. GRID
G2 - - OSC. GRID
G - - - CONTROL GRID
DP - - DIODE PLATE
P - - - PLATE

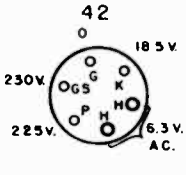


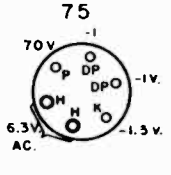


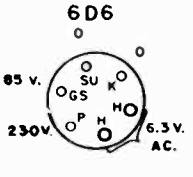


(BOTTOM VIEW OF CHASSIS)









1	19-116	3 GANG VARIABLE CONDENSER	
2	69-107	BAND SWITCH	
3	10-183	SHORT WAVE ANTENNA COIL	
4	10-182	POLICE BAND ANTENNA COIL	
5	10-179	B.C. ANT & PRESELECTOR COIL	
6	10-184	SHORT WAVE OSCILLATOR COIL	
7	10-181	POLICE BAND OSCILLATOR COIL	
8	10-180	B.C. OSCILLATOR COIL	
9	10-178	1 ST I.F. TRANSFORMER	
10	10-176	2 ND. I.F. TRANSFORMER	
11	20-100	B.C. OSC. PADDING CONDENSER	
12	24-103	VOLUME CONTROL	
13	24-106	TONE CONTROL WITH SWITCH	
14	60-128	POWER TRANSFORMER	
15		SPEAKER	

R1	60-123	350	OHM	2	WATT	CARBON	RES	10%
R2	6211	15,000	-	1	-	-	-	
R3	60-131	3000	-	1/2	-	-	-	
R5	6020	2 MEG	-	1/3	-	-	-	
R6	6017	1 -	-	-	-	-	-	
R7	6018	500,000	-	-	-	-	-	
R8	60-124	360,000	-	-	-	-	-	5%
R9	6024	250,000	-	-	-	-	-	
R10	60-125	110,000	-	-	-	-	-	5%
R11	6025	50,000	-	-	-	-	-	
R12	6016	5000	-	-	-	-	-	
R13	60-104	20	-	1/2	-	WIRE	-	5%
R14	60-126	16	-	-	-	-	-	5%

C1	15-102	0009	MFD	MICA	CONDENSER	5%
C2	1504	00025	-	-	-	
C3	1503	00005	-	-	-	
C4	1602	1	MFD	600 VOLT	PAPER	CONDENSER
C5	1648	03	-	-	-	-
C6	1651	004	-	-	-	-
C7	1616	25	-	400	-	-
C9	1605	02	-	-	-	-
C10	1622	05	-	200	-	-
C11	18-202	100	-	400	-	ELECTROLYTIC COND
C12	18-201	120	-	300	-	-

MODEL 761
Alignment
MODELS 768,768B
Alignment,Socket
Trimmers

WARWICK MFG. CORP.

MODELS 542 Late,559,579
648,648B,655B,668,668B
659,749,749B,768,768B
Tuner Adjustments

PUSH BUTTON TUNING ADJUSTMENTS

MODELS 542 Late, 655B, 668, 668B, 648, 648B, 559, 579, 659, 768, 768B, 946, 749, 749B

After receiver is installed and antenna and ground properly connected, plug line cord into a convenient outlet. Then turn the volume control to about the center of rotation. This will turn the receiver on and put it in an operating condition. Time must be allowed for the tubes to heat up before stations can be tuned in. This time is approximately one-half minute.

The automatic tuning feature of your radio makes it possible to set up 6 favorite American broadcast stations and tune them in quickly with the automatic tuner. Choose stations for push-button operation heard with good volume at all times.

Cut the call letters of your 6 selected stations from the list supplied with your receiver and slip them into the Tab Holder from the top, with the clear celluloid in front of the call letters to protect them. Arrange the call letters in the Tab Holder from right to left. Have the call letters of the lowest frequency station at the extreme right and work progressively to the left so that the highest frequency call letters will be at the extreme left.

Follow the procedure outlined below, in order to adjust the push-buttons properly:

1. By means of the Station Selector Knob tune in WITH THE RIGHT HAND AS ACCURATELY AS POSSIBLE the station having the lowest frequency—that is, your selected station which is tuned in nearest the right-hand side of the dial.

2. After the station has been tuned in accurately with the right hand, continue to hold it in its exact position firmly, and with the left hand loosen the Push-Button to be set up for that station by unscrewing the Push-Button about one turn to the left (counter-clockwise).

3. Continuing to hold the Station Selector Knob in its exact position, PUSH THE PUSH-BUTTON IN ALL THE WAY with the left hand.

4. After the Push-Button has been depressed all the way, tighten it gently toward the right (clockwise). Release Push-Button slowly and when in normal position grip button and tighten firmly.

The Push-Button tuning system is now correctly set up for your first selected station of lowest frequency and the Call Letter Tab for this station should be at the extreme right of the Call Letter Holders.

Follow through with this same procedure, setting up the other 5 stations in the order of their frequency—that is, the second station set up will be second lowest in frequency and the third station set up will be third lowest in frequency.

Carefully check each Push-Button for the accuracy of the setting. If, when tuning in any station with its Automatic Push-Button it does not have equal volume or clarity to that obtained with manual tuning, this may indicate the automatic adjustment for that station was not made accurately. Should there be any inaccuracy in any one of the Push-Button adjustments, correction can be made by repeating the above procedure for that button only. Do not reset those Push-Buttons that are accurately adjusted.

No further adjustments are necessary to operate your radio automatically or manually. To receive any one of your four selected stations for automatic operation, merely push in ALL THE WAY the Button set up for that station.

Models 768, 768B

ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent service men having the proper equipment. Re-alignment is very seldom needed and is usually only required after some major part has been replaced because of damage to the receiver.

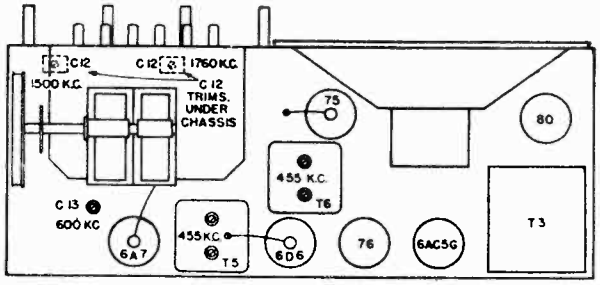
The equipment required for re-aligning this receiver is an output meter and a modulated source of radio frequency (a signal generator or microvolter). This source of radio frequency must be accurately calibrated in frequency and must have a method of varying the output.

All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total meter resistance approximately 7000 ohms, to plate of output tube and B+, or a low voltage A. C. meter may be used connected across speaker voice coil. The output meter remains connected during the entire alignment procedure.

Connect the signal generator to the grid cap of the 6A7 tube through a .1 M.F. condenser. Connect the ground of the generator to the ground lead of the receiver. Set the dial to about 1000 K.C., feed in a 455 K.C. signal. Adjust first and second I.F. trimmers for maximum output. Refer to chassis lay-out for location of trimmers.

Turn the dial to the extreme high frequency end. Feed a 1760 K.C. signal to the receiver antenna lead through a .00025 M.F. mica condenser. Adjust the 1760 KC oscillator trimmer until maximum output is shown. Set the generator to 1500 KC and tune in this signal on the receiver. Then adjust the 1500 KC antenna trimmer to the maximum output. Then impress a 600 KC signal into the receiver antenna lead and tune in this signal on the receiver. Adjust oscillator padding condenser to the maximum output. Follow through with this procedure several times in order to obtain the best alignment adjustment possible. This completes the alignment.



MODEL 761

ALIGNMENT PROCEDURE

The following alignment procedure is for use only by competent service men having the proper equipment. Re-alignment is very seldom needed and is usually only required after some major part has been replaced because of damage to the receiver.

The equipment required for re-aligning this receiver is an output meter and a modulated source of radio frequency (a signal generator or microvolter). This source of radio frequency must be accurately calibrated in frequency and must have a method of varying the output.

All alignments must be made with the volume control turned full on and with the signal input from the generator reduced to as low a value as possible while still giving a sufficient output to be easily read on the output meter.

Connect the output meter, through a .5 M.F. condenser and a resistance of such a value as to make the total resistance approximately 10,000 ohms, to the two small pins of the speaker plug. The output meter remains connected during the entire alignment procedure.

Connect the signal generator to the grid cap of the 1A6 tube through a .1 M.F. condenser. Connect the ground of the generator to the ground post of the receiver. With the wave switch on broadcast position and the dial set to about 1000 K.C., feed in a 456 K.C. signal. Adjust the trimmers on top of the first and second I.F. transformers until the maximum output is obtained. This aligns the I.F.

Leaving the wave switch on broadcast position turn the dial to the extreme high frequency end. Feed a 1680 K.C. signal to the receiver antenna post through a .00025 M.F. mica condenser. Adjust the 1680 K.C. broadcast oscillator trimmer for maximum output. Set the generator to 1500 K.C. and tune in this signal on the receiver. Then adjust the 1500 K.C. broadcast antenna trimmer for maximum output. Set the generator to 600 K.C. and adjust the 600 K.C. broadcast oscillator pad to maximum output while tuning the receiver back and forth across the signal from the generator. This completes the alignment of the broadcast band.

The police band is aligned by feeding 4.0 M.C. signal to the receiver antenna post through the .00025 condenser. Turn the wave switch to the center position and tune the receiver to this signal. Adjust the 4.0 M.C. police antenna trimmer for best output.

The short wave band is aligned in the same way using a 15 M.C. signal and adjusting the 15 M.C. short wave antenna trimmer after having turned the wave switch to the right hand position.

DESCRIPTION

This receiver is a 7 tube, 6 volt storage battery operated superheterodyne.

The tubes used are a 30 as oscillator, a 6D8G as modulator, two 1A4 tubes as I.F. amplifiers, a 6T7G as A.V.C. and audio rectifier and audio voltage amplifier, a 6L5G as audio driver and a 19 as power audio amplifier.

This receiver is made to cover 3 tuning bands, the standard broadcast band which ranges from 1680 K.C. to 535 K.C., the middle or police band which has a frequency range of from 5.6 M.C. to 1.7 M.C. and high frequency or foreign band which is from 20 M.C. to 5.4 M.C.

While a ground is not always necessary with receivers which are made to use the lighting mains as a source of power, a battery operated receiver always requires a good ground if best performance and distance reception is expected. A ground may be made to a water supply system or to a galvanized pipe driven into ground that is moist most of the time. The use of a lightning arrestor is very good insurance against damage by lightning. Several types are on the market and may be obtained very easily. Soldering of all antenna and ground lead joints will eliminate any noise which may be caused by loose connections.

The antenna and ground leads connect to the marked binding posts located on the back of the chassis.

A 6 volt storage battery is the only power supply required for this receiver. The yellow battery lead connects to the positive (+) terminal of the battery and the black lead connects to the negative (—) terminal. If these connections are reversed the receiver will not operate and may be seriously damaged if left this way for more than a short time. **Never charge the battery while operating the receiver.** Attempting to use any other source of power supply will cause serious damage to the receiver.

MODEL 7-Station Automatic Tuning Panel
Installation Data for MODEL A3 Series

WELLS-GARDNER & CO.

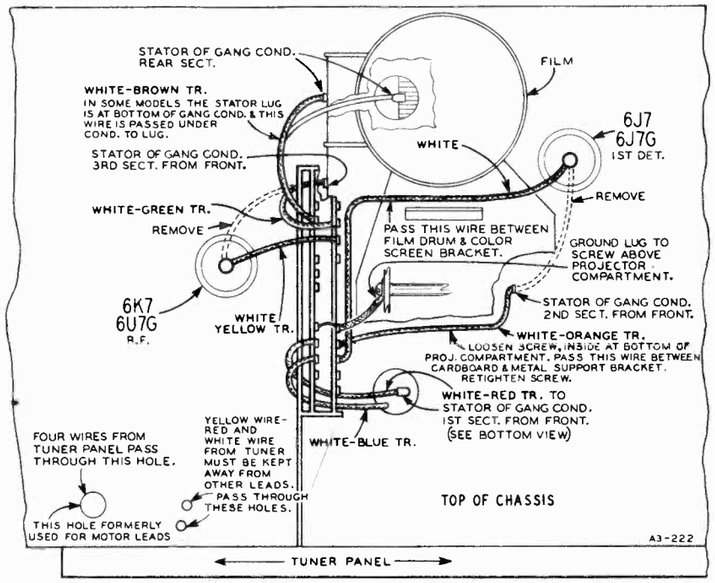


Fig. 3—13 Tube Chassis—Top View

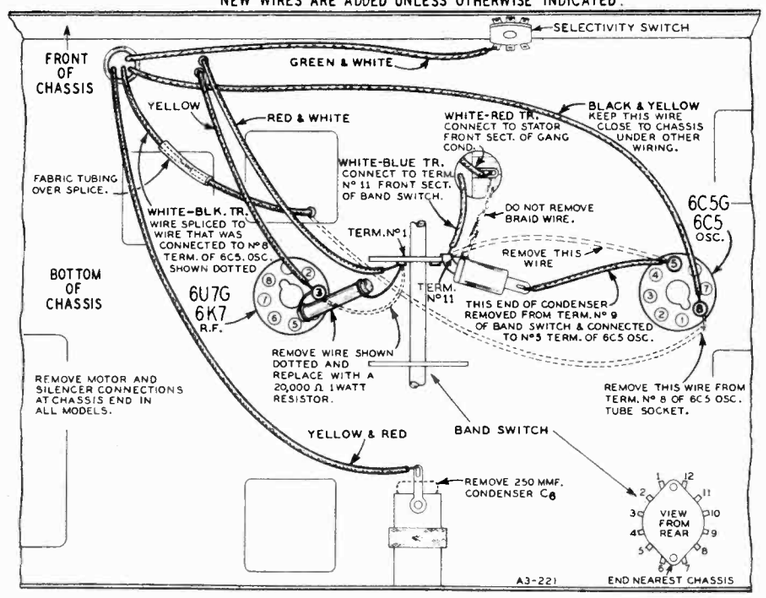


Fig. 4—13 Tube Chassis—Bottom View

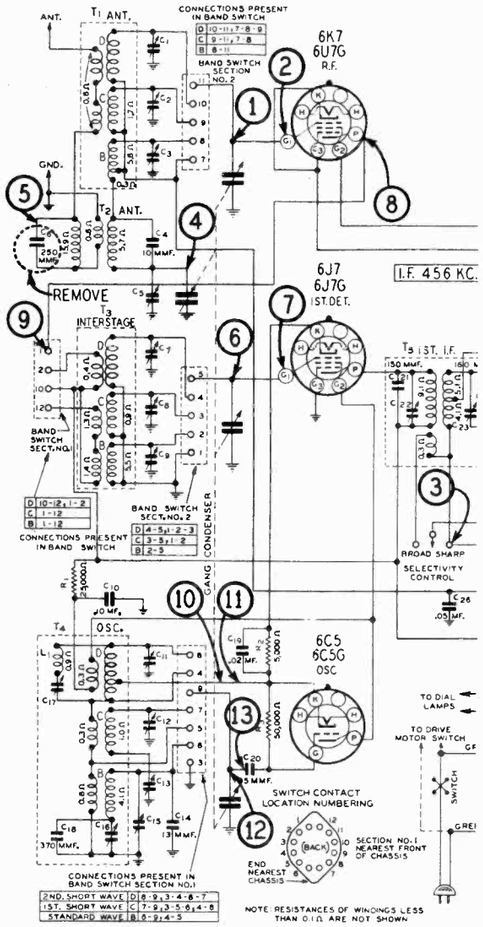


Fig. 5—13 Tube Schematic Diagram

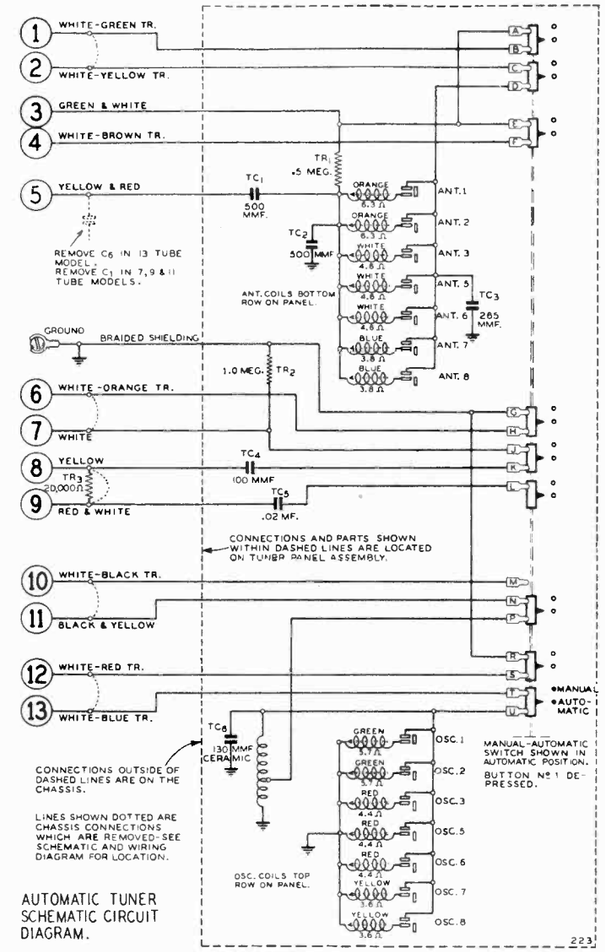


Fig. 6—Tuning Panel Schematic Diagram

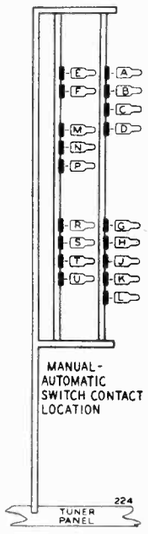


Fig. 8—Tuning Panel Switch Terminals

13 TUBE MODEL-USE ALL 13 WIRES & GROUND LEAD.

9 & 11 TUBE MODELS-CLIP OFF WHITE-BROWN TR. (4) AT SWITCH CONTACT (F)

7 TUBE MODEL-CLIP OFF THE FOLLOWING WIRES: WHITE-ORANGE TR. (6) AT SWITCH CONTACT (H), WHITE (7) AT SWITCH CONTACT (J), YELLOW (8) & RED & WHITE (9) AT CONDENSER TERMINAL STRIP. TR3 20000 OHM RESISTOR IS NOT USED.

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Fig. 7—Table of Tuning Panel Leads Used

13 TUBE RADIO

Instructions for Mounting the New 7 Station Automatic Tuning Panel on the 7, 9, 11 and 13 Tube Chassis

(REPLACING MOTOR DRIVE PANEL)

New 7 Station Automatic Tuning Panel

There are 8 push buttons. Buttons Nos. 1 to 3 and 5 to 8 are automatic Tuning Station Buttons. Button No. 4 is the Manual Tuning Button - See Fig.1. When this button is depressed, the radio is in the manual tuning position.

The small buttons above the push buttons are still used for setting the stations. However, with the new panel, this is done by turning the button clockwise or counter-clockwise until the desired station is tuned in.

The aligning screw, shown in Fig. 1, when turned, moves the iron core of the antenna coil for aligning purposes.

Old Parts Used

Use the following parts of the old assembly:

Escutcheon Plate,
Station Buttons and Hairpin Springs,
Setting Buttons,
Glass Screen and Rubber Bands.

The Following New Parts are Supplied

7 Station Automatic Tuning Panel Assembly.

The parts shown in the list at the end of these instructions.

Removing Old Motor Drive Panel from Chassis

Remove the knobs. Two are set screw knobs and three are the push-on type.

Remove the station buttons by pushing down the lower end of the small hairpin spring at the back of the button and, at the same time, pulling the button off the shaft. Remove the setting buttons by pulling them off.

The screws in the wooden support behind the electric drive panel must be unscrewed and the support removed from the cabinet.

Remove the speaker plug from the socket at the back of the chassis and also the tuning eye tube from its clamp bracket. Loosen the screw holding the bottom shield connection to the back of the chassis. Unscrew and remove the shipping bolts and the "L" bolts from beneath the chassis shelf.

The chassis may then be removed.

Remove the old tuning eye tube bracket from the cabinet.

Turn the electric-manual lever to the electric position.

Unsolder the wire to the silencer switch at the chassis end. Also, unsolder the two motor leads at the A. C. terminal strip under the chassis. Early models used a metal shell condenser which was connected at the same terminal strip. Remove this condenser if one is installed.

Take off the collars from the volume and tone control shafts.

Remove the glass screen by taking out the two screws and removing the two brackets.

Remove the four red mounting screws.

The panel can then be pulled straight out from the chassis.

Mounting New Automatic Tuning Panel on the Chassis

Put a piece of insulating tape on the surface of the support casting at the point shown in Fig. 2. This will prevent possible short circuiting of the switch contacts.

Before mounting the new panel on the chassis, cut off any leads not required as shown in the table - Fig. 7. Bring the tuner panel near the chassis and pass the white-blue tracer and white-red tracer leads through the hole in the chassis under the front section of the gang condenser. Turn the gang condenser until the spring clip on the drive drum is at its lowest position - See Fig. 2 lower left. Line up the drive arm on the large panel drive pulley with the spring clip on the gang condenser drive drum. Since the drive arm will line up with the spring clip under two conditions, refer to Fig. 2 lower left for the correct relation of drive cord winding to drive arm.

Spread the spring clip SLIGHTLY with a small screw driver, bringing this screw driver up from beneath the chassis. Then push the panel toward the chassis, lowering it slightly so that the large drive pulley may be brought up in back of the bracket below the projector compartment. Insert the drive arm in the spring clip.

Mount the panel on the chassis using the four mounting screws at the four points shown in Fig.1.

Secure the two braces to the back of the panel as shown in Fig. 2.

Remove the two screws at the top of the lens housing support bracket. Using the two 8-32 X 3/8" screws supplied, secure the back end of the braces in place. When attaching the brace to the tuner switch side of the lens housing bracket, ground the lug of the braided wire under the screw head as illustrated.

Replace the glass screen using clamps, nuts, and lock washers supplied.

Replace the collars on the volume control and tone control shafts.

Wire the panel in the circuit following Figs. 3,4, 9, 10, 15, and 16.

Replace chassis in cabinet reversing procedure followed when removing the chassis. The wooden shipping support is not used.

The electric-manual lever is not used. A cover plate is supplied which covers the opening left by the removal of this lever. This plate is so made that the back portion should fit snugly into the opening in the cabinet. If it does not, file the cabinet until it fits snugly in place.

Then put the tuning knob on the shaft.

Knobs and Cover Plate

The 5 control knobs formerly used with the motor drive panel are also used with the new automatic tuning panel.

The cover plate used under the tuning knob is described in the previous article.

Alignment

After the new panel is installed, realign the chassis using as a guide the alignment procedure given in the service manual for each chassis.

If a definite peak cannot be reached when making the 1830 KC adjustment on the B range, cut off the compensating condenser C16 in the 9 and 11 tube models, C14 in the 13 tube model. and C13 in the 7 tube model.

If a definite peak cannot be reached when making the 22,000 KC adjustment on the D range, simply back off this trimmer as far as it will go and proceed with the 20,000 KC adjustment.

Next align the automatic tuner. The automatic tuning system is aligned by turning the aligning screw which shifts the position of the iron core of the antenna coil while the coil remains stationary.

Depress station button No. 1 - See Fig. 1. Tune in a signal of the frequency shown below for button No. 1. Turn setting button No. 1 clockwise or counter-clockwise until this signal is accurately tuned in. Then turn the aligning screw of button No. 1 clockwise or counter-clockwise until maximum output is obtained.

Follow the same procedure with regard to the other station tuning buttons using the frequencies shown below.

Button No. 1...Aligning Frequency 700 KC
Button No. 2...Aligning Frequency 700 KC
Button No. 3...Aligning Frequency 850 KC
Button No. 5...Aligning Frequency 850 KC
Button No. 6...Aligning Frequency 850 KC
Button No. 7...Aligning Frequency 1100 KC
Button No. 8...Aligning Frequency 1100 KC

Mounting New Panel on Early Chassis Equipped with First Motor Drive Panels

Chassis equipped with the early type motor drive panel may be identified by the fact that when the chassis is removed from the cabinet and the electric-manual lever is in the electric position, all four red mounting screws can be seen - See Fig. 23. On late models, the two top red screws are behind the glass screen and cannot be seen unless this screen is removed - See Fig. 22.

To mount the new automatic tuning panel on the early chassis, first, using a hack saw, cut off the portion of the bracket assembly below the projector compartment as shown in Fig. 21.

Mount the new panel on the chassis using the two bottom mounting screws. Extend a pencil or pointed instrument through the center of the two upper panel mounting holes and place a mark on the bracket extending down from the projector compartment.

Remove the two lower mounting screws and take off the new panel. Drill and tap two holes for the two upper 8-32 mounting screws in the bracket. The new panel can then be mounted by means of the four mounting screws.

Parts Shipped With 7 Station Automatic Tuning Panel

QUANTITY	ITEM	APPLICATION
1.....	20,000 Ohm Resistor.....	To be used when installing panel on 9, 11, and 13 tube chassis only.
2.....	Braces.....	To secure the panel to top of projector assembly.
4.....	8-32 X 3/8" screws.....	2 used for front end of above brace. 2 used for back end of above brace.
2.....	#8 Shakeproof Lock Washers.....	To secure above brace to panel.
2.....	8-32 Hex Nuts.....	To secure above brace to panel.
2.....	Glass Retainer Clamps.....	To hold the glass screen in place.
2.....	6-32 X 1/4" Round Head Screws...	For above.
2.....	#6 Split Lock Washers.....	For above.
1.....	Circular Cardboard Tab with Words "Manual Tuning" on it.....	To be put into manual switch button (4th button from left).
1.....	Round Celluloid Tab.....	To be pushed into above mentioned button over the cardboard tab.
4.....	8-32 X 1/4" Mounting Screws..... (Heads Red)	To mount panel to chassis.
4.....	#8 Split Lock Washers.....	For above.
1.....	Round Cover Plate.....	To cover opening in front panel of cabinet left by removal of the electric-manual lever.

MODEL 7-Station Automatic Tuning Panel
For MODELS A2,A3,A4,A5 Series
Installation Data.Panel View,Details

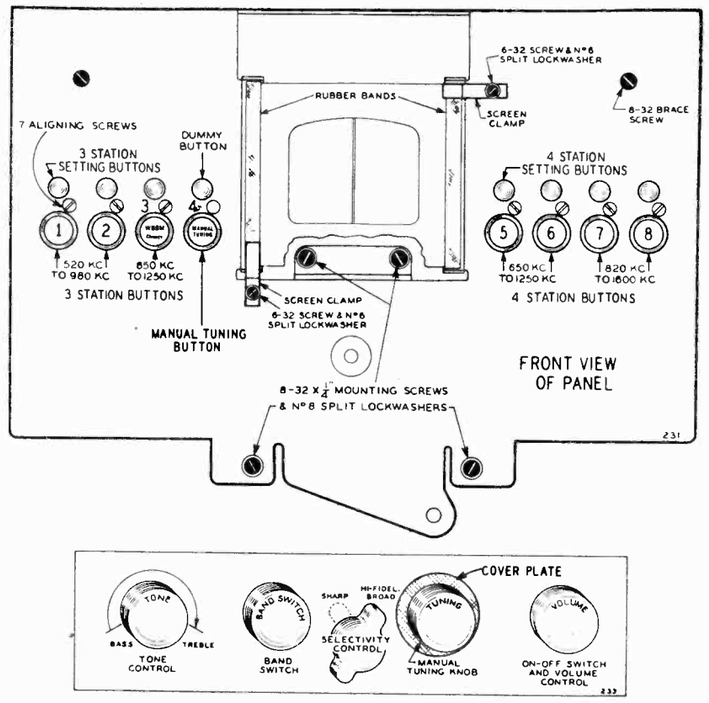

Fig. 1—Automatic Tuning Panel—Front View

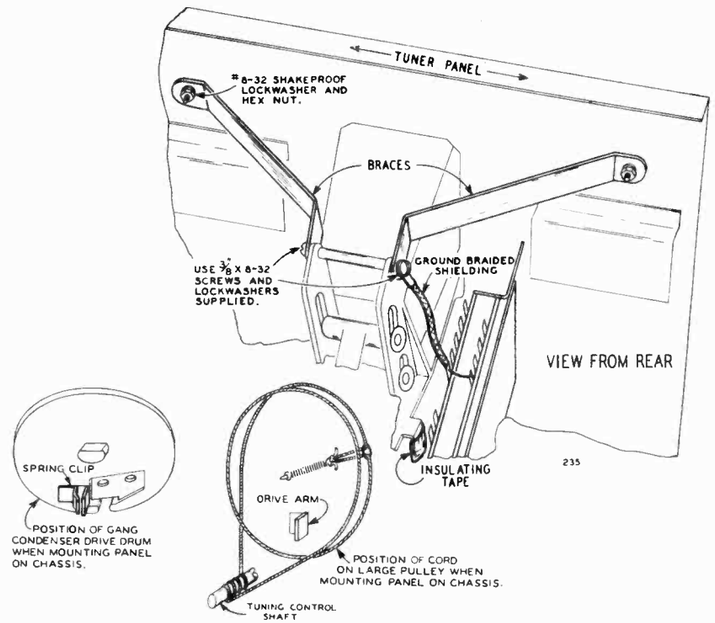

Fig. 2 Automatic Tuning Panel—Back View

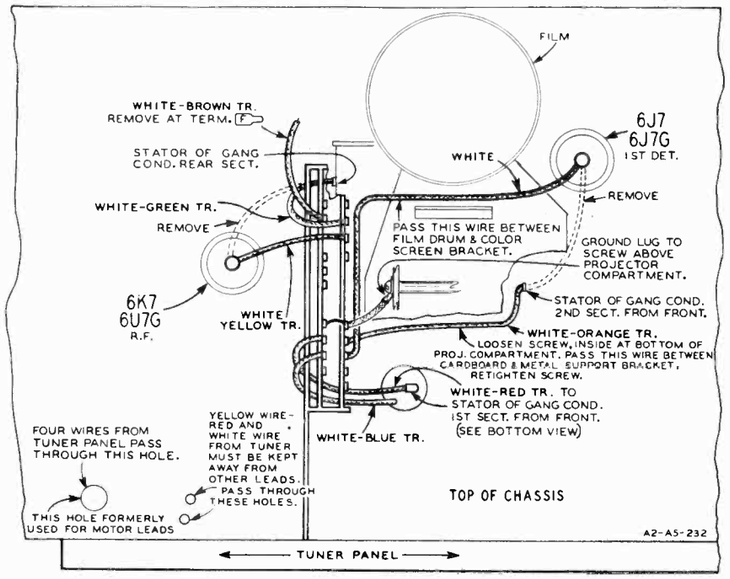

Fig. 9—9 and 11 Tube Chassis—Top View

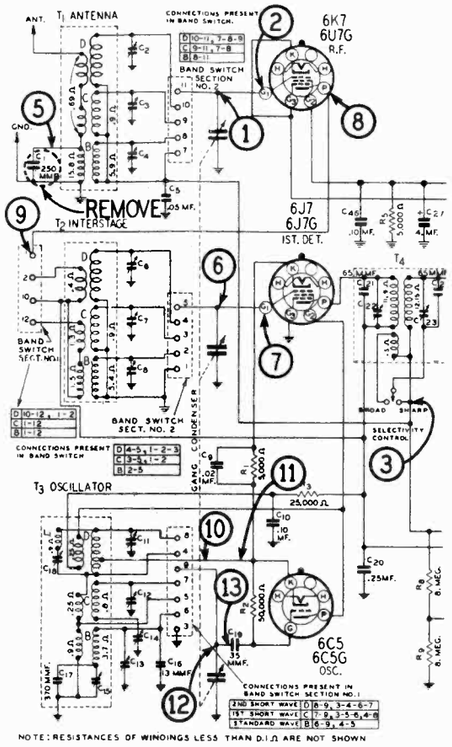

Fig. 11—9 and 11 Tube Schematic Diagram

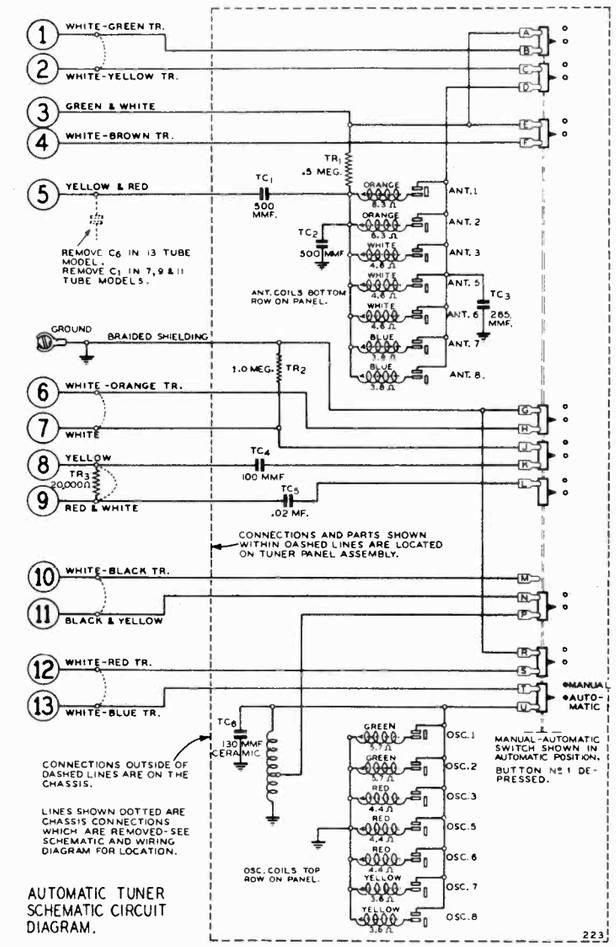

Fig. 13—Tuning Panel Schematic Diagram

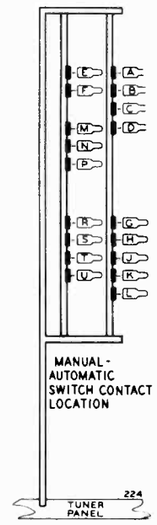

Fig. 14—Tuning Panel Switch Terminals

IMPORTANT—DO NOT REMOVE ANY CONNECTIONS AT TERMINALS TO WHICH NEW WIRES ARE ADDED UNLESS OTHERWISE INDICATED.

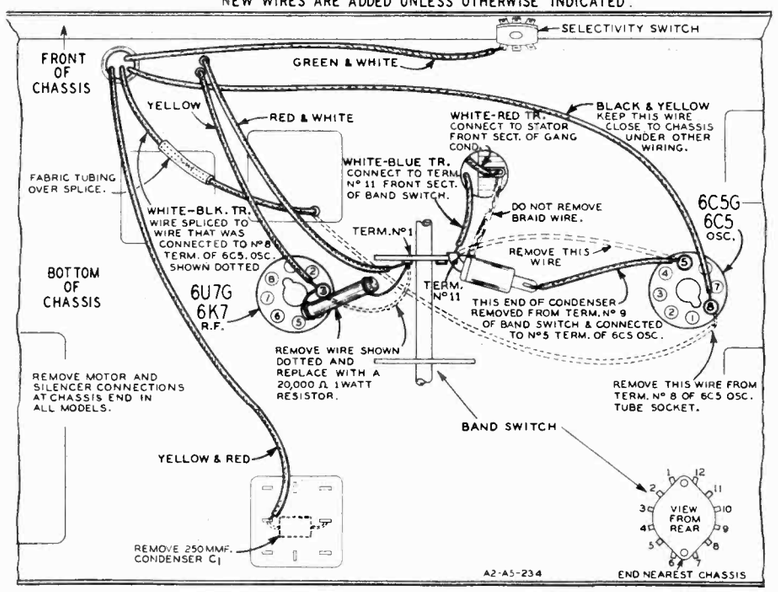

Fig. 10—9 and 11 Tube Chassis—Bottom View

13 TUBE MODEL—USE ALL 13 WIRES & GROUND LEAD.

9 & 11 TUBE MODELS—CLIP OFF WHITE-BROWN TR. (4) AT SWITCH CONTACT (F)

7 TUBE MODEL—CLIP OFF THE FOLLOWING WIRES:
WHITE-ORANGE TR. (6) AT SWITCH CONTACT (H)
WHITE (7) AT SWITCH CONTACT (J)
YELLOW (8) & RED & WHITE (9) AT CONDENSER TERMINAL STRIP.
TR_3 20000 OHM RESISTOR IS NOT USED.

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Fig. 12—Table of Tuning Panel Leads Used

9 AND 11 TUBE RADIOS

MODEL 7-Station Automatic Tuning Panel
Installation Data for MODEL A4 Series

WELLS-GARDNER & CO.

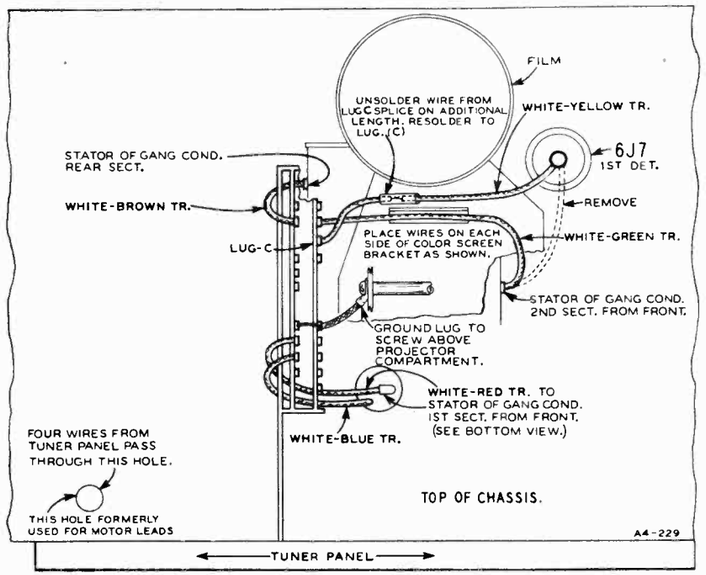

Fig. 15—7 Tube Chassis—Top View

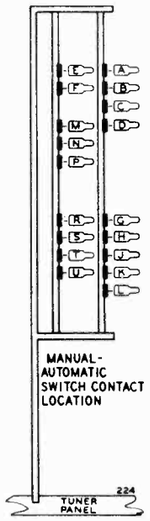

Fig. 17—Tuning Panel Switch Terminals

7 TUBE RADIO

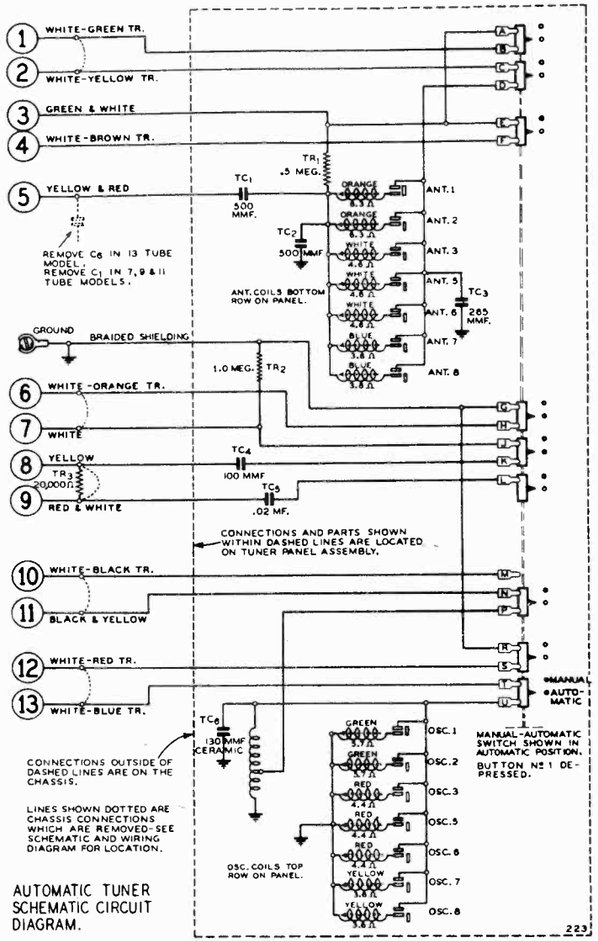

Fig. 19—Tuning Panel Schematic Diagram

Fig. 16—7 Tube Chassis—Bottom View

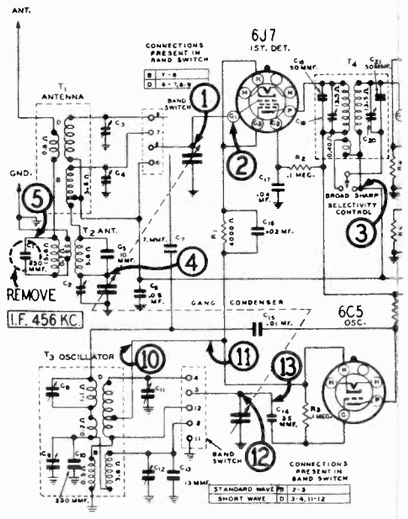

Fig. 18—7 Tube Schematic Diagram

13 TUBE MODEL-USE ALL 13 WIRES & GROUND LEAD.
9 & 11 TUBE MODELS-CLIP OFF WHITE-BROWN TR. (4) AT SWITCH CONTACT (F)
7 TUBE MODEL-CLIP OFF THE FOLLOWING WIRES: WHITE-ORANGE TR. (6) AT SWITCH CONTACT (H); WHITE (7) AT SWITCH CONTACT (J); YELLOW (8) & RED & WHITE (9) AT CONDENSER TERMINAL STRIP. TR3 20000 OHM RESISTOR IS NOT USED.
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Fig. 20—Table of Tuning Panel Leads Used

Early Models—Cutting off bracket

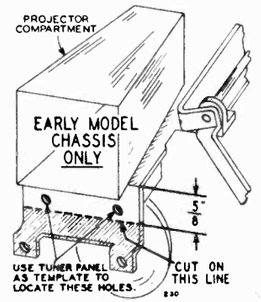


Fig. 21—Cutting Support Bracket—Early Models

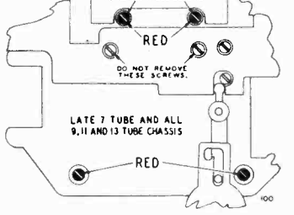


Fig. 22—Location of 4 Red Mounting Screws in Late Models

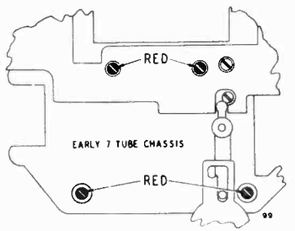


Fig. 23—Location of 4 Red Mounting Screws in Early Models

WELLS-GARDNER & CO.

MODEL B1 Series
Schematic, Voltage
Socket, Trimmers
Alignment

Input Voltages and Currents
"A" Battery ..... 2 Volts—.3 Amperes
"B" Battery ..... 90 Volts—11.5 to 15 Ma.
Power Output - - - 135 Milliwatts Undistorted
Selectivity - - 40 KC Broad at 1000 Times Signal

Intermediate Frequency - - - - - - - 456 KC.
Speaker - - - - - - - - - - - - 6" Dynamic
Tuning Frequency Range - - - 528 to 1730 KC.
Sensitivity - - - - - - - - - 40 Microvolts

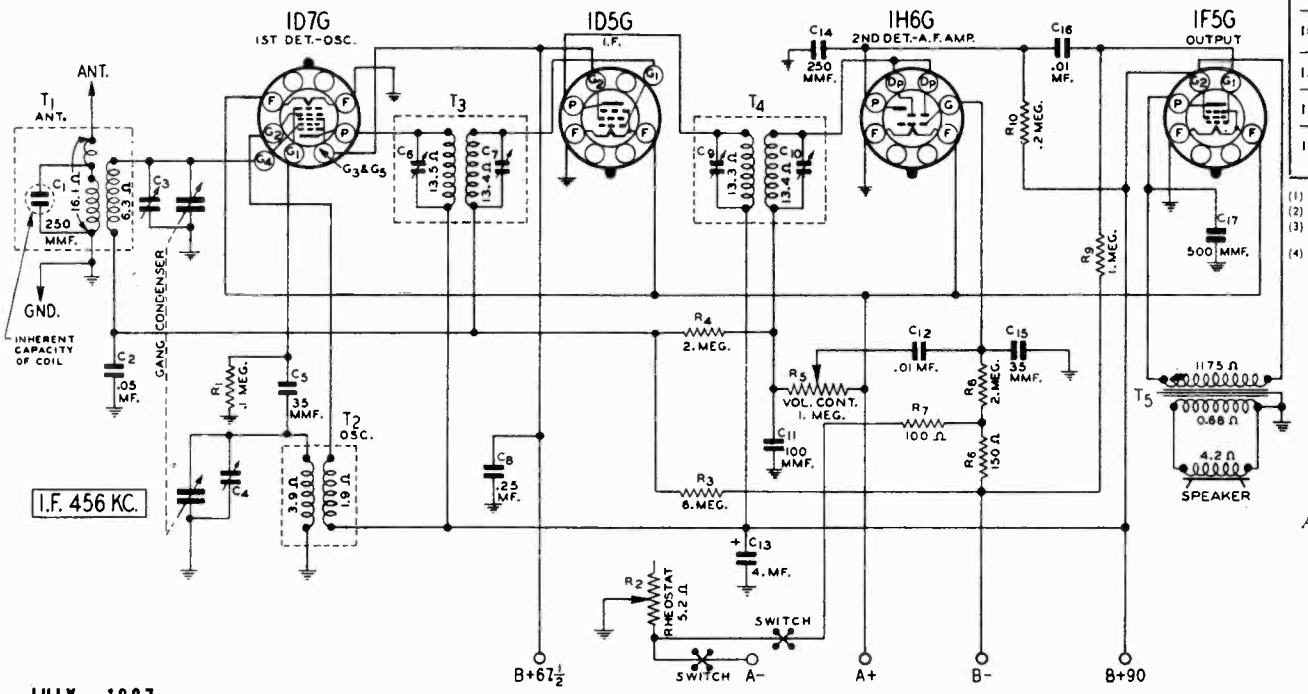


Fig. 1—Schematic Circuit Diagram

VOLTAGES AT SOCKETS
Volume Control: Maximum — Antenna Shorted to Ground
"A" Battery — 2 Volts

Tube	Function	Across Filament	Plate to Ground	Screen to Ground	Control Grid
1D7G	1st Det.-Osc.	2.0	87 87(1)	64	3.5(2)
1D5G	I.F.	2.0	87	64	3.5(2)
1H6G	2nd Det.-1st Audio	2.0	32(3)		1.25(4)
1F5G	Power	2.0	82	87	3.5(2)

(1) Anode Grid (G2) to ground
(2) As read across R6 and R7
(3) As read on 100 volt scale (1000 ohm per volt meter). Subject to variation.
(4) As read across R7

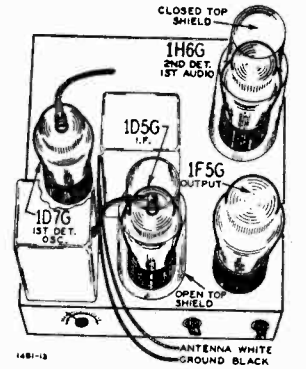


Fig. 2—Tube Arrangement

JULY, 1937

ALIGNMENT PROCEDURE

STEP (Follow Order as Given)	DUMMY ANTENNA	SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	TRIMMERS ADJUSTED See Illustration	PROCEDURE INITIAL STEPS	PROCEDURE ADJUSTMENT
I. F.	.1 mf.	456 KC	Grid of 1st Det.	2nd I. F. (C9) & (C10) 1st I. F. (C6) & (C 7)	Turn rotor to full open	Adjust to Maximum Output
1730 KC Adj.	200 mmf.	1730 KC	Antenna Lead	Osc. (C4)	Turn rotor to full open	Adjust to Maximum Output
1500 KC Adj.	200 mmf.	1500 KC	Antenna Lead	Ant. (C3)	Turn Rotor to Max. Output	Adjust to Maximum Output

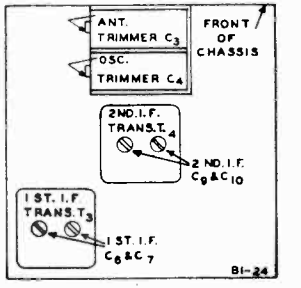


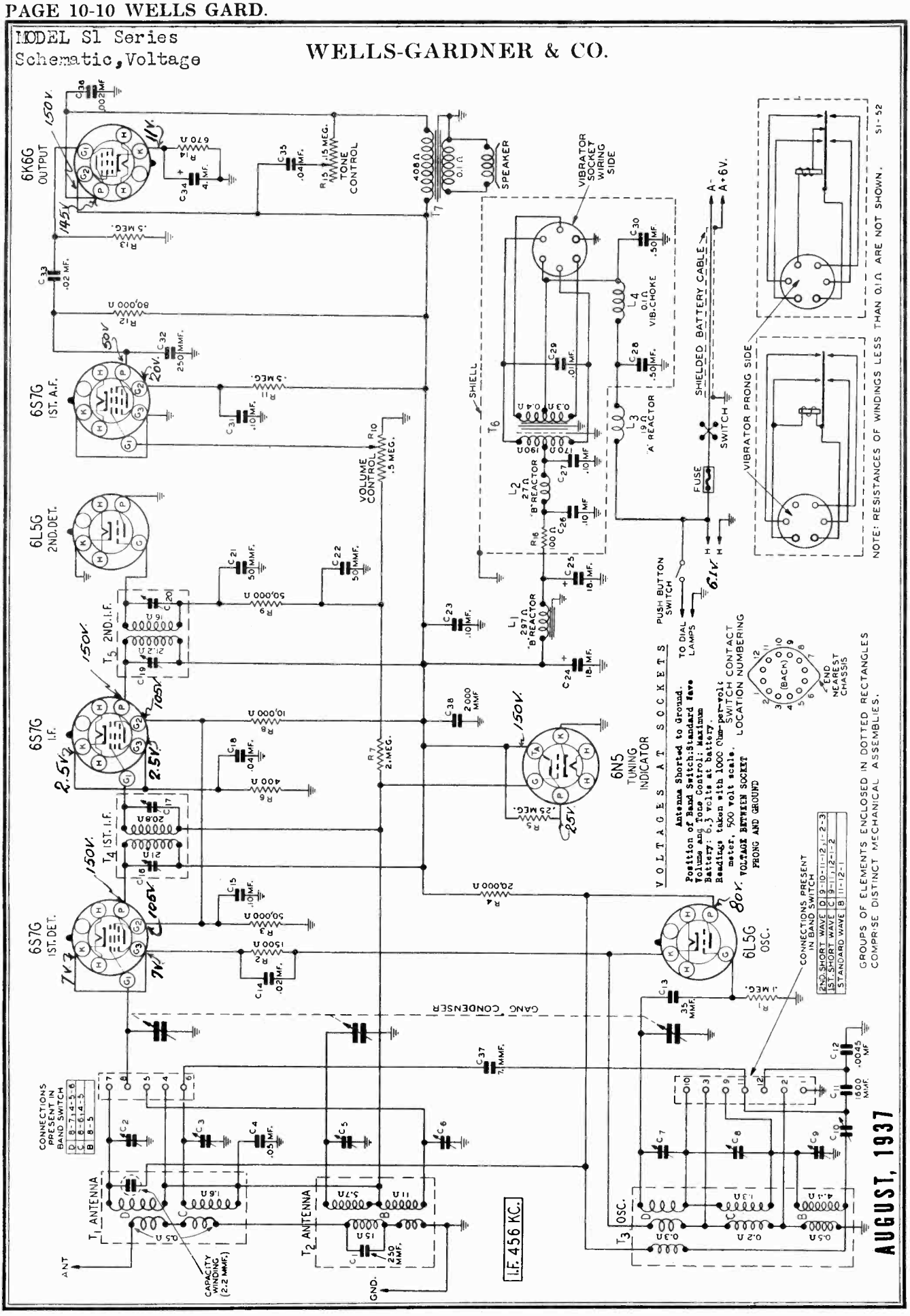
Fig. 3—Trimmer Location

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

NOTE—To obtain dial scale calibration, tune in an 800 KC signal. The pointer should be at the 800 KC mark on the dial. If it is not, note the position of the pointer and remove the chassis from the cabinet. Loosen the pointer screw and set the pointer so that it will be at the 800 KC mark. Tighten the pointer screw and replace the chassis in the cabinet. If the pointer is not at the 800 KC mark another adjustment will be necessary.

MODEL S1 Series
Schematic, Voltage

WELLS-GARDNER & CO.



WELLS-GARDNER & CO.

MODEL S1 Series
Alignment, Trimmers
MODEL S2 Series
Alignment, Trimmers, Tuner

ALIGNMENT PROCEDURE SERIES S1

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

The following equipment is required for aligning:
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter — Non-Metallic Screwdriver.
Dummy Antennas — .1 mf., 200 mmf., and 400 ohms.

STEP (Follow Order as Given)	BAND SWITCH SETTING	DUMMY ANTENNA	SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	TRIMMERS ADJUSTED See Illustration	PROCEDURE INITIAL STEPS	PROCEDURE ADJUSTMENT
I. F.							
2nd I.F. Adj.	Range B	.1 mf.	456 KC	Grid of I.F. Tube	2nd I.F. (C19) & (C20)	Turn Rotor to Full Open	Adjust to Maximum Output
1st I.F. Adj.	Range B	.1 mf.	456 KC	Grid of 1st Det.	1st I.F. (C16) & (C17)	Turn Rotor to Full Open	Adjust to Maximum Output
RANGE D							
22,000 KC	Range D	400 Ohm	22,000 KC	Antenna Lead	Oscillator Range D (C7)	Turn Rotor to Full Open	Adjust to Maximum Output
20,000 KC	Range D	400 Ohm	20,000 KC	Antenna Lead	Antenna Range D (C2)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE C							
6350 KC	Range C	400 Ohm	6350 KC	Antenna Lead	Oscillator Range C (C8)	Turn Rotor to Full Open	Adjust to Maximum Output
6000 KC	Range C	400 Ohm	6000 KC	Antenna Lead	Antenna Range C (C3)	Turn Rotor to Max. Output	Adjust to Maximum Output
RANGE B							
1830 KC	Range B	200 mmf.	1830 KC	Antenna Lead	Oscillator Range B (C9)	Turn Rotor to Full Open	Adjust to Maximum Output
1500 KC	Range B	200 mmf.	1500 KC	Antenna Lead	1st Ant. Range B (C5) 2nd Ant. Range B (C6)	Turn Rotor to Max. Output Set Indicator to 1500 KC— See Note A	Adjust to Maximum Output
600 KC	Range B	200 mmf.	600 KC	Antenna Lead	600 KC (C10)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B

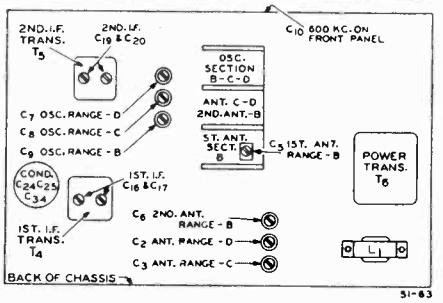
Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

After each range is completed, repeat the procedure as a final check.

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

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

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 on the dial. It may be necessary to increase the input signal to hear the image.



ALIGNMENT PROCEDURE Series S2

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter—Non-Metallic Screwdriver.
Dummy Antennas—.1 mf., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
I. F.					
456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	1st I.F. (C15) & (C16) 2nd I.F. (C21) & (C22)
RANGE B					
1730 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C7)
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1500 KC— See Note A	Ant. Range B (C5)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C8) Rock Rotor—See Note B
RANGE D					
18,300 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C6)
15,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C3) Rock Rotor—See Note B
PERMEABILITY TUNING UNIT			BUTTON DEPRESSED (Band Switch in Push Button Position)	TURN SETTING SCREW TO MAXIMUM OUTPUT	ADJUST COIL POSITION TO MAXIMUM OUTPUT —See Note C
1100 KC	Antenna Lead	200 mmf.	No. 1	Setting Screw No. 1	Antenna Coil No. 1
1100 KC	Antenna Lead	200 mmf.	No. 2	Setting Screw No. 2	Antenna Coil No. 2
850 KC	Antenna Lead	200 mmf.	No. 3	Setting Screw No. 3	Antenna Coil No. 3
850 KC	Antenna Lead	200 mmf.	No. 4	Setting Screw No. 4	Antenna Coil No. 4
700 KC	Antenna Lead	200 mmf.	No. 5	Setting Screw No. 5	Antenna Coil No. 5
700 KC	Antenna Lead	200 mmf.	No. 6	Setting Screw No. 6	Antenna Coil No. 6

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 on the dial. It may be necessary to increase the input signal to hear the image.

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

After each range is completed, repeat the procedure as a final check.

NOTE A—If the pointer is not at 1500 KC on the dial, loosen the 2 clamps which hold the pointer assembly on the cord, move the pointer to the 1500 KC mark, and tighten the clamps.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

NOTE C—At the top of the permeability tuning unit can be seen six "W" openings. Insert the end of a pair of long nose pliers or a screwdriver in the "W" opening of the proper button and adjust the position of the antenna (rear) coil by twisting the pliers or screwdriver until maximum output is obtained

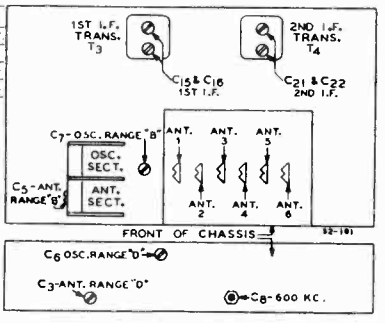


Fig. 2— Trimmer Location

MODEL S2 Series
Schematic, Voltage
Socket, Coils, Notes

WELLS-GARDNER & CO.

Power Consumption - 2.45 Amperes at 6.3 Volts

Power Output - - - - - - - .8 Watt Undistorted
1.4 Watts Maximum

Selectivity - 41 KC Broad at 1000 times Signal

Sensitivity

B Range (Manual Tuning)..... 6 Microvolts Average
B Range (Automatic Tuning)..... 8 Microvolts Average
D Range ..... 8 Microvolts Average

Intermediate Frequency - - - - - - - 456 KC.
Speaker - - - - - - - 6" or 8" P. M. Dynamic

Tuning Frequency Range

B Range (Manual Tuning)..... 528 to 1730 KC
D Range (Manual Tuning)..... 5750 to 18300 KC
Buttons 1 and 2 (Automatic Tuning)..... 820 to 1600 KC
Buttons 3 and 4 (Automatic Tuning)..... 650 to 1250 KC
Buttons 5 and 6 (Automatic Tuning)..... 520 to 980 KC

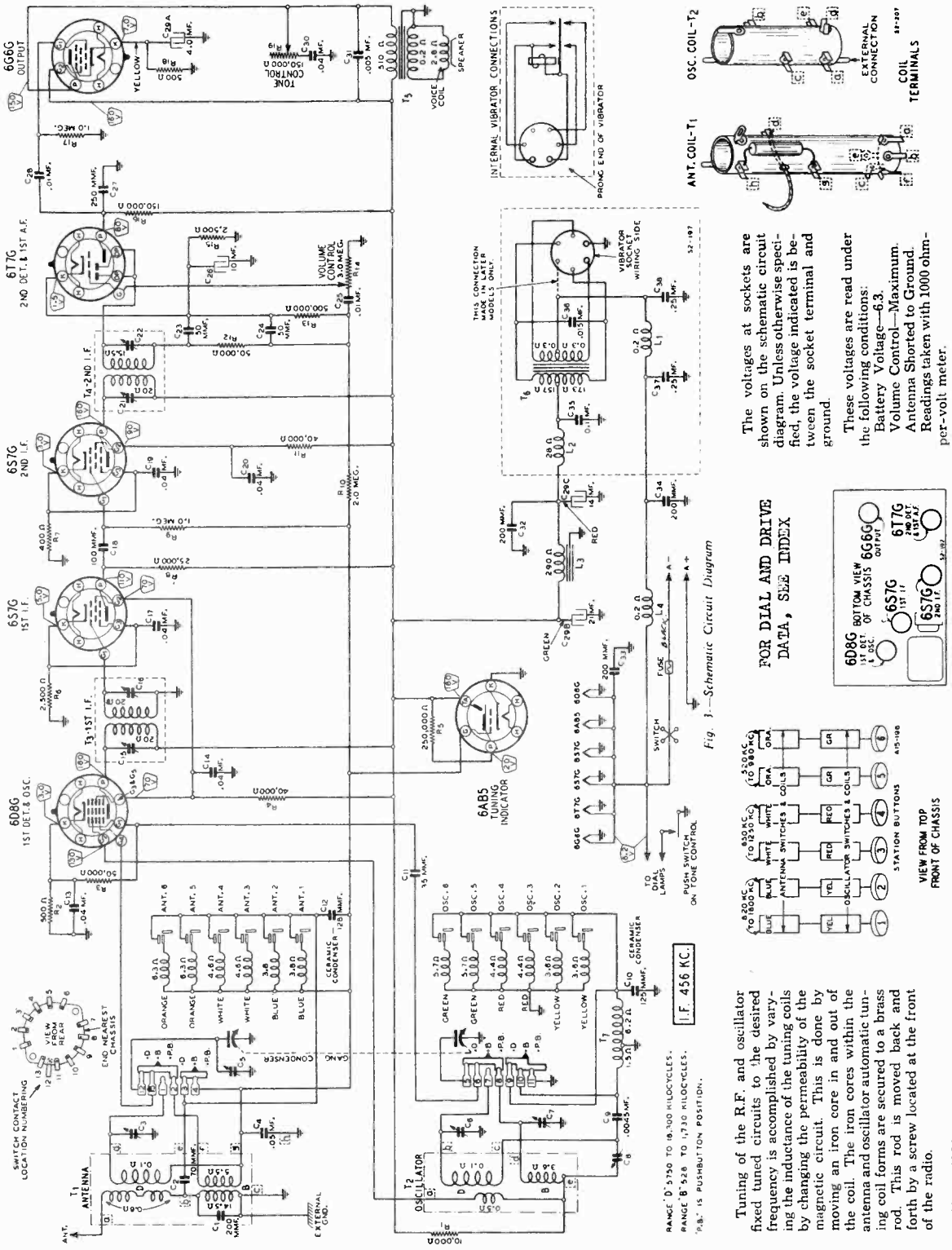


Fig. 1—Schematic Circuit Diagram

FOR DIAL AND DRIVE DATA, SEE INDEX

The voltages at sockets are shown on the schematic circuit diagram. Unless otherwise specified, the voltage indicated is between the socket terminal and ground.

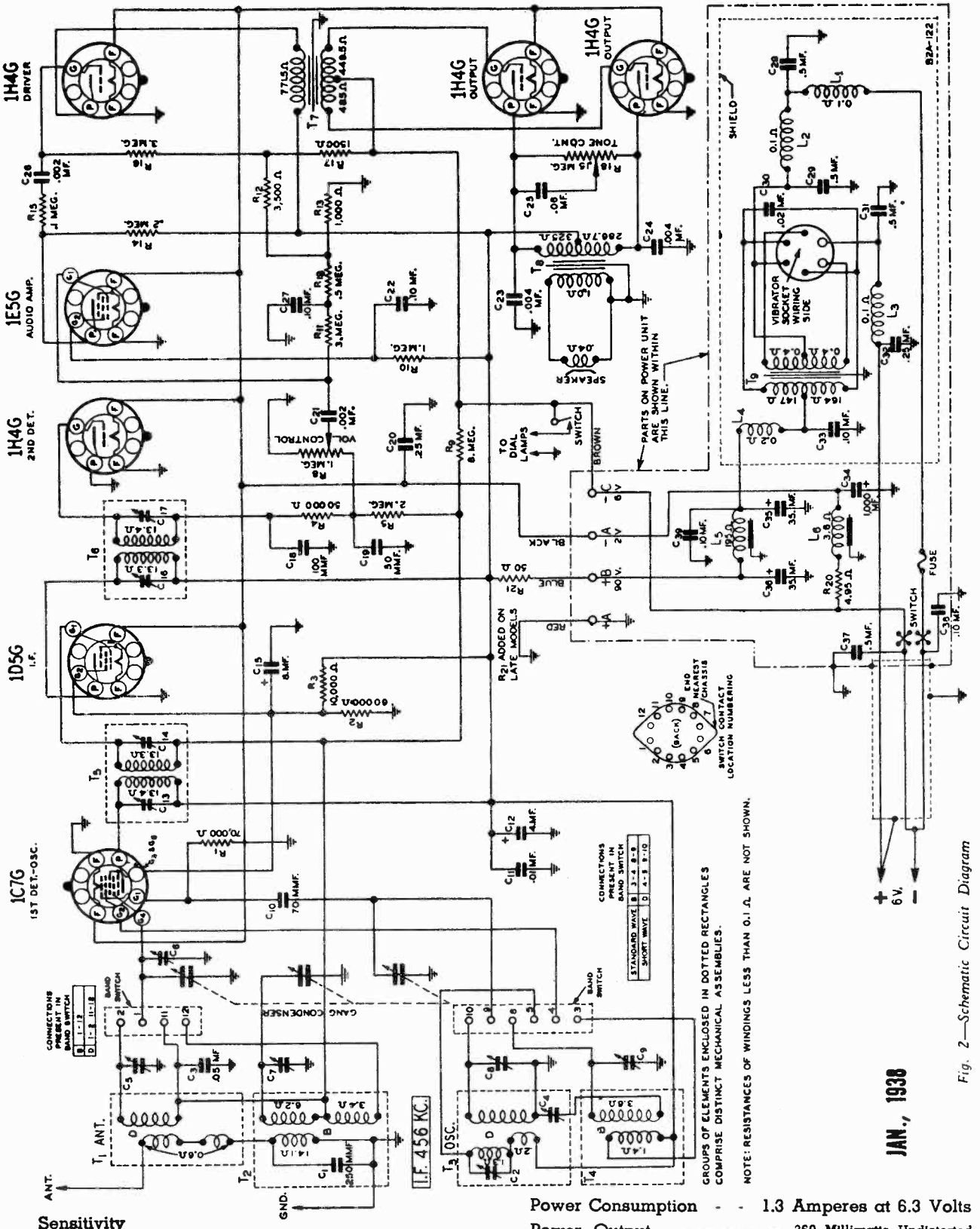
These voltages are read under the following conditions:
Battery Voltage—6.3.
Volume Control—Maximum.
Antenna Shorted to Ground.
Readings taken with 1000 ohm-per-volt meter.

Tuning of the R.F. and oscillator fixed tuned circuits to the desired frequency is accomplished by varying the inductance of the tuning coils by changing the permeability of the magnetic circuit. This is done by moving an iron core in and out of the coil. The iron cores within the antenna and oscillator automatic tuning coil forms are secured to a brass rod. This rod is moved back and forth by a screw located at the front of the radio.

AUGUST, 1938

WELLS-GARDNER & CO.

MODEL B2A Series
Schematic, Specifications



JAN., 1938

Fig. 2—Schematic Circuit Diagram

Sensitivity

B Range.....13.5 Microvolts Average
D Range.....21.0 Microvolts Average

Tuning Frequency Range

B Range.....528 to 1730 KC
D Range.....5750 to 18300 KC

Power Consumption - - 1.3 Amperes at 6.3 Volts
Power Output - - - - - 360 Milliwatts Undistorted
725 Milliwatts Maximum
Selectivity - - 35 KC Broad at 1000 times Signal
Intermediate Frequency - - - - - - - 456 KC
Speaker - - - - 6" P.M. Dynamic—Mantel Models
8" P.M. Dynamic—Console Models

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator With a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

The following equipment is required for aligning:
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter; Non-Metallic Screwdriver.
Dummy Antennas — .1 mf., 200 mmf., and 400 ohms.

STEP (Follow Order as Given)	BAND SWITCH SETTING	DUMMY ANTENNA	SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	TRIMMERS ADJUSTED See Illustration	PROCEDURE INITIAL STEPS	PROCEDURE ADJUSTMENT
I.F.	Range B	.1 mf.	456 KC	Grid of 1st Det.	1st I.F. (C13) & (C14) 2nd I.F. (C16) & (C17)	Turn Rotor to Full Open	Adjust to Maximum Output
RANGE B							
1730 KC	Range B	200 mmf.	1730 KC	Antenna Lead	Oscillator Range B (C9)	Turn Rotor to Full Open	Adjust to Maximum Output
1500 KC	Range B	200 mmf.	1500 KC	Antenna Lead	1st Ant. Range B (C7) 2nd Ant. Range B (C6)	Turn Rotor to Max. Output Set Indicator to 1500 KC—See Note A	Adjust to Maximum Output
600 KC	Range B	200 mmf.	600 KC	Antenna Lead	600 KC (C4)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor—See Note B
RANGE D							
18300 KC	Range D	400 Ohm	18300 KC	Antenna Lead	Oscillator Range D (C8)	Turn Rotor to Full Open	Adjust to Maximum Output
15000 KC	Range D	400 Ohm	15000 KC	Antenna Lead	Ant. Range D (C5)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor—See Note B
6000 KC	Range D	400 Ohm	6000 KC	Antenna Lead	6000 KC (C2)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor—See Note B

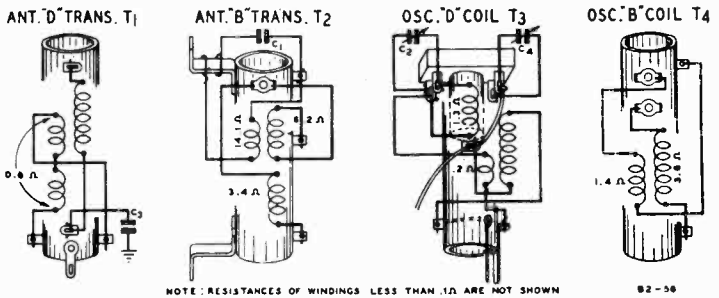


Fig. 6—Coil Terminal Arrangement and D.C. Resistance of Windings

NOTE A—In sets using the finger tip tuning dial, remove the retaining ring which holds the dial scale in position. Readjust rotor to maximum output. Hold the station selector ring and turn the dial scale until the pointer is at the 1500 KC mark. Replace the retaining ring.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

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

After each range is completed, repeat the procedure as a final check.

After alignment of Range D has been completed, do not make any adjustments of the Range B trimmers. If this is done, it will be necessary to realign Range D.

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 on the dial. It may be necessary to increase the input signal to hear the image.

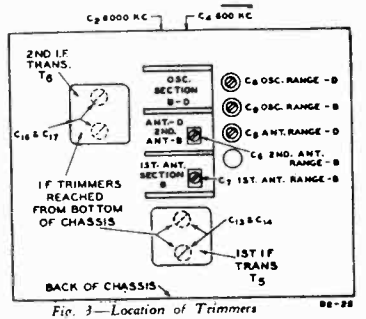


Fig. 3—Location of Trimmers

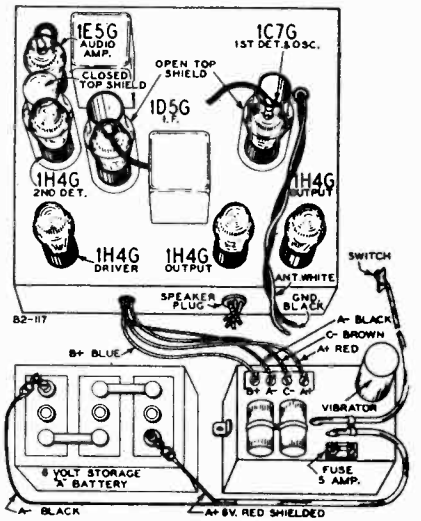


Fig. 5—Tube Arrangement and Battery Connections

VOLTAGES AT SOCKETS

Volume Control: Maximum
Readings taken with 1000 Ohm-per-volt meter.

Antenna Shorted to Ground
Band Switch in Standard Wave Position

TUBE	FUNCTION	VOLTAGE BETWEEN SOCKET PRONG AND GROUND (Unless otherwise indicated) Prong No. 2	Prong No. 3	Prong No. 4	Prong No. 5	Prong No. 6	Prong No. 7	Control Grid Bias
1C7G	1st Det.—Osc.	0	103	66		103	2	
1D5G	I.F.	0	103	66			2	
1H4G	2nd Det.	0	0				2	
1E5G	Audio Amp.	0	40(1)	19(1)			2	1.0 Across R13
1H4G	Driver	0	100				2	4.5 Across R12 & 13
1H4G	Output	0	102		6		2	6 —C to Ground

(1) As read on 1000 volt scale.

A synchronous type vibrator is used in the power unit. This vibrator interrupts the current through the primary of the power transformer and also rectifies the current in the secondary circuit.

If, after a new 2 section dry electrolytic condenser has been installed, vibrator hash is encountered, reverse the connections of the 2 sections.

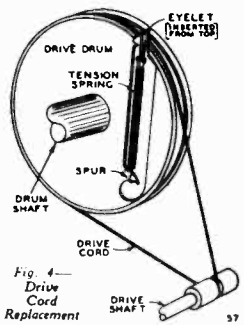


Fig. 4—Drive Cord Replacement

WELLS-GARDNER & CO.

MODEL T2 Series
Schematic, Voltage
Socket, Coils, Notes

Power Consumption - 1.45 Amperes at 32 Volts DC

Power Output - - - - - - - .17 Watts Undistorted
.40 Watts Maximum

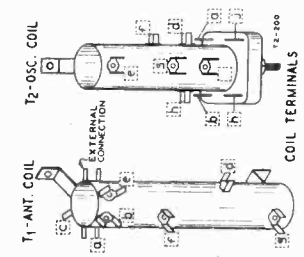
Selectivity - - 30 KC Broad at 1000 times Signal

Sensitivity

B Range (Manual Tuning).....6.0 Microvolts Average
B Range (Automatic Tuning).....6.0 Microvolts Average
D Range .....6.0 Microvolts Average

Intermediate Frequency - - - - - - - - 456 KC
Speaker - - - - - - - - - - - - 8" Dynamic
Tuning Frequency Range

B Range (Manual Tuning)... 528 to 1730 KC (Kilocycles)
D Range (Manual Tuning)...5750 to 18300 KC (Kilocycles)
Buttons 1 and 2 (Automatic Tuning).....820 to 1600 KC
Buttons 3 and 4 (Automatic Tuning).....650 to 1250 KC
Buttons 5 and 6 (Automatic Tuning).....520 to 980 KC



Line Voltage Range

The radio will operate satisfactorily within a line voltage range of 25 to 42 volts. If the line voltage is higher than 42, it will be necessary to use a series resistor to cut it down. If the voltage varies, a variable resistor may be required.

Starting Current

When first turned on, the drain for a few seconds is slightly higher than normal until the tubes heat up. Some automatic plants are adjusted to start under a load of 200 to 300 watts. If a number of devices such as lights or motors are being used and the radio set is turned on the total drain may be sufficient to start the plant.

This radio is designed for use on farms and in those places where the power supply consists of a 32 volt direct current generating plant.

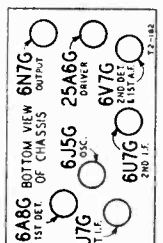
Polarity of Power Supply

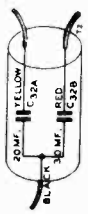
There is a red mark on the plug at the end of the power supply cord of the radio. The prong of the plug at which the red mark is placed must be plugged into the positive side of the line.

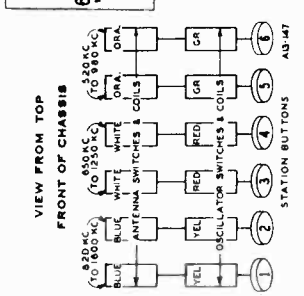
Caution

If used on any other type of power supply than 32 volt DC, severe damage may be done to the receiver.

Do not turn the radio on unless all of the tubes and the dial lamps are in the proper sockets. Use only No. 51 dial lamps.







FOR OTHER DATA
SEE INDEX

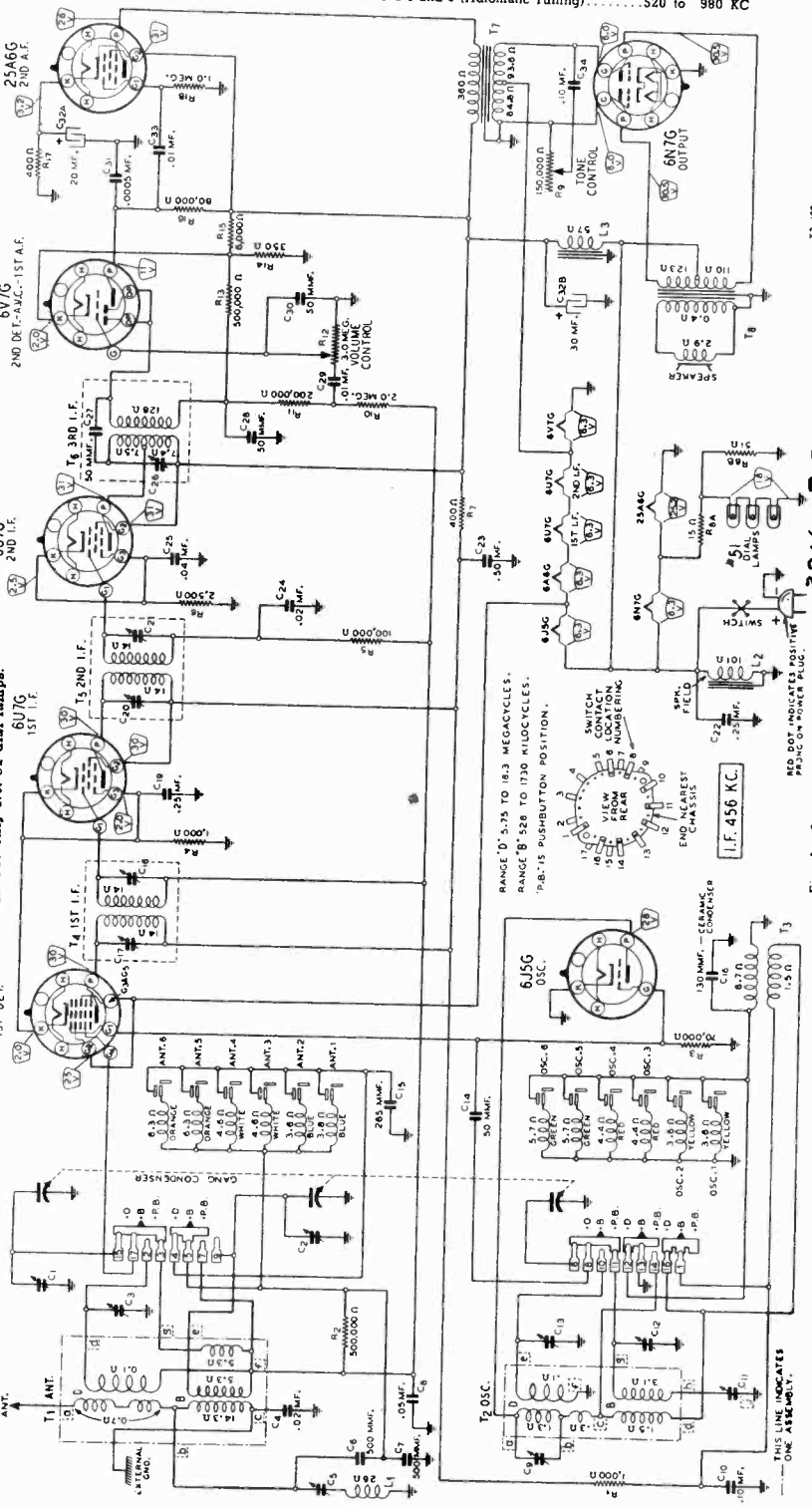


Fig. 3—Schematic Circuit Diagram

MODEL A17

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

IMPORTANT—Follow procedure in the order shown.

The following equipment is required for aligning:

An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter—Non-Metallic Screwdriver.

Dummy Antennas—.1 mf., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
I. F.					
456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	2nd I.F. (C23) & (C24) 1st I.F. (C20) & (C21)
RANGE D					
18,300 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C10)
15,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C2) Int. Range D (C6) Rock Rotor—See Note A
RANGE C					
5400 KC	Antenna Lead	400 Ohm	C Range	Turn Rotor to Full Open	Oscillator Range C (C11)
5000 KC	Antenna Lead	400 Ohm	C Range	Turn Rotor to Max. Output	Antenna Range C (C3) Int. Range C (C7)
RANGE B					
1600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C12)
1400 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1400 KC— See Note B	Ant. Range B (C4) Int. Range B (C8)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C13) Rock Rotor—See Note A

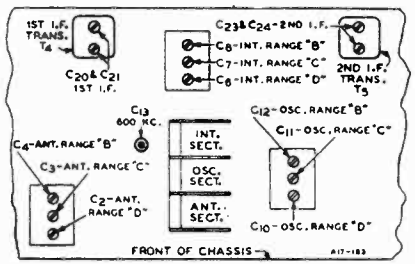
Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC.

After each range is completed, repeat the procedure as a final check.

NOTE A—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

NOTE B—If the pointer is not at 1400 KC on the dial, loosen the 2 clamps which hold the pointer assembly on the cord, move the pointer to the 1400 KC mark, and tighten the clamps.

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 on the dial. It may be necessary to increase the input signal to hear the image.



Location of Trimmers

Phonograph Connections

Phonograph connections are made as shown in the schematic circuit diagram—Fig. 3. On the top of the chassis base and between two of the 76 tube sockets is a round knockout 1⅛ inches in diameter. An octal base socket is mounted in this knockout opening and wired as shown in the schematic.

Tone Control

There are 3 wiring lugs on the tone control. One of the end lugs connects to one end of the tone control resistor. The center lug connects to the slider. The other end lug on the tone control is used for external wiring purposes only and is not connected to the tone control resistor in any way. One side of the tone control condenser and a wire from the B+ line are connected at this lug.

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.

Voltages at Sockets

The voltages at sockets are shown on the schematic circuit diagram. Unless otherwise specified, the voltage indicated is between the socket terminal and ground.

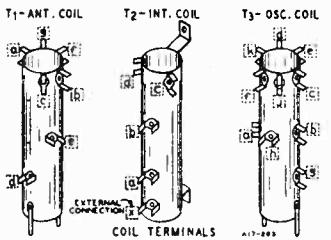
These voltages are read under the following conditions:

Line Voltage—117.

Volume Control—Maximum.

Antenna Shorted to Ground.

Readings taken with 1000 ohm-per-volt meter.



MODEL T2

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:

An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter—Non-Metallic Screwdriver.

Dummy Antennas—.1 mf., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (Unless otherwise specified)
I. F.					
456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	1st I.F. (C17) & (C18) 2nd I.F. (C20) & (C21) 3rd I.F. (C26)
RANGE B					
1730 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C12)
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1500 KC— See Note A	1st Ant. Range B (C2) 2nd Ant. Range B (C1)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C11) Rock Rotor—See Note B
WAVE TRAP					
456 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to 600 KC Adjust Sig. Gen.—See Note C	Wave Trap (C5) Adjust for MINIMUM Output
RANGE D					
18,300 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C13)
15,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C3) Rock Rotor—See Note B
6000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	6000 KC (C9) Rock Rotor—See Note B
PERMEABILITY TUNING UNIT			BUTTON DEPRESSED (Band Switch in Push Button Position)	TURN SETTING SCREW TO MAXIMUM OUTPUT —See Instruction Book	ADJUST COIL POSITION TO MAXIMUM OUTPUT —See Note D
1100 KC	Antenna Lead	200 mmf.	No. 1	Setting Screw No. 1	Antenna Coil No. 1
1100 KC	Antenna Lead	200 mmf.	No. 2	Setting Screw No. 2	Antenna Coil No. 2
850 KC	Antenna Lead	200 mmf.	No. 3	Setting Screw No. 3	Antenna Coil No. 3
850 KC	Antenna Lead	200 mmf.	No. 4	Setting Screw No. 4	Antenna Coil No. 4
700 KC	Antenna Lead	200 mmf.	No. 5	Setting Screw No. 5	Antenna Coil No. 5
700 KC	Antenna Lead	200 mmf.	No. 6	Setting Screw No. 6	Antenna Coil No. 6

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

After each range is completed, repeat the procedure as a final check.

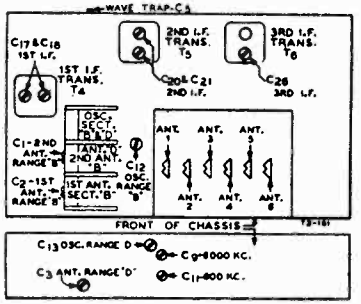
NOTE A—If the pointer is not at 1500 KC on the dial, loosen the 2 clamps which hold the pointer assembly on the cord, move the pointer to the 1500 KC mark, and tighten the clamps.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

NOTE C—Leave condenser rotor at the 600 KC setting and adjust the signal generator until maximum output is obtained at or near 456 KC.

NOTE D—At the top of the permeability tuning unit can be seen six "W" openings. Insert the end of a pair of long nose pliers or a screwdriver in the "W" opening of the proper button and adjust the position of the antenna (rear) coil by twisting the pliers or screwdriver until maximum output is obtained.

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 on the dial. It may be necessary to increase the input signal to hear the image.



MODEL T3 Series
Schematic, Voltage
Socket, Trimmers
Coils, Notes

WELLS-GARDNER & CO.

Power Consumption - 1.45 Amperes at 32 Volts DC
Power Output - - - - - - - .17 Watts Undistorted, .40 Watts Maximum
Selectivity - - 30 KC Broad at 1000 times Signal
Sensitivity (For .05 watt output)
B Range .....6.0 Microvolts Average
D Range .....6.0 Microvolts Average

Intermediate Frequency - - - - - - - - 456 KC
Speaker - - - - - 6" or 8" Electro-Dynamic
Tuning Frequency Range
B Range ..... 528 to 1730 KC (Kilocycles)
D Range ..... 5750 to 18300 KC (Kilocycles)

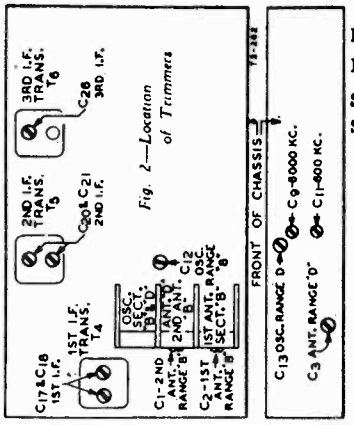


Fig. 2—Location of Trimmers

Line Voltage Range

The radio will operate satisfactorily within a line voltage range of 25 to 42 volts. If the line voltage is higher than 42, it will be necessary to use a series resistor to cut it down. If the voltage varies, a variable resistor may be required.

Starting Current

When first turned on for a few seconds the drain is slightly higher than normal until the tubes heat up. Some automatic plants are adjusted to start under a load of 200 to 300 watts. If a number of devices such as lights or motors are being used and the radio set is turned on the total drain may be sufficient to start the plant.

This radio is designed for use on farms and in those places where the power supply consists of a 32 volt direct current generating plant.

Polarity of Power Supply

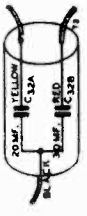
There is a red mark on the plug at the end of the power supply cord of the radio. The prong of the plug at which the red mark is placed must be plugged into the positive side of the line.

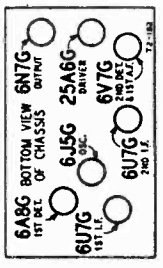
Caution

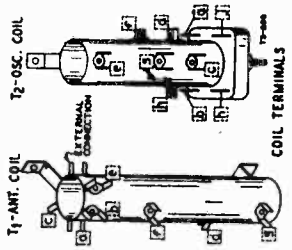
If used on any other type of power supply than 32 volt DC, severe damage may be done to the receiver.

Do not turn the radio on unless all of the tubes and the dial lamps are in the proper sockets. Use only No. 51 dial lamps.

32 Volt Power Supply







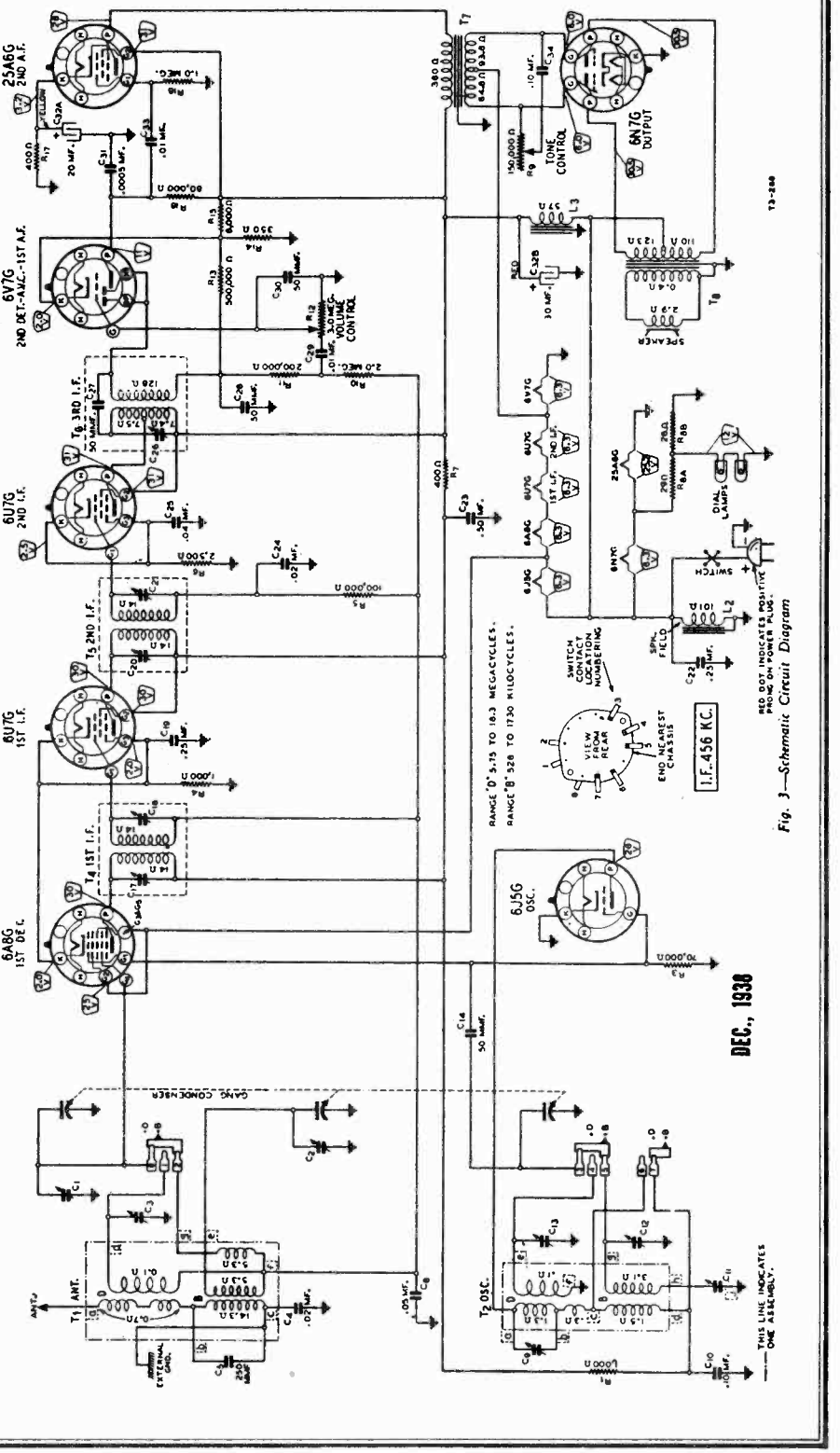


Fig. 3—Schematic Circuit Diagram

DEC., 1938

WG Series T3

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:

An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter—Non-Metallic Screwdriver.

Dummy Antennas—.1 mf., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
I. F.					1st I.F. (C17) & (C18) 2nd I.F. (C20) & (C21) 3rd I.F. (C26)
456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	
RANGE B					
1730 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C12)
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1500 KC—See Note A	1st Ant. Range B (C2) 2nd Ant. Range B (C1)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C11) Rock Rotor—See Note B
RANGE D					
18,300 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C13)
15,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C3) Rock Rotor—See Note B
6000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	6000 KC (C9) Rock Rotor—See Note B

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

After each range is completed, repeat the procedure as a final check.

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 on the dial. It may be necessary to increase the input signal to hear the image.

NOTE A—If the pointer is not at 1500 KC on the dial, hold the drive cord and move the pointer to this mark.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

Dial Pointer Attachment—Tune in a station of known frequency. Move the pointer to the approximate frequency on the dial scale. Pass the cord through the slotted head—See Fig. 4. Hold the drive cord and slide the pointer to the exact frequency on the dial scale.

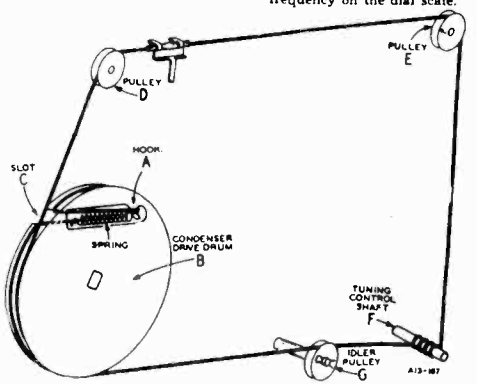


Fig. 4—Drive Cord Replacement

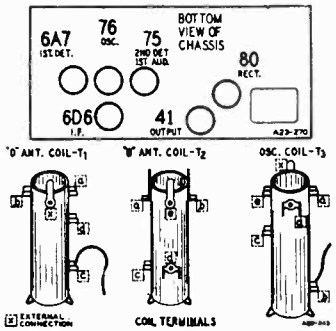
Drive Cord Replacement

Tie a knot with a small loop at one end of the new drive cord. Tie the free end of the drive cord to the tension spring. The distance between knots should be 49¾ inches.

Arrange to keep the gang condenser in the completely closed position.

Place the looped end of the drive cord over hook A on condenser drive drum B (See Fig. 4). Pass the cord through slot C in the drum rim and wind one turn in a clockwise direction (from front of chassis) on condenser drive drum. Pass drive cord over pulleys D and E as shown. Continue cord down to shaft F and wind 4 turns clockwise, progressing towards the chassis. Bring cord over pulley G to bottom of condenser drive drum B as shown. Wind drive cord clockwise (from front of chassis) around condenser drive drum B to slot C. See that the drive cord does not cross in groove of condenser drive drum. Pass the remaining drive cord and tension spring through slot C and secure the free end of the spring on hook A.

WG Series A23



Tuning Frequency Range

B Range ..... 528 to 1730 KC (Kilocycles)

D Range ..... 5750 to 18300 KC (Kilocycles)

Sensitivity (For 0.5 watt output)

B Range ..... 30 Microvolts Average

D Range ..... 50 Microvolts Average

Power Consumption - - 60 Watts (At 117 volts 60 cycles)

Power Output - - - - - - - 1.5 Watts Undistorted, 3.0 Watts Maximum

Selectivity - - 45 KC Broad at 1000 times Signal

Intermediate Frequency - - - - - - - 456 KC

Speaker - - - - - - 6", 8" or 10" Dynamic

For drive cord data, rack and panel assembly, see index.

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

IMPORTANT—Follow procedure in the order shown.

The following equipment is required for aligning:

An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter—Non-Metallic Screwdriver.

Dummy Antennas—.1 mf., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER OR DIAL SETTING	ADJUST TRIMMERS TO MAXIMUM (Unless otherwise specified)
I. F.					2nd I.F. (C16) & (C17) 1st I.F. (C14) & (C15)
456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	
WAVE TRAP					Wave Trap (C5)
456 KC	Antenna Lead	200 mmf.	B Range	600 KC	Adjust for MINIMUM Output
RANGE B				Turn Rotor to Full Closed Position. Pointer should be at low frequency end mark on scale—See Note A.	
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor until dial pointer is at 1500 KC	Oscillator Range B (C11)
1500 KC	Antenna Lead	200 mmf.	B Range	Leave Rotor at above setting	Ant. Range B (C3)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C9) Rock Rotor—See Note B
RANGE D					
18,300 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C8)
15,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C1) Rock Rotor—See Note B

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

After each range is completed, repeat the procedure as a final check.

NOTE A—The low frequency end mark is a small dot at the left side of the short wave scale under the "B." of the number 5.8 and to the right of the "C" of the letters MC. If the pointer is not at this mark on the dial, move the pointer to this mark.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

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 15,000 KC. The signal will then be heard at 15,000 KC 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 on the dial. It may be necessary to increase the input signal to hear the image.

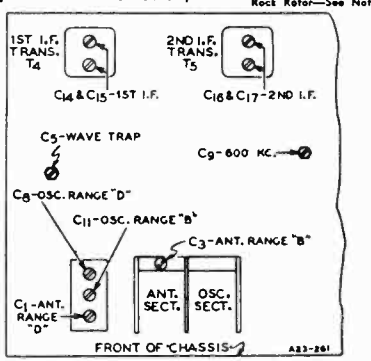


Fig. 2—Location of Trimmers

Schematic, Voltage, Socket Trimmers, Alignment, Coils

WELLS-GARDNER & CO.

MODELS B3 Series (Portable)
B4 Series (Table Models)

Input Voltages and Currents

"A" Battery.....1.5 Volts—.30 Amperes
"B" Battery.....90 Volts—12 to 15 Ma.

Power Output - - - 140 Milliwatts Undistorted

Selectivity - - 41 KC Broad at 1000 Times Signal

Intermediate Frequency - - - - - - - 456 KC.
Speaker - - - - - - - - - 6" P.M. Dynamic
Tuning Frequency Range - - - 540 to 1600 KC.
Sensitivity (For .05 Watt Output)
Table Model.....10.5 Microvolts Average
Portable Model.....20 Microvolts Per Meter Average

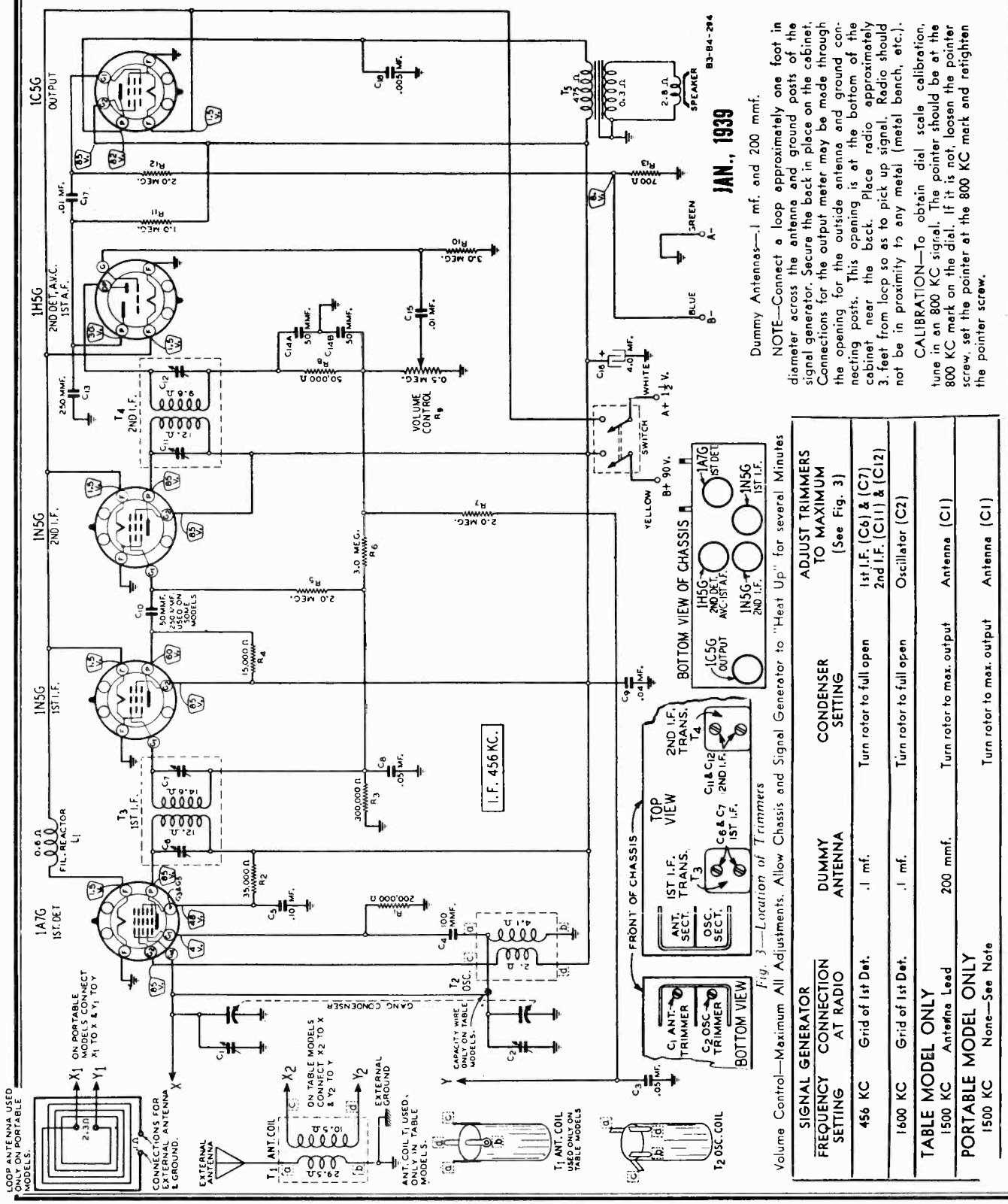


Fig. 3—Location of Trimmers

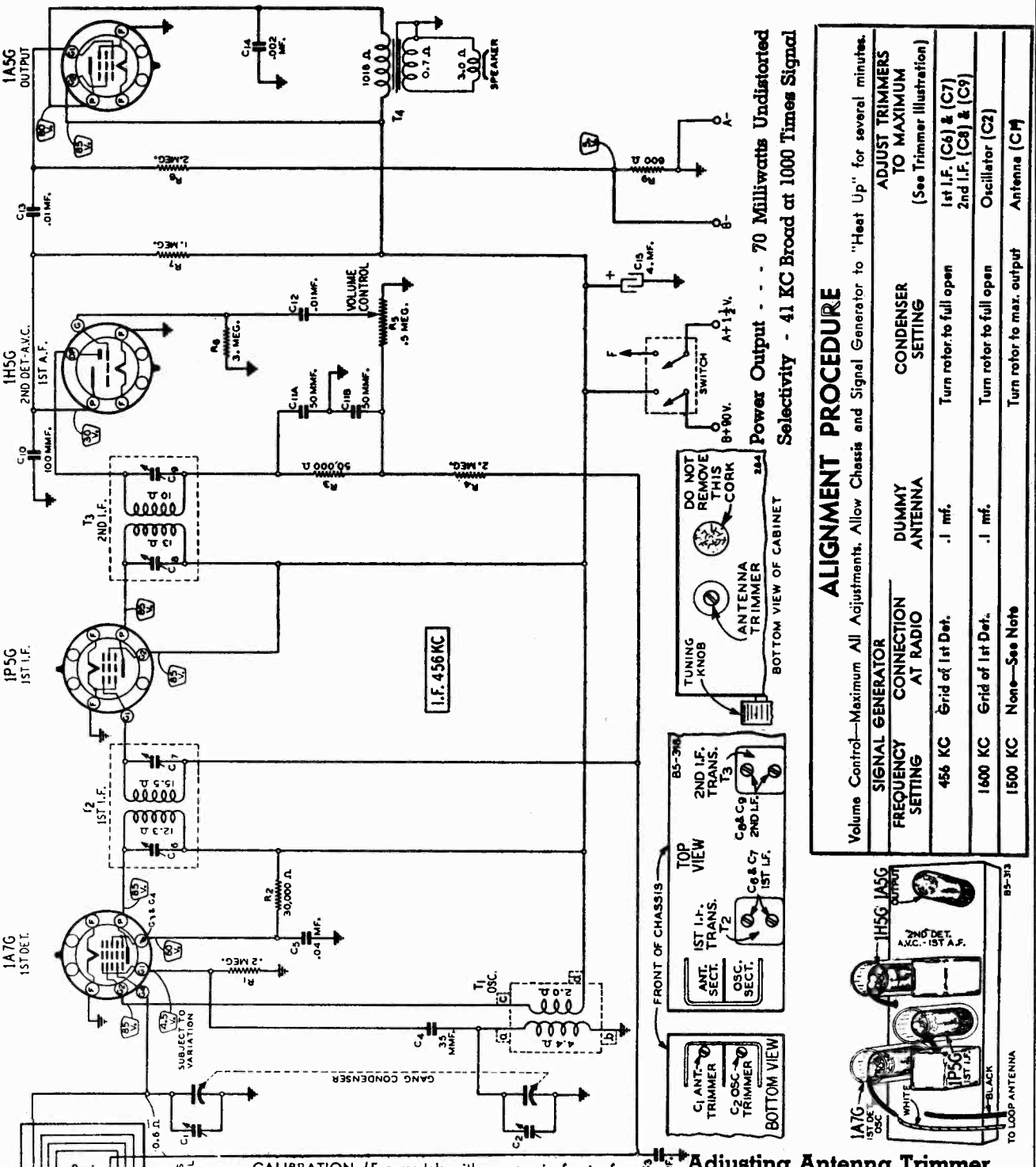
Volume Control—Maximum All Adjustments. Allow Chassis and Signal Generator to "Heat Up" for several Minutes

SIGNAL GENERATOR FREQUENCY SETTING	CONNECTION AT RADIO	DUMMY ANTENNA	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (See Fig. 3)
456 KC	Grid of 1st Det.	.1 mf.	Turn rotor to full open	1st I.F. (C6) & (C7) 2nd I.F. (C11) & (C12)
1600 KC	Grid of 1st Det.	.1 mf.	Turn rotor to full open	Oscillator (C2)
TABLE MODEL ONLY				
1500 KC	Antenna Lead	200 mmf.	Turn rotor to max. output	Antenna (C1)
PORTABLE MODEL ONLY				
1500 KC	None—See Note		Turn rotor to max. output	Antenna (C1)

MODEL 4B5 Series
Schematic, Voltage

WELLS-GARDNER & CO.

Socket, Trimmers
Alignment



Power Output - - - 70 Milliwatts Undistorted

Selectivity - 41 KC Broad at 1000 Times Signal

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments. Allow Chassis and Signal Generator to "Heat Up" for several minutes.

SIGNAL GENERATOR			CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (See Trimmer Illustration)
FREQUENCY SETTING	CONNECTION AT RADIO	DUMMY ANTENNA		
456 KC	Grid of 1st Det.	.1 mf.	Turn rotor to full open	1st I.F. (C6) & (C7) 2nd I.F. (C8) & (C9)
1600 KC	Grid of 1st Det.	.1 mf.	Turn rotor to full open	Oscillator (C2)
1500 KC	None—See Note		Turn rotor to max. output	Antenna (C1)

CALIBRATION (For models with pointer in front of dial scale)—To obtain dial scale calibration, tune in an 800 KC signal. The pointer should be at the 800 KC mark on the dial. If it is not, loosen the pointer screw, set the pointer at the 800 KC mark and retighten the pointer screw.

CALIBRATION (For model with pointer in back of celluloid dial scale)—To obtain dial scale calibration, tune in an 800 KC signal. The pointer should be at the 800 KC mark on the dial. **IF THE POINTER IS AT A HIGHER KC MARK THAN 800 KC**, grasp the drive cord below the tension spring. Hold the tuning control shaft motionless and slowly pull the drive cord down until the pointer is at the 800 KC mark. **IF THE POINTER IS AT A LOWER KC MARK THAN 800 KC**, grasp the drive cord above the tension spring. Hold the tuning control shaft motionless and slowly pull the drive cord up until the pointer is at the 800 KC mark.

Adjusting Antenna Trimmer

After the batteries are installed and the back of the cabinet is in place, adjust the antenna trimmer.

Accurately tune in a weak station signal between 1400 and 1500 KC on the dial. With a screwdriver turn the adjusting screw of the antenna trimmer up or down until maximum output is obtained. This trimmer is reached through an opening in the bottom of the cabinet—see illustration. CAUTION: Do not remove the cork from the other opening at the bottom of the cabinet.

Socket, Trimmers
Alignment

WELLS-GARDNER & CO.

MODEL 5C10 Series
Schematic, Voltage

Power Consumption - 6.25 Amperes at 6.3 Volts

Power Output - - - - - 1.5 Watts Undistorted

Sensitivity - - 1.5 Microvolts at .5 Watt Output

Selectivity - 42 KC Broad at 1000 Times Signal
Tuning Frequency Range - - - 540 to 1560 KC
Intermediate Frequency - - - - - - - 456 KC
Speaker - - - - - - - - 6" Electro-Dynamic

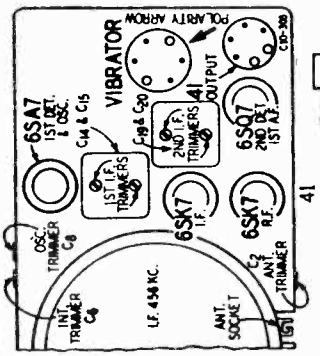


Fig. 2—Tube and Vibrator Location

FOR SETTING PUSH BUTTONS, SEE INDEX.

IF ALIGNMENT
Adjust at 456 KC through 0.05 mfd. condenser.

BC ALIGNMENT
Adjust oscillator trimmer C8 at 1560 KC.
Adjust C6 and C2 trimmers at 1000 KC.

FOR CONVENTIONAL ALIGNMENT, SEE SPECIAL SECTION OF VOLUME VIII

Battery Cable and Fuse

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 cable with the fuse receptacle connects to the battery cable from the radio after the fuse has been inserted.

A 9 ampere automobile fuse is used.

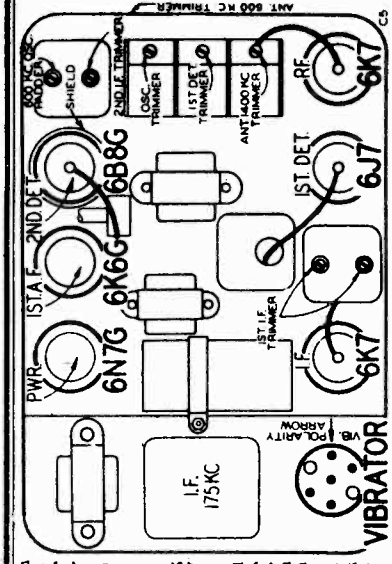
MODELS C5,6CH5 Series
Schematic,Socket,Trimmers
Alignment

WELLS-GARDNER & CO.

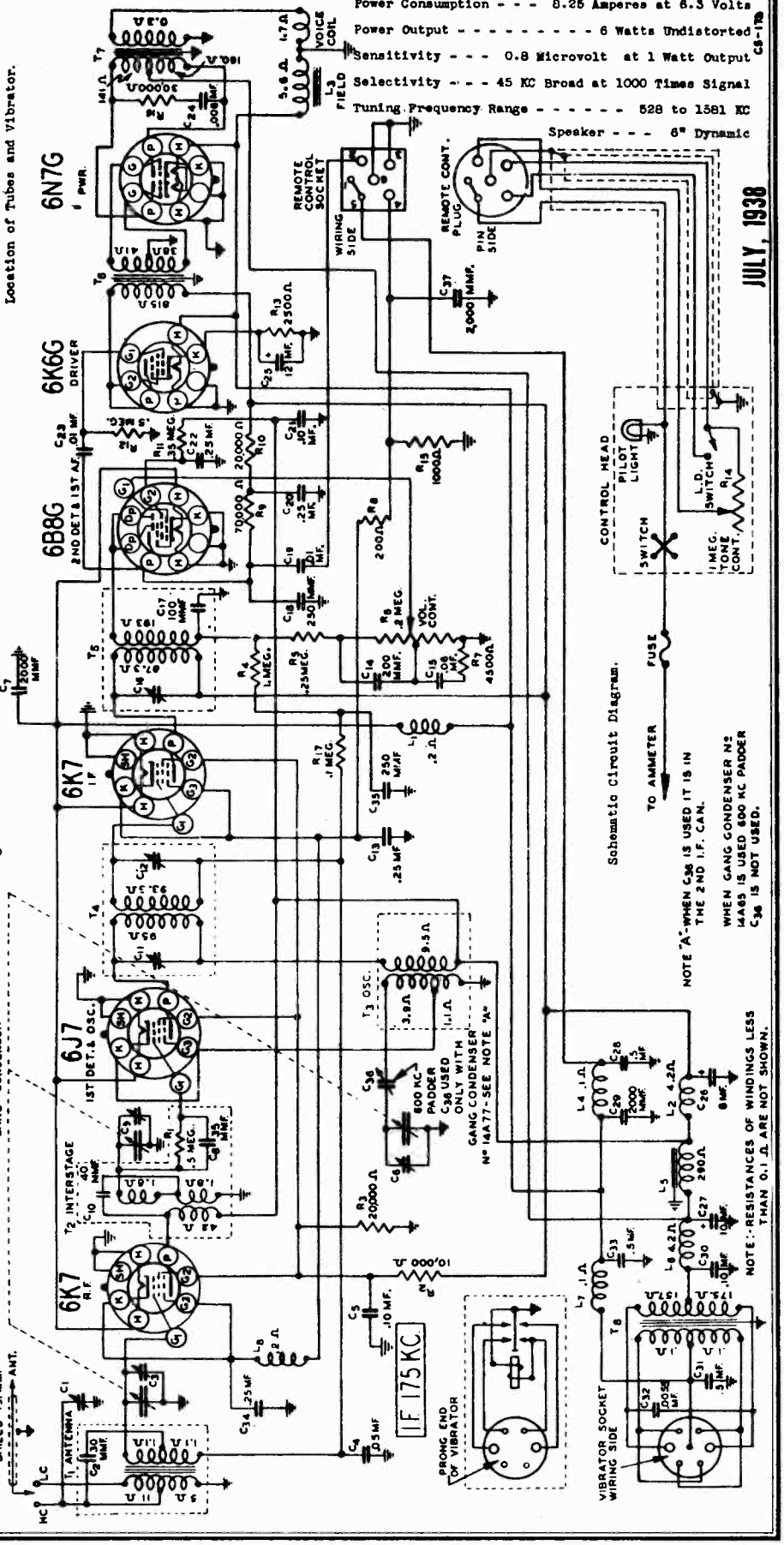
Power Consumption - - - 8.25 Amperes at 6.3 Volts
Power Output - - - - - - - - - 6 Watts Undistorted
Sensitivity - - - 0.8 Microvolt at 1 Watt Output
Selectivity - - - 45 KC Broad at 1000 Times Signal
Tuning Frequency Range - - - - - - 528 to 1581 KC
Speaker - - - 6" Dynamic

C5-1TB

JULY, 1938



Location of Tubes and Vibrator.



Schematic Circuit Diagram.

NOTE "A"-WHEN C36 IS USED IT IS IN THE 2ND I.F. CAN.

WHEN GANG CONDENSER NO 14A85 IS USED 800 KC PADDER C36 IS NOT USED.

NOTE:-RESISTANCES OF WINDINGS LESS THAN 0.1 Ω ARE NOT SHOWN.

Alignment and Calibration

Set the signal generator for 175 KC and connect the output of the signal generator through a .05 mf. condenser to the stator of the 1st detector section of the tuning condenser. Connect the ground lead of the signal generator to the chassis. The chassis should be in the case. Set the volume control at maximum and the L-D switch in the distance position. Attenuate the signal from the signal generator to prevent the leveling off action of the AVC. Then adjust the three I.F. trimers until maximum output is obtained - See Fig. 2.

Set the signal generator for 1581 KC. Turn the rotor of the tuning condenser to the full open position. Insert the antenna plug with the mark on the high capacity (HC) side. Connect the shielded antenna lead from the chassis through a 120 mmf. condenser to the antenna post of the signal generator. Adjust the trimmer of the oscillator section of the three gang condenser until maximum output is obtained.

Set the signal generator for 1400 KC. Carefully turn the rotor of the tuning condenser until maximum output is obtained. Adjust the 1st detector and antenna 1400 KC trimmers for maximum output. Do not change the setting of the oscillator trimmer.

Set the signal generator for 600 KC. Connect the output through a .05 mf. condenser to the control grid of the 6K7 R. F. tube. Rock the tuning condenser rotor and adjust the 600 KC oscillator padder (See Fig. 2) until the peak of greatest intensity is obtained.

Leave the signal generator set for 600 KC and re-connect the output to the shielded antenna lead through a 120 mmf. condenser. Adjust the 600 KC antenna trimmer to maximum. (This trimmer is reached from outside of the case - See Fig. 1.)

After the alignment procedure is completed, the antenna plug may be withdrawn and reinserted on the LC side if a low capacity (70 mmf.) car antenna is used.

Adjusting Antenna 600 KC Trimmer - After the radio is installed and the car antenna is connected, it will be necessary to readjust 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.

Calibrating the Radio - To calibrate the radio, tune in a station of known frequency. Remove the dial lamp assembly from the back of the dial unit. The calibration screw is at the bottom of the dial lamp tube. Hold the tuning knob. Insert a fine blade screwdriver and turn this screw so that the POINTER travels in a clockwise direction until it is at the frequency of the station being received.

WELLS-GARDNER & CO.

MODEL 6C9 Series
Schematic, Voltage
Socket, Trimmers

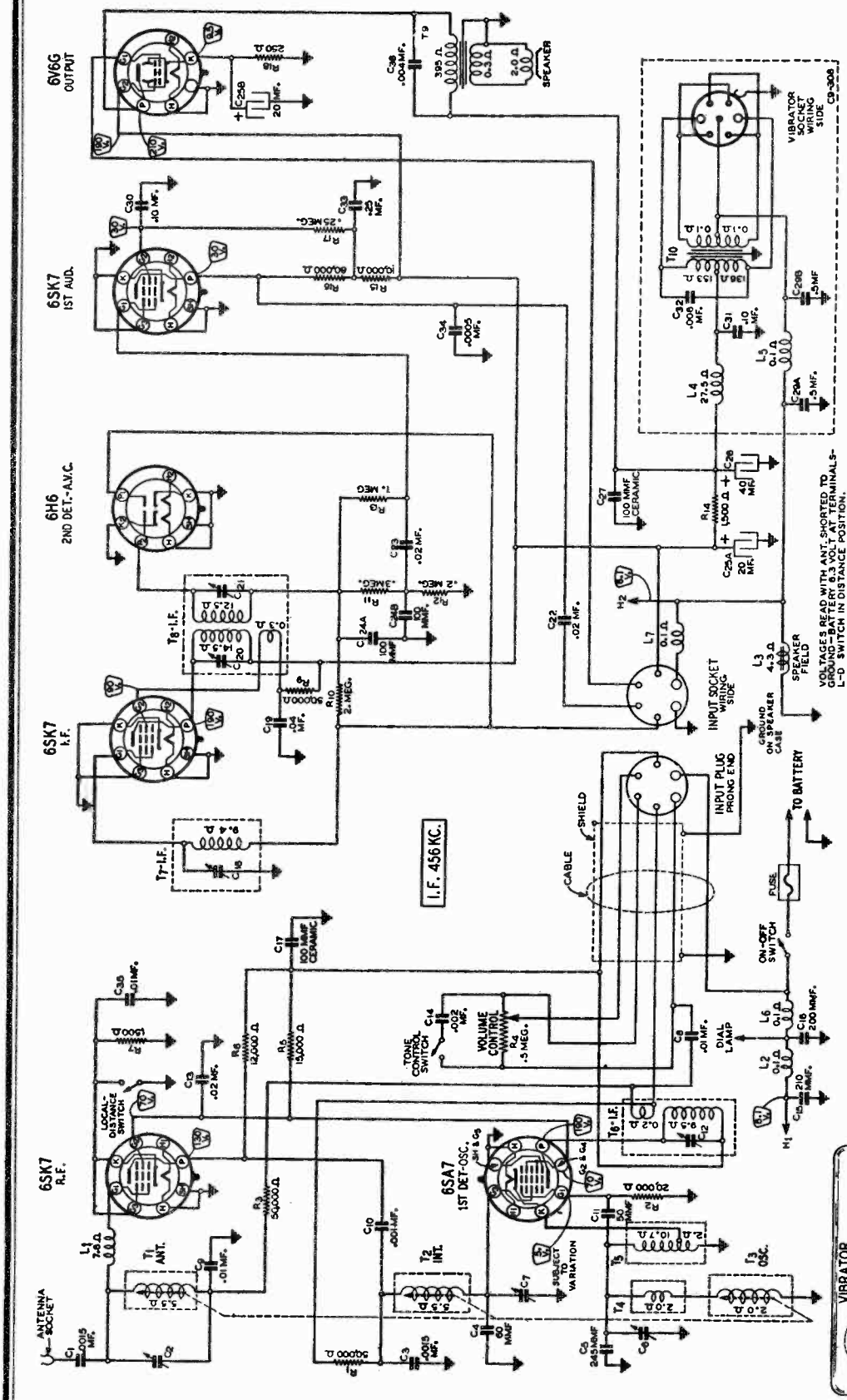


Fig. 5—Schematic Circuit Diagram

Power Consumption - 6.8 Amperes at 6.3 Volts
Power Output - - - - - - 3 Watts Undistorted
Sensitivity - - 1.5 Microvolts at .5 Watt Output
(L-D Switch in Distance Position)
Selectivity - 39 KC Broad at 1000 Times Signal
Tuning Frequency Range - - - 540 to 1560 KC
Intermediate Frequency - - - - - - 456 KC
Speaker - - - - - - - 6" Electro-Dynamic

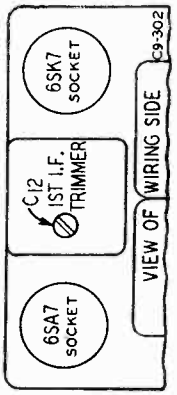


Fig. 6—Location of 1st I.F. Trimmer in Tuning Unit

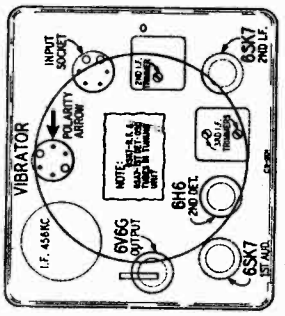


Fig. 2—Tube and Vibrator Location

Procedure for Setting the Station Buttons

There are 5 buttons on the automatic tuning dial by means of which 5 stations may be set.

Any button may be used for any station you can receive.

Make a list of your favorite stations, those which you tune in regularly.

It is better to list the station with the lowest kilocycle number first, the station with the next higher kilocycle number next, and so on.

Depress the manual tuning button AND KEEP IT DEPRESSED DURING THE ENTIRE SETTING OPERATION AS DESCRIBED BELOW. See Fig. 1 for location of buttons. Turn the manual tuning knob so that the indicator moves toward the 1500 KC end of the dial until the stop is reached.

UNLOCK THE TUNING MECHANISM by inserting a screwdriver, as shown in Fig. 1, in the locking screw opening at the bottom of the tuning unit. Loosen the locking screw by turning it counter-clockwise as far as it will go.

TO SET STATIONS ACCURATELY, DO NOT JAR THE RADIO OR BUTTONS WHILE THE MECHANISM IS UNLOCKED.

KEEP THE MANUAL TUNING BUTTON DEPRESSED WITH ONE HAND and, with the other hand, depress the first (left hand) station button. Both will remain depressed.

Select the first station from the list you have made and tune in this station by means of the manual tuning knob.

TURN THE MANUAL TUNING KNOB CAREFULLY BACK AND FORTH UNTIL THE ABOVE MENTIONED STATION IS ACCURATELY TUNED IN TO THE LOUDEST POINT. This station is now set on button No. 1.

CAUTION—Do not touch this button again while the mechanism is unlocked as the setting may be altered.

Next KEEP THE MANUAL TUNING BUTTON DEPRESSED WITH ONE HAND and, with the other hand, depress the second station button FIRMLY AND GENTLY. Then proceed to set the second station on your list in the same manner as described above.

Then continue to set any additional stations on your list on the remaining buttons.

After all desired stations have been set, release any station button which is depressed as follows: KEEP THE MANUAL TUNING BUTTON DEPRESSED WITH ONE HAND and, with the other hand, push in the OFF button a slight amount—only enough to release any station button which is depressed. Should the OFF button be pushed all the way in to the depressed position, no harm will be done except that the dial will not be illuminated.

Turn the manual tuning knob so that the indicator moves toward the 1500 KC end of the dial, until the stop is reached.

NOW LOCK THE TUNING MECHANISM by inserting a screwdriver, as shown in Fig. 1, in the locking screw opening and turning the locking screw in a clockwise direction until it is tight.

Insert a celluloid reinforcement tab half-way in the slot at the front of station button No. 1—See Fig. 3.

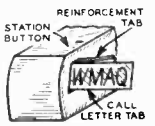


Fig. 3—Inserting Station Tab

Remove the correct station call letter tab for button No. 1 from the sheet supplied by bending the sheet back and forth at the score marks. Place the call letter tab in front of the celluloid reinforcement tab and insert it in slot. Push both tabs all the way in the button slot. Follow the same procedure for inserting the station call letter tabs in any other buttons.

After the stations are set and the mechanism is locked, tune in each of them by depressing the proper button. If any of them does not appear to be properly tuned in after the button has been depressed, reset the station for that button following the procedure outlined above. Changing the setting of one button will not affect the setting of the others.

Alignment Procedure

Remove grille and speaker from speaker unit.

Remove the chassis from tuning unit case in accordance with the article under "General Installation Items" in this manual.

Set the signal generator for 456 KC and connect the output of the signal generator through a .05 mf. condenser to the control grid of the 6SA7 1st detector tube (prong No. 8). Connect the ground lead of the signal generator to the tuning unit chassis. Set the volume control at maximum and the Local-Distance switch to the distance position. Attenuate the signal from the signal generator to prevent the levelling off action of the AVC.

Then adjust the 4 I.F. trimmers until maximum output is obtained. Three of the trimmers are in the speaker unit—See Fig. 2. One trimmer is at the top of the tuning unit —See Fig. 6.

Insert the antenna cable plug in the antenna socket on the tuning unit. The total capacity of the antenna cable and dummy antenna should be 60 mmf. If the cable, for example, has a capacity of 25 mmf., use a 35 mmf. condenser for a dummy antenna. Connect the other end of the antenna cable through the dummy antenna capacity to the output of the signal generator.

Set the signal generator for 1560 KC. Turn the tuning knob until the iron cores are as far out of the tuning coils as they will go. Then adjust the oscillator trimmer C6 (Fig. 1) until maximum output is obtained.

Set the signal generator for 1000 KC. Turn the tuning knob until maximum output is obtained. Adjust interstage trimmer C7 and antenna trimmer C2 for maximum output—See Fig. 1.

Reassemble the radio and install it in the automobile. Insert the car antenna cable. Tune in a weak signal near 1000 KC and readjust the antenna trimmer C2 for maximum output.

Calibration—If it is necessary to calibrate the radio, remove the chassis from the tuning unit case—See article on that subject in this manual. Accurately tune in a signal of known frequency near 1000 KC. Loosen the set screw of the large gear that drives the dial drum. Turn the dial drum until the indicator line is at the frequency of the station tuned in. Tighten the set screw and reassemble.

Adjusting Antenna Trimmer

After the antenna is connected, tune in a weak signal at approximately 1000 KC with the volume control about three-fourths on. Turn the adjusting screw of the antenna trimmer (C2) up or down until maximum output is obtained. See Fig. 1 for location of this trimmer.

Antenna

A shielded antenna cable with bayonet connector plug is required.

The plug on the antenna cable is inserted in the socket at the bottom of the tuning unit case as shown in Fig. 1. The wire at the other end of the cable is connected to the antenna.

LOW CAPACITY ANTENNA

This radio is designed for a low capacity car antenna. The total capacity of antenna and shielded cable should be 35 to 60 mmf.

Types of Low Capacity Antennas —Door hinge; fishpole; over-the-roof types which are mounted quite a distance from the metal roof of the car.

The antenna should be mounted on the same side of the car as the tuning unit.

HIGH CAPACITY ANTENNA

If this radio is to be installed with a high capacity car antenna (200 mmf. total capacity of antenna and shielded cable) an adapter must be used. The adapter is inserted in the socket at the bottom of the tuning unit case. Then the antenna plug is inserted in the adapter.

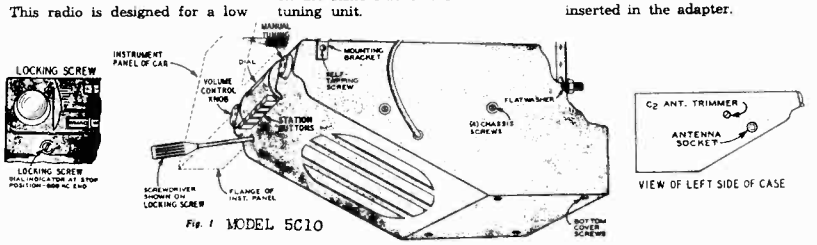


Fig. 1 MODEL 5C10

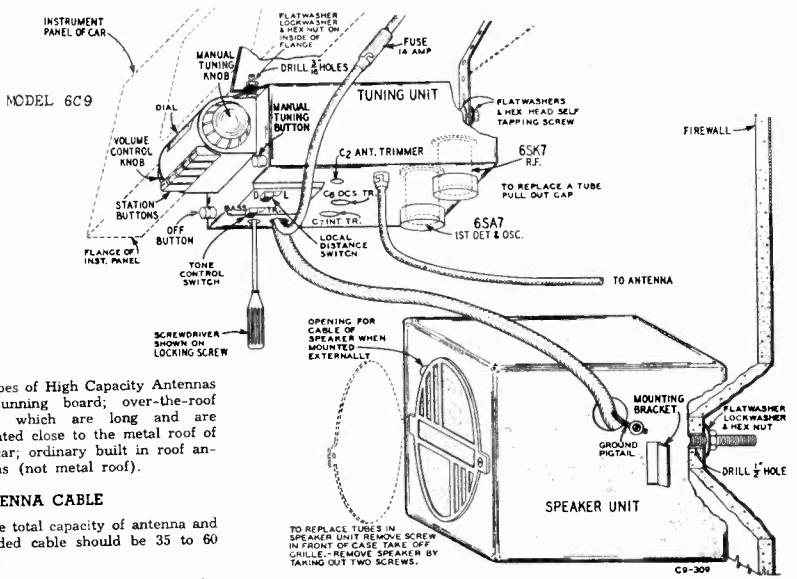


Fig. 1—Details of Mounting Tuning and Speaker Units

Types of High Capacity Antennas — Running board; over-the-roof types which are long and are mounted close to the metal roof of the car; ordinary built in roof antennas (not metal roof).

ANTENNA CABLE

The total capacity of antenna and shielded cable should be 35 to 60 mmf.

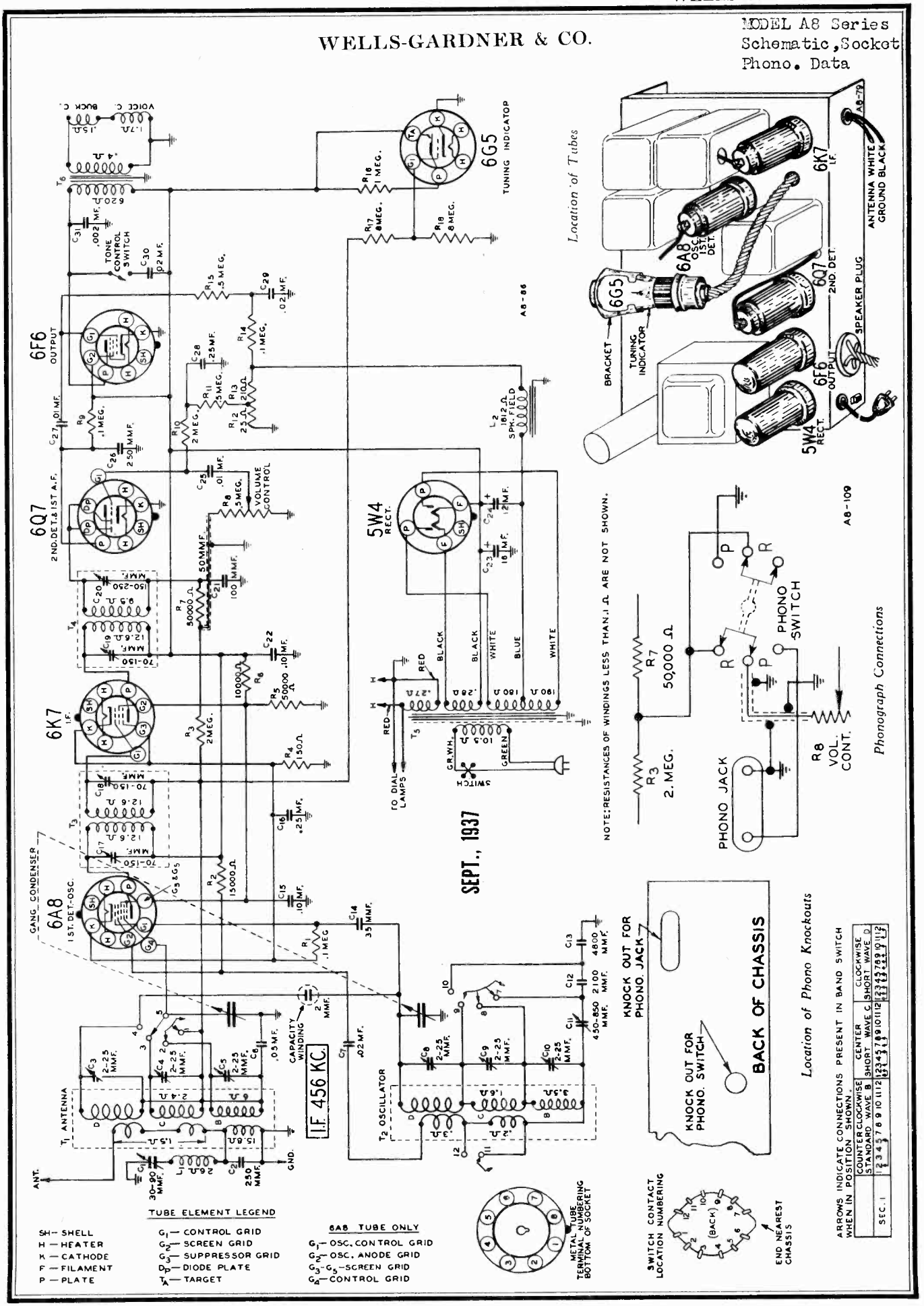
Keep the antenna cable as far away from car wiring as possible and ground the pigtail of the antenna cable shield at the antenna end, otherwise ignition noise may be picked up. The length of the pigtail from the grounding point to the end of the antenna cable should be kept as short as possible, preferably not over one inch.

For the door hinge and over-the-roof type antennas, the antenna lead must be shielded the entire distance from the radio to the point where the lead goes through the car body to the outside. In the case of a running board antenna, the antenna lead shielding must extend all the way to the antenna.

When the antenna cable is connected to an antenna lead coming down the pillar post, the shielded cable should be pushed several inches up into the pillar post.

WELLS-GARDNER & CO.

MODEL A8 Series
Schematic, Socket
Phono. Data



MODEL A8 Series
Alignment, Trimmers
Voltage, Parts

WELLS-GARDNER & CO.

VOLTAGES AT SOCKETS

Line Voltage: 115 — Volume Control: Maximum — Antenna Shorted to Ground

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
6A8	1st Det.-Osc.	0	6.3(1)	200	110		160	6.3(1)	3
6K7	I.F.	0	6.3(1)	200	110	3		6.3(1)	3
6Q7	2nd Det.	0	6.3(1)	110	0	0		6.3(1)	0(2)
6F6	Output	0	6.3(1)	185	200	12.5(3)		6.3(1)	0
5W4	Rectifier	0	5.1(4)		620(5)		620(5)		5.1(4)
6G5	Tuning Indicator	Plate to Ground 18		Target to Ground 200		Cathode to Ground 0		Across Heater 6.3 A.C.	

(1) A.C. voltage as read across heater terminals 2 and 7.
(2) Bias (1.5 volts) as read across resistor R12.
(3) Read across resistor R12 and R13.
(4) A.C. voltage as read across heater terminals 2 and 8.
(5) A.C. voltage read across terminals 4 and 6.

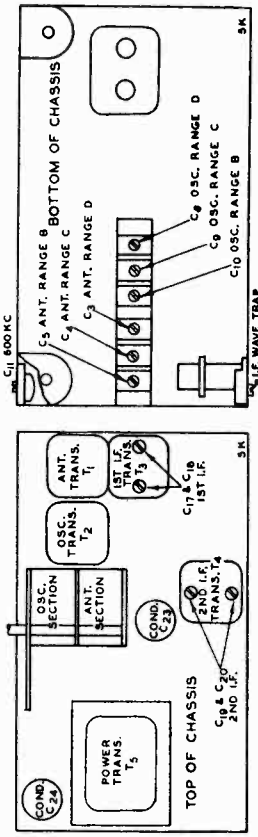
ALIGNMENT PROCEDURE

6 Tube - 3 Band - All-Wave Radio

The following equipment is required for aligning:
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter — Non-Metallic Screwdriver.
Dummy Antennas — .1 mf., 200 mmf., and 400 ohms.

Volume Control—Maximum All Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

STEP (Follow Order as Given)	BAND SWITCH SETTING	DUMMY ANTENNA	SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	TRIMMERS ADJUSTED See Illustration	PROCEDURE INITIAL STEPS	PROCEDURE ADJUSTMENT
I. F.							
2nd I.F. Adj.	Range B	.1 mf.	456 KC	Grid of I.F. Tube	2nd I.F. (C19) & (C20)	Turn Rotor to Full Open	Adjust to Maximum Output
1st I.F. Adj.	Range B	.1 mf.	456 KC	Grid of 1st Det.	1st I.F. (C17) & (C18)	Turn Rotor to Full Open	Adjust to Maximum Output
I.F. Wave Trap	Range B	200 mmf.	456 KC	Antenna Lead	I.F. Wave Trap (C1)	Turn Rotor to Full Open	Adjust to Minimum Output
RANGE D							
18.300 KC	Range D	400 Ohm	18,300 KC	Antenna Lead	Oscillator Range D (C8)	Turn Rotor to Full Open	Adjust to Maximum Output Adjust to Maximum Output Rock Rotor — See Note B
15,000 KC	Range D	400 Ohm	15,000 KC	Antenna Lead	Antenna Range D (C3)	Turn Rotor to Max. Output	
RANGE C							
5800 KC	Range C	400 Ohm	5800 KC	Antenna Lead	Oscillator Range C (C9)	Turn Rotor to Full Open	Adjust to Maximum Output
5000 KC	Range C	400 Ohm	5000 KC	Antenna Lead	Antenna Range C (C4)	Turn Rotor to Max. Output	Adjust to Maximum Output
RANGE B							
1730 KC	Range B	200 mmf.	1730 KC	Antenna Lead	Oscillator Range B (C10)	Turn Rotor to Full Open Turn Rotor to Max. Output	Adjust to Maximum Output
1500 KC	Range B	200 mmf.	1500 KC	Antenna Lead	Ant. Range B (C5)	Set Indicator to 1500 KC— See Note A	Adjust to Maximum Output
600 KC	Range B	200 mmf.	600 KC	Antenna Lead	600 KC (C11)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B



Attenuate the signal from the signal generator to prevent the leveling-off action of the AVC. After each range is completed, repeat the procedure as a final check.

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

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

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 on the dial. It may be necessary to increase the input signal to hear the image.

Prices Subject to Change Without Notice

Series A8 — 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.

MISCELLANEOUS

SOCKETS

Part No.	Description	List Price
3A258	Tube Socket—Octal (7 prong)	.15
3A259	Tube Socket—Octal (5 prong)	.10
3A26C	Tube Socket—Octal (8 prong)	.15
3A58	Speaker Socket, 6 Prong	.10
13X256	6G5 Tube Socket and Cable Assembly	.65

CONDENSERS

TUBULAR

Part No.	Code	Capacitance	Voltage	List Price
46X80	C6	.05 mf.	180	$0.15
46X82	C7	.02 mf.	360	.15
46X98	C16	.10 mf.	180	.20
46X117	C16	.25 mf.	180	.25
46X105	C22	.10 mf.	360	.20
46X120	C25	.01 mf.	360	.15
46X129	C27	.01 mf.	360	.15
46X117	C28	.25 mf.	180	.25
46X172	C29	.02 mf.	180	.15
46X205	C30	.02 mf.	400	.15
46X100	C31	.002 mf.	600	.15

MOLDED

47X69	C2	250 mmf.		.15
47X75	C12	2100 mmf.		.25
47X76	C13	4800 mmf.		.35
47X53	C14	35 mmf.		.10
47X57	C21	100 mmf.		.10
47X65	C26	250 mmf.		.15

ELECTROLYTIC

40X32	C23	16 mf.	250 Wet	.75
40X31	C24	12 mf.	350 Wet	.80

TRIMMERS

17A64	C1	30-90 mmf.	Wave Trap Trimmer	.25
17A59	C3	2-25 mmf.	Range "D" Antenna Trimmer	.40
	C4	2-25 mmf.	Range "C" Antenna Trimmer	
	C5	2-25 mmf.	Range "B" Antenna Trimmer	
	C8	2-25 mmf.	Range "D" Oscillator Trimmer	
	C9	2-25 mmf.	Range "C" Oscillator Trimmer	
	C10	2-25 mmf.	Range "B" Oscillator Trimmer	
17A68		450-850 mmf.	600 KC Trimmer	.45
17A33	C17	70-150 mmf.	1st I.F. Trimmers	.40
	C18	70-150 mmf.		
17A34	C19	70-150 mmf.	2nd I.F. Trimmers	.40
	C20	150-250 mmf.		

MISCELLANEOUS

14A61	2 Gang Condenser less Dial and Drive Assembly		2.90

RESISTORS

CARBON

Part No.	Code	Resistance	Wattage	List Price
A94104	R1	100,000 Ohm	0.2	$0.15
A95153	R2	15,000 Ohm	0.2	.10
A95205	R3	2 Megohm	0.2	.10
A94151	R4	150 Ohm	0.2	.15
B94503	R5	50,000 Ohm	0.5	.15
C94103	R6	10,000 Ohm	1.0	.15
A95503	R7	50,000 Ohm	0.2	.10
A95104	R9	100,000 Ohm	0.2	.10
A95205	R10	2 Megohm	0.2	.10
A94504	R11	500,000 Ohm	0.2	.15
A94104	R14	100,000 Ohm	0.2	.15
A94504	R15	500,000 Ohm	0.2	.15
A95105	R16	1 Megohm	0.2	.10
A95805	R17	8 Megohm	0.2	.10
A95805	R18	8 Megohm	0.2	.10

WIRE WOUND

43X69	R12	25 Ohm	.25	.35
	R13	210 Ohm	2.0	

VARIABLE

363X227	R8	0.5 Megohm	Volume Control and On-Off Switch	1.00

PHONO ATTACHMENT PARTS

Part No.	Description	List Price
P-2A31	Phono Switch (Double Pole Double Throw Switch)	.60
P-3A12	Phono Jack	.10
P-10A36	Switch Knob	.20

SPEAKERS

12A267	6" Dynamic Speaker Compl. with Output Transformer (T6)	5.80
12A260	8" Dynamic Speaker Compl. with Output Transformer (T6)	6.35
12A258	10" Dynamic Speaker Compl. with Output Transformer (T6)	6.85

KNOBS

Specify Name of Knob and Name and Model of Radio	Tuning Control — Set Screw Type	.15
	Volume Control — Push-On Type	.20
	Band Switch — Push-On Type	.20

GENERAL

2X38	Felt Washer (Used behind knobs)	doz.	.10
8X23	Rubber Chassis Mounting Cushion	ea.	.10
2A62	Band Change Switch		.85
2A61	Tone Control Switch		.20
30X44	Grid Clip Only	doz.	.10
4A50	Terminal Strip (2 lugs insulated with mounting hole in center)		.10
4A49	Terminal Strip—Single Lug Insulated (With Mounting Hole at One End)		.10
25X378	Clamp Bracket for Tuning Eye Tube		.10
13X280	Line Cord and Plug		.50
13X214	Antenna and Ground Lead Assembly		.30
25X122	Chassis Mounting Feet	ea.	.10
23A61	Gang Condenser Mounting Cushion Assembly (Includes 3—Rubber Cushions, 3—Hex Shoulder Nuts, 3—No. 6 Flat Washers)		.15

DIAL AND DRIVE ASSEMBLY

Part No.	Description	List Price
11A132	Dial Assembly complete with Gang Condenser, less Dial Lamps and Dial Lamp Sockets	4.60
15A120	Dial Scale and Bracket Assembly	.85
25X422	Bracket only for Dial Scale	.30
68X263	Celluloid Dial Scale only	.50
15X117	Pointer	.15
	Dial Lamp—No. 51 Mazda	.20
7A60	Dial Lamp Socket	.10
4X219	Dial Crystal and Escutcheon Assembly	1.50
25X428	Dial Support Bracket ("L" Shaped)	.10
25X427	Bracket and Bushing for Drive Shaft	.30
25X266	Drive Shaft only	.15
19X21	Horseshoe Washers for above Shaft (Doz.)	.10
24X317	Drive Drum and Pointer Shaft	.50
	20" Drive Cord for Tuning Condenser (Doz.)	.45
28X27	Tension Spring for Drive Cord (Doz.)	.20

TRANSFORMERS AND COILS

Part No.	Code	Description	List Price
9A692	T1	Antenna Transformer and Can Assembly	$2.20
9A693	T2	Oscillator Coil and Can Assembly	1.90
9A694	T3	1st I.F. Transformer and Can Assembly	1.50
9A695	T4	2nd I.F. Transformer and Can Assembly	1.45
53X134	T5	115 Volt, 60 Cycle Power Transformer	3.70
53X136	T5	115-230 Volt, 40-60 Cycle Power Transformer	4.70
61X31	T6	Output Transformer (Part of Speaker Assembly)	2.45
9A714	L1	Wave Trap (456 KC)	.65

MODEL A10 Series
Schematic

WELLS-GARDNER & CO.

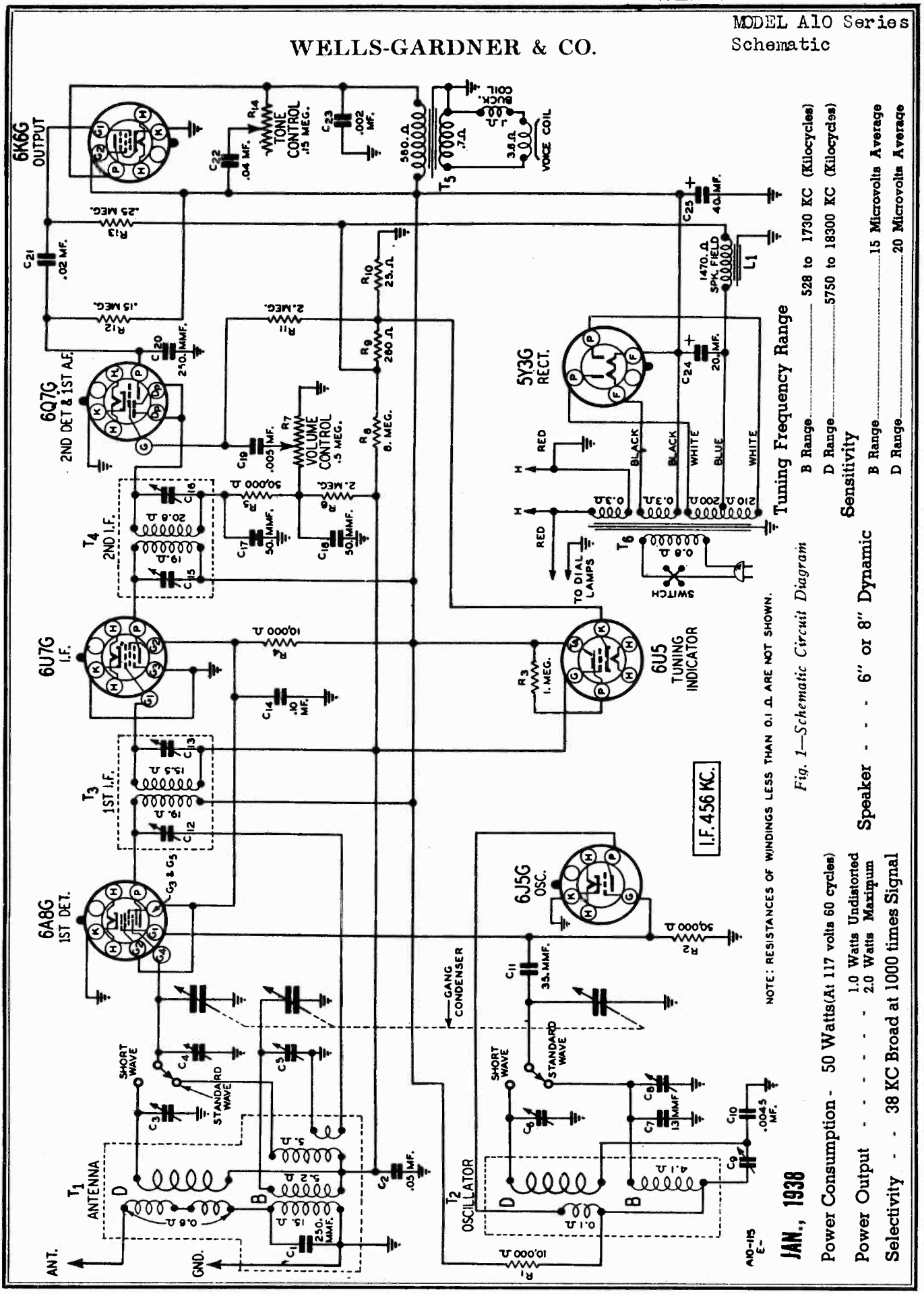


Fig. 1—Schematic Circuit Diagram

Tuning Frequency Range

B Range ..... 528 to 1730 KC (Kilocycles)
D Range ..... 5750 to 18300 KC (Kilocycles)

Sensitivity

B Range ..... 15 Microvolts Average
D Range ..... 20 Microvolts Average

Speaker - - - 6" or 8" Dynamic

Power Output - - - - - - 1.0 Watts Undistorted
2.0 Watts Maximum

Power Consumption - 50 Watts(At 117 volts 60 cycles)

Selectivity - - 38 KC Broad at 1000 times Signal

JAN., 1938

A10-115 E-

MODEL A10 Series
Alignment, Trimmers
Voltage, Socket
Tuner, Drive Cord Data

WELLS-GARDNER & CO.

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator With a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

The following equipment is required for aligning:
An all Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter; Non-Metallic Screwdriver.
Dummy Antennas—.1 mf., 200 mmf., and 400 ohms.

STEP (Follow Order as Given)	BAND SWITCH SETTING	DUMMY ANTENNA	SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	TRIMMERS ADJUSTED See Illustration	PROCEDURE INITIAL STEPS	PROCEDURE ADJUSTMENT
I.F.							
456 KC	Range B	.1 mf.	456 KC	Grid of 1st Det.	1st I.F. (C12) & (C13) 2nd I.F. (C18) & (C16)	Turn Rotor to Full Open	Adjust to Maximum Output
RANGE B							
1730 KC	Range B	200 mmf.	1730 KC	Antenna Lead	Oscillator Range B (C8)	Turn Rotor to Full Open	Adjust to Maximum Output
1500 KC	Range B	200 mmf.	1500 KC	Antenna Lead	1st Ant. Range B (C5) 2nd Ant. Range B (C4)	Turn Rotor to Max. Output Set Indicator to 1500 KC— See Note A	Adjust to Maximum Output
600 KC	Range B	200 mmf.	600 KC	Antenna Lead	600 KC (C9)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor— See Note B
RANGE D							
18300 KC	Range D	400 Ohm	18300 KC	Antenna Lead	Oscillator Range D (C6)	Turn Rotor to Full Open	Adjust to Maximum Output
15000 KC	Range D	400 Ohm	15000 KC	Antenna Lead	Ant. Range D (C3)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor— See Note B

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

After each range is completed, repeat the procedure as a final check.

After alignment of Range D has been completed, do not make any adjustments of the Range B trimmers. If this is done, it will be necessary to realign Range D.

NOTE A—After the 1500 KC adjustment is made, the dial indicator should be at the 1500 KC mark on the dial scale. If it is not, the position of the indicator on the drive cord must be changed. This procedure, however, should not be followed unless it is absolutely necessary as there is danger of breaking the clamp which holds the indicator in place.

If the indicator must be moved, loosen the clamp at the back which holds it in place, move the Indicator to the correct position, and bend the clamp back into place again.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

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 on the dial. It may be necessary to increase the input signal to hear the image.

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

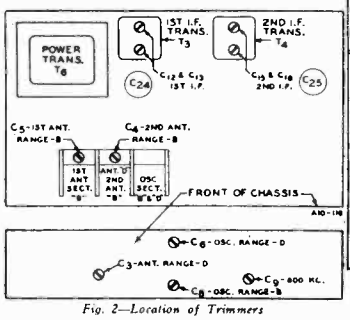


Fig. 2—Location of Trimmers

VOLTAGES AT SOCKETS

Line Voltage: 117—Volume Control: Maximum. Antenna Shorted to Ground.
Readings taken with a 1000 Ohm-per-volt meter. Position of Band Switch: Standard Wave.

TUBE	FUNCTION	VOLTAGE BETWEEN SOCKET PRONG 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
6A8G	1st Det.	0	6.1(1)	165	90	6.5	90	6.1(1)	0
6J5G	Osc.	0	6.1(1)	125		6.5		6.1(1)	0
6U7G	I.F.	0	6.1(1)	165	90	0		6.1(1)	0
6Q7G	2nd Det. & 1st. Audio	0	6.1(1)	80				6.1(1)	0(2)
6K6G	Output	0	6.1(1)	155	165	12.5(3)		6.1(1)	0
5Y3G	Rectifier	0	4.7(4)		480(5)		480(5)		4.7(4)
6U5	Tuning Indicator	Plate to Ground 35		Target to Ground 165		Cathode to Ground		Across Heater 6.1 A.C.	

(1) A.C. voltage read across heater terminals 2 and 7.
(2) Bias (1.2 volts) as read across R10.
(3) Bias voltage as read across R9 and R10.
(4) A.C. voltage as read across filament terminals 2 and 8.
(5) A.C. voltage as read across terminals 4 and 6.

Replacing Drive Cords

Three drive cords, Nos. 1, 2, and 3, as shown in Fig. 5, are used. To replace any of these cords, proceed as follows:

Cord No. 1

Turn the gang condenser to full open position.

Turn the drive shaft so that the holes for the cord are vertical. The positions of the drive shaft and drive drum are shown in Fig. 5.

Tie a double knot in one end of the cord. From the bottom of hole (A) in the drive shaft, thread the other end of the cord through the hole.

Slide a ½ inch length of fabric tubing on the cord, placing it near the free end. Fasten the shorter of the two springs used to the free end of the cord, making the distance between the two knots 22⅞ inches.

Starting at the point where the cord leaves hole (A), wind it around the shaft ¼ of a turn as shown in Fig. 5. Bring the end up to the wide groove (B) in the drive drum and wind on 2¼ turns, progressing toward the edge of the groove. Pass the cord through the slot at (C), placing the fabric tube (F) in position to protect the cord from being cut, and hook the spring to the pin at (D).

Cord No. 2

The gang condenser and tuning shaft should be in the same position as explained for Cord No. 1.

Tie a double knot in one end of the cord. From the top of hole (E) in the drive shaft, thread the other end of the cord through the hole.

Slide a ½ inch length of fabric tubing on the cord, placing it near the free end. Tie a slip knot with a small loop in the free end of the cord so that the length of the cord is 12 inches between the knots.

Starting at the point where the cord leaves hole (E), wind it around the shaft 3¼ turns as shown in Fig. 5. Do not attempt to wind the cord on the drive drum, but put the loop in the slip knot over pin (G). Rotate the drive drum clockwise about ½ a turn. This will unwind the cord on the drive shaft at (E).

Pass the cord through the slot at (C), placing the fabric tube (F) in position to protect the cord from being cut. While holding the cord on the wide flange, rotate the drive drum counterclockwise. The cord will be pulled into position in the groove.

Cord No. 3

The gang condenser and drive drum should be in the same position as explained for Cord No. 1.

Tie one end of the cord on hook (H).

Slide a ½ inch length of fabric tubing over the cord. Place this tubing approximately 13½ inches from the end of the cord to be attached to the spring.

Tie the other end of the cord to the longer of the two springs used. The length of the cord between the knots should be 34⅜ inches.

Pass the cord through slot (J) in groove (P) of the drive drum. Bring the cord up to pulley (K), around the other pulleys as shown in Fig. 5 and down to groove (P'). After passing the cord around the drive drum ½ turn in groove (P), fasten the spring to hook (Q).

Attaching Dial Pointer—Tune in a station of known frequency. Move the pointer to this frequency on the dial scale. After the pointer has been moved to the correct position, clamp it tightly over the fabric tubing on the cord—See Fig. 5.

Lever Tuning Assembly Adjustments

Pressure of Spacers on Heart Cams — The heart cams must rotate freely relative to the shaft spacers when the tightening lever is in the "loose" position and must not rotate relative to the shaft spacers when this lever is in the "tight" position.

Pressure of the spacers against the heart cams is determined by the position of nut (R) on the threaded shaft—See Fig. 5. If, after the tightening lever is turned to the "tight" position, the cams can turn relative to the shaft, this nut must be tightened.

Bend back the ears of washer (S)—See Fig. 5, and tighten nut (R) about ½ turn. Bend the ears of the washer down again on nut (R). Tighten the tightening lever and see if the cams are sufficiently tight.

In general, nut (R) should be at such a position on the threaded shaft that the stop on the tightening lever moves to about ⅛ inch from the end of the slot in the tightening washers when a reasonable amount of pressure is exerted on this lever.

Connection between Gang Condenser and Cam Shaft—One screw only should be used in the universal joint connection between the condenser shaft and the cam shaft. If 2 screws are used, considerably more pressure must be exerted on the station levers to rotate the cam shaft.

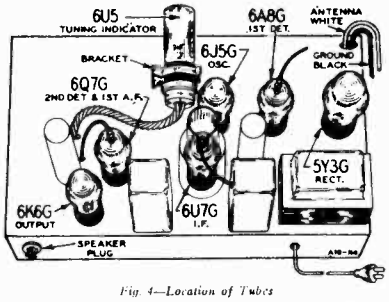


Fig. 4—Location of Tubes

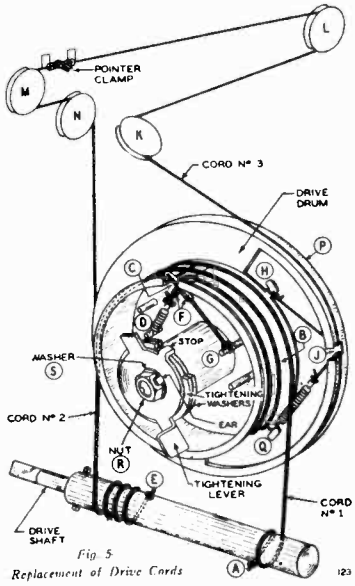


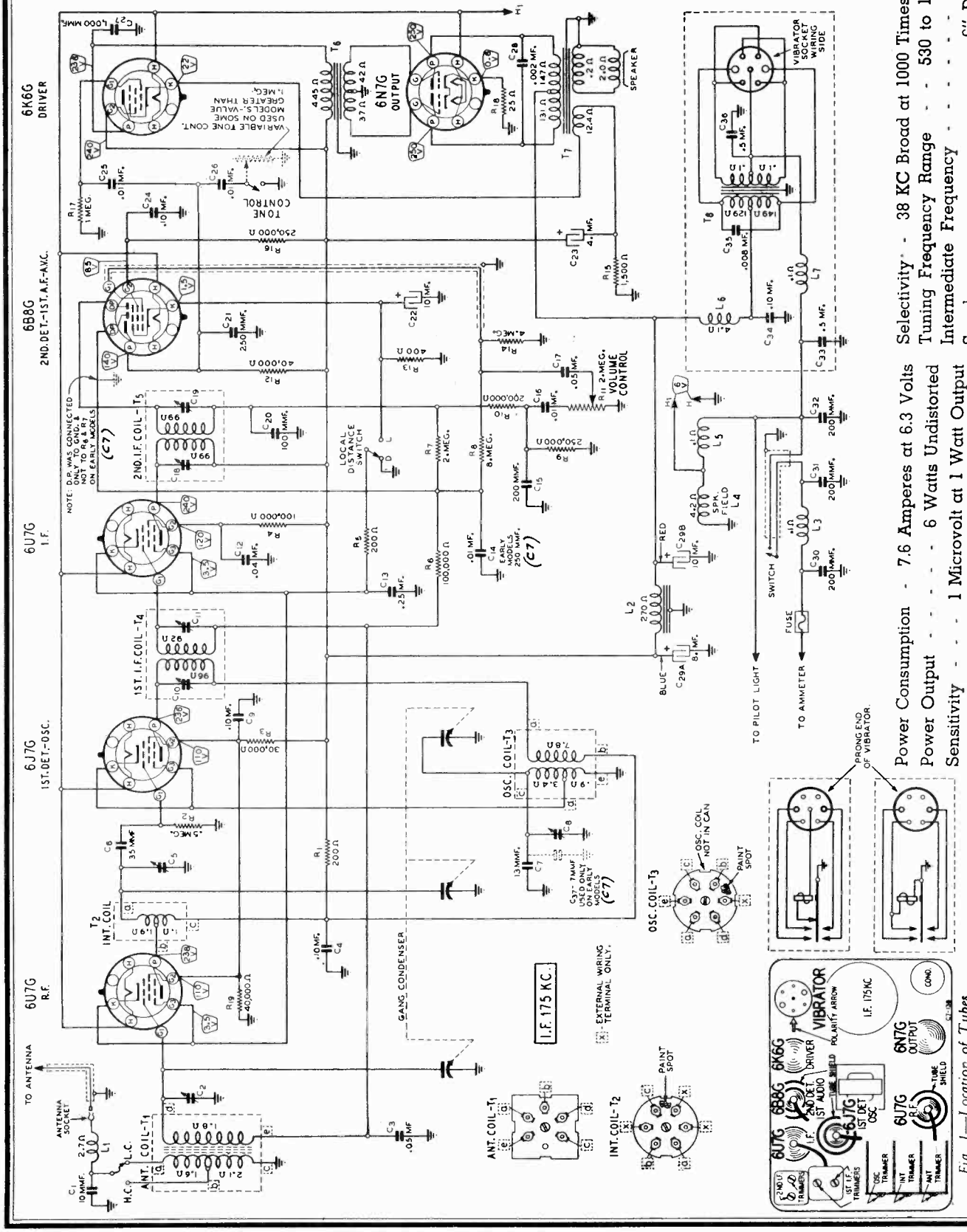
Fig. 5
Replacement of Drive Cords

123

WELLS-GARDNER & CO.

MODELS C7, C11 Series
Schematic, Voltage, Socket
Alignment, Trimmers

ALIGNMENT Adjust IF trimmers at 175 KC thru .05 mf dummy. Adjust Osc. trimmer at 1581 KC thru 120 mmf dummy if 60 inch cable 70 mmf is used - or thru 25 mmf dummy if 30 inch cable 35 mmf dummy is used.
Adjust Interstage and Antenna trimmers at 1400 KC.
Readjust Antenna trimmer C2 at 1400 KC.



Power Consumption - 7.6 Amperes at 6.3 Volts
Power Output - - - - - 6 Watts Undistorted
Sensitivity - - - 1 Microvolt at 1 Watt Output
(L-D Switch in Distance Position)

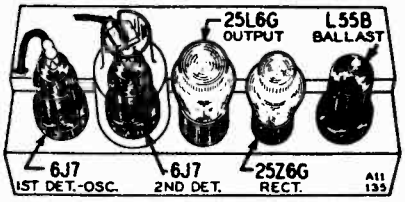
Selectivity - 38 KC Broad at 1000 Times Signal
Tuning Frequency Range - - 530 to 1581 KC
Intermediate Frequency - - - - - - 175 KC
Speaker - - - - - - - - - - - - 6" Dynamic

Fig. 1—Location of Tubes and Vibrator

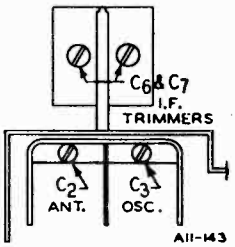
MODEL All Series
Schematic, Voltage
Alignment, Socket

WELLS-GARDNER & CO.

DC OPERATION—Filament and ballast tube voltages will be the same as AC (for 117 volt line). The plate, screen and bias voltages will be slightly lower than those shown above. When operated on DC, the rectifier tube acts as a low resistance series resistor with a drop of approximately 6 volts between plate and cathode.



CAUTION—In any service work on the AC-DC chassis, keep it on a wood or other insulated surface to avoid contacts with ground.



MAY, 1938

VOLTAGES AT SOCKETS FOR 117 VOLT *AC LINE*

See Note Below Regarding Voltages when Operated on DC
Volume Control Maximum—Antenna Lead Grounded—Readings taken with 1000 Ohm-per-volt Meter.

TUBE	FUNCTION	Voltage Between Socket Prong 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
6J7	1st Det. & Osc.		6.3(1)	98	98			6.3(1)	6.0
6J7	2nd Det.		6.3(1)	10	13			6.3(1)	
25L6G	Output		24(1)	92	98			24(1)	5
25Z6G	Rectifier		24(1)	117(2)	125	117(2)		24(1)	125
L55B	Ballast			56.6(3)				56.6(3)	4.5(4)

(1) AC voltage across terminals 2 and 7.
(2) AC voltage to ground.
(3) AC voltage across terminals 3 and 7.
(4) AC voltage across terminals 7 and 8.

Power Consumption - 48 Watts (At 117 volts AC Supply)
Power Output - - - - - - - .8 Watts Undistorted
Selectivity - - 30 KC Broad at 100 times Signal.

Tuning Frequency Range - - - - - 530 to 1730 KC
Sensitivity - - - - - - 180 Microvolts Average

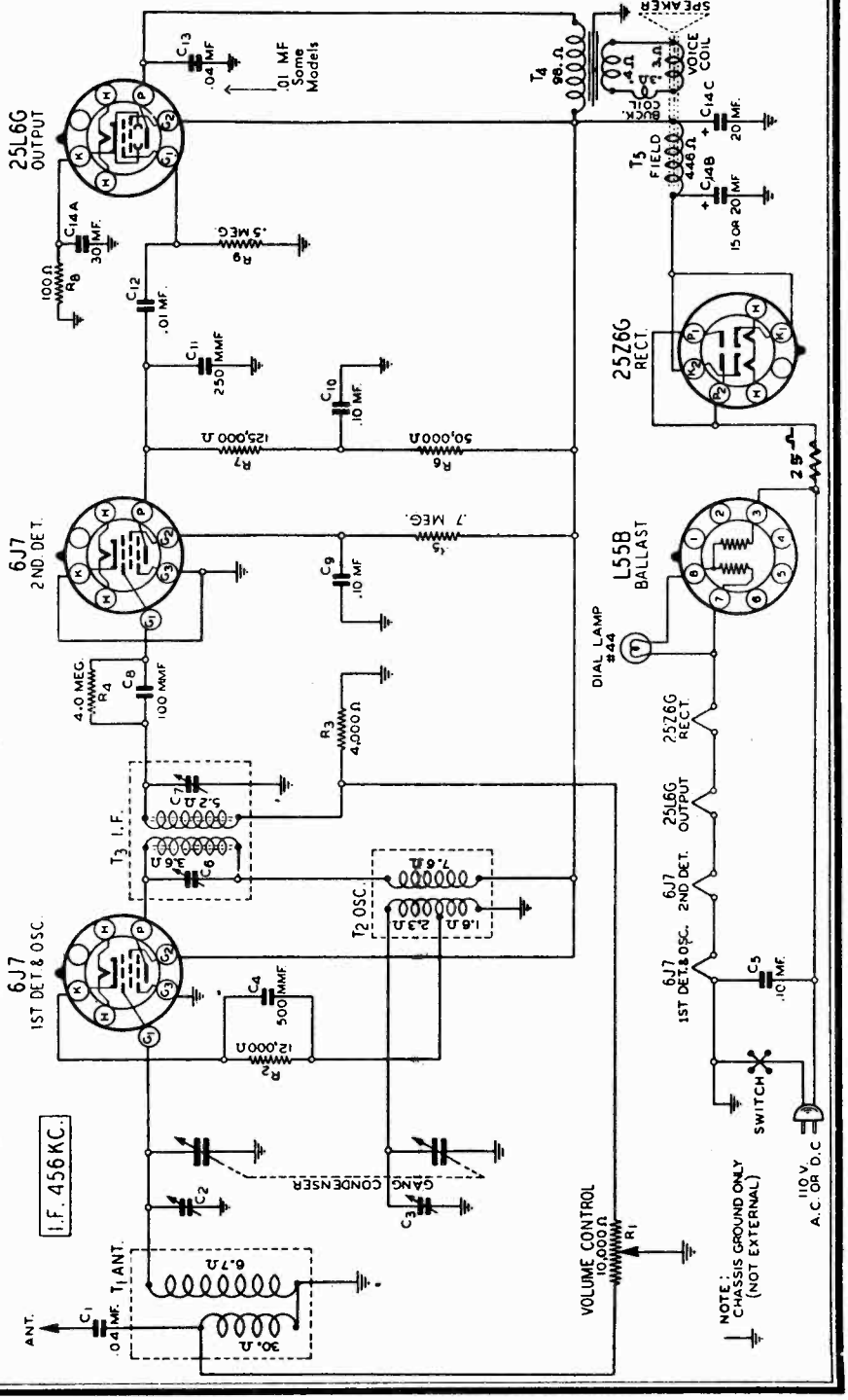
ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments. Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

SIGNAL GENERATOR FREQUENCY SETTING	CONNECTION AT RADIO	DUMMY ANTENNA	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (See Illustration)
456 KC	Grid of 1st Det.	.1 mf.	Turn rotor to full open	I.F. (C6) & (C7)
1730 KC	Antenna Lead	200 mmf.	Turn rotor to full open	Oscillator (C3)
1500 KC	Antenna Lead	200 mmf.	Turn rotor to max. output	Antenna (C2)

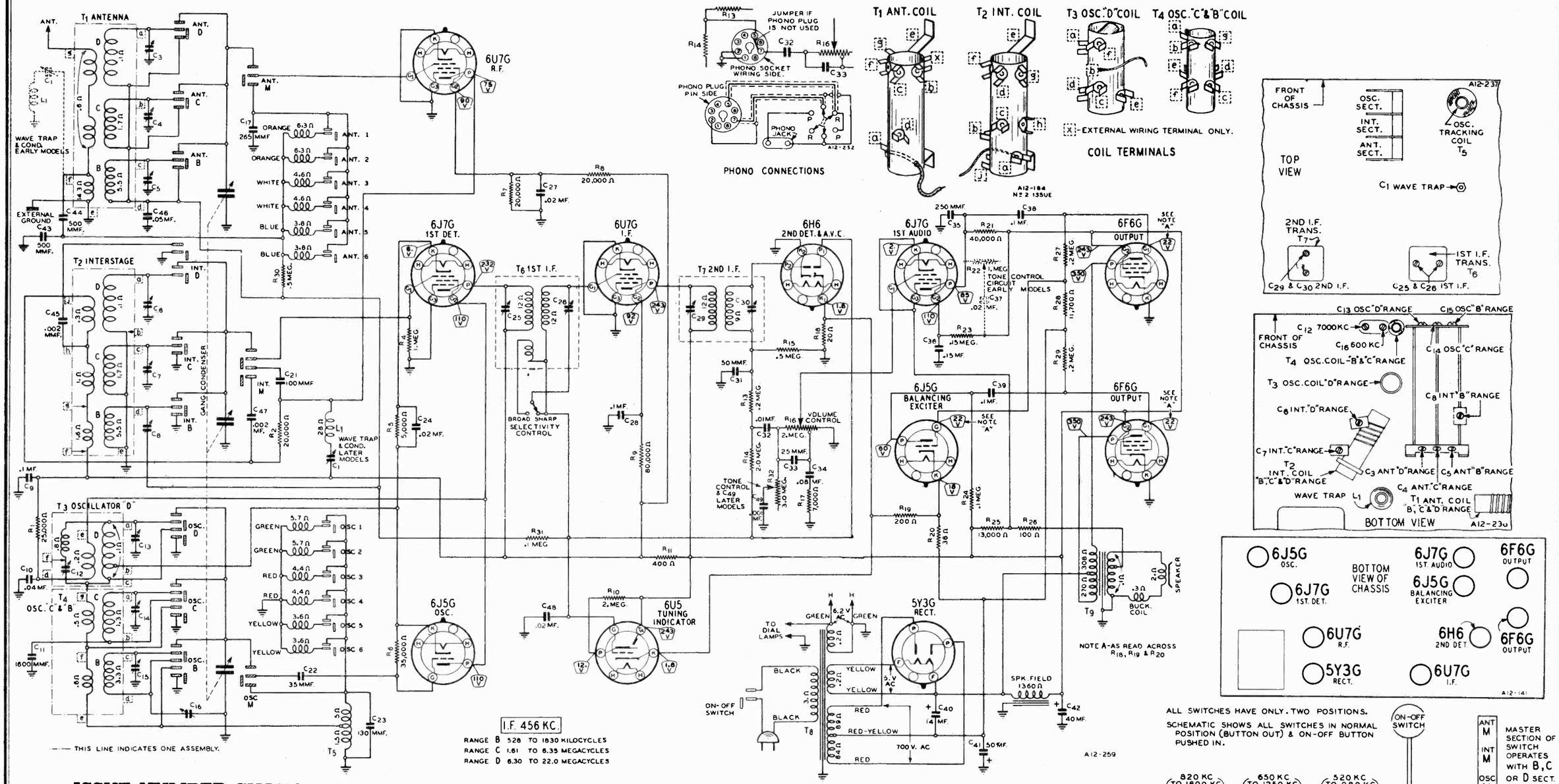
The following equipment is required for aligning:
Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter; Non-Metallic Screwdriver.
Dummy Antennas—.1 mf. and 200 mmf.

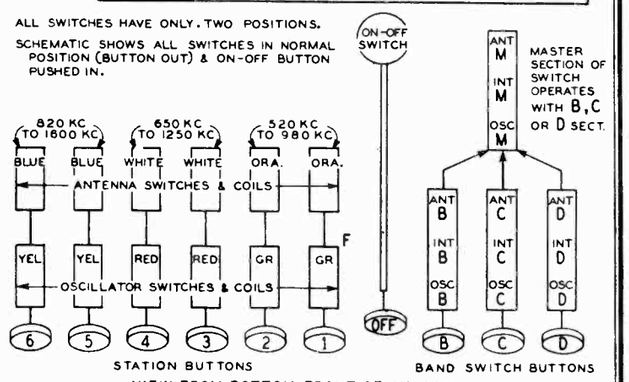
NOTE—To obtain dial scale calibration, tune in an 800 KC signal. The pointer should be at the 800 KC mark on the dial. If it is not, loosen the pointer screw, set the pointer at the 800 KC mark and retighten the pointer screw.



WELLS-GARDNER & CO.

MODEL A12 Series Late
Schematic, Voltage, Socket
Trimmers, Changes
Tuner Switches





ISSUE NUMBER CHANGES

The last digit of the number on the chassis number label identifies the radio as to the issue number.

ISSUE NO. 1

The information contained in the Series A12 Service Manual, with the exception of the Replacement Parts List and Schematic Circuit Diagram, applies with minor changes to all chassis issues, 1 through 6. The Replacement Parts List and Schematic Circuit Diagram, however, apply only to No. 1 issue chassis.

ISSUE NOS. 2 and 3

MECHANICAL CHANGES -- The station button plunger has a length of 7-3/16 inches.

The locking plate for the station button plungers has been redesigned and now employs two side arms mounted in rubber cushioned hinge brackets which are attached to the rear bracket of the tuner assembly by two screws.

ELECTRICAL CHANGES -- The Schematic Circuit Diagram (Fig.3) is that of Issue Nos. 2 through 6. The AVC voltage is fed to the grid of the R.F. tube through the manual and automatic tuning coils. Formerly, it was applied directly to the grid of the R.F. tube through a 1 Megohm resistor.

The operating voltages of several of the tubes have been changed. Correct values are shown on the schematic in this supplement.

ISSUE NOS. 4 and 5

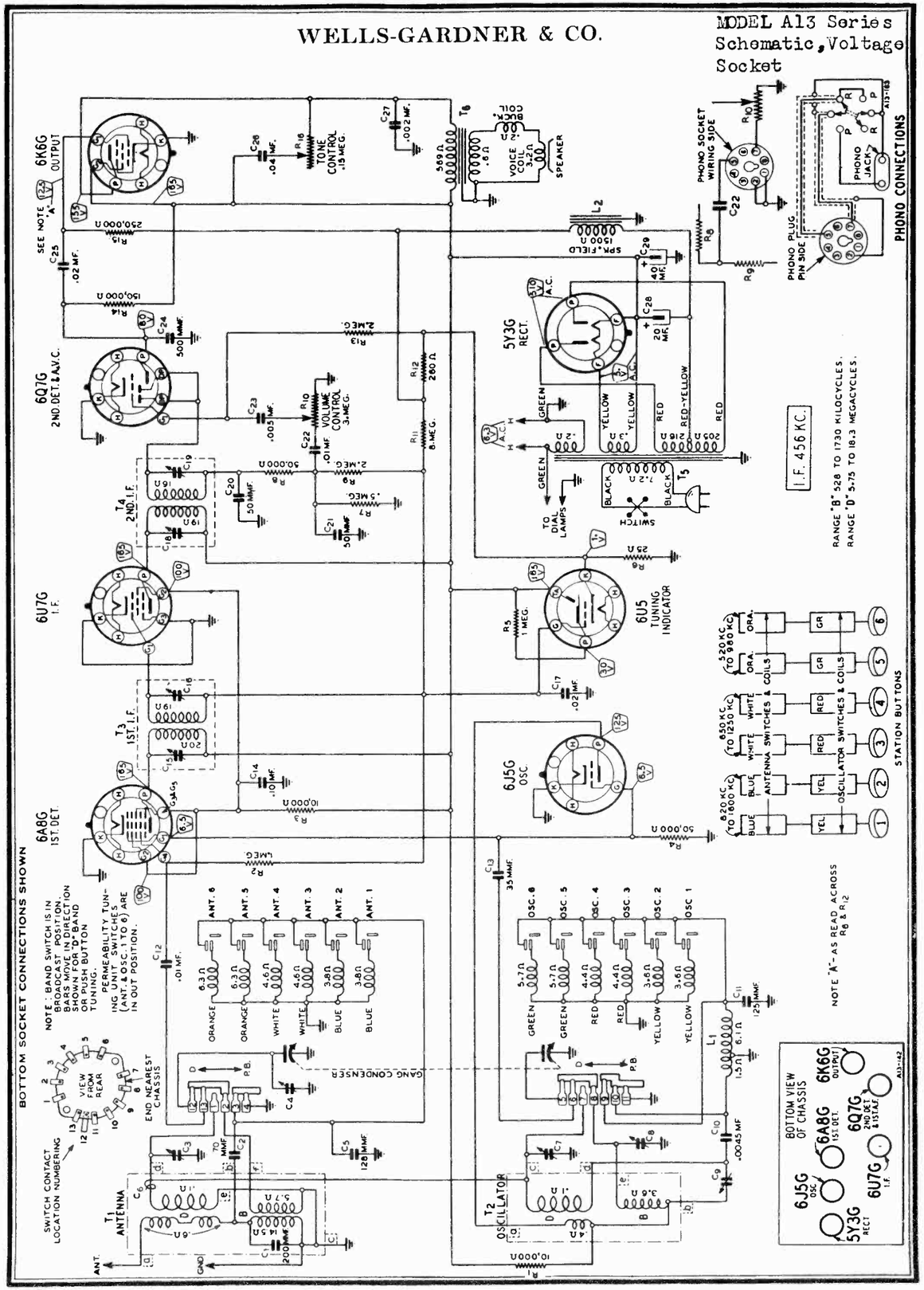
MECHANICAL CHANGES -- The antenna coil (T1) and Wave Trap Coil (L1) have been moved from the top of the chassis base to a position just in back of the band switch underneath the chassis base.

The Wave Trap Trimmer (C1) has been moved from its former position near the 1st I.F. Transformer (T6) to a position near the 6U7G R.F. tube.

ELECTRICAL CHANGES -- The Wave Trap Coil (L1) and Trimmer Condenser (C1) have been removed from the antenna circuit and are now connected in the interstage circuit - See Fig. 3.

ISSUE NO. 6

ELECTRICAL CHANGES -- The Tone Control, formerly in the 1st audio plate has been put in the diode circuit - See Fig. 3. A 1 Megohm Tone Control (R22) and a .02 mf. (C37) condenser were used in the audio plate. A 3 Megohm Tone Control (R32) and a .001 mf. (C49) condenser are used in the diode circuit.



MODEL A13 Series
Alignment, Trimmers
Coils, Specifications

WELLS-GARDNER & CO.

Power Consumption - 50 Watts (At 117 volts 60 cycles)
Power Output - 1.0 Watts Undistorted, 2.0 Watts Maximum
Selectivity - 38 KC Broad at 1000 times Signal
Sensitivity
- B Range (Manual Tuning) ..... 15 Microvolts Average
- B Range (Automatic Tuning) ..... 15 Microvolts Average
- D Range ..... 25 Microvolts Average

Intermediate Frequency - 456 KC
Speaker - 6" or 8" Dynamic
Tuning Frequency Range
- B Range (Manual Tuning) .... 528 to 1730 KC (Kilocycles)
- D Range (Manual Tuning) .... 5750 to 18300 KC (Kilocycles)
- Buttons 1 and 2 (Automatic Tuning) ..... 820 to 1600 KC
- Buttons 3 and 4 (Automatic Tuning) ..... 650 to 1250 KC
- Buttons 5 and 6 (Automatic Tuning) ..... 520 to 980 KC

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter—Non-Metallic Screwdriver.
Dummy Antennas—.1 mf., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM
I. F.					
456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	1st I.F. (C15) & (C16) 2nd I.F. (C18) & (C19)
RANGE B					
1730 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C8)
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1500 KC—See Note A	Ant. Range B (C4)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C9) Rock Rotor—See Note B
RANGE D					
18,300 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C7)
15,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C3) Rock Rotor—See Note B
PERMEABILITY TUNING UNIT			**BUTTON DEPRESSED** (Band Switch In Push Button Position)	**TURN SETTING SCREW TO MAXIMUM OUTPUT —See Instruction Book**	**ADJUST COIL POSITION TO MAXIMUM OUTPUT —See Note C**
1100 KC	Antenna Lead	200 mmf.	No. 1	Setting Screw No. 1	Antenna Coil No. 1
1100 KC	Antenna Lead	200 mmf.	No. 2	Setting Screw No. 2	Antenna Coil No. 2
850 KC	Antenna Lead	200 mmf.	No. 3	Setting Screw No. 3	Antenna Coil No. 3
850 KC	Antenna Lead	200 mmf.	No. 4	Setting Screw No. 4	Antenna Coil No. 4
700 KC	Antenna Lead	200 mmf.	No. 5	Setting Screw No. 5	Antenna Coil No. 5
700 KC	Antenna Lead	200 mmf.	No. 6	Setting Screw No. 6	Antenna Coil No. 6

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

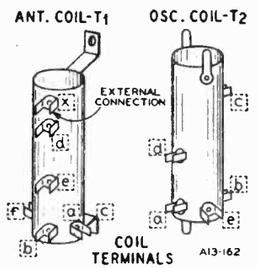
After each range is completed, repeat the procedure as a final check.

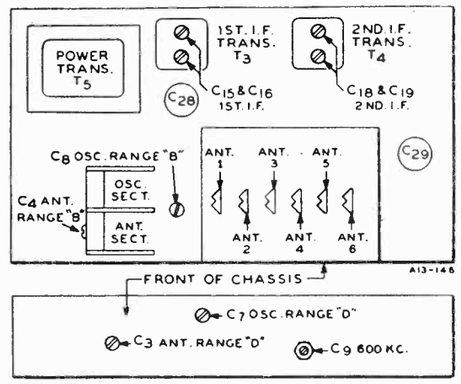
NOTE A—If the pointer is not at 1500 KC on the dial, loosen the 2 clamps which hold the pointer assembly on the cord, move the pointer to the 1500 KC mark, and tighten the clamps.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

NOTE C—At the top of the permeability tuning unit can be seen six "W" openings. Insert the end of a pair of long nose pliers or a screwdriver in the "W" opening of the proper button and adjust the position of the antenna (rear) coil by twisting the pliers or screwdriver until maximum output is obtained.

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 on the dial. It may be necessary to increase the input signal to hear the image.





Socket, Coils, Phono.

WELLS-GARDNER & CO.

MODEL A15 Series
Schematic, Voltage

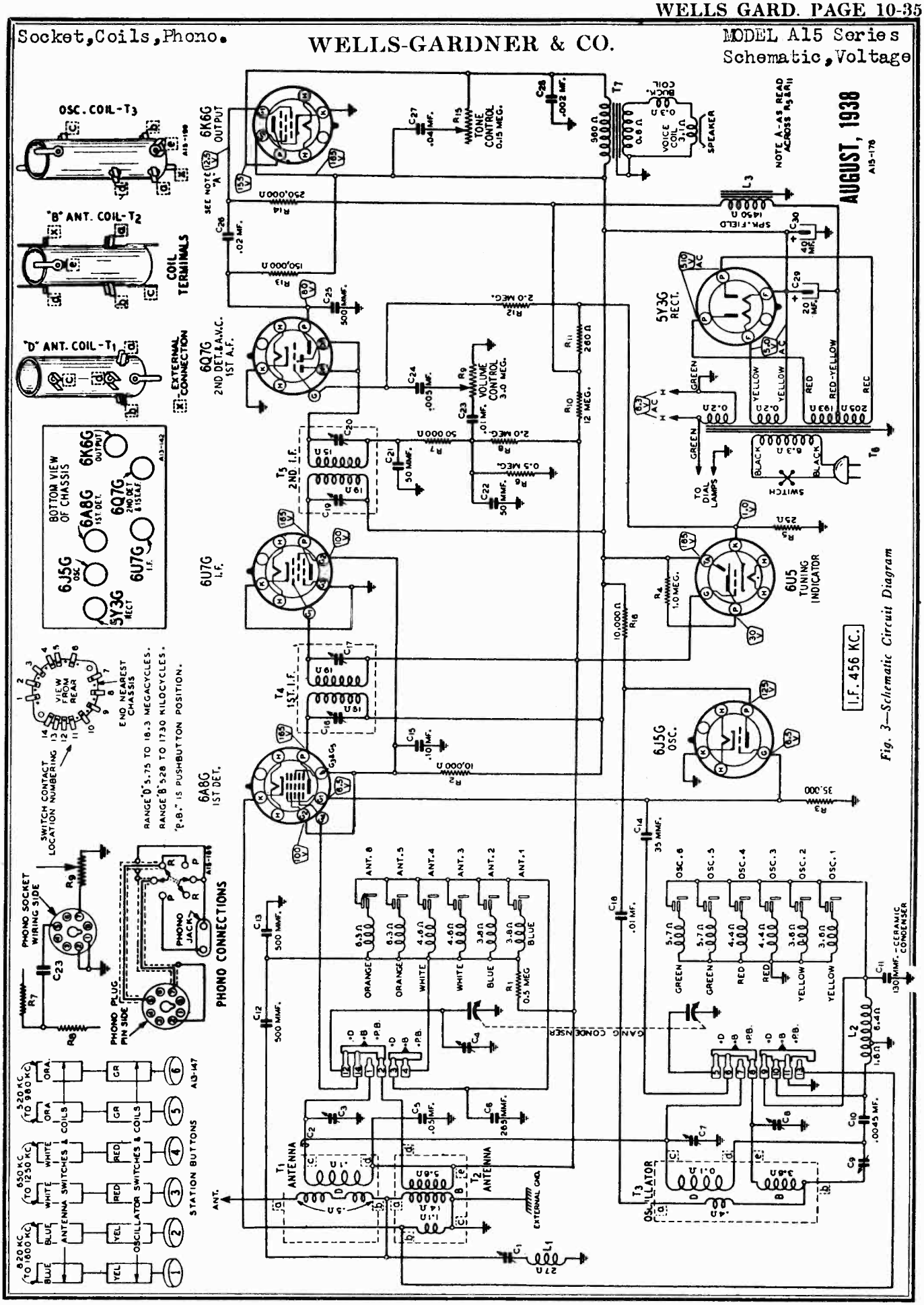


Fig. 3—Schematic Circuit Diagram

MODEL A15 Series
Alignment, Trimmers

WELLS-GARDNER & CO.

Specifications

Power Consumption - 50 Watts (At 117 volts 60 cycles)

Power Output - - - - - - - 1.0 Watts Undistorted, 2.0 Watts Maximum

Selectivity - - 38 KC Broad at 1000 times Signal

Sensitivity

B Range (Manual Tuning).....15 Microvolts Average
B Range (Automatic Tuning).....15 Microvolts Average
D Range .....25 Microvolts Average

Intermediate Frequency - - - - - - - 456 KC

Speaker - - - - - - - - - 6" or 8" Dynamic

Tuning Frequency Range

B Range (Manual Tuning).... 528 to 1730 KC (Kilocycles)
D Range (Manual Tuning)....5750 to 18300 KC (Kilocycles)
Buttons 1 and 2 (Automatic Tuning).....820 to 1600 KC
Buttons 3 and 4 (Automatic Tuning).....650 to 1250 KC
Buttons 5 and 6 (Automatic Tuning).....520 to 980 KC

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:

An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter—Non-Metallic Screwdriver.

Dummy Antennas—.1 mf., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (Unless otherwise specified)
I. F.					
456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	1st I.F. (C16) & (C17) 2nd I.F. (C19) & (C20)
RANGE B					
1730 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C8)
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1500 KC— See Note A	Ant. Range B (C4)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C9) Rock Rotor—See Note B
WAVE TRAP					
456 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to 600 KC Adjust Sig. Gen.—See Note C	Wave Trap (C1) Adjust for MINIMUM Output
RANGE D					
18,300 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C7)
15,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C3) Rock Rotor—See Note B
PERMEABILITY TUNING UNIT			BUTTON DEPRESSED (Band Switch in Push Button Position)	TURN SETTING SCREW TO MAXIMUM OUTPUT —See Instruction Book	ADJUST COIL POSITION TO MAXIMUM OUTPUT —See Note D
1100 KC	Antenna Lead	200 mmf.	No. 1	Setting Screw No. 1	Antenna Coil No. 1
1100 KC	Antenna Lead	200 mmf.	No. 2	Setting Screw No. 2	Antenna Coil No. 2
850 KC	Antenna Lead	200 mmf.	No. 3	Setting Screw No. 3	Antenna Coil No. 3
850 KC	Antenna Lead	200 mmf.	No. 4	Setting Screw No. 4	Antenna Coil No. 4
700 KC	Antenna Lead	200 mmf.	No. 5	Setting Screw No. 5	Antenna Coil No. 5
700 KC	Antenna Lead	200 mmf.	No. 6	Setting Screw No. 6	Antenna Coil No. 6

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

After each range is completed, repeat the procedure as a final check.

NOTE A—If the pointer is not at 1500 KC on the dial, loosen the 2 clamps which hold the pointer assembly on the cord, move the pointer to the 1500 KC mark, and tighten the clamps.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

NOTE C—Leave condenser rotor at the 600 KC setting and adjust the signal generator until maximum output is obtained at or near 456 KC.

NOTE D—At the top of the permeability tuning unit can be seen six "W" openings. Insert the end of a pair of long nose pliers or a screwdriver in the "W" opening of the proper button and adjust the position of the antenna (rear) coil by twisting the pliers or screwdriver until maximum output is obtained.

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 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 on the dial. It may be necessary to increase the input signal to hear the image.

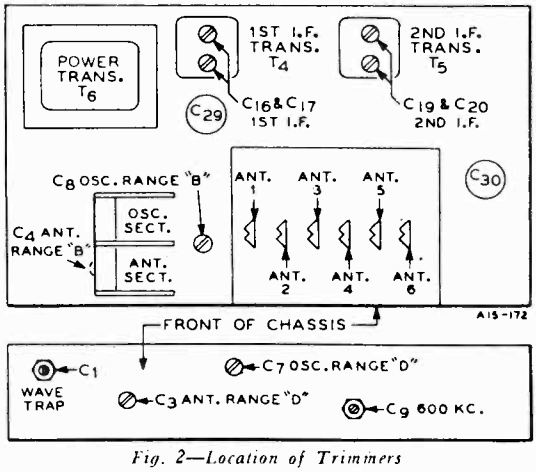


Fig. 2—Location of Trimmers

ALIGNMENT

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

After each range is completed, repeat the procedure as a final check.

NOTE A—Hold the tuning knob and turn the film drum until it is at the 1500 KC mark on the dial.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

NOTE C—At the bottom of the permeability tuning unit can be seen six "W" openings. Insert the end of a pair of long nose pliers or a screwdriver in the "W" opening of the proper button and adjust the position of the antenna (rear) coil by twisting the pliers or screwdriver until maximum output is

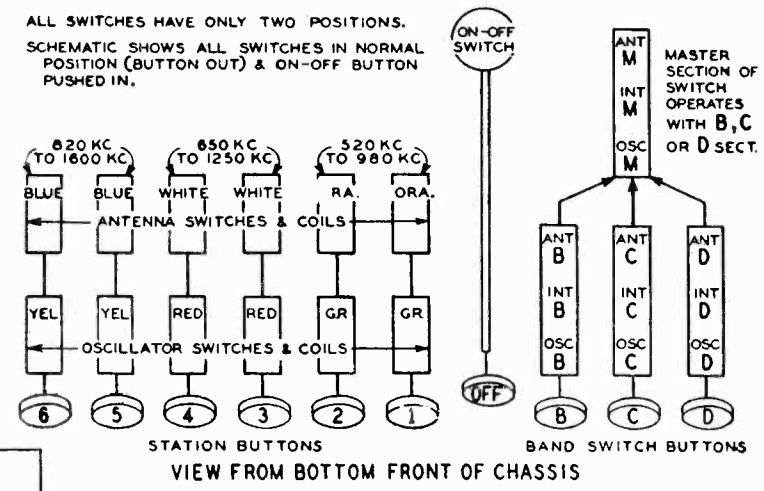
CAUTION—When aligning the short wave bands, be sure NOT to adjust at the image frequency. This can be checked as follows:

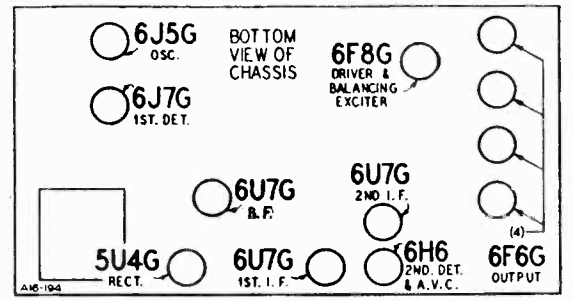
Let us say the signal generator is set for 5000 KC. The signal will then be heard at 5000 KC on the dial of the radio. The image signal, which is much weaker, will be heard at 5000 less 912 KC, or 4088 KC on the dial. It may be necessary to increase the input signal to hear the image.

NOTICE—Re-alignment is necessary if glass tubes are replaced by their equivalent in metal tubes, or vice versa, in the R.F. and I.F. stages.

13 Tube AC Radio

FOR TUNER DATA SEE INDEX





Movie Dial Adjustments and General Service Data

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Selectivity Control—Sharp Position All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:

An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter—Non-Metallic Screwdriver.

Dummy Antennas—.1 mf., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	CONNECTION AT RADIO	DUMMY ANTENNA	BUTTON DEPRESSED	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (Unless otherwise specified)
I. F.					
456 KC	Grid of 2nd I.F. Tube	.1 mf.	B Range	Turn Rotor to Full Open	3rd I.F. (C37) & (C38)
456 KC	Grid of 1st I.F. Tube	.1 mf.	B Range	Turn Rotor to Full Open	2nd I.F. (C31) & (C32)
456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	1st I.F. (C27) & (C28)
WAVE TRAP					
456 KC	Antenna Lead	200 mmf.	No. 1		Wave Trap (C1) Adjust for MINIMUM Output
RANGE B					
1830 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C22)
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1500 KC—See Note A	Ant. Range B (C4) Int. Range B (C12)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C19) Rock Rotor—See Note B
RANGE C					
6350 KC	Antenna Lead	400 Ohm	C Range	Turn Rotor to Full Open	Oscillator Range C (C21)
6000 KC	Antenna Lead	400 Ohm	C Range	Turn Rotor to Max. Output	Antenna Range C (C3) Int. Range C (C11)
RANGE D					
22,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C20)
20,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C2) Int. Range D (C10) Rock Rotor—See Note B
7000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	7000 KC (C18) Rock Rotor—See Note B
PERMEABILITY TUNING UNIT				TURN SETTING SCREW TO MAXIMUM OUTPUT —See Instruction Book	ADJUST COIL POSITION TO MAXIMUM OUTPUT —See Note C
700 KC	Antenna Lead	200 mmf.	No. 1	Setting Screw No. 1	Antenna Coil No. 1
700 KC	Antenna Lead	200 mmf.	No. 2	Setting Screw No. 2	Antenna Coil No. 2
850 KC	Antenna Lead	200 mmf.	No. 3	Setting Screw No. 3	Antenna Coil No. 3
850 KC	Antenna Lead	200 mmf.	No. 4	Setting Screw No. 4	Antenna Coil No. 4
1100 KC	Antenna Lead	200 mmf.	No. 5	Setting Screw No. 5	Antenna Coil No. 5
1100 KC	Antenna Lead	200 mmf.	No. 6	Setting Screw No. 6	Antenna Coil No. 6

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

After each range is completed, repeat the procedure as a final check.

NOTE A—Hold the tuning knob and turn the film drum until it is at the 1500 KC mark on the dial. There is a slot at the bottom of the film drum which will permit the drum to be rotated a small distance. If the drum must be rotated an additional amount in order to calibrate, loosen the film drum pulley set screw and turn the film drum until it is at the correct position. Then tighten the set screw.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

NOTE C—At the bottom of the permeability tuning unit can be seen six "W" openings. Insert the end of a pair of long nose pliers or a screwdriver in the "W" opening of the proper button and adjust the position of the antenna (rear) coil by twisting the pliers or screwdriver until maximum output is obtained.

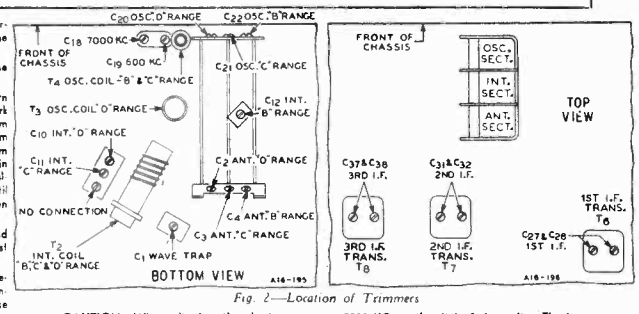


Fig. 2—Location of Trimmers

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 on the dial. It may be necessary to increase the input signal to hear the image.

Adjusting Height of Image on Screen

The image height should be so adjusted that the complete image for each band will be centered on the screen.

Depress the B band (Broadcast) button. If the image is not centered on the screen, loosen the nut of the B band image height adjusting screw—See Fig. 3. Turn the screw until the image is centered and tighten the nut.

Next depress the D band (2nd Short Wave) button. If the image is not centered on the screen, turn the knurled head of the D band image height adjusting screw until the image is centered on the screen.

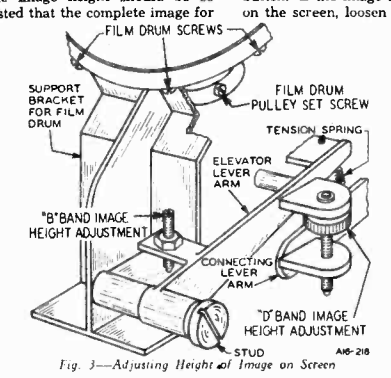


Fig. 3—Adjusting Height of Image on Screen

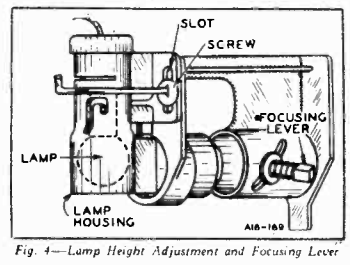


Fig. 4—Lamp Height Adjustment and Focusing Lever

Calibrating the Radio

To calibrate the radio, tune in a station of known frequency between 800 and 1,000 KC on the Broadcast band.

Hold the tuning knob in position and turn the film drum until it is at the correct kilocycle mark on the dial scale. Care should be taken not to touch the film. There is a slot at the bottom of the film drum which will permit the drum to be rotated a small distance.

If the drum must be rotated an additional amount in order to calibrate, loosen the film drum pulley set screw (Fig. 6) and turn the film drum until it is at the correct position. Then tighten this set screw.

EARLY MODELS—Some of the first production models employed a film drum pulley bushing with a small set screw hole—See Fig. 6. Two types of film drum pulleys were used with this bushing; one employed a 3/16 inch brass set screw, the other a 1/8 inch steel set screw. In calibrating, the latter screw should not be passed through the set screw hole in the bushing, but should be tightened against the outer wall of the bushing. If calibration cannot be made without passing the set screw through the hole, loosen the 6 screws around the edge of the film drum and carefully rotate the film a slight amount

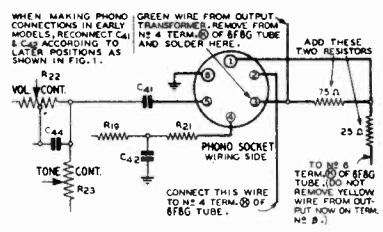


Fig. 7—Phonograph Connections

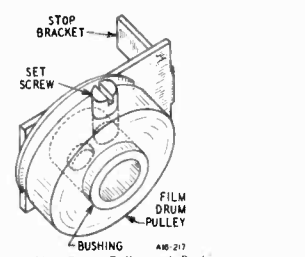
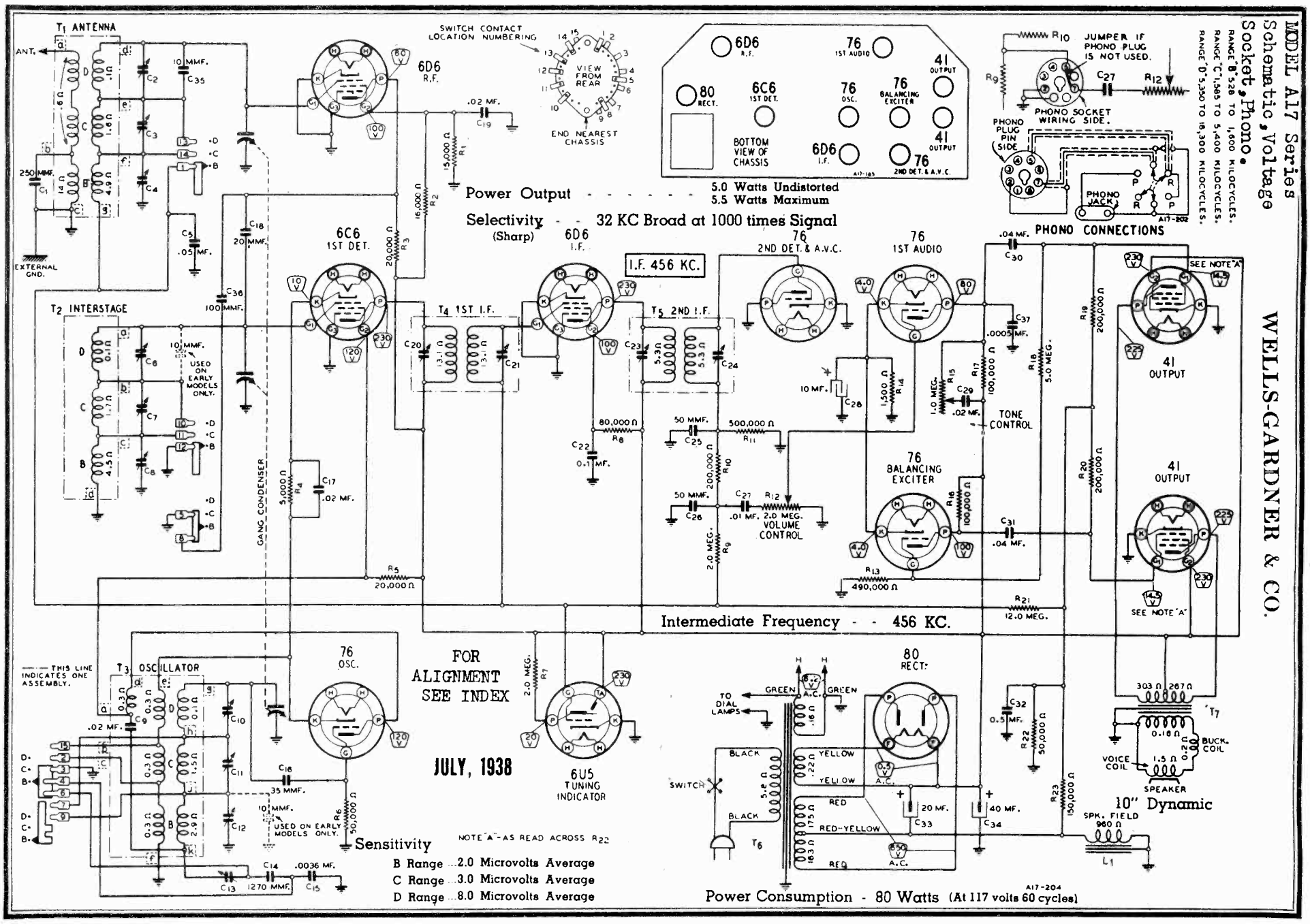


Fig. 6—Film Drum Pulley and Bushing

WELLS-GARDNER & CO.
MODEL A16 Series
Alignment, Trimmers
Phono, Data, Changes
Movie Dial Data

PAGE 10-40 WELLS GARD.
MODEL A17 Series
Schematic, Voltage
Socket, Phono.
RANGE "B" 528 TO 1,600 KILOCYCLES.
RANGE "C" 1,585 TO 5,400 KILOCYCLES.
RANGE "D" 5,350 TO 18,300 KILOCYCLES.



Power Output - - - - - - - 5.0 Watts Undistorted
5.5 Watts Maximum

Selectivity - - 32 KC Broad at 1000 times Signal (Sharp)

Sensitivity
B Range ...2.0 Microvolts Average
C Range ...3.0 Microvolts Average
D Range ...8.0 Microvolts Average

Intermediate Frequency - - 456 KC.

Power Consumption - 80 Watts (At 117 volts 60 cycles)

WELLS-GARDNER & CO.

MODEL A20 Series
Schematic, Voltage
Socket, Coils
Specifications

SPECIFICATIONS

Power Consumption -- 65 Watts (At 117 volts 60 cycles)

Power Output - - - - - - - 3.0 Watts Undistorted
4.0 Watts Maximum

Selectivity - - 40 KC Broad at 1000 times Signal

Intermediate Frequency - - - - - - - 456 KC

Speaker - - - - - - - - 8" or 10" Dynamic

Tuning Frequency Range

B Range..... 528 to 1730 KC (Kilocycles)

D Range.....5750 to 18300 KC (Kilocycles)

Sensitivity (For 0.5 watt output)

B Range.....25 Microvolts Average

D Range.....40 Microvolts Average

The voltages at sockets are shown on the schematic circuit diagram. Unless otherwise specified, the voltage indicated is between the socket terminal and ground.

These voltages are read under the following conditions:

Line Voltage—117.

Volume Control—Maximum.

Antenna Shorted to Ground.

Readings taken with 1000 ohm-per-volt meter.

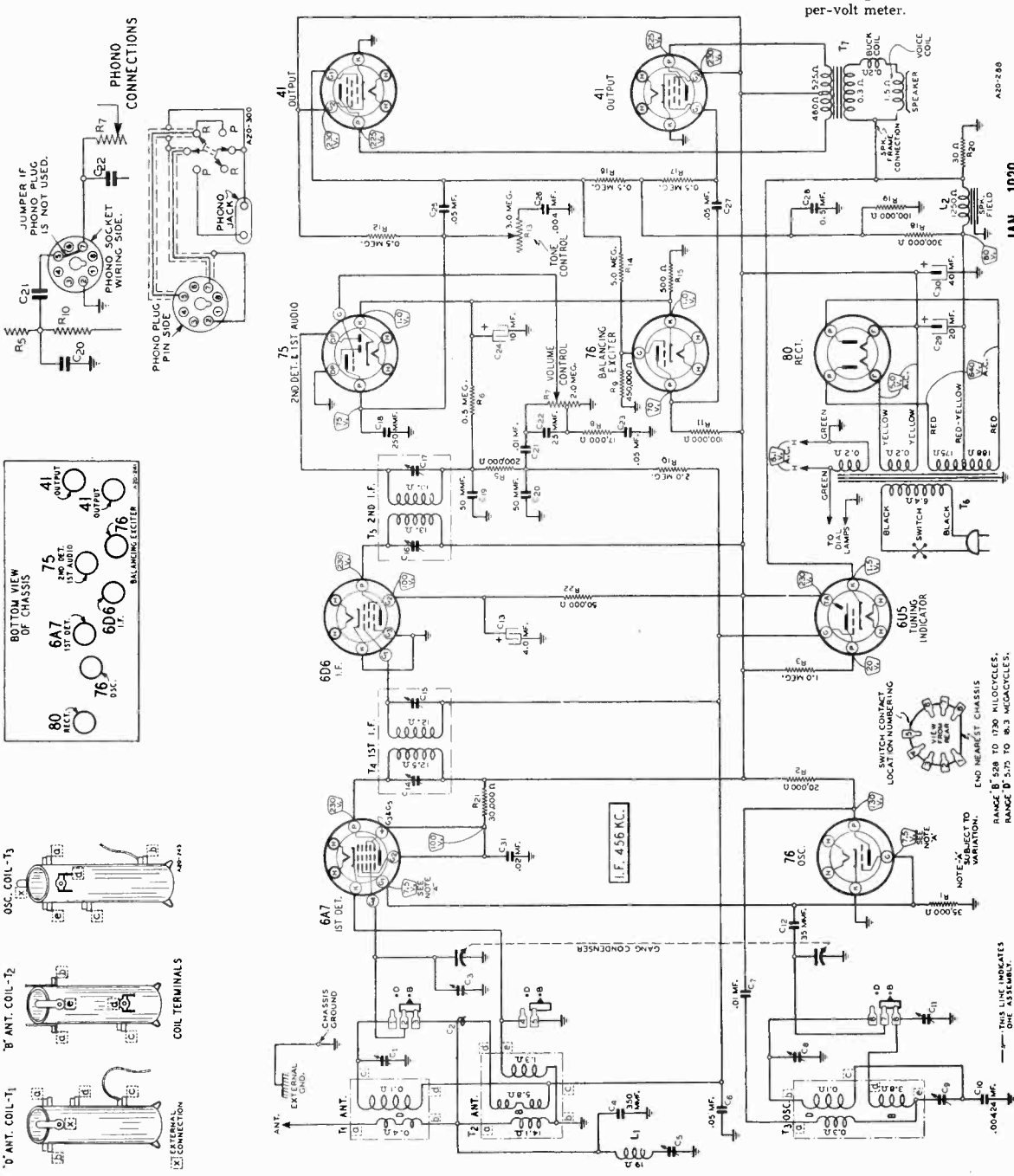


Fig. 3—Schematic Circuit Diagram

MODEL A20 Series
Alignment, Phono. Data
Drive Cord Data, Trimmers

MODELS T2, A12, A13, A15
A22, A23, A24 Series
Tuner Data

WELLS-GARDNER & CO.

SETTING PUSH BUTTONS WG SERIES A15, A22, A23, A24.

Selecting the Stations to be Set

There are 6 buttons on the push button tuning dial by means of which 6 stations may be set for quick tuning. They are numbered 1 to 6 in Fig. 2.

Make a list of your favorite stations, those which you tune in regularly. There may be any number up to and including 6 in this list.

It is better to list the station with the highest kilocycle number first, the station with the next lower kilocycle number next, and so on.

Frequencies Covered by Each Button

The frequency range of each station button is shown in Fig. 2. Any station within the range of a button may be set. Although, in some cases, it may be possible to set a certain station on several buttons, it is better to set the stations so that the kilocycle numbers decrease from buttons 1 to 6.

Setting a Station Button

Select a station from the list you have prepared, preferably the station with the highest kilocycle number, and tune in this station with the tuning knob in the usual way. Determine what program is being broadcast.

At each side of the escutcheon plate is an escutcheon screw—See Fig. 2. Remove the escutcheon plate by unscrewing these two screws. Be careful to avoid scratching the plate.

When this is done, the setting screws above the six buttons will be exposed.

Turn the band switch knob to the PUSH BUTTON TUNING position —See Fig. 2. The station tuned in previously will probably disappear.

If the kilocycle number of the station tuned in is within the range of button No. 1, push this button in. The same station or a different station may be heard.

With a small screw driver, slowly turn the setting screw above button No. 1 in or out until the desired station (the one previously tuned in) is heard. Turning the screw in (clockwise) will tune in stations with higher kilocycle numbers while turning the screw out (counter-clockwise) will tune in stations with lower kilocycle numbers. Be sure not to tune in some other station broadcasting the same program. Using the tuning eye as a guide, *accurately* tune in this station. The station is now set on this button.

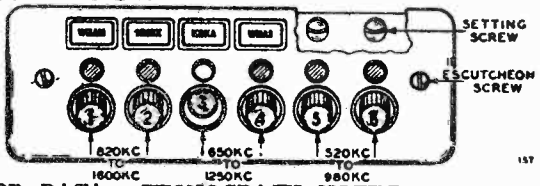
To determine whether the correct station has been set, turn the band switch knob back to the BROADCAST position. The same station should be heard (provided the tuning knob has not been turned). If it is not, turn the band switch knob to the PUSH BUTTON TUNING position again and retune with the setting screw.

Remove the station call letter tab from the sheets provided and push the tab all the way to the bottom of the rectangular space above the correct station button opening in the escutcheon plate. Then cover the call letter tab with one of the clear celluloid tabs.

Proceed in the same manner to set stations on any of the remaining buttons. Use blank tabs above buttons on which stations are not set.

After all of the stations have been set, carefully replace the escutcheon plate.

If at any time you wish to change the setting of a button from one station to another, repeat the above procedure. Changing the setting of one button will not affect the setting of any of the other buttons. The old call letter tab may be removed by sticking a pin through the notch in the celluloid tab and through the call letter tab.



WG SERIES A20 ALIGNMENT, DRIVE CORD DATA, PHONOGRAPH NOTES.

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

IMPORTANT—Follow procedure in the order shown.

The following equipment is required for aligning:

An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output Indicating Meter—Non-Metallic Screwdriver.

Dummy Antennas—.1 mf., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (Unless otherwise specified)
I. F. 456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	2nd I.F. (C16) & (C17) 1st I.F. (C14) & (C15)
WAVE TRAP 456 KC	Antenna Lead	200 mmf.	B Range	600 KC	Wave Trap (C5) Adjust for MINIMUM Output
RANGE B 1730 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C11)
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output Set Indicator to 1500 KC—See Note A	Ant. Range B (C3)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C9) Rock Rotor—See Note B
RANGE D 18,300 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C8)
15,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C1) Rock Rotor—See Note B

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

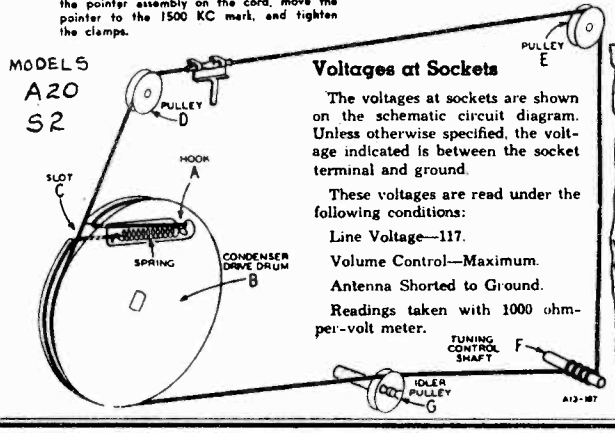
After each range is completed, repeat the procedure as a final check.

NOTE A—If the pointer is not at 1500 KC on the dial, loosen the 2 clamps which hold the pointer assembly on the cord, move the pointer to the 1500 KC mark, and tighten the clamps.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

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 15,000 KC. The signal will then be heard at 15,000 KC 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 on the dial. It may be necessary to increase the input signal to hear the image.

Fig. 4—Drive Cord



Voltages at Sockets

The voltages at sockets are shown on the schematic circuit diagram. Unless otherwise specified, the voltage indicated is between the socket terminal and ground.

These voltages are read under the following conditions:

Line Voltage—117.

Volume Control—Maximum.

Antenna Shorted to Ground.

Readings taken with 1000 ohm-per-volt meter.

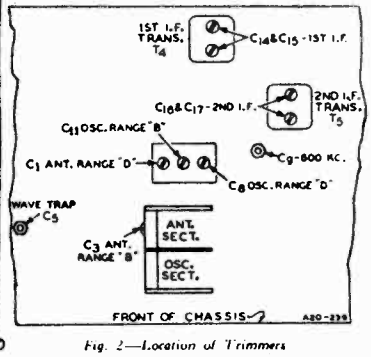


Fig. 2—Location of Trimmers

Drive Cord Replacement

Tie a knot with a small loop at one end of the new drive cord. Slide a 1¾ inch length of fabric tubing on the cord. Tie the free end of the drive cord to the tension spring. The distance between knots should be 48½ inches.

Arrange to keep the gang condenser in the completely closed position.

Place the looped end of the drive cord over hook A on condenser drive drum B (See Fig. 4). Pass the cord through slot C in the drum rim and wind one turn in a clockwise direction (from front of chassis) on condenser drive drum. Pass drive cord over pulleys D and E as shown. See that the fabric tubing is now between pulleys D and E. Continue cord down to shaft F and wind 2¼ turns clockwise, progressing towards the chassis. Bring cord over pulley G to bottom of condenser drive drum B as shown. Wind drive cord clockwise (from front of chassis) around condenser drive drum B to slot C. See that the drive cord does not cross in groove of condenser drive drum. Pass the remaining drive cord and tension spring through slot C and secure the free end of the spring on hook A.

DIAL POINTER ATTACHMENT—Tune in a station of known frequency. Move the pointer to this frequency on the dial scale. Clamp pointer tightly over the fabric tubing on the cord—See Fig. 4.

Phonograph Connections

Phonograph connections are made as shown in the schematic circuit diagram—Fig. 3. On the back panel of the chassis base is a round knockout 1-9/64 inches in diameter. An octal base socket is mounted in this knockout opening and wired as shown in the schematic.

A phono cable assembly may then be purchased (See parts list). On one end of this cable is an octal plug and on the other end is a phonograph-radio switch and double tip jack.

MODEL A22 Series
Schematic, Voltage
Socket, Phono., Coils
MODEL A24 Series
Socket, Phono., Coils

WELLS-GARDNER & CO.

SPECIFICATIONS

Power Consumption - - 65 Watts (At 117 volts 60 cycles)

Power Output - - - - - - - 3.0 Watts Undistorted
4.0 Watts Maximum

Selectivity - - 40 KC Broad at 1000 times Signal

Intermediate Frequency - - - - - - - 456 KC

Speaker - - - - - - - - - - - 10" Dynamic

Tuning Frequency Range

B Range..... 528 to 1730 KC (Kilocycles)

D Range.....5750 to 18300 KC (Kilocycles)

Sensitivity (For 0.5 watt output)

B Range.....25 Microvolts Average

D Range.....40 Microvolts Average

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.

Voltages at Sockets

The voltages at sockets are shown on the schematic circuit diagram. Unless otherwise specified, the voltage indicated is between the socket terminal and ground.

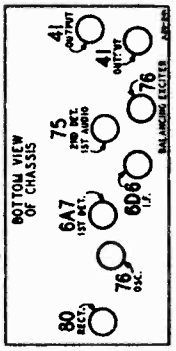
These voltages are read under the following conditions:

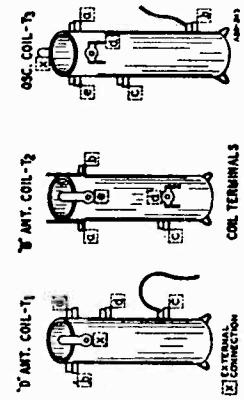
Line Voltage—117.

Volume Control—Maximum.
Antenna Shorted to Ground.
Readings taken with 1000 ohm-per-volt meter.

WG SERIES A22 and A24

BOTTOM VIEW OF CHASSIS





FOR TUNER DATA SEE INDEX

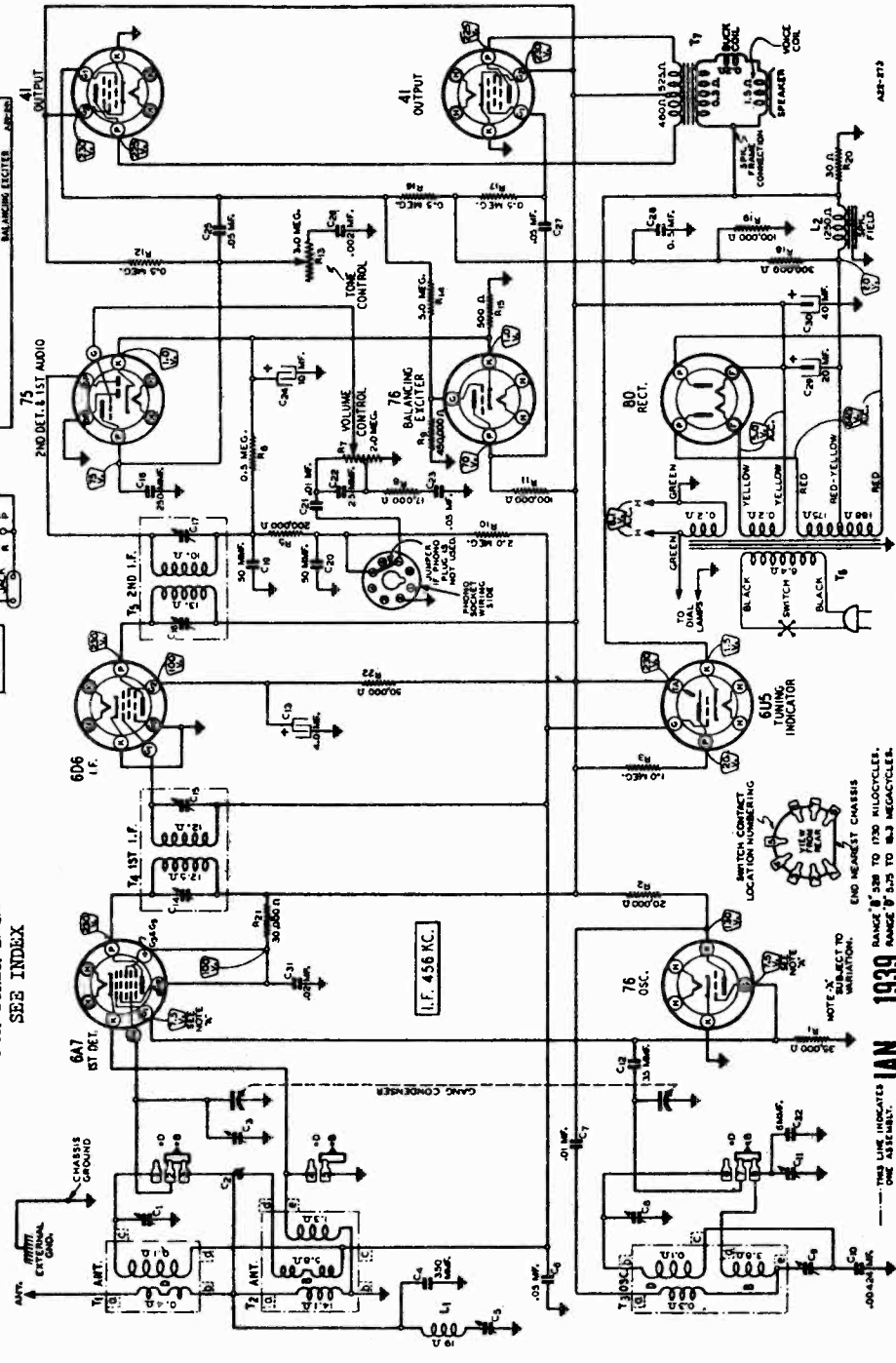


Fig. 3—Schematic Circuit Diagram

MODEL A22 Series
MODEL A24 Series
Alignment, Trimmers
Drive Data
MODEL A23 Series
Drive Data

WELLS-GARDNER & CO.

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for several minutes.

IMPORTANT—Follow procedure in the order shown.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BAND SWITCH SETTING	CONDENSER OR DIAL SETTING	ADJUST TRIMMERS TO MAXIMUM (Unless otherwise specified)
I. F. 456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	2nd I.F. (C16) & (C17) 1st I.F. (C14) & (C15)
WAVE TRAP 456 KC	Antenna Lead	200 mmf.	B Range	600 KC	Wave Trap (C5) Adjust for MINIMUM Output
RANGE B				Turn Rotor to Full Closed Position. Pointer should be at low frequency end mark on scale—See Note A.	
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor until dial pointer is at 1500 KC	Oscillator Range B (C11)
1500 KC	Antenna Lead	200 mmf.	B Range	Leave Rotor at above setting	Ant. Range B (C3)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Max. Output	600 KC (C9) Rock Rotor—See Note B
RANGE D 18,300 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C8)
15,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Max. Output	Ant. Range D (C1) Rock Rotor—See Note B

NOTE A—The low frequency end mark is a small dot at the left side of the short wave scale under the "5." of the number 5.8 and to the right of the "C" of the letters MC. If the pointer is not at this mark on the dial, move the pointer to this mark.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

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

After each range is completed, repeat the procedure as a final check.

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 15,000 KC. The signal will then be heard at 15,000 KC 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 on the dial. It may be necessary to increase the input signal to hear the image.

General Service Data

Drive Cord Replacement

Tie a knot with a small loop at one end of the new drive cord. Tie the other end to the tension spring, leaving a distance of 64⅛ inches between the knots.

Turn the gang condenser to the full open position. Secure the free end of the spring over hook A—See Fig. 4. Turn the gang condenser to the completely closed position.

Pass the cord through slot B and, guiding the cord in the groove of the drive drum, turn the gang condenser to the full open position. Hook the cord in slot B and turn the gang condenser to the completely closed position. Unhook the cord from slot B and pass over pulleys C, D, and E as shown. Pass the cord in front of idler pulley F. Wind 2½ turns counter-clockwise (from front of chassis) around the drive shaft spool, progressing away from the chassis. Pass cord up and over the drive drum. Guiding the cord in the groove of the drive drum, turn the gang condenser to the full open position. If necessary, stretch the tension spring and pull the drive cord taut. Pass drive cord through slot B and secure the loop to the tension spring at point G.

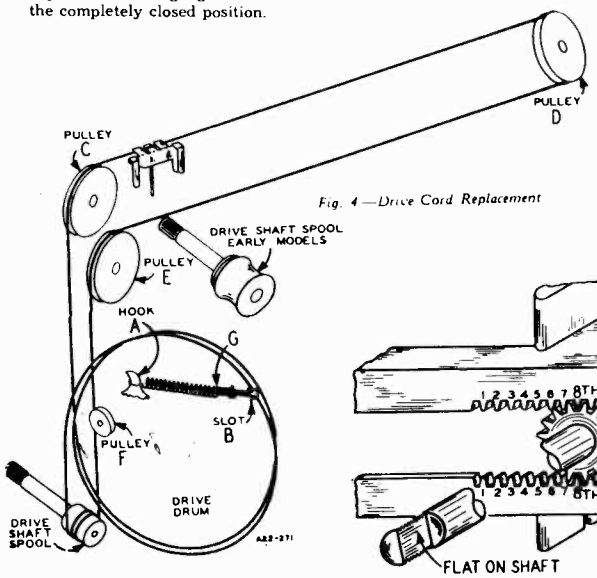


Fig. 4—Drive Cord Replacement

EARLY MODELS—In the early models using a larger drive shaft spool (See Fig. 4), there should be a distance of 65½ inches between the knots.

DIAL POINTER ATTACHMENT—Tune in a station of known frequency. Move the pointer to the approximate frequency on the dial scale. Pass the cord through the slotted head—See Fig. 4. Hold the drive cord and slide the pointer to the exact frequency on the dial scale

Rack and Pinion Assembly

If it is ever necessary to re-assemble the automatic tuning unit, proceed as follows: The pinion gear shaft should be held in such a position that the flat portion is vertical or turned slightly counter-clockwise from the vertical as shown in Fig. 5.

The lower rack should be meshed with the pinion gear so that the 8th tooth from the front on each side of the rack is in line with the axis of the pinion gear shaft—See Fig. 5. The upper rack should then be lined up with the lower rack and meshed with the pinion gear. The 8th tooth from the front on each side of the upper rack will then line up with the axis of the pinion gear shaft.

The rear and side brackets can then be mounted on the rack and pinion assembly.

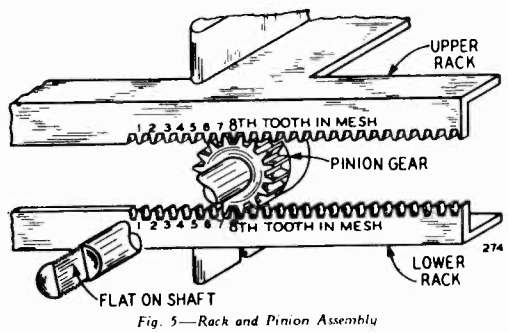


Fig. 5—Rack and Pinion Assembly

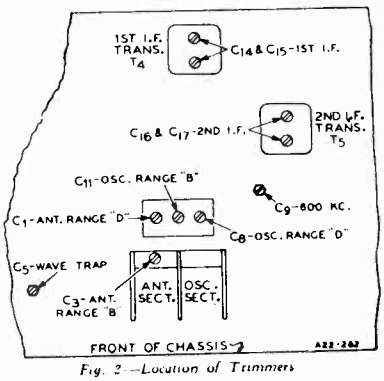


Fig. 2—Location of Trimmers

WELLS-GARDNER & CO.

MODEL A23 Series
Schematic, Voltage
Phono. Data

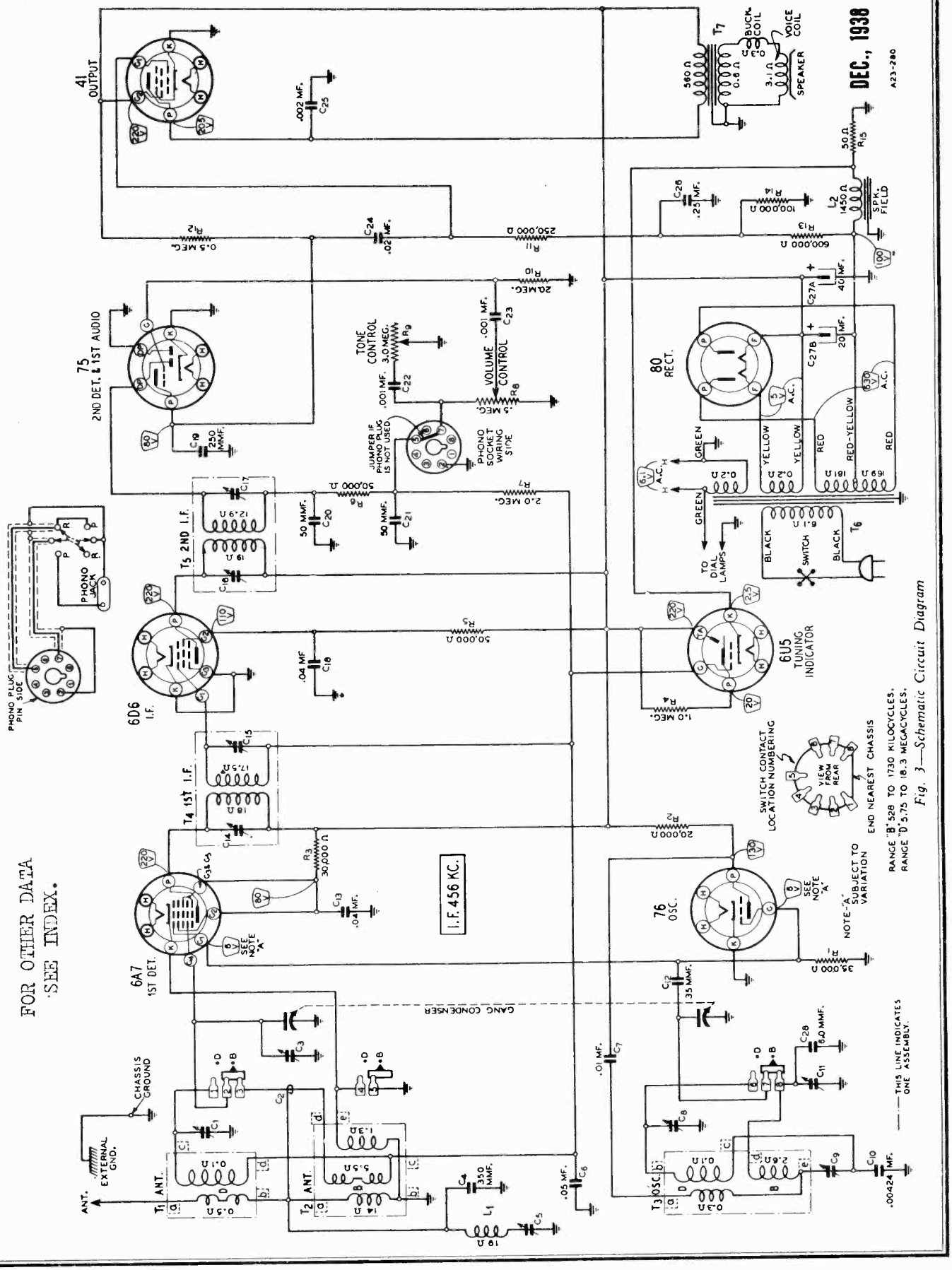


Fig. 3—Schematic Circuit Diagram

FOR OTHER DATA
SEE INDEX.

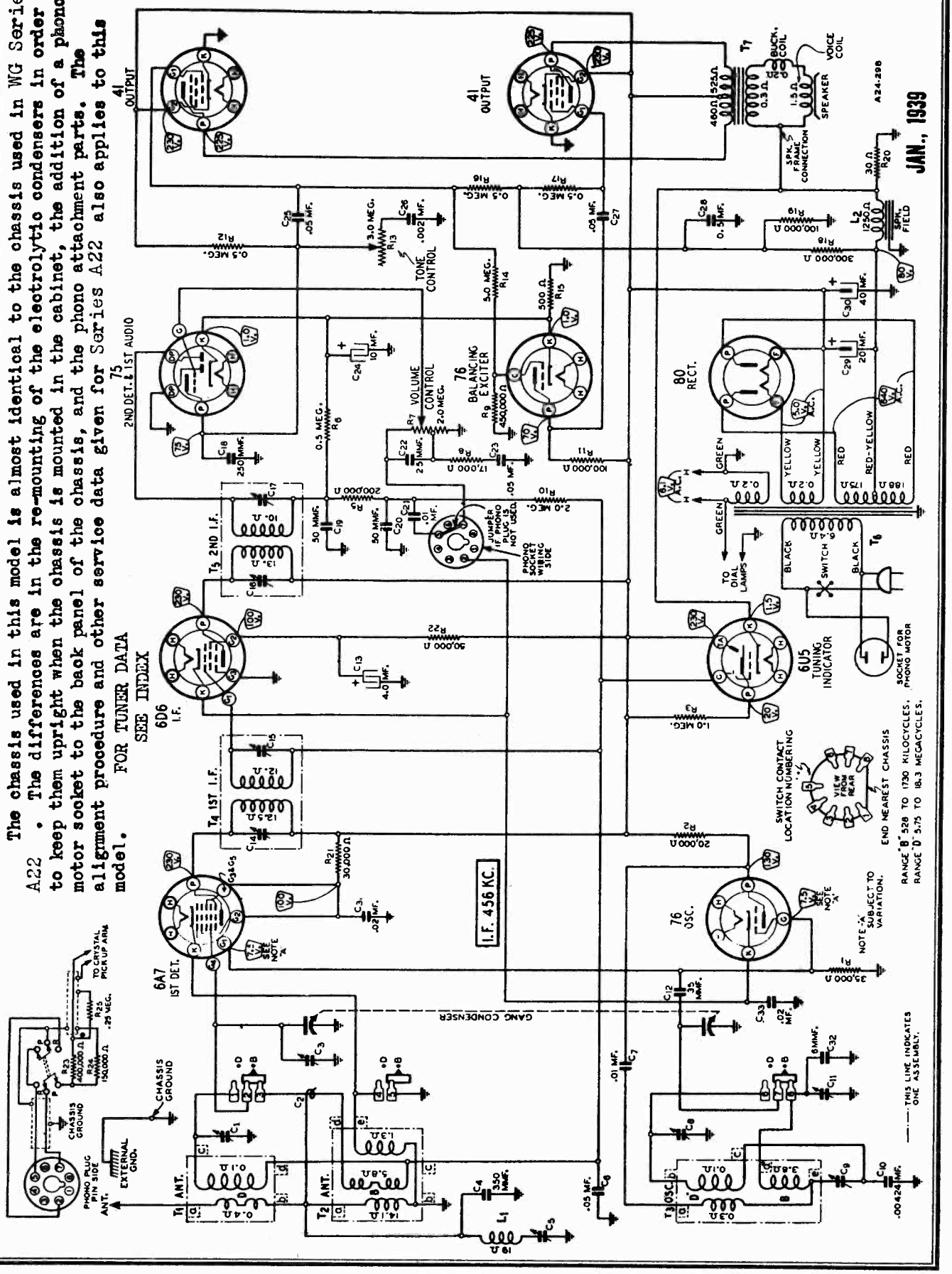
MODEL A24 Series
Schematic, Voltage
Phono. Data

WELLS-GARDNER & CO.

The chassis used in this model is almost identical to the chassis used in WG Series A22. The differences are in the re-mounting of the electrolytic condensers in order to keep them upright when the chassis is mounted in the cabinet, the addition of a phono motor socket to the back panel of the chassis, and the phono attachment parts. The alignment procedure and other service data given for Series A22 also applies to this model.

FOR TUNER DATA SEE INDEX

JAN., 1939



MODEL D689
Schematic, Voltage, Coils
Socket, Sensitivity

WESTERN AUTO SUPPLY CO.

SPECIFICATIONS

Power Consumption - 70 Watts (At 117 volts 60 cycles)

Power Output - - - - - - 3.0 Watts Undistorted
4.0 Watts Maximum

Selectivity - 31.5 KC Broad at 1000 times Signal
(Sharp)

Sensitivity

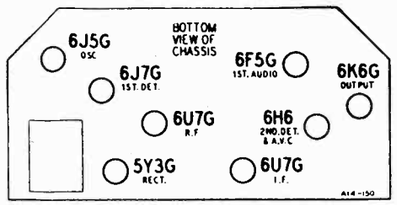
B Range (Manual Tuning)	1.0 Microvolt	Average
B Range (Automatic Tuning)	1.0 Microvolt	Average
C Range	3.0 Microvolts	Average
D Range	5.0 Microvolts	Average

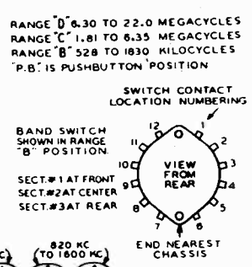
Intermediate Frequency - - - - - - - 456 KC.

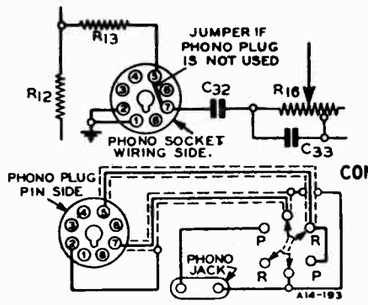
Speaker - - - - - - - 10" or 12" Dynamic

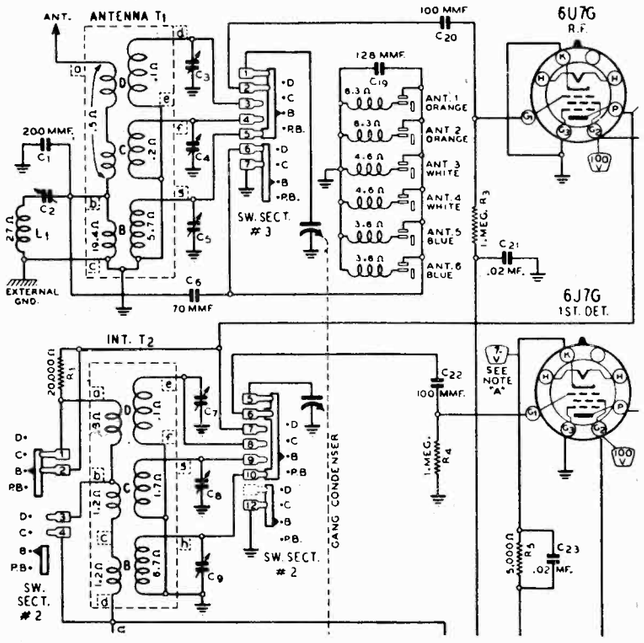
Tuning Frequency Range

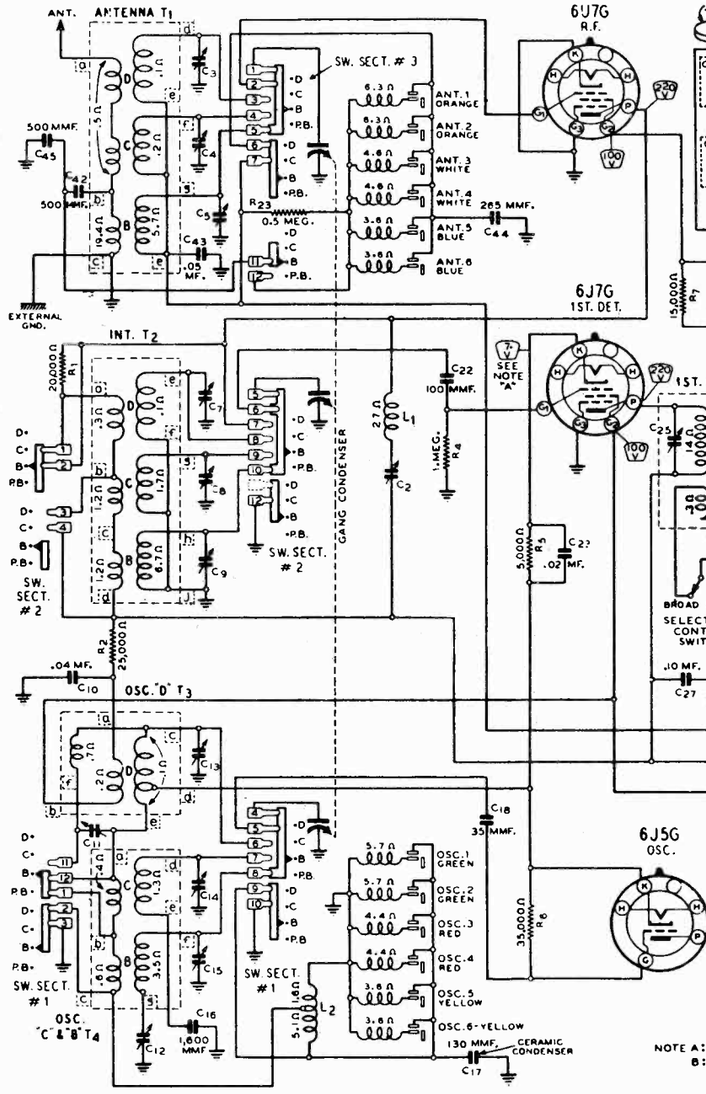
B Range (Manual Tuning)	528	to	1830 KC
C Range (Manual Tuning)	1810	to	6350 KC
D Range (Manual Tuning)	6300	to	22000 KC
Buttons 1 & 2 (Automatic Tuning)	520	to	980 KC
Buttons 3 & 4 (Automatic Tuning)	650	to	1250 KC
Buttons 5 & 6 (Automatic Tuning)	820	to	1600 KC

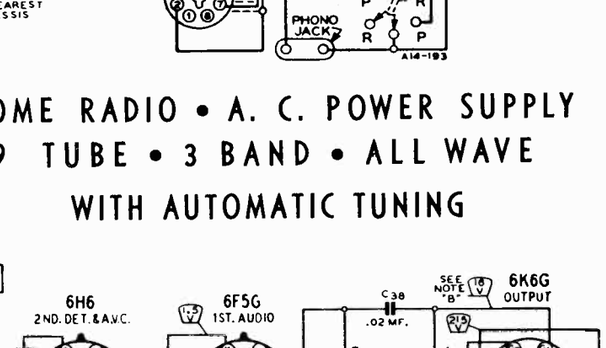












HOME RADIO • A. C. POWER SUPPLY
9 TUBE • 3 BAND • ALL WAVE
WITH AUTOMATIC TUNING

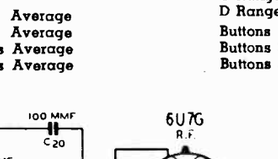


Fig. 4—Partial Schematic Circuit Diagram—Issue No. 1

FOR TUNER DATA SEE INDEX

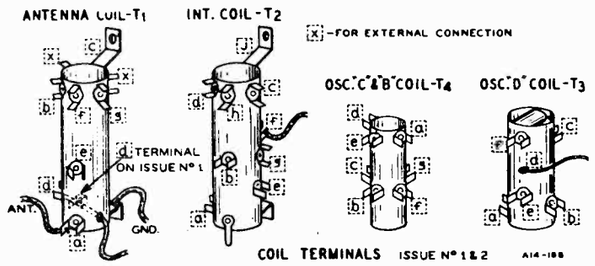


Fig. 3—Schematic Circuit Diagram—Issue No. 2

MAY, 1938

WESTERN AUTO SUPPLY CO.

MODEL D689
Alignment, Trimmers
Parts
MODEL D705, Issue 1
Parts List

Replacement Parts

NOTICE: There is a chassis number label on the chassis base. The chassis number identifies the radio as to chassis, dial, and issue number. When ordering parts or writing, be sure to mention the chassis number.

SPEAKERS

When ordering parts for speakers, specify part number of speaker and letters preceding part number stamped on the speaker.

12A310	10" Dynamic Speaker	4.75
	Cone and Voice Coil Assembly for above Speaker	2.00
12A311	12" Dynamic Speaker	6.80
	Cone and Voice Coil Assembly for above Speaker	2.80
12A316	10" Dynamic Speaker	5.40
	Cone and Voice Coil Assembly for above Speaker	2.00

TRANSFORMERS AND COILS

Part No.	Code	Description	List Price
9A953	T1	Antenna Transformer Assembly (Issue No. 1 only)	$1.65
9A954	T1	Antenna Transformer Assembly (Issue No. 2)	1.65
9A955	T2	R.F. Interstage Transformer Assembly	1.40
9A964	T3	Oscillator Coil Assembly "D" Range	.75
9A958	T4	Oscillator Coil Assembly "B" and "C" Range	1.80
9A957	T5	1st I.F. Transformer and Can Assembly	1.60
9A958	T6	2nd I.F. Transformer and Can Assembly	$1.30
53X182	T7	117 Volt, 60 Cycle, Standard Power Transformer	4.80
53X183	T7	117 Volt, 25 Cycle, Standard Power Transformer	4.75
53X184	T7	117 Volt, 40-60 Cycle, Universal Power Transformer	4.15
51X67	T8	Output Transformer	1.35
9A739	L1	Wave Trap Coil	.45
9A929	L2	Oscillator Tracking Coil	.45

RESISTORS

CARBON

Part No.	Code	Resistance	Wattage	List Price
C9A203	R1	20,000 Ohm	1.0	$0.15
C9A253	R2	25,000 Ohm	1.0	.15
A95105	R3	1 Megohm	0.2 (Issue No. 1 only)	.10
A95105	R4	1 Megohm	0.2	.10
A94503	R5	1.5 Megohm	0.2	.10
A94353	R6	35,000 Ohm	0.2	.15
C9A153	R7	15,000 Ohm	1.0	.15
D94143	R8	14,000 Ohm	2.0	.15
B94853	R9	80,000 Ohm	0.5	.15
A95401	R10	400 Ohm	0.2	.10
A95208	R11, R12	2 Megohm	0.2	.10
A95204	R13	200,000 Ohm	0.2	.10
A95604	R14	600,000 Ohm	0.2	.10
A95702	R15	7,000 Ohm	0.2	.10
A95154	R17	150,000 Ohm	0.2	.10
A95254	R18	250,000 Ohm	0.2	.10
A94252	R20	2,500 Ohm	0.2	.15
A94188	R21	188 Ohm	1.0	.20
A94320	R22	320 Ohm	0.2	.15
A95504	R23	500,000 Ohm	0.2 (Issue No. 2)	.10

VARIABLE

36X250	R16	2 Megohm	Volume Control and On-Off Switch
40X228	R19	1 Megohm	Tone and Selectivity Control

CONDENSERS

MISCELLANEOUS

Part No.			List Price
47X107	C17	130 mmf. Ceramic	.30
47X103	C19	128 mmf. Ceramic (Issue No. 1 only)	.25
47X105	C44	265 mmf. Silvered Mica (Issue No. 2)	.30
14A88		3 Gang Condenser less Dial and Drive Assembly (Issue No. 1 only)	3.45
		3 Gang Condenser less Dial and Drive Assembly (Issue No. 2)	3.45

DIAL AND DRIVE ASSEMBLY

No. 9 DIAL

Models using this dial may be identified by the round push buttons used on the tuning unit. The station call letters are mounted on the escutcheon above the buttons.

SEE PARTS Model D705 Issue 1

No. 10 DIAL

Models using this dial may be identified by the rectangular push buttons used on the tuning unit. The station call letter tabs are mounted in the push button.

Part No.		List Price
26A114	Dial Mounting Plate only—Complete with 3 Idler Pulleys less Tuning Knob Shaft and Tone Control (See Fig. 5 for method of replacing drive cord)	$1.40
25X527	Brace for above Mounting Plate (Top of Dial Mounting Plate to back of Chassis)	.10
25X528	Brace for Gang Condenser (Gang Mounting Bracket to side of Dial Mounting Plate)	.10
19X67	Tuning Eye Tube Clamp Assembly	.10
	Tuning Knob Shaft only	.10
	Horse Shoe Washers for above Shaft	Doz. .10
28X174	Drive Drum for Condenser	.10
	Spring Clamp to hold Drive Drum to Shaft	Doz. .20
	30" Drive Cord (See Fig. 5)	Ea. .20
	Tention Spring for Drive Cord	Doz. .75
17X32	Dial Glass (Specify Name and Chassis Number of Radio)	.40
	Dial Background	.85
7A60	Pointer for Dial	.10
	Clamp for Glass Crystal	.10
	Plain Glass Crystal	.10
	Dial Lamp Socket Assembly with Wire	.10
	Dial Lamp—No. 51	.20

PHONO ATTACHMENT PARTS

Part No.	Description	List Price
	30" Phono Cable Assembly Complete (Includes Plug, Double-tip Phono Jack, Switch, and Knob)	$2.70
	Phono Socket—Octal (6 Prong)—Must be ordered for Chassis not equipped with this socket	.10
	Plug (8 Prong) Only of Phono Cable	.15
	Phono Jack Only of Phono Cable	.15
	Phono Switch Only of Phono Cable	.75
	Knob Only of Phono Cable	.20

AUTOMATIC TUNING ASSEMBLY

Part No.	Description	List Price
25A382	Automatic Tuning Push Button Assembly Complete with 12 Coils less Push Buttons	$5.55
24A89	Front Bracket for Tuning Assembly—Includes 4 Setting Screws and Front Switch Contact Spring Strip	.75
25X349	Setting Screw Only—Part of above Bracket	Doz. .20
26A90	Rear Bracket for Tuning Assembly—Includes Rear Switch Contact Spring Strip—Issue No. 1 Only	.60
26A115	Rear Bracket for Tuning Assembly—Includes Rear Switch Contact Spring Strip—Issue No. 2	.60
26A92	Station Button Plunger with 2 Switch Contacts mounted on Fiber Strips and 1 Rubber Bumper—Issue No. 1 Only	.10
26A111	Station Button Plunger with 2 Switch Contacts mounted on Fiber Strips and 1 Rubber Bumper—Issue No. 2	.10
8X44	Rubber Bumper only for above Station Button Plunger	Doz. .10
28X198	Compression Spring for Station Button Plunger	Doz. .10
37X119	Locking Plate for Button Plungers (At Rear of Assembly—Length 4⅝")—Issue No. 1 Only	.10
29X183	Flat Pressure Spring for Locking Plate	Doz. .25
25X522	"L" Shaped Stop Bracket used behind above Spring (At back of Tuning Push Button Assembly)—Issue No. 1 Only	Doz. .10
37X130	Locking Plate for Button Plungers (At rear of Assembly)—Issue No. 2	.10
30X113	Hinge Bracket for Locking Plate—Issue No. 2	Doz. .10
8X71	Rubber Bushing for Hinge Bracket—Issue No. 2	Doz. .10
24A88	Fiber Blinder and Felt Pad (Used on Button Plungers and located behind Button Escutcheon)—No. 9 Dial only	Doz. .10
29X584	Adjustable Coil Support Bracket for Rear (Antenna) Coils	.10
28X184	Spring Clamps for holding front and rear coils in place	Doz. .10
26A93	Tuning Rod Assembly—Includes 2 Iron Cores, one 3/16" Washer, and 1 Compression Spring (for Buttons Nos. 1 and 2—520-980 KC)	.30
26A94	Tuning Rod Assembly—Includes 2 Iron Cores, one 3/16" Washer, and 1 Compression Spring (for Buttons Nos. 3 and 4—650-1250 KC)	$0.30
26A95	Tuning Rod Assembly—Includes 2 Iron Cores, One 3/16" Washer, and 1 Compression Spring (for Buttons Nos. 5 and 6—820-1600 KC)	.30
28X181	Compression Spring for Tuning Rod	Doz. .25
9A925	Antenna Coil Assembly (Color—Orange; Range 520-980 KC; Buttons 1 and 2)	.15
9A936	Antenna Coil Assembly (Color—White; Range 650-1250 KC; Buttons 3 and 4)	.15
9A926	Antenna Coil Assembly (Color—Blue; Range 820-1600 KC; Buttons 5 and 6)	.15
9A927	Oscillator Coil Assembly (Color—Green; Range 520-980 KC; Buttons 1 and 2)	.15
9A937	Oscillator Coil Assembly (Color—Red; Range 650-1250 KC; Buttons 3 and 4)	.15
9A928	Oscillator Coil Assembly (Color—Yellow; Range 820-1600 KC; Buttons 5 and 6)	.15
9X48	Fiber Strip to Cover Setting Screws—No. 9 Dial	Doz. .15
9X60	Fiber Strip to Cover Setting Screws—No. 10 Dial	Doz. .15
26A97	2 Call Letter Sheets (U. S. Stations) and Celluloid Tabs —For Mounting in Escutcheon—No. 9 Dial	.40
26A113	1 Call Letter Sheet (U. S. Stations) and Celluloid Tabs —For Mounting on Push Button—No. 10 Dial	.15

Prices Subject to Change Without Notice.

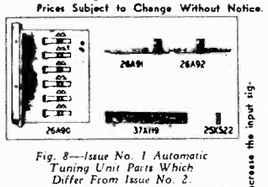


Fig. 8—Issue No. 1 Automatic Tuning Unit Parts Which Differ From Issue No. 2.

ALIGNMENT PROCEDURE

The following equipment is required for aligning:

Volume Control—Maximum All Adjustments.
Selectivity Control—Sharp Position All Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for several minutes.
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter—Non-Metallic Screwdriver.
Dummy Antennas—1 mf., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	BAND SWITCH SETTING	DUMMY ANTENNA	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (Unless otherwise specified)
I. F. 456 KC	Grid of 1st I.F. Tube		.1 mf.	Turn Rotor to Full Open	2nd I.F. (C29) & (C30)
456 KC	Grid of 1st Det.		.1 mf.	Turn Rotor to Full Open	1st I.F. (C25) & (C26)
WAVE TRAP 456 KC	Antenna Lead		Push Button Position Button No. 1 Depressed		Wave Trap (C2) Adjust for MINIMUM Output
RANGE B 1830 KC	Antenna Lead	B Range	200 mmf.	Turn Rotor to Full Open	Oscillator Range B (C15)
1500 KC	Antenna Lead	B Range	200 mmf.	Turn Rotor to Max. Output Set Indicator to 1500 KC—See Note A	Ant. Range B (C5) Int. Range B (C9)
600 KC	Antenna Lead	B Range	200 mmf.	Turn Rotor to Max. Output	600 KC (C12) Rock Rotor—See Note B
RANGE C 8350 KC	Antenna Lead	C Range	400 Ohm	Turn Rotor to Full Open	Oscillator Range C (C14)
6000 KC	Antenna Lead	C Range	400 Ohm	Turn Rotor to Max. Output	Antenna Range C (C4) Int. Range C (C8)
RANGE D 22,000 KC	Antenna Lead	D Range	400 Ohm	Turn Rotor to Full Open	Oscillator Range D (C13)
20,000 KC	Antenna Lead	D Range	400 Ohm	Turn Rotor to Max. Output	Ant. Range D (C3) Int. Range D (C7) Rock Rotor—See Note B
7000 KC	Antenna Lead	D Range	400 Ohm	Turn Rotor to Max. Output	7000 KC (C11) Rock Rotor—See Note B
PERMEABILITY TUNING UNIT		BUTTON DEPRESSED (Band Switch in Push Button Position)		TURN SETTING SCREW TO MAXIMUM OUTPUT —See Instruction Book	ADJUST COIL POSITION TO MAXIMUM OUTPUT —See Note C
700 KC	Antenna Lead	No. 1	200 mmf.	Setting Screw No. 1	Antenna Coil No. 1
700 KC	Antenna Lead	No. 2	200 mmf.	Setting Screw No. 2	Antenna Coil No. 2
850 KC	Antenna Lead	No. 3	200 mmf.	Setting Screw No. 3	Antenna Coil No. 3
850 KC	Antenna Lead	No. 4	200 mmf.	Setting Screw No. 4	Antenna Coil No. 4
1100 KC	Antenna Lead	No. 5	200 mmf.	Setting Screw No. 5	Antenna Coil No. 5
1100 KC	Antenna Lead	No. 6	200 mmf.	Setting Screw No. 6	Antenna Coil No. 6

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

After each range is completed, repeat the procedure as a final check.

NOTE A—If the pointer is not at 1500 KC on the dial, loosen the 2 clamps which hold the pointer assembly on the cord, move the pointer to the 1500 KC mark, and tighten the clamps.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

NOTE C—At the bottom of the permeability tuning unit can be seen six "W" openings. Insert the end of a pair of long nose pliers or a screwdriver in the "W" opening of the proper button and adjust the position of the antenna (rear) coil by twisting the pliers or screwdriver until maximum output is obtained.

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 on the dial.

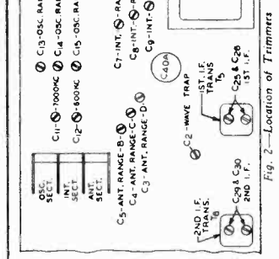


Fig. 2—Location of Trimmers

It may be necessary to increase the input signal to hear the image.

NOTICE—Re-alignment is necessary if glass tubes are replaced by their equivalent in metal tubes, or vice versa, in the R.F. and I.F. stages.

MODEL D689
Circuit, Tuner Data
Changes, Phono. Data

WESTERN AUTO SUPPLY CO.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

CONDENSERS

TUBULAR

Part No.	Code	Capacitance	Voltage	List Price
46X212	C10	.05 mf.	400	$0.15
46X187	C20	.05 mf.	400	.15
46X188	C26	.05 mf.	400	.15
46X223		.05 mf.	400	.15
46X186	C38	.05 mf.	400	.15
46X174		.05 mf.	400	.15
46X202		.05 mf.	400	.15
46X180		.05 mf.	400	.15
46X208	C43	.05 mf.	400 (Issue No. 2)	.15

ELECTROLYTIC

Part No.	Code	Capacitance	Voltage	List Price
46X239	C37	10 mf.	25 Dry	.30
46X78	C40	20 mf.	250 Wet	.30
44X40	C41	40 mf.	300 Wet	.30

MOLDED

Part No.	Code	Capacitance	Voltage	List Price
47X97	C1	280 mmf.	(Issue No. 1 only)	.10
47X99	C2	750 mmf.		.10
47X98	C3	1600 mmf.		.10
47X93	C4	3600 mmf.		.10
47X94	C5	8 mf.	(Issue No. 1 only)	.10
47X87	C6	280 mmf.		.10
47X88	C7	750 mmf.		.10
47X89	C8	1600 mmf.		.10
47X91	C9	3600 mmf.		.10
47X92	C10	8 mf.		.10
47X84	C42, C45	500 mmf.	(Issue No. 2)	.20

TRIMMER

Part No.	Code	Capacitance		List Price
17A64	C2	30-90 mmf.	Wave Trap	$0.25
17A88	C3	1-12 mmf.	Antenna Range "D"	.25
	C4	1-12 mmf.	Antenna Range "C"	
	C5	1-12 mmf.	Antenna Range "B"	
17A36	C8	1-12 mmf.	Interstage Range "D"	.25
	C9	1-12 mmf.	Interstage Range "C"	
	C10	1-12 mmf.	Interstage Range "B"	
17A88	C11	40-100 mmf.	600 KC Padder	.25
17A36	C12	250-550 mmf.	600 KC Padder	.25
17A88	C13	1-12 mmf.	Oscillator Range "D"	.25
	C14	1-12 mmf.	Oscillator Range "C"	
	C15	1-12 mmf.	Oscillator Range "B"	
17A85	C25	70-110 mmf.	1st I.F.	.30
	C26	70-110 mmf.		
17A84	C28	70-150 mmf.	2nd I.F.	.35
	C29	150-250 mmf.		

Circuit

This model is a 3 band A.C. operated radio with a 6 button inductive type automatic tuning system.

A 4 position rotary switch is used to switch the tuning circuits from automatic (push button) tuning to any of the 3 manual tuning ranges (one broadcast and 2 short wave ranges).

In MANUAL TUNING, an R. F. antenna transformer with tuned secondary is used before the 6U7G R. F. tube. The output of this tube is fed through another R. F. transformer with tuned secondary into the 6J7G 1st detector tube. A 6J5G tube functions as a separate oscillator. The antenna, interstage, and oscillator circuits are tuned by sections of the gang condenser.

In AUTOMATIC TUNING, the gang condenser is not used. A single tuned circuit is used before the R. F. tube while a stage of resistance coupling is employed between this tube and the 1st detector. The other automatic tuned circuit is the oscillator grid circuit. Tuning of the R. F. and oscillator fixed tuned circuits to the desired frequency is accomplished by varying the inductance of tuning coils by changing the permeability of the magnetic circuit. This is done by moving an iron core in and out of the coil.

The iron cores within the automatic tuning antenna and oscillator coil forms are secured to a brass rod. This rod is moved back and forth by a screw at the front of the radio.

Alignment between the oscillator and antenna automatic tuning coils is obtained by changing the antenna (rear) coil position while the iron core remains stationary.

Now, to describe the connections for one MANUAL TUNING range: Let us assume that the rotary band switch is turned to the range B position. The antenna transformer B band secondary is connected to the R. F. tube grid circuit. The antenna transformer C and D band secondaries are open circuited.

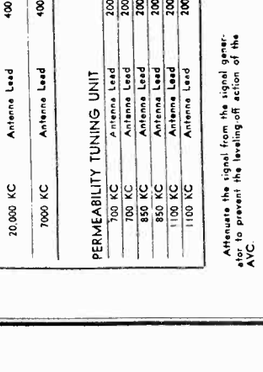


Fig. 1—Location of Controls and Push Buttons—No. 9 Dial Escutcheon

The oscillator B band coil is connected to the grid circuit of the oscillator tube. The oscillator B band cathode coil is connected to ground. The oscillator C and D band grid coils are open circuited. If any automatic tuning button is depressed, the automatic tuning oscillator coil corresponding to that button is short circuited.

In like manner, to describe the connections for one AUTOMATIC TUNING circuit, assume that the band switch is in the push button position and button number 1 is depressed.

In issue No. 1 sets, the antenna circuit is connected to the R. F. tube grid circuit through the band switch. The antenna circuit is also connected to the antenna No. 1 automatic tuning coil through Ant. 1 switch. The antenna No. 1 coil is tuned by fixed condenser C19.

In issue No. 2 sets, the antenna circuit is connected to the automatic tuning antenna coils through the band switch. The antenna No. 1 automatic tuning coil is connected to the R. F. tube grid circuit through the Ant. 1 switch. Antenna No. 1 coil is tuned by condensers C44 and C45.

In both issues, the connections from the antenna and interstage transformer secondaries are open circuited.

The plate of the R. F. tube is connected in series with resistor R1 to the B+ circuit. It is also connected through coupling condenser C22 to the grid of the 1st detector. The latter is connected through grid leak R4 to ground.

The oscillator cathode circuit is connected through the tap on tracking coil L2 to ground. This tracking coil is connected through the band switch to the control grid circuit of the oscillator tube. It is also connected to oscillator No. 1 coil through the Osc 1 switch. The tracking or oscillator grid coil is tuned by fixed condenser C17 and the inductance of oscillator coil No. 1.

One stage of I. F. amplification is employed using a 6U7G tube. An expander is used in the 1st I. F. transformer for high fidelity reception.

A 6H6 tube functions as a diode 2nd detector. AVC voltage is applied to the control grid circuits of the R. F. and I. F. tubes.

Across the volume control resistor R16 is a filter composed of condensers C33 and C34 and resistor R15. At high volume settings, the filter is not effective. At low volume settings, the action of this filter results in an increase of high and low frequency amplitudes relative to the other frequency amplitudes.

The output of the 2nd detector is applied to the 6F5G A. F. tube. The output of this tube is fed through resistance coupling into the 6K6G output tube.

A dynamic reproducer is employed.

Degeneration or negative feedback is used in the audio amplifier. A portion of the voltage developed across the secondary of the output transformer is fed back into the cathode circuit of the 1st audio tube. The voltage fed back is of the proper phase to reduce the amplitude of certain frequencies. This results in a reduction in distortion.

The power unit uses a 5Y3G full wave rectifier. A 6U5 tuning indicator tube is employed.

General Service Data

Issue Number

The last digit of the number on the chassis number label identifies the radio as to the issue number.

Issue No. 1

Mechanical Assembly—The station button plunger has a length of 6⅝ inches.

The locking plate for the station button plungers has 2 swivel tabs which fit into slots in the rear bracket of the tuner assembly—See Fig. 8.

Electrical Assembly—The schematic circuit diagram (Fig. 3) is that of issue No. 2 sets. The partial schematic illustration (Fig. 4) shows the sections of the issue No. 1 circuit which differ from the issue No. 2 circuit.

The A. V. C. voltage is applied directly to the R. F. tube grid circuit through a resistor.

Wave trap (L1 and C2) is in the antenna circuit.

Lugs 11 and 12 of band switch section No. 3 are used to connect a pilot lamp when the rotary band switch is in the automatic tuning (push button) position.

Issue No. 2

Mechanical Changes—The station button plunger has a length of 7⅜ inches.

The locking plate for the station button plungers has been re-designed and now employs 2 side arms mounted in rubber cushioned hinge brackets which are attached to the rear bracket of the tuner assembly by 2 screws—See Fig. 7.

Electrical Changes—The schematic circuit diagram (Fig. 3) is that of issue No. 2 sets.

The A. V. C. is fed into the R. F. tube grid circuit through the manual and the automatic tuning antenna coils.

The wave trap is in the R. F. tube plate circuit.

Lugs 11 and 12 of band switch section No. 3 are used to open the connection between the antenna circuit and the automatic tuning antenna coils.

The following changes are made to bring about the change mentioned above in the A. V. C. circuit:

C43 is inserted between the secondary of the antenna transformer and ground to isolate the A. V. C. from ground. C21 is replaced by C43. R23 is added to isolate the automatic tuning coils from the manual tuning coils. C1 is replaced by C42 and C45 in the automatic tuning coil circuit. R3 and C20 are removed from the R. F. tube grid circuit. C19 is replaced by C44 in the automatic tuning coil circuit.

ATTACHING DIAL POINTER—Tune in a 1500 KC signal. Move the pointer to the 1500 KC mark on the dial and clamp it tightly over the fabric tubing on the cord.

Phonograph Connections

Phonograph connections are made as shown in the schematic circuit diagram Fig. 3. On the top of the chassis base and between the 6H6 and 6F5G tube sockets is a round knockout opening 1⅜ inches in diameter. An octal base socket is mounted in this knockout opening and wired as shown in the schematic.

A phono cable assembly may then be purchased (See parts list). On one end of this cable is an octal plug and on the other end is a phonograph-radio switch and double tip jack.

Some models are shipped from the factory equipped with the phono socket. A jumper is inserted in this socket which must be removed if the phonograph installation is made —See Fig. 3.

Voltages at Sockets

The voltages at sockets are shown on the schematic circuit diagram. Unless otherwise specified, the voltage indicated is between the socket terminal and ground.

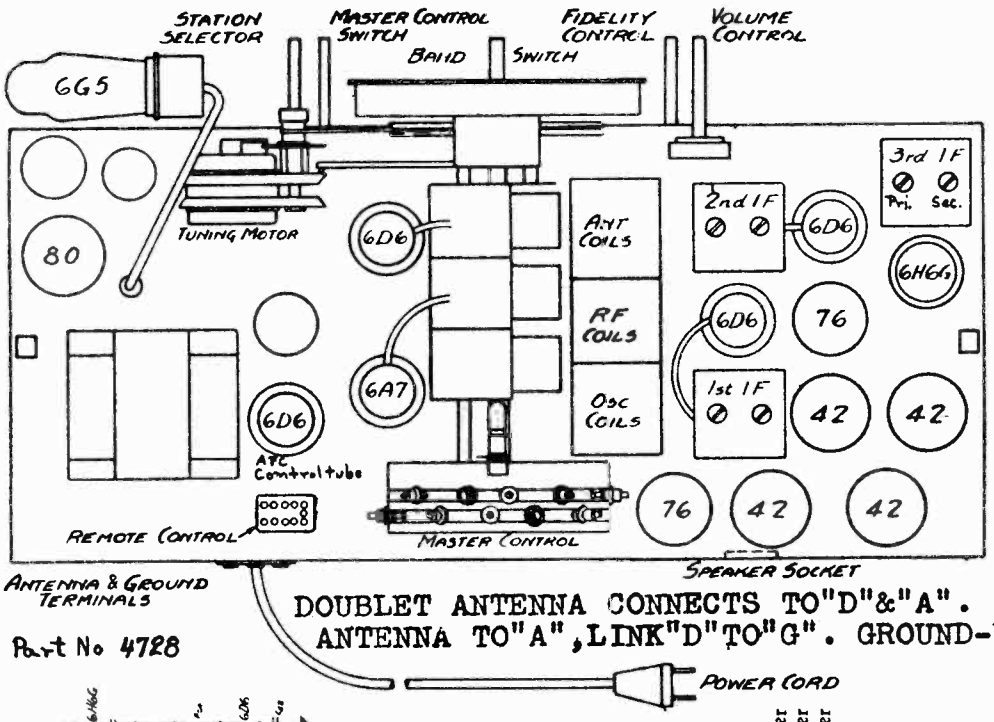
These voltages are read under the following conditions:
Line Voltage—117.
Volume Control—Maximum.
Antenna Shorted to Ground.
Readings taken with 1000 ohms-per-volt meter.

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.

WESTERN AUTO SUPPLY CO.

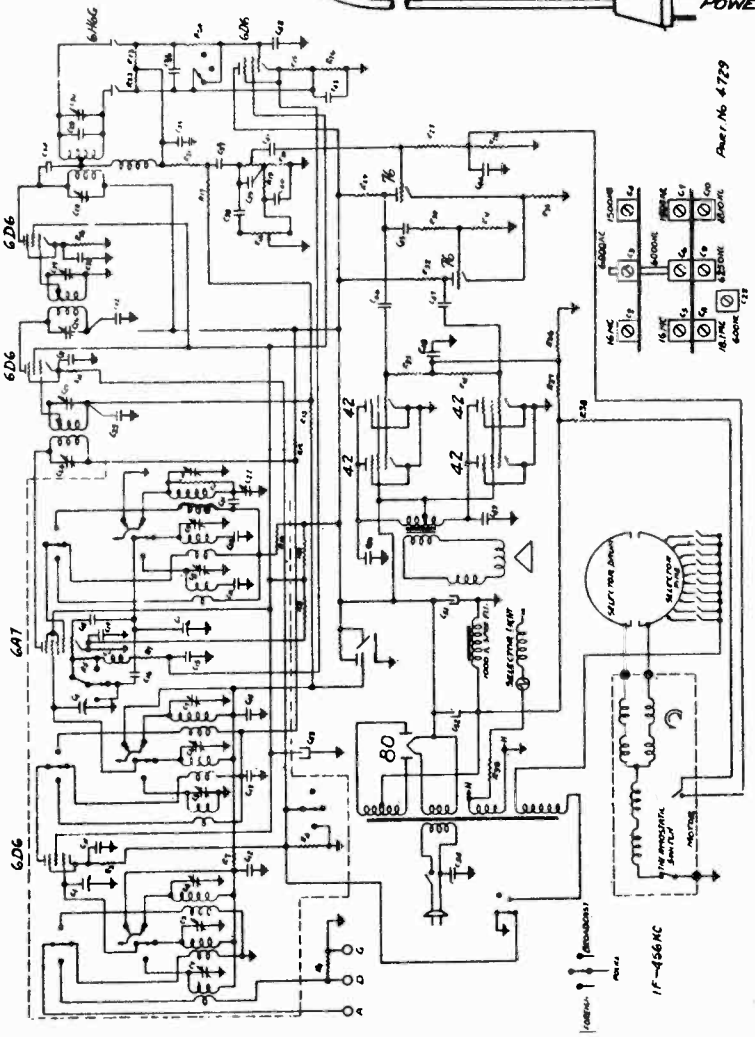
MODEL D690
Schematic, Socket
Trimmers



Frequency Ranges
B----540-1800KC
P----1800-6250KC
F----6250-18100KC

DOUBLET ANTENNA CONNECTS TO "D" & "A". SINGLE-WIRE ANTENNA TO "A", LINK "D" TO "G". GROUND-WIRE TO "G".

Power Supply: Unless specifically stated otherwise, these receivers are designed to operate on 115 VOLTS 60 CYCLES ALTERNATING CURRENT ONLY.



Symbol	Part No.	Description			
R1,13,29,32	2880	100 M 1/3W 10%	C2,3,4	3822	2-35 mmf triple trimmer
R2,7,21	631	50 M 1/3W	C5,6,7	3822	2-35 mmf triple trimmer
R3,12,14,15,16	2421	1000 ohm 1/3W	C8,9,10	3822	2-35 mmf triple trimmer
R4	2421	1000 ohm 1/3W	C11,12,14,17, 31,33	580	.05—200 V
R5	2783	2500 ohm 1/3W 10%	C13,32	575	.1—400 V
R6	3937	500 ohm ½ W Wire-wound ±10%	C15,23,42,43,44	572	.1—200 V
R8	3805	7000 ohm 3½ W Wirewound	C16	2925	25 mmf mica
			C18	4676	8 mmf
R9	3805	8000 ohm 1½ W Wirewound	C19	2694	.005—600 5%
			C20	2741	1330 mmf 5%
R10	600	10M 1/3W	C21		.01—400 V
R11	3581	3M 1/3W ±10%	C22	2560	350 mmf variable padder
R17,22,23,24, 28,27,30	2599	1 meg 1/3W 10%	C34,35	1285	100 mmf mica
			C36,48	2792	.2—200 V
R18	2737	2 meg tone control	C37,41	576	.02—400 V
R20	3800	3 meg volume control	C38,40	824	.002—600 V
R25	2572	400 ohm 1/3W 10%	C39	2780	50 mmf mica
R26	2691	500 ohm 1/3W 10%	C45,46,47	2600	.02—600 V
R33,34,19	2730	200 M 1/3W 10%	C49,50	2601	.01—600 V
R36		150 M 1/3W 10%	C51	4062	30 MF 275 V
R38,37	2731	500 M 1/3W 10%	C52	4649	24 MF 450 V
R39		20 ohm 1 W	C53	3079	8 MF 150 V
C1		400 mmf variable	C54	3135	.003—800 V

MODEL D690
Alignment
Tuner Data

WESTERN AUTO SUPPLY CO.

INSTRUCTIONS FOR ADJUSTMENT AND OPERATION OF THE ELECTRIC AUTOMATIC TUNING SYSTEM

Before attempting to adjust the automatic tuner, read the following instructions carefully and proceed exactly as directed. Setting up the ***Master Selector*** requires no tools, and is very easily accomplished when the proper procedure is followed.

The tuning unit consists essentially of three parts, which may be described briefly as follows:

Master Selector: This includes the ***Selector Drum,*** the ***Selector Pins,*** and the ***Selector Light.*** These parts are mounted on the rear of the variable condenser, together with their associated brackets and wiring.

Motor and Drive: This assembly consists of an induction motor having a mechanical drive clutch with magnetic throw-out, and a train of gears operating directly onto the ***Manual Station Selector*** drive shaft. No oiling is necessary.

Push Button Assembly: These buttons are located on the front of the chassis, and extend through the escutcheon above the dial. Stations are tuned in automatically when the button with the call letters of the desired station is depressed and held down until the motor stops and the station is heard. When the button is pushed down, an automatic silencer mutes the receiver until the desired station is exactly on tune.

SETTING UP THE MASTER SELECTOR

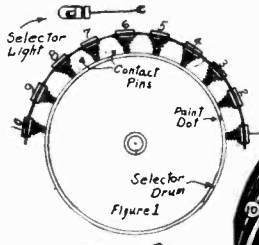
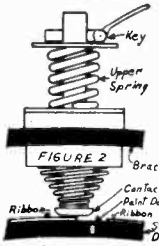


Figure 1



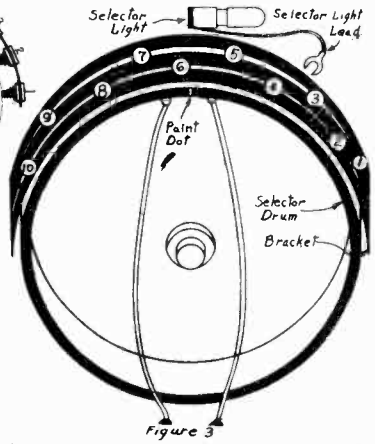


Figure 3

As a means of simplifying these operations, list ten of your favorite local or strong near-by stations according to frequency or position on the dial. Setting up weak or distant stations is not recommended. Call the station nearest the left-hand end of the dial (nearest 600 kc) the No. 1 station, and number the other stations similarly going from left to right across the dial. For example, assume that your favorite stations operate on frequencies of 600 kc, 700 kc, 800 kc, 900 kc, 1000 kc, 1100 kc, 1200 kc, 1300 kc, 1400 kc, and 1500 kc. Then the 600 kc station would be No. 1, the 700 kc station would be No. 2, and so on down the list with the 1500 kc station being designated No. 10. Reference to the push buttons is not necessary since they are not used until After the Master Selector has been set up.

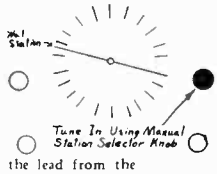
On the back of the receiver will be found the ***Selector Drum*** and the ten ***Contact Pins*** which determine the points at which the tuner will stop when the buttons are pressed. Referring to the diagrams, ***Fig. 1*** shows the general layout and relation of the drum and contacts. ***Fig. 2*** shows one of the contact pins in detail; note that while the position of the contact may be varied at will by sliding it along the slot in the bracket, it is held securely by a strong spring which will not allow it to move when the selector drum turns under it. ***Fig. 3*** shows the arrangement of the ***Contact Pins,*** each pin being numbered according to the system suggested for numbering the station, thus ***pin No. 1*** will be used for ***Station No. 1, pin No. 2*** will be used for ***Station No. 2,*** and so on down the list.

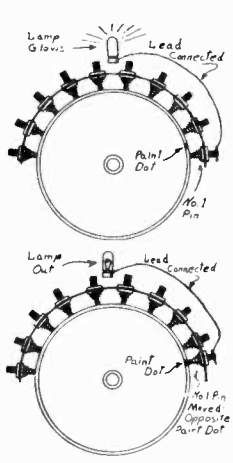
On the ***Selector Drum*** are two pairs of ***Contact Ribbons.*** Note that there is a ***Paint Dot*** on the edge of the drum directly opposite the break in the ribbons on the upper half of the drum. This ***Paint Dot*** is for the purpose of locating the approximate position at which a given ***Contact Pin*** should be set in order to have the ***Drum*** stop for a particular station.

It is very important that the following steps be followed exactly as outlined; any deviation may necessitate re-setting some of the stations:

1. Set the receiver for reception of Standard Broadcast Stations as outlined previously under "Operation." Turn the Master Control Switch to the extreme right-hand position and wait about ten minutes to allow the tubes to reach their final operating temperature.

2. Using the Manual Station Selector (upper right) knob, tune in the No. 1 station, that is, the one nearest the 600 kc end of the dial. Watch the tuning eye closely, making certain that the station is tuned in perfectly.





3. Face the rear of the chassis. Attach the lead from the ***Selector Light*** to the ***No. 1 Contact Pin;*** unless the pin happens to be set exactly, the lamp will glow when the lead is touched to the pin.

4. Observe the position of the ***Paint Dot*** on the edge of the ***Drum.*** Grasp the No. 1 pin firmly and slide it toward the ***Paint Dot,*** being careful not to break the connection between the ***Selector Light*** lead and the pin. When the pin is directly opposite the ***Paint Dot,*** the light will go out, indicating that the contact is properly set. To insure greatest accuracy in making the setting, slide the pin back and forth across the break between the ribbons, leaving it set half way between the points where the lamp lights. ***Be very careful not to move the Selector Drum while the pin is being set.*** When the pin is definitely in its proper position, ***Disconnect the Selector Light Lead from the Pin.***

5. Repeat the above procedure for the ***No. 2*** station: tune in the station, connect the ***Selector Light*** lead to the ***No. 2*** contact pin, move this pin opposite the ***Paint Dot*** so that the light goes out, then ***Disconnect the Selector Light Lead.***

6. Using similar procedure, set up the other eight stations, in each case using the ***Contact Pin*** bearing the ***same number as that assigned to the station being set up.*** Always ***Disconnect the Selector Light Lead*** as soon as a station has been set up; failure to do so will cause the receiver to hum, and may result in the lamp being burned out.

7. After all the stations have been set up, located the Call Letters of your stations on the printed sheets supplied with the receiver. Remove the desired call letter discs from the sheets. Remove the metal ferrules from the buttons, place the call letter discs behind the celluloid and press the ferrules back on the proper buttons.

8. The only operations necessary to receive any of the ten stations set up as outlined above are: Turn the Master Control Switch to the Center position, allow about one minute for the tubes to heat, press the button with the call letters of the desired station Holding the Button Down Until the Pointer Stops Moving and the Station is Heard, then adjust the tone and volume. Be sure that the Band Selector switch is in the proper position for reception of Standard Broadcast stations.

ALINEMENT PROCEDURE

The Master Control Switch must be turned to the extreme right hand position for all alinement.

IF. Connect generator ground to receiver chassis. Using .1 mfd. condenser in series with the high side of the generator, apply 456 kc. signal to t1 grid of the 6D6 second IF amplifier tube, and aline the PRIMARY only of the third IF transformer. (See above diagram.) Connect generator to grid of 6D6 first IF tube and aline the second IF transformer. Repeat for transformer No. 1 applying signal to grid of 6A7 translator.

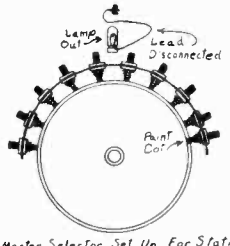
RF. (See circuit diagram for location of trimmers.) Using a 200 mmf. condenser in series with the high side of the generator turn band selector switch all the way to the left, tuning condenser to minimum capacity. Feed 1810 kc. signal to antenna terminal and adjust broadcast oscillator trimmer for top frequency. Set generator frequency at some point around 1500 1600 kc., and adjust broadcast antenna and RF trimmers. Set generator for 600 kc., tune receiver to signal and adjust the padder. The tuning condenser should be rocked back and forth through the signal while varying the padder in order to assure perfect alinement.

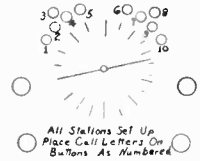
A 400 ohm resistor must be used in series with the generator as a "dummy" antenna for proper alinement of the two short wave bands. Set the band selector switch in the center position, adjust the oscillator top frequency for 6250 kc., then aline the antenna and RF trimmers at about 6000 kc. With the band selector in the extreme right position, adjust the top frequency of the high frequency to 18,100 kc., and aline the antenna and RF trimmers at about 16,000 kc. In order to make sure that the top end of the last band is set properly, it is best to screw the oscillator trimmer down tight, then unscrew to the second peak. The antenna and RF trimmers should be screwed down tight, then unscrewed to the first peak. This procedure must be followed in order that the oscillator and RF circuits will be set in the correct relation to each other, otherwise a "dead" spot at a lower frequency will result, and the dial calibration will not be correct. Usually, it is best to rock the tuning condenser back and forth slightly while making these adjustments at high frequencies.

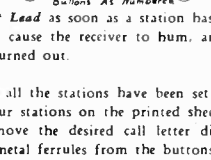
AFC. Connect a high resistance DC voltmeter between the cathode of the 6D6 AFC control tube and ground. Turn the Master Control Switch to the CENTER position and the Band Selector Switch to the extreme left hand position. Apply a strong 456 kc. signal to the grid of the 6A7 translator and adjust the secondary of the third IF transformer until the voltage is the same as with no signal.

Master Control Switch: The extreme left position turns the power off. The center position connects the motor and the automatic frequency control for automatic tuning. The right hand position disconnects the motor and automatic frequency control and increases sensitivity for manual tuning of weak stations. (The right hand position is also used for setting up stations for automatic tuning.)

FOR OPERATING SUGGESTIONS SEE MODEL D691.







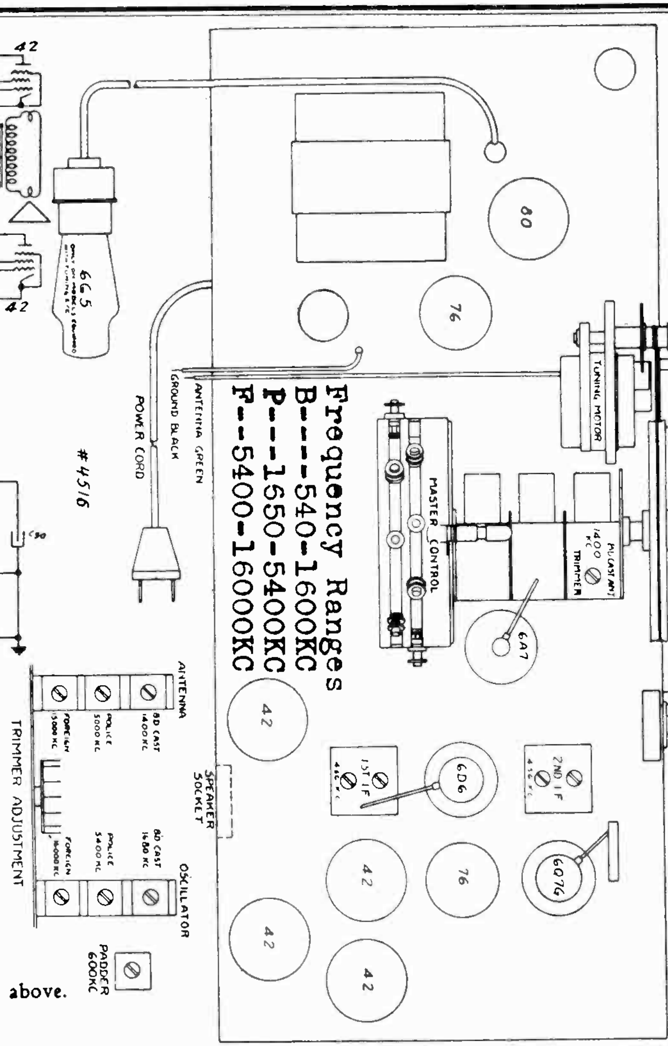
Tubes required are:

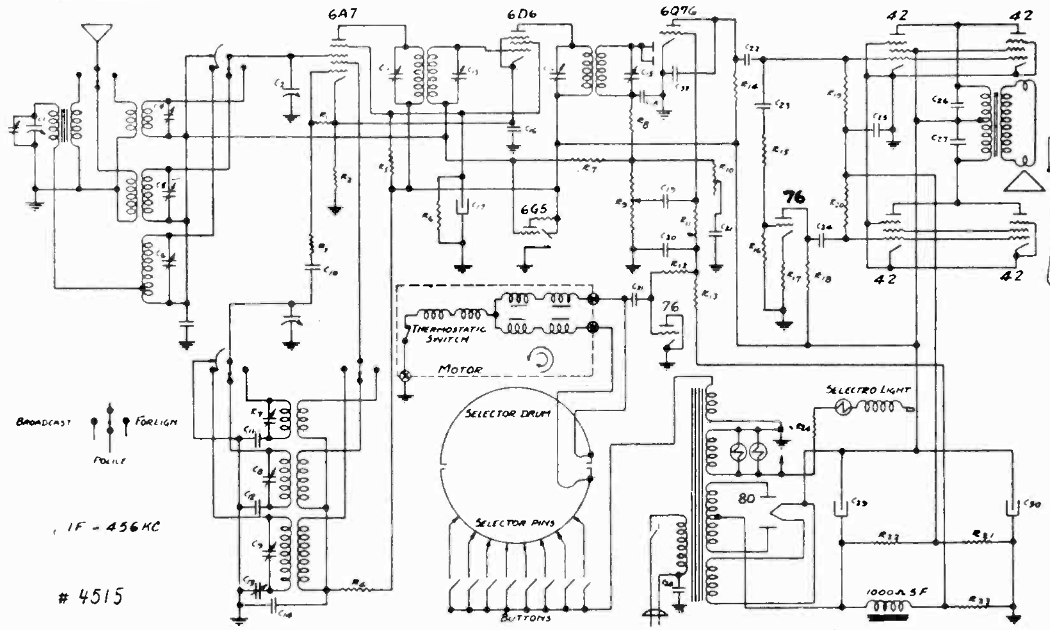
1—6D6 Radio Frequency Amplifier	1—6D6 AFC Control
1—6A7 Oscillator—translator	1—76 Driver
2—6D6 Intermediate Frequency Amplifiers	1—76 Phase Inverter
1—6H6G Detector AVC—Discriminator	4—42 Power Output
1—6G5 Cathode Ray Tuning Tube	1—80 Rectifier

WESTERN AUTO SUPPLY CO.

MODEL D691
Schematic, Socket
Trimmers, Alignment

ALIGNMENT OF SHORT-WAVE BANDS ON NEXT PAGE





Symbol	Part No.	Description			
C1.2.3	4354	Variable Condenser	R4	617	20 M 1/3 W
C4.9	1611	3-35 MMF trimmer	R5	4530	30 M 1 W
C5.6.7.8	2597	1-10 MMF trimmer	R7.11.13	624	1 Meg 1/3 W
C10	2780	50 MMF mica	R9		500 M volume control
C11	2793	.006-600 V 5%	R10		2 Meg tone control
C12	2741	1330 MMF mica 5%	R12.22	2731	500 M 1/3 W 10%
C13	2560	200-400 MMF padder	R14.18.19.20.21	2730	200 M 1/3 W 10%
C14	576	.02-400 V	R15	2599	1 Meg 1/3 W 10%
C15		IF trimmers	R16	2568	300 M 1/3 W 10%
C16.25	2792	.2-200 V	R17	4529	10 M 1/3 W 10%
C17	4528	4 MF—150 V	R23	3580	10 ohm 1/2 W 10%
C18.32	1286	250 MMF mica	R24	4535	20 ohm 1 W 10%
C19	576	.02-400 V			
C20	572	.1-200 V			
C21	581	.005-600 V			
C22.24	2600	.02-600 V			
C23	563	.05-400 V			
C26.27	2601	.01-600 V			
C28	3135	.003-800 V			
C29	3375	16 MF—450 V			
C30	4062	30 MF—275 V			
C31	580	.05-200 V			
R1.6.8	631	50 M 1/3 W			
R2.3	2689	100 ohm 1/3 W 10%			

Do not use tubes of types different from those shown above.

ALINEMENT PROCEDURE

IF. Connect the generator ground to receiver chassis. Using .1 mfd. condenser in series with high side of the generator, apply 456 kc. signal to the grid of the 6D6 IF amplifier tube and aline second IF transformer trimmers. Repeat for first IF transformer, applying signal to grid of the 6A7 tube. (See above diagram for location of tubes and transformers.)

RF. (See circuit diagram for location of trimmers.) Using a 200 mmf. condenser in series with the high side of the generator, turn band selector switch all the way to the left, tuning condenser to minimum capacity, feed 1680 kc. signal to antenna terminal and adjust broadcast oscillator trimmer for top frequency. Set generator frequency at some point around 1400-1500 kc., and adjust broadcast antenna and RF trimmers. Set generator for 600 kc., tune receiver to signal and adjust the padder. The tuning condenser should be rocked back and forth through the signal while varying the padder in order to assure perfect alinement.

Unless specifically stated otherwise, these receivers are designed to operate on *115 volts 60 cycles alternating current only.*

MODEL D691
Tuner Data
Alignment

WESTERN AUTO SUPPLY CO.

ALIGNMENT OF SHORT-WAVE BANDS

A 400 ohm resistor must be used in series with the generator as a "dummy" antenna for proper alinement of the two short wave bands. Set the band selector switch in the center position, adjust the oscillator top frequency for 5400 kc., then aline the antenna trimmer at about 5000 kc. With the band selector in the extreme right position, adjust the top frequency of the high frequency band to 16,000 kc., and aline the antenna trimmer at about 15,000 kc. In order to make sure that the top end of the last band is set properly, it is best to screw the oscillator trimmed down tight, then unscrew to the second peak. The antenna trimmer should be screwed down tight, then unscrewed to the first peak. This procedure must be followed in order that the oscillator and RF circuits will be set in the correct relation to each other, otherwise a "dead" spot at a lower frequency will result, and the dial calibration will not be correct. Usually, it is best to rock the tuning condenser back and forth slightly while making these adjustments at high frequencies.

Tubes required are:
1—6A7 Oscillator-translator
1—6D6 Intermediate Frequency Amplifier
1—6Q7G Detector AVC—First Audio Amplifier
1—76 Driver—Phase Inverter
1—76 Silencer
4—42 Power Output
1—80 Rectifier
1—6G5 Cathode Ray Tuning Tube (on models equipped with "eye" tuning indicator)

INSTRUCTIONS FOR ADJUSTMENT AND OPERATION OF THE D691 ELECTRIC AUTOMATIC TUNING SYSTEM

Before attempting to adjust the automatic tuner, read the following instructions carefully and proceed exactly as directed. Setting up the *Master Selector* requires no tools, and is very easily accomplished when the proper procedure is followed.

The tuning unit consists essentially of three parts, which may be described briefly as follows:

Master Selector: This includes the *Selector Drum*, the *Selector Pins*, and the *Selector Light*. These parts are mounted on the rear of the variable condenser, together with their associated brackets and wiring.

Motor and Drive: This assembly consists of an induction motor having a mechanical drive clutch with magnetic throw-out, and a train of gears operating directly onto the *Manual Station Selector* drive shaft. No oiling is necessary.

Push Button Assembly: These buttons are located on the front of the chassis, and extend through the escutcheon below the dial. Stations are tuned in automatically when the button under the call letters of the desired station is depressed and held down until the motor stops and the station is heard. When the button is pushed down, an automatic silencer mutes the receiver until the desired station is exactly on tune.

SETTING UP THE MASTER SELECTOR

As a means of simplifying these operations, list eight of your favorite *local* or strong near-by stations according to frequency or position on the dial. Setting up weak or distant stations is not recommended. Call the station nearest the left-hand end of the dial (nearest 1600 kc) the *No. 1* station, and number the other

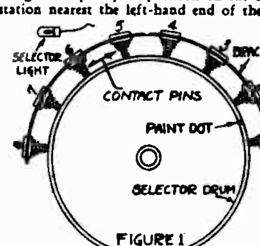


FIGURE 1

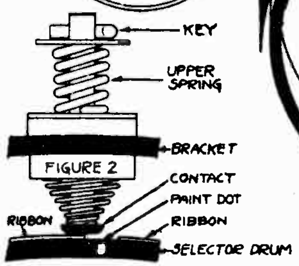


FIGURE 2

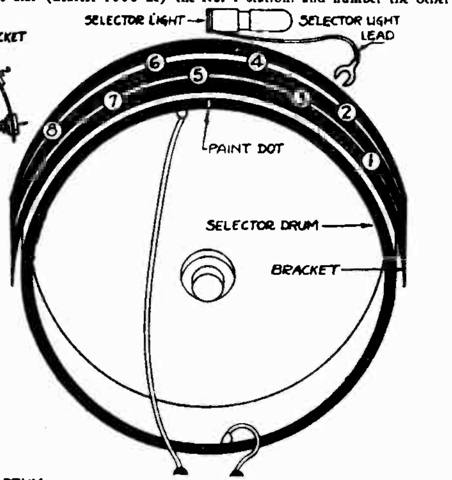


FIGURE 3

stations similarly going from left to right across the dial. For example, assume that you favorite stations operate on frequencies of 1500 kc, 1400 kc, 1300 ks, 1200 kc, 1000 kc, 900 kc, 700 kc, and 600 kc. Then the 1500 kc station would be *No. 1*, the 1400 kc station would be *No. 2*, and so on down the list with the 600 kc station being designated *No. 8*. Reference to the push buttons is not necessary since they are not used until *After* the *Master Selector* has been set up.

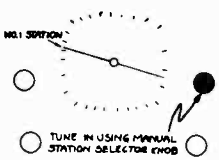
On the back of the receiver will be found the *Selector Drum* and the eight *Contact Pins* which determine the points at which the tuner will stop when the buttons are pressed. Referring to the diagrams, *Fig. 1* shows the general layout and relation of the drum and contacts. *Fig. 2* shows one of the contact pins in detail: note that while the position of the contact may be varied at will by sliding it along the slot in the bracket, it is held securely by a strong spring which will not allow it to move when the selector drum turns under it. *Fig. 3* shows the arrangement of the *Contact Pins*, each pin being numbered according to the system suggested for numbering the stations, thus *pin No. 1* will be used for *Station No. 1*, *pin No. 2* will be used for *Station No. 2*, and so on down the list.

On the *Selector Drum* are two pairs of *Contact Ribbons*. Note that there is a *Paint Dot* on the edge of the drum directly opposite the break in the ribbons on the upper half of the drum. This *Paint Dot* is for the purpose of locating the approximate position at which a given *Contact Pin* should be set in order to have the *Drum* stop for a particular station.

It is very important that the following steps be followed exactly as outlined; any deviation may necessitate re-setting some of the stations:

1. Set the receiver for reception of *Standard Broadcast Stations*, as outlined previously under "*Operation*." Turn the receiver "*On*," let it run for *at Least Ten Minutes* to allow the tubes to reach their final operating temperature.

2. Using the *Manual Station Selector* (upper right) knob, tune in the No. 1 station, that is, the one nearest the 1600 kc end of the dial. Watch the tuning eye closely, making certain that the station is tuned in perfectly.



3. Face the rear of the chassis. Attach the lead from the *Selector Light* to the *No. 1 Contact Pin*; unless the pin happens to be set exactly, the lamp will glow when the lead is touched to the pin.

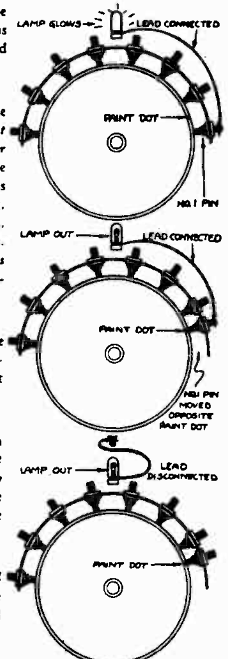
4. Observe the position of the *Paint Dot* on the edge of the *Drum*. Grasp the No. 1 pin firmly and slide it toward the *Paint Dot*, being careful not to break the connection between the *Selector Light* lead and the pin. When the pin is directly opposite the *Paint Dot*, the light will go out, indicating that the contact is properly set. To insure greatest accuracy in making this setting, slide the pin back and forth across the break between the ribbons, leaving it set half way between the points where the lamp lights. *Be very careful not to move the Selector Drum while the pin is being set.* When the pin is definitely in its proper position, *Disconnect the Selector Light Lead from the Pin.*

5. Repeat the above procedure for the *No. 2* station; tune in the station, connect the *Selector Light* lead to the *No. 2* contact pin, move this pin opposite the *Paint Dot* so that the light goes out, then *Disconnect the Selector Light Lead.*

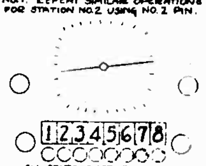
6. Using similar procedure, set up the other six stations, in each case using the *Contact Pin* bearing the *same number as that assigned to the station being set up.* Always *Disconnect the Selector Light Lead* as soon as a station has been set up; failure to do so will cause the receiver to hum, and may result in the lamp being burned out.

7. After all the stations have been set up, locate the *Call Letters* of your stations on the printed sheets supplied with the receiver. Remove the desired call letter blocks from the sheets, and insert them in the proper pockets above the push buttons.

8. The only operations necessary to receive any of the eight stations set up as outlined above are: Turn the power switch on by rotating the lower left knob to the right—*turn the control a few degrees beyond the point at which the switch snaps on* — allow about one minute for the tubes to heat, press the button under the call letters of the desired station *Holding the Button Down Until the Pointer Stops Moving and the Station is Heard*, then adjust the tone and volume. Be sure that the *Band Selector* switch is in the proper position for reception of *Standard Broadcast Stations.*



MASTER SELECTOR SET UP FOR STATION NO. 1. REPEAT SIMILAR OPERATIONS FOR STATION NO. 2 USING NO. 2 PIN.



ALL STATIONS SET UP; PLACE CALL LETTERS IN WINDOWS AS NUMBERED

OPERATING SUGGESTIONS

Be sure that your stations are listed in the proper order according to frequency or position on the dial. Do not confuse frequency (kilocycles) with wave length (meters).

Be sure that your stations are tuned in exactly before setting the contact pins.

Do not set up weak stations, or distant stations too weak to afford clear reception at all times.

Do not press more than one button at a time. Holdi down more than one button will cause inaccurate tuning, or the motor may not turn at all.

Do not leave the Selector Light Lead connected after . pins are set up.

Do not run the motor for excessively long periods of time. While no damage will result, a protective cut-out will shut off the power to the motor after four to five minutes of *continuous* operation, and the automatic tuner will not function again until the motor has been allowed to cool for several minutes.

When tuning stations, *do not release the button until the pointer stops moving.*

Do not attempt to set adjacent pins in the same slot too close together.

Do not expect good results unless a good outdoor antenna is used.

Do not change the relative positions of the contact pins; keep them in the same order as shown on the diagram (Figure 3).

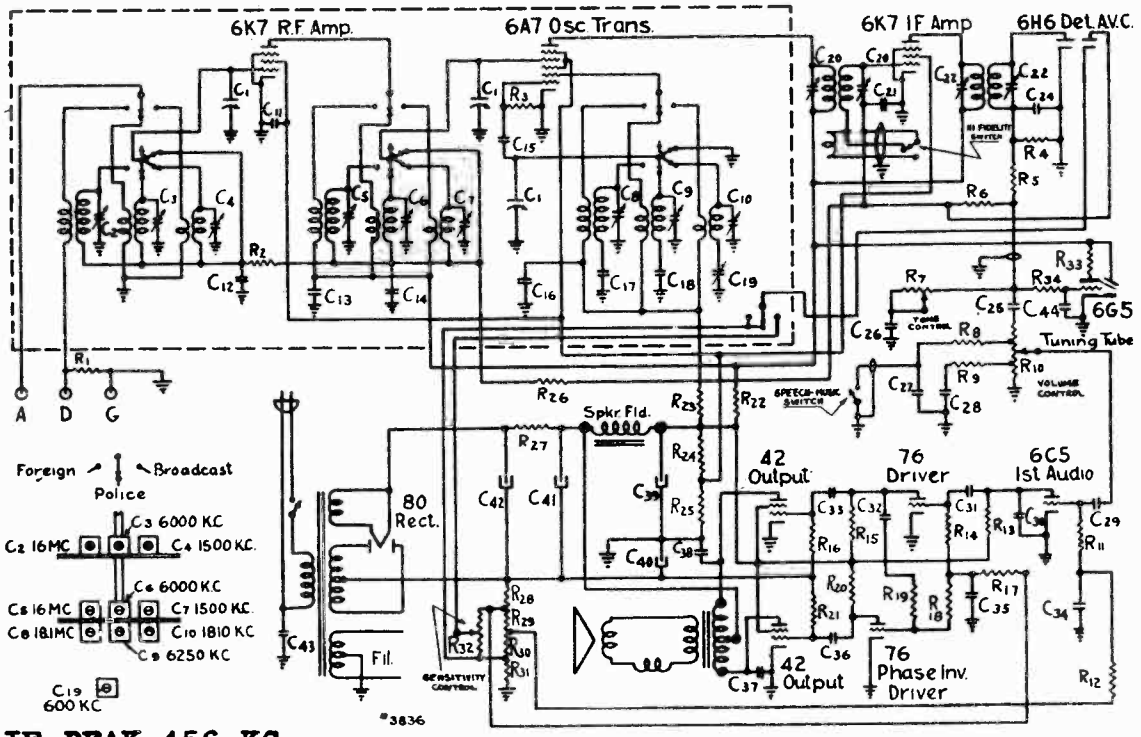
MODEL D692, Early Schematic

WESTERN AUTO SUPPLY CO.

Tubes

Tubes required are:

1—6K7 Radio frequency amplifier
1—6A7 Oscillator—translator
1—6K7 Intermediate frequency amplifier
1—6H6 Detector—automatic volume control
1—6C5 First audio amplifier
1—6G5 Cathode ray tuning tube (on models equipped with "eye" tuning indicator)
1—76 Driver
1—76 Driver-phase inverter
2—42 Power output
1—80 Rectifier



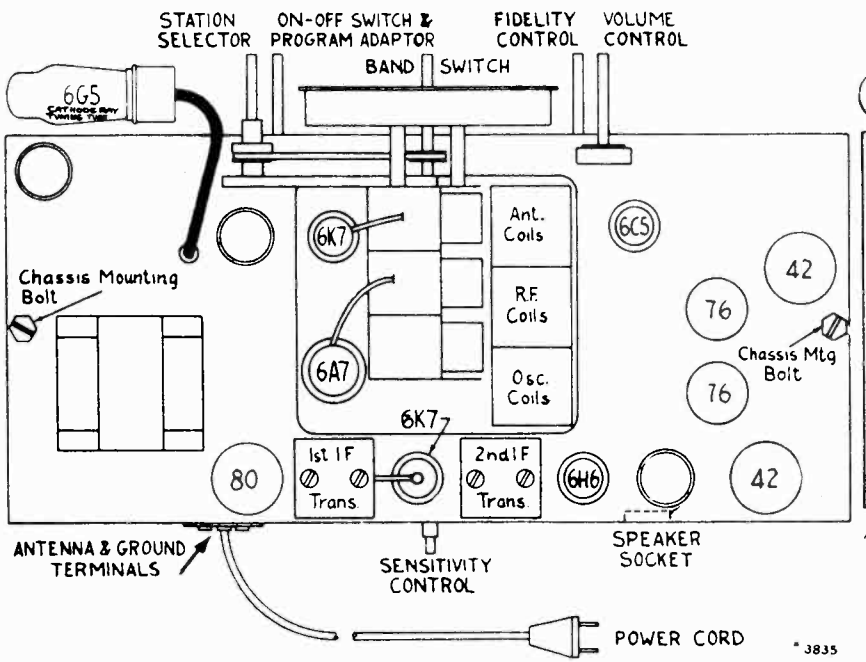
IF PEAK 456 KC

Symbol	Part No.	Description
C1	3814	9-400 mmf Variable
C2,3,4	3822	2-35 triple trimmer
C5,6,7	3822	2-35 triple trimmer
C8,9,10	3822	2-35 triple trimmer
C11,21,34	572	.1—200 V.
C12,14	580	.05 200 V.
C13	575	.1 400 V.
C15,24	2780	50 mmf mica
C16	568	.01 400 V.
C17	2694	.005 5% tolerance
C18	2741	1330 mmf 5% tolerance
C19	2560	350 mmf variable padder
C20,22		IF Trimmers
C25,28	2385	.02 200 V.
C26	2695	.003 600 V.
C27	824	.002 600 V.
C29	576	.02 400 V.
C30	1286	250 mmf mica
C31,33,36	2600	.02 600 V.
C32	563	.05 400 V.
C35	579	.25 200 V.
C37,38	3138	.001 800 V.
C39	3113	16 MF regulating
C40	3136	20 MF 25 V.
C41	3112	16 MF 450 V.
C42	3111	16 MF 500 V.
C43	3135	.003 800 V.
R1,5,15,20,26	603	100 M 1/3 W.
R2,3,13	631	50 M 1/3 W.
R4,14,16,21	615	500 M 1/3 W.
R6	2693	2 meg 1/3 W.
R7	3799	2 meg tone control
R8,17	2568	300 M 1/3 W.

Symbol	Part No.	Description
R9,23	617	20 M 1/3 W.
R10	3800	3 meg volume control
R11,12	624	1 meg 1/3 W.
R18	2688	60 M 1/3 W. 10%
R19	2731	500 M 1/3 W. 10%
R22	2421	1 M 1/3 W.
R24	3805	7 M 3.5 W.
R25	3805	8 M 1.5 W.
R27	3809	100 ohms 2 W. 10%
R28	3806	120 ohms 1.5 W. 10%
R29	3808	50 ohms .75 W. 10%
R30	3807	35 ohms .5 W. 10%
R31	3870	15 ohms .5 W. 10%
R32	3801	2 M Variable
	3796	Power transformer
	3797	No. 1 IF transformer
	3798	No. 2 IF transformer
	2981	Tuning tube cable
	3838	12" Speaker
	2898	Tuning tube clamp
	3815	RF coil
	3943	Oscillator coil
	3817	Antenna coil
	3825	Planetary drive
	3826	Drive belt
	3198	Idler pulley
	3199	Idler spring
	3831	Minute pointer
	3832	Tuning pointer
	3802	On-off switch
	3818	RF and Antenna switch
	3819	Oscillator switch

MODEL D-692 (EARLY)

TUBE LAYOUT *and* CONNECTION DIAGRAM



Connect a high impedance AC voltmeter across the loudspeaker terminals. Volume control should be set a few degrees back of maximum volume position. Use a weak signal from the generator, strong signals tend to cause improper adjustments.

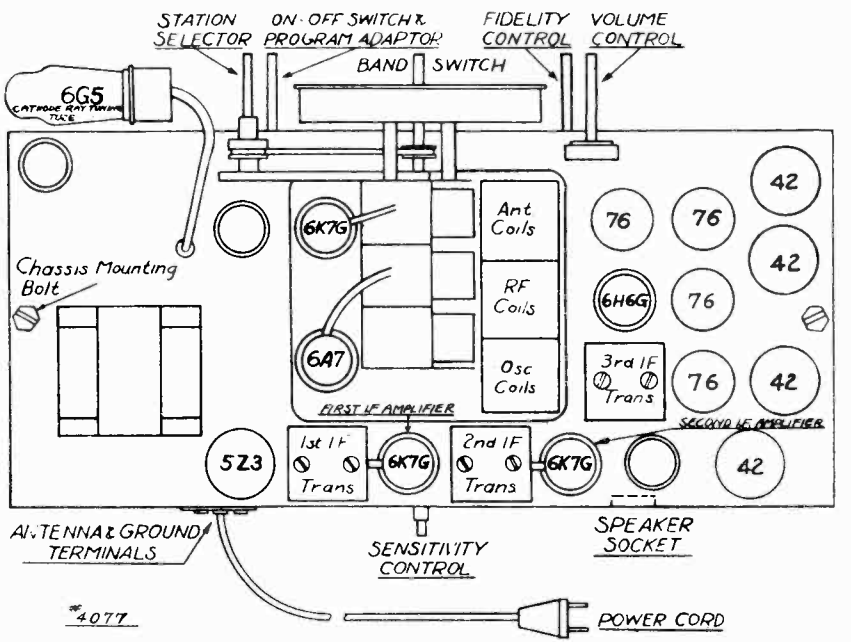
Be sure that the fidelity control is NOT in the HIGH FIDELITY position. It will not be possible to properly aline the receiver unless this control is turned part way toward its "bass" position."

IF. Connect the generator ground to receiver chassis. Using .1 mfd. condenser in series with high side of the generator, apply 456 kc. signal to the grid of the 6K7 IF amplifier tube and aline second IF transformer trimmers. Repeat for first IF transformer, applying signal to grid of the 6A7 tube. (See above diagram for location of tubes and transformers.)

RF. (See circuit diagram for location of trimmers.) Using a 200 mmf. condenser in series with the high side of the generator, turn band selector switch all the way to the left, tuning condenser to minimum capacity, feed 1810 kc. signal to antenna terminal and adjust broadcast oscillator trimmer for top frequency. Set generator frequency at some point around 1500-1600 kc., and adjust broadcast antenna and RF trimmers. Set generator for 600 kc., tune receiver to signal and adjust the padder. The tuning condenser should be rocked back and forth through the signal while varying the padder in order to assure perfect alinement.

A 400 ohm resistor must be used in series with the generator as a "dummy" antenna for proper alinement of the two short wave bands. Set the band selector switch in the center position, adjust the oscillator top frequency for 6250 kc., then aline the antenna and RF trimmers at about 6000 kc. With the band selector in the extreme right position, adjust the top frequency of the high frequency to 18,100 kc., and aline the antenna and RF trimmers at about 16,000 kc. In order to make sure that the top end of the last band is set properly, it is best to screw the oscillator trimmer down tight, then unscrew to the second peak. The antenna and RF trimmers should be screwed down tight, then unscrewed to the first peak. This procedure must be followed in order that the oscillator and RF circuits will be set in the correct relation to each other, otherwise a "dead" spot at a lower frequency will result, and the dial calibration will not be correct. Usually, it is best to rock the tuning condenser back and forth slightly while making these adjustments at high frequencies.

MODEL D-694



Connect a high impedance AC voltmeter across the loudspeaker terminals. Volume control should be set a few degrees back of maximum volume position. Use a weak signal from the generator, strong signals tend to cause improper adjustments.

Be sure that the fidelity control is NOT in the HIGH FIDELITY position. It will not be possible to properly aline the receiver unless this control is turned part way toward its "bass" position.

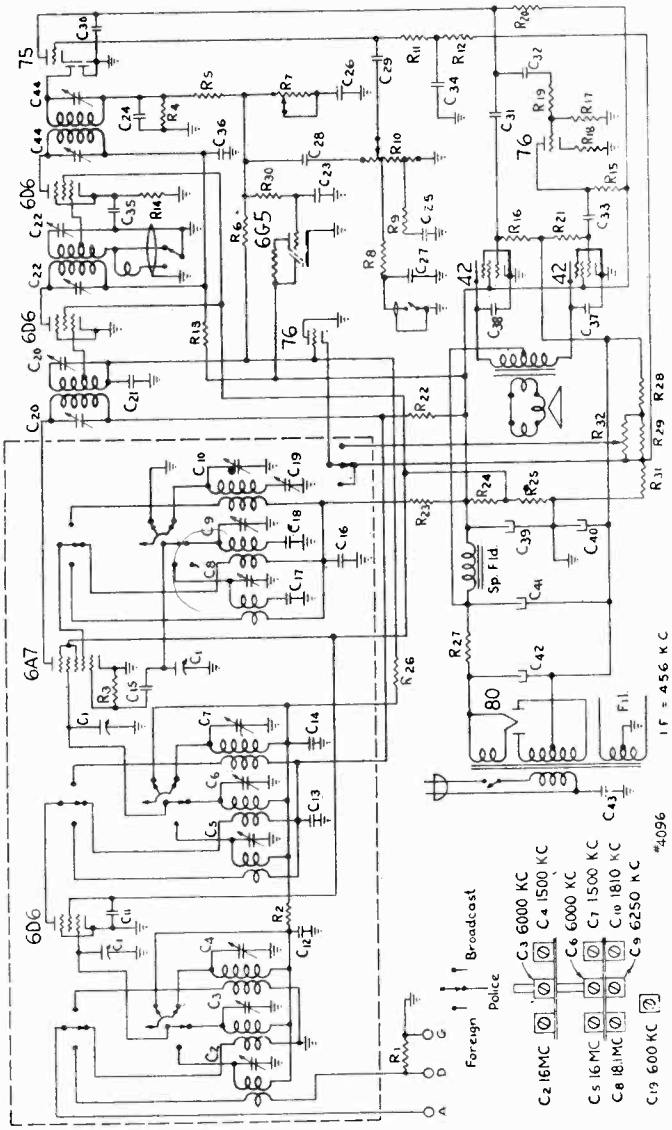
IF. Connect the generator ground to receiver chassis. Using .1 mfd. condenser in series with high side of generator, apply 456 kc. signal to grid of 6K7G second IF amplifier and aline transformer No. 3. Repeat for transformer No. 2, applying signal to grid of 6K7G first IF amplifier. Repeat for transformer No. 1, applying signal to grid of 6A7 translator. (See above diagram for location of tubes and transformers.)

RF. (See circuit diagram for location of trimmers.) Using a 200 mmf. condenser in series with the high side of the generator, turn band selector switch all the way to the left, tuning condenser to minimum capacity, feed 1810 kc. signal to antenna terminal and adjust broadcast oscillator trimmer for top frequency. Set generator frequency at some point around 1500-1600 kc., and adjust broadcast antenna and RF trimmers. Set generator for 600 kc., tune receiver to signal and adjust the padder. The tuning condenser should be rocked back and forth through the signal while varying the padder in order to assure perfect alinement.

A 400 ohm resistor must be used in series with the generator as a "dummy" antenna for proper alinement of the two short wave bands. Set the band selector switch in the center position, adjust the oscillator top frequency for 6250 kc., then aline the antenna and RF trimmers at about 6000 kc. With the band selector in the extreme right position, adjust the top frequency of the high frequency to 18,100 kc., and aline the antenna and RF trimmers at about 16,000 kc. In order to make sure that the top end of the last band is set properly, it is best to screw the oscillator trimmer down tight, then unscrew to the second peak. The antenna and RF trimmers should be screwed down tight, then unscrewed to the first peak. This procedure must be followed in order that the oscillator and RF circuits will be set in the correct relation to each other, otherwise a "dead" spot at a lower frequency will result, and the dial calibration will not be correct. Usually, it is best to rock the tuning condenser back and forth slightly while making these adjustments at high frequencies.

WESTERN AUTO SUPPLY CO.

MODEL D692, Late
Schematic
Alignment



ALINEMENT PROCEDURE

Connect a high impedance AC voltmeter across the loudspeaker terminals. Volume control should be set a few degrees back of maximum volume position. Use a weak signal from the generator, strong signals tend to cause improper adjustments.

Be sure that the fidelity control is NOT in the HIGH FIDELITY position. It will not be possible to properly aline the receiver unless this control is turned part way toward its "bass" position.

IF. Connect the generator ground to receiver chassis. Using .1 mfd condenser in series with high side of generator, apply 456 kc signal to grid of 6D6 second IF amplifier and aline transformer No. 3. Repeat for transformer No. 2, applying signal to grid of 6D6 first IF amplifier. Repeat for transformer No. 1, applying signal to grid of 6A7 translator. (See above diagram for location of tubes and transformers.)

RF. (See circuit diagram for location of trimmers.) Using a 200 mmf. condenser in series with the high side of the generator, turn band selector switch all the way to the left, tuning condenser to minimum capacity, feed 1810 kc. signal to antenna terminal and adjust broadcast oscillator trimmer for top frequency. Set generator frequency at some point around 1500-1600 kc., and adjust broadcast antenna and RF trimmers. Set generator for 600 kc., tune receiver to signal and adjust the padder. The tuning condenser should be rocked back and forth through the signal while varying the padder in order to assure perfect alinement.

A 400 ohm resistor must, be used in series with the generator as a "dummy" antenna for proper alinement of the two short wave bands. Set the band selector switch in the center position, adjust the oscillator top frequency for 6250 kc., then aline the antenna and RF trimmers at about 6000 kc. With the band selector in the extreme right position, adjust the top frequency of the high frequency to 18,100 kc., and aline the antenna and RF trimmers at about 16,000 kc. In order to make sure that the top end of the last band is set properly, it is best to screw the oscillator trimmer down tight, then unscrew to the second peak. The antenna and RF trimmers should be screwed down tight, then unscrewed to the first peak. This procedure must be followed in order that the oscillator and RF circuits will be set in the correct relation to each other, otherwise a "dead" spot at a lower frequency will result, and the dial calibration will not be correct. Usually, it is best to rock the tuning condenser back and forth slightly while making these adjustments at high frequencies.

Symbol	Part No.	Description
C1	3814	9-400 mmf Variable
C2,3,4	3822	2-35 triple trimmer
C5,6,7	3822	2-35 triple trimmer
C8,9,10	3822	2-35 triple trimmer
C11,21,34	572	.1-200 V.
C12,14,23	580	.05-200 V.
C13	575	.1-400 V.
C15,24	2780	50 mmf mica
C16,35	568	.01-400 V.
C17	2694	.005 5% tolerance
C18	2741	1330 mmf 5% tolerance
C19	2560	350 mmf variable padder
C20,22,44		IF Trimmer
C25	4072	.03-200 V.
C26	2695	.003-600 V.
C27	824	.002-600 V.
C28,29	576	.02-400 V.
C30	1286	250 mmf mica
C31,33	2600	.02-600 V.
C32,36	563	.05-400 V.
C37,38	3138	.001-800 V.
C39	3113	16 MF regulating
C40	3136	20 MF 25 V.
C41	3112	16 MF 450 V.
C42	3111	16 MF 500 V.
C43	3135	.003-800 V.
R1,5,15,26	603	100 M 1/3 W.

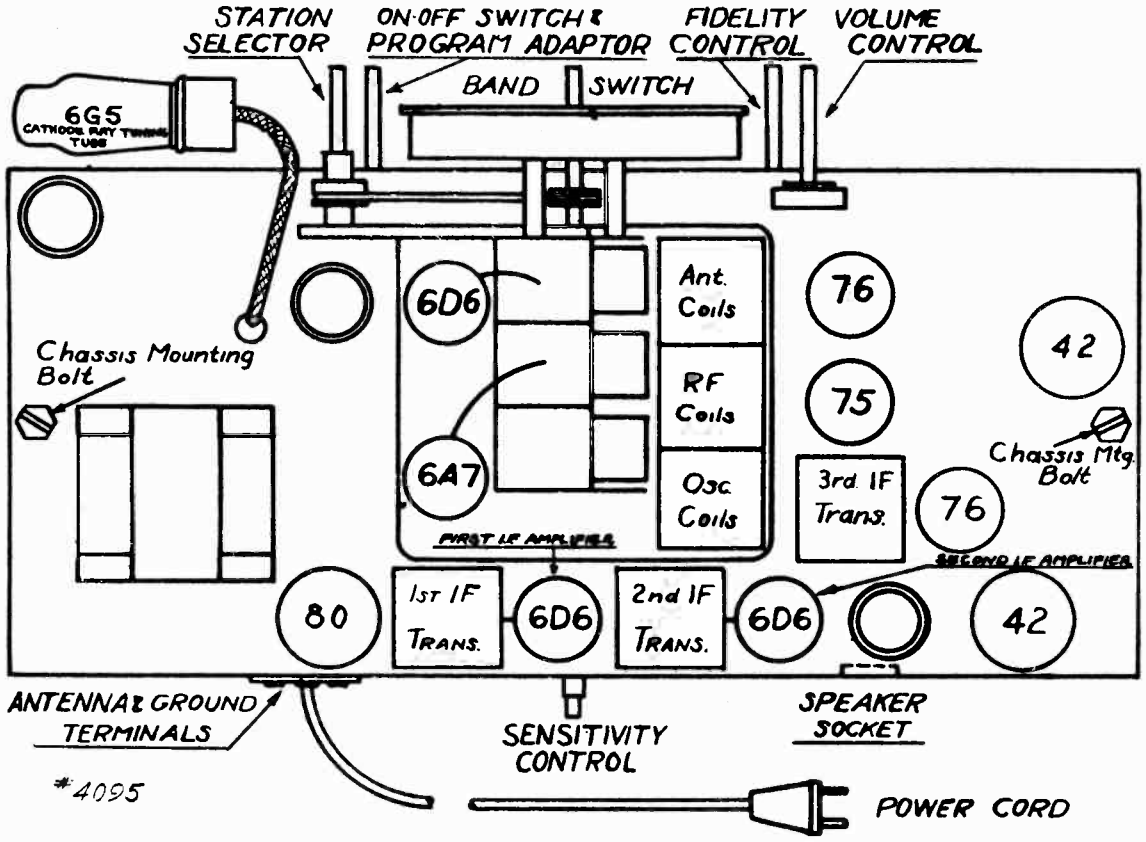
Symbol	Part No.	Description
R10	3800	3 meg volume control
R11,12	624	1 meg 1/3 W.
R13,14,22	2421	1 M 1/3 W.
R17	2880	100 M 1/3 W. 10 %
R18	614	5 M 1/3 W.
R19	2731	500 M 1/3 W. 10%
R20	598	200 M 1/3 W.
R24	3805	7 M 3.5 W.
R25	3805	8 M 1.5 W.
R27	3809	100 ohms 2 W. 10%
R28	3806	120 ohms 1.5 W. 10%
R29	4111	85 ohms 1.0 W. 10%
R30	2106	3 meg 1/3 W.
R31	3870	15 ohms .5 W. 10%
R32	3801	2 M variable
R2,3	631	50 M 1/3 W.
R4,16,21	615	500 M 1/3 W.
R6	2693	2 meg 1/3 W.
R7	3799	2 meg tone control
R8	2568	300 M 1/3 W.
R9,23	617	20 M 1/3 W.

3796	Power transformer
4061	No. 1 IF transformer
4060	No. 2 IF transformer
3968	No. 3 IF transformer
2981	Tuning tube cable
3838	12" Speaker
2898	Tuning tube clamp
3815	RF coil
3943	Oscillator coil
3817	Antenna coil
4105	Drive belt
3198	Idler pulley
3199	Idler spring
3831	Minute pointer
3832	Tuning pointer
3802	On-off switch
3818	RF and Antenna switch
3819	Oscillator switch

MODEL D-692 (LATE)

MODEL D692, Late
Socket, Trimmers
Antenna Data

WESTERN AUTO SUPPLY CO.



Tubes must be in proper position and connected as shown.

Tubes required are:
1—6D6 Radio Frequency Amplifier
1—6A7 Oscillator-translator
2—6D6 Intermediate Frequency Amplifiers
1—76 Automatic Bias Control
1—75 Detector AVC—First Audio Amplifier
1—76 Driver—Phase Inverter
2—42 Power Output
1—80 Rectifier
1—6G5 Cathode Ray Tuning Tube (on models equipped with "eye" tuning indicator)

Do not use tubes of types different from those shown above. When replacing tubes or checking connections, refer to the TUBE LAYOUT CHART.

Connections

Turn the lower right knob to the left as far as it will go. This turns the power switch "off."

Connect the antenna and ground leads to the receiver as shown on the diagrams below. For use with a single wire antenna, connect as shown on Figure 1. If used with a doublet antenna, connect according to Figure 2.

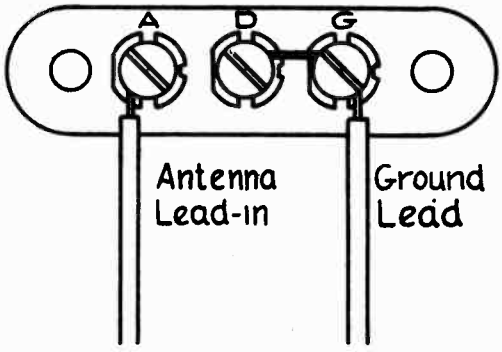


Fig. 1

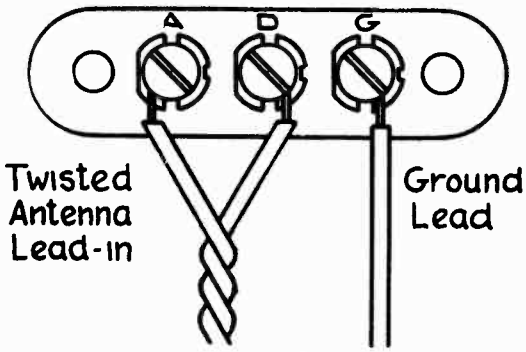


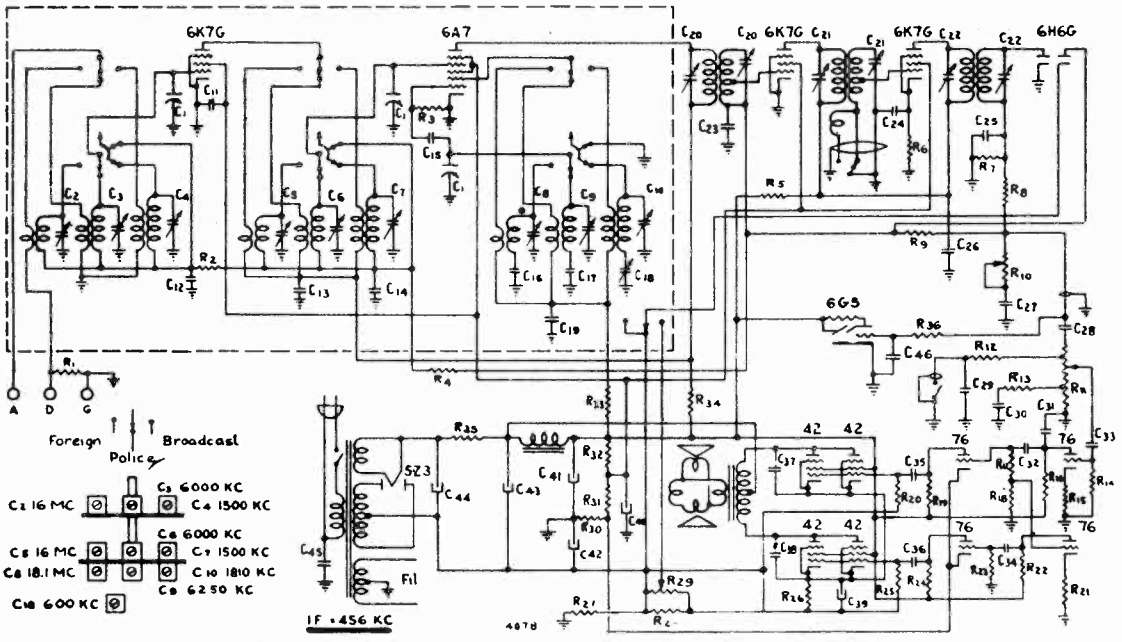
Fig. 2

MODEL D694
Schematic

WESTERN AUTO SUPPLY CO.

Tubes

Tubes required are:
1—6K7G Radio frequency Amplifier
1—6A7 Oscillator—Translator
2—6K7G Intermediate frequency Amplifiers
1—6H6G Detector—AVC—Bias control
1—6G5 Cathode ray tuning tube (on models equipped with "eye" tuning indicator)
1—76 First Audio Amplifier
1—76 Phase Inverter
2—76 Drivers
4—42 Power Output
1—5Z3 Rectifier



FOR ALIGNMENT, SEE INDEX

Symbol	*Part No.*	*Description*
C1	3814	9-400 mmf variable
C2,3,4	3822	2-35 triple trimmer
C5,6,7	3822	2-35 triple trimmer
C8,9,10	3822	2-35 triple trimmer
C11,23	572	.1 200V.
C12,14,46	580	.05 200V.
C13	575	.1 400V.
C15,25	2780	50 mmf mica
C16	2694	.005 5% tolerance
C17	2741	1330 mmf 5% tolerance
C18	2560	350 mmf variable padder
C19,24	568	.01 400V.
C20,21,22		IF trimmers
C26	563	.05 400V.
C27	2695	.003 600V.
C28,33	576	.02 200V.
C29	824	.002 600V.
C30	4072	.03 200V.
C31	1286	250 mmf mica
C32,34,35,36	2600	.02 600V.
C37,38	3138	.001 800V.
C39,42	4071	20 MF 35 WV.
C40	3079	8 MF 150V.
C41	4062	30 MF 275V. Reg.
C43	3112	16 MF 450V.
C44	3111	16 MF 500V.
C45	3135	.003 800V.
R1,4,8,16,19,22,24	603	100 M 1/3 W.
R2,3	631	50 M 1/3 W.
R5,6,34	2421	1 M 1/3 W.
R7,23	615	500 M 1/3 W.
R9	2693	2 meg 1/3 W.
R10	3799	2 meg tone control
R11	3800	3 meg volume control

Symbol	*Part No.*	*Description*
R12,20,25	2568	300 M 1/3 W.
R13,33	617	20 M 1/3 W.
R14	624	1 meg 1/3 W.
R15,21	614	5 M 1/3 W.
R17	2731	500 M 10% 1/3 W.
R18	2880	100 M 10% 1/3 W.
R26	4068	300 ohm 10% 3 W. flex.
R27	3808	50 ohm 10% ¾ W. flex.
R28	4069	200 ohm 10% 2 W. flex.
R29	3801	2 M variable
R30	639	750 ohm 1/3 W.
R31	3805	8 M 1.5 W.
R32	3805	7 M 3.5 W.
R35	4070	100 ohm 10% 3 W. flex
	4058	Power transformer
	4061	No. 1 IF transformer
	4060	No. 2 IF transformer
	3968	No. 3 IF transformer
	2981	Tuning tube cable
	4082	12" Dynamic speaker
	4079	12" P.M. speaker
	2898	Tuning tube clamp
	3815	RF coil
	3943	Oscillator coil
	3817	Antenna coil
	3825	Planetary drive
	3826	Drive belt
	3198	Idler pulley
	3199	Idler spring
	3831	Minute pointer
	3832	Tuning pointer
	3802	On-off switch
	3818	RF and antenna switch
	3819	Oscillator switch

MODEL D695(1936)
Socket,Trimmers
Phono.Data,Coils

WESTERN AUTO SUPPLY CO.

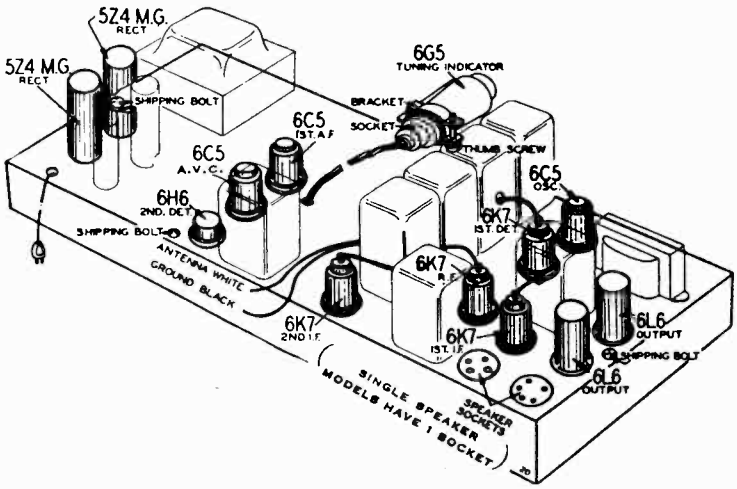


Fig. 5—Location of Tubes

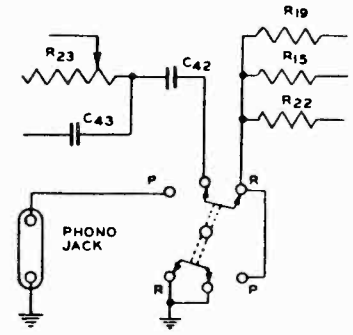


Fig. 7—Phonograph Connections

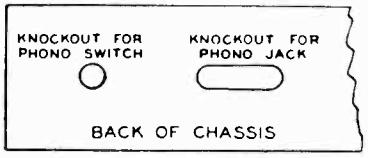


Fig. 8—Location of Phono Knockouts

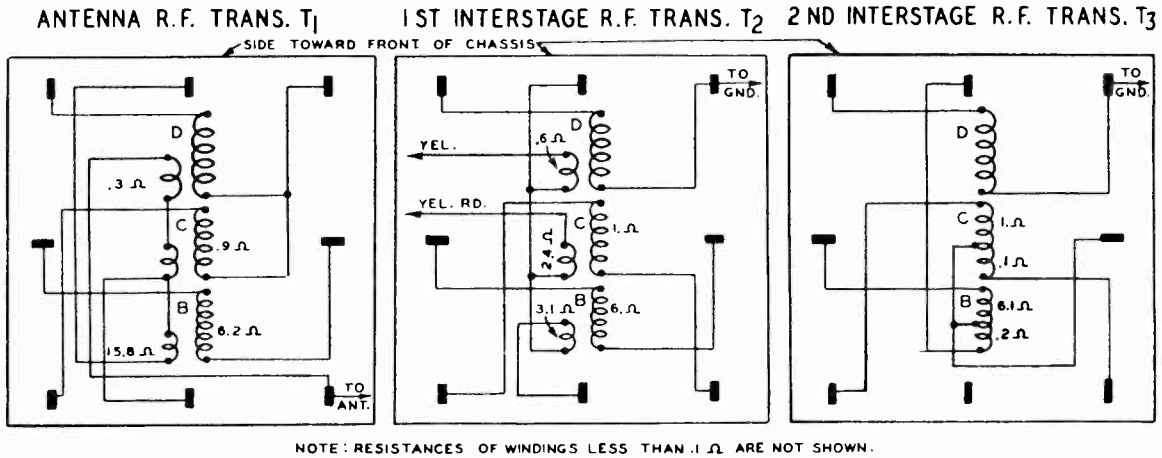
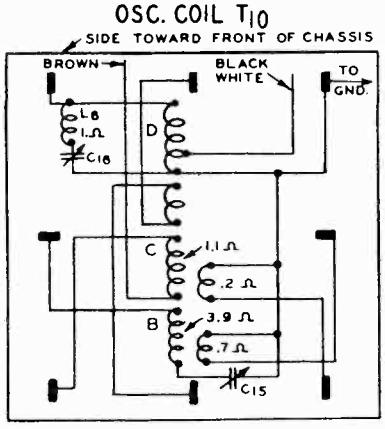


Fig. 6—R.F. and Oscillator Coil Base Terminal Arrangement and D.C. Resistance of Windings



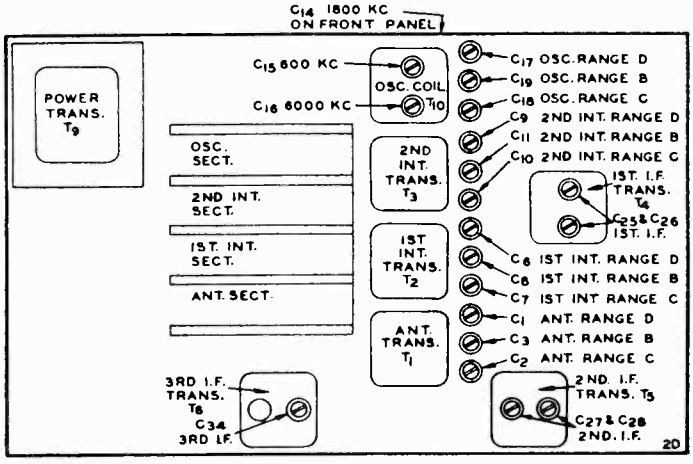
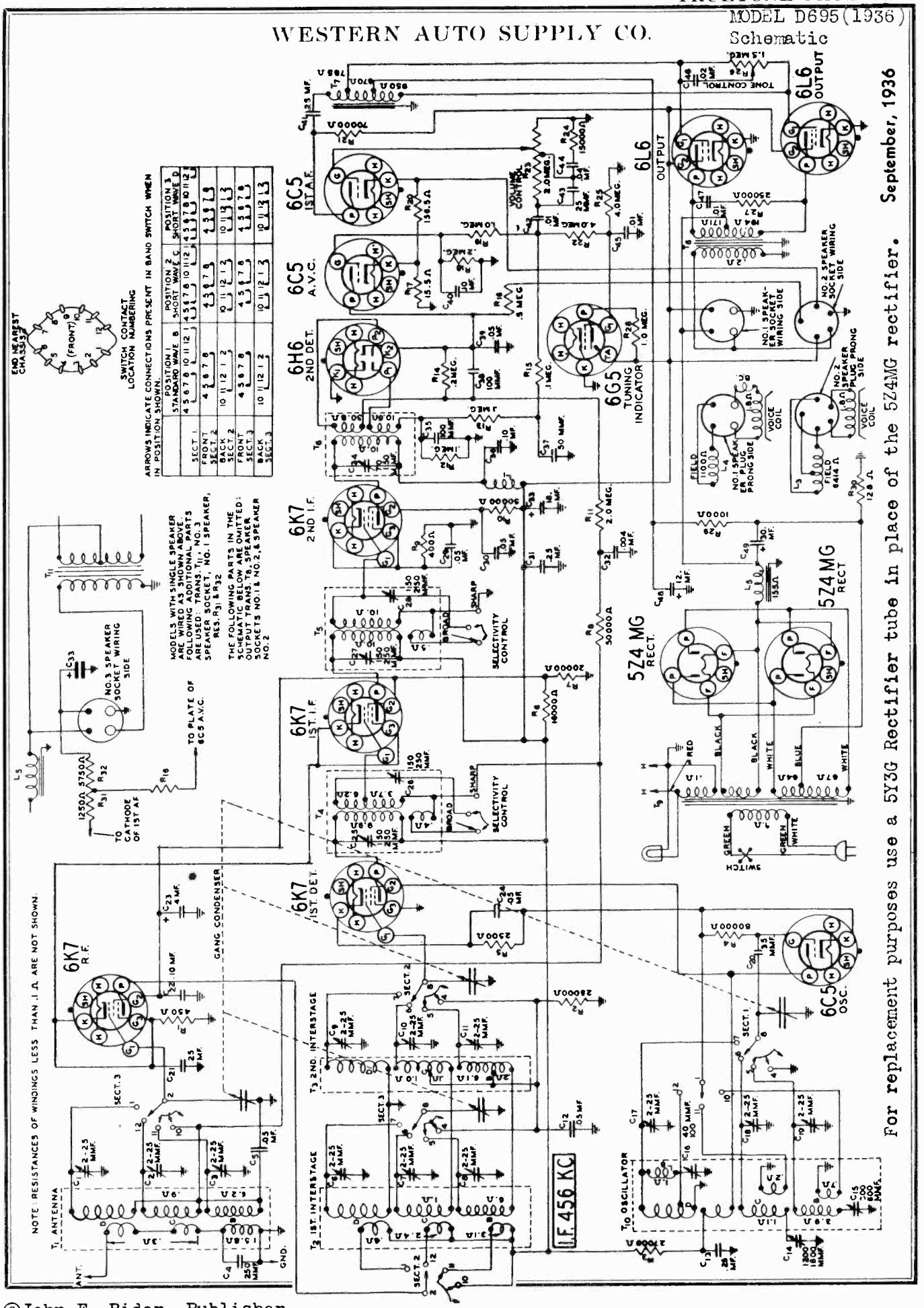


Fig. 3—Location of Trimmers

WESTERN AUTO SUPPLY CO.

MODEL D695 (1936)
Schematic



For replacement purposes use a 5Y3G Rectifier tube in place of the 5Z4MG rectifier. September, 1936

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.

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.

Line Voltage: 115
Volume Control: Maximum

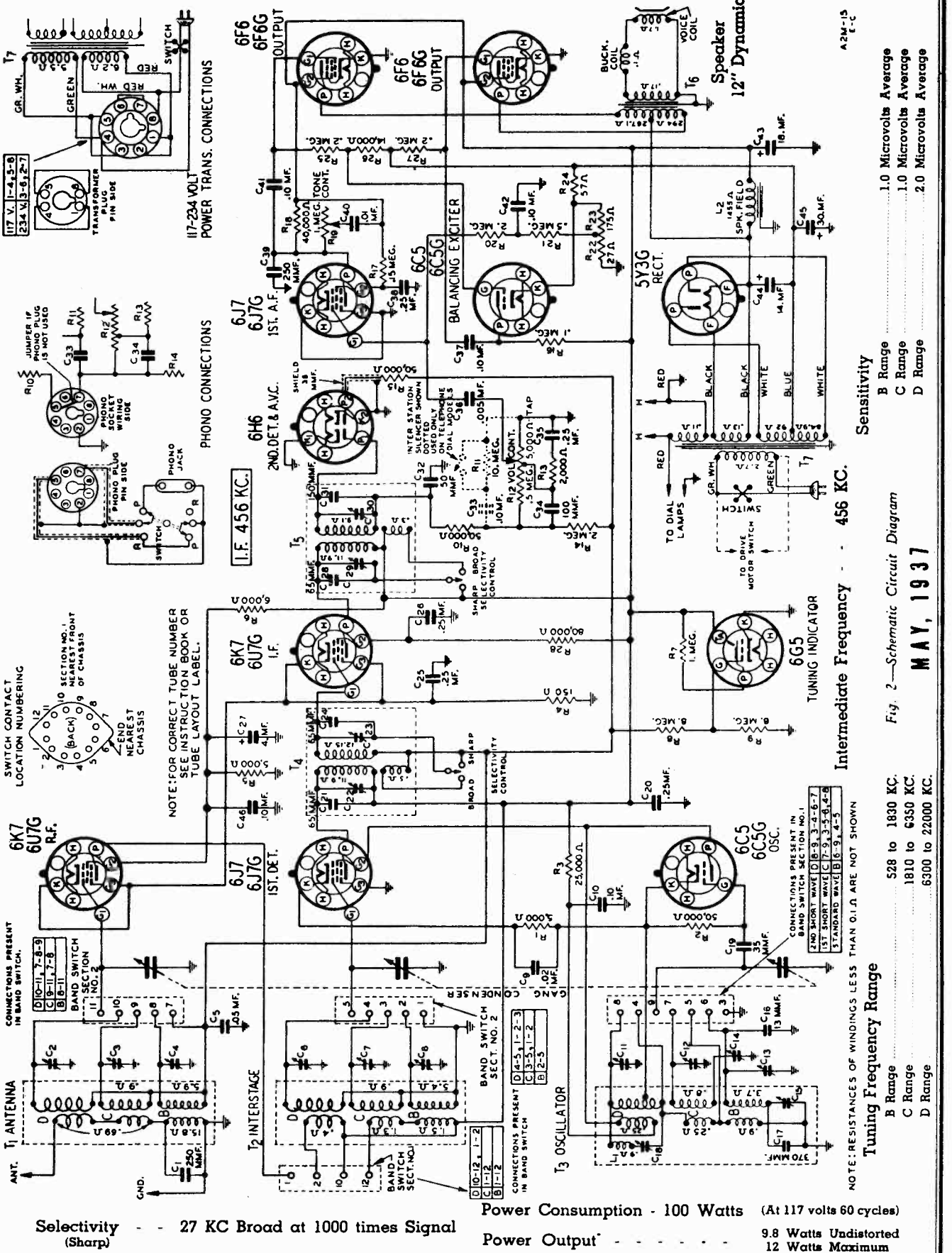
Antenna Shorted to Ground
Position of Band Switch: Standard Wave

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)	8.0
6H6	2nd Det.	0	6.2(1)					6.2(1)	
6C8	A.V.C.	0	6.2(1)	8(3)				6.2(1)	0.8
6C8	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)	
5Z4WG	Rectifier	0	5.0(5)		1024(6)		1024(6)		5.0(5)
6G8	Tuning Indicator	Plate to Ground 25(2)		Target to Ground 250		Cathode to Ground 0		Across Heater 6.3 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.

WESTERN AUTO SUPPLY CO.

MODEL D697
Schematic, Phono. Data
Transformer Data



Sensitivity

B Range	1.0 Microvolts Average
C Range	1.0 Microvolts Average
D Range	2.0 Microvolts Average

Intermediate Frequency - - 456 KC.

Tuning Frequency Range

B Range	528 to 1830 KC.
C Range	1810 to 6350 KC.
D Range	6300 to 22000 KC.

NOTE: RESISTANCES OF WINDINGS LESS THAN 0.1 Ω ARE NOT SHOWN

Fig. 2—Schematic Circuit Diagram

MAY, 1937

Selectivity - - 27 KC Broad at 1000 times Signal (Sharp)

Power Consumption - 100 Watts (At 117 volts 60 cycles)

Power Output - - - - - - 9.8 Watts Undistorted, 12 Watts Maximum

MODEL D697
Alignment, Circuit Data
Trimmers, Coils

WESTERN AUTO SUPPLY CO.

11 TUBE • 3 BAND • ALL WAVE

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.
Selectivity Control—Sharp Position All Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter — Non-Metallic Screwdriver.
Dummy Antennas — .1 mf., 200 mmf., and 400 ohms.

STEP (Follow Order as Given)	BAND SWITCH SETTING	DUMMY ANTENNA	SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	TRIMMERS ADJUSTED See Illustration	PROCEDURE INITIAL STEPS	PROCEDURE ADJUSTMENT
I. F.							
2nd I.F. Adj.	Range B	.1 mf.	456 KC	Grid of I.F. Tube	2nd I.F. (C29) & (C30)	Turn Rotor to Full Open	Adjust to Maximum Output
1st I.F. Adj.	Range B	.1 mf.	456 KC	Grid of 1st Det.	1st I.F. (C22) & (C23)	Turn Rotor to Full Open	Adjust to Maximum Output
RANGE B							
1830 KC	Range B	200 mmf.	1830 KC	Antenna Lead	Oscillator Range B (C13)	Turn Rotor to Full Open	Adjust to Maximum Output
1500 KC	Range B	200 mmf.	1500 KC	Antenna Lead	Ant. Range B (C4) Int. Range B (C8)	Turn Rotor to Max. Output Set Indicator to 1500 KC— See Note A	Adjust to Maximum Output
600 KC	Range B	200 mmf.	600 KC	Antenna Lead	600 KC (C15)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE C							
6350 KC	Range C	400 Ohm	6350 KC	Antenna Lead	Oscillator Range C (C12)	Turn Rotor to Full Open	Adjust to Maximum Output
6000 KC	Range C	400 Ohm	6000 KC	Antenna Lead	Antenna Range C (C3) Int. Range C (C7)	Turn Rotor to Max. Output	Adjust to Maximum Output
2000 KC	Range C	400 Ohm	2000 KC	Antenna Lead	2000 KC (C14)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE D							
22,000 KC	Range D	400 Ohm	22,000 KC	Antenna Lead	Oscillator Range D (C11)	Turn Rotor to Full Open	Adjust to Maximum Output
20,000 KC	Range D	400 Ohm	20,000 KC	Antenna Lead	Ant. Range D (C2) Int. Range D (C6)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
7000 KC	Range D	400 Ohm	7000 KC	Antenna Lead	7000 KC (C18)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B

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

After each range is completed, repeat the procedure as a final check.

NOTE A—In sets using the telephone dial tuning, there will be seen inside the telephone dial button ring an escutcheon plate held in place by four screws. Loosen the 2 screws nearest the pointer. An extension of the pointer will be seen protruding over the edge of this escutcheon plate. Move the pointer to the 1500 KC mark on the dial and then tighten the 2 escutcheon screws. (Do not tighten these screws too much.)

In sets using the moving beam of light indicator, there is a 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 the beam is at the 1500 KC mark on the dial. Retighten the screw.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

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 on the dial. It may be necessary to increase the input signal to hear the image.

NOTICE—Re-alignment is necessary if glass tubes are replaced by their equivelent in metal tubes, or vice versa, in the R.F. and I.F. stages.

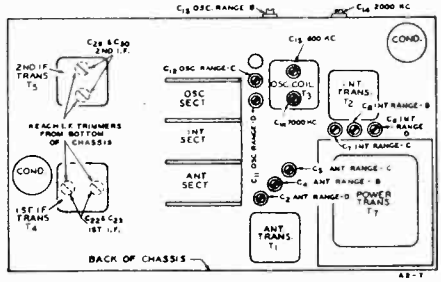


Fig. 3—Location of Trimmers

Circuit

This model is a three band AC operated radio with a tuning range as shown in the specifications above.

Referring to the schematic circuit diagram, Fig. 2, T1 and T2 are the antenna and interstage R.F. transformer assemblies and T3 is the oscillator coil assembly. The standard wave, 1st and 2nd short wave coils in each assembly are indicated by the letters B, C and D respectively.

The band switch completes connections to the coils in use. The band switch sections are designated in the schematic as section 1 and section 2.

The antenna transformer with tuned secondary feeds into a type 6K7 R.F. amplifier tube. The output of this tube is fed through the interstage R.F. transformer with tuned secondary into a 6J7 tube which functions as the 1st detector.

A separate type 6C5 tube is employed in the oscillator circuit. The oscillating circuit is always resonant at 456 KC above the frequency to which the R.F. amplifier is tuned.

One stage of I.F. amplification is employed using a 6K7 tube. The primaries and secondaries of the 1st and 2nd I.F. transformers are tuned by small trimmer condensers.

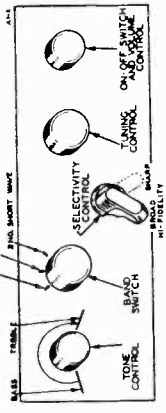


Fig. 1—Arrangement of Controls

Referring to the 1st and 2nd I.F. transformers T4 and T5 in Fig. 2, it will be noted that there is a coupling winding shown below the primary of T4 and below the secondary of T5.

When the selectivity control is in the sharp position, the coupling windings are open circuited and the loose coupling which exists between the primary and secondary of these transformers results in high selectivity.

When the selectivity control is in the broad position, the coupling winding which is wound under the primary in the case of T4 is connected in series with the secondary. In the case of T5, the coupling winding which is wound under the secondary is in series with the primary. This provides overcoupling which results in a greatly widened resonance curve. Passage of a wide range of audio frequencies is thus obtained.

A 6H6 tube functions as a diode 2nd detector. AVC voltage is applied to the control grid circuits of the R.F. and I.F. tubes.

Across the volume control resistor R12 is a filter composed of condensers C34 and C35 and resistor R13. At high volume settings, the filter is not effective. At low volume settings, the action of this filter results in an increase of high and low frequency amplitudes relative to the other frequency amplitudes.

The output of the 2nd detector is applied to the 6J7 1st A. F. tube. The output of this tube is fed thru resistance coupling into the 6F6 output tube shown nearest to it in the schematic.

A portion of the voltage developed across the output tube grid resistor is applied to the control grid of the 6C5 balancing exciter tube. This tube functions as a phase inverter and applies the audio voltage of proper phase and amplitude to the other 6F6 output tube. The two output tubes operate as a stage of Class A push-pull amplification. The balancing exciter tube thus replaces a push-pull input transformer. A dynamic reproducer is employed.

The power unit uses a 5Y3G full wave rectifier. A 6G5 tuning indicator tube is employed.

Glass and Metal Tubes

All sets of this series use a 6H6 metal tube and 5Y3G and 6G5 glass tubes.

It will be noted in the schematic that there are two tube type numbers shown at the other sockets. The "metal" tube sets use the upper tube type numbers which are for metal tubes while the "glass" tube sets use the lower tube type numbers which are for glass tubes.

Re-alignment is necessary if glass tubes are replaced by their equivalent in metal tubes, or vice versa, in the R.F. and I.F. stages.

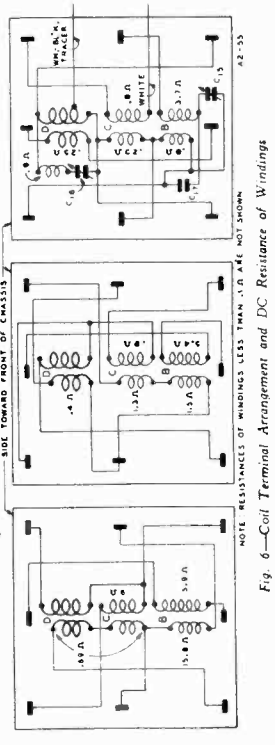


Fig. 6—Coil Terminal Arrangement and DC Resistance of Windings

WESTERN AUTO SUPPLY CO.

MODEL D697
Voltage, Socket
Changes, Phono. Data
Parts List

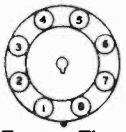


Fig. 7—Octal Tube Terminal Numbering (bottom of socket).

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 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.

Phonograph Connections

Phonograph connections are made as shown in the schematic circuit diagram Fig. 2. On the front panel of the chassis base is a round knockout 1⅛ inches in diameter. An octal base socket is mounted in this knockout opening and wired as shown in the schematic.

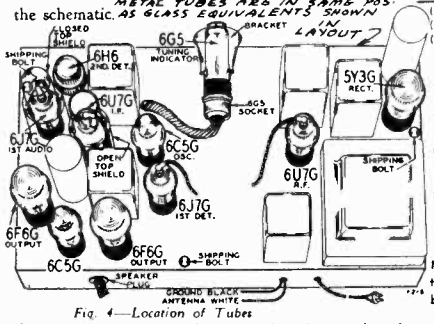


Fig. 4—Location of Tubes

A phono cable assembly may then be purchased (see parts list). On one end of this cable is an octal plug and on the other end is a phonograph-radio switch and double tip jack.

Some models are shipped from the factory equipped with the phono socket. A jumper is inserted in this socket which must be removed if the phonograph installation is made—see Fig. 2.

117-234 Volt Power Transformers

Some models are equipped with a 117-234 volt 40 to 60 cycle power transformer. Connections as shown in Fig. 2 are completed to a special octal socket mounted on the back panel of the chassis. A plug which goes with this socket may then be inserted for either the 117 volt or 234 volt connection.

If one of these transformers is to be installed in a chassis equipped with a regular transformer, there is a 1⅛ inch round knockout on the back panel which may be removed to permit installation of the octal socket mentioned above.

Dial and Drive Assembly

Complete information regarding the dial and drive assemblies will be found in the Dial and Drive Service Notes issued for this chassis. (see index)

Changes in Later Models

Later models of this series have the following changes incorporated in them.

On the first models, the 2nd I.F. Coil was not expanded. In other words, the extra selectivity coupling winding was not incorporated in the early type coil. Models with the letter "C" or any later issue stamped on the chassis use the new type coil with the selectivity coupling winding. Because of the change in coil connections, the selectivity switch used on the late model is not interchangeable with that on the early model.

When ordering parts, therefore, it is important that the issue letter on the chassis be noted and the correct part number as shown in the parts list be specified.

VOLTAGES AT SOCKETS

Line Voltage: 117—Volume Control: Maximum
Readings taken with 1000 Ohm-per-volt meter.
Antenna Shorted to Ground
Position of Band Switch: Standard Wave

TUBE	FUNCTION	VOLTAGE BETWEEN SOCKET PRONG 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 6U7G	R.F.	0	6.1(1)	250	105	2.5		6.1(1)	2.5
6J7 6J7G	1st Det.	0	6.1(1)	250	125	0		6.1(1)	5.8
6C5 6C5G	Osc.	0	6.1(1)	125(2)				6.1(1)	0
6K7 6U7G	I.F.	0	6.1(1)	250	100	2.5		6.1(1)	2.5
6H6	2nd Det.—A.V.C.	0	6.1(1)					6.1(1)	0
6J7 6J7G	1st A.F.	0	6.1(1)	110	120	0(3)		6.1(1)	0(3)
6C5 6C5G	Balancing Exciter	0	6.1(1)	100				6.1(1)	18.5
6F6 6F6G	Output	0	6.1(1)	330	250			6.1(1)	0(4)
5Y3G	Rectifier	0	4.8(5)		730(6)		730(6)		4.8(5)
6G5	Tuning Indicator	Plate to Ground 20		Target to Ground 250		Cathode to Ground 0		Across Heater 6.1 A.C.	

(1) A.C. voltage as read across heater terminals 2 and 7.
(2) Subject to variation.
(3) Bias (2.5 volts) as read across resistor R22.
(4) Bias (24 volts) as read across resistors R22, R23, & R24.
(5) A.C. voltage as read across filament terminals 2 and 8.
(6) A.C. voltage as read across terminals 4 and 6.

The R.F. circuit of early models was slightly different from that used in later models. The screen grids of the R.F. and I.F. tubes now supplied by separate voltage sources were formerly connected together and supplied from a single source. On the latter models, resistor R 28 and condenser C 46 were not used.

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.

MISCELLANEOUS

SOCKETS

Part No.	Description	List Price
3A256	Tube Socket—Octal (7 Prong)	$0.15
3A263	Tube Socket—Octal (8 Prong)	.15
3A261	Tube Socket—Octal (5 Prong)	.10
3A262	Speaker Socket (6 Prong)	.15
13X285	Tuning Eye Tube Socket and Cable Assembly	.55
3A266	Phono Socket—Octal (4 Prong)	.10
3A252	Dual Keyway Socket—Octal (8 Prong)—Universal Power Transformer Connections	.15
6A214	Plug (4 Prong)—Used with above Socket	.75

SPEAKERS

When ordering parts for speakers, specify part number of speaker and letter preceding part number stamped on the speaker.

12A269	12" Dynamic Speaker, complete with Output Trans. (T6). Cone and Voice Coil Assembly for above speaker Output Transformer only (T6)	7.70 4.60 2.45

KNOBS

Specify Name of Knob & Name & Model of Radio	Volume Control Knob	.15
	Tone Control Knob	.15
	Tuning Control Knob	.15
	Band Switch Knob	.20
	Selectivity Control Knob	.25

GENERAL

25X378	Clamp Bracket for Tuning Eye Tube	.10
32X50	Tube Shield—Closed Top (Used on glass and metal tube chassis)	.15
32X32	Tube Shield—Open Top (Used only on models having glass tubes)	.15
32X51	Tube Shield Base	.10
2X38	Felt Washers (Used Behind Knobs)	doz. .10
8X23	Rubber Cushions (Chassis Mounting)	doz. .10
30X44	Grid Clip only	.10
2A78	Selectivity Switch (Early Type—Used when 2nd I.F. is not expanded)	.40
2A83	Selectivity Switch (Late Type—Used when 2nd I.F. is expanded)	.45
4A38	Terminal Strip (1 lug insulated, one lug used for mtg.)	.10
4A53	Terminal Strip (3 lugs insulated, mounting hole used)	.10
4A68	Terminal Strip (3 lugs insulated)	.10
13X214	Antenna and Ground Lead Assembly	.30
13X80	Line Cord and Plug	.50
2A79	Band Switch (2 section, 3 position)	1.65

TRANSFORMERS AND COILS

Part No.	Code	Description	List Price
9A779	T1	Antenna Transformer and Can Assembly	$2.15
9A780	T2	R.F. Interstage Transformer and Can Assembly	2.30
9A781	T3	Oscillator Coil and Can Assembly	3.40
9A782	T4	1st I.F. Transformer and Can Assembly	2.40
9A783	T5	2nd I.F. Transformer and Can Assembly (Early Type—Without selectivity coupling winding)	2.25
9A857	T5	2nd I.F. Transformer and Can Assembly (Late Type—With selectivity coupling winding)	2.25
	T6	Output Transformer (See "Speakers")	
53X148	T7	117 Volt, 60 Cycle, Standard Power Transformer	4.45
53X149	T7	117 Volt, 25 Cycle, Standard Power Transformer	7.15
53X150	T7	117-234 Volt, 40-60 Cycle, Universal Power Transformer	5.75

CONDENSERS

TUBULAR

Part No.	Code	Capacitance	Voltage	List Price
46X80	C5	.05 mf.	180	$0.15
46X187	C9	.02 mf.	180	.15
46X105	C10	.10 mf.	360	.20
46X121	C20	.25 mf.	360	.30
46X117	C25	.25 mf.	180	.25
46X121	C26	.25 mf.	360	.30
46X98	C33	.10 mf.	180	.20
46X197	C35	.25 mf.	180	.25
46X147	C36	.005 mf.	360	.15
46X105	C37	.10 mf.	360	.20
46X121	C38	.25 mf.	360	.30
46X161	C40	.01 mf.	600	.15
46X105	C41	.10 mf.	360	.20
46X98	C42	.10 mf.	180	.20
46X181	C46	.10 mf.	240	.15

CONDENSERS (Cont.)

ELECTROLYTIC

Part No.	Code	Capacitance	Voltage	List Price
45X223	C27	4 mf.	150 Dry	$0.75
44X11	C43	18 mf.	299 Wet	1.10
44X30	C44	14 mf.	450 Wet	1.00
45X222	C45	30 mf.	25 Dry	.95

MOLDED

47X69	C1	250 mmf.	.15
47X81	C19	35 mmf.	.25
47X56	C32	50 mmf.	.10
47X57	C34	100 mmf.	.10
47X65	C39	250 mmf.	.15

TRIMMER

17A73	C2	2-25 mmf.	Range "D" Antenna Trimmer	.35
	C3	2-25 mmf.	Range "C" Antenna Trimmer	
	C4	2-25 mmf.	Range "B" Antenna Trimmer	
17A73	C6	2-25 mmf.	Range "D" Interstage Trimmer	.35
	C7	2-25 mmf.	Range "C" Interstage Trimmer	
	C8	2-25 mmf.	Range "B" Interstage Trimmer	
17A76	C11	2-25 mmf.	Range "D" Oscillator Trimmer	.25
	C12	2-25 mmf.	Range "C" Oscillator Trimmer	
	C13	1-12 mmf.	Range "B" Oscillator Trimmer	.20
17A68	C14	1300-1700 mmf.	2000 KC Adjustment	.50
17A75	C15	40-120 mmf.	Oscillator 600 KC Adjustment	.40
	C18	40-100 mmf.	Oscillator 7000 KC Adjustment	
17A70	C22	5-55 mmf.	1st I.F. Trimmer	.40
	C23	15-55 mmf.		
17A70	C29	15-55 mmf.	2nd I.F. Trimmer	.40
	C30	15-55 mmf.		

MISCELLANEOUS

47X80	C16	13 mmf.	Compensating Capacitor	.50
47X89	C17	370 mmf.	Iron Clad	.30
47X91	C21	65 mmf.	Iron Clad	.25
47X91	C24	65 mmf.	Iron Clad	.25
47X91	C28	65 mmf.	Iron Clad	.25
47X83	C31	150 mmf.	Iron Clad	.35
44A70	3 Section Gang Condenser (less dial and drive assembly)			4.20

* Used on late models only.

RESISTORS

CARBON

Part No.	Code	Resistance	Wattage	List Price
A94502	R1	5,000 Ohm	0.2	$0.15
A94503	R2	50,000 Ohm	0.2	.15
C94253	R3	25,000 Ohm	1.0	.15
A94151	R4	150 Ohm	0.2	.15
E94502	R5	5,000 Ohm	3.0	.30
G94602	R6	6,000 Ohm	5.0	.40
A95105	R7	1 Megohm	0.2	.10
A94805	R8	8 Megohm	0.2	.15
A94809	R9	8 Megohm	0.2	.15
A95503	R10	50,000 Ohm	0.2	.10
A95106	R11	10 Megohm	0.2	.10
A94202	R13	2,000 Ohm	0.2	.10
A95205	R14	2 Megohm	0.2	.10
A95503	R15	50,000 Ohm	0.2	.10
A94104	R16	100,000 Ohm	0.2	.15
A94154	R17	150,000 Ohm	0.2	.15
B94403	R18	40,000 Ohm	0.5	.15
A95205	R20	2 Megohm	0.2	.10
A95504	R21	500,000 Ohm	0.2	.10
B93570	R24	57 Ohm	0.5	.20
A93204	R25	200,000 Ohm	0.2	.20
A93143	R26	14,000 Ohm	0.2	.20
A95204	R27	200,000 Ohm	0.2	.10
*B94803	R28	80,000 Ohm	0.5	.15

WIRE WOUND

41X77	R22	27 Ohm	0.25	.35
	R23	175 Ohm	2.0	

VARIABLE

36X236	R12	500,000 Ohm	Volume Control and On-Off Switch	1.00
40X224	R19	1 Megohm	Tone Control	.65

* Used on late models only.

PHONO ATTACHMENT PARTS

Part No.	Description	List Price
13X298	30" Phono Cable Assembly Complete (Includes Plug, Double-tip Phono Jack, Switch, and Knob)	$2.55
3A266	Phono Socket—Octal (4 Prong)—Must be ordered for Chassis not equipped with this socket	.10
6A218	Plug (8 Prong) Only of Phono Cable	.15
3A12	Phono Jack Only of Phono Cable	.10
3A50	Phono Switch Only of Phono Cable	.70
10A90	Knob Only of Phono Cable	.20

DIAL AND DRIVE PARTS WILL BE FOUND IN SPECIAL DIAL AND DRIVE NOTES (see index)

Prices Subject to Change Without Notice.

MODEL D697
MODEL D698
Telephone Dial Data

WESTERN AUTO SUPPLY CO.

NOS. 9, 10, & 11 — 17 BUTTON TELEPHONE DIAL

NOS. 3 & 7 — PHANTOM LIGHT DIAL

APRIL, 1937

Identification of Dial and Chassis

The following description will identify the different dials:

No. 9 Dial—17 Button Telephone Dial—Station call letters in black push buttons.

No. 11 Dial—Same as No. 9 Dial except push buttons are brown.

No. 10 Dial—17 Button Telephone Dial—Station call letters are rectangular in shape and are mounted in rectangular openings in escutcheon ring. Equipped with visible tone and volume indicators.

No. 3 Dial—Glass dial—Moving beam of light indicators—Tone and volume indicated by series of circles.

No. 7 Dial—Glass dial—Moving beam of light indicators—Tone and volume indicated by slanting lines.

The following description will identify the chassis used with the above dials:

8 Tube---D698

11 Tube---D697

Telephone Dial Assembly

The telephone dial assembly provides a means of pre-setting a number of broadcasting stations and tuning in these stations at any time by depressing a button and rotating the dial to a stop position.

The apparatus is mounted on an assembly attached at the front of the chassis. An examination of this assembly will clearly show the method of operation.

Silencer Circuit—A silencer circuit is provided which results in silent tuning between stations when using the telephone dial buttons.

When a telephone dial button is depressed, a circuit is established between the ungrounded end of the volume control and the chassis ground. Referring to Fig. 1 it will be noted that contact is made between the line from the volume control, contact ring, contact washer arm (when button is depressed), spring and pulley ring stud. Since the pulley ring is at ground potential, this grounds the audio voltage and no signal will be heard until the button is released to break the contact.

It should be noted that the contact ring is part of the pulley ring assembly, but is insulated from it.

In the case of powerful local stations a slight amount of signal may be heard when the button is depressed.

Telephone Dial Adjustments

Noise When Tuning in a Signal with a Telephone Dial Button

As explained in the article on "Silencer Circuit" in this manual, no noise or signal should be heard when tuning in a signal with a telephone dial button until the button is released. If noise is heard while tuning in a signal with one of these buttons, it can be corrected as follows:

If Noise Occurs on All Buttons—This is probably due to a poor contact between the flat contact spring and the contact ring—See Fig. 1. Clean the flat contact spring and contact ring to insure a good electrical connection. Ordinary cleaning fluid may be used and will be effective in most cases in cleaning the surface without affecting the plating. If the contact is still not satisfactory, a piece of fine emery cloth may be used.

If Noise Occurs on One Button Only—This is due to a poor contact between the pulley ring stud, spring, contact washer, and contact ring—See Fig. 1. Clean all of these items of the particular button, in the same manner as mentioned previously, so as to provide a good electrical connection.

Telephone Dial Drive Cord Slipping

If the telephone dial drive cord slips on the tuning shaft pulley, this may be remedied by adjusting the drive cord tension pulley. Loosen the tension pulley bracket screw and adjust pulley assembly until the desired tension is obtained.

Position of Stop Pin

When the telephone dial assembly is on the chassis, the gang condenser rotor should not completely open or close. The travel of the rotor in this respect is controlled by the gang stop pin on the pulley ring—See Fig. 4. This is necessary to protect the gang condenser in case the telephone dial is swung rapidly to either of the extreme positions. When the gang stop pin is properly set, it will serve as the stop at both extreme positions. If the rotor is seen to open completely or close completely, the stop pin should be pulled back and re-set to overcome this condition.

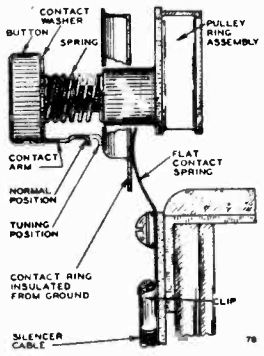


Fig. 1—Silencer Assembly

Greasing and Oiling

After a period of time, put some light grease on the pulley ring shaft and on the teeth of the pulley ring. Use light oil on the drive shaft assembly bearing, care being taken not to get any on the drive cord.

Telephone Dial Replacements

Replacing Complete Dial and Condenser Assembly

Remove the grid lead clip from tube grid cap.

Remove silencer cable from the contact spring assembly. Unsolder dial lamp lead from terminal of tube socket.

Unsolder the three stator section connections of the gang condenser. Unsolder the three braided shield leads which ground the gang condenser frame to the chassis, taking care not to loosen the connections of any other units which are grounded at these common points.

At the back of the gang condenser is a stud which secures the assembly to an "L" bracket which is secured to the chassis.

Through this stud is a cotter pin. Remove only the cotter pin, metal washer, and rubber washer.

Viewing the assembly from the back, on the left is a brass bolt which holds the dial support bracket to the chassis—remove this bolt from underneath the chassis.

Grasp the dial support brace and move entire assembly toward the front of the chassis. When the support casting rubber cushions slip clear of the slot in front of chassis, lift entire assembly clear of chassis.

To replace this assembly, reverse the procedure as given above.

Replacing Pulley and Button Ring Assembly Only

Remove drive cord.

From underneath the chassis, unsolder the dial lamp lead from prong of the tube socket. Pull this lead through and out to the front of the assembly.

Remove the four escutcheon screws which hold the escutcheon ring and glass crystal in place. The dial scale pointer is removed by unhooking it from the center stud. Unscrew and remove center stud, washers, and dial scale. Slide pulley ring assembly off the center shaft.

On the No. 10 dial, two strips of celluloid between the escutcheon ring and the glass crystal will have to be removed.

To replace the pulley ring assembly, proceed as follows: Lay the assembly face down and adjust the stop pin. The stop pin (Fig. 2) is directly in back of the wide spacer on the dial button ring. Pull this pin back and adjust it to the center position —See Fig. 2.

Rotate tuning condenser rotor counter-clockwise (from front) as far as possible—See. Fig. 2.

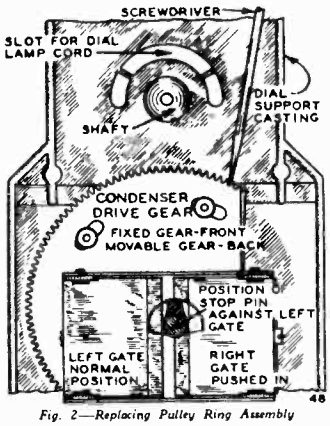


Fig. 2—Replacing Pulley Ring Assembly

Place the pulley ring assembly on the shaft with the knot of the dial lamp lead at the top—do not engage the gears.

Pull the dial lamp lead through the slot in the pulley ring gear and through the long slot in the dial support casting. Then place this lead through the clip under the dial support brace and out through the opening in the back of this brace.

With the gears still disengaged, rotate the pulley ring clockwise (frum front) ⅓ revolution until the stop pin passes over the right gate and comes to rest against the left gate—See Fig. 2.

With the condenser rotor fully closed, push the pulley ring on the shaft until the pulley ring gear engages the *fixed gear only* (front) of the condenser drive gear assembly. Hold the pulley ring assembly and with a fine blade screw driver, move the movable (back) gear clockwise one tooth relative to the fixed gear—See Fig. 2. Then push the pulley ring all of the way on, engaging the movable gear.

Now lay the chassis on its back. Replace in the order given the large washer with rectangular hole, dial scale, washers, center stud, dial pointer, glass crystal, and escutcheon. Resolder the lamp lead.

For the No. 10 dial, before putting the escutcheon on, lay the two celluloid strips on the glass crystal with the inside flange facing away from the glass. Then lay the escutcheon on top of the celluloid strips. The section not cut out for station call letters should be at the wide spacer in the button spacer ring. Center the small holes in the celluloid discs in the station call letter openings and then tighten the escutcheon screws.

The stop pin must now be adjusted, as explained in article "Position of Stop Pin," until the condenser does not open or close fully. Injury to the condenser will result if allowed to open or close fully.

Replace the drive cord as explained in the article "Replacing Drive Cord."

Replacing Gates

After a great amount of use, one or both of the stop gates may wear, making it necessary to replace the stop gate assembly. This is done by first removing the pulley ring assembly as explained in the article "Replacing Pulley and Button Ring Assembly."

The stop gate assembly is then removed by taking out the two screws at the bottom of the assembly.

WESTERN AUTO SUPPLY CO.

MODEL D698
Schematic, Phono.
Transformer Data

Power Consumption - 67 Watts (At 117 volts 60 cycles)
Power Output - - - - - 2.5 Watts Undistorted, 4.5 Watts Maximum
Selectivity - 30 KC Broad at 1000 times Signal
Intermediate Frequency (Sharp) - - - - - 456 KC.
Speakers - - - - - 8", 10" or 12" Dynamic

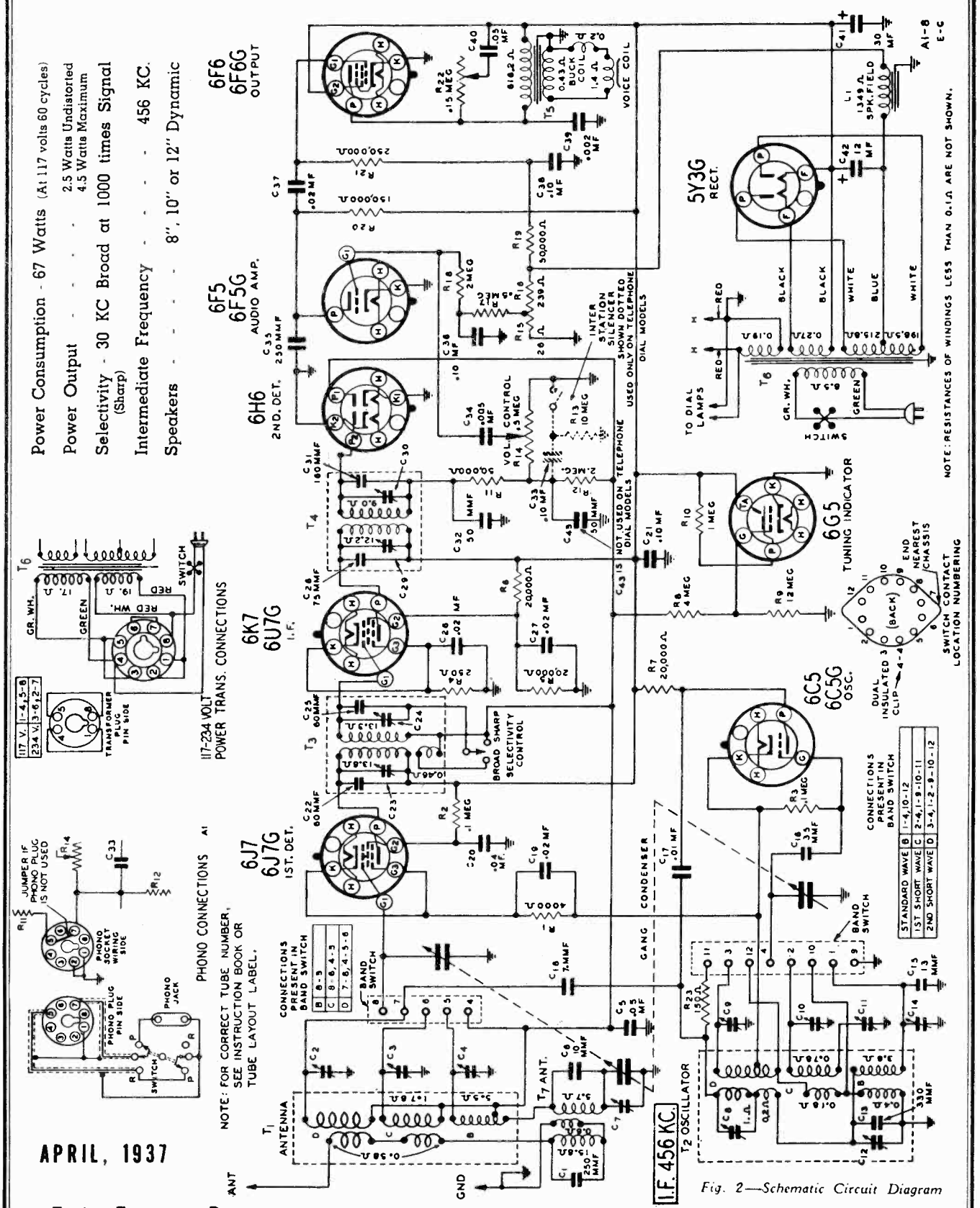


Fig. 2—Schematic Circuit Diagram

Tuning Frequency Range

B Range	528 to 1830 KC.
C Range	1810 to 6350 KC.
D Range	6300 to 22000 KC.

Sensitivity

B Range	8 Microvolts Average
C Range	13 Microvolts Average
D Range	9 Microvolts Average

MODEL D698
Alignment, Voltage
Socket, Trimmers, Coils

WESTERN AUTO SUPPLY CO.

8 TUBE • 3 BAND • ALL WAVE

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.
Selectivity Control—Sharp Position All Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

The following equipment is required for aligning:
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter — Non-Metallic Screwdriver.
Dummy Antennas — .1 mf., 200 mmf., and 400 ohms.

STEP (Follow Order at Given)	BAND SWITCH SETTING	DUMMY ANTENNA	SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	TRIMMERS ADJUSTED See Illustration	PROCEDURE INITIAL STEPS	PROCEDURE ADJUSTMENT
I. F.							
2nd I.F. Adj.	Range B	.1 mf.	456 KC	Grid of I.F. Tube	2nd I.F. (C29) & (C30)	Turn Rotor to Full Open	Adjust to Maximum Output
1st I.F. Adj.	Range B	.1 mf.	456 KC	Grid of 1st Det.	1st I.F. (C23) & (C24)	Turn Rotor to Full Open	Adjust to Maximum Output
RANGE B							
1830 KC	Range B	200 mmf.	1830 KC	Antenna Lead	Oscillator Range B (C14)	Turn Rotor to Full Open	Adjust to Maximum Output
1500 KC	Range B	200 mmf.	1500 KC	Antenna Lead	1st Ant. Range B (C7) 2nd Ant. Range B (C4)	Turn Rotor to Max. Output Set Indicator to 1500 KC — See Note A	Adjust to Maximum Output
600 KC	Range B	200 mmf.	600 KC	Antenna Lead	600 KC (C12)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE C							
6350 KC	Range C	400 Ohm	6350 KC	Antenna Lead	Oscillator Range C (C10)	Turn Rotor to Full Open	Adjust to Maximum Output
6000 KC	Range C	400 Ohm	6000 KC	Antenna Lead	Antenna Range C (C3)	Turn Rotor to Max. Output	Adjust to Maximum Output
2000 KC	Range C	400 Ohm	2000 KC	Antenna Lead	2000 KC (C11)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE D							
22,000 KC	Range D	400 Ohm	22,000 KC	Antenna Lead	Oscillator Range D (C9)	Turn Rotor to Full Open	Adjust to Maximum Output
20,000 KC	Range D	400 Ohm	20,000 KC	Antenna Lead	Antenna Range D (C2)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
7000 KC	Range D	400 Ohm	7000 KC	Antenna Lead	7000 KC (C8)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B

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

After each range is completed, repeat the procedure as a final check.

NOTE A—In sets using the telephone dial tuning, there will be seen inside the telephone dial button ring an escutcheon plate held in place by four screws. Loosen the 2 screws nearest the pointer. An extension of the pointer will be seen protruding over the edge of this escutcheon plate. Move the pointer to the 1500 KC mark on the dial and then tighten the 2 escutcheon screws. (Do not tighten these screws too much.)

In sets using the moving beam of light indicator, there is a 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 the beam is at the 1500 KC mark on the dial. Retighten the screw.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

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 on the dial. It may be necessary to increase the input signal to hear the image.

NOTICE—Re-alignment is necessary if glass tubes are replaced by their equivalent in metal tubes, or vice versa, in the R.F. and I.F. stages.

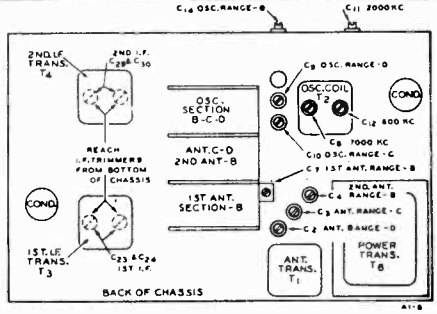


Fig. 3—Location of Trimmers

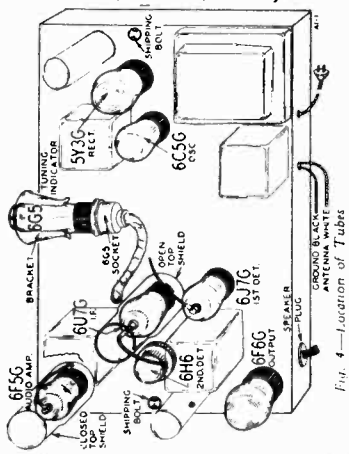


Fig. 4—Location of Tubes

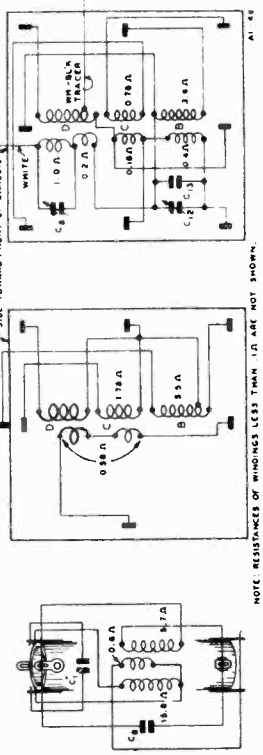


Fig. 7—Coil Terminal Arrangement and D.C. Resistance of Windings

Phonograph Connections

Phonograph connections are made as shown in the schematic circuit diagram Fig. 2. On the side panel of the chassis base is a round knockout 1⅛ inches in diameter. An octal base socket is mounted in this knockout opening and wired as shown in the schematic.

A phono cable assembly may then be purchased (see parts list). On one end of this cable is an octal plug and on the other end is a phonograph radio switch and double tip jack.

Some models are shipped from the factory equipped with the phono socket. A jumper is inserted in this socket which must be removed if the phonograph installation is made—See Fig. 2.

Early Models—A few of the early models did not have the circular knockout for the phonograph socket as mentioned above. If a phonograph installation is to be made in connection with one of these early models, write the factory for detailed instructions.

VOLTAGES AT SOCKETS

Line Voltage: 117—Volume Control: Maximum
Readings taken with 1000 Ohm-per-volt meter.
Antenna Shorted to Ground
Position of Band Switch: Standard Wave

TUBE	FUNCTION	VOLTAGE BETWEEN SOCKET PRONG 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
6J7 6J7G	1st Det.	0	6.1(1)	220	100	7.9		6.1(1)	7.9
6C5 6C5G	Osc.	0	6.1(1)	140				6.1(1)	0
6K7 6U7G	I.F.	0	6.1(1)	220	100	2		6.1(1)	2
6H6	2nd Det.	0	6.1(1)		0			6.1(1)	0
6F5 6F5G	Audio Amp.	0	6.1(1)		75			6.1(1)	0(2)
6F6 6F6G	Power	0	6.1(1)	215	220			6.1(1)	0(3)
5Y3G	Rectifier	0	4.9(4)		610(5)		610(5)		4.9(4)
6S5	Tuning Indicator	Plate to Ground 20		Target to Ground 220		Cathode to Ground 0		Across Heater 6.1 A. C.	

(1) A.C. voltage as read across heater terminals 2 and 7.
(2) Bias (1.5 volts) as read across resistor R15.
(3) Bias (14 volts) as read across resistors R15 and R16.
(4) A.C. voltage as read across filament terminals 2 and 8.
(5) A.C. voltage as read across terminals 4 and 6.

MODELS D701, D721, S721 (1936)

WESTERN AUTO SUPPLY CO. Schematic, Specifications

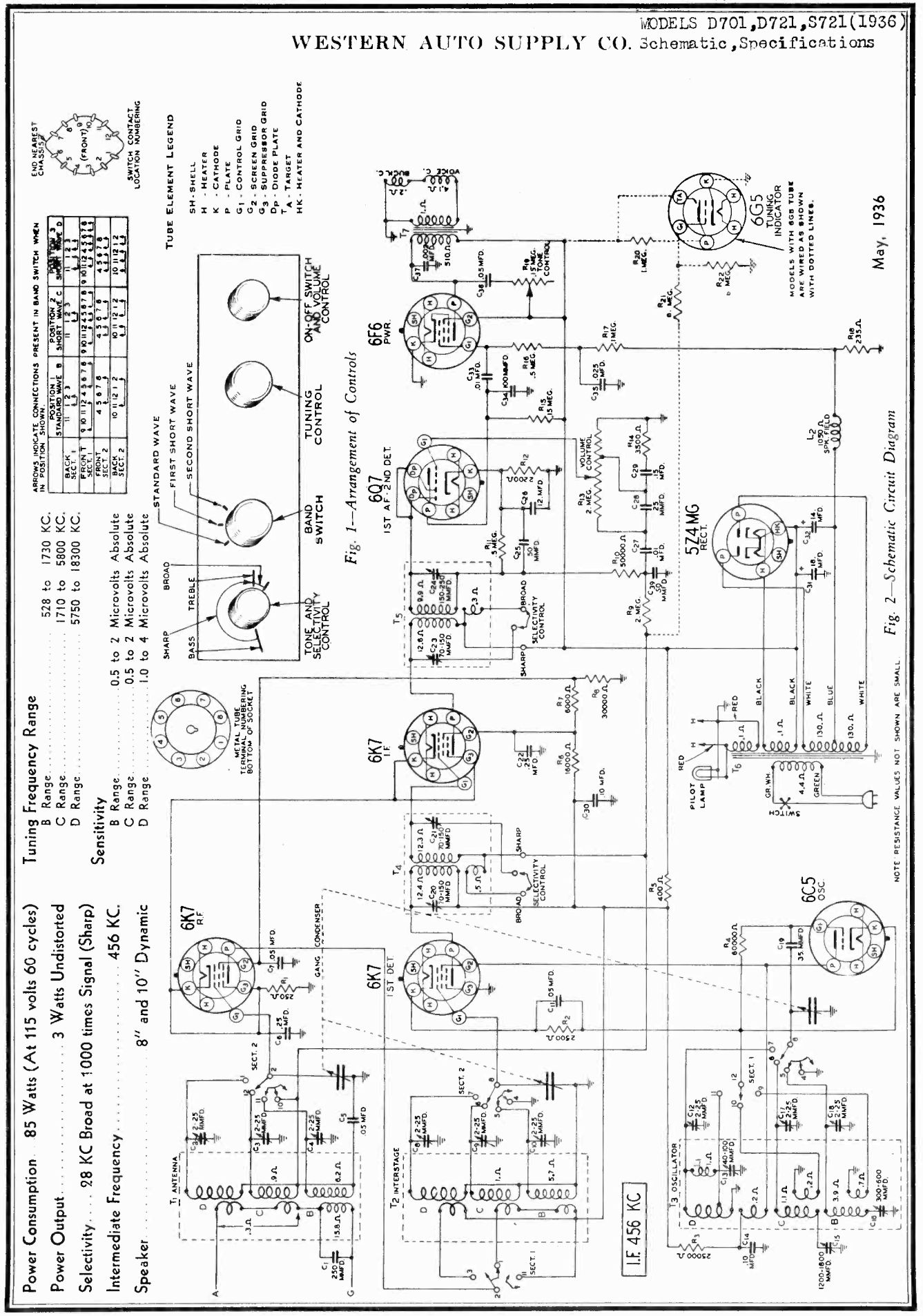


Fig. 1—Arrangement of Controls

Fig. 2—Schematic Circuit Diagram

May, 1936

Circuit

This model is a three band radio with a tuning range in each band as shown in the specifications above. Three band coverage is accomplished by means of three sets of R. F. and oscillator coils and a two-section triple throw switch.

Referring to the schematic circuit diagram, Fig. 2, T1 and T2 are the antenna and interstage R. F. transformer assemblies and T3 is the oscillator coil assembly. The standard wave, 1st, and 2nd short wave coils in each assembly are indicated by the letters B, C and D respectively. The band switch sections are designated as section one and section two.

The band switch completes connections to the coils in use. It also short circuits the R. F. transformer secondary and oscillator coil 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 through the interstage R. F. transformer with tuned secondary into another 6K7 tube which functions as the 1st detector.

A separate type 6C5 tube is employed in the oscillator circuit. The oscillating circuit is always resonant at 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 1st detector tube. This results in the intermediate or beat frequency of 456 KC being 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 T4 and T5 in Fig. 2, it will be noted that there is a coupling winding shown in the illustration below the primary of T4 and below the secondary of T5.

When the selectivity control is in the sharp position, the coupling windings are open circuited and the loose coupling which exists between the primary and secondary of these transformers results in high selectivity.

When the selectivity control is in the broad position, the coupling winding which is wound under the primary in the case of T4 is connected in series with the secondary. In the case of T5, the coupling winding which is wound under the secondary is in series with the primary. This provides overcoupling which results in a greatly widened resonance curve. Passage of a wide range of audio frequencies is thus obtained.

A type 6Q7 duo-diode triode tube functions as the second detector and a one stage amplifier. The two diode plates are connected together. AVC voltage is applied through isolating resistors to the control grid circuits of the R. F. and I. F. tubes. The audio voltage developed across volume control resistor R13 is applied through the movable arm to the control grid of the 6Q7 tube.

Across the volume control resistor R13 is a filter composed of condensers C28 and C29 and resistor R14. A tap connection near the low potential end of the volume control is connected between the two condensers. At high volume settings, the filter is not effective. At the low volume settings, as the pointer approaches the tap, the higher frequencies are bypassed through condenser C29. Very high frequencies are transmitted through condenser C28 to compensate for the reduction of these frequencies. At low volume settings the low frequency amplitudes are increased as a result.

Resistance coupling is used between the first audio stage and the output stage which employs a type 6P6 output pentode tube. A type 5Z4MG (metal glass tube) full wave rectifier is used in the power unit.

The models with the tuning indicator tube are wired as shown in the schematic. This tube contains a triode and cathode ray section in one envelope.

The cathode ray is produced by the attraction of electrons from the upper end of the cathode to the coated target or anode, which is operated at a high positive potential. When this electron stream strikes the target the coating glows. The electron stream is controlled by an additional element, or control electrode, in the tube.

As a signal is tuned in, the control grid of the triode section of the 6E5 cathode ray tube becomes increasingly negative, the negative bias voltage being taken from the AVC line. The AVC voltage is reduced to a suitable value by the potentiometer arrangement of the 10 and 1.5 megohm resistors. The increased bias voltage reduces the triode plate current. This reduces the voltage drop across the 1 megohm plate resistor and raises the triode plate voltage. The triode plate is connected to the control electrode of the cathode ray section of the tube.

The shape and size of the area on the target struck by the cathode ray is governed by the voltage of the control electrode. When the signal is tuned to resonance, practically no plate current flows and the voltage of the control electrode is the same as that of the target. There is no opposition to the flow of electrons to the target. Tuning off resonance decreases the control electrode voltage and causes the darkened sector of the target to widen, because of the opposition to the flow of electrons in the direction of the control electrode.

Alignment and Calibration

Correct alignment is extremely important in connection with all wave radios. 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, 1800, 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.

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 (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 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. 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 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 AVC action.

Adjust the oscillator Range B trimmer (C18) 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 interstage Range B trimmer (C10) and antenna Range B trimmer (C4) 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 selector to the Range C position (1st short wave band).

Adjust the oscillator Range C trimmer (C17) 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 (C9) and antenna Range C trimmer (C3) 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 selector to the Range D position (2nd short wave band).

Adjust the oscillator Range D trimmer (C12) 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 (C8) and antenna Range D trimmer (C2) 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.

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.

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.

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.

Voltage Chart

The voltage readings are taken with a voltmeter having a resistance of 1000 ohms per volt.

The standard metal tube socket terminal numbering system (bottom of socket) is shown in Fig. 5. On the schematic circuit diagram, Fig. 2 is a list giving the complete names of the tube elements and the corresponding symbols as used on the sockets on the schematic.

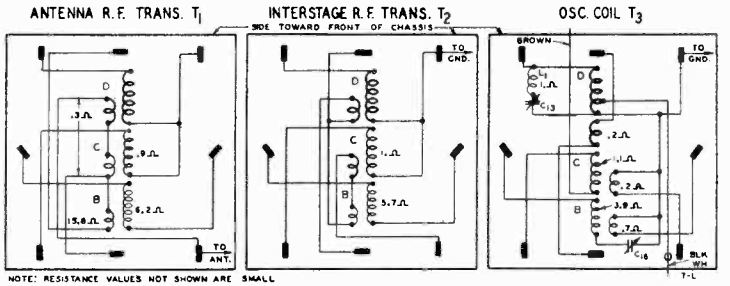


Fig. 4—R. F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

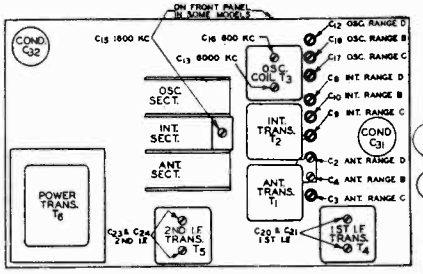


Fig. 3—Location of Trimmers

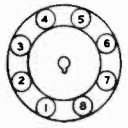


Fig. 5—Metal tube terminal numbering (bottom of socket)

Drive Assembly

This model uses a two-speed planetary drive.

All of the early sets are equipped with a flat belt and may be identified by the ¼ inch wide belt. The later sets use the same type of drive, but have a black cord belt. This is a bronze cable with a black fabric covering. It is about 1/16 inch in diameter.

The belt type also has an idler pulley which the cord type does not have.

The planetary assembly is the unit that is integral with the tuning shaft. It is at the bottom of the belt. If the nut 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 the nut is too loose, the drive will slip in slow speed. The remedy in this case is, of course, to tighten up the nut.

Should the drive belt slip when the planetary pulley is turning, first inspect the drive drum assembly. This is the assembly which is mounted on the tuning condenser shaft. If this assembly and the tuning condenser rotor turn satisfactorily, the belt is probably too loose and a new one will be required. In the sets with the flat belt type of drive, there is an idler pulley which can be positioned, and by means of which the belt tension can be increased. In this type, therefore, the belt tension should be increased before attempting to put on a new one.

The replacement parts list shows the parts used in each type of drive and the parts common to both types.

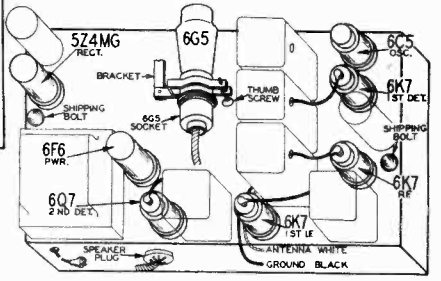


Fig. 6—Location of Tubes

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	6.1(1)	260	100	4.0	....	6.1(1)	4.0
6K7	1st Det.	0	6.1(1)	260	118	0	....	6.1(1)	9.0
6C5	Osc.	0	6.1(1)	120	...	0	....	6.1(1)	0
6K7	I.F.	0	6.1(1)	260	138	4.0	....	6.1(1)	4.0
6Q7	1st A.F.—2nd Det.	0	6.1(1)	105	0	0	....	6.1(1)	1.4
6F6	Power Amp.	0	6.1(1)	238	260	18	....	6.1(1)	0
5Z4MG	Rect.	0	4.9(2)		680(3)		680(3)		4.9(2)
6E5	Tuning Indicator	Plate to Ground 30(4)		Target to Ground 270		Cathode to Ground 0		Across Heater 6.1 A.C.	

(1) A.C. voltage as read across heater terminals 2 and 7.
(2) A.C. voltage as read across heater terminals 2 and 8.
(3) A.C. voltage as read across terminals 4 and 6.
(4) As read with 500,000 ohm meter.

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.

The phono switch must 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. Unsolder the .01 mf. condenser C27 from the volume control.

Strip about 2¾ inches of the shielding from each end of the cable furnished with the phono attachment parts. Connect one lead of the cable to the terminal on the volume control from which condenser C27 was removed. The other end of this lead is connected to the phono switch as shown in Fig. 7. The second cable lead is connected to the open end of condenser C27. Then connect the other end of this lead to the phono switch as shown in Fig. 7. Both of the shielded cable leads connected to the phono switch are connected to the switch terminals nearest the chassis base. Before connecting the cable leads to the phono switch, it will be necessary to slip a piece of varnished tubing over the portion of the cable that passes near the 6K7 1st I.F. tube socket.

Now ground the shielding by soldering it to the lugs on the chassis base. One of these lugs is located just below the planetary drive; the other is near the rear mounting foot of the gang condenser.

Complete the other connections as illustrated in Fig. 7. The lead between the tone control and the .05 mf. tubular condenser C36 mounted on the back of the chassis base, should be covered with a piece of varnished tubing.

The tin plate shield is soldered to the tone control mounting bracket in such a way that when it is bent down toward the bottom and back of the chassis it will shield the lower leads of the phono switch and the lead between the tone control and tubular condenser C36.

After making the phono connections, the I.F. stages should be realigned.

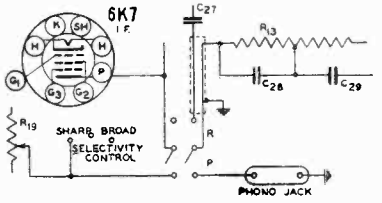


Fig. 7—Phonograph Connections

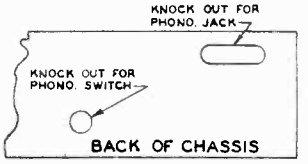


Fig. 8—Location of Phono Knockouts

Switch Contact Location Numbering

A standard arrangement for switch contact location numbering has been adopted. This numbering is illustrated in Fig. 2. In contact locations not used, the number applying to that particular location is not employed.

MODEL D705
Issues 1 to 6

WESTERN AUTO SUPPLY CO.

Drive Cord Data
Switch Data, Phono.

Drive Cord Replacement

LATE MODELS—Tie a knot with a small loop at one end of the new drive cord. Slide a 1¾ inch length of fabric tubing on the cord. The free end of the drive cord should be tied to the tension spring in such a manner that there is a distance of 56⅜ inches between the knots.

Turn the gang condenser to full open position.

Place the looped end of the drive cord over the hook on condenser drive drum A—See Fig. 2. Bring the cord up through the slot in the drum rim and pass to the right (from back of chassis) and around pulley B. Then bring the cord to the left and over pulley C. See that the fabric tubing is now between pulleys B and C. Continue cord down to control shaft D and wind 3½ turns counter-clockwise (from back of chassis) on shaft D. Bring cord up to and over pulley E. Bring cord down to top of drive drum A and wind one turn clockwise around the drum rim.

Pass the remaining drive cord and tension spring through the slot in the drum. Place free end of spring over the hook on the condenser drive drum.

EARLY MODELS—The procedure is the same as for the late models with the following exceptions:

The distance between the knots on the drive cord should be 49¼ inches.

Leaving shaft D (Fig. 3), the drive cord is brought directly to the top of drive drum A and then continued as in late models.

Permeability Tuning and Band Switch Assemblies—Differences in Early Models

A few of the first models used a station button plunger 6$^{13}/_{32}$ inches long. These models may be identified by a red paint mark on the front bracket of the tuning unit at the upper right corner. On later models, this length was changed to 6$^{1}/_{16}$ inches. These models have an orange paint mark in place of the red mark. It is important, therefore, that the length be noted when ordering this part and the correct part number, as shown in the parts list, be specified.

The plungers are replaceable only on the permeability (6 button) tuning unit. In the case of the band switch unit, if any parts require replacing, the entire assembly must be ordered. Two of these assemblies are listed, one using the early short shaft and the other using the later long shaft. The short shaft (early unit) has no paint mark on it. The long shaft (late unit) has an orange paint mark on it.

A change was also made on the tuning rod assembly (Rod on which 2 iron cores are mounted). The rod used on early models was 3¾ inches long and the back end of the rod rested in a small cup in the end of the compression spring. The rod used on late models is 4¾ inches long, extends through the compression spring and projects beyond the rear bracket of the tuning assembly. Only the later type rod complete with the compression spring and a small washer is being furnished for replacement. This complete assembly is interchangeable with the early type.

ATTACHING DIAL POINTER—Tune in a 1500 KC signal. Move the pointer to the 1500 KC mark on the dial and clamp it tightly over the fabric tubing on the cord.

Phonograph Connections

Phonograph connections are made as shown in the schematic circuit diagram. On the back panel of the chassis base is a round knockout 1$^{9}/_{64}$ inches in diameter. An octal and on the other end is a phono-base socket is then mounted in this knockout opening. In the case of the jack. early models a 1$^{9}/_{64}$ inch hole must be drilled in the back panel. A phono cable assembly may then be purchased (see parts list). On one end of this cable is an octal plug

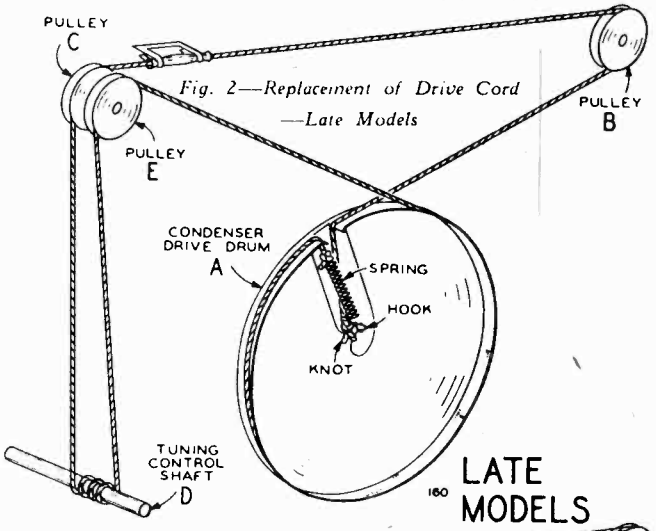


Fig. 2—Replacement of Drive Cord —Late Models

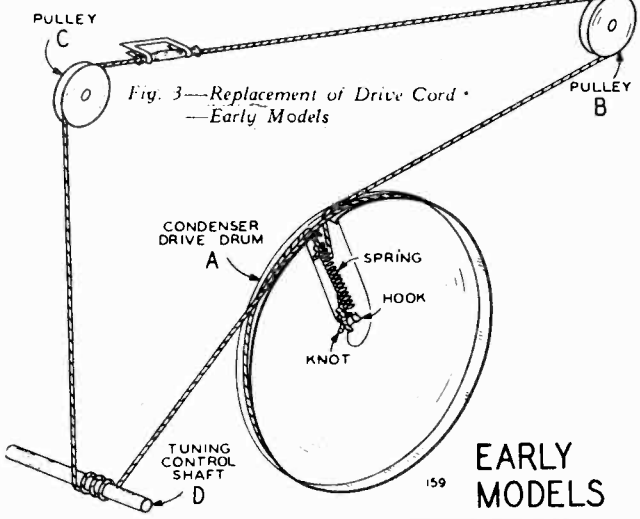


Fig. 3—Replacement of Drive Cord —Early Models

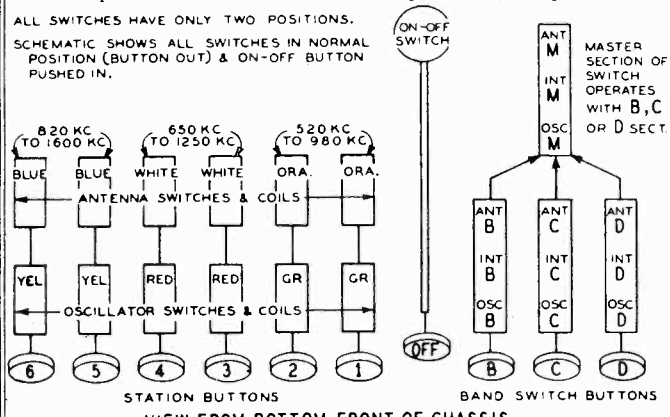


Fig. 5—Permeability Tuning Unit and Band Switch Arrangement.

MODEL D705
Issues 1 to 6 incl.
Distortion Notes

WESTERN AUTO SUPPLY CO.

MODEL D705
Issues 2 to 6 incl.
Schematic, Voltage, Coils
Trimmers, Changes

ISSUE NUMBER CHANGES

The last digit of the number on the chassis number label identifies the radio as to the issue number.

ISSUE NO. 1

The information (see notes for issue 1) with the exception of the Replacement Parts List and Schematic Circuit Diagram, applies with minor changes to all chassis issues, 1 through 6. The Replacement Parts List and Schematic Circuit Diagram, however, apply only to No. 1 issue chassis.

ISSUE NOS. 2 and 3

MECHANICAL CHANGES -- The station button plunger has a length of 7-3/16 inches.

The locking plate for the station button plungers has been redesigned and now employs two side arms mounted in rubber cushioned hinge brackets which are attached to the rear bracket of the tuner assembly by two screws.

ELECTRICAL CHANGES -- The AVC voltage is fed to the grid of the R.F. tube through the manual and automatic tuning coils. Formerly, it was applied directly to the grid of the R.F. tube through a 1 Megohm resistor.

The operating voltages of several of the tubes have been changed. Correct values are shown on the schematic in this supplement.

ISSUE NOS. 4 and 5

MECHANICAL CHANGES -- The antenna coil (T1) and Wave Trap Coil (L1) have been moved from the top of the chassis base to a position just in back of the band switch underneath the chassis base.

The Wave Trap Trimmer (C1) has been moved from its former position near the 1st I.F. Transformer (T6) to a position near the 6U7G R.F. tube.

ELECTRICAL CHANGES -- The Wave Trap Coil (L1) and Trimmer Condenser (C1) have been removed from the antenna circuit and are now connected in the interstage circuit.

ISSUE NO. 6

ELECTRICAL CHANGES -- The Tone Control, formerly in the 1st audio plate circuit, has been put in the diode circuit. A 1 Megohm Tone Control (R22) and a .02 mf. (C37) condenser were used in the audio plate. A 3 Megohm Tone Control (R32) and a .001 mf. (C49) condenser are used in the diode circuit.

MECHANICAL CHANGES -- The antenna coil (T1) and Wave Trap Coil (L1) have been moved from the top of the chassis base to a position just in back of the band switch underneath the chassis base.

The Wave Trap Trimmer (C1) has been moved from its former position near the 1st I.F. Transformer (T6) to a position near the 6U7G R.F. tube.

ELECTRICAL CHANGES -- The Wave Trap Coil (L1) and Trimmer Condenser (C1) have been removed from the antenna circuit and are now connected in the interstage circuit.

CHANGES IN LATER PRODUCTION

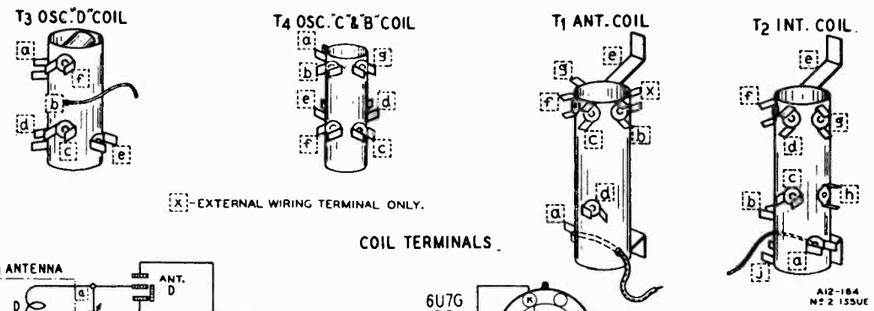
Mechanical and electrical changes have been made in the later productions, including several new dials. Changes and parts lists of Issues 2 to 6 are given herewith.

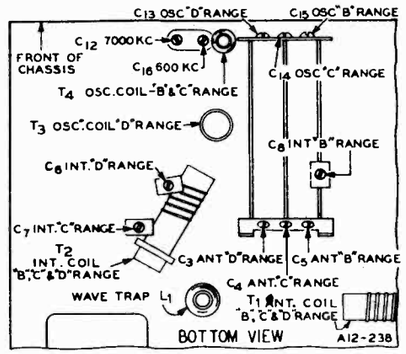
FOR THE FOLLOWING ELECTRICAL CHANGES REFER TO SCHEMATIC ON THIS PAGE.

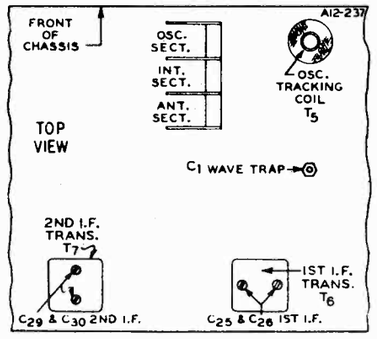
DISTORTION (ALL ISSUES NOS. 1 THROUGH 6)

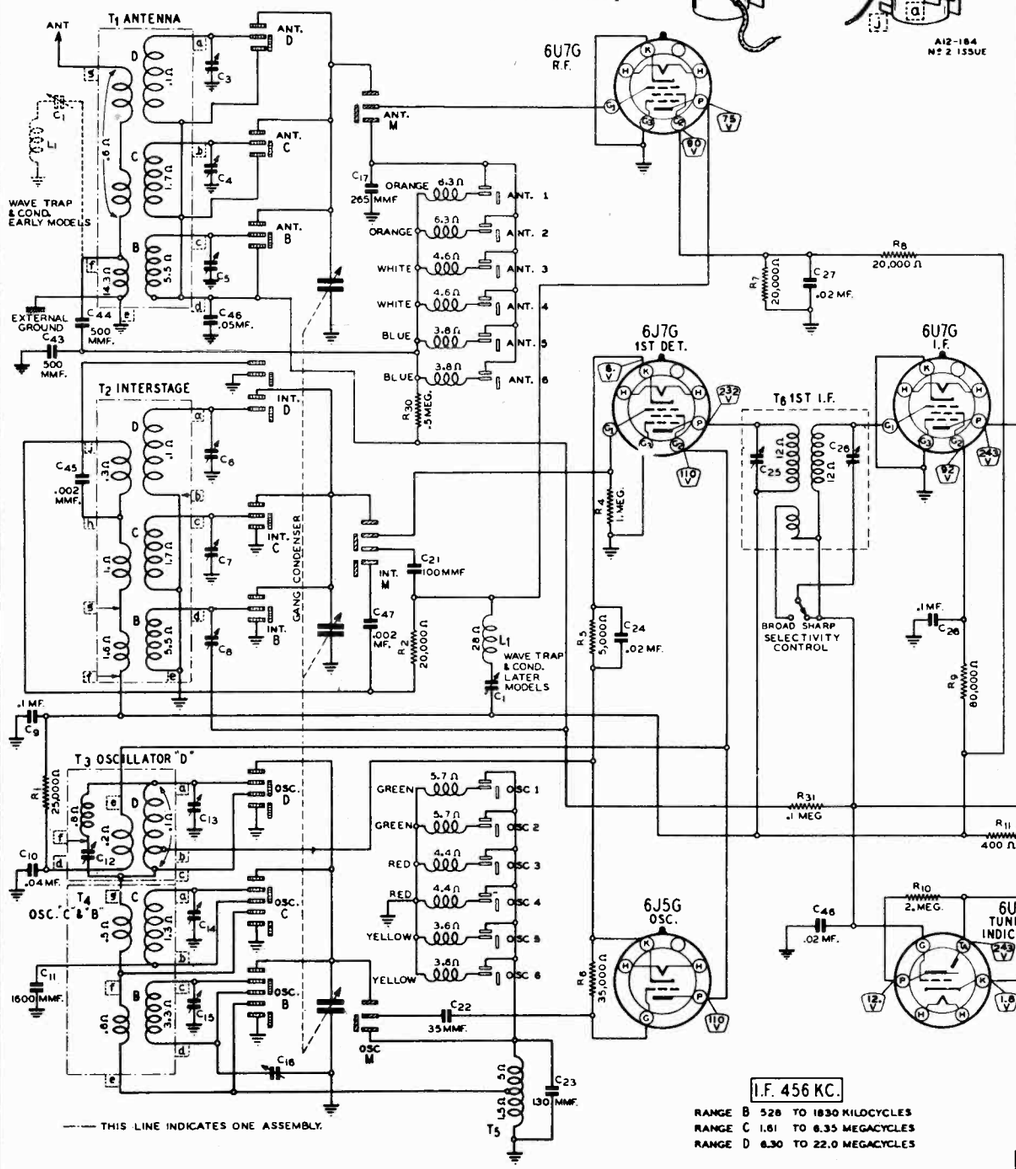
If mushy reproduction is encountered on a medium or strong signal after the radio has been turned on for about ten minutes, it probably is due to grid current in the 6U7G R.F. and I.F. tubes.

Change the 4 megohm resistor R14 to a 2 megohm resistor and if this does not clear up the reproduction replace either the 6U7G R.F. or I.F. tubes or both of them.





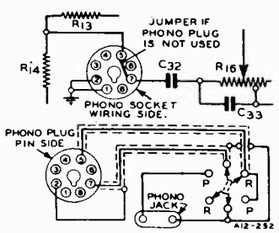




JULY, 1938

SCHEMATIC CIRCUIT DIAGRAM FOR ISSUE NOS. 2 THROUGH 6.

SOCKET LAYOUT: SEE ISSUE NO. 1 SOCKET LAYOUT.

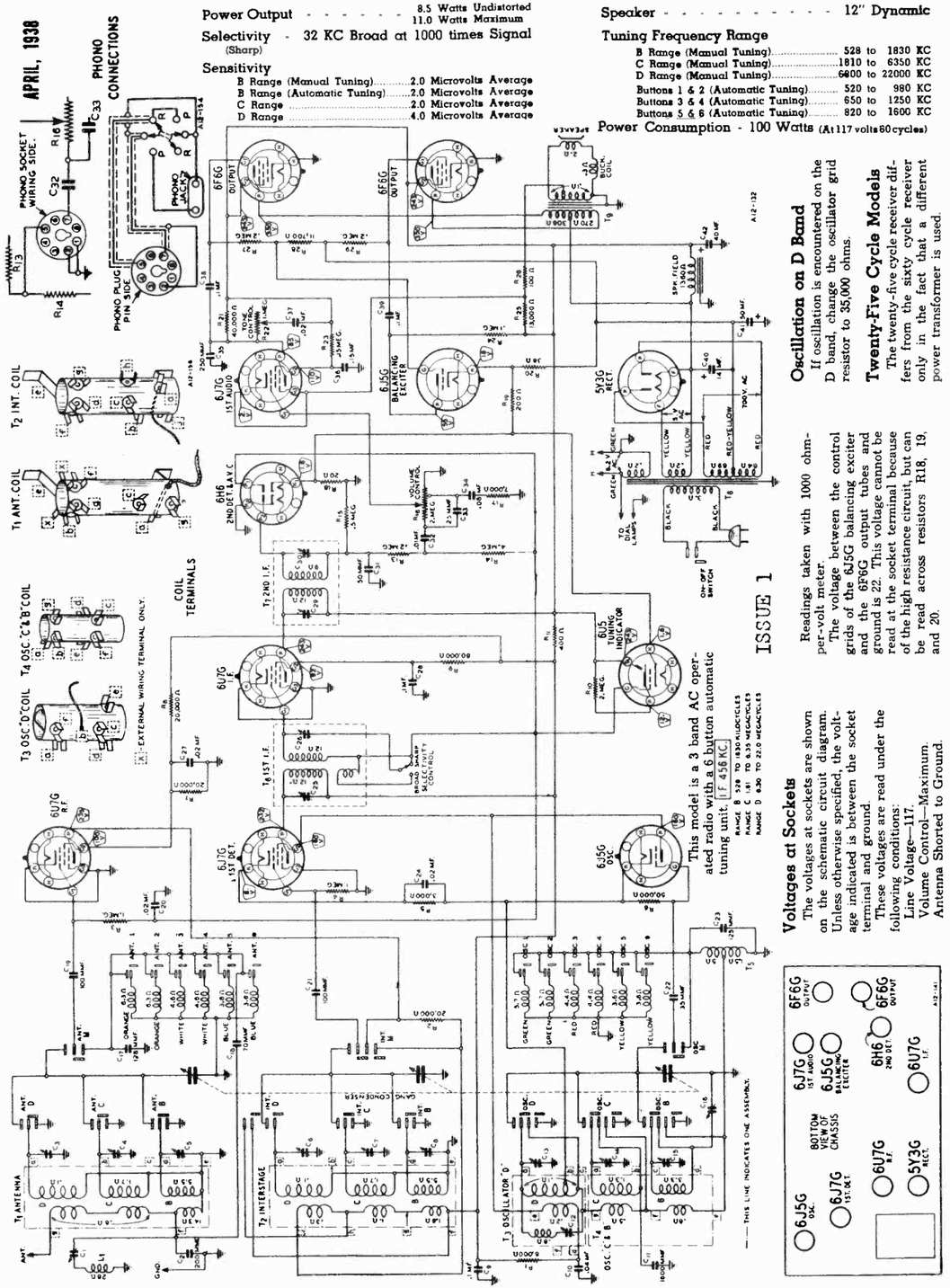


PHONO CONNECTIONS

MODEL D705, Issues 1 to 6
Socket, Specifications
Notes

WESTERN AUTO SUPPLY CO.

MODEL D705, Issue 1
Schematic, Voltage



Power Output - - - - - - - 8.5 Watts Undistorted
11.0 Watts Maximum

Selectivity - 32 KC Broad at 1000 times Signal (Sharp)

Sensitivity

B Range (Manual Tuning)	2.0 Microvolts Average
B Range (Automatic Tuning)	2.0 Microvolts Average
C Range	2.0 Microvolts Average
D Range	4.0 Microvolts Average

Speaker - - - - - - - - - - - 12" Dynamic

Tuning Frequency Range

B Range (Manual Tuning)	528	to 1830 KC
C Range (Manual Tuning)	1810	to 6350 KC
D Range (Manual Tuning)	6400	to 22000 KC
Buttons 1 & 2 (Automatic Tuning)	520	to 980 KC
Buttons 3 & 4 (Automatic Tuning)	650	to 1250 KC
Buttons 5 & 6 (Automatic Tuning)	820	to 1600 KC

Power Consumption - 100 Watts (At 117 volts 60 cycles)

Oscillation on D Band

If oscillation is encountered on the D band, change the oscillator grid resistor to 35,000 ohms.

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.

This model is a 3 band AC operated radio with a 6 button automatic tuning unit. I.F. 456 KC.

RANGE B 528 TO 1830 KILOCYCLES
RANGE C 1810 TO 6350 KILOCYCLES
RANGE D 6400 TO 22.0 MEGACYCLES

ISSUE 1

Readings taken with 1000 ohms-per-volt meter.
The voltage between the control grids of the 6J5G balancing exciter and the 6F6G output tubes and ground is 22. This voltage cannot be read at the socket terminal because of the high resistance circuit, but can be read across resistors R18, 19, and 20.

Voltages at Sockets

The voltages at sockets are shown on the schematic circuit diagram. Unless otherwise specified, the voltage indicated is between the socket terminal and ground.

These voltages are read under the following conditions:
Line Voltage—117.
Volume Control—Maximum.
Antenna Shorted to Ground.

MODEL D705, Issues 1 to 6
Alignment, Trimmers

WESTERN AUTO SUPPLY CO.

Circuit

Ten buttons are provided on the front panel. Three buttons actuate linear band switches for a broadcast and 2 short wave manual tuning ranges. Six buttons actuate switches which connect fixed tuned circuits for automatic tuning. Depressing any of the 9 band and automatic tuning buttons also turns on the radio. Depressing the 10th button will turn the radio to the off position.

The band switch has 4 arms as shown in Fig. 5, one each for the B, C, and D bands (broadcast, 1st and 2nd short wave, respectively) and one called the "Master" arm. The master arm switches from manual to automatic tuning and vice versa. This arm is actually over the other 3 arms rather than in back of them, as shown in the illustration. Depressing any of the B, C, or D band buttons actuates the arm for that band and also the master arm. The latter is in only when one of the 3 band switch buttons is depressed.

In manual tuning, an R. F. antenna transformer with tuned secondary is used before the 6U7G R.F. tube. The output of this tube is fed through another R. F. transformer with tuned secondary into the 6J7G 1st detector tube. A 6J5G tube functions as a separate oscillator. The antenna, interstage, and oscillator circuits are tuned by sections of the gang condenser.

In automatic tuning, the gang condenser is not used. A single tuned circuit is used before the R. F. tube while a stage of resistance coupling is employed between this tube and the 1st detector. The other automatic tuned circuit is the oscillator grid circuit. Tuning of the R. F. and oscillator fixed tuned circuits to the desired frequency is accomplished by varying the inductance of tuning coils by changing the permeability of the magnetic circuit. This is done by moving an iron core in and out of the coil.

The iron cores within the automatic tuning antenna and oscillator coil forms are secured to a brass rod. This rod is moved back and forth by a screw at the front of the radio.

Alignment between the oscillator and antenna automatic tuning coils is obtained by changing the antenna (rear) coil position while the iron core is held in place on the shaft.

In the schematic, the band switch and the automatic tuning switch are broken into sections each of which is given a name that is, to some extent, descriptive of its location in the circuit. Ant. D, for example, completes the antenna coil D band connections when the D range button is depressed. The location of the Ant. D connections on the band switch is shown in Fig. 5. All of the switches have only 2 positions. In the schematic, they are in the normal or button out position.

Now, to describe the connections for one manual tuning range: Let us assume that the B band button is depressed. The antenna transformer B band secondary is connected to the R. F. tube grid circuit through the Ant. B and Ant. M sections of the B band and master switch arms. The antenna transformer C and D band secondaries are short circuited.

The interstage transformer B band secondary is connected to the 1st detector tube grid circuit through the Int. B and Int. M sections of the switch arms mentioned above. The interstage transformer C band secondary is short circuited and the D band secondary is open circuited.

The oscillator B band grid coil is connected to the grid circuit of the oscillator tube through the Osc. B and Osc. M sections of the same switch arms as mentioned above. The oscillator B band cathode coil is connected to ground through the Osc. B section. The oscillator C and D band grid coils are short circuited.

The permeability tuning coils are open circuited.

In like manner, to describe the connections for one automatic tuning circuit, assume that button number 1 is depressed.

The antenna circuit is connected to the R. F. tube grid circuit through the Ant. M section of the master switch arm. The antenna circuit is also connected to the antenna No. 1 permeability coil through Ant. 1 switch. The antenna No. 1 coil is shunted by fixed condenser C17. The connections from the antenna and interstage transformer secondaries are open circuited.

The plate of the R. F. tube is connected in series with resistor R2 to the B+ line. It is also connected through coupling condenser C21 to the grid of the 1st detector. The latter is connected through grid leak R4 to ground.

The oscillator cathode circuit is connected through the tap on tracking coil T5 to ground. This tracking coil is connected through the Osc. M switch section to the control grid circuit of the oscillator tube. It is also connected to oscillator No. 1 coil through the Osc. 1 switch section. The tracking or oscillator grid coil is tuned by fixed condenser C23 and the inductance of oscillator coil No. 1.

One stage of I. F. amplification is employed using a 6U7G tube. An expander is used in the 1st I. F. transformer for high fidelity reception.

A 6H6 tube functions as a diode 2nd detector. AVC voltage is applied to the control grid circuits of the R. F. and I. F. tubes.

Across the volume control resistor R16 is a filter composed of condensers C33 and C34 and resistor R17. At high volume settings, the filter is not effective. At low volume settings, the action of this filter results in an increase of high and low frequency amplitudes relative to the other frequency amplitudes.

The output of the 2nd detector is applied to the 6J7G 1st A. F. tube. The output of this tube is fed through resistance coupling into the 6F6G output tube immediately to the right of it in the schematic.

A portion of the voltage developed across the output tube grid resistor is applied to the control grid of the 6J5G balancing exciter tube. This tube functions as a phase inverter and applies the audio voltage of proper phase and amplitude to the other 6F6G output tube. The two output tubes operate as a stage of Class A push-pull amplification. The balancing exciter tube thus replaces a push-pull input transformer. A dynamic reproducer is employed.

Degeneration or negative feedback is used in the audio amplifier. A portion of the voltage developed across the secondary of the output transformer is fed back into the cathode circuit of the 1st audio tube. The voltage fed back is of the proper phase to reduce the amplitude of certain frequencies. This results in a reduction in distortion.

The power unit uses a 5Y3G full wave rectifier. A 6U5 tuning indicator tube is employed.

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.
Selectivity Control—Sharp Position All Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The following equipment is required for aligning:
An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.
Output Indicating Meter—Non-Metallic Screwdriver.
Dummy Antennas—.1 mf., 200 mmf., and 400 ohms.

SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	DUMMY ANTENNA	BUTTON DEPRESSED	CONDENSER SETTING	ADJUST TRIMMERS TO MAXIMUM (Unless otherwise specified)
I. F.					
456 KC	Grid of I.F. Tube	.1 mf.	B Range	Turn Rotor to Full Open	2nd I.F. (C29) & (C30)
456 KC	Grid of 1st Det.	.1 mf.	B Range	Turn Rotor to Full Open	1st I.F. (C25) & (C26)
RANGE B					
1830 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Full Open	Oscillator Range B (C15)
1500 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Mex. Output Set Indicator to 1500 KC—See Note A	Ant. Range B (C5) Int. Range B (C8)
600 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to Mex. Output	600 KC (C16) Rock Rotor—See Note B
WAVE TRAP					
456 KC	Antenna Lead	200 mmf.	B Range	Turn Rotor to 600 KC Adjust Sig. Gen.—See Note C	Wave Trap (C1) Adjust for MINIMUM Output
RANGE C					
6350 KC	Antenna Lead	400 Ohm	C Range	Turn Rotor to Full Open	Oscillator Range C (C14)
6000 KC	Antenna Lead	400 Ohm	C Range	Turn Rotor to Mex. Output	Antenna Range C (C4) Int. Range C (C7)
RANGE D					
22,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Full Open	Oscillator Range D (C13)
20,000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Mex. Output	Ant. Range D (C3) Int. Range D (C6) Rock Rotor—See Note B
7000 KC	Antenna Lead	400 Ohm	D Range	Turn Rotor to Mex. Output	7000 KC (C12) Rock Rotor—See Note B
PERMEABILITY TUNING UNIT				TURN SETTING SCREW TO MAXIMUM OUTPUT —See Instruction Book	ADJUST COIL POSITION TO MAXIMUM OUTPUT —See Note D
700 KC	Antenna Lead	200 mmf.	No. 1	Setting Screw No. 1	Antenna Coil No. 1
700 KC	Antenna Lead	200 mmf.	No. 2	Setting Screw No. 2	Antenna Coil No. 2
850 KC	Antenna Lead	200 mmf.	No. 3	Setting Screw No. 3	Antenna Coil No. 3
850 KC	Antenna Lead	200 mmf.	No. 4	Setting Screw No. 4	Antenna Coil No. 4
1100 KC	Antenna Lead	200 mmf.	No. 5	Setting Screw No. 5	Antenna Coil No. 5
1100 KC	Antenna Lead	200 mmf.	No. 6	Setting Screw No. 6	Antenna Coil No. 6

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

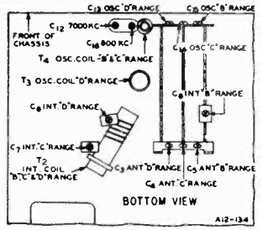
After each range is completed, repeat the procedure as a final check.

NOTE A—If the pointer is not at 1500 KC on the dial, loosen the 2 clamps which hold the pointer assembly on the cord, move the pointer to the 1500 KC mark, and tighten the clamps.

NOTE B—Turn the rotor back and forth and adjust the trimmer until the peak of greatest intensity is obtained.

NOTE C—Leave condenser rotor at the 600 KC setting and adjust the signal generator until maximum output is obtained at or near 456 KC.

NOTE D—At the bottom of the permeability tuning unit can be seen six "W" openings. Insert the end of a pair of long nose pliers or a screwdriver in the "W" opening of the proper button and adjust the position of the antenna (rear) coil by twisting the pliers or screwdriver until maximum output is obtained.



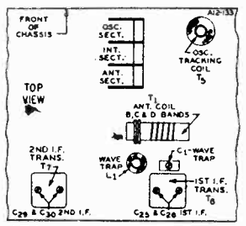


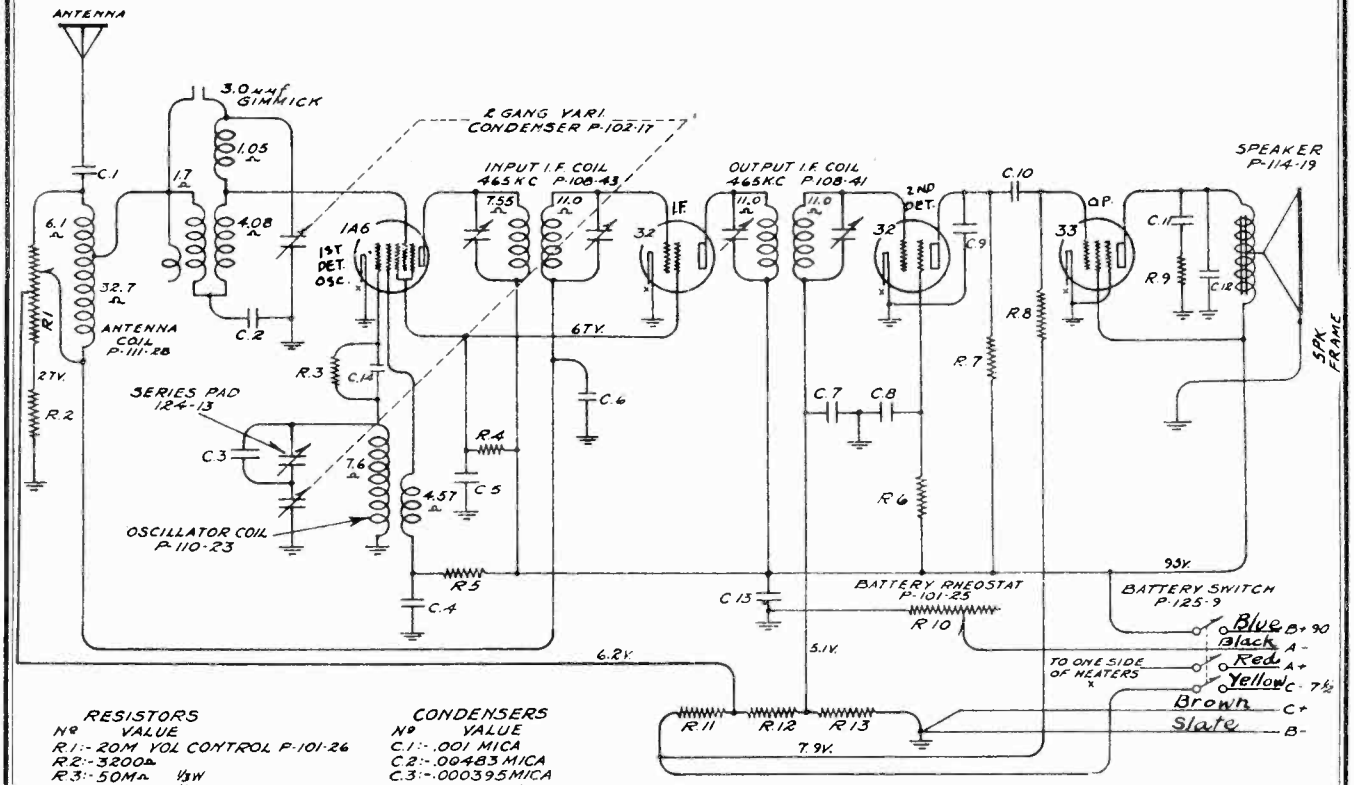
Fig. 1—Location of Trimmers

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 on the dial. It may be necessary to increase the input signal to hear the image.

NOTICE—Re-alignment is necessary if glass tubes are replaced by their equivalent in metal tubes, or vice versa, in the R.F. and I.F. stages.

WESTERN AUTO SUPPLY CO.

MODEL D709 (1933)
Schematic, Socket
Trimmers



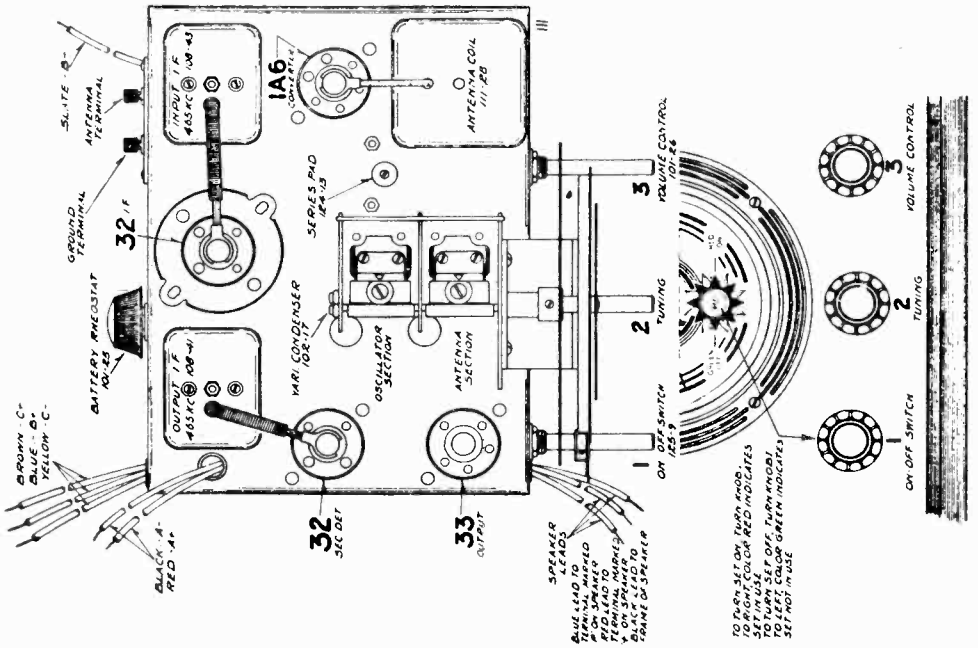
RESISTORS	
Nº	VALUE
R.1	20M VOL CONTROL P-101-26
R.2	3200Ω
R.3	50MΩ ⅓W
R.4	11MΩ ⅓W
R.5	10MΩ ⅓W
R.6	3 MEGΩ ⅓W
R.7	750MΩ ⅓W
R.8	500MΩ ⅓W
R.9	35MΩ ⅓W
R.10	4Ω BAT. RHEOSTAT P-101-25
R.11	1300Ω
R.12	1920Ω
R.13	9800Ω ⅓W

CONDENSERS	
Nº	VALUE
C.1	.001 MICA
C.2	.00483 MICA
C.3	.000395 MICA
C.4	.01 X 200V
C.5	.05 X 200V
C.6	.25 X 200V
C.7	.05 X 200V
C.8	.01 X 200V
C.9	.00025 MICA
C.10	.01 X 400V
C.11	.01 X 400V
C.12	.0005 MICA
C.13	.25 X 200V
C.14	.00025 MICA

- NOTE -
R. 2, R.11, R.12 ARE IN ONE UNIT P-106-21
C.4, C.5 ARE IN ONE UNIT P-118-11
C.6, C.13 " " " P-118-5
C.7, C.8 " " " P-118-11
NUMBERS PREFIXED BY LETTER 'P' ARE PART Nos
ALL VOLTAGES INDICATED ARE WITH NEW BATTERIES, VOLUME CONTROL ON FULL

IF PEAK 465 KC

Serial No. 5D115200A and up



BATTERIES NEEDED

The following batteries are needed.

2.....45 volt "B" Batteries.

1.....7½ Volt "C" Battery.

1.....3 Volt Dry "A" Battery or 2 Volt Storage Battery.

"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.

3 Volt "A" Battery—The voltage regulator required with this type of battery as illustrated in Fig. 4 is not supplied with the receiver unless specified. This device consists of a rheostat which controls the voltage, a voltmeter for measuring its value as supplied to the receiver and a small push button switch for cutting the voltmeter in and out of the circuit. It has two prongs at the bottom which plug into the socket in the platform at the rear left corner of the chassis. The circuit diagram of the regulator is shown in Fig. 5.

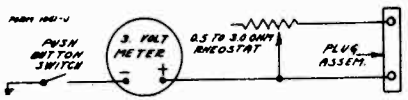


Fig. 5—Schematic Diagram of Voltage Regulator

The receiver is shipped from the factory with a jumper between the two socket connections and a fibre strip over the socket. This strip must be removed and the jumper taken out as illustrated in Figs. 6 and 7 before the regulator can be inserted as shown in Fig. 4. The jumper is in the "A+" line.

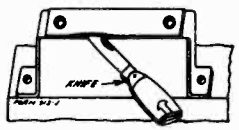


Fig. 6—Prying off Fiber Cover

When a new 3 volt "A" battery is inserted, the adjusting knob must be turned to the left hand position and then turned up until the voltmeter indicates 1.9 to 2 volts. The push button must be held in until the adjustment is completed. **Caution the user never to operate the receiver with the adjustment beyond 2 volts.**

Air Cell "A" Battery—If an air cell "A" battery is used, a series resistor will be required 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

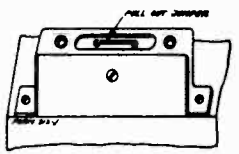


Fig. 7—Removing Jumper Wire

Replacing Drive Cord

Remove chassis from cabinet.

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

Remove the dial by taking out the six rivets from the dial assembly.

Remove the on-off indicator dial by pulling it forward.

With the condenser plates in a completely open position, slip the new drive cord thru hole "A" (from the front) in the drive drum. See Fig. 9.

Pull the cord thru this hole far enough to tie a knot near the end. Make this knot large enough so that it will not pull back thru the hole.

Slip the opposite end of the drive cord thru hole "B" of the drive drum.

Now slip the piece of fine tubing (about ¾" long) over the drive cord and insert about half of this tubing into hole "B" as shown in the illustration. This is important to prevent the cord from being cut.

Bring the drive cord down to the drive shaft and wrap the cord in a clockwise direction about two and one-half times around this shaft, progressing toward the front.

Bring the cord up from the drive shaft and wrap it around the drive drum approximately one and one-half times in a clockwise direction, progressing toward the front until the cord is up to the turned-in portion of the flange "C". See Fig. 9.

Pull the cord tight and tie the end of the cord to the tension spring as shown in the illustration. The knot should be at the bend in the flange so that the spring will be under sufficient tension to prevent the drive cord from slipping.

Now, by applying a little tension on the spring, hook the other end of the spring into hole "D" on the opposite side of the drum. Hook the spring from the inside (in later models hole "D" is replaced by a hook on the inside of the drive drum).

Turn the drive shaft back and forth several times to take out the slack and see if the drive is operating properly. *If the cord slips on the drive shaft, remove the spring from the drive drum and add an additional knot in the cord at the spring in order to put greater tension on the spring.*

Replace the on-off indicator dial, care being taken that the indicator is so placed that it will properly show the on and off positions.

Re-assemble the pointer and dial to the drive assembly. If the rivets are broken use No. 2 by ¼" long round head machine screws and nuts.

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.

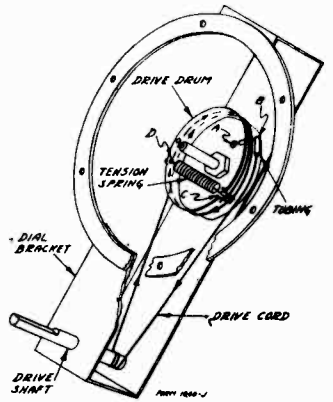


Fig. 9—Replacing Drive Cord

VOLTAGES AT SOCKETS
Volume Control at Maximum—Antenna Shorted to Ground. B+135 Volts Voltages to Chassis

Type of Tube	Function	Across Filament	Plate to Gnd.	Screen to Gnd.	Grid to Gnd.	Normal Plate M. A.
32	1st Det. & Osc.	2.0	135	67.5	7.5 (1) (2)	2.5
34	I. F.	2.0	135	67.5	2.5 (3)	2.8
34	2nd Det.	2.0	50	40 (1)	0	1.8
30	1st Audio	2.0	135		9 (4)	3.0
19	Output	2.0	135		4.5	3.2 Total

(1) With 250,000 ohm meter.
(2) Subject to variation.
(3) With 25,000 ohm meter.
(4) Read at "C" battery.

Alignment Procedure and Dial 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 .1 MF condenser to the coil end of the grid leak resistor R1. There is a lead which runs from the center tuning condenser stator to a lug at the bottom of the R. F. coil assembly. This connection can be made at the lug on the coil to which this lead is connected.

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

Turn the volume control to the maximum position.

Then adjust the three 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. 8.

As stated above, use a non-metallic screwdriver to make the adjustment.

1750 KC Adjustment

Set the signal generator for 1750 KC.

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

Connect the antenna lead of the receiver thru a 250 mmf. condenser to the output of the signal generator.

Keep the volume control at the maximum position.

Adjust the trimmer of the oscillator section of the three gang condenser until maximum output is obtained. The location of this trimmer is shown in Fig. 8.

1500 KC Adjustment

Set the signal generator for 1500 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.

Dial Calibration

To obtain dial scale calibration tune in an 800 KC signal and set the dial pointer at that mark on the dial scale. When calibrated in this manner, the setting will be approximately correct at both ends of the scale.

SPECIFICATIONS

Input Voltages
- "A" Battery - - - - - 2 Volts (.5 Amperes)
- "B" Batteries - - - - - 67½ and 135 Volts
- "C" Batteries - - - - - 4½, 9 and 22½ Volts

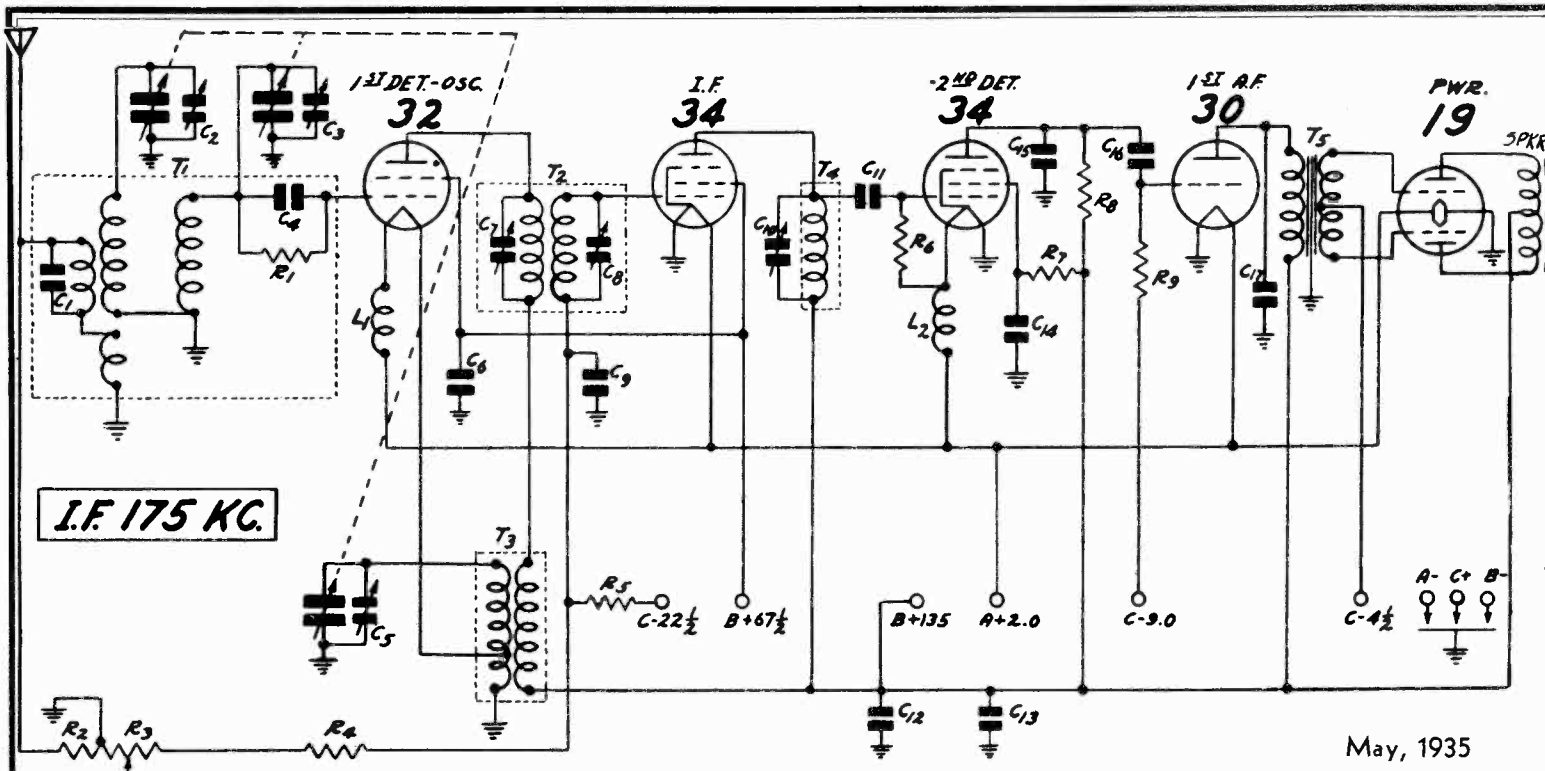
Power Output - - - - 1 Watt (Undistorted)

Sensitivity - - - - 15 Microvolts Absolute

Tuning Range - - - - - - 530 to 1750 KC

Intermediate Frequency - - - - - 175 KC

Speaker - - - - - - - - - 6" Magnetic



WESTERN AUTO SUPPLY CO

MODEL D709 (1935) S709
Schematic, Socket
Trimmers

May, 1935

C1 150 MMF MOULDED
C2 GANG TRIMMER
C3 GANG TRIMMER
C4 35 MMF MOULDED
C5 GANG TRIMMER
C6 .25 MF 180 V.
C7 40-100 MMF } DUAL
C8 20-70 MMF } (P-17A37)
C9 .05 MF 180 V.
C10 40-100 MMF (P-17A38)
C11 50 MMF MOULDED
C12 .10 MF 180 V.
C13 8.0 MF 150 V. ELECTROLYTIC
C14 10 MF 180 V.
C15 .002 MF 300 V.
C16 .006 MF 300 V.
C17 .002 MF 300 V.

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

R1 1.0 MEGOHM .2 W.
R2 10 000 OHM } VOLUME
R3 60 000 OHM } CONTROL
R4 900 OHM .2 W.
R5 6 500 OHM .2 W.
R6 2.0 MEGOHM .2 W.

R7 100 000 OHM .5 W.
R8 40 000 OHM .5 W.
R9 1.0 MEGOHM .2 W.

L1 SINGLE FILAMENT REACTOR (P-9A281)
L2 SINGLE FILAMENT REACTOR (P-9A281)

T1 DOUBLE TUNED ANTENNA COIL (P-9A381)
T2 1ST I.F. COIL (P-9A383)
T3 OSC. COIL (P-9A382)
T4 2ND I.F. COIL (P-9A384)
T5 AUDIO INPUT TRANS. (P-50X11)

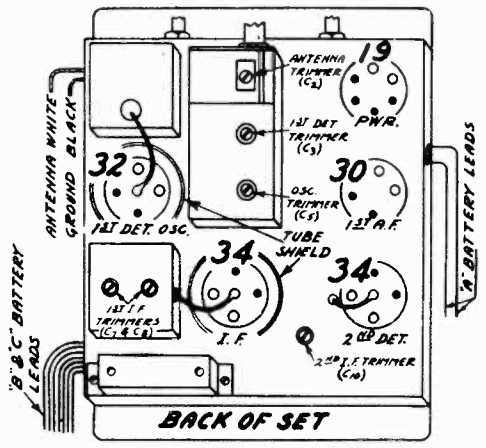


Fig. 8—Tube Arrangement

Following are the D. C. resistances of the various windings in the chassis.

Part No.		Code	D. C. Resistance in Ohms
9A381	Double Tuned Ant. Trans. Pri. (in series)	T1	17.
	Double Tuned Ant. Trans. Sec. (Antenna)	T1	3.5
	Double Tuned Ant. Trans. Sec. (1st Det.)	T1	3.5
9A383	1st I.F. Trans. Primary	T2	80.
	1st I.F. Trans. Secondary	T2	105.
9A382	Oscillator Coil Cathode Winding	T3	2.
	Oscillator Coil Plate Winding	T3	7.
9A384	2nd I.F. Reactor Coil	T4	50.
9A281	Filament Reactor (In 1st Det. Ckt.)	L1	Small
9A281	Filament Reactor (In 2nd Det. Ckt.)	L2	Small
50X11	Audio Transformer Primary	T5	950.
	Audio Transformer Secondary (Center Tap to outside)	T5	600.
	Audio Transformer Secondary (Center Tap to inside)	T5	550.
12A217	Magnetic Speaker (Center Tap to outside)		290.
	Magnetic Speaker (Center Tap to inside)		250.

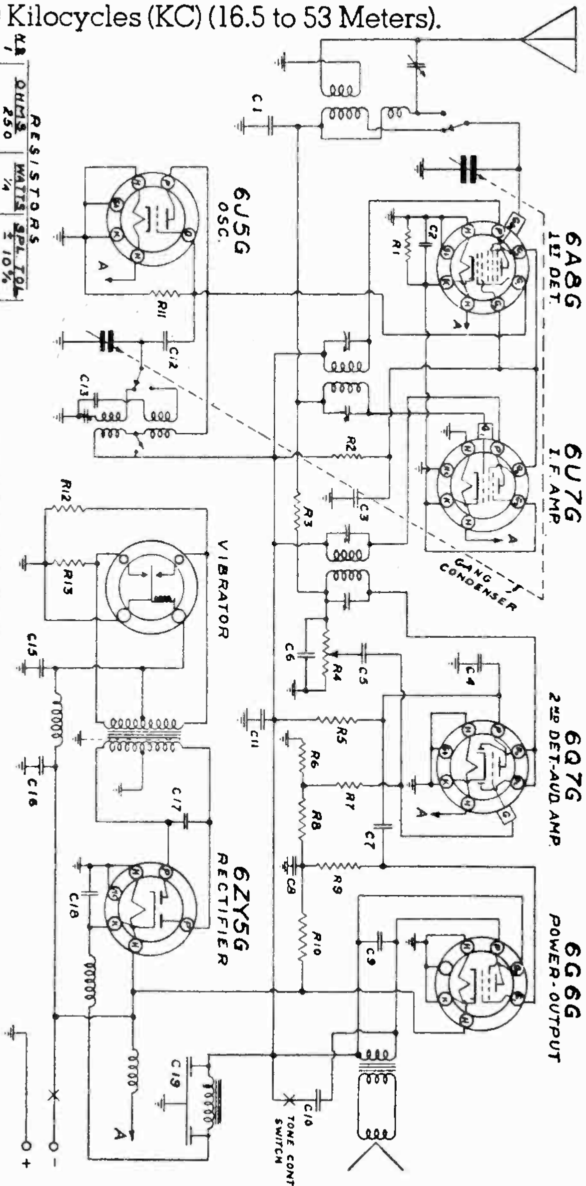
Trimmers

MODEL D709 (1938)

WESTERN AUTO SUPPLY CO.

Schematic, Socket
Trimmers, Alignment

Six Tube 6 Volt Battery Dual Wave Superheterodyne



SWITCHES IN BROADCAST POSITION
I.F. 456 K.C.

This receiver requires a good ground.

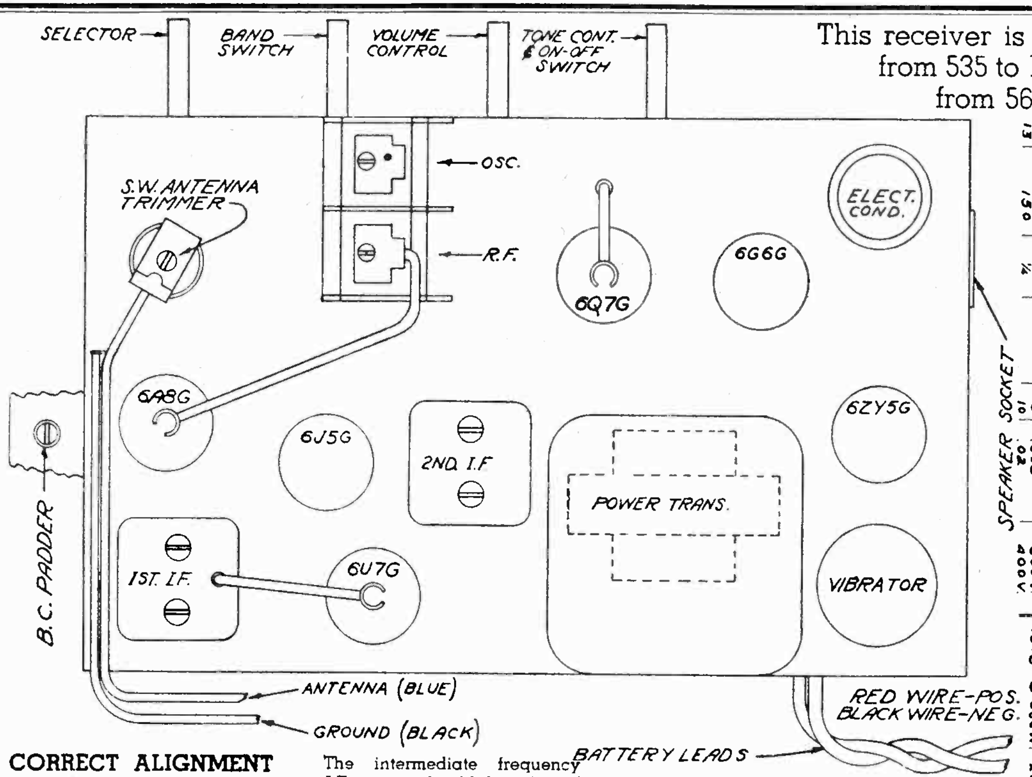
This receiver is designed to operate over two tuning ranges: from 535 to 1730 Kilocycles (KC) (173.4 to 561 meters), and from 5650 to 18,100 Kilocycles (KC) (16.5 to 53 Meters).

RESISTORS

No.	OHMS	WATTS	SPL. TOL.
1	250	¼	± 10%
2	15,000	¼	
3	1 MEG	¼	
4	500,000	¼	(VOL. CON)
5	180,000	¼	
6	180,000	¼	± 10%
7	500,000	¼	
8	600,000	¼	± 10%
9	400,000	¼	
10	100,000	¼	
11	40,000	¼	
12	180	¼	
13	150	¼	

CONDENSERS

No.	CAP.-MFD.	TYPE	No.	CAP.-MFD.	TYPE
1	.05	200 V.	11	.1	200 V.
2	.25	200 V.	12	.00005	MICA
3	.1	200 V.	13	.004 (±5%)	MICA
4	.00025	MICA	14		
5	.01	400 V.	15	.5	50 V.
6	.00025	MICA	16	.5	50 V.
7	.01	400 V.	17	.015	1000 V.
8	.05	200 V.	18	.01	400 V.
9	.005	600 V.	19	8-8 CCCW	200 W.V.
10	.02	400 V.			



CORRECT ALIGNMENT PROCEDURE

The intermediate frequency I.F. stage should be aligned properly as the first step. After the I.F. transformers have been properly adjusted and peaked, the Broadcast Band should always be the next procedure; after which, the Short Wave Band may be aligned.

I.F. ALIGNMENT

With the wave switch in the broadcast band and the gang condenser set at minimum, adjust the test oscillator to 456 KC and connect the output of test oscillator or signal generator to the grid of the first detector tube (6A8G) through a .05 or .1 mfd. condenser. The ground on the test oscillator can be connected to the chassis ground. Align all four I.F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT

Connect the output of the signal generator to the antenna lead (blue) through a .0002 mfd. mica condenser. Set the gang condenser to minimum and the oscillator to 1730 KC and adjust the Broadcast "oscillator trimmer" to receive this signal. Make no other adjustments at this frequency. Then set the generator to 1400 KC and tune in this signal by rotating the gang to 1400 on the dial. Adjust the Broadcast "antenna" trimmer to a maximum signal. Set the signal generator to 600 KC and tune in the signal on the receiver.

Note: Approximately the same sensitivity should be noted at this point as was at 1400 KC. The signal strength may sometimes be improved by padding the circuits. This is done by slowly increasing or decreasing the oscillator padding condenser and, at the same time, continuously tuning back and forth across the signal with the receiver until the maximum reading is obtained on the output meter. This adjustment may seem a little complicated but is the easiest way to adjust the oscillator to the antenna. Return to 1400 KC and again go over the adjustments of this frequency to be certain that they were not put slightly out of alignment when adjustment was made at 600 KC.

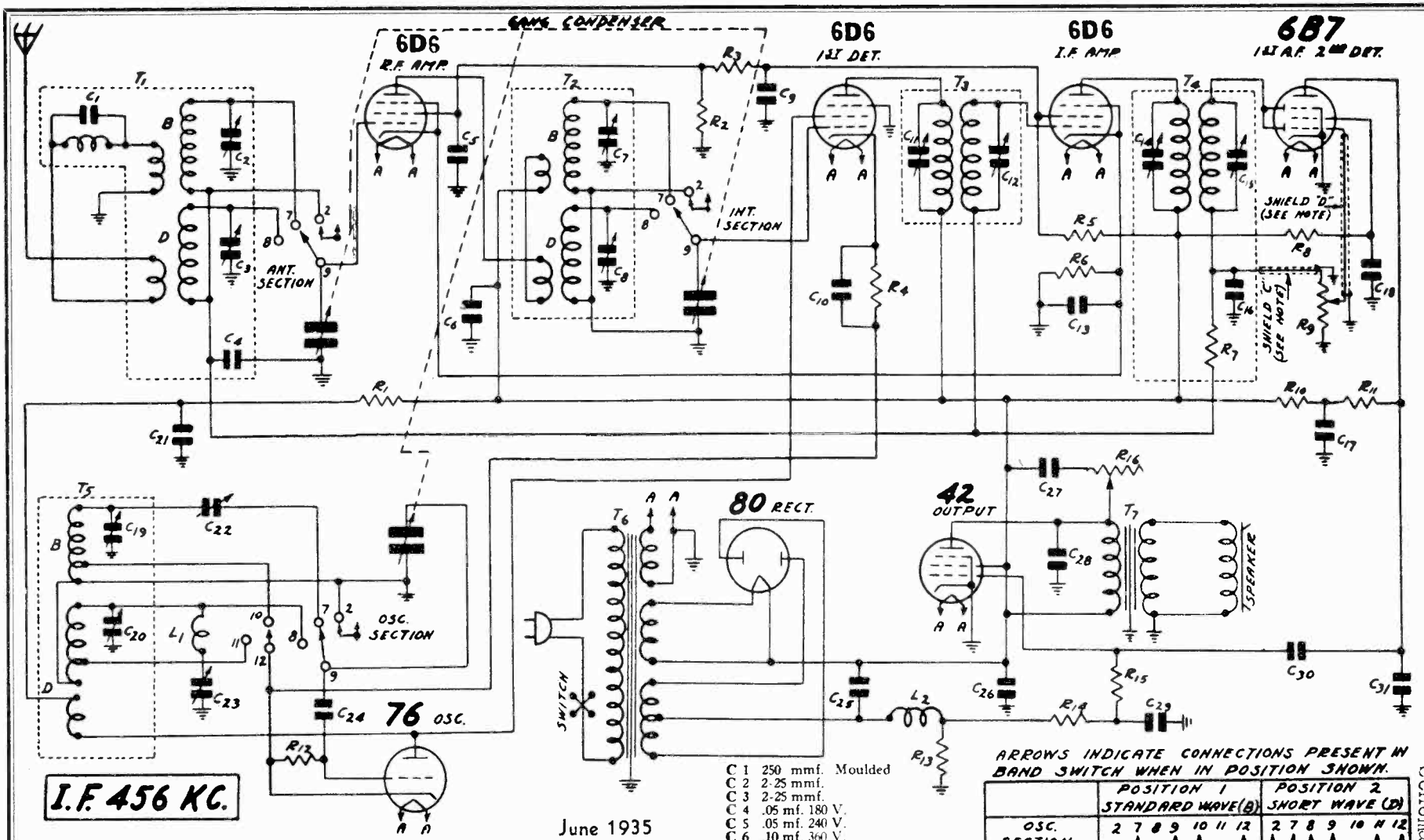
SHORT WAVE BAND ALIGNMENT

The short wave band is adjusted by setting the generator to 16,000 KC and tuning in the signal. Adjust the "short wave antenna" to give maximum output. As there is no variable low frequency padding condenser on this band, the sensitivity of the receiver should be checked at 6000 KC to determine whether the circuits are in line at this frequency. Should the receiver lack sensitivity at 6000 KC, the antenna and oscillator coils, as well as the .004 mica padding condenser, should be tested for defects as sometimes these components become subject to mechanical or electrical injuries, despite their rugged construction and liberal ratings.

WESTERN AUTO SUPPLY CO.

MODELS D710, D711 (1935)
S710, S711

Schematic



June 1935

C 1 250 mmf. Moulded
C 2 2-25 mmf.
C 3 2-25 mmf.
C 4 .05 mf. 180 V.
C 5 .05 mf. 240 V.
C 6 .10 mf. 360 V.
C 7 2-25 mmf.
C 8 2-25 mmf.

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

	POSITION 1 STANDARD WAVE (B)	POSITION 2 SHORT WAVE (D)
OSC. SECTION	2 7 8 9 10 11 12	2 7 8 9 10 11 12
ANT. & INT. SECTION	2 7 8 9	2 7 8 9

CONTACT LOCATIONS NOT NUMBERED ARE BLANK.

GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES. THE CAPACITY OF SHIELD "C" AND "D" IS 50 MMF EACH.

C 9 .25 mf. 240 V.
C10 .05 mf. 180 V.
C11 70-150 mmf. } One
C12 70-150 mmf. } Assembly
C13 .25 mf. 180 V.
C14 70-150 mmf. } One
C15 150-250 mmf. } Assembly
C16 50 mmf. Moulded
C17 .25 mf. 360 V.
C18 .25 mf. 360 V.
C19 2-25 mmf.
C20 2-25 mmf.
C21 .10 mf. 360 V.
C22 300-600 mmf. } One
C23 40-100 mmf. } Assembly
C24 35 mmf. Moulded
C25 14 mf. 400 V. Electrolytic
C26 18 mf. 300 V. Electrolytic
C27 .05 mf. 600 V.
C28 .002 mf. 600 V.
C29 .03 mf. 180 V.
C30 .01 mf. 480 V.
C31 .002 mf. 600 V.
R 1 25000 ohm 1.0 W.
R 2 30000 ohm .5 W.
R 3 6000 ohm .5 W.
R 4 2500 ohm .2 W.
R 5 16000 ohm 2.0 W.
R 6 150 ohm .2 W.
R 7 2.0 Megohm .2 W.
R 8 300000 ohm .5 W.
R 9 500000 ohm Volume Control
R10 20000 ohm .2 W.
R11 60000 ohm .5 W.
R12 80000 ohm .2 W.
R13 235 ohm Armored Wire Wound
R14 100000 ohm .2 W.
R15 500000 ohm .2 W.
R16 150000 ohm Tone Control
T 1 Antenna R. F. Trans.
T 2 Interstage R. F. Trans.
T 3 1st I. F. Trans.
T 4 2nd I. F. Trans.
T 5 Osc. Inductors
T 6 Power Trans.
T 7 Output Trans.
L 1 Osc. Tracking Coil
L 2 Speaker Field (1050 ohms)

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, 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.

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

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the antenna lead of the signal generator thru a .1 MF condenser to the grid of the 1st detector.

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

Turn the band switch to the standard wave position.

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. 6.

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 250 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 standard wave trimmer (C19) until maximum output is obtained. The location of this trimmer is shown in Fig. 4.

1500 KC Adjustment

Set the signal generator for 1500 KC.

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

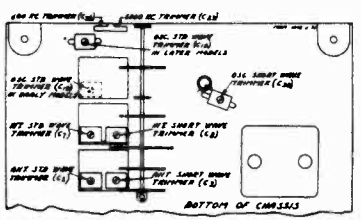


Fig 4—Location of Trimmers

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

Adjust the interstage standard wave trimmer (C7) and antenna standard wave trimmer (C2) until maximum output is obtained.

Do not change the setting of the oscillator standard wave 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. 4 for location of this trimmer.

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

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

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

Turn the band switch to the short wave position.

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 short wave trimmer (C20) until maximum output is obtained. See Fig. 4 for location of this trimmer.

If a maximum output peak cannot be reached, it may be due to the fact that the antenna and interstage short wave trimmers are screwed down too far. Back off these two trimmer screws two or three turns and then adjust the oscillator short wave trimmer for maximum ouptut.

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 short wave trimmer (C8) and antenna short wave trimmer (C3) until maximum output is obtained.

When adjusting the interstage short wave 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 short wave trimmer, the 15,000 KC adjustment must be repeated.

Do not make any further change in the setting of the oscillator short wave 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. 4 for location of this trimmer.

Use a non-metallic screw driver for this adjustment.

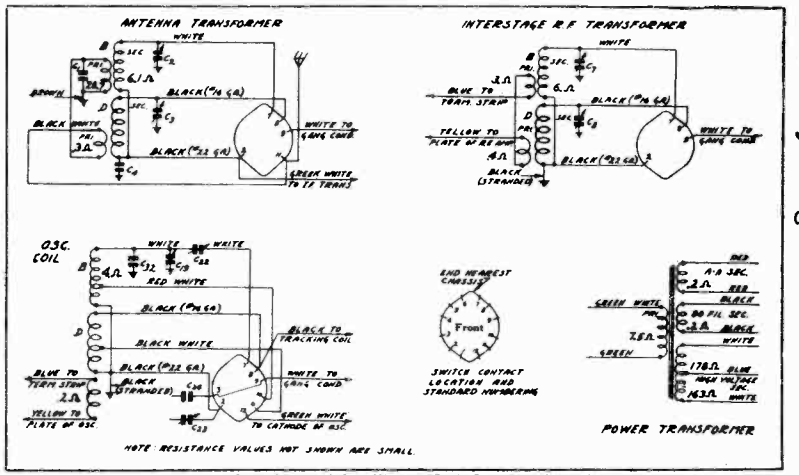


Fig. 3—Color Coding of Coil Wires and D. C. Resistance of Windings

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. Refer to Fig. 3.

New Part No.	Item	Code	D. C. Resistance in Ohms
9A368	Antenna Transformer		
	Range B Primary Winding	T1	20.7
	Range D Primary Winding	T1	0.3
	Range B Secondary Winding	T1	6.1
	Range D Secondary Winding	T1	Small
9A387	R. F. Interstage Transformer		
	Range B Primary Winding	T2	3.0
	Range D Primary Winding	T2	0.4
	Range B Secondary Winding	T2	6.0
	Range D Secondary Winding	T2	Small
9A388	Oscillator Coils		
	Range B Grid Coil	T5	
	Red White to White		4.0
	Red White to ground		Small
	Range D Grid Coil	T5	
	Black White to Black		Small
	Black White to ground		Small
	Oscillator Plate Coil	T5	0.2
9A389	1st I. F. Transformer		
	Primary Winding	T3	12.0
	Secondary Winding	T3	11.1
9A390	2nd I. F. Transformer		
	Primary Winding	T4	12.0
	Secondary Winding	T4	4.5
	Output Transformer (Part of Speaker Assembly)		
	Primary Winding	T7	510.
	Secondary Winding	T7	1.0
	Dynamic Speaker		
	Speaker Field	L2	1025.
	Speaker Voice Coil		4.1
	Speaker Bucking Coil		0.2

New Part No.	Item	Code	D. C. Resistance in Ohms
53X91	115 volt 60 cycle Power Transformer		
	Primary Winding	T6	7.5
	Tube Filament Secondary (A-A)	T6	0.2
	80 Filament Secondary	T6	0.2
	High Voltage Secondary Winding	T6	
	Center tap to inside		173.
	Center tap to outside		178.
9A391	High Frequency Oscillator		
	Tracking Coil	L1	1.1

VOLTAGES AT SOCKETS

Line Voltage - 112

Antenna Shorted to Ground

Type of Tube	Function	Heater Volts	Plate to Ground	Screen to Ground	Cathode to Ground	Plate M. A.
6D6	R. F.	6.1	240	95	3	7.
6D6	1st Det.	6.1	240	100	9	3.5
76	Osc.	6.1	100			5.
6D6	I. F.	6.1	240	120	3	7.5
6B7	2nd Det.	6.1	55	40	0	2.3
42	Power	6.1	225	240	17 (1)	38.0
80	Rectifier	4.6				32.0 per plate

Changes in Early Models

In the early models of this receiver the oscillator standard wave trimmer C19 was in the oscillator coil can—see Fig. 4.

In the early models the antenna transformer had two B primary windings as shown in Fig. 5. In later models only one winding was used as shown in Fig. 3.

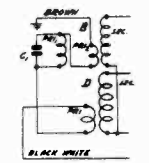


Fig. 5—Antenna Transformer on Early Models

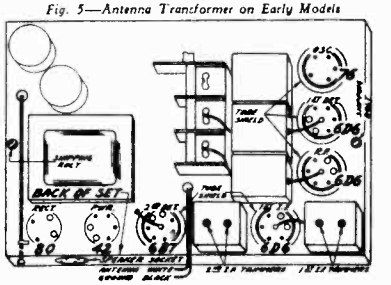


Fig. 6—Location of Tubes

MODELS D-710, D-711, S-710, S-711 (1935)

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 base directly below the wet electrolytic condensers. These holes are 1¼" from the bottom, ⅞" and 3¾" from the front of the chassis.

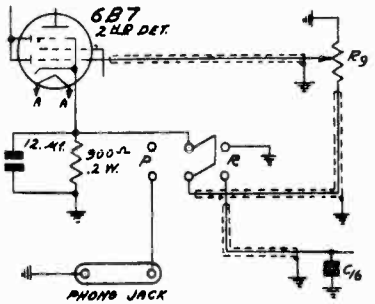


Fig. 7—Phonograph Connections

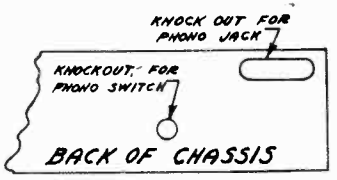


Fig. 8—Location of Phono Knockouts

The ground lug which extends out from the side of the chassis should be bent back into the chassis wall.

The connections are made by opening the diode return circuit at the volume control. Unsolder the shielded lead which runs from the I. F. transformer to the volume control at the lug on the volume control, Cut this lead to length and connect it to the switch as shown in Fig. 7. The extra length of shielded lead which is provided, is connected from the volume control R9 to the phono switch as illustrated.

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

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

A high impedance pick-up should be used. If a low impedance pick-up 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.

Servicing R. F. Coil Assemblies

The R. F. 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. 3.

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

MODELS D-714-M, S-712 (1935)

PHONO ATTACHMENT PARTS

Part No.	New Part No.	Description	List Price
P-9A386		Phono Switch (Double Pole Double Throw Switch)	$ .60
P-9A387		Phono Jack	.10
P-9A389		Switch Knob	.20
P-9A390	2A31	12.0 mf. - 25 Volt - Dry Electrolytic Condenser	.75
P-9A388	3A12	900 Ohm .2 Watt Resistor	.15
	10A36	12 Inches of No. 722G Shielded Hookup Wire	.10
	45X37	Terminal Strip	.10
	A9-8901		
	4A39		

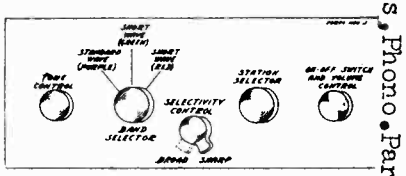


Fig. 1—Arrangement of Controls

General Service Data

D. C. Resistance of Windings

Refer to Fig. 5.

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.	Item	Coils	D. C. Resistance in Ohms
9AJ76	Antenna Transformer	T1	
	Range B Primary Winding		21.2
	Range C Primary Winding		0.3
	Range D Primary Winding		0.2
	Range B Secondary Winding		6.1
	Range C Secondary Winding		1.8
	Range D Secondary Winding		Small
9A377	R. F. Interstage Transformer	T2	
	Range B Primary Winding		2.4
	Range C Primary Winding		1.4
	Range D Primary Winding		0.4
	Range B Secondary Winding		6.0
	Range C Secondary Winding		1.9
	Range D Secondary Winding		Small
9A378	Oscillator Coils	T5	
	Range B Grid Coil		
	Red White Tap to White		3.8
	Red White Tap to Ground		0.9
	Range C Grid Coil		
	Green White Tap to Green		1.3
	Green White Tap to Ground		0.6
	Range D Grid Coil		
	Black White Tap to Black		Small
	Black White Tap to Ground		Small
	Oscillator Plate Coil		0.2
9A379	1st I. F. Transformer	T3	
	Primary Winding		11.6
	Secondary Winding		
	Long Portion		11.4
	Short Portion		0.5
9A380	2nd I. F. Transformer	T4	
	Primary Winding		14.3
	Secondary Winding		4.4
*12A223	Dynamic Speaker (8")	L1	
	Output Transformer Primary Winding	T7	510.
	Output Transformer Sec. Winding	T7	1.0
	Speaker Field		1025.
	Speaker Voice Coil		4.1
	Speaker Bucking Coil		0.2
53X91	115 Volt 60 Cycle Power Transformer	T6	
	Primary Winding		7.5
	Tube Filament Winding (A-A)		0.2
	80 Filament Secondary		0.2
	High Voltage Secondary Winding		
	Center Tap to Inside		163.
	Center Tap to Outside		178.
9A391	High Frequency Oscillator Tracking Coil	L2	1.1

*Speakers with other part numbers may have slightly different values of D. C. resistance.

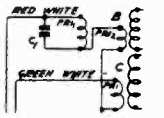


Fig. 8—Antenna Transformer in Early Models

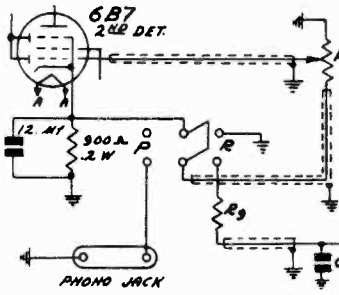


Fig. 9—Phonograph Connections

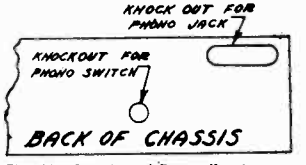


Fig. 10—Location of Phono Knockouts

MODEL D712M (1935)
Voltage, Socket, Trimmers
Coils, Phono, Connections

WESTERN AUTO SUPPLY CO.

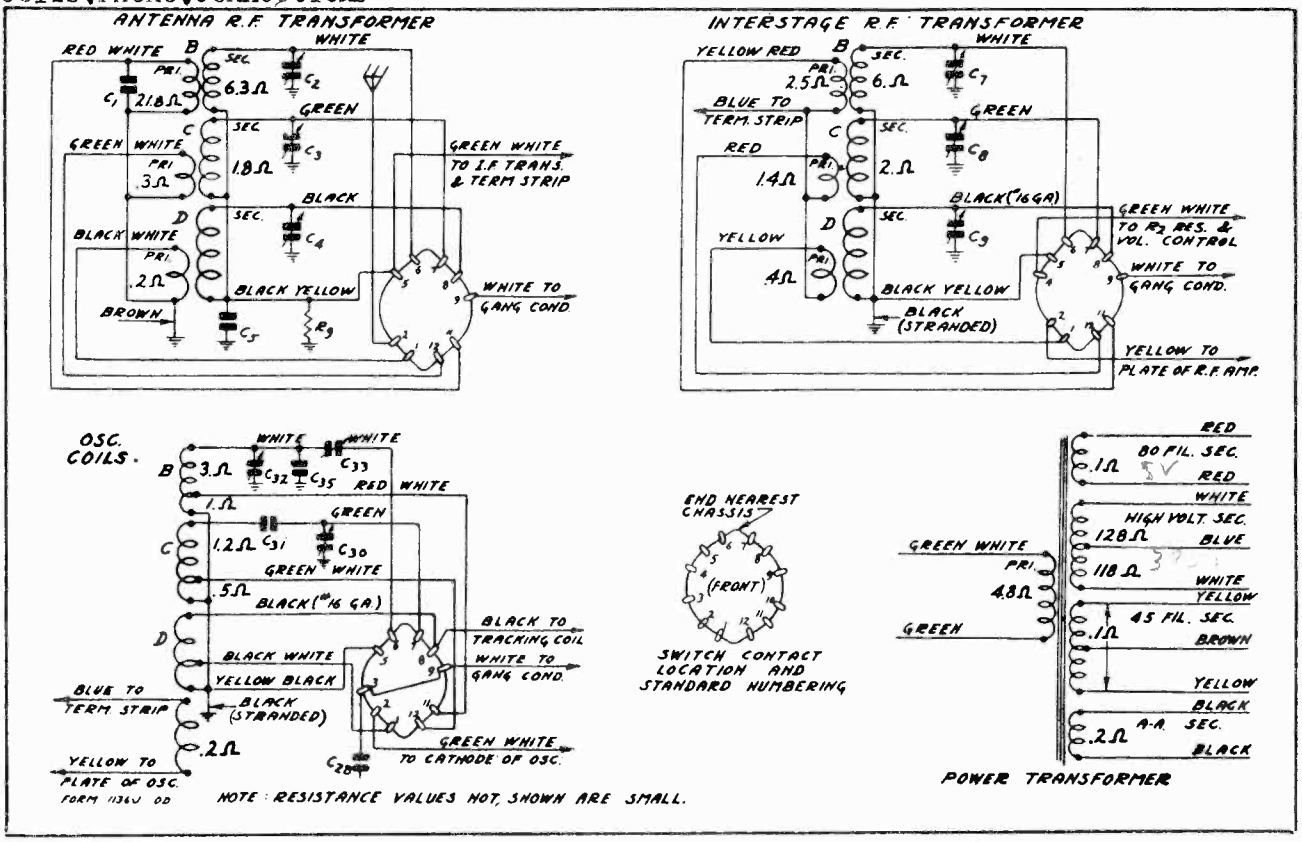


Fig. 4—Color Coding of Coil Wires and D. C. Resistance of Windings (Also see complete D. C. Resistance List in this Manual)

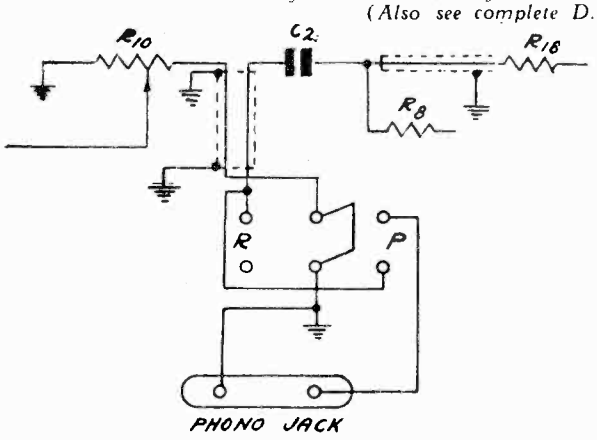


Fig. 7—Phonograph Connections

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	Cathode 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.

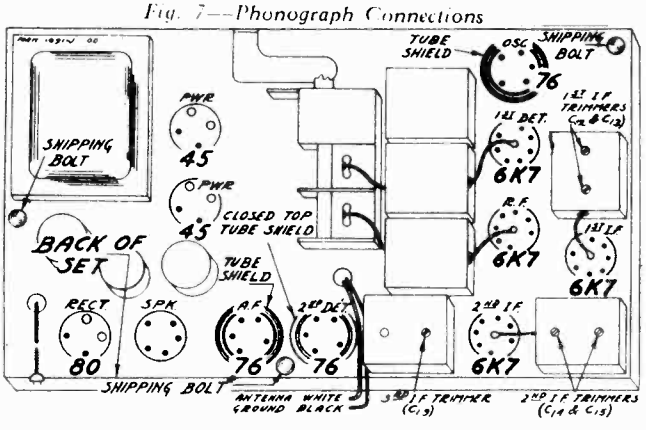


Fig. 5—Location of Tubes

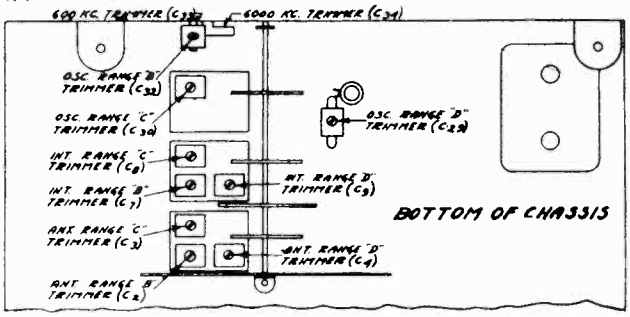


Fig. 3—Location of Trimmers

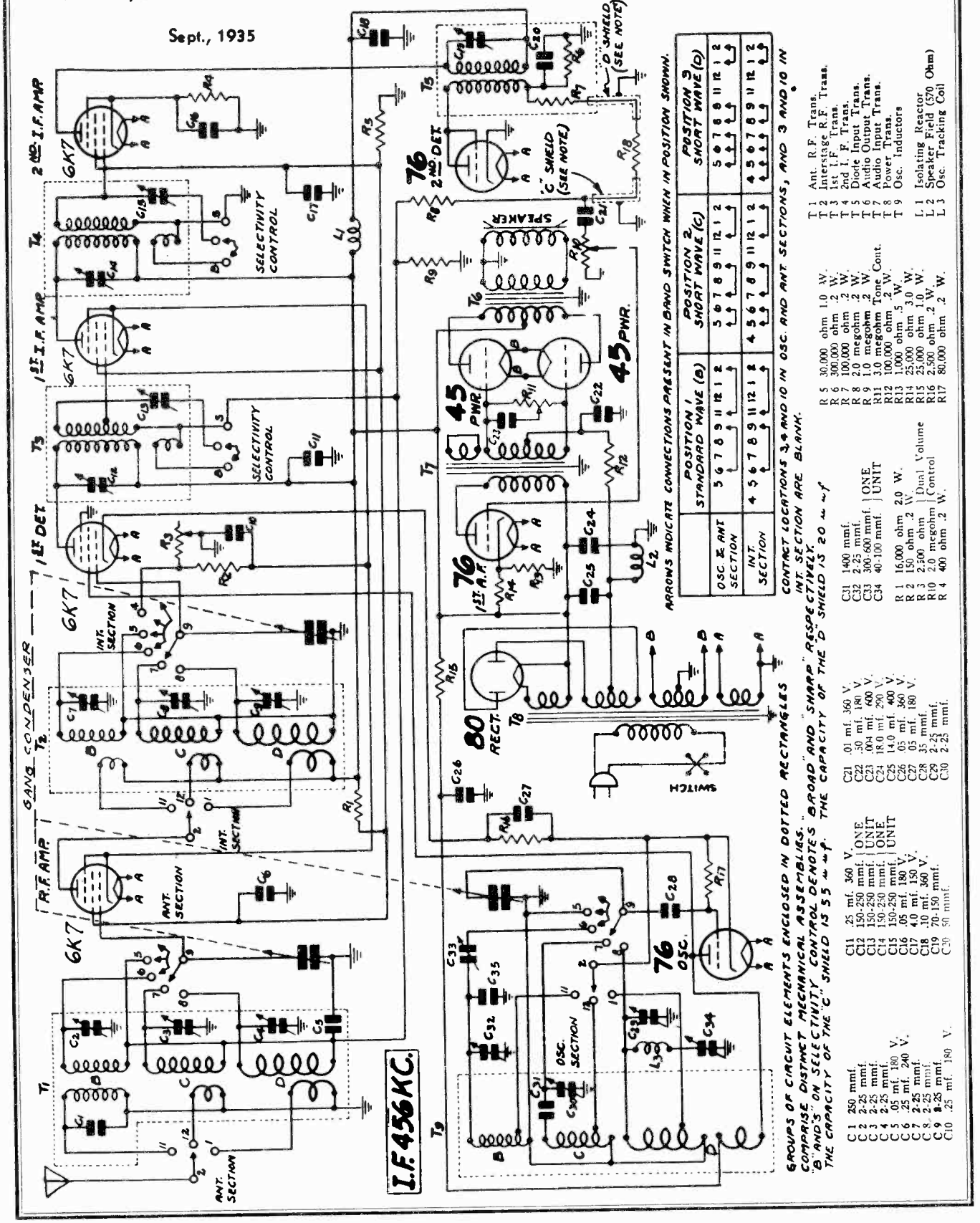
WESTERN AUTO SUPPLY CO.

MODEL D712M (1935)
Schematic

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



	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

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

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. "BROAD" AND "SHARP" RESPECTIVELY. "B" AND "C" ON SELECTIVITY CONTROL DENOTES THE CAPACITY OF THE "C" SHIELD IS 55 μμf. THE CAPACITY OF THE "D" SHIELD IS 20 μμf

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 70-150 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

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		120.
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.

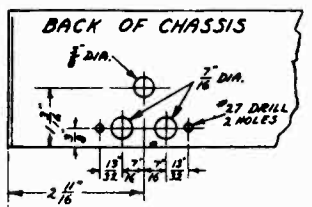


Fig. 8—Details of Panel Drilling for Phono Assembly

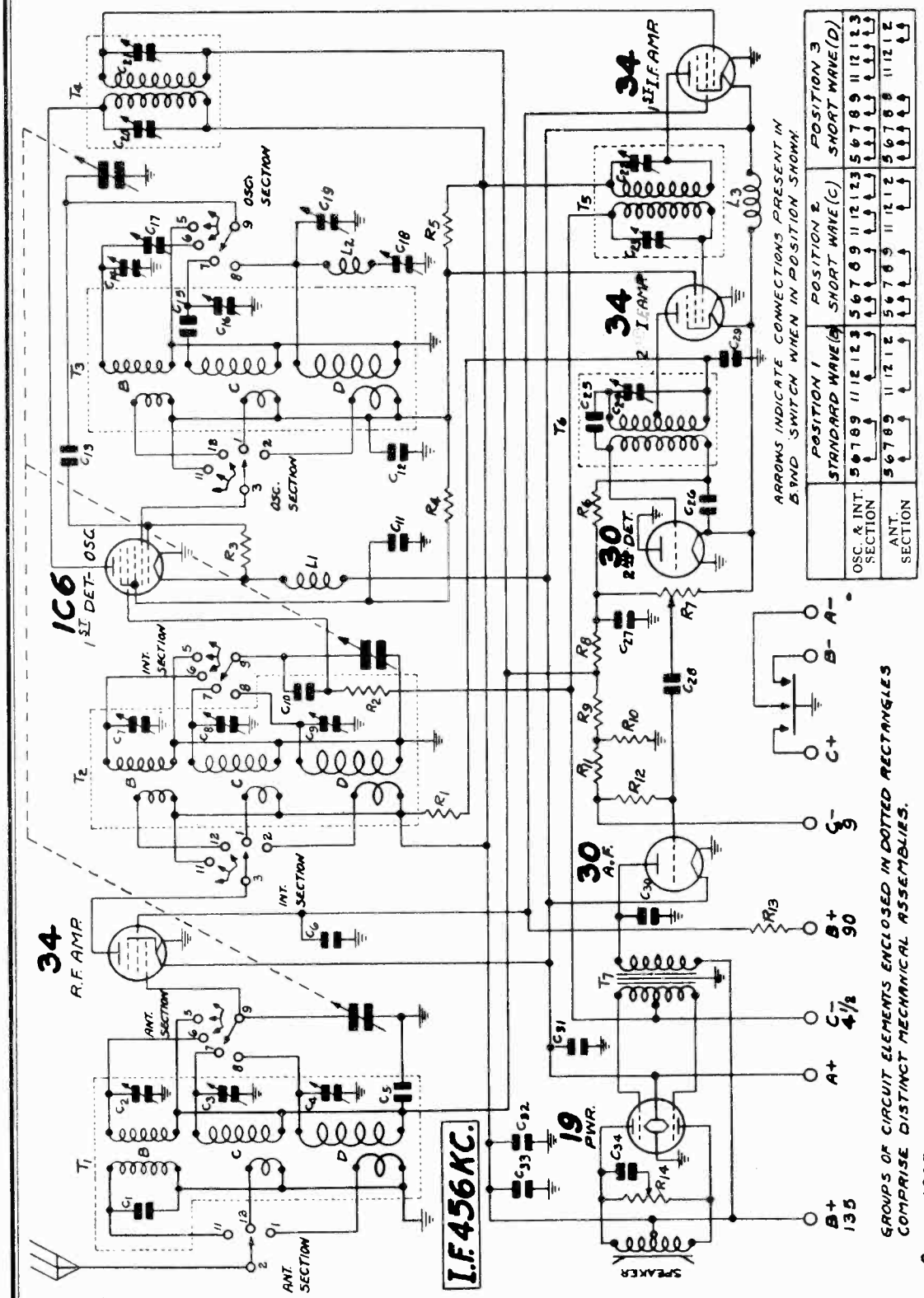
Phonograph Connections

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.

WESTERN AUTO SUPPLY CO.

MODEL D713 (1935)
Schematic



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

Contact Locations 4 and 10 in Osc. & Int. Sections and 3, 4 and 10 in Ant. Section are Blank.

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

Sept., 1935

Fig. 2—Schematic Circuit Diagram

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. 180 V.
C 7 2-25 mmf.
C 8 2-25 mmf.
C 9 2-25 mmf.
C10 35 mmf.
C11 .05 mf. 180 V.
C12 .25 mf. 180 V.
C13 35 mmf.
C14 2-25 mmf.
C15 1400 mmf.
C16 2-25 mmf.
C17 300-600 mmf. } ONE
C18 40-100 mmf. } ASSEMBLY
C19 2-25 mmf.
C20 70-150 mmf. } ONE
C21 70-150 mmf. } ASSEMBLY
C22 70-150 mmf. } ONE
C23 70-150 mmf. } ASSEMBLY
C24 40-100 mmf.
C25 50 mmf.
C26 100 mmf.
C27 50 mmf.
C28 .002 mf. 600 V.
C29 .05 mf. 180 V.
C30 250 mmf.
C31 .50 mf. 180 V.
C32 .25 mf. 180 V.
C33 20.0 mf. 150 V. Electrolytic
C34 .05 mf. 240 V.

R 1 1,000 Ohm .2 W.
R 2 1.0 Megohm .2 W.
R 3 100,000 Ohm .2 W.
R 4 5,000 Ohm .2 W.
R 5 10,000 Ohm .5 W.
R 6 60,000 Ohm .2 W.
R 7 1.0 Megohm Vol. Cont.
R 8 3.0 Megohm .2 W.
R 9 1.0 Megohm .2 W.
R10 2,000 Ohm .2 W.
R11 7,000 Ohm .2 W.
R12 3.0 Megohm .2 W.
R13 30,000 Ohm .2 W.
R14 150,000 Ohm Tone Control

T 1 Antenna R.F. Trans.
T 2 Interstage R.F. Trans.
T 3 Osc. Inductors
T 4 1st. I.F. Trans.
T 5 2nd. I.F. Trans.
T 6 3rd. I.F. Trans.
T 7 Push-Pull Input Trans.

L 1 Single Filament Reactor
L 2 Osc. Tracking Coil
L 3 Single Filament Reactor

MODEL D713 (1935)
Voltage, Socket, Coils
Trimmers

WESTERN AUTO SUPPLY CO.

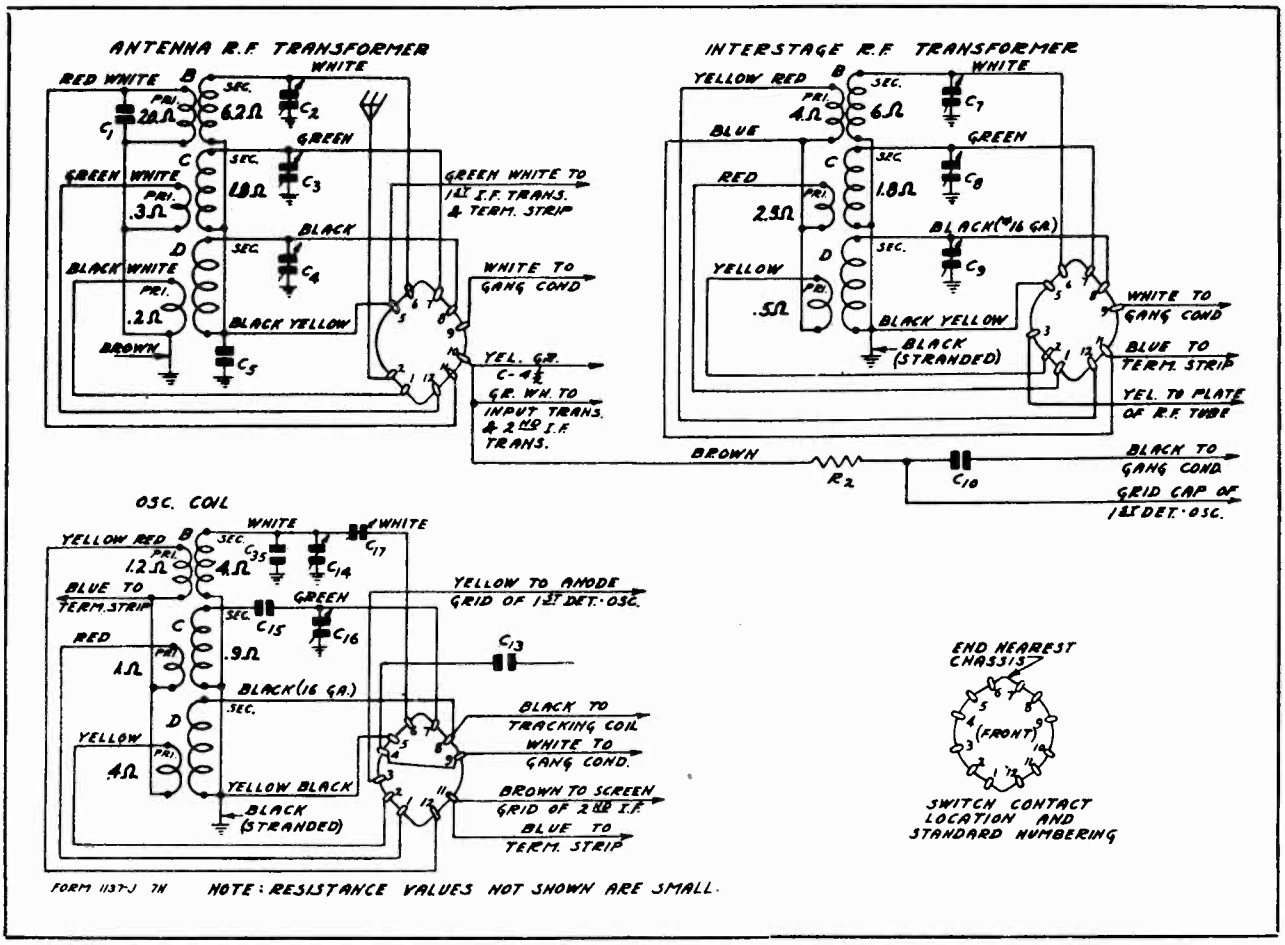


Fig. 11—Color Coding of Coil Wires and D. C. Resistance of Windings (Also See Complete D. C. Resistance List Below)

VOLTAGES AT SOCKETS
Batteries up to Rated Voltages Ant. Shorted to Ground
Voltages Read from Negative Fil. Terminal
Volume Control at Maximum

Type of Tube	Function	Across Filam't	Plate to Ground	Screen to Ground	Control Grid to Ground	Normal Plate M. A.
34	R. F. Amp.	2.0	135	45		1.8
1C6	1st Detector Oscillator	2.0	135 75(1)	65		2.6 1.8(1)
34	1st I. F. Amp.	2.0	135	45		1.8
34	2nd I. F. Amp.	2.0	133	75	4.5	2.25
30	2nd Detector	2.0				
30	A. F. Amp.	2.0	135			3.0
19	Power Amp.	2.0	135		4.5	1.0 (Per Plate)

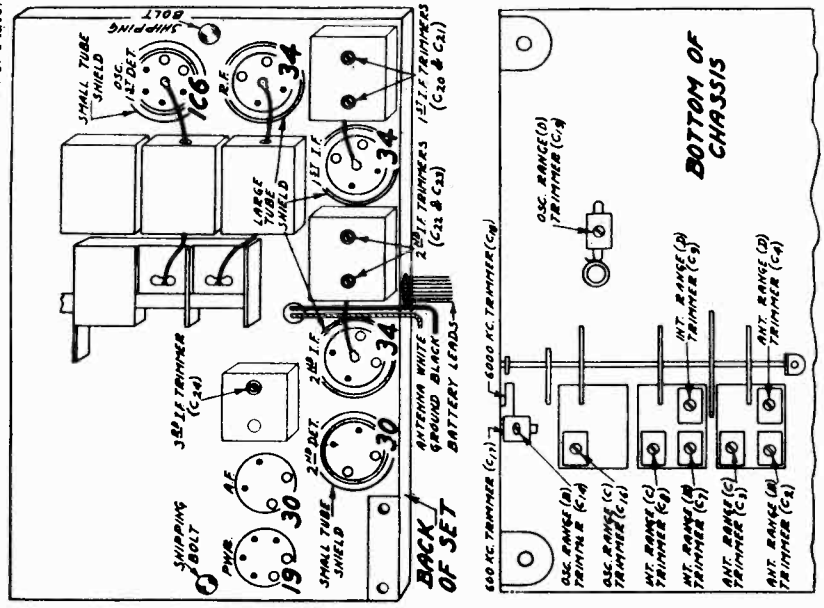


Fig. 9—Arrangement of Trimmers

WESTERN AUTO SUPPLY CO.

SPECIFICATIONS

Input Voltages

"A" Battery	2 Volts (0.68 Amperes)
"B" Batteries	90 and 135 Volts
"C" Batteries	4½ and 9 Volts
Power Output	1 Watt Undistorted
Selectivity	24 KC Broad at 1000 times Signal
Intermediate Frequency	456 KC.
Speaker	8" Magnetic

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	2.0 Microvolts Absolute
C Range Average	4.0 Microvolts Absolute
D Range Average	6.0 Microvolts Absolute

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, 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.

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 C-10—see Fig. 2. There is a lead which goes to the lug on the top of the center stator section of the tuning condenser—see Fig. 10. 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 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. 10.

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 (C14) 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 (C7) and antenna Range B trimmer (C2) to maximum.

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 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 (C16) 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 (C8) 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).

Adjust the oscillator Range D trimmer (C19) 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 (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 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 (C18) until the peak of greatest intensity is obtained. See Fig. 9 for location of this trimmer.

Use a non-metallic screwdriver for this adjustment.

Voltages

Check the voltages at the sockets to see if correct values are being delivered to the tubes. The antenna and ground should be disconnected and the antenna and ground leads from the set connected together. The volume control should be turned to the right or maximum position.

The voltage chart gives the voltages with all tubes in, the speaker connected and the set in operating condition. These voltages are typical of the sets but will vary slightly with variations in individual receivers, tubes, test equipment used and battery voltages.

Changes in Early Models

Condenser C35 7 mmf. (not shown in Fig. 2, was added to the oscillator coil assembly in parallel with oscillator Range B trimmer condenser C14. It is not, however, used in all cases but only when this capacity is required in this circuit.

MODEL D713 (1935)
Drive Cord Data
Resistances

WESTERN AUTO SUPPLY CO.

Replacing Drive Cord

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

Loosen the two set screws in the collar on the band selector shaft.

Loosen the dial assembly by taking out the two screws which secure the bottom of this assembly to the chassis and one screw at the top which secures this assembly to the bracket.

Pull the dial assembly forward until the collar is free of the band selector shaft; and lay the assembly face downward in front of the chassis.

Turn the drive drum until the opening in this drum is approximately vertical and with the hole at the top as shown in Fig. 12.

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. 12. Insert one end of the new drive cord from the outside through the hole in the eyelet in the drive drum.

Tie the end of the cord, which has been inserted through the hole, 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 half turns, progressing toward the front.

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 this shaft as shown in Fig. 12, progressing toward the back of chassis.

Wrap the cord on directly under the drive drum above.

Then bring this cord up to the drive drum until it is up to the hole in the drive drum as shown in the illustration.

Now 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 3/8" from the flange of the drum as shown in Fig. 12. Cut off the surplus length of cord after it is knotted.

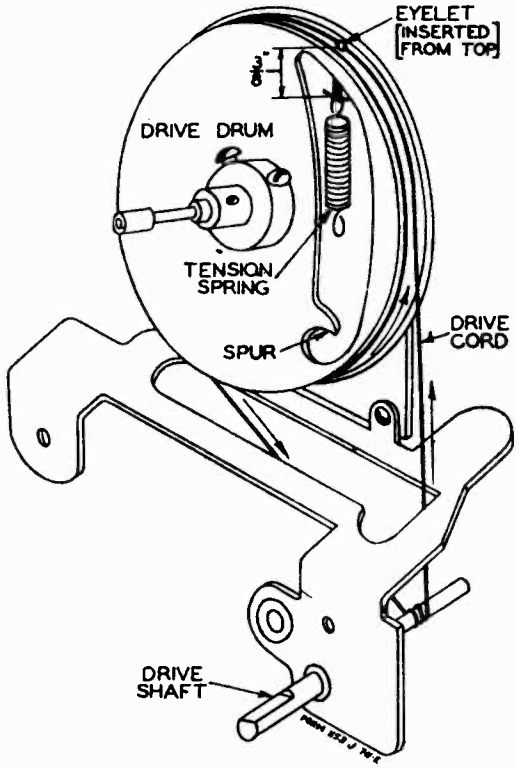


Fig. 12—Drive Cord Replacement

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

Turn the drive shaft back and forth several times.

Replace the drive assembly and pointer.

Replace the chassis in the cabinet.

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.	Winding	Code	D. C. Resistance in Ohms
P-9A416	Antenna R. F. Transformer	T1	
	Range B Primary Winding		20.0
	Range C Primary Winding		0.3
	Range D Primary Winding		0.2
	Range B Secondary Winding		6.2
	Range C Secondary Winding		1.8
	Range D Secondary Winding		Small
P 9A392	Interstage R. F. Transformer	T2	
	Range B Primary Winding		4.0
	Range C Primary Winding		2.5
	Range D Primary Winding		0.5
	Range B Secondary Winding		6.0
	Range C Secondary Winding		1.8
	Range D Secondary Winding		Small
P-9A393	Oscillator Coils	T3	
	Range B Plate Coil		1.2
	Range C Plate Coil		1.0
	Range D Plate Coil		0.4
	Range B Grid Coil		4.0
	Range C Grid Coil		0.9
	Range D Grid Coil		Small
P-9A394	1st I. F. Transformer	T4	
	Primary Winding		11.4
	Secondary Winding		11.4
P-9A395	2nd I. F. Transformer	T5	
	Primary Winding		11.4
	Secondary Winding		11.4
P-9A396	3rd I. F. Transformer	T6	
	Primary Winding		
	Tap to B+		8.0
	Tap to Variable Trimmer		8.2
	Secondary Winding		126.0
P-50X11	Audio Input Transformer	T7	
	Primary Winding		1005.0
	Secondary Winding		
	Center Tap to Inside		580.0
	Center Tap to Outside		630.0
*P-12A218	Magnetic Speaker		
	Speaker Coil		
	Center Tap to Inside		275.0
	Center Tap to Outside		300.0
P-9A281	Single Filament Reactor	L1	1.2
P-9A391	High Frequency Oscillator Tracking Coil	L2	0.7
P-9A281	Single Filament Reactor	L3	1.2

WESTERN AUTO SUPPLY CO.

MODEL D714 (1939)
Schematic, Voltage
Socket, Trimmers

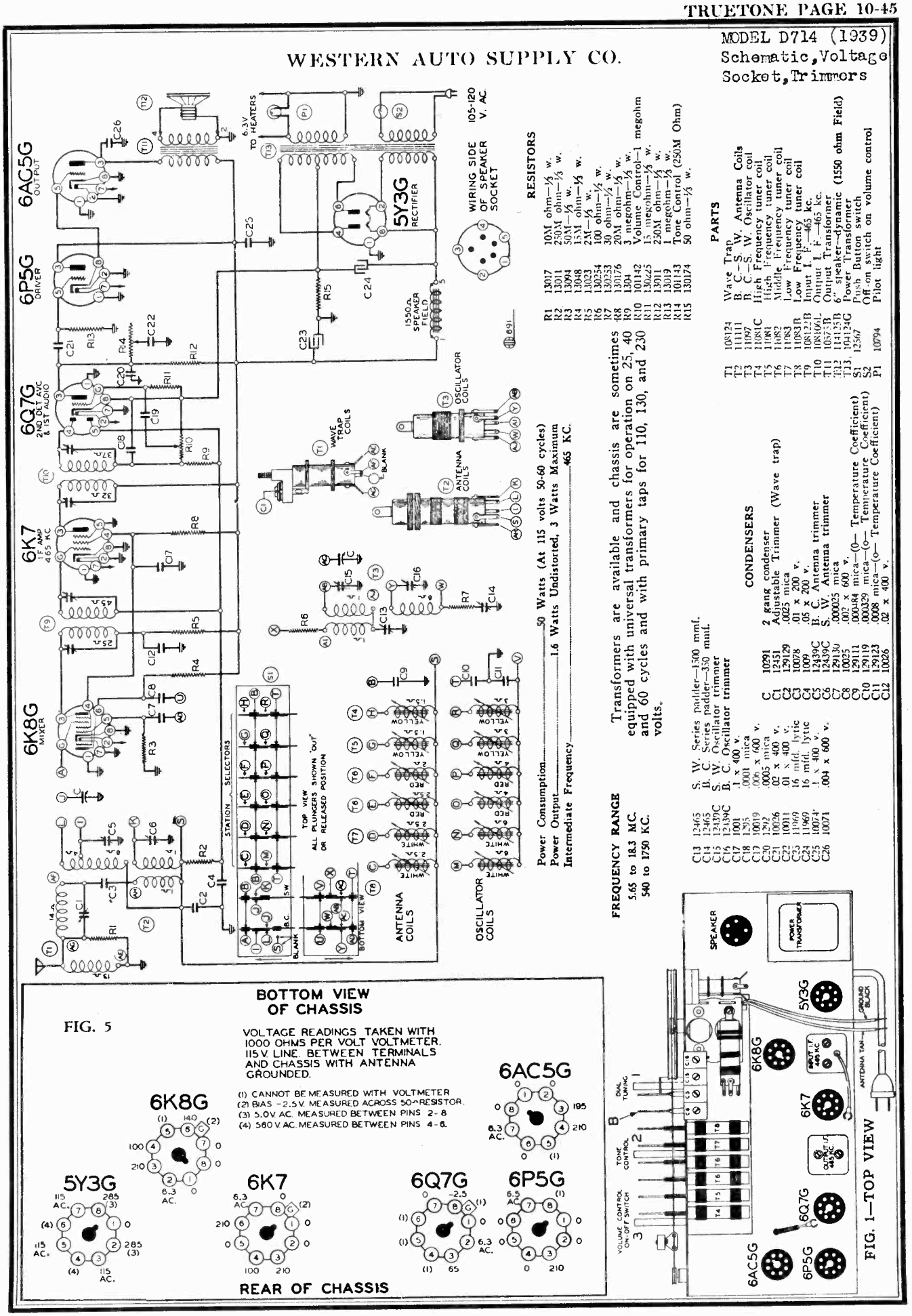


FIG. 5

FIG. 1—TOP VIEW

FREQUENCY RANGE
5.65 to 18.3 MC.
540 to 1750 KC.

Transformers are available and chassis are sometimes equipped with universal transformers for operation on 25, 40 and 60 cycles and with primary taps for 110, 130, and 230 volts.

Power Consumption	50 Watts (At 115 volts 50-60 cycles)
Power Output	1.6 Watts Undistorted, 3 Watts Maximum
Intermediate Frequency	465 KC.

RESISTORS

R1	13017	10M ohm—½ w.
R2	13011	250M ohm—½ w.
R3	13094	50M—½ w.
R4	13048	15M ohm—½ w.
R5	13023	2M—½ w.
R6	130253	100 ohm—½ w.
R7	130176	20M ohm—½ w.
R8	1301	3 megohm—½ w.
R9	101142	Volume Control—1 megohm
R10	130225	15 megohm—½ w.
R11	13011	250M ohm—½ w.
R12	13019	1 megohm—½ w.
R13	101143	Tone Control (250M Ohm)
R14	130174	50 ohm—½ w.
R15		

PARTS

T1	10S124	Wave Trap
T2	111111	B. C.—S. W. Antenna Coils
T3	11097	B. C.—S. W. Oscillator coil
T4	110S1C	High Frequency tuner coil
T5	110S1	High Frequency tuner coil
T6	110S2	Middle Frequency tuner coil
T7	110S3	Low Frequency tuner coil
T8	110S3B	Low Frequency tuner coil
T9	108121B	Input I. F.—465 kc.
T10	108106L	Output I. F.—465 kc.
T11	10673B	Output Transformer
T12	1141231B	6" speaker—dynamic (1550 ohm Field)
T13	1041124G	Power Transformer
S1	12567	Push button switch
S2		Off-on switch on volume control
P1	10794	Pilot light

CONDENSERS

C	10291	2 gang condenser	
C1	12451	Adjustable Trimmer (Wave trap)	
C2	129129	.0025 mica	
C3	10078	.01 x 200 v.	
C4	1009	.05 x 200 v.	
C5	12439C	B. C. Antenna trimmer	
C6	12439C	S. W. Antenna trimmer	
C7	129130	.000025 mica	
C8	10025	.002 x 600 v.	
C9	129111	.000484 mica—(0— Temperature Coefficient)	
C10	129119	.00039 mica—(0— Temperature Coefficient)	
C11	129123	.0008 mica—(o— Temperature Coefficient)	
C12	10026	.02 x 400 v.	
C13	12465	S. W. Series padder—1500 mmf.	
C14	12465	B. C. Series padder—350 mmf.	
C15	12439C	S. W. Oscillator trimmer	
C16	12439C	B. C. Oscillator trimmer	
C17	1001	.1 x 400 v.	
C18	1295	.0001 mica	
C19	10019	.006 x 600 v.	
C20	1292	.0005 mica	
C21	10026	.02 x 400 v.	
C22	10011	.01 x 400 v.	
C23	11969	16 mfd. lytic	
C24	11969	16 mfd. lytic	
C25	10074*	.1 x 400 v.	
C26	10071	.004 x 600 v.	

ALIGNING INSTRUCTIONS:

CAUTION:—No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low line voltages, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary. No aligning adjustments should be attempted with the chassis in the cabinet.

To remove the chassis from the cabinet, remove the four bolts which are used to fasten the chassis to the cabinet bottom; pull the knobs off their shafts and detach the pointer from the drive string (see Fig. 1, top view).

NOTE:—On the front of the string dial drum a calibrated scale is provided for aligning this chassis to the frequencies listed in the alignment procedure. Attach a pointer so that it will indicate proper dial setting in respect to the position of the variable condenser.

DIAL CALIBRATION:

To correct dial calibration rotate the tuning knob to the right until the dial pointer reaches the extreme end of the dial scale; then rotate the tuning knob to the left until the pointer reaches the other extreme end of the dial scale.

Stop clamps on the pointer slider bar make the pointer self aligning thereby correcting dial calibration.

ALIGNMENT PROCEDURE

- Volume control—Maximum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

The following equipment is required for aligning:

- An all wave signal generator which will provide an accurately calibrated signal at the test frequencies as listed.
- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antennas—.1 mf., 200 mmf. and 400 ohms.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Pushbutton Indicated Below Pushed "In"	Variable Condenser Setting	Trimmers Adjusted (In Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Grid of 6K7	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 1)	Output I. F.	Adjust to maximum output
	465 Kc.	.1 MFD.	Grid of 6K8G	Broadcast	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 1)	Input I. F.	Adjust to maximum output
BROAD-CAST BAND	1750 Kc.	200 mmf.	Antenna lead	Broadcast	Rotor full open (Plates out of mesh)	Trimmer (C16) (See Fig. 1)	Broadcast oscillator	Adjust to maximum output
	1400 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 1400 Kc.	Trimmer (C5) (See Fig. 1)	Broadcast antenna	Adjust to maximum output
	600 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 600 Kc.	Trimmer (C14) (See Fig. 4)	Broadcast oscillator series pad	Adjust to maximum rock dial. (See note "A")
	465 Kc.	200 mmf.	Antenna lead	Broadcast	Set Dial at 600 Kc.	Trimmer (C1) (See Fig. 4)	I. F. Wave Trap	Adjust for minimum output
SHORT WAVE BAND	17 Mc.	400 ohms	Antenna lead	Short Wave	Set Dial at 17 MC	Trimmer (C15) (See Fig. 1)	Short Wave oscillator	Adjust to maximum output
	17 Mc.	400 ohms	Antenna lead	Short Wave	Dial Set at 17 MC	Trimmer (C6) (See Fig. 1)	Short Wave antenna	Adjust to maximum output
	6 Mc.	400 ohms	Antenna lead	Short Wave	Set Dial at 6 MC	Trimmer (C13) (See Fig. 4)	Short Wave oscillator series pad	Adjust to maximum rock dial. (See note "A")

NOTE "A" Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

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

After each band is completed, repeat the procedure as a final check.

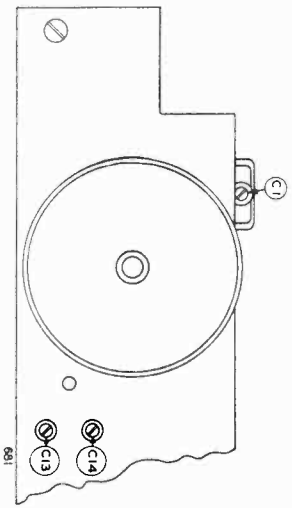


FIG. 4

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on the voltage chart are measured with 115 volts A. C. on the primary of the power transformer.

Resistances of coil windings are indicated in ohms on the schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D. C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.

PROCEDURE FOR SETTING THE AUTOMATIC STATION PUSHBUTTONS:

Important: **Allow the radio to "warm up" for about 15 minutes before setting the station adjustment screws for the pushbuttons**

After you have made up your list of stations, press button marked "Broadcast" and tune set manually until station selected having the highest frequency is tuned in and the program noted. Press button covering frequency range in which station is located (See Fig. 3). Adjust screw through station tab opening above button pressed until the same station is heard clearly and is correctly tuned.

Press pushbutton marked "Broadcast" and tune in next station selected. Press button covering frequency range in which station is located. Adjust screw through station tab opening above button pressed until the same station is heard clearly and with maximum volume.

Follow this procedure for each button until you have selected all of your stations. The automatic buttons are now set up for quick tuning and no further adjustment is necessary.

NOTE: In setting up the pushbuttons, station identification may require switching back and forth to button marked "Broadcast" until the same program is heard for both. If the same program is heard on more than one station, find the station on dial tuning and select the proper one on the pushbutton by comparing the order or sequence of programs with that on dial tuning.

Punch out the station call letter tabs of the stations you have set up for the automatic buttons from the set of sheets supplied and insert them into the rectangular openings in the escutcheon. One of the small, clear celluloid tabs supplied should be snapped into place over each of the station call letter tabs.

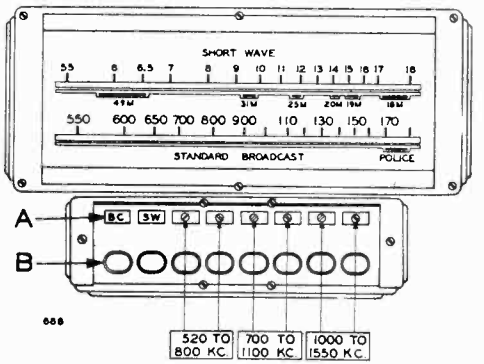


FIG. 3—Showing Station Adjustment Screws.

MODEL 8712, D714N (1935)
WESTERN AUTO SUPPLY CO. Schematic, Trimmers

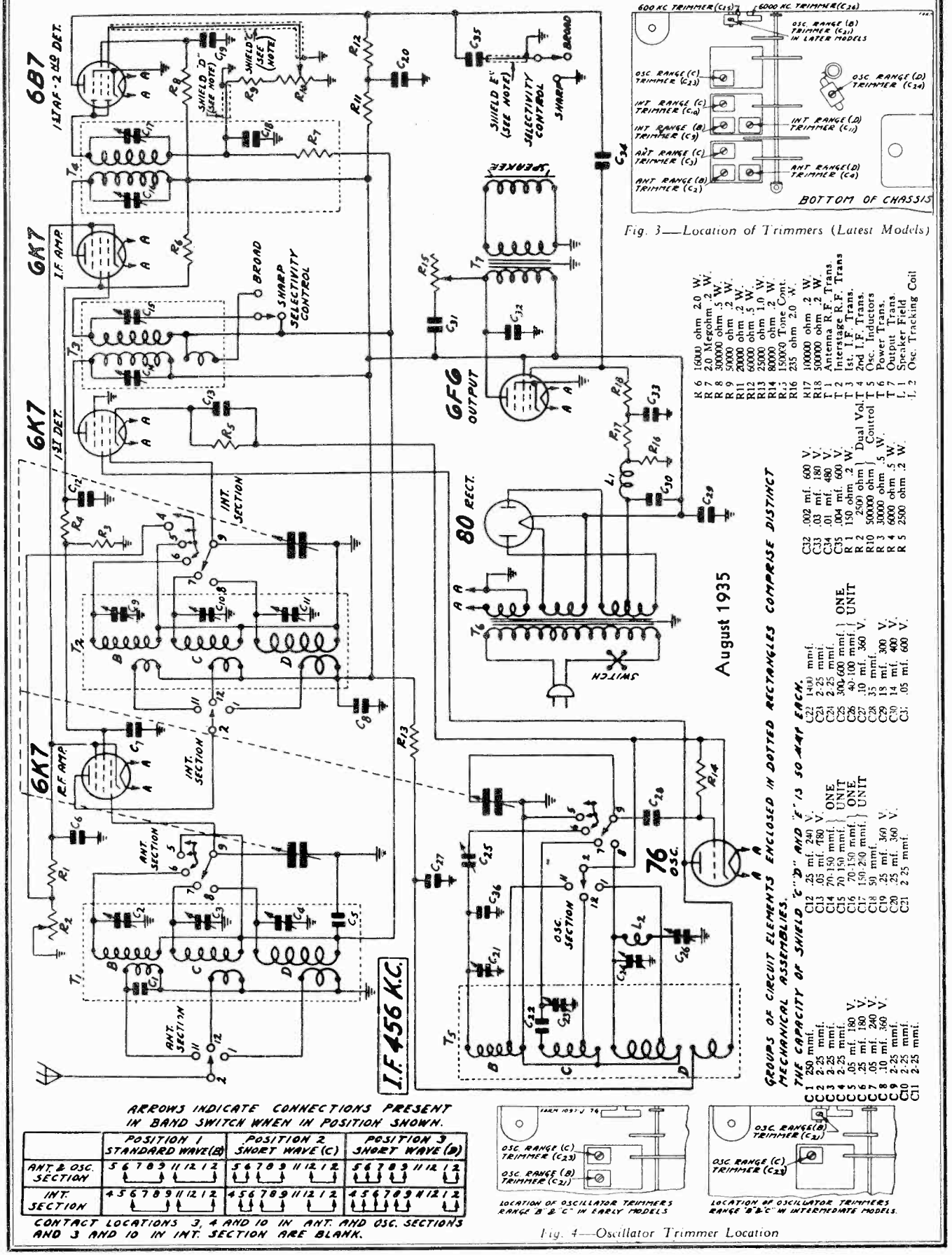


Fig. 3—Location of Trimmers (Latest Models)

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)
ANT. & OSC. 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 ANT. AND OSC. SECTIONS AND 3 AND 10 IN INT. SECTION ARE BLANK.

Fig. 4—Oscillator Trimmer Location

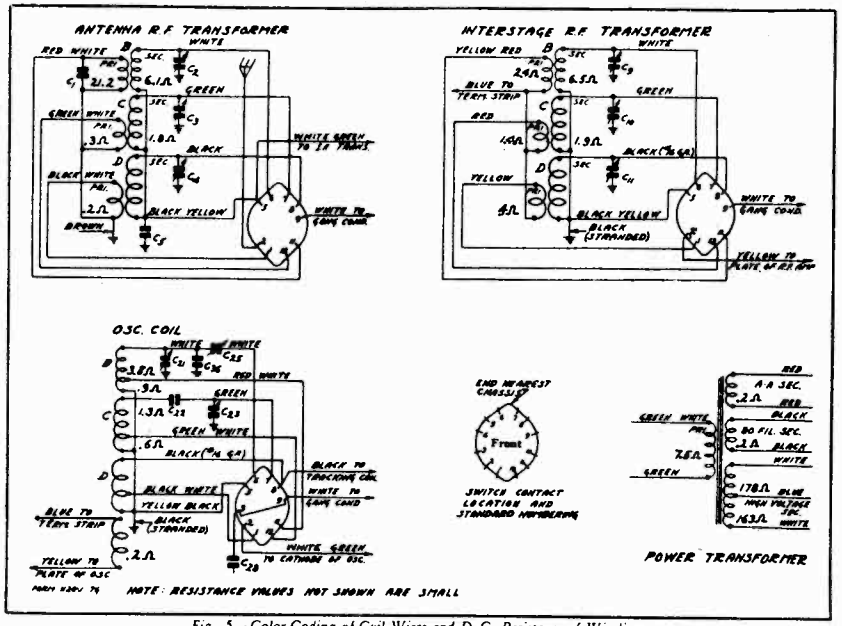


Fig. 5—Color Coding of Coil Wires and D. C. Resistance of Windings (Also see complete D. C. Resistance List in this Manual)

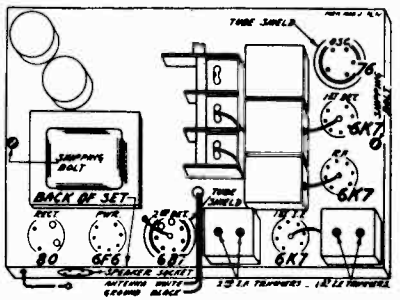


Fig. 6—Location of Tubes

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	Plate M. A.
6K7 (6D6)	R. F.	6.1	230	95	3.0	6.4
6K7 (6I6)	1st Det.	6.1	230	100	9.0	3.2
76	Osc.	6.1	100			5.2
6K7 (6I6)	I. F.	6.1	230	120	3.0	9.
6B7	2nd Det.	6.1	55(1)	40		2.3
6F6 (42)	Power	6.1	215	230	17(2)	30.0
80	Rectifier	4.7				34. per plate

(1) As read with 500,000 ohm meter
(2) As read across R16

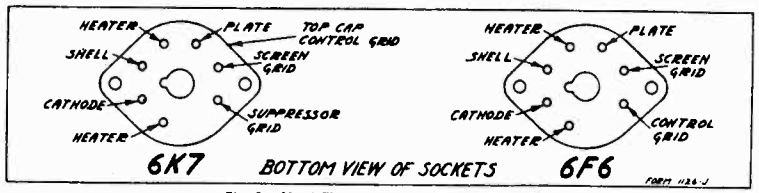


Fig. 7—Metal Tubes—Bottom View of Sockets

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. 5.

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 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.

A standard arrangement for switch contact location numbering has been adopted. This numbering is illustrated in Fig. 5. In contact locations not used, the number applying to that particular location is not employed.

Changes in Early Models

In the early models of this receiver, the antenna transformer (T1) had two Range B Primary windings as shown in Fig. 8.

The oscillator Range B and C trimmer locations varied in the early and intermediate models of this receiver as shown in Figs. 3 and 4.

Referring to Fig. 2, in the early models of this receiver, contact No. 4 in the interstage section of the band selector was not used. The purpose of this contact arrangement is to short out variable resistor R2 in the second short wave position. In these models the relative positions of resistors R1 and R2 were reversed. The common connection from the suppressor grid and cathodes of the R. F. and I. F. amplifier tubes was connected to the control arm of variable resistor R2. The latter was connected to resistor R1 which was grounded at the other end. The by-pass condenser C6 remains connected as before, to the cathode and suppressor grid connection.

The type 6K7 and 6F6 metal tubes replace the types 6D6 and 42 glass tubes respectively which were used in the early models.

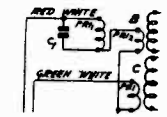


Fig. 8—Antenna Transformer in Early Models

Phonograph Connections

Phonograph connections can be made as shown in Fig. 9. 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. 10.

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 1¾" 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.

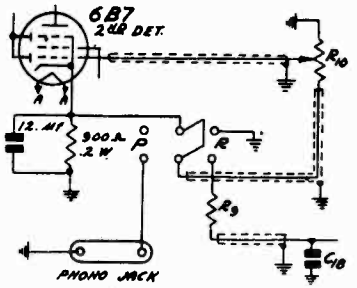


Fig. 9—Phonograph Connections

Replace the single lug insulated terminal strip (located on the rear panel, directly in back of the band selector switch) with (P-4A39) double lug insulated terminal strip with ground lug. Be sure to solder back to this new terminal strip any leads that were connected to the other terminal strip.

The connections are made by opening the diode return circuit at the volume control. Unsolder the 50,000 ohm resistor R9 (covered with saturated sleeving in early models) from the lug at the volume control and from the shielded lead which runs from the I. F. transformer. Cut this shielded lead to length and connect to the open lug on the new terminal strip. Connect one side of the 50,000 ohm resistor R9 to the same lug and the other side to the phono switch—see Fig. 9. Ground the shield to the ground lug of the terminal strip.

The extra shielded lead which is provided should be inserted into a piece of saturated sleeving.

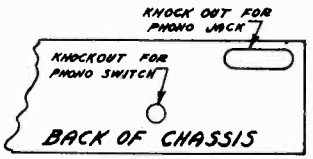


Fig. 10—Location of Phono Knockouts

Circuit

This model is a three band receiver with a tuning range in each band as shown in the specifications above. Three band coverage is accomplished by means of three sets of R. F. and oscillator coils and a three section triple throw switch.

Referring to the schematic circuit diagram, Fig. 2, T1 and T2 are the antenna and interstage R. F. transformer assemblies and T5 is the oscillator coil assembly. The standard wave, 1st and 2nd short wave coils in each assembly are indicated by the letters B, C and D respectively. The three sections of the band switch are designated in the schematic as the antenna, interstage and oscillator sections.

The band switch completes connections to the coils in use. It also short circuits the R. F. transformer secondary and oscillator coil 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 through the interstage R. F. transformer with tuned secondary into another 6K7 tube which functions as the 1st detector.

A separate type 76 tube is employed in the oscillator circuit. Referring to the oscillator assembly T5, Fig. 2, B, C and D refer to the standard wave, 1st short wave and 2nd short wave oscillator coils respectively. The oscillating circuit is always resonant at 456 KC above the frequency to which the R. F. amplifier is tuned.

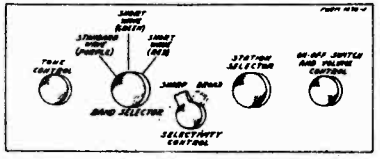


Fig. 1—Arrangement of Controls

The oscillator potential is fed into the cathode circuit of the 6K7 first detector tube. This results in the intermediate or beat frequency of 456 KC being present in the plate circuit of this tube.

One stage of I. F. amplification is employed using a 6K7 tube. The primaries and secondaries of the first and second I. F. transformers are tuned by small trimmer condensers.

Selectivity Control—Referring to the 1st I. F. transformer T3 in Fig. 2, it will be noted that there is a coupling winding shown in the illustration below the primary. Refer also to the by-pass arrangement in the pentode plate circuit of the 6B7.

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. High audio frequencies are by-passed to ground through condenser C35.

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.

In order to allow passage of the higher audio frequencies in the broad position, the capacity of the by-pass condenser to ground is greatly reduced (C35 and the capacity of shield E in series).

Dual Volume Control—A dual manual volume control is employed. In one section the audio voltage applied to the 1st audio section of the 6B7 tube is varied (R10). In the other section the R. F. and 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 through contact No. 4 of the interstage section of the band selector when in the 2nd short wave position.

A type 6B7 duo diode pentode tube functions as the second detector and a one stage audio amplifier. The two diode plates are connected together. AVC voltage is applied through isolating resistors to the control grid circuits of the R. F. and I. F. tubes. The audio voltage developed across volume control resistor R10 is applied through the movable arm to the control grid of the 6B7 tube. Resistance coupling is used between the first audio stage and the output stage which employs a type 6F6 output pentode tube. A type 80 full wave rectifier tube is used in the power unit.

Alignment and Calibration

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 (standard wave band—purple dial color).

Turn the selectivity switch 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. 6.

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 (C21) until maximum output is obtained. The location of this trimmer is shown in Figs. 3 and 4.

1500 KC Adjustment

Set the signal generator for 1500 KC.

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

There is a lever arm in front of the large gear on the tuning condenser shaft by means of which the position of the station pointer may be adjusted. Set the station pointer at the 1500 KC mark on the dial scale by adjusting this lever arm.

Adjust the interstage Range B trimmer (C9) and antenna Range B trimmer (C2) to maximum.

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 (C23) until maximum output is obtained. See Figs. 3 and 4 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 (C10) 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 (C24) 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 (C11) 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.

Tuning Frequency Range

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

Sensitivity

B Range Average	0.5 Microvolts Absolute
C Range Average	1.0 Microvolts Absolute
D Range Average	2.0 Microvolts Absolute

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

Power Output - - - - - - 3 Watts Undistorted

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

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

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

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		286.5
P-51X26	Audio Output Transformer	T8	
	Primary Winding		
	Center Tap to Inside		133.5
	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	La	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

WESTERN AUTO SUPPLY CO.

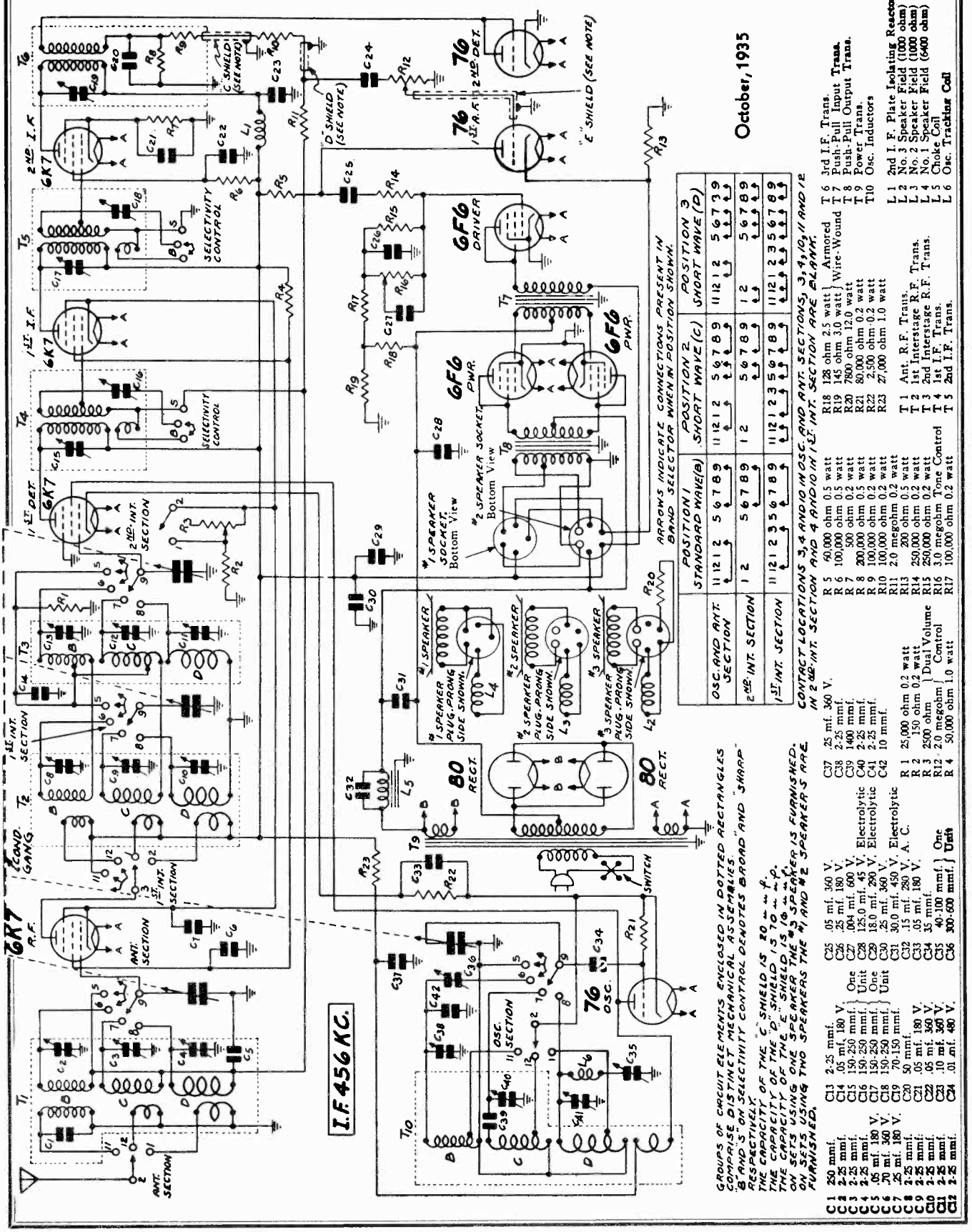
MODEL D716 (1935)
Schematic

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.



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

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

October, 1935

C1	250 mmf.	C13	2.25 mmf.	C25	.05 mf. 360 V.	C37	.25 mf. 360 V.	R 5	40,000 ohm 0.5 watt	R18	128 ohm 2.5 watt } Armored	T 6	3rd I.F. Trans.
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	T 7	Push-Pull Input Trans.
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	T 8	Push-Pull Output Trans.
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	T 9	Power Trans.
C5	.05 mf. 180 V.	C17	150-250 mmf. } One	C29	18.0 mf. 280 V. Electrolytic	C41	2.25 mmf.	R 9	100,000 ohm 0.2 watt	R22	2,500 ohm 0.2 watt	T10	Osc. Inductors
C6	.10 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			L 1	2nd I. F. Plate Isolating Reactor
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.	L 2	No. 3 Speaker Field (1000 ohm)
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.	L 3	No. 2 Speaker Field (1000 ohm)
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.	L 4	No. 1 Speaker Field (6400 ohm)
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.	L 5	Choke Coil
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.	L 6	Osc. Tracking Coil

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

"B AND 3" ON SELECTIVITY CONTROL DENOTES BROAD AND SHARP RESPECTIVELY.

THE CAPACITY OF THE "C" SHIELD IS 20 mmf.

THE CAPACITY OF THE "D" SHIELD IS 10 mmf.

THE CAPACITY OF THE "E" SHIELD IS 10 mmf.

ON SETS USING ONE SPEAKER THE #3 SPEAKER IS FURNISHED.

ON SETS USING TWO SPEAKERS THE #1 AND #2 SPEAKERS ARE FURNISHED.

MODEL D716 (1935)
Voltage, Socket, Coils
Trimmers

WESTERN AUTO SUPPLY CO.

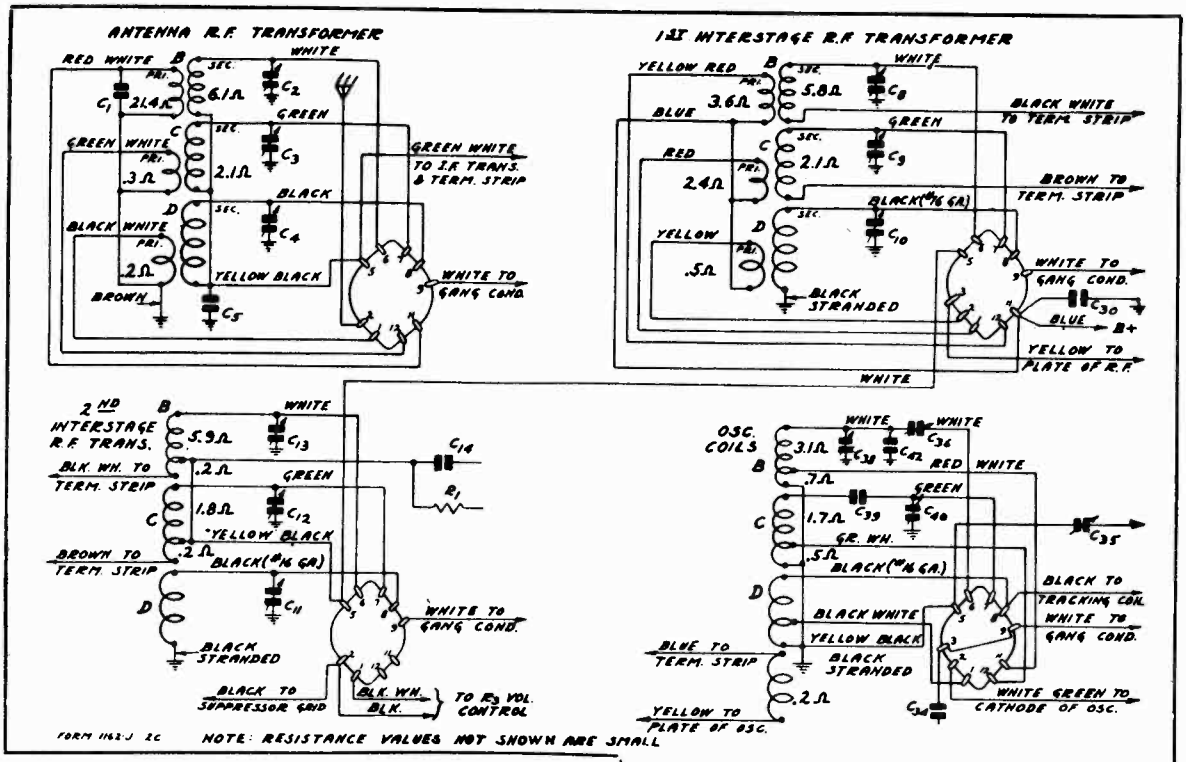


Fig. 4—Color Coding of Coil Wires and D. C. Resistance of Windings. (Also see complete D. C. Resistance List)

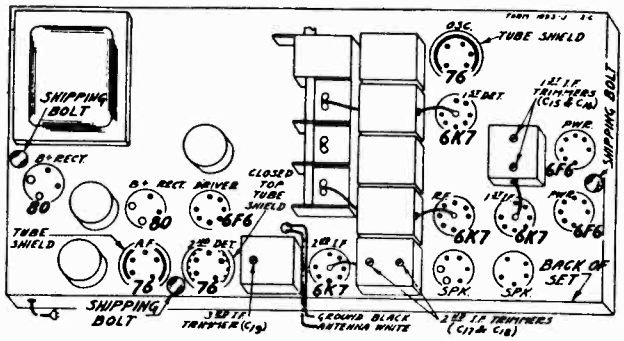
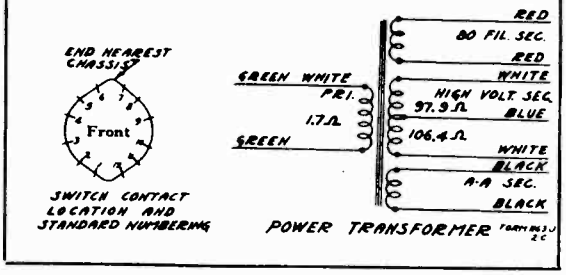


Fig. 5—Location of Tubes



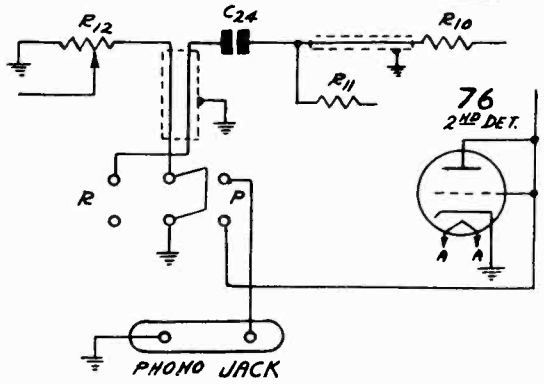


Fig. 7—Phonograph Connections

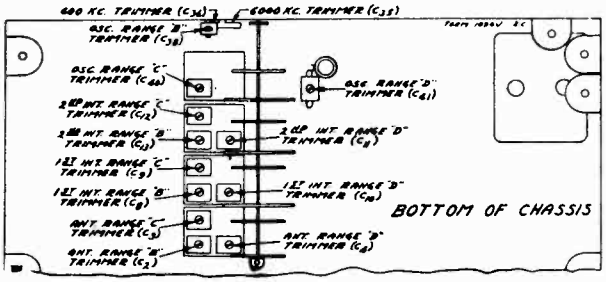


Fig. 3—Location of Trimmers

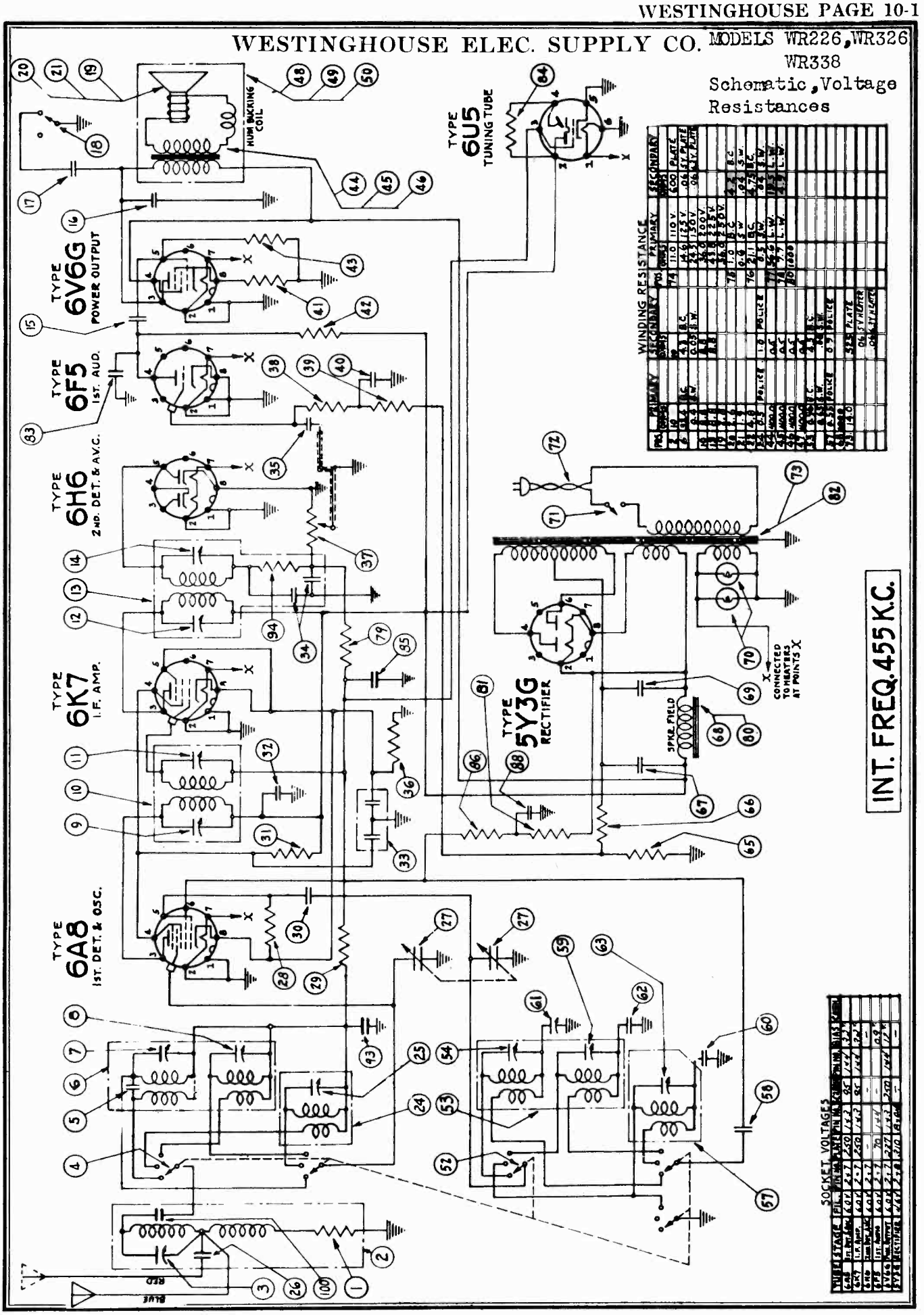
VOLTAGES AT SOCKETS
Line Voltage 115 - Antenna Shorted to Ground
Volume Control at Maximum

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

WESTINGHOUSE ELEC. SUPPLY CO. MODELS WR226, WR326 WR338

Schematic, Voltage Resistances



MODELS WR226, WR326
WR338

WESTINGHOUSE ELEC. SUPPLY CO.

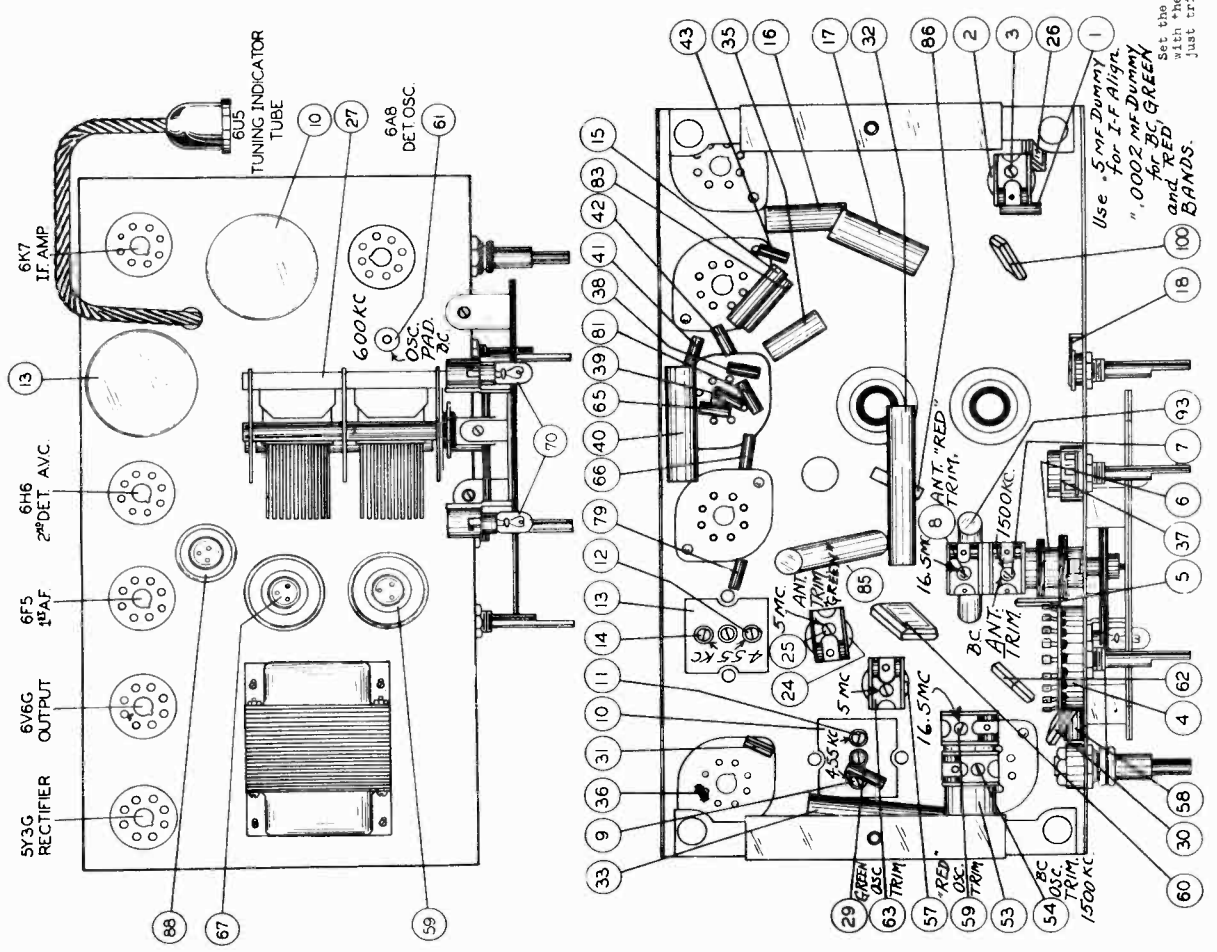
Socket, Trimmers, Parts
Alignment

SERVICE PARTS LIST

Dia. #	Part #	Description of Parts
1	RE 3333	33,000 ohm, 1/2 W. resistor - part of RC 95326
2	RC 95326	Trap coil
3		Trimmer condenser 100-200 mmf. - part of RC 95326
4	SW 9579	Switch assembly
5		.000005 mfd. mica condenser - part of RC 95302
6	RC 95302	Preselector coil
7		Trimmer condenser 1.6-12 mmf. - part of RC 95302
8		Trimmer condenser 4-35 mmf. - part of RC 95302
9		Trimmer condenser - part of IC 95113
10	IC 95113	1st I.F. coil (455 K.C.)
11		Trimmer condenser - part of IC 95113
12		Trimmer condenser - part of IC 95114
13	IC 95114	2nd I.F. coil (455 K.C.)
14		Trimmer condenser - part of IC 95114
15	CW 4-02	.02 mfd., 400 V. condenser
16	CW 6-005	.005 mfd., 600 V. condenser
17	CW 6-05	.05 mfd., 600 V. condenser
18	SW 9573	Tone control switch
19	DM 9529	Speaker diaphragm (SK 9576)
20	DM 9527	Speaker diaphragm (SK 9576)
21	DM 9534	Speaker diaphragm (SK 9583)
22	RC 95304	Preselector coil (police band) - part of RC 95304
25		Trimmer condenser 1.6-12 mmf. - part of RC 95304
26		.00005 mfd. mica condenser - part of RC 95326
27	CG 9567	Gang condenser
28	RE 4733	47,000 ohm, 1/2 W. resistor
29	RE 2733	27,000 ohm, 1/2 W. resistor
30	CE 9545	.00005 mfd. mica condenser
31	RE 4733	47,000 ohm, 1/2 W. resistor
32	CW 4-10	.1 mfd., 400 V. condenser
33	CW 9535	.1-.1 mfd. 400 V. dual condenser
34		.0001-.0001 mfd. condenser - part of IC 95114
35	CW 2-02	.02 mfd., 200 V. condenser
36	RS 2213	220 ohm, 1/2 W. resistor
37	VR 9548	Volume control - .5 meg.
38	RE 1053	1 meg., 1/2 W. resistor
39	RE 4743	470,000 ohms, 1/2 W. resistor
40	CW 4-05	.05 mfd., 400 V. condenser
41	RE 2713	270 ohm, 1/2 W. resistor
42	RE 2243	220,000 ohm, 1/2 W. resistor
43	RE 4743	470,000 ohm, 1/2 W. resistor
44	TR 95145	Output transformer (6-1/2" speaker SK 9576)
45	TR 95143	Output transformer (12" speaker SK 9575)
46	TR 95154	Output transformer (10" speaker SK 9583)
48	SK 9578	Speaker 6-1/2"
49	SK 9575	Speaker 12"
50	SK 9583	Speaker 10"
53		Broadcast oscillator coil - part of RC 95303
54	RC 95305	Trimmer condenser 4-35 mmf. - part of RC 95303
57	CW 4-02	Police oscillator condenser
58		Trimmer condenser 1.6-12 mmf. - part of RC 95303
59	CK 9547	.0016 mfd. mica condenser
60	CK 9585	Oscillator series (lag) condenser 225-700 mmf.
61	CM 959	.002 mfd. mica condenser
62		Trimmer condenser 4-35 mmf. - part of RC 95305
63	RE 1503	15 ohm. 1/2 W. resistor
66	RE 2703	27 ohm, 1/2 W. resistor
67	CE 9562	18 mfd. 300 V. electrolytic condenser
68	CL 9569	Field coil (6-1/2" speaker SK 9576)
69	CE 9564	18 mfd., 450 V. electrolytic condenser
70	LP 9510	Dial lamp - 6.3 V., .2h amp.
71		Line switch - part of VR 9548
72	CB 9512	Line cable assembly
73	TR 95132	Power transformer 105-125 V., 50-60 cycle
79	RE 4743	470,000 ohm, 1/2 W. resistor
80	CL 9567	Field coil (12" speaker SK 9575 & 10" speaker SK9583)
81	RE 3533	33,000 ohm, 1/2 W. resistor
82	TR 95135	Power transformer 105-125 V., 25 cycle
83	CW 6-001	.001 mfd. 600 V. condenser
84		1 meg., 1/4 W. resistor - part of CB 95152
85	CW 4-05	.05 mfd., 400 V. condenser
86	RE 1033	10,000 ohm, 1/2 W. resistor
88	CE 9568	8 mfd., 450 V. electrolytic condenser
93	CW 4-05	.05 mfd., 400 V. condenser
94		47,000 ohm, 1/2 W. resistor - part of IC 95114
100	CM 959	.002 mfd. mica condenser

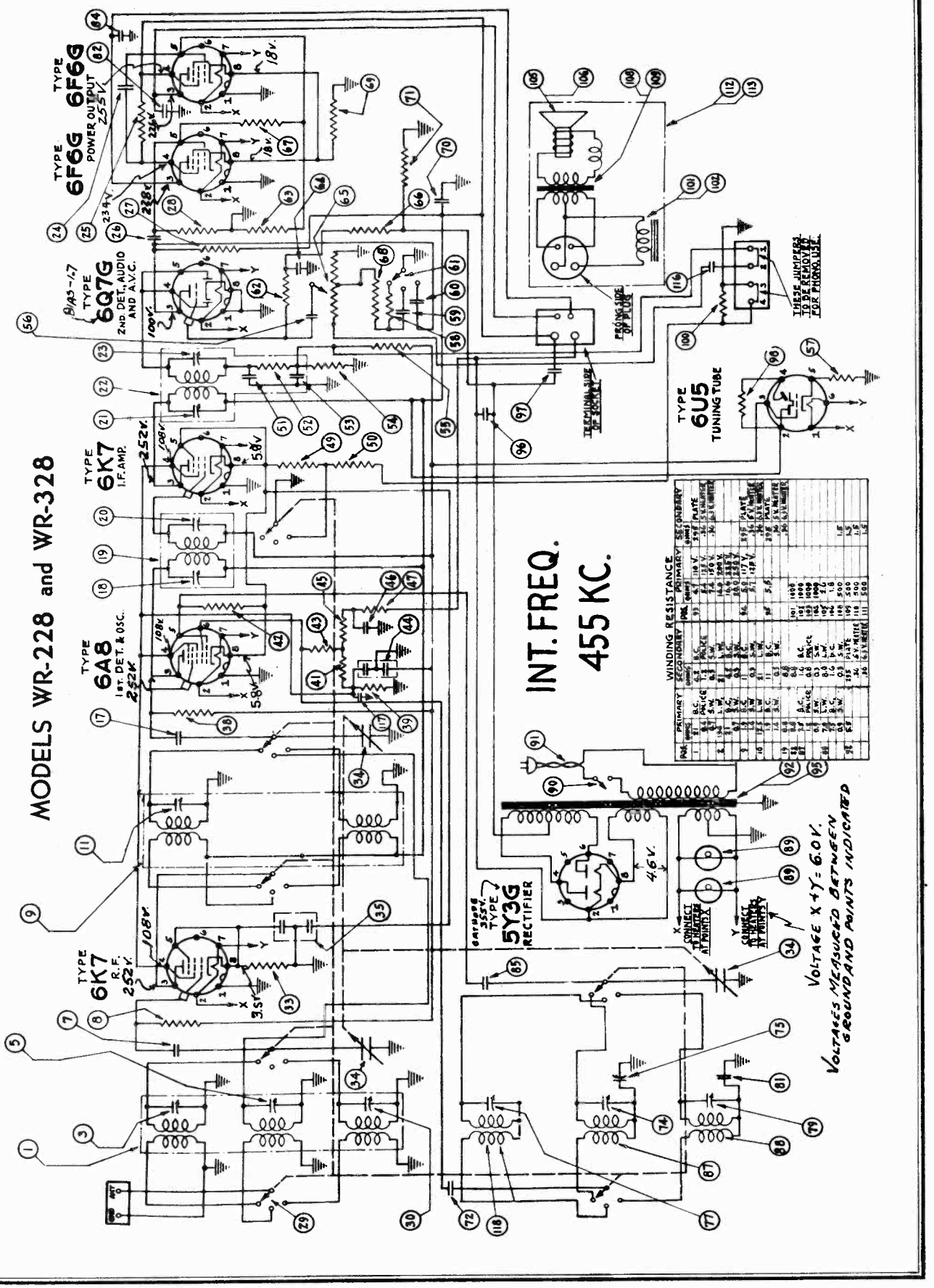
WAVE TRAP ADJUSTMENT

Set the test oscillator to 455 K.C. and with the signal applied to the antenna adjust trimmer condenser #3 to minimize the signal. Under actual operating conditions this trimmer may be adjusted slightly to minimize ar interfering signal known to be on or near the 455 K.C. channel.



WESTINGHOUSE ELEC. SUPPLY CO.

MODELS WR228, WR528
Schematic, Voltage
Resistances



MODELS WR228, WR328
Socket, Trimmers
Aligument, Parts

WESTINGHOUSE ELEC. SUPPLY CO.

Dia. #	Part #		Description of Parts
1	RC 95306		Antenna composite coil assembly
2			Broadcast antenna trimmer - part of RC 95306
3			Police antenna trimmer - part of RC 95308
4	CM 9519		.0005 mfd. mica condenser
5	RE 2743		270,000 ohm, 1/2 W. resistor
6	RC 95307		R.F. composite coil assembly
7			Broadcast R.F. trimmer - part of RC 95307
8	CM 9519		.0005 mfd. mica condenser
9			1st I.F. trimmers - part of IC 95119
10			1st I.F. transformer (less housing)
11			2nd I.F. trimmers - part of IC 95120
12			2nd I.F. transformer (less housing)
13	IC 95120		.01 mfd., 400 V. condenser
14	CW 4-01		1000 ohm, 1/2 W. resistor
15	RB 1023		.02 mfd., 400 V. condenser
16	CW 4-02		100,000 ohm, 1/2 W. resistor
17	RE 1043		180,000 ohm, 1/2 W. resistor
18	RE 1043		Wave change switch assembly - part of RC 96306
19	SW 9580		Short-wave antenna trimmer - part of RC 96306
20			390 ohm, 1/2 W. resistor
21	RE 3913		Variable gang condenser
22	CG 9569		.1 mfd.-.1 mfd., 400 V. dual condenser
23	CW 9535		270,000 ohm, 1/2 W. resistor
24	RE 2743		68,000 ohm, 1/2 W. resistor
25	RE 6833		10,000 ohm, 1/2 W. resistor
26	RE 1033		47,000 ohm, 1/2 W. resistor
27	RE 4733		4700 ohm, 1/2 W. resistor
28	RE 4723		.1 mfd.-.1 mfd., 400 V. dual condenser
29	CW 9535		10,000 ohm, 2 W. resistor
30	RE 103822		6800 ohm, 2 W. resistor
31	CE 9568		8 mfd., 450 V. electrolytic condenser
32	RE 682522		150 ohm, 1/2 W. resistor
33	RE 1513		1500 ohm, 1/2 W. resistor
34	CM 9513		.0001 mfd. mica condenser
35	RW 4733		47,000 ohm, 1/2 W. resistor
36	CM 9513		.0001 mfd. mica condenser
37	RE 4743		470,000 ohm, 1/2 W. resistor
38	RE 4743		470,000 ohm, 1/2 W. resistor
39	CW 4-02		.02 mfd., 400 V. condenser
40	RE 2253		2.2 meg., 1/2 W. resistor
41	RE 4743		470,000 ohm, 1/2 W. resistor
42	CW 2-10		.1 mfd., 200 V. condenser
43	VR 9556		2 meg., mid-tapped volume control
44	RE 4743		470,000 ohm, 1/2 W. resistor
45	RE 4743		470,000 ohm, 1/2 W. resistor
46	RE 1043		100,000 ohm, 1/2 W. resistor
47	RE 271522		270 ohm, 2 W. resistor
48	CW 4-10		.1 mfd., 400 V. condenser
49	RB 1803		18 ohm, 1/2 W. resistor
50	CW 6-005		.005 mfd., 600 V. condenser
51		CS 9585	B.C. oscillator trimmer - part of RC 95308
52			B.C. oscillator lag condenser
53			Police oscillator trimmer - part of RC 95309
54			S.W. oscillator trimmer - part of RC 95310
55	CM 9545		4050 mmfd. mica condenser
56	CW 6-002		.002 mfd., 600 V. condenser
57	CW 6-002		.002 mfd., 600 V. condenser
58	CM 9513		.0001 mfd. mica condenser
59	RC 95308		Broadcast oscillator coil
60	RC 95310		S.W. oscillator coil
61	LP 9510		Dial light - 6.3 V., .25 amp.
62	CB 9512		Line cable and plug assembly
63	TR 95117		Power transformer 105-125 V. 50-60 cycle
64	TR 95120		Power transformer 105-125 V. 25 cycle
65	CE 9564		18 mfd., 150 V. electrolytic condenser
66	CE 9562		18 mfd., 300 V. electrolytic condenser
67	RE 1052		1 meg., 1/2 W. resistor
68	RB 1033		10,000 ohm, 1/2 W. resistor
69	CL 9574		Field coil (8" speaker)
70	CL 9572		Field coil (12" speaker)
71	DA 9532		8" speaker diaphragm
72	DM 9528		12" speaker diaphragm
73	TR 95153		Output transformer (8" speaker)
74	TR 95150		Output transformer (12" speaker)
75	SX 9681		8" speaker complete
76	SX 9685		12" speaker complete
77	CW 4-02		.02 mfd., 400 V. condenser
78	CW 9825		1 mfd., 200 V. condenser
79	RC 95309		Police oscillator coil

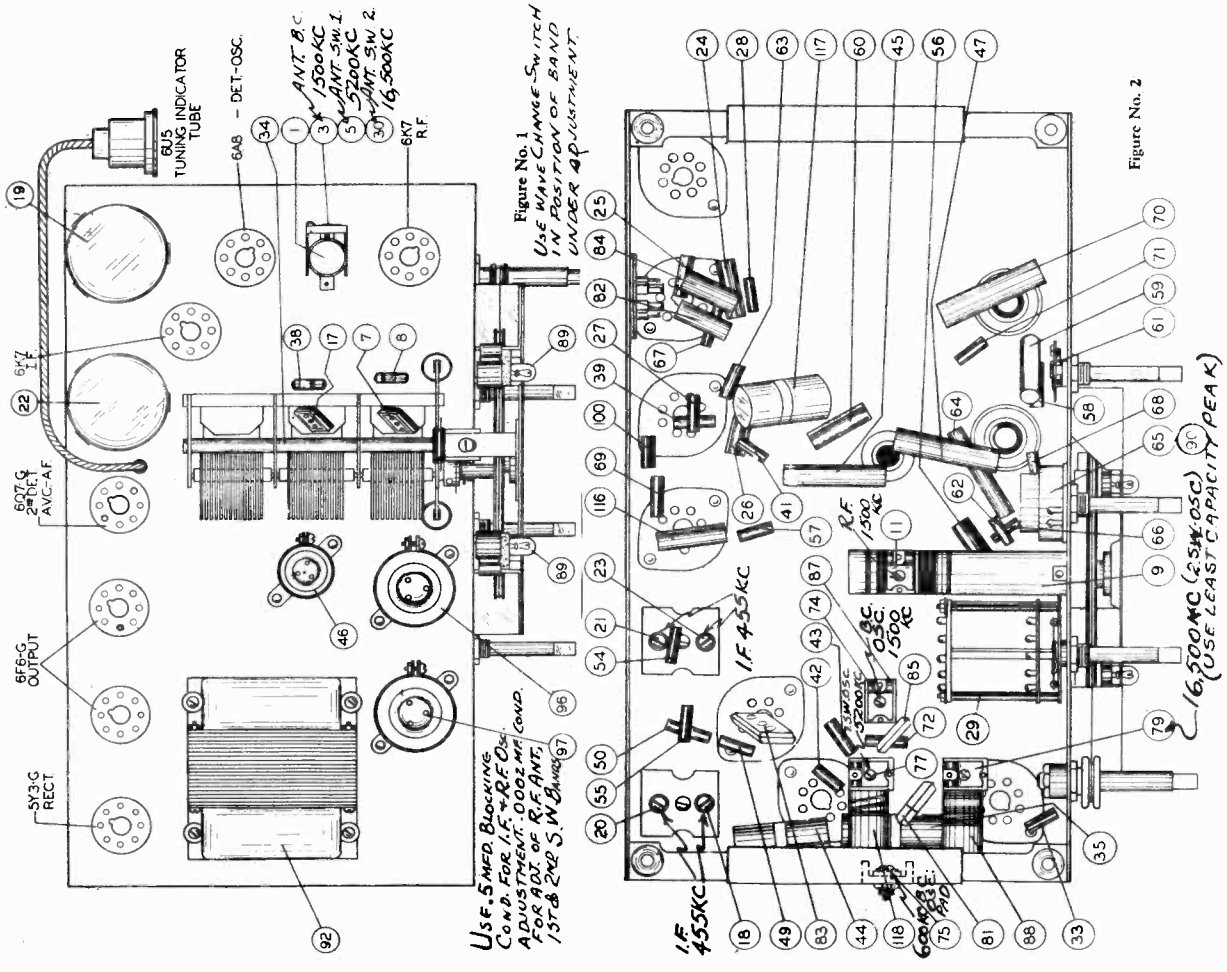


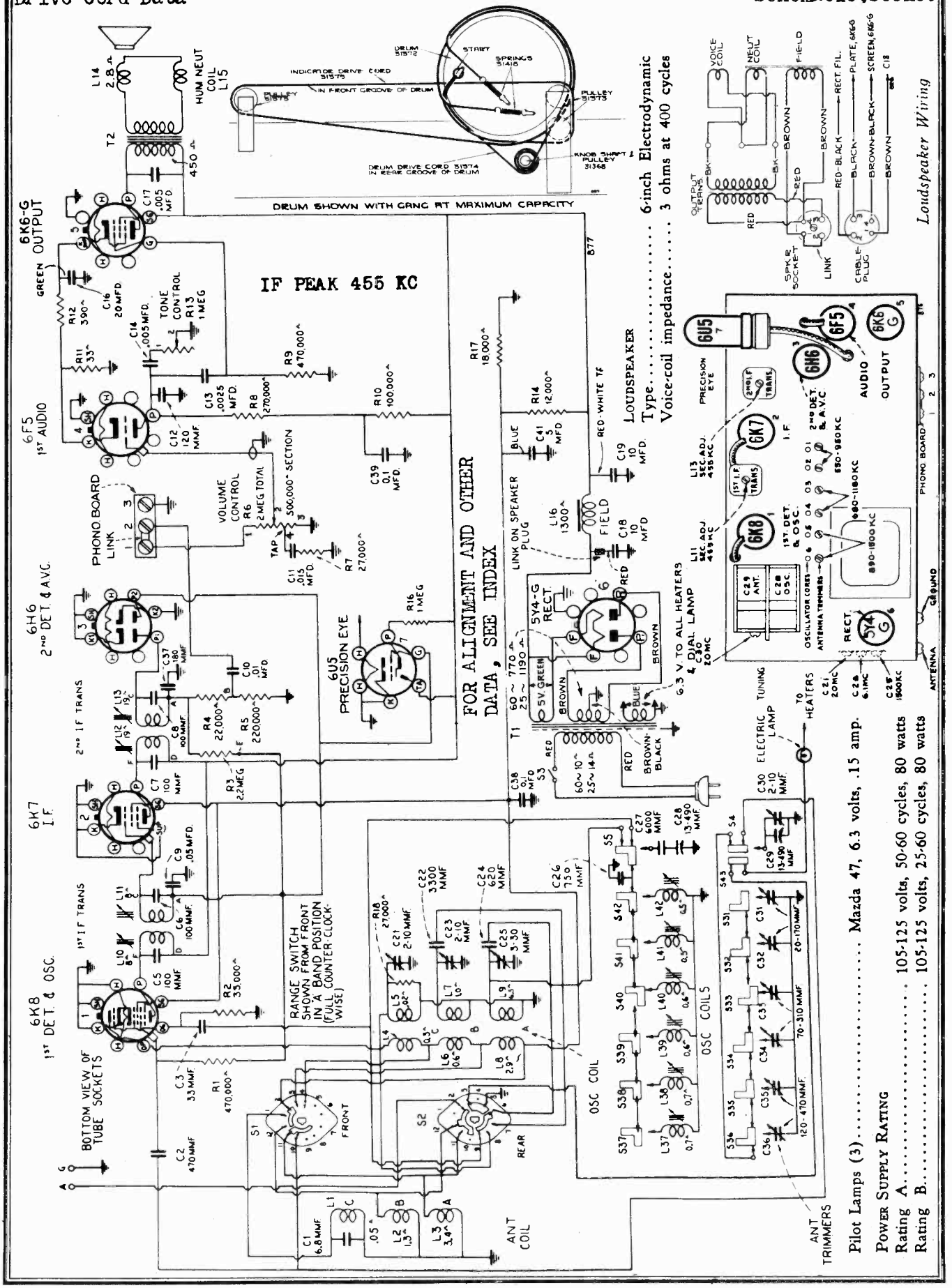
Figure No. 1 Use Wave Change Switch in Position of Band under Adjustment.

Figure No. 2

Trimmers, Speaker Drive Cord Data

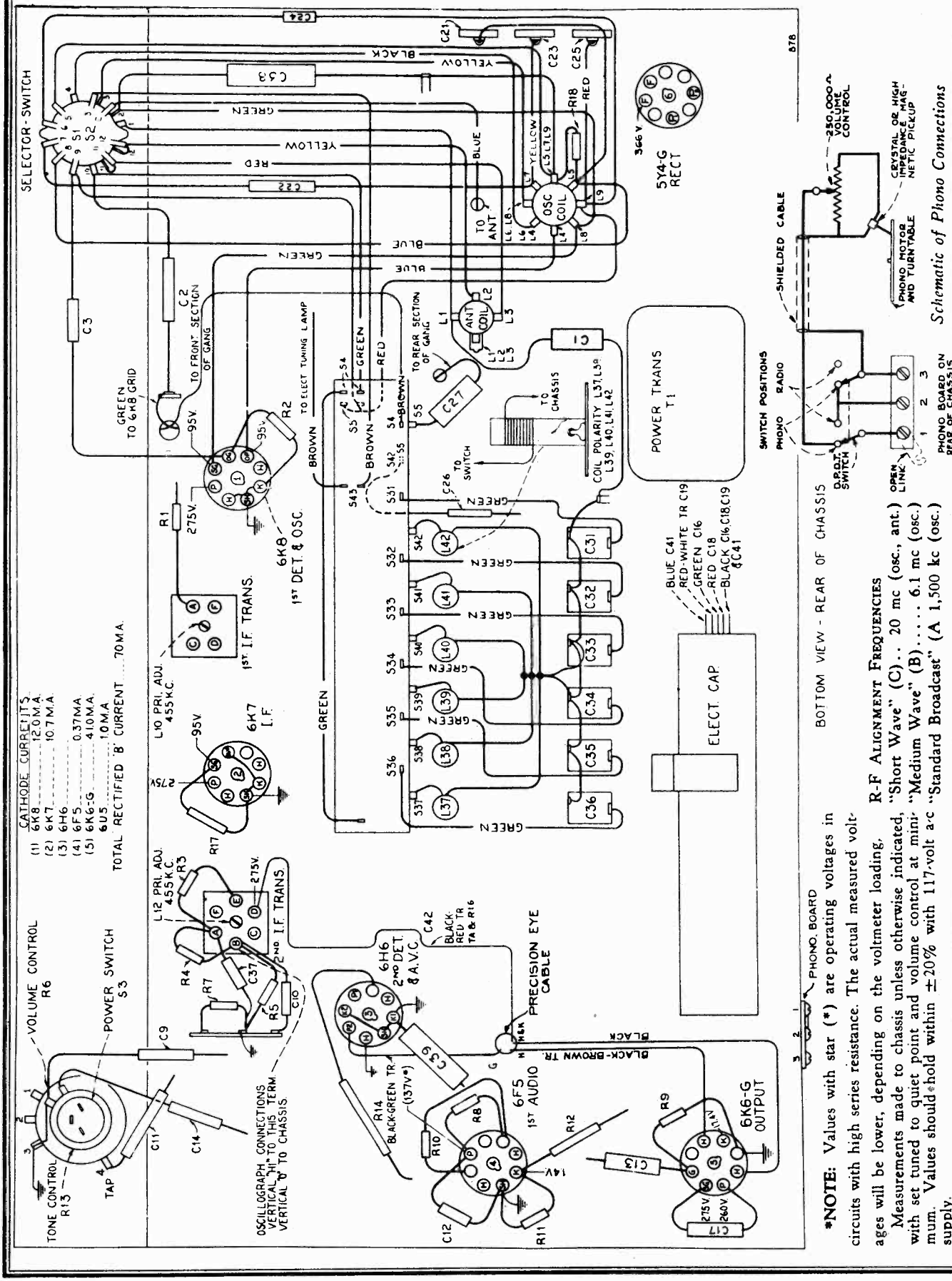
WESTINGHOUSE ELEC. SUPPLY CO.

MODEL WR264
Schematic, Socket



MODEL WR264
Chassis Wiring
Voltage

WESTINGHOUSE ELEC. SUPPLY CO.



***NOTE:** Values with star (*) are operating voltages in circuits with high series resistance. The actual measured voltages will be lower, depending on the voltmeter loading.

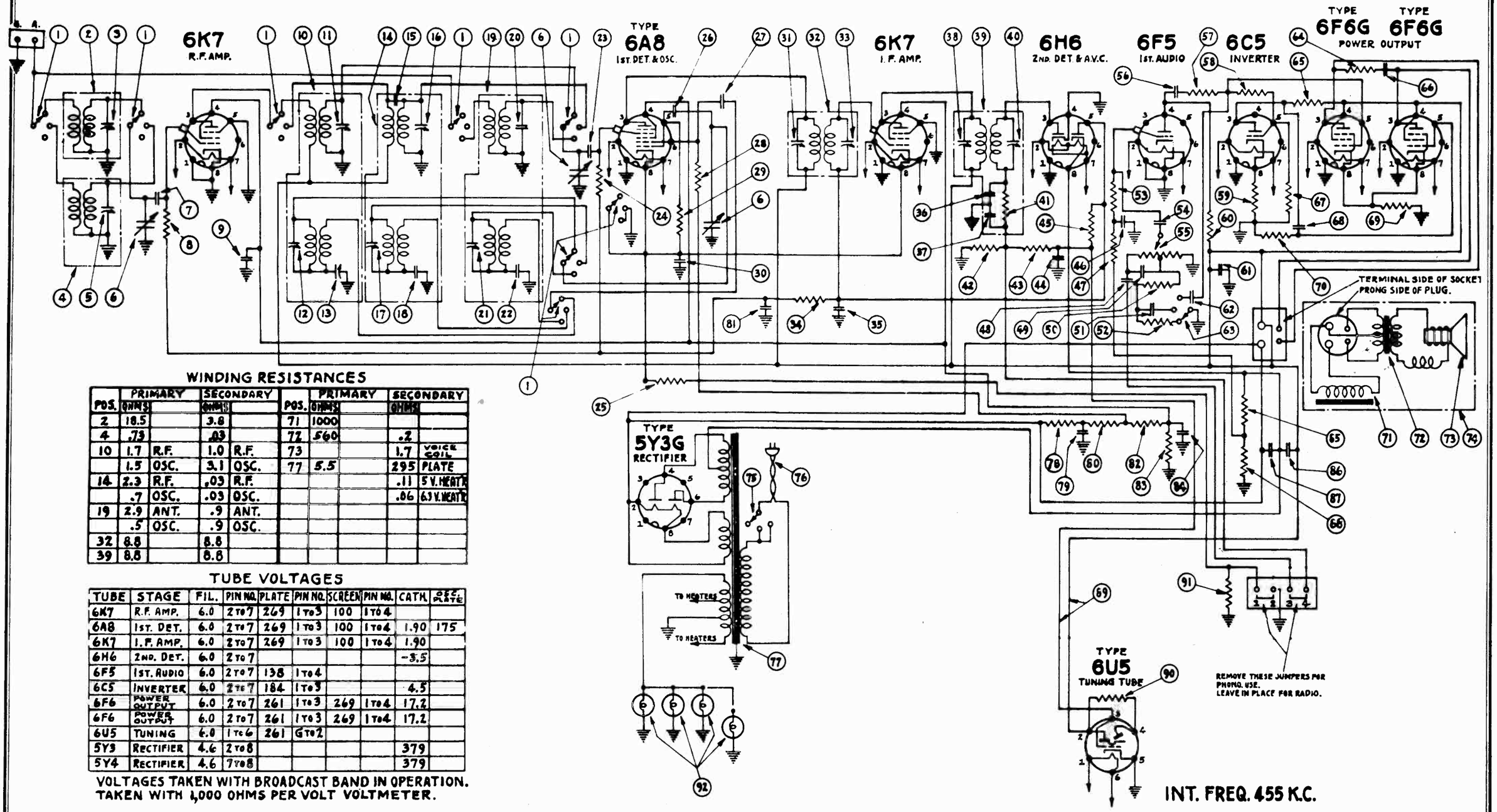
Measurements made to chassis unless otherwise indicated, with set tuned to quiet point and volume control at minimum. Values should hold within ±20% with 117-volt a-c supply.

R-F Alignment Frequencies

"Short Wave" (C).. 20 mc (osc., ant.)
"Medium Wave" (B)..... 6.1 mc (osc.)
"Standard Broadcast" (A 1,500 kc (osc.)

WESTINGHOUSE ELEC. SUPPLY CO.

MODEL WR330
Schematic, Voltage
Resistances



WINDING RESISTANCES

POS.	PRIMARY OHMS		SECONDARY OHMS		POS.	PRIMARY OHMS		SECONDARY OHMS	
2	18.5		3.8		71	1000			
4	.73		.03		72	560		.2	
10	1.7	R.F.	1.0	R.F.	73			1.7	VOICE COIL
	1.5	OSC.	3.1	OSC.	77	5.5		295	PLATE
14	2.3	R.F.	.03	R.F.				.11	5 V. HEATR
	.7	OSC.	.03	OSC.				.06	6.3 V. HEATR
19	2.9	ANT.	.9	ANT.					
	.5	OSC.	.9	OSC.					
32	8.8		8.8						
39	8.8		8.8						

TUBE VOLTAGES

TUBE	STAGE	FIL.	PIN NO.	PLATE	PIN NO.	SCREEN	PIN NO.	CATH.	OSC. PLATE
6K7	R.F. AMP.	6.0	2 TO 7	269	1 TO 3	100	1 TO 4		
6A8	1ST. DET.	6.0	2 TO 7	269	1 TO 3	100	1 TO 4	1.90	175
6K7	I.F. AMP.	6.0	2 TO 7	269	1 TO 3	100	1 TO 4	1.90	
6H6	2ND. DET.	6.0	2 TO 7					-3.5	
6F5	1ST. AUDIO	6.0	2 TO 7	138	1 TO 4				
6C5	INVERTER	6.0	2 TO 7	184	1 TO 3			4.5	
6F6	POWER OUTPUT	6.0	2 TO 7	261	1 TO 3	269	1 TO 4	17.2	
6F6	POWER OUTPUT	6.0	2 TO 7	261	1 TO 3	269	1 TO 4	17.2	
6U5	TUNING	6.0	1 TO 6	261	G TO 2				
5Y3	RECTIFIER	4.6	2 TO 8					379	
5Y4	RECTIFIER	4.6	7 TO 8					379	

VOLTAGES TAKEN WITH BROADCAST BAND IN OPERATION.
TAKEN WITH 1,000 OHMS PER VOLT VOLTMETER.

WESTINGHOUSE ELEC. SUPPLY CO.

MODEL WR330
Socket, Trimmers
Alignment, Parts

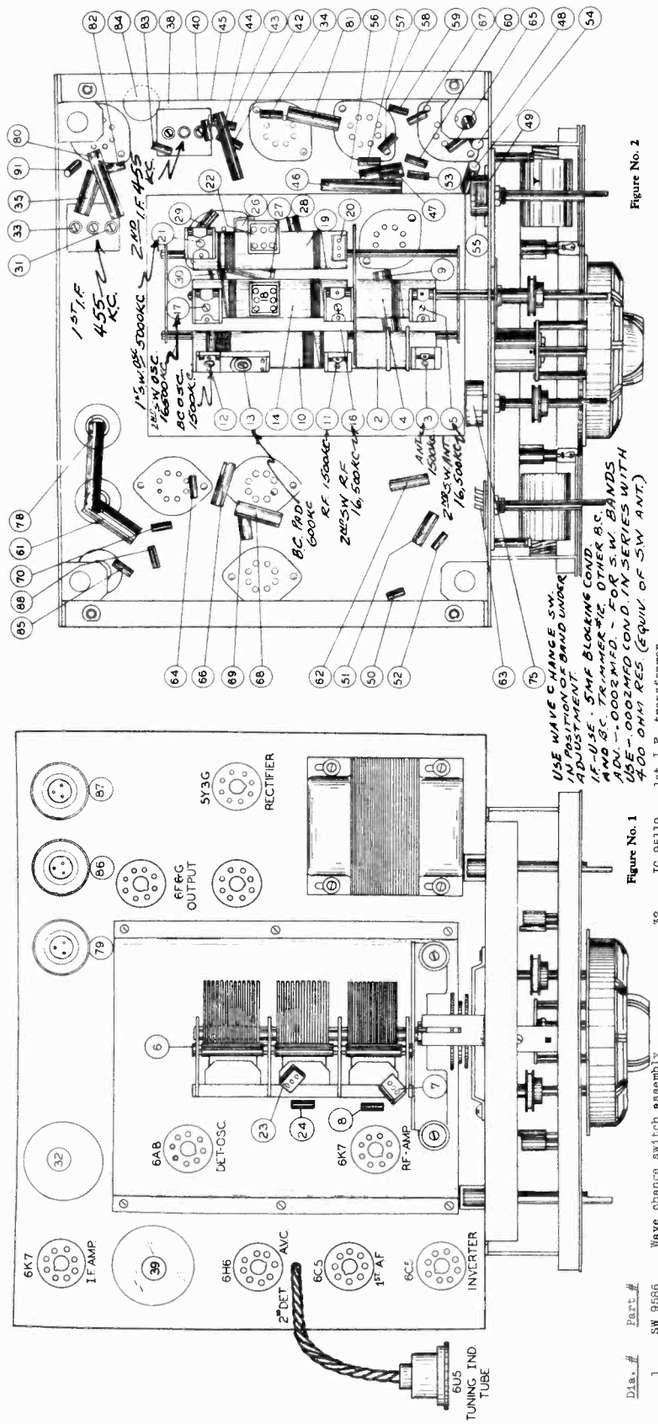


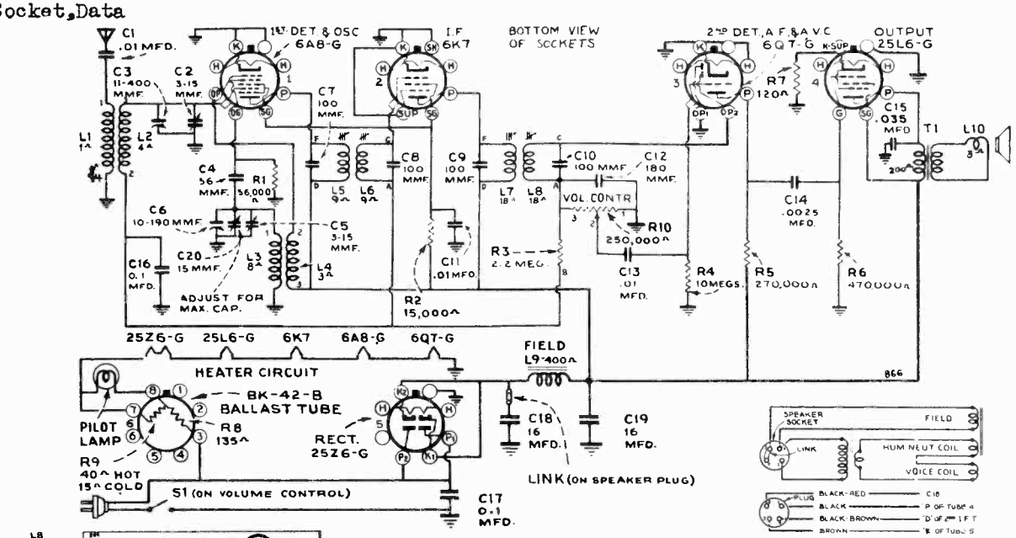
Figure No. 2

Dia.-#	Part #		
1	SW 9586	Wave change switch assembly	32
2	RC 95311	B.C. antenna coil assembly	33
3		4-35 mmf. trimmer - part of RC 95311	34
4	RC 95312	S.W. antenna coil assembly	35
5		4-35 mmf. trimmer - part of RC 95312	36-37
6		Variable condenser gang	38-40
7	C9 9566	.0005 mfd. mica condenser	41
8	CM 9519	1000 ohm, 1/2 W. resistor	42
9	CW 4-10	.01 mfd., 400 V. condenser	43
10	RC 95317	B.C. composite coil assembly	44
11		4-35 mmf. trimmer - part of RC 95317	45
12		5-25 mmf. trimmer - part of RC 95317	46
13		300-600 mmf. trimmer - part of RC 95317	47
14	RC 95315	S.W. composite coil assembly	48
15		4-35 mmf. trimmer - part of RC 95315	49
16-17		4.5 mmf. mica condenser - part of RC 95315	50
18		3400 mmf. mica condenser - part of RC 95315	51
19	RC 95314	Police composite coil assembly	52
20		10 mmf. mica condenser - part of RC 95314	53
21		4-35 mmf. trimmer - part of RC 95314	54
22		1100 mmf. mica condenser - part of RC 95314	55
23	CW 9519	1000 mfd., 400 V. condenser	56
24	RE 1042	100,000 ohm, 1/2 W. resistor	57
25	RE 1533	150 ohm, 1/2 W. resistor	58
26	CM 9513	.0001 mfd. mica condenser	59
27	CW 4-01	.01 mfd., 400 V. condenser	60
28	RE 5624412	5,600 ohm, 1 W. resistor	61
29	RE 4733	47,000 ohm, 1/2 W. resistor	62
30	CE 9505	.05 mfd., 200 V. condenser	63
31	CW 2-05	80-200 mmf. trimmers - part of RC 95119	64

	IC 95119	1st I.F. transformer	65
	RE 4745	470,000 ohm, 1/2 W. resistor	66
	CW 4-05	.05 mfd., 400 V. condenser	67
		100 mmf. mica condenser - part of IC 95121	68
		80-200 mmf. trimmers - part of IC 95121	69
	IC 95121	2nd I.F. transformer	70
	RE 4723	47,000 ohm, 1/2 W. resistor	71
	RE 4743	470,000 ohm, 1/2 W. resistor	72
	TR 95150	Speaker output transformer	73
	DM 9528	Speaker diaphragm assembly (12")	74
	SM 9865	Speaker complete (12")	75
	CB 9577	Line cord	76
	CB 9512	Line cable and plug assembly	77
	TR 95121	Power transformer - 105-125 volts, 50-60 cycles	78
	RE 682522	6800 ohm, 2 W. resistor	79
	CE 9528	8 mfd., 450 V. electrolytic condenser	80
	RE 103522	10,000 ohm, 2 W. resistor	81
	CW 4-05	.05 mfd., 400 V. condenser	82
	RE 6833	68000 ohm, 1/2 W. resistor	83
	CW 4-50	.5 mfd., 400 V. condenser	84
	RE 1803	18 ohm, 1/2 W. resistor	85
	CE 9562	18 mfd., 300 V. electrolytic condenser	86
	CE 9554	18 mfd., 450 V. electrolytic condenser	87
	RE 1803	18 ohm, 1/2 W. resistor	88
	CB 90151	Cable and plug assembly - part of CB 95151	89
		Tweeter speaker - part of CB 95151	90
	RE 2253622	22,500 ohm, 2 W. resistor .	91
	LP 9510	Dial light - 6.3 V., .25 amp.	92

MODEL WR154
Schematic, Voltage
Alignment, Trimmers
Socket, Data

WESTINGHOUSE ELEC. SUPPLY CO.



Frequency Range..... 540 to 1,720 kc
R-F Alignment Frequency.. 1,500 kc (osc., ant.)
Intermediate Frequency..... 455 kc

TUBE COMPLEMENT

(1) RCA-6A8-G..... First-Det., Osc.
(2) RCA-6K7..... Intermediate Amp.
(3) RCA-6Q7-G..... Second-Det., A-F, A.V.C.
(4) RCA-25L6-G..... Power Output
(5) RCA-25Z6-G..... Rectifier
(6) BK-42-B..... Ballast

Dial lamp.... Mazda No. 47, 6.3 volts, 0.15 amp.

POWER OUTPUT (125-volt, 60-cycle supply)

Undistorted..... 1.0 watt
Maximum..... 1.5 watts

LOUDSPEAKER

Type..... 5-inch Electrodynamic
Voice-coil Impedance..... 3.4 ohms at 400 cycles

POWER SUPPLY RATINGS

A-C Rating.. 105-125 volts, 50-60 cycles, 50 watts
D-C Rating..... 105-125 volts, 50 watts

Precautionary Lead Dress

1. Keep power cord close to chassis base and away from volume control.
2. Keep speaker leads close to chassis and away from volume control and 25L6-G socket.
3. Keep black wire from 2nd i-f transformer to volume control close to front apron and away from other parts.
4. Keep pilot lamp leads close to chassis base.
5. Keep 6Q7-G grid lead away from dial lamp.

Figure 2—Tube Socket Voltages and Location of Parts

* Note: Values with star (*) are operating voltages. Values not starred are actual measured voltages.

Measurements made to chassis unless otherwise indicated.

Measurements made with set tuned to quiet point, volume control at minimum, using 1,000-ohm-per-volt meter, having ranges of 10, 50, 250, and 500 volts. (Use nearest range above the specified measured voltage).

Values should hold within approximately ± 20% for 117-volt 60-cycle supply. On d-c, voltages are approximately 10% lower except heaters which remain the same.

Alignment Procedure

CAUTION: The chassis is connected to one side of the power supply. Avoid contact of chassis or parts to external ground when servicing.

Output meter alignment.—Connect the meter across the speaker voice-coil, and turn the receiver volume control to maximum.

Test Oscillator.—For all alignment operations, connect the low side of the test oscillator to the receiver chassis through a 0.1 mfd. capacitor.

Pre-setting dial.—With gang condenser in full mesh, move dial pointer to coincide with horizontal lines. This is a friction adjustment.

Re-sealing i-f adjusting screws.—After completion of alignment, seal the i-f adjusting screws with a few drops of household cement.

Note 1.—Reel up the antenna wire and connect the high side of test oscillator through an 80-mmfd. capacitor to terminal "X" on antenna coil (see top view).

25-cycle operation.—For operation with 25-cycle power supply, connect a 16-mfd., 150-volt dry electrolytic capacitor (Part No. 31323) in parallel with C18.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
No. 1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	Quiet point between 550-750 kc	L7 and L8 (2nd I-F Transformer)
No. 2	6A8-G 1st-det. grid cap, in series with .01 mfd.	455 kc		L5 and L6 (1st I-F Transformer)
No. 3	See Note 1	1,500 kc	1,500 kc	C5* (oscillator) C2 (antenna)

* Trimmer C20 on gang condenser should be screwed clockwise for maximum capacity before adjusting C5.

Transformer Data
Pick-up, Motor Coils

WESTINGHOUSE ELEC. SUPPLY CO.

MODEL WR472
Schematic, Voltage
Socket, Trimmers

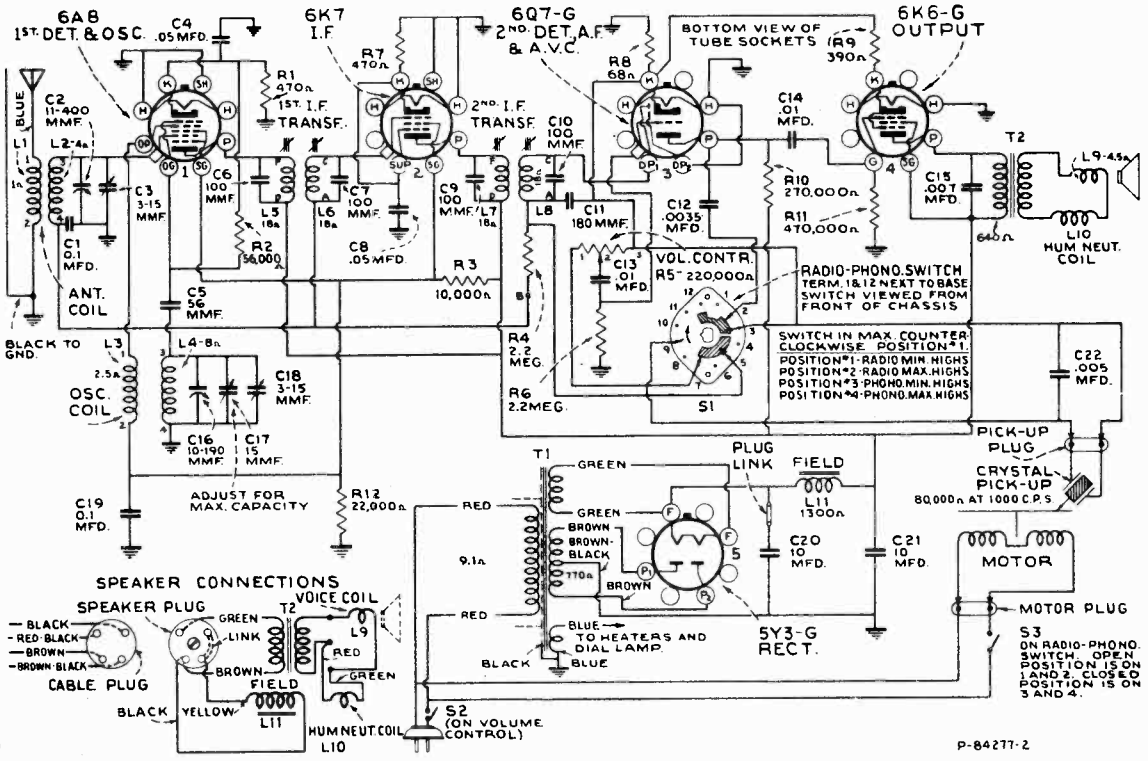


Figure 4—Schematic Circuit Diagram

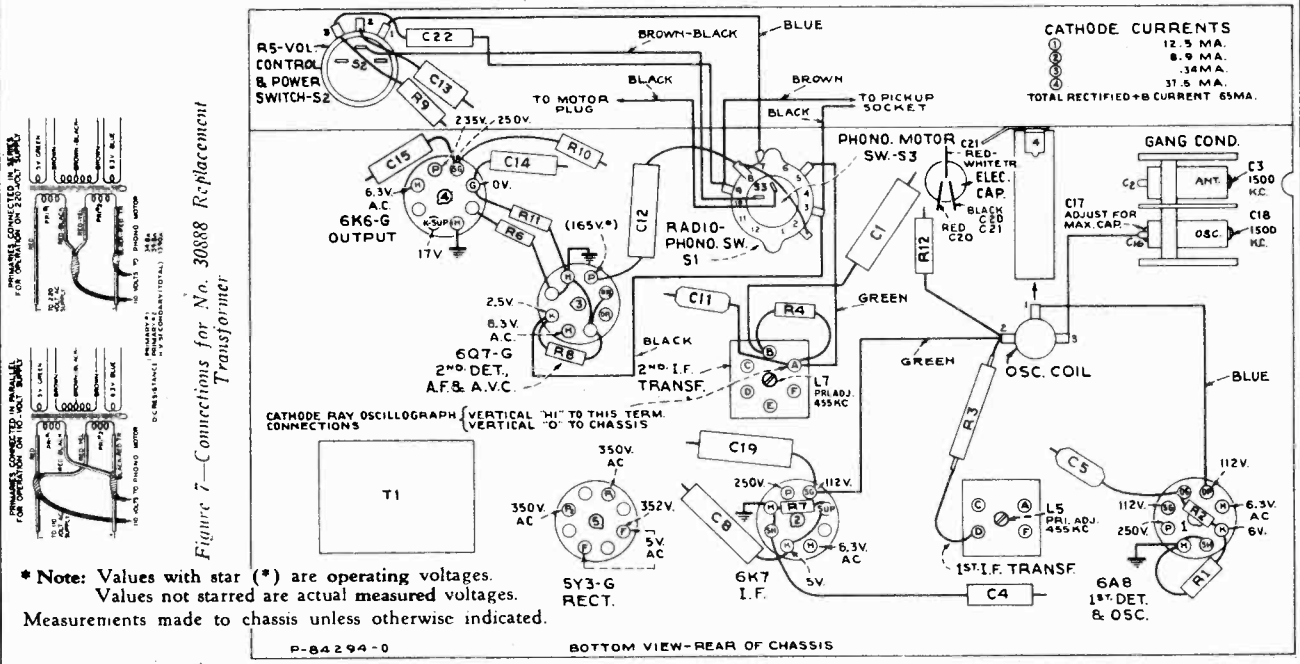


Figure 3—Tube Socket Voltages

Figure 7—Connections for No. 30888 Replacement Transformer

* **Note:** Values with star (*) are operating voltages.
Values not starred are actual measured voltages.
Measurements made to chassis unless otherwise indicated.

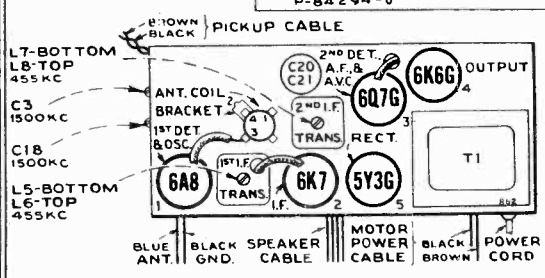


Figure 2—Tube and Trimmer Locations

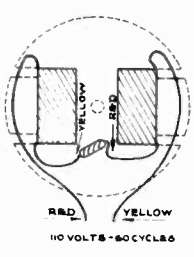


Figure 5—Motor Coil Connections

D-C resistance of each coil (for 110 volts, 50 and 60 cycles) is approximately 82 ohms.

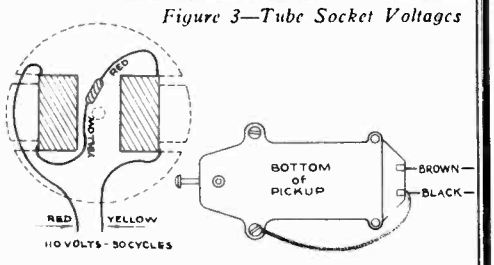


Figure 6—Pickup Connections

MODEL WR-472 PHONOGRAPH MOTOR SERVICE DATA

The synchronous motor used in this instrument is designed to be simple and foolproof. Among its many features are constancy of speed, low power consumption, single moving part, ease of starting, rubber damper, ease of repair, and long life. The parts that may require attention are plainly shown in figure 1. The motor is started by turning "on" the power switch and giving the turntable a clockwise spin with the hand. Smooth starting and running will be insured by keeping the bearings well cleaned and oiled.

Hum and Vibration.—A small amount of hum when starting, decreasing to a negligible amount when running, is normal. If excessive vibration occurs it may be due to:

1. Insufficient lubrication, or any failure that will cause binding.
2. Leather washer not oiled. (Check to make certain that the leather washer is above the steel washer.)
3. Motor not properly supported from motor board.
4. Burrs on poles of rotor or stator. Remove with fine emery cloth.

Removing Rotor.—The rotor and turntable assembly simply rests on the ball bearing at bottom of vertical bearing. Remove by lifting up.

Rotor Adjustment.—Loosen the three screws that hold the rotor to the turntable, insert three 16-mil shims at equal distances around the gap between the rotor and stator, and then carefully tighten the three screws. The top of rotor must be flush with top of stator; add additional steel washers beneath the stator if necessary.

Lubrication.—Oiling points are indicated in figure 1.

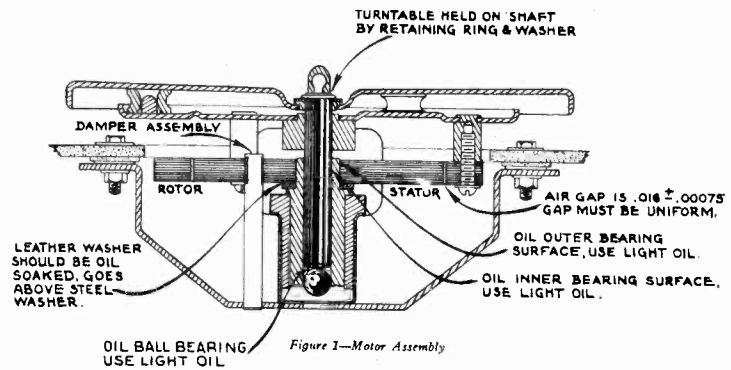


Figure 1—Motor Assembly

Alignment Procedure

Cathode-ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output meter alignment.—If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-oscillator.—For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Precautionary Lead Dress

1. Dress power leads to phono motor switch away from the audio wiring.
2. Dress power cord and motor cable to end of chassis (free from volume control wiring).
3. Dress pilot lamp lead away from 6Q7G grid.
4. Capacitors C13 and C15 (located at volume control) must be dressed at right angles to each other and as far apart as possible.

Pre-setting dial.—With gang condenser in full mesh, move dial pointer to coincide with horizontal lines. This is a friction adjustment.

Re-sealing I.F. Adjustment Screws.—After completion of alignment, seal the I.F. core adjustment screws with a few drops of household cement.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
No. 1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	Quiet point between 550-750 kc	L7 and L8 (2nd I-F Transformer)
No. 2	6A8 1st-det. grid cap, in series with .01 mfd.	455 kc		L5 and L6 (1st I-F Transformer)
No. 3	Antenna lead, in series with 200 mmfd.	1,500 kc	1,500 kc	C18* (osc.) C3 (antenna)

* Trimmer C17 on gang condenser should be screwed clockwise for maximum capacity before adjusting C18

Frequency Range..... 540-1,720 kc
R-F Alignment Frequency..... 1,500 kc (osc., ant.)
Intermediate Frequency..... 455 kc

TUBE COMPLEMENT

(1) RCA-6A8..... First Det., and Osc.
(2) RCA-6K7..... Intermediate Amp.
(3) RCA-6Q7-G..... Second Det., A-F, and A.V.C.
(4) RCA-6K6-G..... Power Output
(5) RCA-5Y3-G..... Rectifier
Dial Lamp..... Mazda No. 44, 6.3 volts, 0.25 amp.

POWER OUTPUT (125-volt, a-c supply)

Undistorted..... 2.0 watts
Maximum..... 3.5 watts

LOUDSPEAKER

Type..... 5 inch electrodynamic
V-C impedance..... 5 ohms at 400 cycles

POWER SUPPLY RATINGS

Rating A-6..... 105-125 volts, 60 cycles, 80 watts
Rating A-5..... 105-125 volts, 50 cycles, 80 watts

PHONOGRAPH..... Synchronous (manual starting)
Records..... 10-inch and 12-inch, 78 r.p.m.
Pickup..... Crystal, 80,000 ohms at 1,000 c.p.s.
Average Output of Pickup..... 1½-volts, at 1,000 c.p.s. across ¼ meg. load

MODEL WR-264

Phonograph Terminal Board.—A 3-terminal board is located on the rear of the chassis for connecting a phonograph pickup, or Record Player, into the audio amplifier of the receiver. The above schematic shows connections for a high-impedance pickup with a switch for changing from radio to records. For low-impedance pickups, a suitable step-up transformer should be used to provide proper impedance matching, and should be connected between the pickup and radio-phono switch. The volume control is optional.

Loudspeaker.—The loudspeaker voice-coil may be centered in the normal manner by using three narrow feelers to obtain equal spacing of the air-gap. The dust cover must be removed before centering, and may be done by gently cutting it free from the cone, being careful not to cut or damage the cone while doing so.

Precautionary Lead Dress.—

1. Dress power-switch leads against left apron to prevent hum pickup.
2. Dress R1 away from front of chassis.
3. Electric-tuning lamp leads must be dressed in front of range switch.
4. Dress lead from L5 to range switch away from other leads.
5. Dress leads away from antenna coil.
6. Dress other parts and leads away from R14, as it becomes heated.
7. Leads across back of chassis should be dressed under electrolytic to prevent approaching phono board.
8. Keep leads of C27 as short as possible.

FREQUENCY RANGES

"Standard Broadcast" (A)..... 540-1,720 kc
"Medium Wave" (B)..... 2.3-7 mc
"Short Wave" (C)..... 7-22 mc

Calibration Scale on Indicator - Drive - Cord Drum.—The tuning dial is fastened in the cabinet and cannot be used for reference during alignment, therefore, a calibration scale is attached to the rear of the drum which is mounted on the front shaft of the gang condenser. The setting of the gang condenser is read on this scale, which is calibrated in degrees. The correct setting of the gang in degrees, for each alignment frequency, is given in the alignment table.

As the first step in r-f alignment, check the position of the drum. The 180° mark on the drum scale must be vertical, and directly over the center of the gang-condenser shaft when the plates are fully meshed. The distance from the front of the chassis to the drum must not exceed ⅜-inch. The drum is held to the shaft by means of two set screws, which must be tightened securely when the drum is in the correct position.

Pointer for Calibration Scale.—Improvise a pointer for the calibration scale by fastening a piece of wire to the gang-condenser frame, and bend the wire so that it points to the "180°" mark on the calibration scale when the plates are fully meshed.

Dial-Indicator Adjustment.—After fastening the chassis in the cabinet, attach the dial indicator to the drive cable with indicator at the 530 kc mark, and gang condenser fully meshed. The indicator has a spring clip for attachment to the cable.

After completion of alignment, seal the i-f core-adjusting screws with household cement.

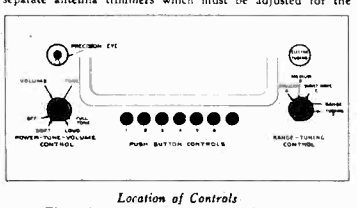
The dial tuning (right hand) push button must be pushed in for steps 1 to 5 inclusive.

Steps	Connect the high side of test-osc. to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	"A" band, Quiet Point between 550-750 kc	L12 and L13 (2nd I-F Trans.)
2	6K8 det. grid cap, in series with .01 mfd.	455 kc		L10 and L11 (1st I-F Trans.)
3	Antenna Terminal, in series with 400 ohms	20 mc	20 mc (23°) "C" band	C21 (osc.)* C30 (ant.)**
4	Antenna Terminal, in series with 400 ohms	6.1 mc	6.1 mc (31°) "B" band	C23 (osc.)†
5	Antenna Terminal, in series with 200 mmf.	1,500 kc	1,500 kc (28½°) "A" band	C25 (osc.)
6	Follow "Adjustments for Electric Tuning"			

* Use minimum capacity peak if two peaks can be obtained.
** Rock gang slightly and use maximum capacity peak if two peaks can be obtained with C30. Check to determine that C21 has been adjusted to the correct peak by tuning to approximately 28° (19.09 mc), where a weaker signal should be received.
† Use minimum capacity peak if two peaks can be obtained. Check to determine that C23 has been adjusted to the correct peak by turning to approximately 49° (5.19 mc), at which point a weaker signal should be received.
NOTE: Oscillator tracks 455 kc above signal on all bands.

ADJUSTMENTS FOR ELECTRIC TUNING

This receiver has seven push buttons. The right-hand button connects the gang condenser for manual tuning. The other six buttons are for electric tuning of six different stations in the standard-broadcast rance. The station buttons connect to separate permeability tuned oscillator coils and separate antenna trimmers which must be adjusted for the desired stations. Use an insulated screwdriver or alignment tool for making adjustments. Allow at least five minutes warm-up period before making adjustments.



Location of Controls
The right-hand push-button is for dial tuning

The procedure is as follows:

1. Make a list of the desired six stations, arranged in order from low to high frequencies. See "Tube and Trimmer Locations" view for frequency coverage of each button.
2. Push in the dial-tuning button, and manually tune in the first station on the list.
3. Push in station button No. 1 (left) and adjust No. 1 oscillator core (L37) to receive this station. Screw the core all the way in, to lowest frequency, and then unscrew slowly until station is received.
4. Adjust No. 1 antenna trimmer (C36) for maximum output on this station.

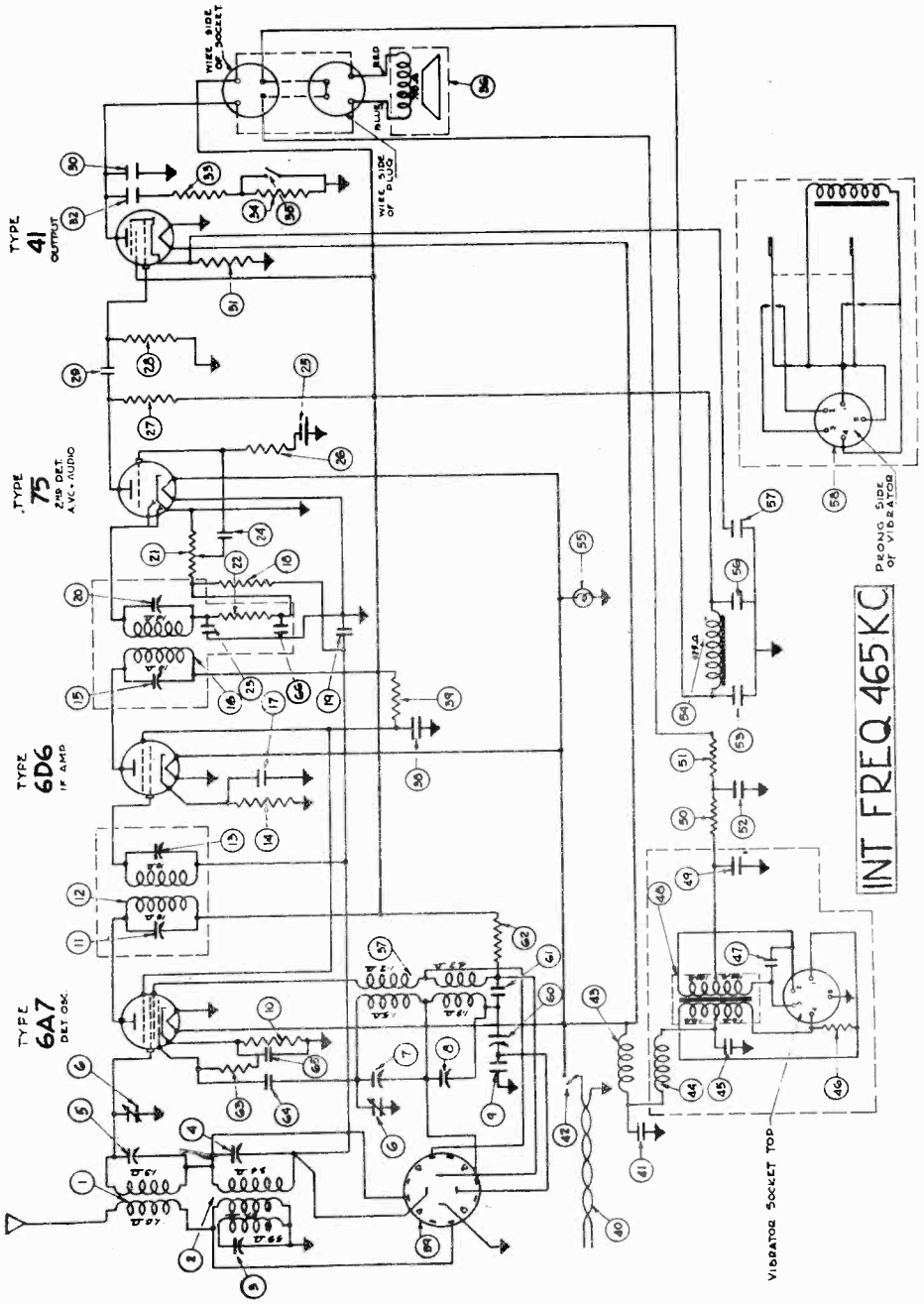
Clockwise adjustment of cores and trimmers tunes the circuits to lower frequencies.

5. Adjust for each of the remaining five stations in the same manner.
6. Make a final careful adjustment of the oscillator cores and antenna trimmers. Use the Precision Eye to ensure sharp peaking.

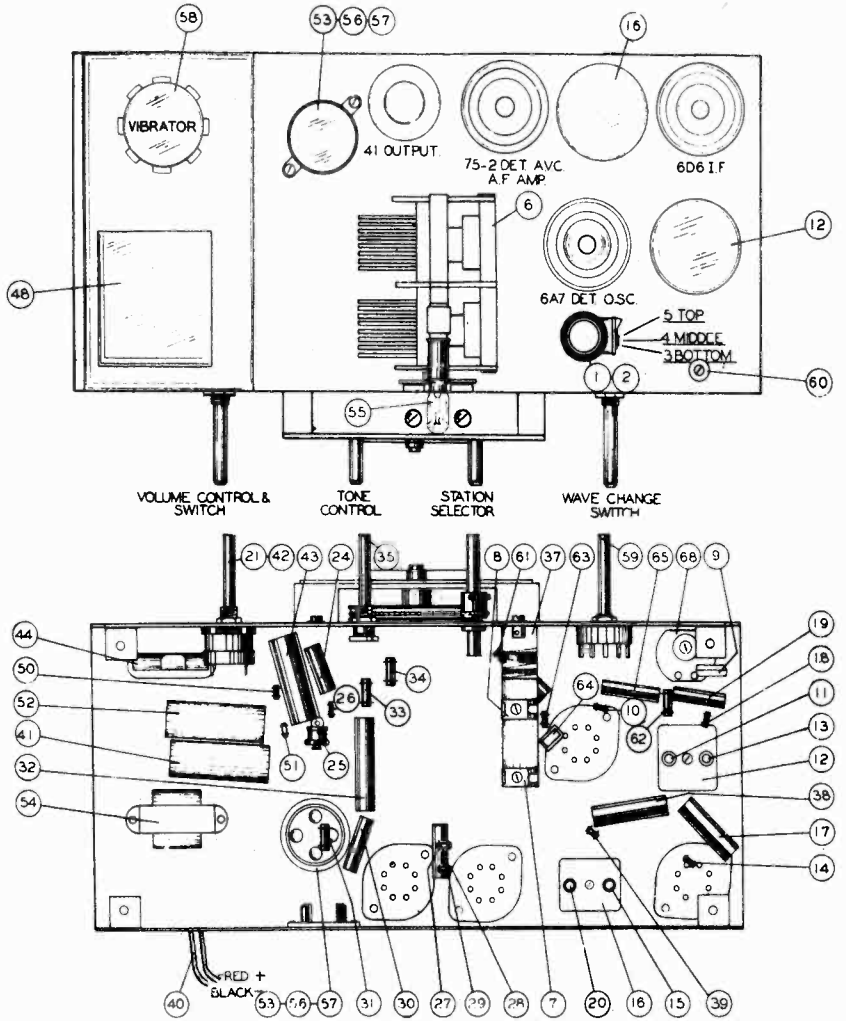
MODELS WR603, WR606

WESTINGHOUSE ELEC. SUPPLY CO.

Schematic



MODELS WR603, WR606 WESTINGHOUSE ELEC. SUPPLY CO.
Chassis, Socket,
Trimmers, Alignment
Parts



Set the volume control to the maximum position, the tone control to the treble position, the wave change switch to the broadcast band position and the dial indicator to approximately 600 KC. Set the test oscillator to 465 KC. and apply the test signal to the grid of the type #6D6 I.F. amplifier tube thru a .5 mfd. condenser.
Adjust trimmer condenser #15 and #20 to maximum output.

Apply the test signal to the grid of the type #6A7 first detector-oscillator tube and adjust trimmer condensers #12 and #13 to maximum output.
Apply the test signal to the antenna lead of the receiver and adjust the trap coil trimmer #3 to minimum output.

SHORT-WAVE BAND ADJUSTMENTS

Set the test oscillator and dial indicator to 6000 KC. and adjust the short-wave oscillator trimmer condenser, #7, to maximum output.
Adjust the short wave antenna trimmer #5 to maximum output.

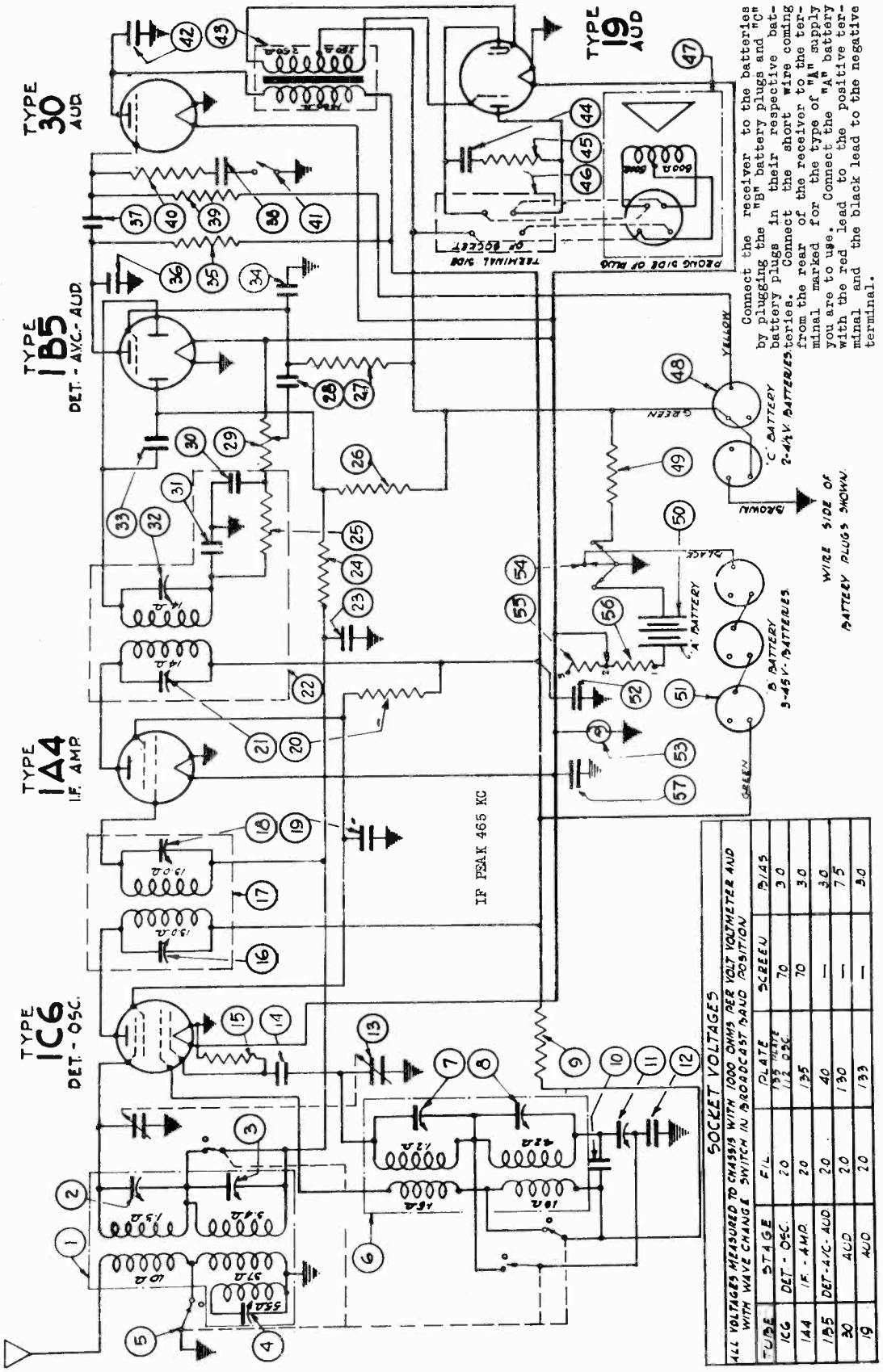
Check the receiver over the shortwave band for sensitivity and calibration.

Dia. #	Part #	Description of Parts
1	RC 95237	Antenna coil assembly
2		Trap coil - part of RC 95237
3		Trimmer condenser, 30-60 mmf. - part of RC 95237
4		Trimmer condenser, 1.5-10 mmf. - part of RC 95237
5		Trimmer condenser, 4-25 mmf. - part of RC 95237
6	CG 9552	Variable condenser - 2 gang
7		Trimmer condenser, 6-30 mmf. - part of RC 95238
8		Trimmer condenser, 4-25 mmf. - part of RC 95238
9	CM 9526	.0012 mfd. oscillator series condenser
10	SA 105264	500 ohm, 1/4 W. resistor
11		Trimmer condenser, 45-135 mmf. - part of IC 9569
12	IC 9569	1st I.F. coil (465 KC.)
13		Trimmer condenser, 45-135 mmf. - part of IC 9569
14	RE 95117	500 ohm, 1/4 W. resistor
15		Trimmer condenser, 30-100 mmf. - part of IC 9574
16	IC 9574	2nd I.F. coil (465 KC.)
17	CW 2-05	.05 mfd., 200 V. condenser
18	RE 9574	1 meg., 1/4 W. resistor
19	CW 4-02	.02 mfd., 400 V. condenser
20		Trimmer condenser, 30-100 mmf. - part of IC 9574
21	VR 9523	.5 meg. volume control
22	RE 9524	50,000 ohm, 1/8 W. resistor
23		.0001 mfd. mica condenser - part of IC 9574
24	CW 4-02	.02 mfd., 400 V. condenser
25	BY 952	Grid bias cell
26	RE 9574	1 meg., 1/4 W. resistor
27	RE 9585	1/4 meg., 1/4 W. resistor
28	RE 9572	1/2 meg., 1/4 W. resistor
29	CW 4-02	.02 mfd., 400 V. condenser
30	CW 4-005	.005 mfd., 400 V. condenser
31	SA 105265	750 ohm, 1/4 W. resistor
32	CW 4-05	.05 mfd., 400 V. condenser
33	SA 105249	5000 ohm, 1/4 W. resistor
34	SA 105274	20,000 ohm, 1/4 W. resistor
35	SW 9558	Tone control switch
36	SK 9539	Speaker
37	RC 95238	Oscillator coil
38	CW 2-05	.05 mfd., 200 V. condenser
39	SA 105254	15,000 ohm, 1/4 W. resistor
40	CB 9556	Power supply cable
41	CW 2-50	.5 mfd., 200 V. condenser
42		On-Off switch - part of VR 9523
43	SA 105452	"A" choke
44	SA 105452	"A" choke
45	CW 957	.5 mfd., 120 V. condenser
46	SA 105258	200 ohm, 1/4 W. resistor
47	CW 9521	.008 mfd., 1600 V. condenser
48	TR 9569	Power transformer
49	CW 9513	.05 mfd., 200 V. condenser
50	RE 9537	50 ohm, 1/4 W. resistor
51	RE 9516	50 ohm, 1/4 W. resistor
52	CW 2-50	.5 mfd., 200 V. condenser
53		8 mfd., 200 V. electrolytic cond. - part of CE 9541
54	TR 9534	"B" choke
55	LP 9516	Dial lamp (6. volt)
56		8 mfd., 250 V. electrolytic condenser - part of CE 9541
57		10 mfd., 25 V. electrolytic condenser - part of CE 9541
58	VI 957	Vibrator
59	SW 9559	Wave change switch
60	CS 9560	Broadcast oscillator series condenser
61	CW 4-02	.02 mfd., 400 V. condenser
62	SA 105275	25,000 ohm, 1/4 W. resistor
63	RE 9575	50,000 ohm, 1/4 W. resistor
64	CM 9513	.0001 mfd., mica condenser
65	CW 2-05	.05 mfd., 200 V. condenser
66		.0001 mfd. mica condenser - part of IC 9574
67	DM 9519	Speaker diaphragm

MODELS WR604, WR607

WESTINGHOUSE ELEC. SUPPLY CO.

Schematic, Voltage



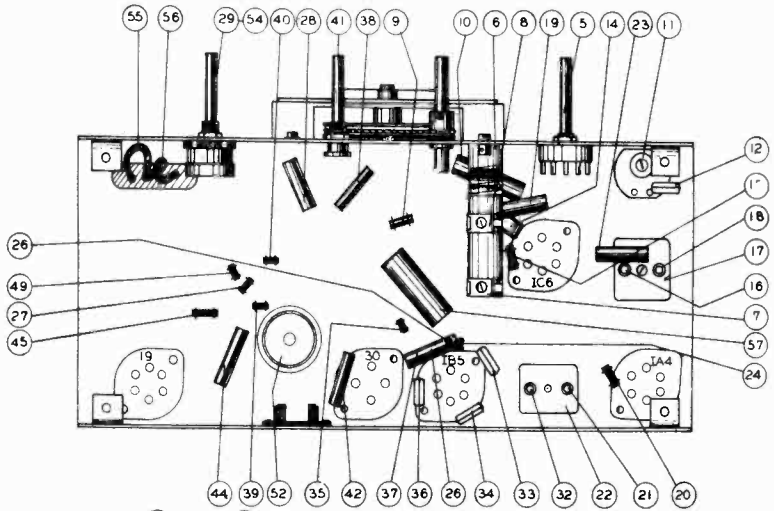
SOCKET VOLTAGES

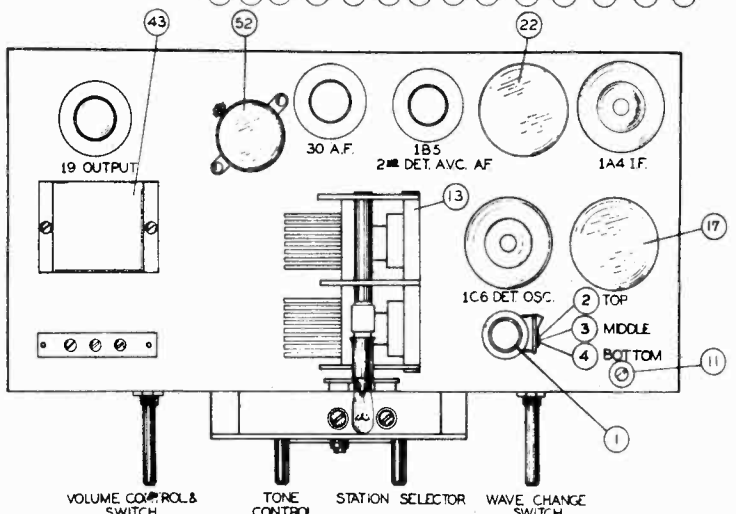
ALL VOLTAGES MEASURED TO CHASSIS WITH 1000 OHMS PER VOLT VOLTMETER AND WITH WAVE CHANGE SWITCH IN BROADCAST BAND POSITION

TUBE	STAGE	F/L	PLATE	SCREEN	B/45
1C6	DET - OSC	20	135 MAX 125 OSC	70	30
1A4	I.F. - AMP	20	135	70	30
1B5	DET-A.V.C.-AUD	20	40	—	30
30	AUD	20	130	—	75
19	AUD	20	133	—	30

MODELS WR604, WR607 WESTINGHOUSE ELEC. SUPPLY CO.

Alignment, Trimmers Socket, Chassis, Parts





Dia. #	Part #	Description of Parts	List Price
1	RC 95237	Antenna coil assembly	$ 2.25
2		4-25 mmf. trimmer condenser - part of RC 95237	
3		1.5-10 mmf. trimmer condenser - part of RC 95237	
4		30-60 mmf. trimmer condenser - part of RC 95237	
5	SW 9559	Wave change switch	.65
6	RC 95238	Oscillator coil assembly	1.60
7		10-35 mmf. trimmer condenser - part of RC 95238	
8		4-25 mmf. trimmer condenser - part of RC 95238	
9	SA 105249	5,000 ohm, 1/4 W. resistor	.15
10	CW 4-02	.02 mfd., 400 V. condenser	.15
11	CS 9560	350-700 mmf. oscillator series condenser	.35
12	CM 9526	.0012 mfd. mica condenser	.20
13	CG 9552	Variable condenser (2 gang)	2.75
14	CM 9513	.100 mmf. mica condenser	.10
15	RE 9575	50,000 ohm, 1/4 W. resistor	.15
16		30-100 mmf. trimmer condenser - part of IC 9579	
17	IC 9579	First I.F. coil (465 KC.)	2.00
18		30-100 mmf. trimmer condenser - part of IC 9579	
19	CW 2-05	.05 mfd., 200 V. condenser	.15
20	SA 105254	15,000 ohm, 1/4 W. resistor	.15
21		30-100 mmf. trimmer condenser - part of IC 9574	
22	IC 9574	Second I.F. coil (465 KC.)	1.75
23	CW 2-05	.05 mfd., 200 V. condenser	.15
24	RE 9530	1 meg., 1/8 W. resistor	.10
25	RE 9524	50,000 ohm, 1/4 W. resistor	.10
26	RE 9530	1 meg., 1/8 W. resistor	.10
27	RE 9574	1 meg., 1/4 W. resistor	.15
28	CW 4-02	.02 mfd., 400 V. condenser	.15
29	VR 9538	.5 meg. volume control	.95
30		100 mmf. mica condenser - part of IC 9574	
31		100 mmf. mica condenser - part of IC 9574	
32		30-100 mmf. trimmer condenser - part of IC 9574	
33	CM 9513	100 mmf. mica condenser	.10
34	CM 9513	100 mmf. mica condenser	.10
35	RE 9585	250,000 ohm, 1/4 W. resistor	.15
36	CM 9513	100 mmf. mica condenser	.10
37	CW 4-02	.02 mfd., 400 V. condenser	.15
38	CW 4-005	.005 mfd., 400 V. condenser	.15
39	RE 9572	500,000 ohm, 1/4 W. resistor	.15
40	SA 105272	10,000 ohm, 1/4 W. resistor	.15
41	SW 9558	Tone control switch	.40
42	CW 6-005	.005 mfd., 600 V. condenser	.15
43	TR 9570	Audio transformer	2.00
44	CW 4-01	.01 mfd., 400 V. condenser	.15
45	SA 105274	20,000 ohm, 1/4 W. resistor	.15
46	SA 107257	Speaker socket	.10
47	SK 9540	Speaker	6.00
48	PG 9514	"C" battery plug	.10
49	SA 105267	1000 ohm, 1/4 W. resistor	.15
50	DM 9519	Speaker diaphragm	1.25
51	PG 958	"B" battery plug	.10
52	CE 9542	8 mfd., 200 V. electrolytic condenser	1.25
53	LP 9518	Dial lamp, 2 V., .06 amp.	.30
54		On-off switch - part of VR 9538	
55	RE 9591	0.94 ohm resistor	.15
56	RE 9592	0.42 ohm resistor	.15
57	CW 2-50	.5 mfd., 200 V. condenser	.25

Set the volume control to the maximum position, the tone control to the treble position, the wave change switch on the broadcast band and the dial indicator to approximately 600 KC.

Set the test oscillator to 465 KC. and apply the test signal to the grid of the type 1A4 tube, through a 0.5 mfd. blocking condenser, and adjust the I.F. trimmer condensers #21 and #32 to maximum output.

Apply the test signal to the grid of the type 1C6 first detector-oscillator tube and adjust the I.F. trimmer condensers #16 and #18 to maximum output.

Apply the test signal to the antenna lead of the receiver and adjust the wave trap trimmer condenser #4 to minimum output.

BROADCAST BAND ADJUSTMENTS

1. Set the test oscillator and dial indicator to 1600 KC. and apply the test signal to the antenna of the receiver through a .0002 mfd. condenser.

2. Adjust the broadcast oscillator trimmer condenser #8 to maximum output.

3. Adjust the Broadcast preselector trimmer #3 to maximum output.

4. Set the test oscillator and dial indicator to 600 KC. and adjust the oscillator series condenser #11 to maximum output at the same time rocking the variable condenser.

5. Return the test oscillator and dial indicator to 1600 KC. and check the adjustment of trimmer condensers #8 and #3 for accuracy.

SHORT WAVE BAND ADJUSTMENTS

1. Set the wave change switch to the short-wave band position.

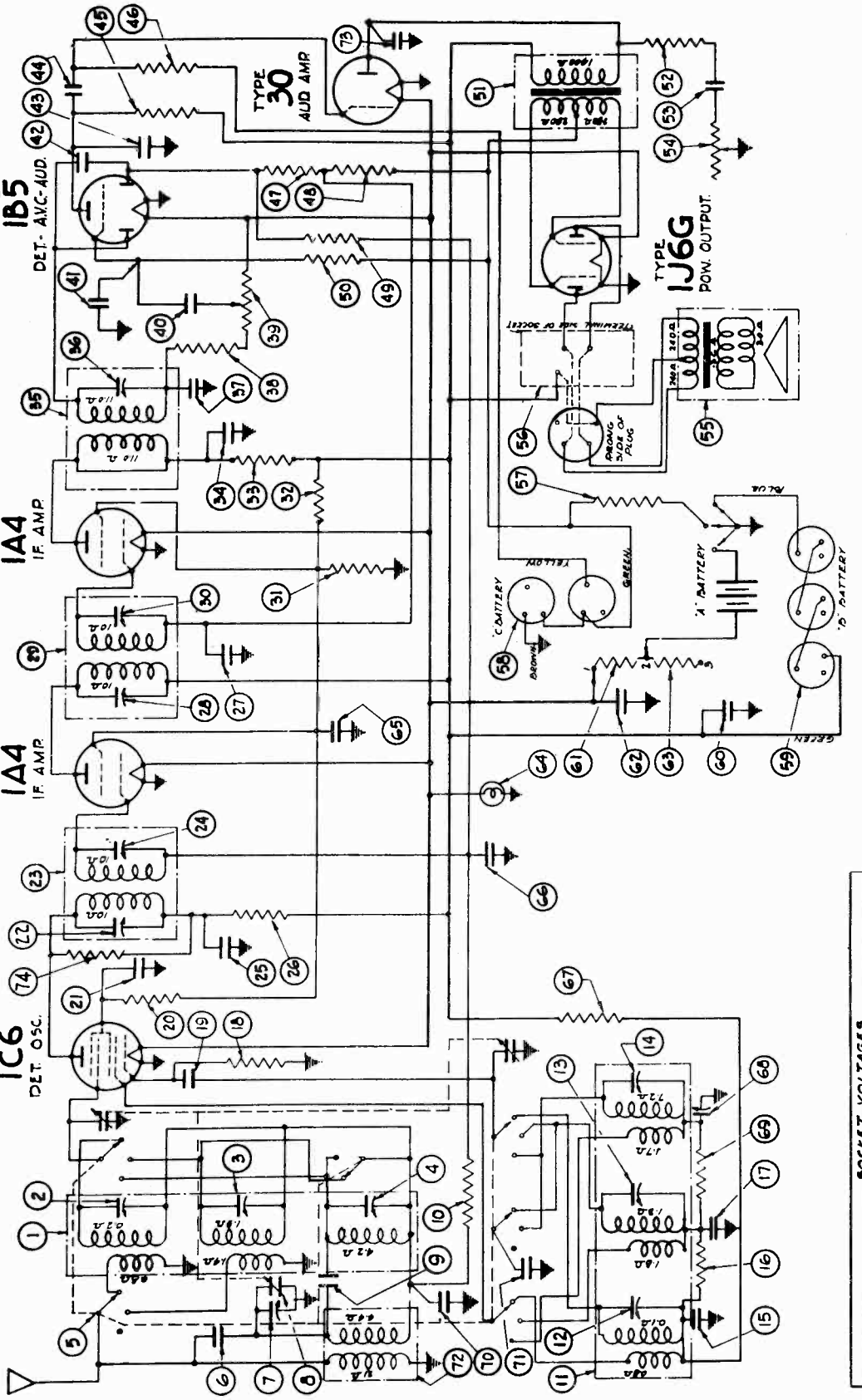
2. Set the test oscillator and dial indicator to 6000 KC. and adjust the short-wave trimmer condenser #7 to maximum output.

3. Adjust the short-wave preselector trimmer condenser #2 to maximum output.

4. Check the receiver over the short-wave band for sensitivity and calibration.

WESTINGHOUSE ELEC. SUPPLY CO.

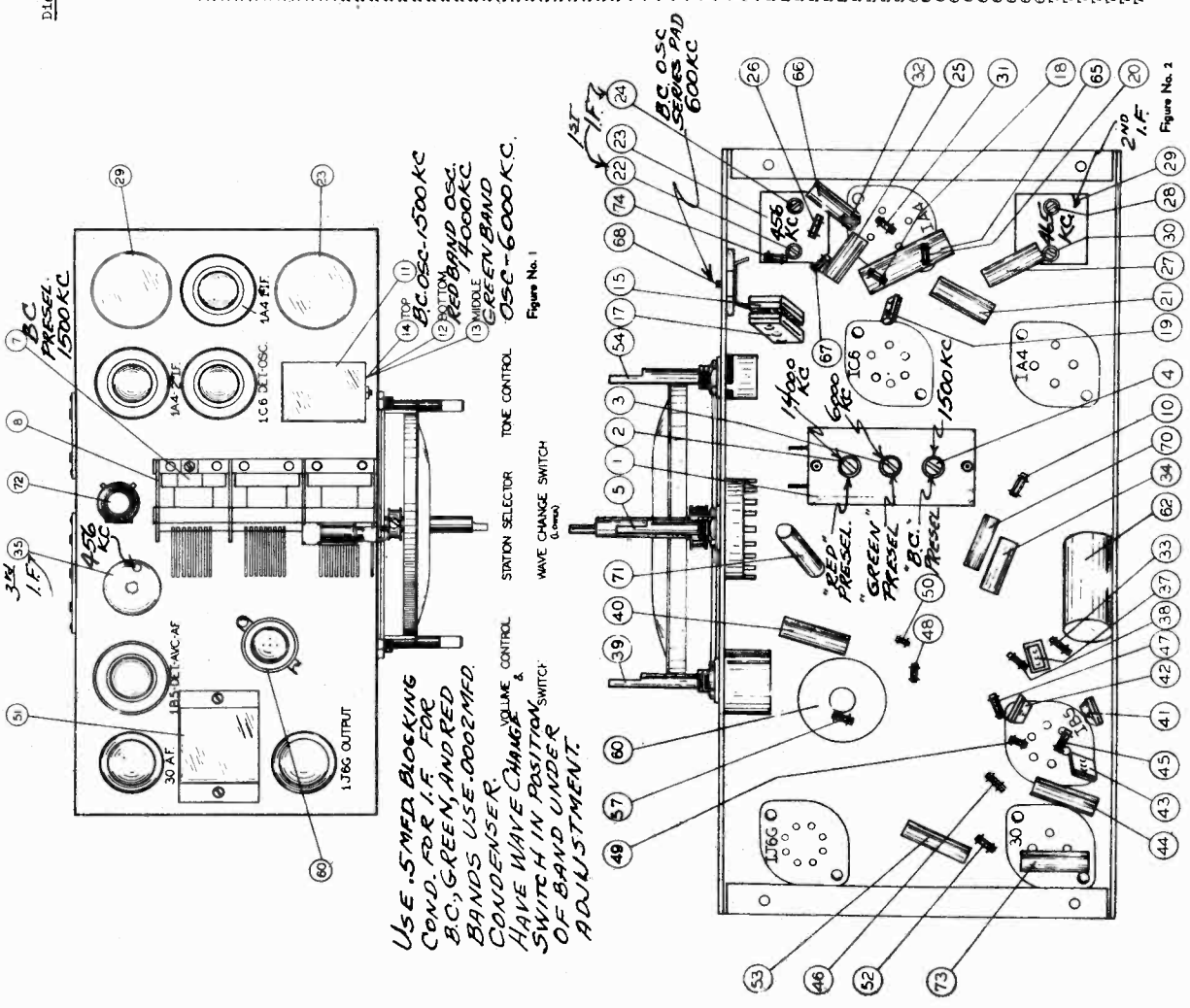
MODELS WR605, WR608
Schematic, Voltage



MODELS WR605, WR608
Alignment, Socket
Trimmers, Chassis, Parts

WESTINGHOUSE ELEC. SUPPLY CO.

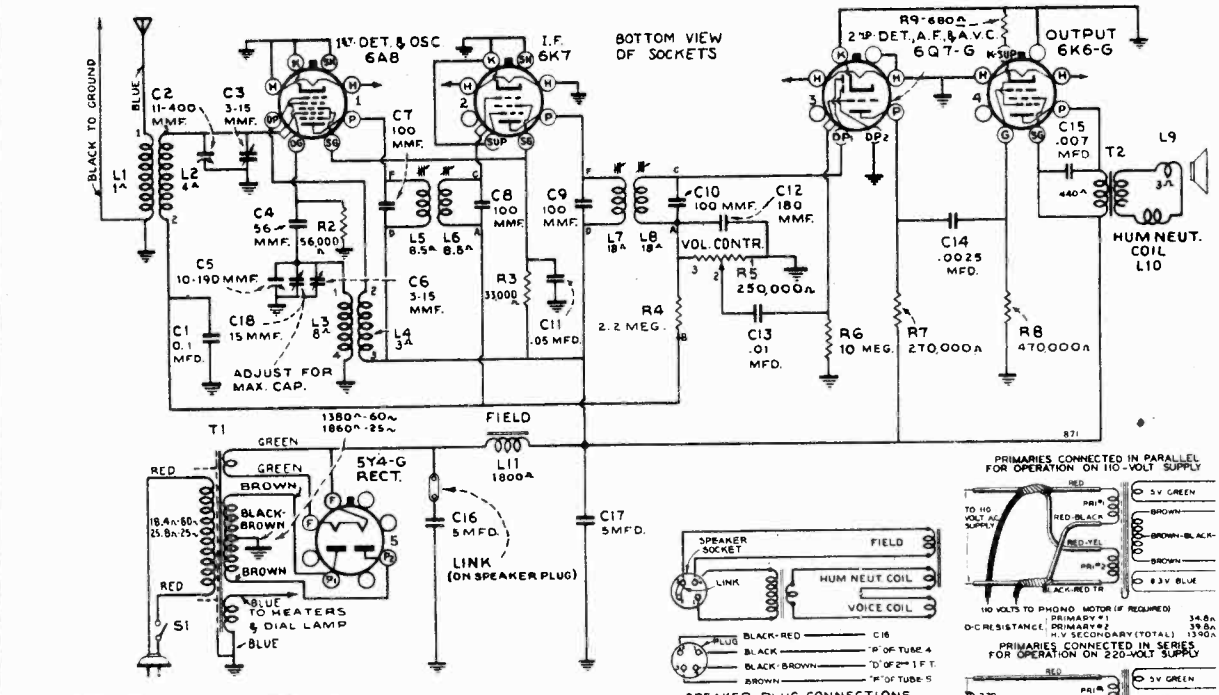
Dia. #	Part #	Description of Parts
1	RC 96257	Preselector coil
2		30-60 mmf. trimmer condenser - part of RC 95257
3		4-30 mmf. trimmer condenser - part of RC 95257
4		4-30 mmf. trimmer condenser - part of RC 95257
5	SW 9548	Wave change switch
6		10 mmf. mica condenser - part of RC 95258
7		15-25 mmf. trimmer condenser - part of CG 9554
8	CG 9554	Variable condenser - 3 gang
9		Twisted wires
10	RE 9584	100,000 ohm, 1/4 W. resistor
11	RC 95259	Oscillator coil
12		1.5 to 10 mmf. trimmer condenser - part of RC 95259
13		1.5 to 10 mmf. trimmer condenser - part of RC 95259
14		4-30 mmf. trimmer condenser - part of RC 95259
15	CM 9510	.0032 mfd. mica condenser
16	RE 96188	2500 ohm, 1/8 W. resistor
17	CM 959	.002 mfd. mica condenser
18	SA 105276	50,000 ohm, 1/4 W. resistor
19	CM 9513	.0001 mfd. mica condenser
20	SA 105267	1000 ohm, 1/4 W. resistor
21	CW 2-05	.05 mfd., 200 V. condenser
22		45 to 135 mmf. trimmer condenser - part of IC 9572
23	IC 9572	1st I.F. coil (465 KC.)
24		45 to 135 mmf. trimmer condenser - part of IC 9572
25	CW 2-05	.05 mfd., 200 V. condenser
26	SA 105276	2500 ohm, 1/4 W. resistor
27	CW 2-05	.05 mfd., 200 V. condenser
28		45 to 135 mmf. trimmer condenser - part of IC 9569
29	IC 9569	2nd I.F. coil (465 KC.)
30		45 to 135 mmf. trimmer condenser - part of IC 9569
31	SA 105276	50,000 ohm, 1/4 W. resistor
32	SA 105272	10,000 ohm, 1/4 W. resistor
33	SA 105267	1000 ohm, 1/4 W. resistor
34	CW 2-05	.05 mfd., 200 V. condenser
35	IC 9568	3rd I.F. coil (465 KC.)
36		30-60 mmf. trimmer condenser - part of IC 9568
37	CM 9513	.0001 mfd. mica condenser
38	SA 105276	50,000 ohm, 1/4 W. resistor
39	VR 9540	1/2 meg. volume control
40	CW 4-02	.02 mfd., 400 V. condenser
41	CM 9513	.0001 mfd. mica condenser
42	CM 9513	.0001 mfd. mica condenser
43	CM 956	.00025 mfd. mica condenser
44	CW 4-02	.02 mfd., 400 V. condenser
45	RE 9585	.25 meg., 1/4 W. resistor
46	RE 9672	.5 meg., 1/4 W. resistor
47	RE 9574	1 meg., 1/4 W. resistor
48	RE 9574	1 meg., 1/4 W. resistor
49	RE 9574	1 meg., 1/4 W. resistor
50	RE 9574	1 meg., 1/4 W. resistor
51	TR 9570	Audio transformer
52	SA 105267	1000 ohm, 1/4 W. resistor
53	CW 2-05	.05 mfd., 200 V. condenser
54	VR 9539	10,000 ohm tone control
55	SK 9541	Speaker socket
56	SA 107257	1000 ohm, 1/4 W. resistor
57	PG 9514	"C" battery plug
58	PG 958	"B" battery plug
59	CE 9543	30 mfd 200 V. electrolytic condenser
60	RE 9594	0.31 ohm resistor
61	CW 2-50	.5 mfd., 200 V. condenser
62	RE 9691	0.94 ohm resistor
63	LP 9518	Dial lamp
64	CW 2-25	.25 mfd., 200 V. condenser
65	CW 2-05	.05 mfd., 200 V. condenser
66	SA 105270	2500 ohm, 1/4 W. resistor
67	CS 9560	350-700 mmf. oscillator series condenser
68	RE 9527	5000 ohm, 1/8 W. resistor
69	CW 2-05	.05 mfd., 200 V. condenser
70	CW 4-005	.005 mfd., 400 V. condenser
71	RC 95258	Antenna coil
72	CW 4-005	.005 mfd., 400 V. condenser
73	RE 9584	.1 meg., 1/4 W. resistor
74	TR 9596	Output transformer
75	DA 9520	Speaker diaphragm
76		

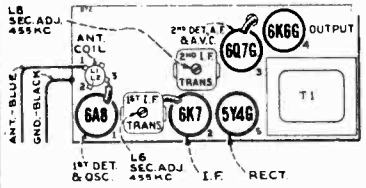


Alignment, Socket Trimmers, Data

WESTINGHOUSE ELEC. SUPPLY CO.

MODEL WR256
Schematic, Voltage





Precautionary Lead Dress

1. Power transformer leads and power cord must be dressed toward rear apron away from volume control.
2. Blue lead from "A" terminal of 2nd I.F transformer to volume control must be dressed toward front apron away from other parts.
3. Speaker cable leads must be dressed close to chassis base, away from 6K6-G socket and volume control.

Connections for No. 30888 Transformer

Frequency Range..... 540 to 1,720 kc
R-F Alignment Frequency.... 1,500 kc (osc., ant.)
Intermediate Frequency..... 455 kc

Tube Complement

(1) RCA-6A8..... First-Det., Osc.
(2) RCA-6K7..... Intermediate Amp.
(3) RCA-6Q7-G..... Second-Det., A-F, A.V.C.
(4) RCA-6K6-G..... Power Output
(5) RCA-5Y4-G..... Rectifier

Dial lamp.....Mazda No. 44, 6.3 volts, 0.25 amps.

Power Output (125-volt, a-c supply)

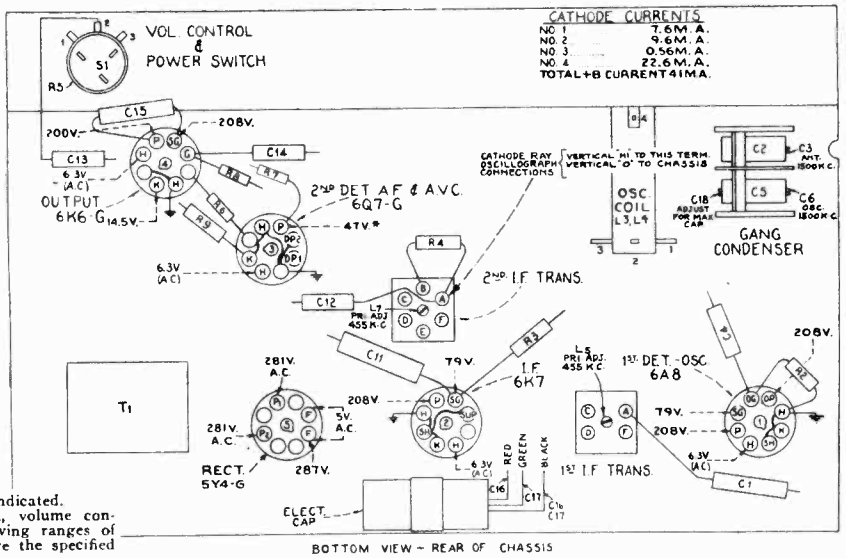
Undistorted..... 1.0 watt
Maximum..... 2.0 watts

Loudspeaker

Type..... 5-inch Electrodynamic
Voice-coil Impedance..... 3.4 ohms at 400 cycles

Power Supply Ratings

Rating A..... 105-125 volts, 50-60 cycles, 50 watts
Rating B..... 105-125 volts, 25-60 cycles, 50 watts



BOTTOM VIEW - REAR OF CHASSIS

Measurements made to chassis unless otherwise indicated.
Measurements made with set tuned to quiet point, volume control at minimum, using 1,000-ohm-per-volt meter, having ranges of 10, 50, 250, and 500 volts. (Use nearest range above the specified measured voltage.)
Values should hold within approximately ± 20% for 117-volt 60-cycle supply.

Tube Socket Voltages and Location of Parts
Values with star (*) are operating voltages.
Values not starred are actual measured voltages.

Alignment Procedure

Cathode-ray Alignment is the preferable method. Connections for the oscillograph are shown in the chassis drawing.

Output meter alignment. If this method is used, connect the meter across the voice coil, and turn the receiver volume control to maximum.

Test-oscillator. For all alignment operations, connect the low side of the test-oscillator to the receiver chassis, and keep the output as low as possible to avoid a-v-c action.

Pre-setting dial. With gang condenser in full mesh, move dial pointer to coincide with horizontal lines. This is a friction adjustment.

Steps	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. peak output
No. 1	6K7 I-F grid cap, in series with .01 mfd.	455 kc	Quiet point between 550-750 kc	L7 and L8 (2nd I-F Transformer)
No. 2	6A8 1st-det. grid cap, in series with .01 mfd.	455 kc		L5 and L6 (1st I-F Transformer)
No. 3	Antenna lead, in series with 200 mmfd.	1,500 kc	1,500 kc	C6* (oscillator) C3 (antenna)

*Trimmer C18 on gang condenser should be screwed clockwise for maximum capacity before adjusting C6.

EXCEPT for the following data:-
Model WRT-700 is the same as RCA Model TT-5
Model WRT-701 is the same as RCA Model TRK-5

SUPPLEMENTARY
REPLACEMENT PARTS LIST FOR
WESTINGHOUSE TELEVISION RECEIVERS

Model WRT-700 (5" Television Attachment)
Model WRT-701 (5" Console)

When ordering replacement parts refer to this supplementary sheet first and if the part appears here it should be ordered by the stock number and receiver model indicated. For parts not listed in this sheet, refer to the main parts list.

Parts should be ordered from your Westinghouse Parts Distributor giving the stock number of part and model number of receiver.

TELEVISION CHASSIS ASSEMBLIES

Stock Number			Unit List Price
33835	Adjuster	- Magnetite core and stud in tube for high frequency oscillator circuit adjustment (used with L13)	$ .60
33120	Choke	- Filter choke (L39)	3.25

3-BAND RADIO RECEIVER
RC-429-A Used with Model WRT-701

30752	Bracket	- "Precision Eye" bracket	.25
30766	Cap	- Rubber cap for "Precision Eye"	.15
13871	Socket	- "Precision Eye" socket	.45

MISCELLANEOUS ASSEMBLIES
Model WRT-700
Model WRT-701

33827	Cap	- Pilot lamp "bulls eye" (Model WRT-701 only)	.65
33716	Escutcheon	- Dial escutcheon less scale and buttons (Model WRT-701 only)	14.00
31210	Button	- Station selector push button (Model WRT-701 only).	.10
33715	Dial	- 3 Band glass dial scale (Model WRT-701 only)	1.70
31095	Disc	- Package of 8 protective cover discs for push buttons (Model WRT-701 only)	.10
33754	Glass	- Safety protective glass for Kinescope	2.90
31355	Knob	- Band switch knob (Model WRT-701 only)	.12
33181	Knob	- Television "Brightness", "Vert. Hold", or Radio "Volume" knob	.25
31391	Knob	- Television "Contrast", "Hor. Hold", "Fine Tuning" or Radio "Tone Control" knob	.15
33178	Knob	- Television "Off-on" control knob (Model WRT-700 only)	.20
33179	Knob	- Radio tuning knob (Model WRT-701 only)	.25
33176	Knob	- Television "Station Selector" control knob (white dot)	.30
31355	Knob	- Television "Volume Control" knob (Model WRT-700 only)	.12
30991	Markers	- Complete set of call letter markers (Model WRT-701")	.40
14270	Spring	- Knob spring for Stock No. 31355, 33176, 33178 and 33181 knobs	.05
30330	Spring	- Knob spring for Stock No. 31391 knob	.03
4982	Spring	- Knob spring for Stock No. 33179 knob	.05

Prices subject to change without notice.

EXCEPT for the following data:-
Model WRT-702 is the same as RCA Model TRK-9
Model WRT-703 is the same as RCA Model TRK-12

SUPPLEMENTARY
REPLACEMENT PARTS LIST FOR
WESTINGHOUSE TELEVISION RECEIVERS

Model WRT-702 (9" Console)
Model WRT-703 (12" Console)

When ordering replacement parts refer to this supplementary sheet first and if the part appears here it should be ordered by the stock number (and receiver model) indicated. For parts not listed in this sheet, refer to the main parts list.

Parts should be ordered from your Westinghouse Parts Distributor giving the stock number of the part and the model number of the receiver.

3-BAND RADIO RECEIVER CHASSIS
RC-427-B in WRT-703
RC-427-C in WRT-702

Stock Number			Unit List Price
30716	Clip	- Precision eye mounting clip with wing screw	$ .25
32634	Cord	- Variable condenser drive cord	.10
33712	Plate	- Finished drive plate with drive pully and bracket	1.95
33713	Pointer	- Dial pointer and carriage	.40
13871	Socket	- "Precision Eye" socket	.45

MISCELLANEOUS ASSEMBLIES
WRT-702 and WRT-703

32425	Button	- Station selector push button	.20
33827	Cap	- Orange pilot lamp "Bulls Eye"	.65
33752	Cushion	- Kinescope masking cushion (Model WRT-703 only)	2.30
33753	Cushion	- Kinescope masking cushion (Model WRT-702 only)	2.00
33710	Dial	- Three band glass dial scale	2.30
33711	Escutcheon	- Dial escutcheon less buttons, button shaft, and dial scale	4.75
31355	Knob	- Radio tuning, volume, or range selector knob	.12
31391	Knob	- Television "Contrast", "Hor. Hold", or "Fine Tuning" knob	.15
33181	Knob	- Television "Brightness" or "Vert. Hold" knob	.25
33176	Knob	- Television "Station selector" knob	.30
33178	Knob	- "Victrola, Radio, Television - Fidelity selection knob"	.20
32067	Marker	- Complete set of call letter markers	.35
31460	Marker	- "Dial Tuning" push button marker	.04
30330	Spring	- Knob spring for stock No. 31391 knob	.03
14270	Spring	- Knob spring for stock No. 31355, 33181, 33176, and 33178 knobs	.05

Prices subject to change without notice.

Trimmers
Chassis

WESTINGHOUSE ELEC. INTERNATIONAL CO.

MODEL WR102
Alignment
Socket

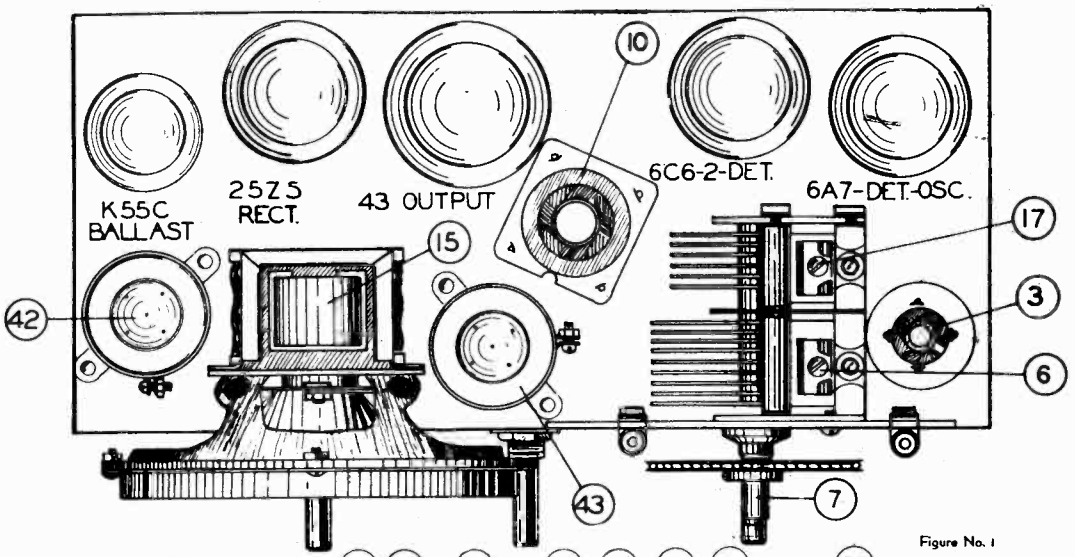


Figure No. 1

FOR OTHER DATA
SEE INDEX

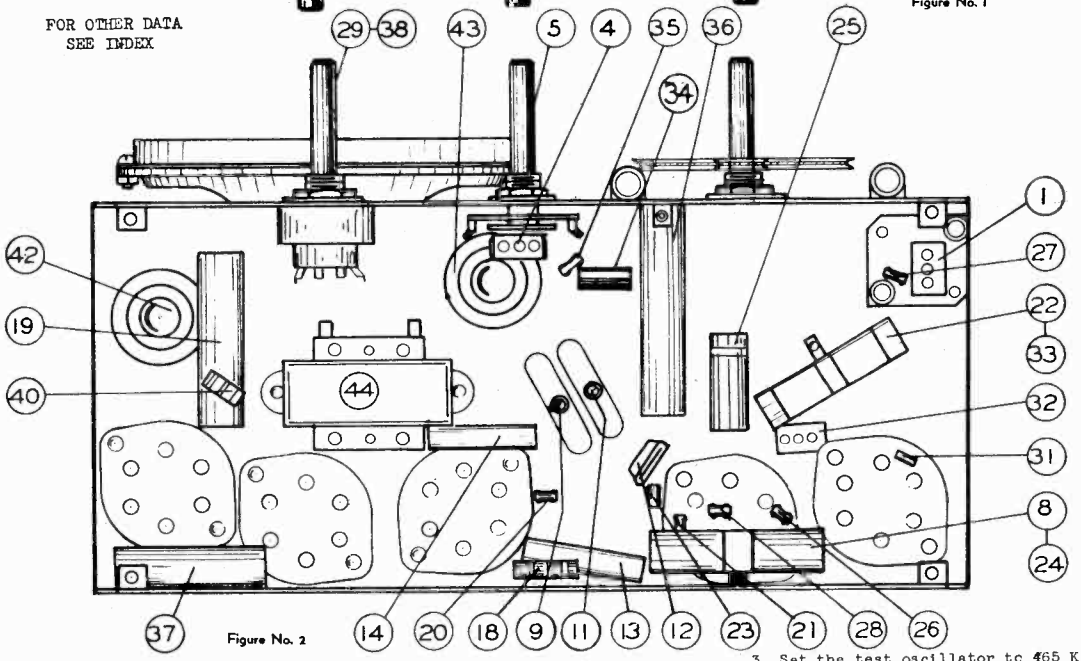


Figure No. 2

Type and Number of Tubes 1 #6A7, 1 #6C6, 1 #43, 1 #25Z5, 1 #K55C (Ballast) - Total 5
Power Supply Characteristics.. 105-125 volts D.C. or 105-125 volts, 50-60 cycle A.C.
Power Consumption ..... 44 Watts
Total Power Output ..... 1.10 Watts
Undistorted Power Output ..... 0.75 Watts
Tuning Ranges ..... (Broadcast Band 535 to 1525 K.C.
(Shortwave Band 1500 to 3000 K.C.
Line-Up Frequencies ..... I.F. 465 K.C.. 1400 K.C.

LINE-UP CAPACITOR ADJUSTMENTS

To properly align the circuits of this receiver it is essential to use a high grade modulated test oscillator, the output of which can be continuously varied and reduced sufficiently to prevent overload as the individual circuits of the receiver are brought into alignment. A conventional output meter should be connected across the terminals of the speaker voice coil to indicate when the individual circuits are correctly aligned. The sensitivity of this meter must be sufficient to give satisfactory readings with low input signals.

Before attempting to align the receiver, the service man should familiarize himself with the general layout of the chassis, location of the various tubes and alignment condensers. Top and bottom views of the chassis are shown in Figures #1 and #2 and should be carefully studied before actual work is started.

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

1. Set the volume control to maximum position and wave change switch to standard broadcast band.
2. Connect the output meter across the voice coil terminals of the speaker.
3. Set the test oscillator tc 465 K.C. and adjust its output to produce a measureable reading on the output meter when the test signal is applied to the grid of the type 6A7 first detector-oscillator tube through a 0.5 mfd. blocking condenser.
4. Adjust trimmers #9 and #11 to maximum output.

ALIGNMENT OF OSCILLATOR AND R. F.

1. Check the pointer setting to be sure that is is exactly horizontal when the tuning condenser is completely closed.
2. Set the test oscillator and dial indicator to 1400 K.C. and adjust the oscillator trimmer condenser #17 to maximum output.
3. Apply the test signal to the antenna of the receiver through a .0001 mfd. blocking condenser and adjust trimmer condenser #6 to maximum output.
4. Check sensitivity over the band.
5. Turn wave change switch to the shortwave band and check the sensitivity over scale.

MODEL WR209 **WESTINGHOUSE ELEC. INTERNATIONAL CO.**

Alignment, Socket

Trimmers, Chassis

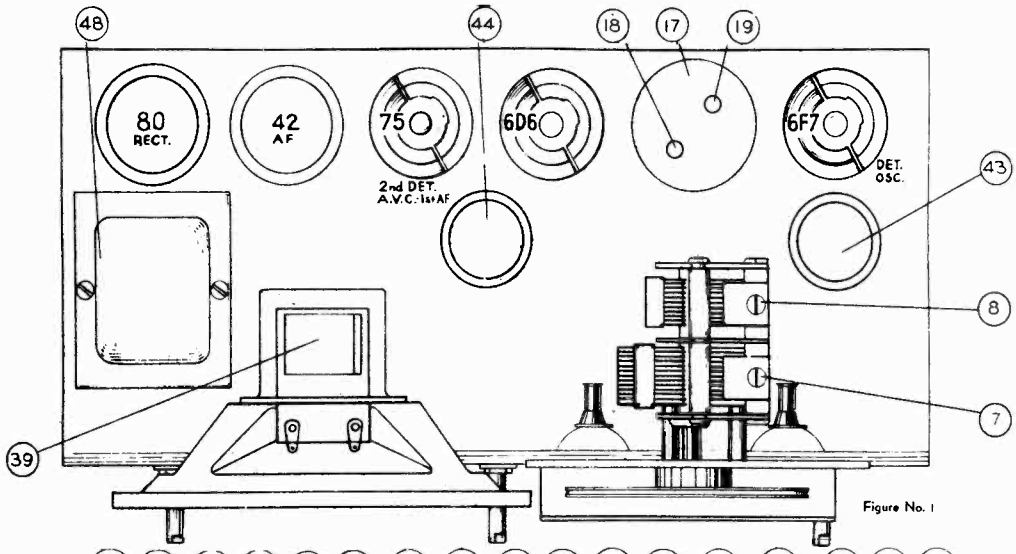


Figure No. 1

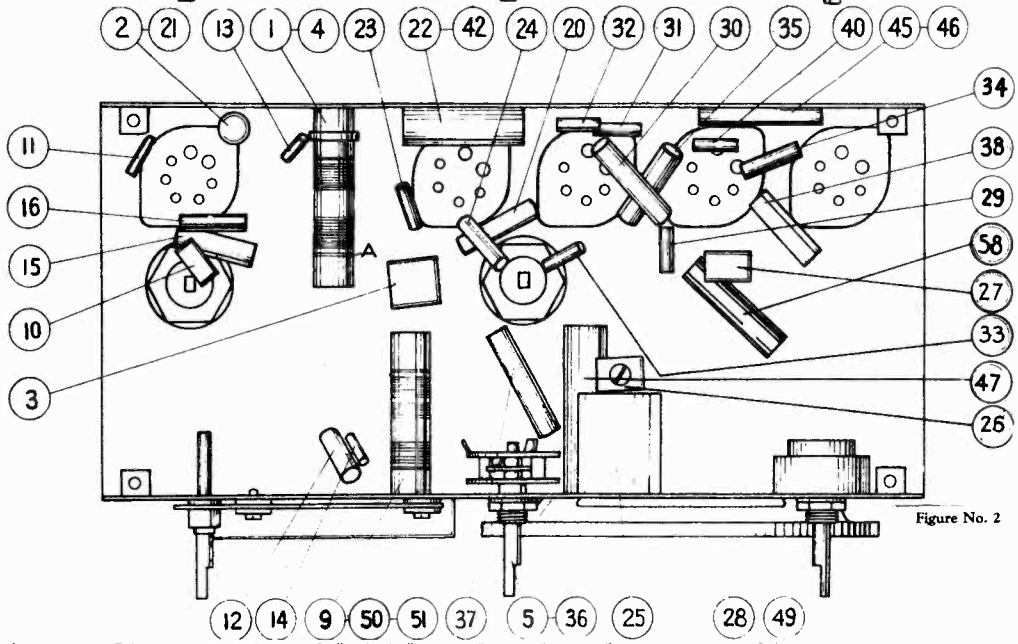


Figure No. 2

Type and Number of Tubes ---------- 1 #6F7, 1 #6D6, 1 #75, 1 #42, 1 #80 - Total 5
Power Supply ---------- 105 to 125 volts, 50 to 60 cycles A.C.
Power Consumption ---------- 46 Watts
Tuning Ranges ---------- 540 to 1500 K.C. and 1500 to 3200 K.C.
Maximum Undistorted Output ---------- 1.5 Watts
Maximum Output ---------- 2.8 Watts
Line-Up Frequencies ---------- I.F. 465 K.C., 1400 K.C.

This model is a five-tube, A.C., two-band superheterodyne receiver whose circuit comprises a combined first detector-oscillator an intermediate frequency amplifier, a combined second detector, A.V.C. and first audio amplifier, a power pentode output stage and a rectifier with its associated filter circuit and power transformer.

This model is designed to work over two bands, the broadcast band extending from 540 to 1500 K.C. and a police band which extends from 1400 to 3200 K.C.

LINE-UP CAPACITOR ADJUSTMENTS

To align the circuits of this receiver it is essential to use a high grade modulated test oscillator, the output of which can be continuously varied with absence from overload when the individual circuits of the receiver are brought into alignment.

A conventional output meter can be connected across the terminals of the speaker voice coil to indicate when the circuits are aligned. The sensitivity of the output meter must be sufficient to give satisfactory reading with a low input signal.

Before attempting to align the receiver, the service man should familiarize himself with the general layout of the chassis, location of the tubes and various alignment condensers. Top and bottom views of the chassis are shown in Fig. #1 and #2 and should be carefully studied before the actual work is started

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

1. Set volume control on full, turn tone control knob to the right hand position. Set wave-change switch on the broadcast position and the dial indicator at approximately 600 K.C.
2. Connect output meter across voice coil of speaker.
3. Set test oscillator to 465 K.C. and adjust its output to produce a measurable reading on output meter when test signal is applied to the grid of the 6D6 I.F. tube thru a .5 mfd. blocking condenser.
4. Adjust #26 (see Fig. #2) to maximum output reducing output of test oscillator as required.
5. Apply test signal to grid of 6F7 first detector-oscillator tube and adjust #18 and #19 (Fig. #1) to maximum output.
6. With test signal still on the grid of 6F7 tube, repeat the above adjustments for greatest sensitivity.

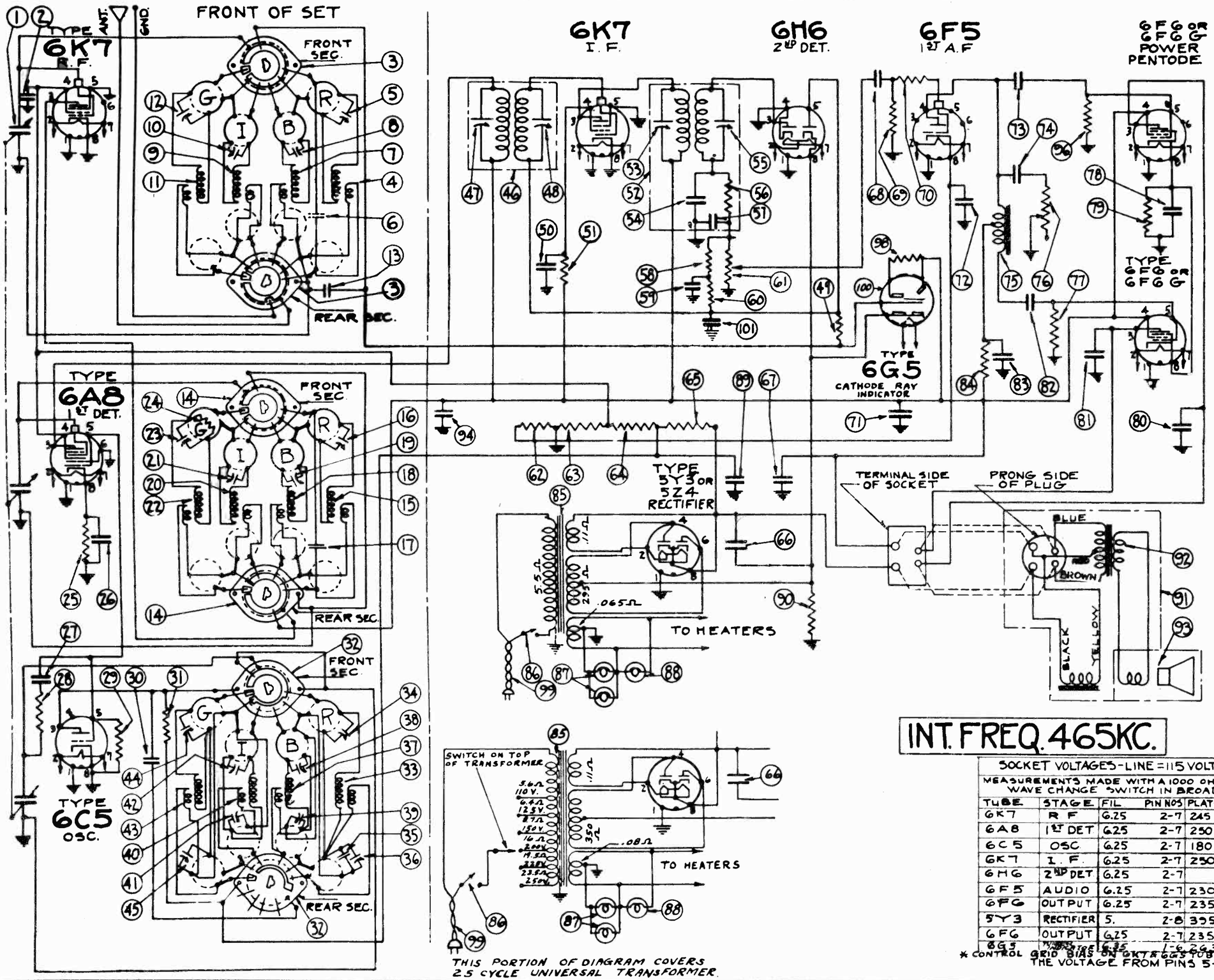
ADJUSTMENT OF BROADCAST BAND

1. Leave test signal on grid of 6F7 tube and set the test oscillator to1400 K.C.
2. Turn the gang condenser to its maximum position. Adjust dial indicator until either end is directly over the long horizontal lines on the dial scale. Then set dial indicator to 1400 K.C.
3. Adjust trimmer #8 to maximum output.
4. Apply test signal to antenna of set thru a .0002 mfd. condenser and adjust trirmer #7 to maximum output.

ADJUSTMENT OF POLICE BAND

When adjustments as outlined under the broadcast band are completed, the police band requires no adjustment unless the coil had been changed. In this event, set test oscillator and station indicator to 1700 K.C. and apply test signal to antenna lead. The police band winding is indicated by "A" in Fig. #2. Adjust the position of this winding by sliding it back and forth on the core until maximum output is indicated on the output meter. This winding should then be secured in place by applying a thin coat of coil cement.

WESTINGHOUSE ELEC. INTERNATIONAL CO.



D.C. RESISTANCE MEASURED WITH WAVE CHANGE SWITCH IN CORRESPONDING BAND POSITION			
COIL	DIA. NO	PRIM.	SEC
G-ANT	11	120	20
G-R.F.	22	11	20
G-OSC	43	6	8
I-ANT.	9	18.5	3.8
I-R.F.	20	0.8	10.7
I-OSC.	40	1.4	3.3
B-ANT	7	2.1	1.0
B-R.F.	18	1.8	1.0
B-OSC	37	0.5	0.9
R-ANT	4	0.7	0.03
R-R.F.	15	2.0	0.03
R-OSC	33	0.5	0.03
1ST I.F.	46	8.6	8.6
2ND I.F.	52	8.6	8.6
INTERSTAGE TRANS	75	4200	9000
OUT PUT TRANS	92	392	.03
SPKR FIELD		1800	
VOICE COIL	93	3.2	

INT. FREQ. 465KC.

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

TUBE	STAGE	FIL	PIN NOS	PLATE	PIN NOS	SCREEN	PIN NOS	BIAS	PIN NOS
6K7	R F	6.25	2-7	245	3-1	100	4-1	* SEE NOTE	
6A8	1ST DET	6.25	2-7	250	3-1	100	4-1	2.4	8-1
6C5	OSC	6.25	2-7	180	3-1				
6K7	I. F.	6.25	2-7	250	3-1	105	4-1	* SEE NOTE	
6H6	2ND DET	6.25	2-7					5.1	8-1
6F5	AUDIO	6.25	2-7	230	4-1			1.5	8-1
6F6	OUTPUT	6.25	2-7	235	3-1	250	4-1	21.5	8-1
5Y3	RECTIFIER	5.	2-8	395	8-1				
6F6	OUTPUT	6.25	2-7	235.	3-1	250	4-1	21.5	8-1
6G5	INDICATOR	6.25	1-6	263	2-5			X SEE NOTE	

* CONTROL GRID BIAS ON 6K7 & 6G5 TUBES IS EQUAL TO APPROX. 5/10 TENTHS THE VOLTAGE FROM PINS 5-1 ON THE 6H6 TUBE SOCKET.

Socket, Trimmers
Chassis

MODELS WR214X
WR314X

WESTINGHOUSE ELEC. INTERNATIONAL CO.

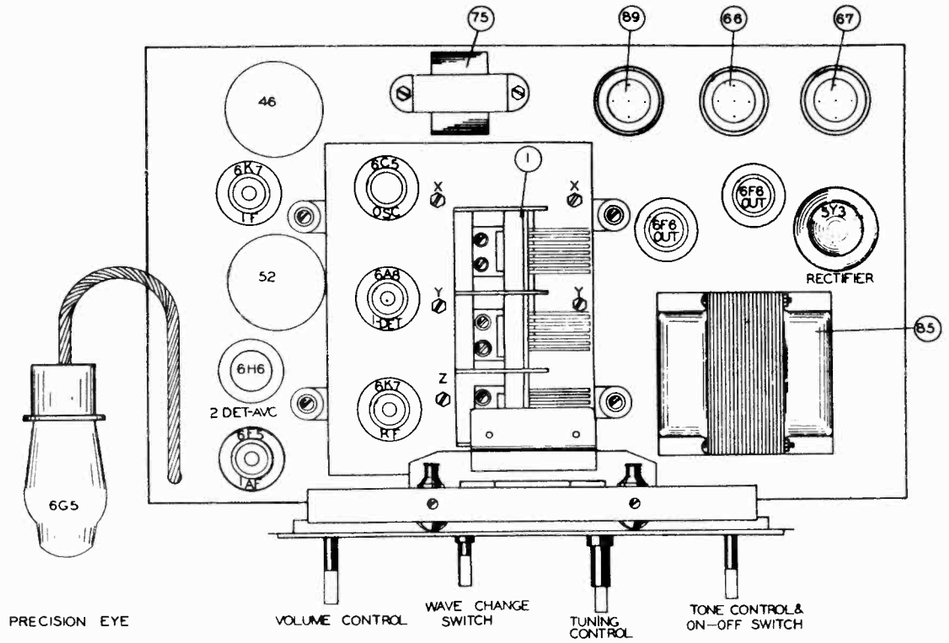


Figure No. 1

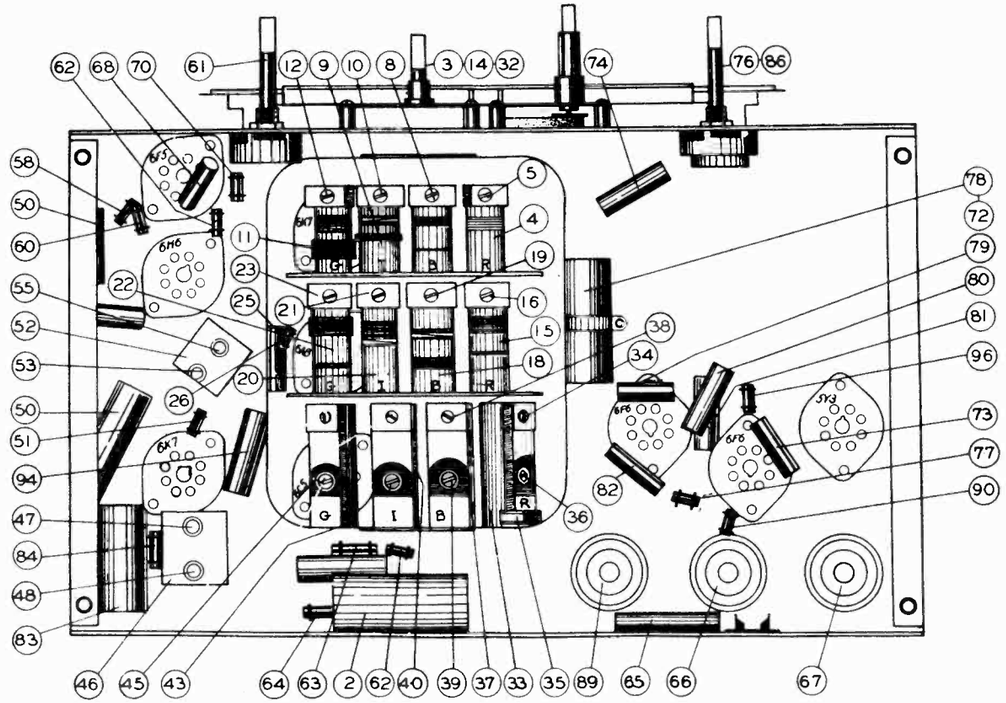


Figure No. 2

MODELS WR214X
WR314X

WESTINGHOUSE ELEC. INTERNATIONAL CO.

Alignment
Parts

Dia.#	Part #	Description of Parts	List Price
19	CS 9553	I.F.-10 mmf. trimmer condenser	.15
20	RC 98215	R.F. coil (White)	1.00
21	CS 9554	4-30 mmf. trimmer condenser	.15
22	RC 98216	R.F. coil (Green)	1.30
23	CS 9555	4-50 mmf. trimmer condenser	.15
24	RE 9529	1.5 meg., 1/4 W. resistor - part of RC 98216	
25	CW 2-05	300 ohm, 1/4 W. resistor	.10
26	CM 9511	.05 mfd., 200 V. condenser	.15
27	RE 9537	.000065 mfd. mica condenser	.10
28	RE 9824	50 ohm, 1/4 W. resistor	.10
29	RE 9535	50,000 ohm, 1/4 W. resistor	.10
30	RE 9538	.04 mfd., 200 V. condenser	.25
31	SM 9557	5,000 ohm, 1/2 W. resistor	.20
32	RC 95223	Switch and bracket assembly - oscillator section	1.60
33		Oscillator coil (Red)	2.50
34	CW 959	3-15 mmf., trimmer condenser - part of CS 9657	.80
35		.002 mfd., mica condenser - part of CS 9657	.26
36	RC 95213	800-1600 mmf. oscillator series cond. - part of CS 9657	1.75
37		Oscillator coil (Blue)	.75
38		245-460 mmf. trimmer condenser - part of CS 9520	
39	RC 95221	Oscillator coil (White)	1.90
40		300-600 mmf. osc. series condensr - part of CS 9517	.55
41	RC 95222	Oscillator coil (Green)	1.85
42		50-100 mmf. trimmer condenser - part of CS 9568	.60
43	IC 9576	90-160 mmf. osc. series condenser - part of CS 9568	
44		415-800 I.F. coil assembly - 465 K.C.	1.50
45		80-200 mmf. trimmer condenser - part of IC 9576	
46		80-200 mmf. trimmer condenser - part of IC 9576	
47	RE 9585	.25 meg., 1/4 W. resistor	.15
48	CW 2-25	.25 mfd., 200 V. condenser	.15
49	SA 105277	75,000 ohm, 1/4 W. resistor	.15
50	IC 9577	Second I.F. coil assembly - 465 KC.	1.85
51		80-200 mmf. trimmer condenser - part of IC 9577	
52		80-200 mmf. trimmer condenser - part of IC 9577	
53		80-200 mmf. trimmer condenser - part of IC 9577	
54		50,000 ohm, 1/4 W. resistor - part of IC 9577	
55		100 mmf. mica condenser - part of IC 9577	
56	SA 105281	1 meg., 1/4 W. resistor	.15
57	CW 2-05	.05 mfd., 200 V. condenser	.15
58	SA 105281	1 meg., 1/4 W. resistor	.15
59	VR 9532	5 meg., volume control	1.00
60	SA 105268	1500 ohm, 1/4 W. resistor	.15
61			
62	SA 104966	30,000 ohm, 1/2 W. resistor	.15
63	SA 101404	15,000 ohm, 1 W. resistor	.20
64	SA 103835	10,000 ohm, 2 W. resistor	.25
65	CE 9536	12 mfd., 450 V. electrolytic condenser	.80
66	CE 9535	16 mfd., 300 V. electrolytic condenser	.75
67	CW 4-005	.02 mfd., 400 V. condenser	.15
68	SA 105281	1 meg., 1/4 W. resistor	.15
69	RE 9684	1 meg., 1/4 W. resistor	.15
70	CW 4-10	.1 mfd., 400 V. condenser	.15
71	CE 9526	12 mfd., 25 V. electrolytic condenser	.90
72	CW 4-02	.02 mfd., 400 V. condenser	.15
73	CW 4-02	.02 mfd., 400 V. condenser	.15
74	TR 9563	Interstage transformer - 15,000 ohm min.	2.50
75	VR 9537	.1 meg., tone control - 5,000 ohm min.	1.00
76	RE 9585	1.5 meg., 1/4 W. resistor - part of CS 9626	.15
77		12 mfd. electrolytic condenser - part of CS 9626	
78	RE 9587	500 ohm resistor	.35
79	CW 4-005	.005 mfd., 400 V. condenser	.15
80	CW 4-005	.005 mfd., 400 V. condenser	.15
81	CW 4-02	.02 mfd., 400 V. condenser	.15
82	CW 9526	1 mfd., 400 V. condenser	.40
83	SA 105272	10,000 ohm, 1/4 W. resistor	.15
84	TR 9662	Power transformer - 105-125 V., 50-60 cycle	5.00
85		On & off switch - part of VR 9537	
86	LP 9515	Dial lamp - 3.5 V., .35 amp.	.20
87	LP 9510	Tuning indicator lamp - 6.3 V., .25 amp.	.20
88	CE 9528	8 mfd., 450 V. electrolytic condenser	.80
89	CW 4-02	37 ohm, 1/4 W. resistor	.15
90	RE 95101	Speaker	7.50
91	TR 9577	Output transformer	1.75
92	SA 107282	Antenna trimmer & coil assembly	1.15
93	CW 4-05	.05 mfd., 400 V. condenser	.15
94	RE 9585	.25 meg., 1/4 W. resistor - part of CB 9598	
95		1 meg., 1/4 W. resistor - part of CB 9598	
96	CB 9512	Line cable and plug	.60
97	CB 9598	*Precision eye & cable assembly	.70
98	CW 2-05	.05 mfd., 200 V. condenser	.15

ELECTRICAL SPECIFICATIONS

Type and Number of Tubes	2 #6K7, 1 #6A8, 1 #6C5, 1 #6H6, 1 #6F5, 2 #6F6, 1 #6G5, 1 #5Y3 - Total 10
Power Supply	105 to 125 volts, 50 to 60 cycles
Power Consumption	80 Watts
Maximum Undistorted Output	4.5 Watts
Maximum Output	6.5 Watts
Tuning Ranges	(Green Band - 160 K.C. to 390 K.C. (White Band - 525 to 1800 KC. (Blue Band - 1750 to 6000 KC. (Red Band - - 5800 to 18500 KC.
Line-Up Frequencies	I.F. 465 KC.,350 KC.,165 KC.,1600 KC., 570 KC.,5500 KC.,1900 KC., 17000 KC., and 6000 KC.

LINE-UP CAPACITOR ADJUSTMENTS

ADJUSTMENT OF I.F. (465 KC.)

1. Set volume control on full and turn tone control to bass position.
2. Connect output meter across voice coil of speaker.
3. Set test oscillator to 465 K.C. and adjust the output meter to measurable value. Keep output meter when test signal is applied to the grid of 6K7 I.F. tube through a .5 mfd. blocking condenser.
4. Adjust trimmers #53 and #56 for maximum output reducing output of test oscillator as required.
5. Repeat steps 3 and 4 for grid of 6A8 first detector and adjust #47 and #48 for maximum output.

ADJUSTMENT OF GREEN BAND

1. Set wave change switch to Green Band position.
2. Set test oscillator and dial indicator to 350 KC.
3. Apply test signal to antenna terminal of the chassis through a .0002 mfd. series condenser and adjust #44, #23, and #12 for maximum output.
4. Set test oscillator and dial indicator to 165 KC. and adjust #45 for maximum output, at the same time rocking the variable tuning condenser.
5. Return to 350 KC. setting with both test oscillator and dial indicator and repeat adjustment of #44, #23 and #12 for accuracy.

ADJUSTMENT OF BROADCAST BAND

1. Set wave change switch to the White or Broadcast Band position.
2. Set test oscillator and dial indicator to 1600 KC. and adjust #42, #21 and #10 for maximum output.
3. Set test oscillator and dial indicator to 570 KC. and adjust #41 for maximum output, at the same time rocking the variable tuning condenser.
4. Return to 1600 KC. setting and make readjustment of #42, #21 and #10.

ADJUSTMENT OF BLUE BAND

NOTE: In adjusting the Blue and Red Bands, a .0002 mfd. series padding condenser must be connected in series should be inserted in the high side of the test oscillator leads. This condenser-resistor combination is the approximate equivalent of a short-wave antenna.

1. Set wave change switch to Blue Band position.
2. Set test oscillator and dial indicator to 5500 KC. and adjust #38, #19 and #8 for maximum output.
3. Set test oscillator and dial indicator to 1900 KC. and adjust #39 for maximum output, at the same time rocking the variable tuning condenser.

ADJUSTMENT OF RED BAND

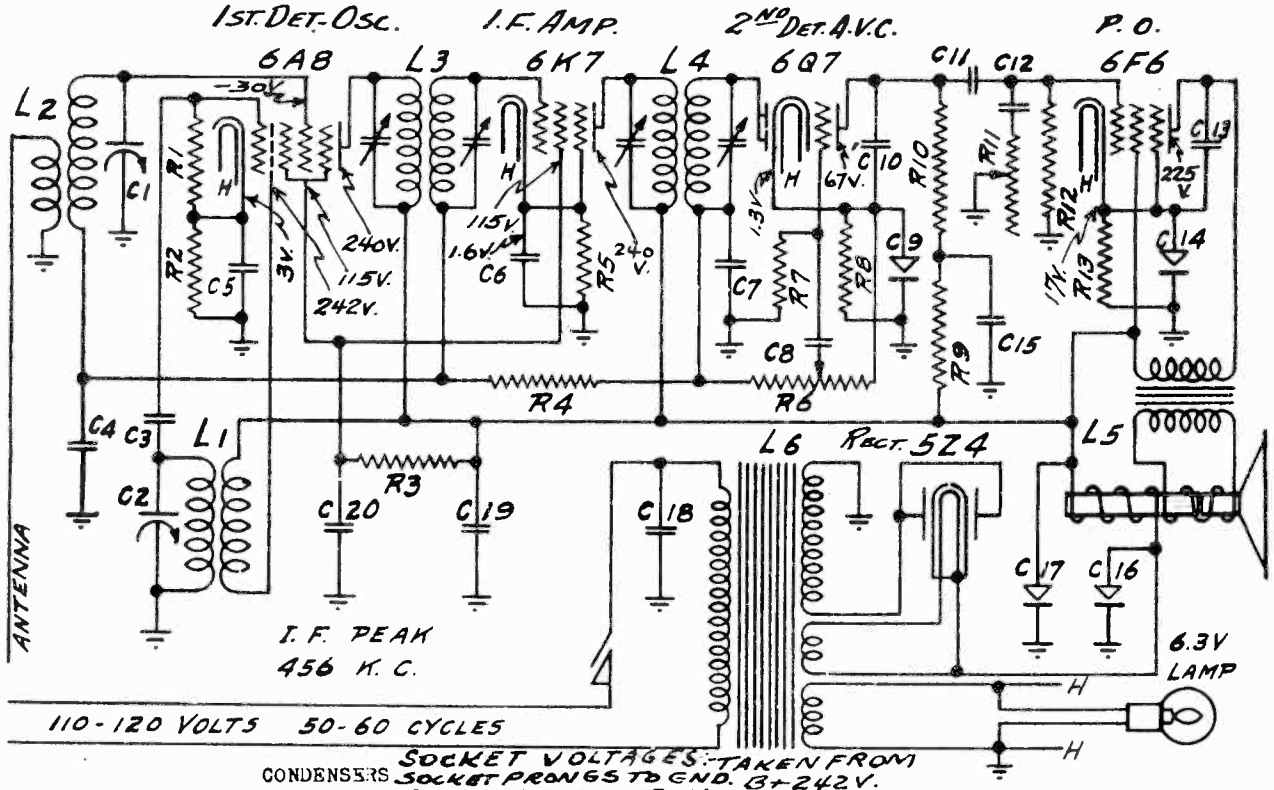
1. Set wave change switch to Red Band position.
2. Set test oscillator and dial indicator to 17000 KC. and adjust #34, #16 and #6 for maximum output.
3. Set test oscillator and dial indicator to 6000 KC. and adjust #36 for maximum output, at the same time rocking the variable tuning condenser.
4. Return to 17000 KC. setting and make readjustment of #34, #16 and #5.

IMPORTANT: While testing or making adjustments, the chassis should not be turned upside down or left in this position too long the condenser may be injured.

Dia.#	Part #	Description of Parts	List Price
1	CB 9551	Variable condenser - 3 gang	$ 4.50
2	CW 2-100	1 mfd., 200 V. condenser	.40
3	SW 9556	Switch and bracket assembly - antenna section	1.40
4	RC 95220	Antenna coil (Red)	.85
5	CS 9554	4-30 mmf. trimmer condenser	.15
6		Twisted wire - part of RC 95220	
7	RC 95212	Antenna coil (Blue)	.80
8	CS 9554	4-30 mmf. trimmer condenser	.15
9	RC 95218	Antenna coil (White)	1.00
10	CS 9554	4-30 mmf. trimmer condenser	.15
11	RC 95219	Antenna coil (Green)	1.25
12	CS 9554	4-30 mmf. trimmer condenser	.15
13	CW 9513	.05 mfd., 200 V. condenser	.25
14	SW 9556	Switch and bracket assembly - R.F. section	1.40
15	RC 95217	R.F. coil (Red)	1.35
16	CS 9554	4-30 mmf. trimmer condenser	.15
17	CM 9512	6 mmf. mica condenser	.15
18	RC 95214	R.F. coil (Blue)	1.00

WILCOX-GAY CORP.

MODEL 7E5
Schematic, Voltage
Alignment, Socket
Trimmers



SOCKET VOLTAGES:-TAKEN FROM SOCKET PRONGS TO GND. B+ 242 V. SPEAKER FIELD 78. METER 1000 OHMS/VOLT.

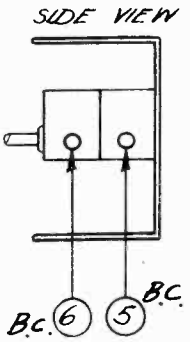
CONDENSERS

C1	77-2007	Preselector Section of Variable Condenser
C2	77-2007	Oscillator Section of Variable Condenser
C3	76-2002	.00005 Mfd. Mica Condenser
C4	75-2005	.1 Mfd. 200 V. Paper Condenser
C5	75-2005	.1 Mfd. 200 V. Paper Condenser
C6	75-2005	.1 Mfd. 200 V. Paper Condenser
C7	76-268	.00025 Mfd. Mica Condenser
C8	75-2005	.1 Mfd. 200 V. Paper Condenser
C9	18-928	25 Mfd. 25 V. Dry Electrolytic Cond.
C10	76-662	.002 Mfd. Mica Condenser
C11	75-2005	.1 Mfd. 200 V. Paper Condenser
C12	75-2003	.01 Mfd. 400 V. Paper Condenser
C13	75-2002	.004 Mfd. 600 V. Paper Condenser
C14	18-928	25 Mfd. 25 V. Dry Electrolytic Cond.
C15	75-2005	.1 Mfd. 200 V. Paper Condenser
C16	18-2008	8 Mfd. 350 W.V. Dry Electrolytic
C17	18-2008	8 Mfd. 250 W.V. Dry Electrolytic
C18	75-2003	.01 Mfd. 400 V. Paper Condenser
C19	75-2011	.5 Mfd. 200 V. Paper Condenser
C20	75-2005	.1 Mfd. 200 V. Paper Condenser

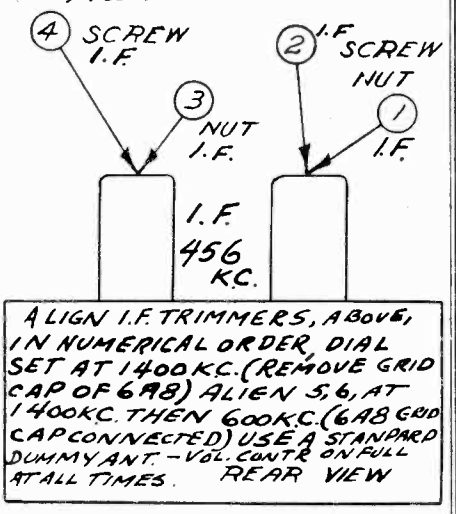
INDUCTANCES

L1	17-2135	Oscillator Coil Assembly
L2	17-2138	Preselector Coil Assembly
L3	68-2040	First I.F. Transformer Assembly
L4	68-2041	Second I.F. Transformer Assembly
L5	64-2045	5" Speaker, 1500 Ohm Field, 6F6 Output Trans.
L6	80-2009	Power Transformer for 110-120 V. 60 Cycle

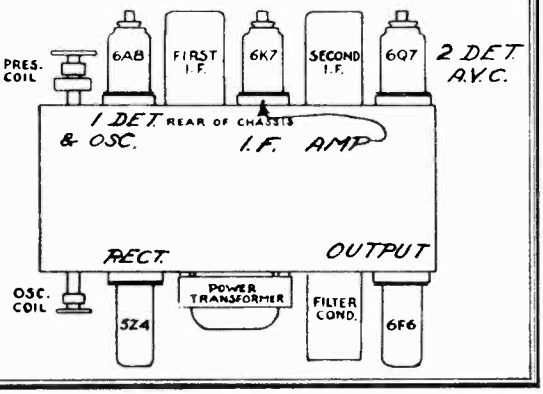
CODE	PART NO.	RESISTORS
R1	53-898	50,000 Ohm Type M Resistor
R2	53-1062	250 Ohm Wirewound Resistor
R3	53-1042	25,000 Ohm Type M Resistor
R4	53-926	1 Meg Ohm Type M Resistor
R5	53-1062	250 Ohm Wirewound Resistor
R6	19-1291	500,000 Ohm Volume Control & Line Switch
R7	53-925	500,000 Ohm Type M Resistor
R8	53-919	5,000 Ohm Type M Resistor
R9	53-923	100,000 Ohm Type M Resistor
R10	53-924	250,000 Ohm Type M Resistor
R11	19-1317	250,000 Ohm Tone Control
R12	53-925	500,000 Ohm Type M Resistor
R13	53-1063	500 Ohm Wirewound Resistor



25-2120

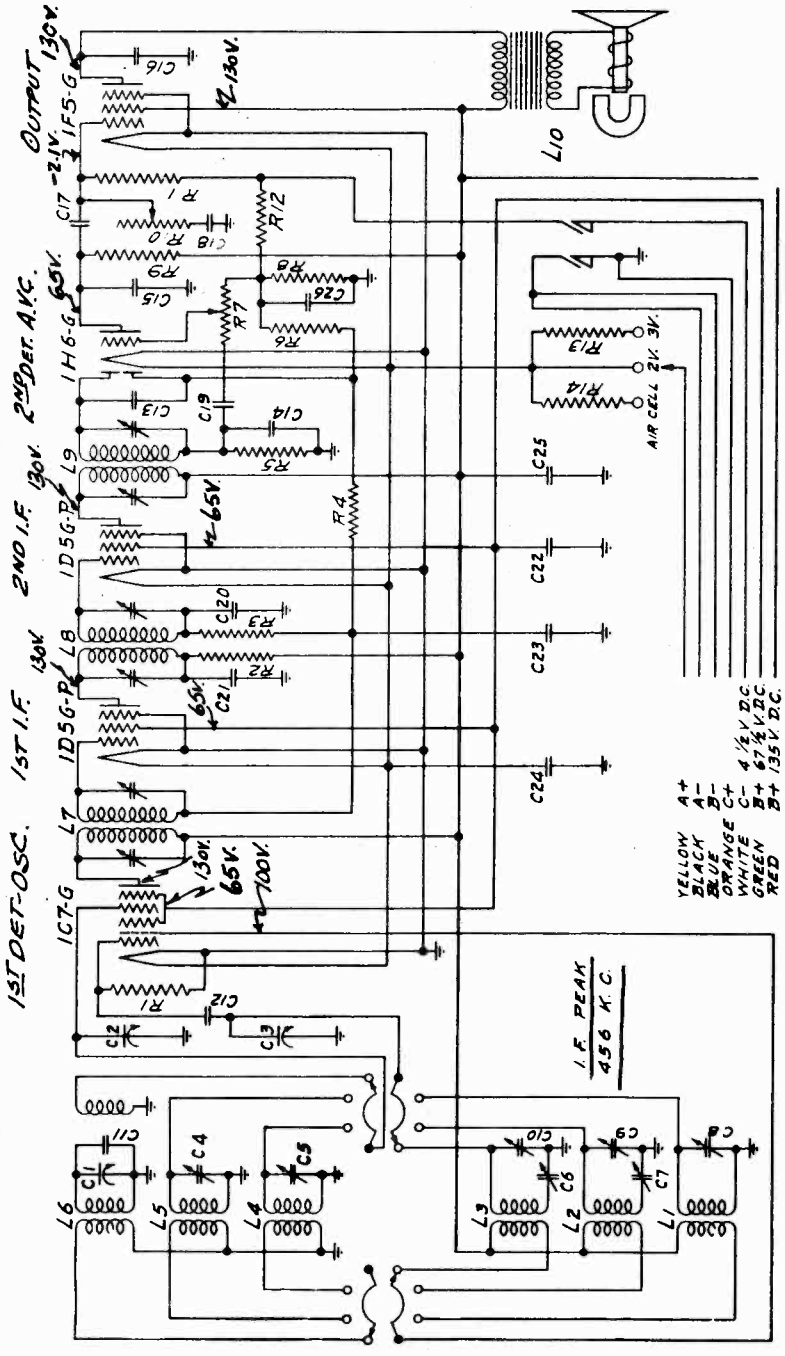


ALIGNMENT:- CONNECT OUTPUT METER BETWEEN PLATE 6F6 AND GROUND.



MODELS A41,A42
Chassis 7R5
Schematic,Voltage
Socket,Alignment

WILCOX-GAY CORP.



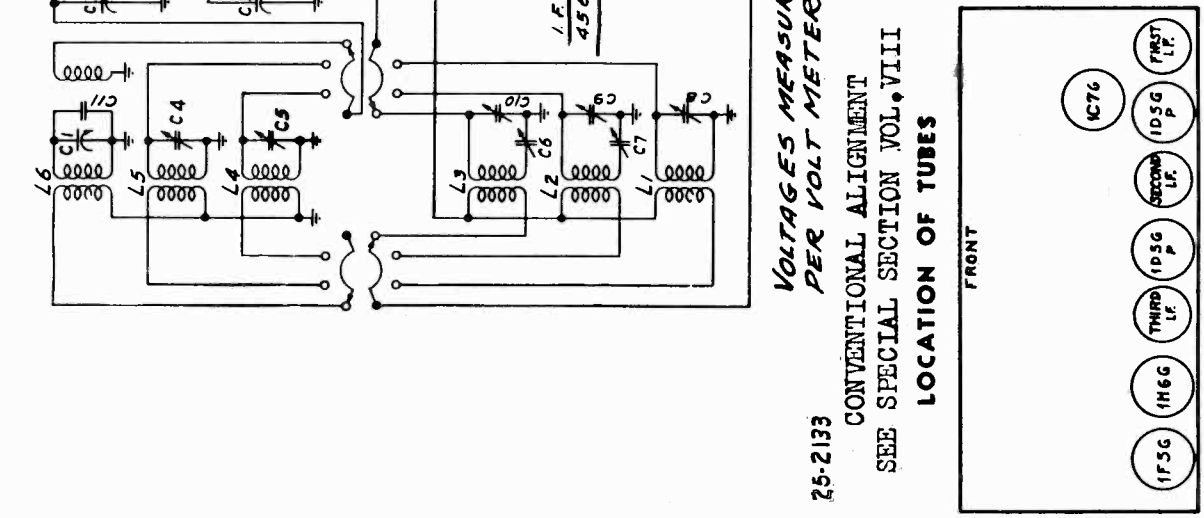
VOLTAGES MEASURED FROM SOCKET PRONGS TO GROUND. WITH A 1000 OHM PER VOLT METER. FILAMENT VOLTAGE 1.5.

25-2133

CONVENTIONAL ALIGNMENT

SEE SPECIAL SECTION VOL. VIII

LOCATION OF TUBES



RESISTORS

CODE	PART NO.		
R1	53-908	50,000 Ohm	1/4 Watt Resistor
R2	53-919	5,000 Ohm	1/4 Watt Resistor
R3	53-915	100,000 Ohm	1/4 Watt Resistor
R4	53-926	1 Meg	1/4 Watt Resistor
R5	53-925	800,000 Ohm	1/4 Watt Resistor
R6	53-925	800,000 Ohm	1/4 Watt Resistor
R7	10-8008	500,000 Ohm	Volume Control
R8	53-925	500,000 Ohm	1/4 Watt Resistor
R9	53-924	250,000 Ohm	Tone Control & D.P.S.T. Switch
R10	10-8010	250,000 Ohm	1/4 Watt Resistor
R11	53-925	500,000 Ohm	1/4 Watt Resistor
R12	53-906	50,000 Ohm	1/4 Watt Resistor
R13	53-8016	4.18 Ohm	Wirewound Resistor
R14	53-8015	.78 Ohm	Wirewound Resistor

CONDENSERS

CODE	PART NO.	
C1,C8,C3	77-8011	3 Gang Tuning Condenser
C4, C5	78-1607	3-80 Mmfd. 2 Gang Trimmer Cond.
C6, C7	78-8088	600 & 1600 Mmfd. 2 Gang Trimmer Cond.
C8,C9,C10	78-8050	3-80 Mmfd. 3 Gang Trimmer Condenser
C11	76-2003	.00001 Mfd. Mica Condenser
C12	76-2002	.00005 Mfd. Mica Condenser
C13	76-2002	.00005 Mfd. Mica Condenser
C14	76-2007	.0008 Mfd. Mica Condenser

CONDENSERS (Cont'd.)

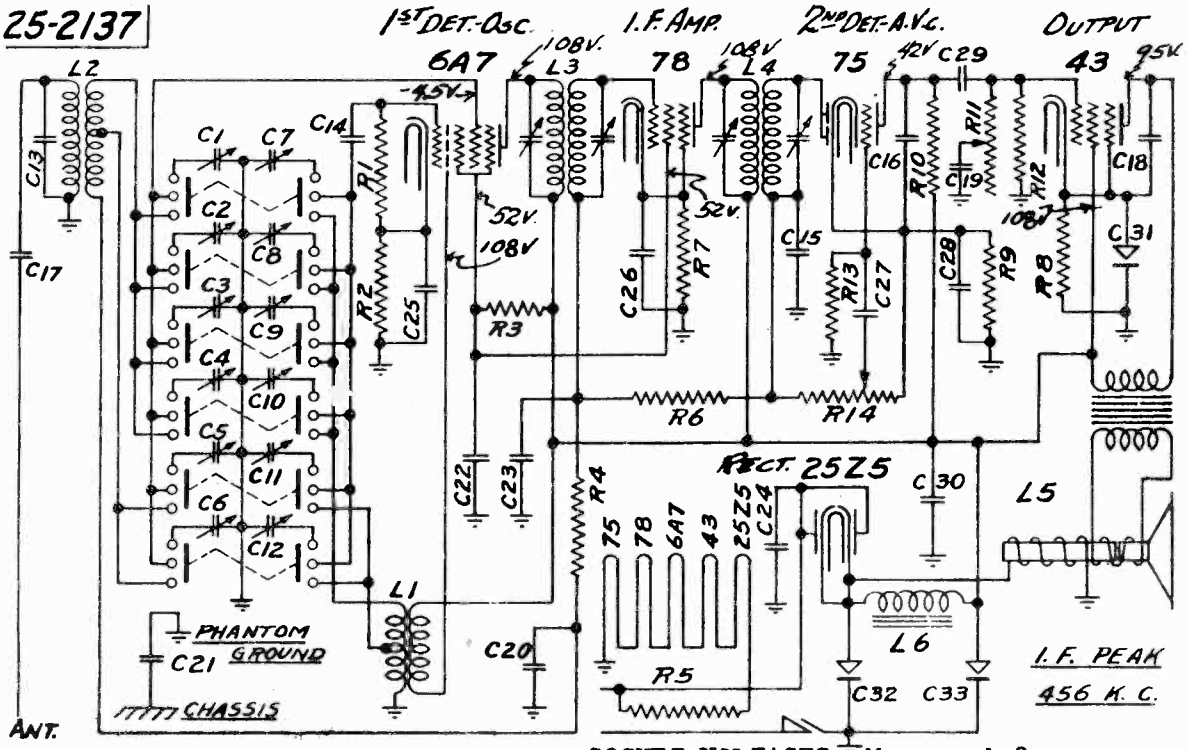
CODE	PART NO.	
C15	76-265	.001 Mfd. Mica Condenser
C16	75-2002	.004 Mfd. 400 V. Paper Condenser
C17	75-2003	.01 Mfd. 400 V. Paper Condenser
C18	75-2003	.01 Mfd. 400 V. Paper Condenser
C19	75-2003	.01 Mfd. 400 V. Paper Condenser
C20	75-2003	.01 Mfd. 400 V. Paper Condenser
C21	75-2003	.01 Mfd. 400 V. Paper Condenser
C22	75-2006	.1 Mfd. 200 V. Paper Condenser
C23	75-2006	.1 Mfd. 200 V. Paper Condenser
C24	75-2011	.5 Mfd. 200 V. Paper Condenser
C25	75-2011	.5 Mfd. 200 V. Paper Condenser
C26	75-2011	.5 Mfd. 200 V. Paper Condenser

INDUCTANCES

CODE	PART NO.	
L1	17-2183	Foreign Band Oscillator Coil Assembly
L2	17-2170	Police Band Oscillator Coil Assembly
L3	17-2150	Broadcast Band Oscillator Coil Assembly
L4	17-2182	Foreign Band Preselector Coil Assembly
L5	17-2168	Police Band Preselector Coil Assembly
L6	17-2151	Broadcast Band Preselector Coil Assembly
L7	68-2047	First I. F. Transformer Assembly
L8	68-2047	Second I. F. Transformer Assembly
L9	68-2048	Third I. F. Transformer Assembly
L10	64-2052	5" Speaker Permanent Magnet Field for Model A-41 Output Trans. for single 1F5-G Tube
L10	64-2053	6½" Speaker Permanent Magnet Field for Model A-42 Output Trans. for single 1F5-G

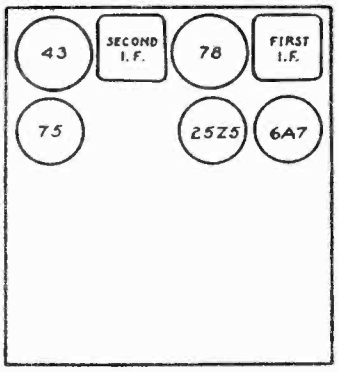
WILCOX-GAY CORP.

MODEL A48
Chassis 7S5
Schematic, Voltage
Socket, Alignment



CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII

LOCATION OF TUBES



SOCKET VOLTAGES, Measured from socket prongs to ground with a 1000 ohm per volt meter. B+ 180V., Speaker field 125 V., Line voltage was 120 at 60 cycles.

CODE	PART NO.	RESISTORS
R1	53-898	50,000 Ohm 1/4 Watt Resistor
R2	53-1062	250 Ohm Wirewound Resistor
R3	53-1042	25,000 Ohm 1/4 Watt Resistor
R4	53-923	100,000 Ohm 1/4 Watt Resistor
R5	20-2009	173 Ohm Resistor in Power Line Cord
R6	53-926	1 Megohm 1/4 Watt Resistor
R7	53-1063	500 Ohm Wirewound Resistor
R8	53-1063	500 Ohm Wirewound Resistor
R9	53-919	5,000 Ohm 1/4 Watt Resistor
R10	53-924	250,000 Ohm 1/4 Watt Resistor
R11	19-2009	250,000 Ohm Tone Control
R12	53-925	500,000 Ohm 1/4 Watt Resistor
R13	53-925	500,000 Ohm 1/4 Watt Resistor
R14	19-2007	500,000 Ohm Volume Control & Off-On Switch

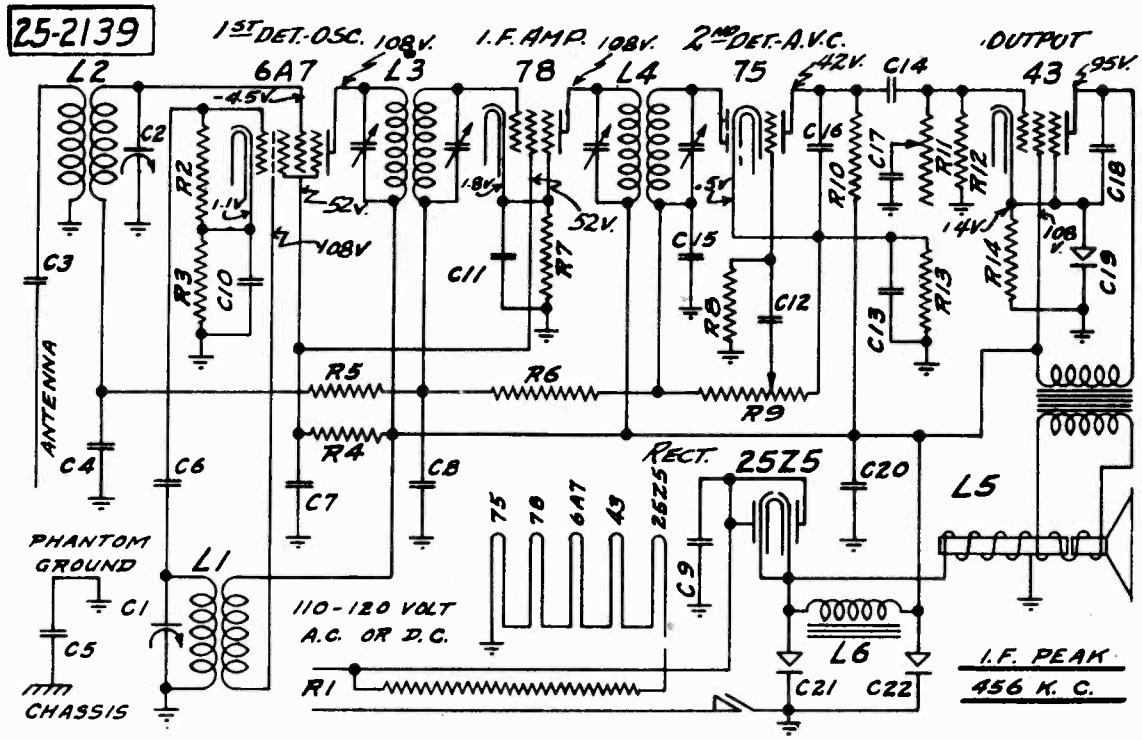
C1, C2	78-2033	40-240 Mmfd. Two Gang Trimmer Condenser
C3, C4	78-2033	40-240 Mmfd. Two Gang Trimmer Condenser
C5, C6	78-2033	40-240 Mmfd. Two Gang Trimmer Condenser
C7, C8	78-2033	40-240 Mmfd. Two Gang Trimmer Condenser
C9, C10	78-2033	40-240 Mmfd. Two Gang Trimmer Condenser
C11, C12	78-2033	40-240 Mmfd. Two Gang Trimmer Condenser
C13	76-2002	.00005 Mfd. Mica Condenser
C14	76-2002	.00005 Mfd. Mica Condenser
C15	76-307	.0006 Mfd. Mica Condenser
C16	76-265	.001 Mfd. Mica Condenser
C17	76-265	.001 Mfd. Mica Condenser
C18	75-2002	.004 Mfd. 600 V. Paper Condenser
C19	75-2003	.01 Mfd. 400 V. Paper Condenser
C20	75-2003	.01 Mfd. 400 V. Paper Condenser
C21	75-2005	.1 Mfd. 200 V. Paper Condenser
C22	75-2005	.1 Mfd. 200 V. Paper Condenser
C23	75-2005	.1 Mfd. 200 V. Paper Condenser
C24	75-2005	.1 Mfd. 200 V. Paper Condenser
C25	75-2005	.1 Mfd. 200 V. Paper Condenser
C26	75-2005	.1 Mfd. 200 V. Paper Condenser
C27	75-2005	.1 Mfd. 200 V. Paper Condenser
C28	75-2005	.1 Mfd. 200 V. Paper Condenser
C29	75-2005	.1 Mfd. 200 V. Paper Condenser
C30	75-2011	.5 Mfd. 200 V. Paper Condenser
C31	18-928	25 Mfd. 25 V. Dry Electrolytic Cond.
C32, C33	18-2009	20 Mfd. & 10 Mfd. 150 W.V. Dry Elect. Cond.

INDUCTANCES

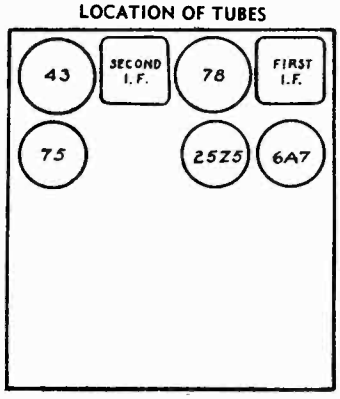
L1	17-2198	Oscillator Coil Assembly
L2	17-2200	Preselector Coil Assembly
L3	68-2051	First I. F. Transformer Assembly
L4	68-2052	Second I. F. Transformer Assembly
L5	64-2055	4" Speaker, 2100 Ohm, 43 Tube Output Trans.
L6	14-2002	20 Henry Filter Choke

MODEL A49
Chassis 7T5
Schematic, Voltage
Alignment, Socket

WILCOX-GAY CORP.



LOCATION OF TUBES



CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII

SOCKET VOLTAGES, Measured from socket prongs to ground with a 1000 ohm per volt meter. B+ 180V., Speaker field 125 V., Line voltage was 120 at 60 cycles.

RESISTORS

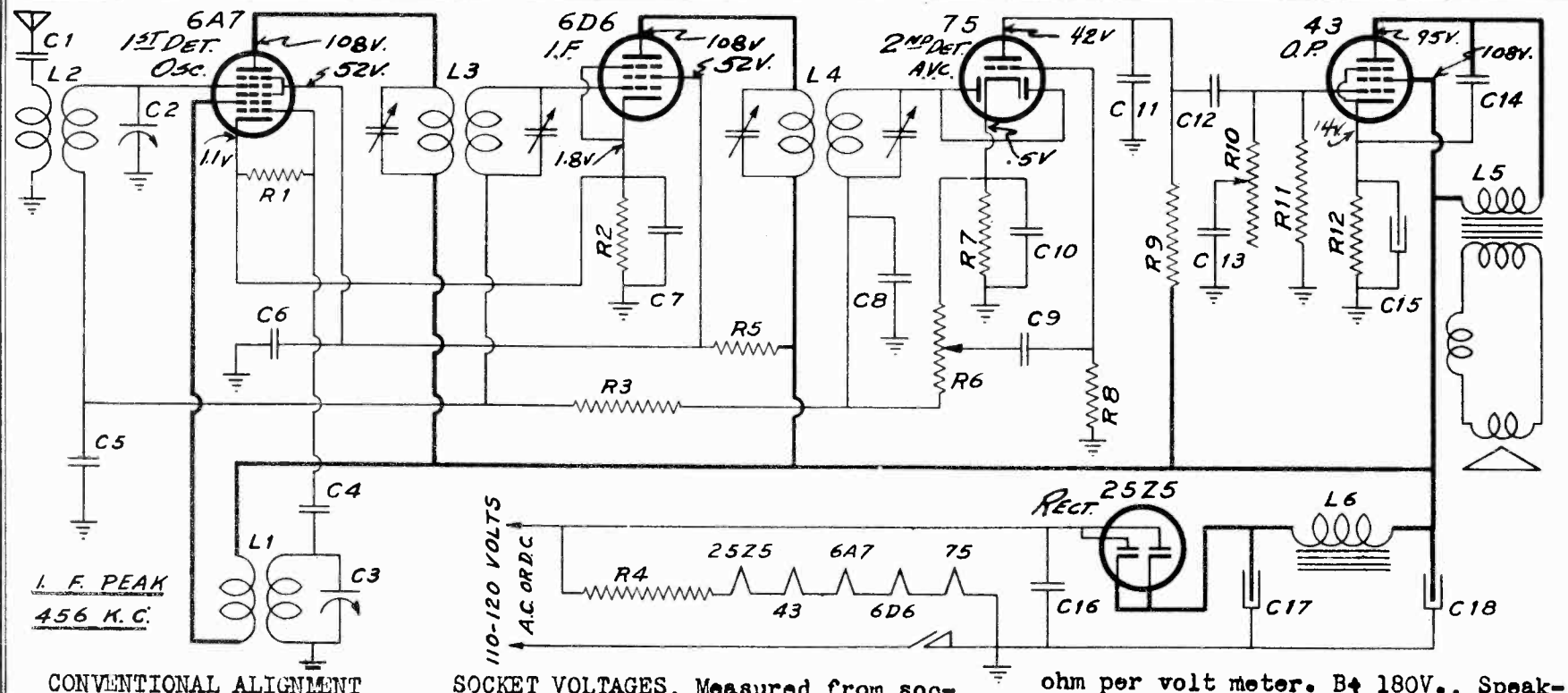
CODE	PART NO.	
R1	20-2009	175 Ohm Resistor in Power Line Cord
R2	53-898	50,000 Ohm 1/4 Watt Resistor
R3	53-1062	250 Ohm Wireohm Resistor
R4	53-1042	25,000 Ohm 1/4 Watt Resistor
R5	53-923	100,000 Ohm 1/4 Watt Resistor
R6	53-926	1 Megohm 1/4 Watt Resistor
R7	53-1063	500 Ohm Wirewound Resistor
R8	53-1063	500 Ohm Wirewound Resistor
R9	19-2007	500,000 Ohm Volume Control & Off-On Switch
R10	53-924	250,000 Ohm 1/4 Watt Resistor
R11	19-2009	250,000 Ohm Tone Control
R12	53-925	500,000 Ohm 1/4 Watt Resistor
R13	53-919	5,000 Ohm 1/4 Watt Resistor
R14	53-1063	500 Ohm Wireohm Resistor

CONDENSERS

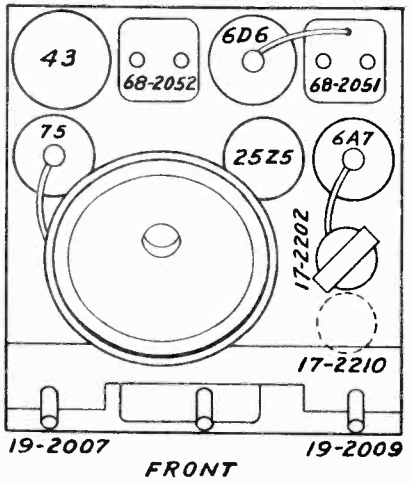
C1, C2	77-2007	2 Gang Variable Condenser
C3	76-266	.001 Mfd. Mica Condenser
C4	76-2003	.01 Mfd. 200 V. Paper Condenser
C5	75-2005	.1 Mfd. 200 V. Paper Condenser
C6	76-2002	.00005 Mfd. Mica Condenser
C7	75-2005	.1 Mfd. 200 V. Paper Condenser
C8	75-2005	.1 Mfd. 200 V. Paper Condenser
C9	75-2005	.1 Mfd. 200 V. Paper Condenser
C10	75-2005	.1 Mfd. 200 V. Paper Condenser
C11	75-2005	.1 Mfd. 200 V. Paper Condenser
C12	75-2005	.1 Mfd. 200 V. Paper Condenser
C13	75-2005	.1 Mfd. 200 V. Paper Condenser
C14	75-2005	.1 Mfd. 200 V. Paper Condenser
C15	76-307	.0005 Mfd. Mica Condenser
C16	76-265	.001 Mfd. Mica Condenser
C17	75-2002	.004 Mfd. 600 V. Paper Condenser
C18	75-2002	.004 Mfd. 600 V. Paper Condenser
C19	18-928	25 Mfd. 25 V. Dry Electrolytic Cond.
C20	75-2011	.5 Mfd. 200 V. Paper Condenser
C21, C22	18-2009	25 Mfd. & 10 Mfd. W.V. Dry Elect. Cond.

INDUCTANCES

L1	17-2204	Oscillator Coil Assembly
L2	17-2202	Preselector Coil Assembly
L3	68-2051	First I.F. Transformer Assembly
L4	68-2052	Second I.F. Transformer Assembly
L5	64-2055	4" Speaker, 2100 Ohm, 43 Tube Output Trans
L6	14-2002	20 Henry Filter Choke



CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII



SOCKET VOLTAGES, Measured from socket prongs to ground with a 1000 ohm per volt meter. B+ 180V., Speaker field 125V., Line voltage was 120 at 60 cycles.

	RESISTORS	
R1	53-898	50,000 Ohm 1/4 Watt Resistor
R2	53-1062	250 Ohm 1/2 Watt Resistor
R3	53-926	1 Meg Ohm 1/4 Watt Resistor
R4	20-2009	173 Ohm Rest. in Power Cord
R5	53-1042	25,000 Ohm 1/4 Watt Resistor
R6	19-2007	500,000 Ohm Volume Cont. & Switch
R7	53-919	5,000 Ohm 1/4 Watt Resistor
R8	53-925	500,000 Ohm 1/4 Watt Resistor
R9	53-924	250,000 Ohm 1/4 Watt Resistor
R10	19-2009	250,000 Ohm Tone Control
R11	53-925	500,000 Ohm 1/4 Watt Resistor
R12	53-1063	500 Ohm 1/2 Watt Resistor

	CONDENSERS	
C1	75-2001	.002 Mfd. 600 V. Paper Cond.
C2, C3,	77-2007	Two Gang Variable Condenser
C4	76-2002	.00005 Mfd. Mica Condenser
C5	75-2005	.1 Mfd. 200 V. Paper Cond.
C6	75-2005	.1 Mfd. 200 V. Paper Cond.

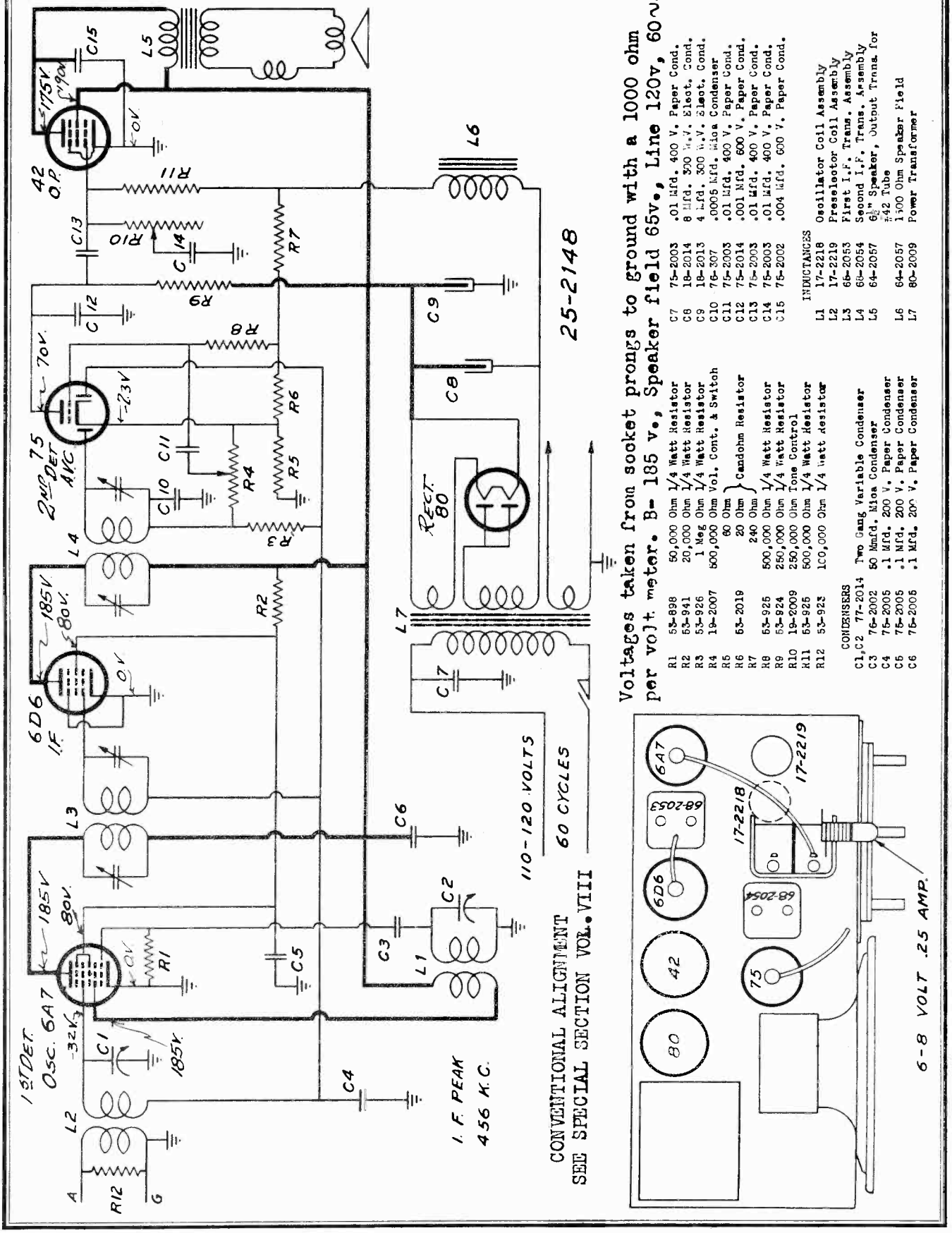
	COND. (Cont.)	
C7	75-2005	.1 Mfd. 200 V. Paper Cond.
C8	76-307	.0005 Mfd. Mica Condenser
C9	75-2005	.1 Mfd. 200 V. Paper Cond.
C10	75-2005	.1 Mfd. 200 V. Paper Cond.
C11	75-2014	.001 Mfd. 600 V. Paper Cond.
C12	75-2005	.1 Mfd. 200 V. Paper Cond.
C13	75-2003	.01 Mfd. 400 V. Paper Cond.
C14	75-2002	.004 Mfd. 600 V. Paper Cond.
C15	18-928	25 Mfd. 25 W.V. Dry Elect. Cond.
C16	75-2005	.1 Mfd. 200 V. Paper Cond.
C17	18-2010	16 Mfd. 150 W.V. Dry Elect. Cond.
C18	18-2011	8 Mfd. 150 W.V. Dry Elect. Cond.

	INDUCTANCES	
L1	17-2210	Oscillator Coil Assembly
L2	17-2202	Preselector Coil Assembly
L3	68-2051	First I.F. Trans. Assembly
L4	68-2052	Second I.F. Trans. Assembly
L5	81-2003	Output Transformer for # 43 Tube
L6	64-2056	4" Speaker, 450 Ohm Field

25-2144

MODEL A52
Chassis 8E5
Schematic, Voltage
Socket, Alignment

WILCOX-GAY CORP.

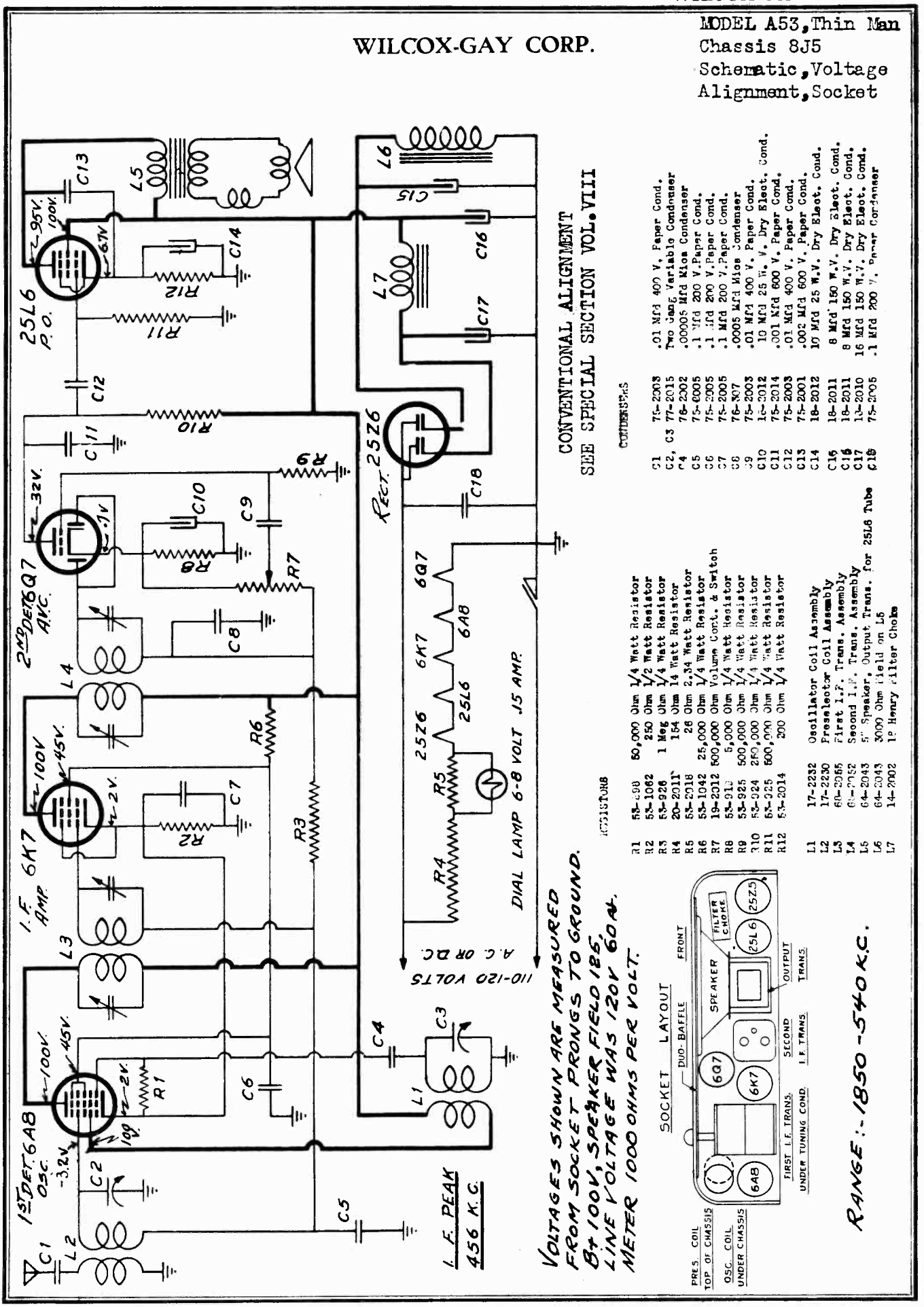


Voltages taken from socket prongs to ground with a 1000 ohm per volt meter. B- 185 v., Speaker field 65v., Line 120v., 60~.

R1	53-898	50,000 Ohm 1/4 Watt Resistor	C7	75-2003	.01 Mfd. 400 V. Paper Cond.
R2	53-941	20,000 Ohm 1/4 Watt Resistor	C8	18-2014	8 Mfd. 350 V. Elect. Cond.
R3	53-926	1 Meg Ohm 1/4 Watt Resistor	C9	18-2013	4 Mfd. 300 V. Elect. Cond.
R4	19-2007	500,000 Ohm Vol. Cont. & Switch	C10	76-307	.0005 Mfd. Mica Condenser
R5		60 Ohm } Candohm Resistor	C11	75-2003	.01 Mfd. 400 V. Paper Cond.
R6	53-2019	20 Ohm }	C12	75-2014	.001 Mfd. 600 V. Paper Cond.
R7		240 Ohm }	C13	75-2003	.01 Mfd. 400 V. Paper Cond.
R8	53-925	500,000 Ohm 1/4 Watt Resistor	C14	75-2003	.01 Mfd. 400 V. Paper Cond.
R9	53-924	250,000 Ohm 1/4 Watt Resistor	C15	75-2002	.004 Mfd. 600 V. Paper Cond.
R10	19-2009	250,000 Ohm Tone Control			INDUCTANCES
R11	53-925	500,000 Ohm 1/4 Watt Resistor	L1	17-2218	Oscillator Coil Assembly
R12	53-923	100,000 Ohm 1/4 Watt Resistor	L2	17-2219	Preselector Coil Assembly
		CONDENSERS	L3	66-2053	First I.F. Trans. Assembly
C1,C2	77-2014	Two Gang Variable Condenser	L4	66-2054	Second I.F. Trans. Assembly
C3	76-2002	50 Mmfd. Mica Condenser	L5	64-2057	6½" Speaker, Output Trans. for 42 Tube
C4	75-2005	.1 Mfd. 200 V. Paper Condenser	L6	64-2057	1300 Ohm Speaker Field
C5	75-2005	.1 Mfd. 200 V. Paper Condenser	L7	80-2009	Power Transformer
C6	75-2006	.1 Mfd. 200 V. Paper Condenser			

WILCOX-GAY CORP.

MODEL A53, Thin Man
Chassis 8J5
Schematic, Voltage
Alignment, Socket



RESISTORS

R1	53-[illegible]	50,000 Ohm	1/4 Watt Resistor
R2	53-1062	250 Ohm	1/2 Watt Resistor
R3	53-926	1 Meg Ohm	1/4 Watt Resistor
R4	20-2011	154 Ohm	14 Watt Resistor
R5	53-2018	28 Ohm	2.34 Watt Resistor
R6	53-1042	25,000 Ohm	1/4 Watt Resistor
R7	19-2012	500,000 Ohm	Volume Cont. & Switch
R8	53-91[illegible]	5,000 Ohm	1/4 Watt Resistor
R9	53-925	500,000 Ohm	1/4 Watt Resistor
R10	53-924	250,000 Ohm	1/4 Watt Resistor
R11	53-925	500,000 Ohm	1/4 Watt Resistor
R12	53-2014	200 Ohm	1/4 Watt Resistor

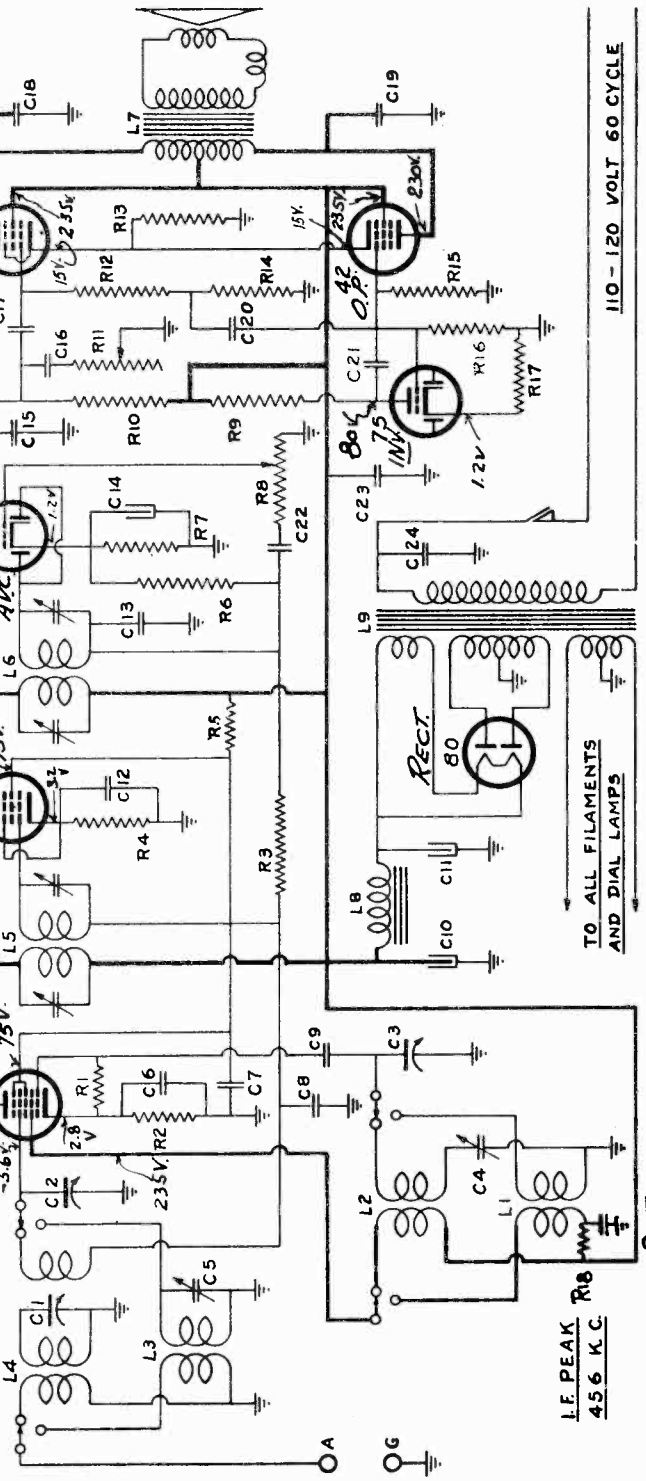
L1	17-2232	Oscillator Coil Assembly
L2	17-2230	Preselector Coil Assembly
L3	60-2065	First I.F. Trans. Assembly
L4	60-2052	Second I.F. Trans. Assembly
L5	64-2043	5" Speaker, Output Trans. for 25L6 Tube
L6	64-2043	3000 Ohm Field on L5
L7	14-2002	12 Henry Filter Choke

CONDENSERS

C1	75-2003	.01 Mfd 400 V. Paper Cond.
C2, C3	77-2015	Two Gang Variable Condenser
C4	76-2002	.00005 Mfd Mica Condenser
C5	75-2005	.1 Mfd 200 V. Paper Cond.
C6	75-2005	.1 Mfd 200 V. Paper Cond.
C7	75-2005	.1 Mfd 200 V. Paper Cond.
C8	76-307	.0005 Mfd Mica Condenser
C9	75-2003	.01 Mfd 400 V. Paper Cond.
C10	1[illegible]-2012	10 Mfd 25 W. V. Dry Elect. Cond.
C11	75-2014	.001 Mfd 600 V. Paper Cond.
C12	75-2003	.01 Mfd 400 V. Paper Cond.
C13	75-2001	.002 Mfd 600 V. Paper Cond.
C14	18-2012	10 Mfd 25 W.V. Dry Elect. Cond.
C15	18-2011	8 Mfd 150 W.V. Dry Elect. Cond.
C16	18-2011	8 Mfd 150 W.V. Dry Elect. Cond.
C17	18-2010	16 Mfd 150 W.V. Dry Elect. Cond.
C18	75-2005	.1 Mfd 200 V. Paper Condenser

MODELS A54, Chassis 8L7
A55, Chassis 8N7
Schematic, Voltage
Socket, Alignment

WILCOX-GAY CORP.



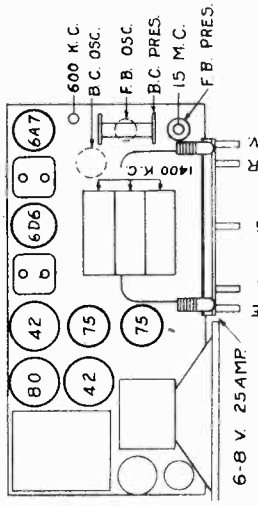
Voltages taken from socket prongs to ground. B+ 235V. Speaker field 87. Line 120 volts 60 cycles. Meter 1000 ohms per volt.

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VLII

C1,C2,C3	77-2016	3 Gang Variable Condenser
C4	78-2031	Broadcast Series Osc. Trimmer
C5	78-2010	3-30 MMFD. Foreign Band
C6	75-2005	.1 Mfd. 200 V. Paper Condenser
C7	75-2005	.1 Mfd. 200 V. Paper Condenser.
C8	75-2005	.1 Mfd. 200 V. Paper Condenser
C9	76-2002	.00005 Mfd. Mica Condenser
C10	18-2006	16 Mfd. 250 W.V. Elect. Condenser
C11	18-721	8 Mfd. 450 W.V. Elect. Condenser
C12	75-2005	.1 Mfd. 200 V. Paper Condenser
C13	76-2007	.0005 Mfd. Mica Condenser
C14	18-2012	10 Mfd. 25 W.V. Dry Elect. Cond.
C15	75-2014	.001 Mfd. 600 V. Paper Condenser
C16	75-2003	.01 Mfd. 400 V. Paper Condenser
C17	75-2005	.1 Mfd. 200 V. Paper Condenser
C18	75-2001	.002 Mfd. 600 V. Paper Condenser
C19	75-2001	.002 Mfd. 600 V. Paper Condenser
C20	75-2005	.1 Mfd. 200 V. Paper Condenser
C21	75-2005	.1 Mfd. 200 V. Paper Condenser
C22	75-2005	.1 Mfd. 200 V. Paper Condenser
C23	75-2012	.5 Mfd. 400 V. Paper Condenser
C24	75-2003	.01 Mfd. 400 V. Paper Condenser
C25	75-2005	.1 Mfd. 200 V. PAPER CONDENSER
R1	53-~~896~~	50,000 Ohm 1/4 Watt Resistor
R2	53-1062	250 Ohm 1/2 Watt Resistor
R3	53-926	1 Megohm 1/4 Watt Resistor
R4	53-1065	500 Ohm 1/2 Watt Resistor
R5	53-921	40,000 Ohm 1/4 Watt Resistor
R6	53-925	500,000 Ohm 1/4 Watt Resistor
R7	53-919	5,000 Ohm 1/4 Watt Resistor
R8	19-2007	500,000 Ohm Vol. Cont. & Switch
R9	53-924	250,000 Ohm 1/4 Watt Resistor
R10	53-924	250,000 Ohm 1/4 Watt Resistor
R11	19-2009	250,000 Ohm Tone Control
R12	53-926	500,000 Ohm 1/4 Watt Resistor
R13	53-2011	250 Ohm 1/2 Watt Resistor
R14	53-921	20,000 Ohm 1/4 Watt Resistor
R15	53-925	500,000 Ohm 1/4 Watt Resistor
R16	53-925	500,000 Ohm 1/4 Watt Resistor
R17	53-919	5,000 Ohm 1/4 Watt Resistor
R18	53 898	50,000 OHM 1/4 WATT RESISTOR
L1	17-2149	Foreign Band Osc. Coil Assembly
L2	17-2227	Broadcast Oscillator Coil Assembly
L3	17-2228	Foreign Band Pres. Coil Assembly
L4	17-2226	Broadcast Preselector Coil Assembly.

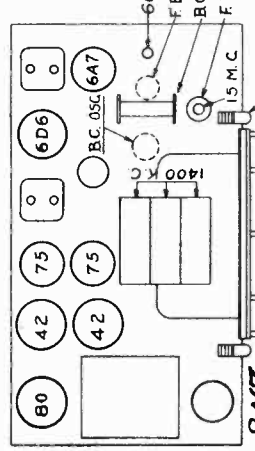
MODEL A54

L7	64-2058	6½" Speaker - #42 Push Pull Output Trans.
L8	64-2058	6½" Speaker - 1000 Ohm Field



MODEL A55

L5	64-2059	12" Speaker - #42 Push Pull Output Trans.
L6	64-2059	12" Speaker - 1000 Ohm Field
L9	80-2022	Power Transformer



L5	68-2051	First I.F. Transformer Assembly
L6	68-2051	Second I.F. Transformer Assembly
L9	80-2022	Power Transformer

For MODELS 6S306, 9S307 15S308 Installation, Operation

ZENITH RADIO CORP.

MODEL 169-31 Automatic Record Changer

INSTALLATION, OPERATION AND SERVICE

AUTOMATIC RECORD CHANGER

used in

Models 6-S-306, 9-S-307; 15-S-308

This Record Changer will automatically play a series of eight 10- or seven 12-inch records of the 78 revolutions-per-minute type or, if you so desire, you may change records, of any size up to 12 inches, manually. Records of the last few years with the standard eccentric or spiral stopping groove will operate the automatic mechanism and change your records for you.

INSTALLATION

The Automatic Record Changer as supplied consists of two units.

1. **The Motorboard Unit** which includes the automatic record changer mechanism, the turntable, and the pickup.
2. **The Motor Unit** which includes the support plate assembly.

The units are supplied ready for mounting on a cabinet rail. This rail must be drilled in accordance with the information and dimensions shown on page 4. Wooden support blocks as shown, must be provided by the customer. All other necessary parts are included in your purchase. It is essential for proper operation that the rail and support blocks provide for the mounting of the motor support plate exactly 2¾ inches below the top surface of the motorboard. The support blocks should be attached to the rail with heavy wood screws. Details of this mounting, with all necessary dimensions, are given on page 4.

1. Install the Motor Unit with support plate loosely in position as shown on page 4. Do not tighten the mounting screws.
2. Loosen the two set screws in the collar of the flexible coupling on the Motorboard Unit, a detail of which is shown on page 3.
3. Place the Motorboard Unit in position on the cabinet rail with the upper mounting springs in place as shown on page 4. Make sure that the guide pins extending from the motor support plate enter the rubber grommets in the Motorboard Unit without binding.
4. Secure Motorboard in position using the screws and lower mounting springs as shown on page 4. Tighten up the four motorboard mounting screws to compress all eight mounting springs to the dimensions shown. *Make sure that the Motorboard Assembly is level in the cabinet.*
5. Tighten up the mounting screws on the Motor Unit support plate assembly so that they are firmly down against the spacers.
6. Check the installation to be sure that there is no binding between the collar of the flexible coupling and the collar of the motor spindle. See page 3.
7. Tighten the two set screws of the flexible coupling down on the spindle of the Motor Unit.

Needle Box

The needle box is in a separate package. Place the box in the hole in the motorboard with the needle ejector tab toward the front. To do this tilt the box upwards at front and lower into hole with the lug on back of box in the slot in the motorboard. Slide the lug under the motorboard and the box drops in place.

Speed Regulation and Lubrication

There are three holes in the top of the turntable which give access to oil holes and a speed regulating screw in the motor mechanism beneath. Revolve the turntable slowly until you can see the holes and screw through the turntable. A few drops of good quality light machine oil should be applied in the oil holes at regular intervals, about once every six months.

Speed Regulation.—After the phonograph is in operation the speed should be checked while playing a record.

1. Place a piece of white paper under edge of record so that it is plainly visible.
2. Count the number of revolutions per minute with the aid of a watch.
3. If not 78, stop the turntable, lift off the record and set the turntable to give access to the speed regulator screw through one of the holes.
4. Insert a screwdriver through the hole in the turntable into the groove in the speed regulator screw and turn to right (clockwise) to decrease speed, or to the left (counter-clockwise) to increase speed.
5. Replace and replay record, recount and adjust until speed is checked at 78 r. p. m.

Shipping

Shipping blocks as shown on page 4 should be used in all cases of reshipment.

OPERATION

Before operating the phonograph, either automatically or manually, be sure that the pickup is down and can be moved by hand. If not, a "cycle" must be completed to bring it down. To do this, throw Turntable Switch "on." The turntable will start to revolve and the cycle of motion on the pickup arm will be resumed. When the pickup arm comes down, turn off the Turntable Switch.

Cautions

1. Never use force to start or stop the motor or any part of the record-changing mechanism or pickup arm.

2. The use of records which have become warped or damaged through improper care may cause the mechanism to jam and damage the instrument. In addition, records which have become warped will slide on one another when playing, resulting in unsatisfactory reproduction.

3. This instrument is not recommended for playing 10-inch and 12-inch records in mixed sequence. If the user desires this service he must be positive that all records are perfectly flat and free from warp. The Index and Record Reject Lever must be set at "10" and after playing the last selection the pickup will come down in position for a 10-inch record and repeat the playing of the record on a 10-inch diameter unless the Turntable Switch is turned off. Any jamming of the mechanism under these conditions indicates that the records used are not perfectly flat or that their edges are not sufficiently smooth to permit normal operation of the separators in dropping each record in sequence onto the turntable.

4. Do not leave records on the record holder posts, as they are liable to warp, particularly so in warmer climates. Keep your records in a record file (album or cabinet) when not in use. If any records should become warped, place them on a flat surface with a flat heavy article, such as a large book, on top and leave them in this position for a few days.

Controls and Moving Mechanism

Index and Record Reject Lever.—This lever is located near the right front corner of the motorboard with its index plate marked for four positions—"MANUAL," "12," "10," and "REJECT." When you desire to change record selections manually, this lever should be set in the "MANUAL" position. With the lever in the "12" position, the mechanism is set to play a series of 12-inch records automatically. To play either a series of 10-inch records, or 10- and 12-inch records mixed, the lever should be set at the "10" position.

To reject a record being played, or to start the record-changing cycle in case the record just played does not have the standard eccentric or spiral stopping groove, simply push the lever to the "REJECT" position and let go. The pickup will raise up and swing outwards and the next record will drop down. Upon releasing the lever, it will automatically return to the "10" position. If you are playing a series of 12-inch records, the lever should be returned to the "12" position after rejecting a record. Keep the lever in its "MANUAL" position when not actually playing records automatically.

1.

MODEL 169-31 Automatic Record Changer

ZENITH RADIO CORP.

Automatic Record Changer

Adjustments, Notes

GENERAL INFORMATION

Before servicing the automatic record changer, inspect the assembly to see that all levers, parts, gears, springs, etc. are in good order and are correctly assembled.

A bind or jam in the mechanism can usually be relieved by rotating the turntable in the reverse direction.

The changer can be conveniently rotated through its change cycle by pushing the index lever to "Reject" and revolving the turntable by hand. Six turntable revolutions are required for one change cycle.

The turntable, spindle, and pinion gear are assembled by means of a 3/32 inch straight pin. This pin may be removed by gently driving with a standard pin punch.

If the record changer or cabinet is not perfectly level, normal operation is likely to be affected.

The 10 and 12 inch records must be absolutely flat for smooth operation when using a mixture of the two sizes.

A shorting switch, located in the pickup head, operates due to pressure when the pickup is placed on the pickup rest.

ADJUSTMENTS

A. Main Lever.—This lever is basically important in that it interlinks the various individual mechanisms which control needle landing, tripping, record separation, etc. One adjustment is provided for the main lever. Rotate the turntable until the changer is out-of-cycle; and adjust rubber bumper bracket (A) so that the roller clears the nose of the cam plate by 1/16 inch.

B. Friction Clutch.—The motion of the tone arm toward the center of the record is transmitted to the trip pawl "22" by the trip lever "7" through a friction clutch "5." If the motion of the pickup is abruptly accelerated or becomes irregular due to swinging in the eccentric groove, the trip finger "7" moves the trip pawl "22" into engagement with the pawl on the main gear, and the change cycle is started. Proper adjustment of the friction clutch "5" occurs when movement of the tone arm causes positive movement of the trip pawl "22" without tendency of the clutch to slip. The friction should be just enough to prevent slippage, and is adjustable by means of screw "B." If adjustment is too tight, the needle will repeat grooves; if too loose, tripping will not occur at the end of the record.

C. Pickup Lift Cable Screw.—During the record change cycle, lever "16" is actuated by the main lever "15" so as to raise the tone arm clear of the record by means of the pickup lift cable. To adjust pickup for proper elevation, stop the changer "in-cycle" at the point where pickup is raised to the maximum height above turntable plate, and has not moved outward; at this point adjust locknuts "C" to obtain 1 inch spacing between needle point and turntable top surface.

D. & E. Needle Landing on Record. — The relation of coupling between the tone arm vertical shaft and lever "20" determines the landing position of the needle on a 10 inch record. Position of eccentric stud "E" governs the landing of the needle on a 12 inch record; this, however, is dependent on the proper 10 inch adjustment.

To adjust for needle landing, place 10 inch record on turntable; push index lever to reject position and return to the 10 inch position; see that pickup locating lever "17" is tilted fully toward turntable; rotate mechanism through cycle until needle is just ready to land on the record; then see that pin "V" on lever "14" is in contact with "Step T" on lever "17." The correct point of landing is 4-11/16 inches from the nearest side of the turntable spindle; loosen the two screws "D" and adjust horizontal position of tone arm to proper dimension, being careful not to disturb levers "14" and "17". Leave approximately 1/32 inch end play between hub of lever "20" and pickup base bearing, and tighten the blunt nose screw "D"; run mechanism through several cycles as a check, then tighten cone pointed screw "D".

After adjusting for needle landing on a 10 inch record, place 12 inch record on turntable; push index lever to reject and return to 12 inch position; rotate mechanism through cycle until needle is just ready to land on the record; the correct point of landing is 5-11/16 inches from nearest side of spindle. If the landing is incorrect, turn stud "E" until the eccentric end adjusts lever "14" to give correct needle landing. The eccentric end of the stud must always be toward the rear of the motor board, otherwise incorrect landing may occur with 10 inch records.

F. & G. Record Separating Knife. — The upper plate (knife) "25" on each of the record posts serves to separate the lower record from the stack and to support the remaining records during the change cycle. It is essential that the spacing between the knife and the rotating record shelf "27" be accurately maintained. The spacing for the 10 inch record is nominally .055 inch, and for the 12 inch record is .075 inch.

To adjust, rotate the knife to the point of minimum vertical separation from the record shelf and turn screw and locknut "F" to give .052—.058 inch separation. Screw "G" must not be depressed during this adjustment. After setting screw "F" adjust screw "G" so that when its tip is depressed flush with top of record shelf, the vertical spacing between the knife, in its lowest rotational position, and the shelf, is .072—.078 inch.

H. Record Support Shelf.—The record shelf revolves during the change cycle to allow the lower record to drop onto the turntable. Both posts are rotated simultaneously by a gear and rack coupled to the main lever "15," and it is necessary that adjustments be such that the record is released from both shelves at the same instant. To adjust, place a 12 inch record on the turntable, rotate mechanism into cycle to the point where tone arm is at maximum distance outward from turntable; lift record upward until it is in contact with both separating knives, then loosen screws "H" and shift record shelves so that the curved inner edges of the shelves are uniformly spaced at least 1/16 inch from record edge. Tighten the blunt nose screw "H," run mechanism through cycle several times to check action, then tighten cone pointed screw "H".

If record shelves or knives are bent, or not perfectly horizontal, improper operation and jamming of mechanism will occur.

J. Tone Arm Rest Support (not shown).—When the changer is out-of-cycle, the front lower edge of the pickup head should be 5/16 inch above surface of motor board. This may be adjusted by bending the tone arm support bracket, which is associated with the tone arm mounting base, in the required direction.

K. Trip Pawl Stop Pin.—The position of the trip pawl stop pin "K" in relation to the main lever "15" governs the point at which the roller enters the cam. By bending the pin support either toward or away from trip pawl bearing stud, the roller can be made to enter the cam later or earlier, respectively. This adjustment should be made so that the roller definitely clears the cam outer guide as well as the nose of the cam plate.

Lubrication.—Petrolatum or petroleum jelly should be applied to cam, main gear, spindle pinion gear, and gears of record posts.

Light machine oil should be used in the tone arm vertical bearing, record post bearings, and all other bearings of various levers on underside of motor board.

The felt washer between the turntable and spindle bearing should be soaked in light engine oil whenever the turntable is removed, or as required for proper operation.

Do not allow oil or grease to come in contact with, rubber mounting of tone arm base, rubber bumper, or flexible coupling of drive motor.

MISCELLANEOUS SERVICE HINTS

Incorrect adjustment of a particular mechanism of the changer is generally exhibited in a specific mode of improper operation. The following relations between effects on operation and the usual mis-adjustments will enable ready adjustment in most cases.

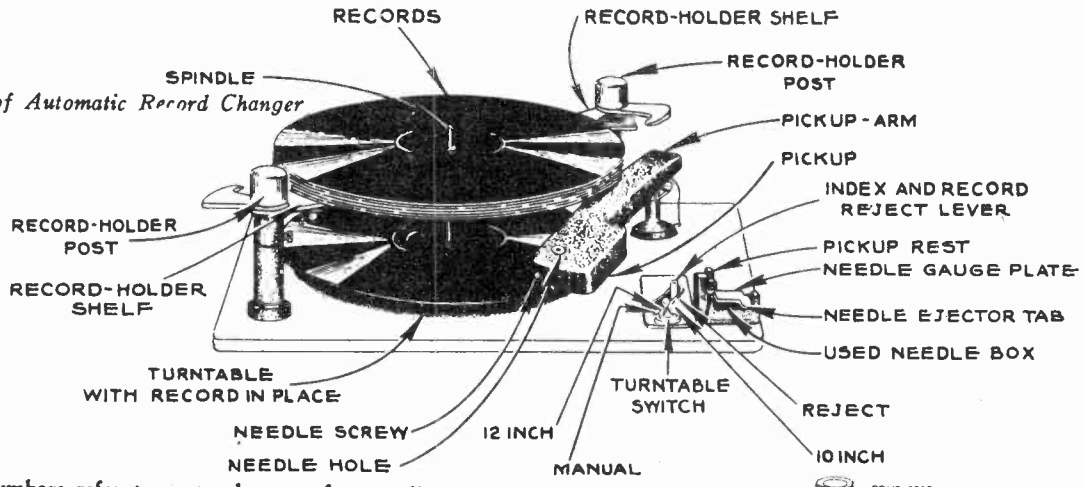
1. For any irregularity of operation, the adjustment of the main lever "15" should be checked first as in "A".
2. Needle does not land properly on both 10 and 12 inch records—Make complete adjustments "D" and "E".
3. Needle does not land properly on 12 inch record but correct on 10 inch—Effect adjustment "E".
4. Failure to trip at end of record—Increase clutch "5" friction by means of screw "B". Also, see that levers "7" and "12" are free to move without touching each other.
5. Pickup strikes lower record of stack or drags across top record on turntable—Adjust lift cable per adjustment "C".
6. Needle does not track after landing—Friction clutch "5" adjustment "B" may be too tight; bind in tone arm vertical bearing; levers "7" and "12" fouled; or pickup output cable twisted.
7. Cycle commences before record is complete—Record is defective, or adjustment "B" of friction clutch "5" is too tight.
8. Wow in record reproduction—Record is defective; flexible coupling between motor and changer mechanism not correctly assembled; or instrument is not being operated at normal room temperature (65° F).
9. Record knives strike edge of records—Records warped; record edges are rough; or knife adjustments "F" and "G" are incorrect.
10. Record not released properly—Adjust record shelf assemblies in respect to shaft by means of adjustment "H".
11. Needle lands in 10 inch position on 12 inch record or misses record when playing both types mixed—Increase tension of pickup locating lever spring "30".

Chassis, Details

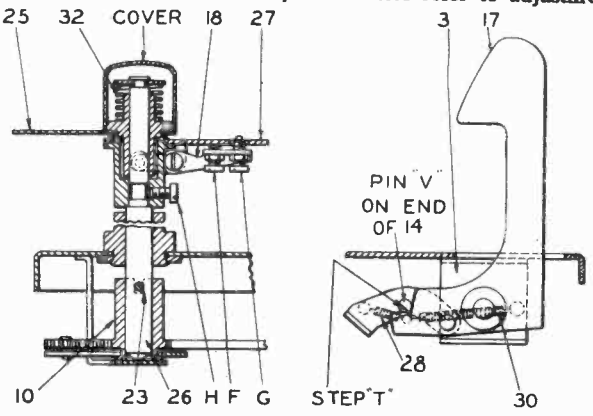
ZENITH RADIO CORP.

MODEL 169-31 Automatic Record Changer

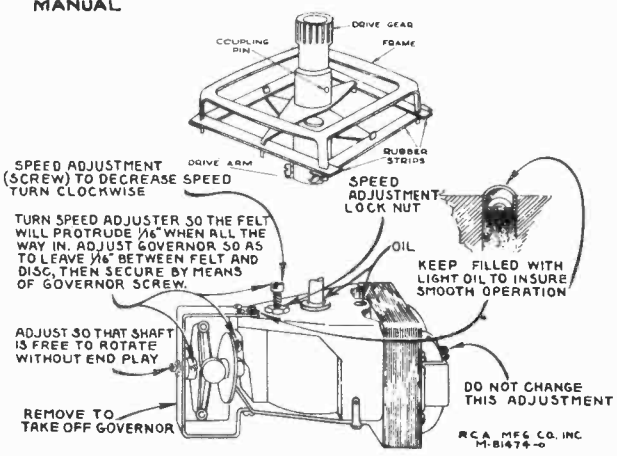
Top View of Automatic Record Changer



NOTE: Numbers refer to parts—letters refer to adjustments.

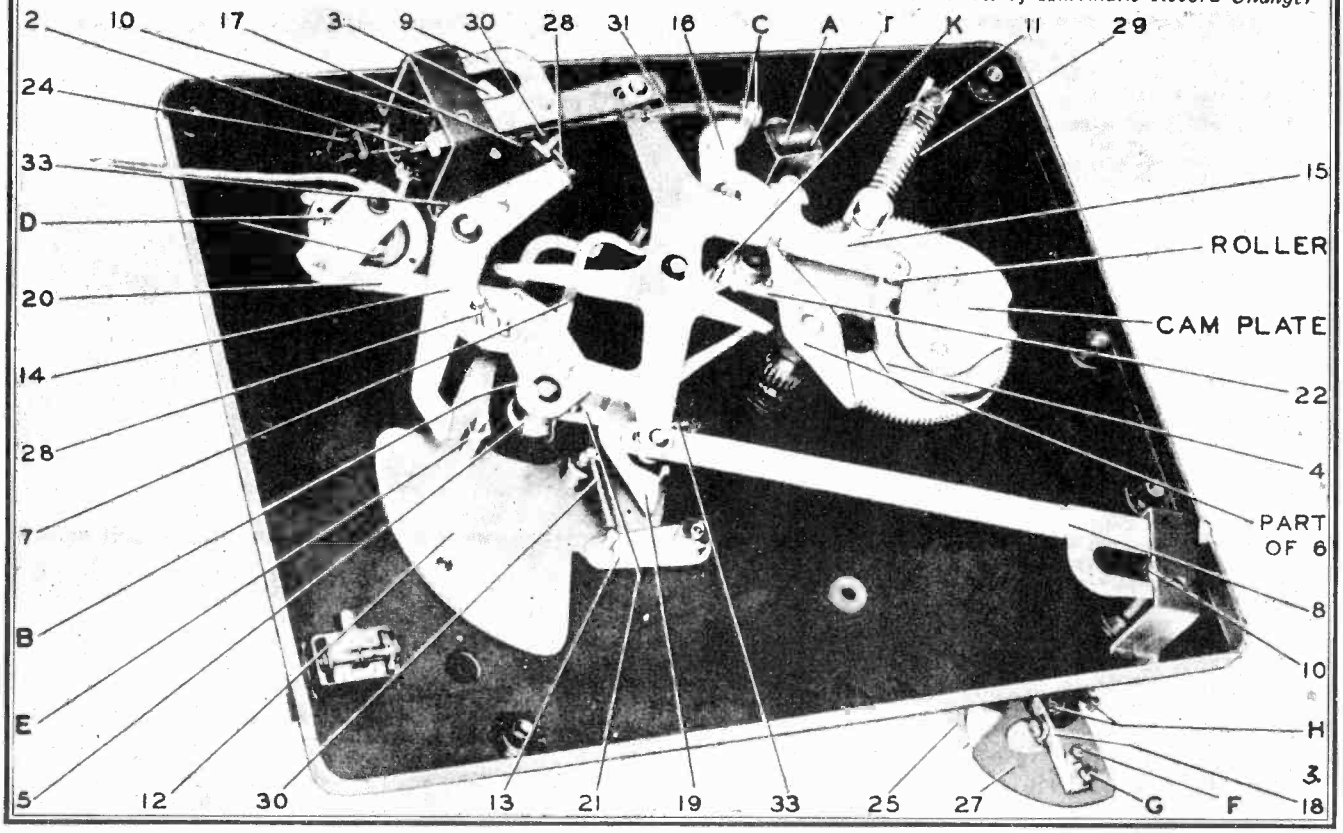


Details of Record Shelf Posts, and Locating Lever Assemblies



Motor Data and Coupling

Bottom View of Automatic Record Changer



MODEL 169-31 Automatic Record Changer

ZENITH RADIO CORP.

Details, Notes

Turntable Switch.—The toggle switch located just in front of the Index and Record Reject Lever controls the current to the turntable motor. To start the turntable, throw the switch to the "ON" position. To stop the turntable throw the switch to the "OFF" position.

Pickup and Top-Loading Needle Socket.—The pickup is the new crystal type, with a hole in the top for insertion of needles. When not playing records, the pickup arm should be moved out to the right beyond the turntable and placed at rest on the support with the edge of the pickup arm in the groove and the pickup over the needle gauge plate. The pickup must be in this position to change needles.

To insert a needle initially, loosen the needle screw on the front of the pickup, place needle in hole at top so that it drops down against the needle gauge plate and then tighten up the needle screw.

Needle Ejector.—The extending tab on the needle gauge plate of the needle box operates the needle ejector. To change a needle, place pickup in rest position, loosen needle screw and press the extending tab on the needle gauge plate to drop the used needle into the box below. Release tab, allowing the needle gauge plate to swing back, and then insert a new needle in the pickup as described above.

Record Holder Shelves.—To place a record on the turntable or to remove records, raise the record holder shelves, by lifting with the fingers under the shelf, and swing clear of outer edge of record. Also push back vertical lever adjacent to the rear record holder post. You now have clear access to the turntable. Before loading the magazine for Automatic Operation swing the record holder shelves back into position.

Automatic Operation

1. See that pickup is over needle gauge plate with needle properly in place. If not, complete a "cycle" as explained in the first paragraph under "OPERATION."

2. With Index and Record Reject Lever at "MANUAL," place the first of the series of records on the turntable and the remainder of the series (up to seven 10-inch or six 12-inch records) on the record holder posts (as shown in Figure 1). The records should be arranged in the desired order with the desired selection face up and the last selection on top.

3. Set the Index and Record Reject Lever to the proper position. (See CONTROLS: — INDEX AND RECORD REJECT LEVER.)

4. Throw Turntable Switch to the left—"ON"—turntable should commence to revolve.

5. When turntable has attained speed, lift pickup and lower gently on to the record so that the needle point enters the outside groove.

6. Close the lid of the cabinet to eliminate mechanical reproduction of sound by the needle.

The whole series of records will now play without further attention, and the last record will repeat until the Turntable Switch is turned off. Allow the record-changing mechanism to complete its cycle before the turntable is stopped.. Then lift the pickup, swing the arm to the right beyond the edge of the record and lower it onto the pickup rest with pickup over needle gauge plate. The record player is then ready for reloading, or for manual operation.

Manual Operation

To play records manually:

1. Proceed as in step 1, under "AUTOMATIC OPERATION."

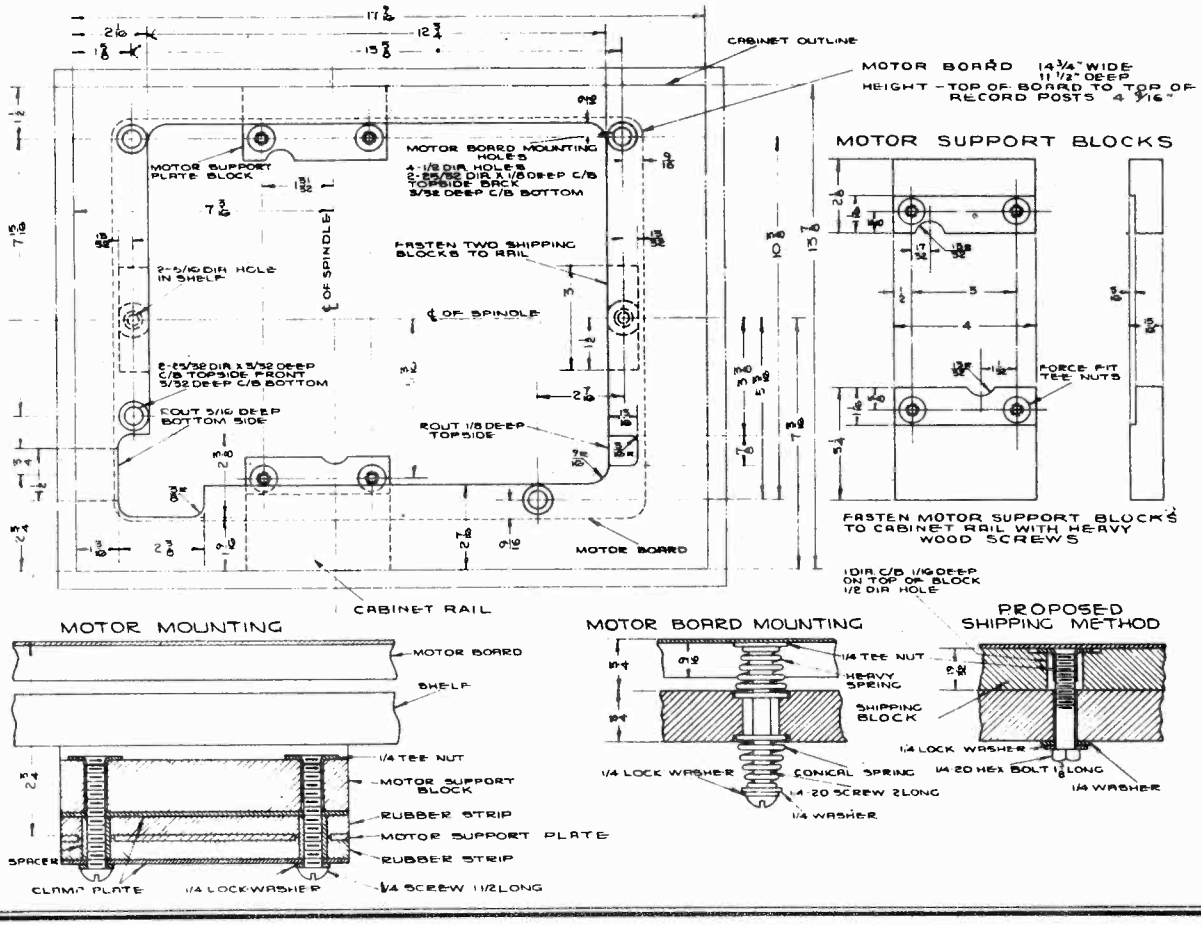
2. Place record on turntable with desired selection upwards.

3. Set Index and Record Reject Lever to "MANUAL" position.

4. Proceed as in steps 4, 5 and 6 under "AUTOMATIC OPERATION."

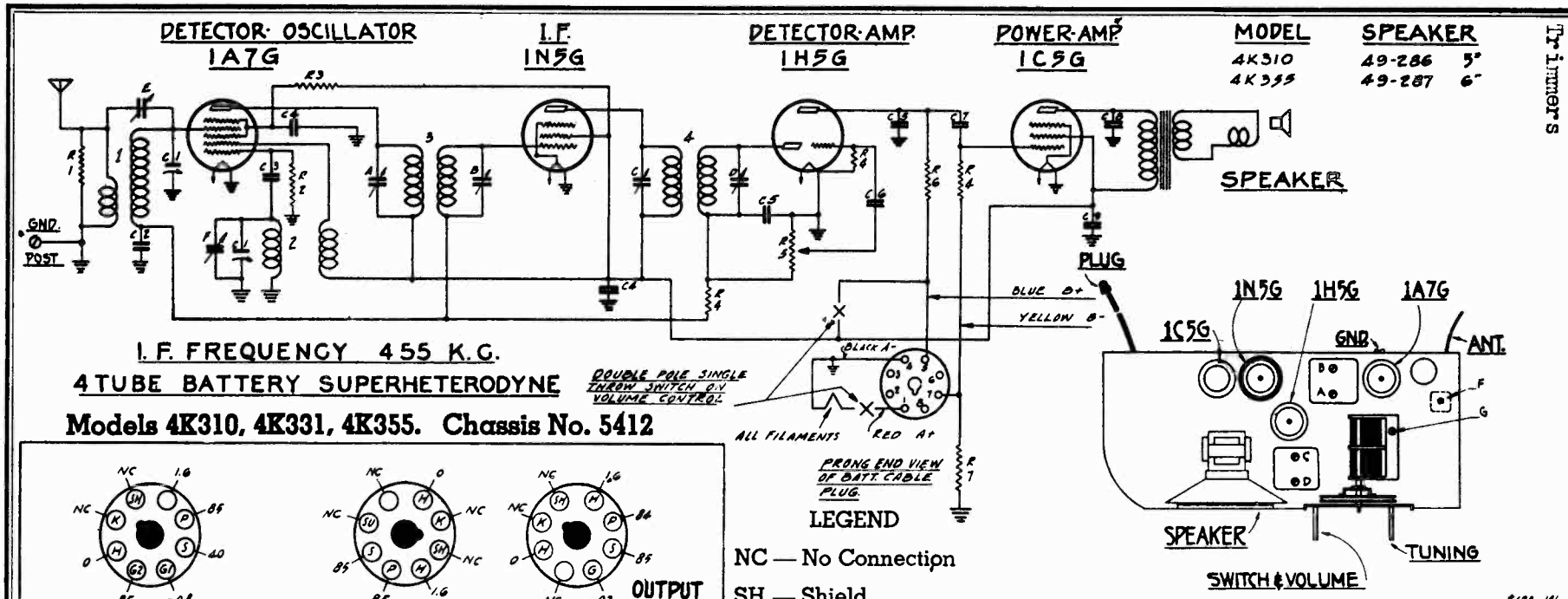
When you have finished playing, be sure that the turntable has stopped and the pickup is in the rest position over needle gauge plate. Never leave pickup with needle resting on a record or on the turntable.

Good reproduction can only be obtained with the turntable revolving at 78 revolutions per minute. For speed check and regulation see INSTALLATION,



4.

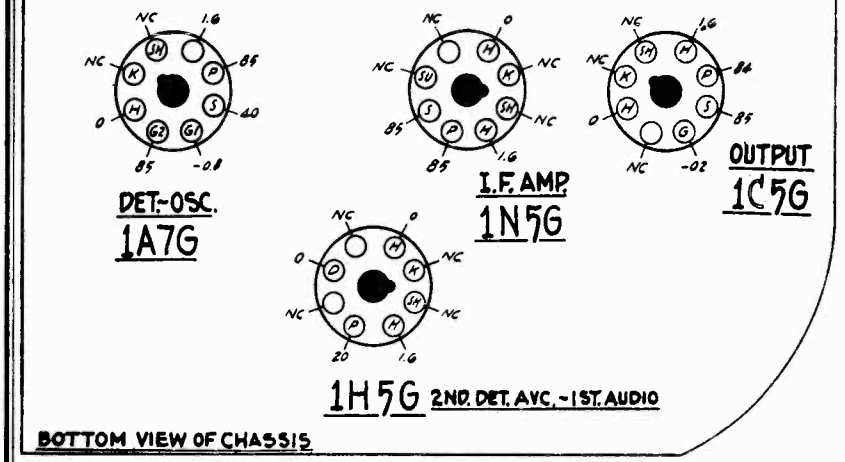
ZENITH RADIO CORP.



I. F. FREQUENCY 455 K.C.

4 TUBE BATTERY SUPERHETERODYNE

Models 4K310, 4K331, 4K355. Chassis No. 5412



LEGEND

NC — No Connection
SH — Shield
H — Heater
P — Plate
S — Screen
G — Grid
SU — Suppressor
D — Diode
K — Cathode
F — Filament

Location of tubes and trimmers

DIAG NO	PART NO	DESCRIPTION
1	3-6704	ANTENNA COIL ASSEMBLY
2	3-6381	OSCILLATOR COIL ASSEMBLY
3	95-513	1ST. I.F. TRANSFORMER
4	95-520	2ND I.F. TRANSFORMER
5		SPEAKER TRANS. (ON SPEAKER)
A		1ST. I.F. TRANS. PRIMARY
B		1ST. I.F. TRANS. SECONDARY
C		2ND. I.F. TRANS. PRIMARY
D		2ND. I.F. TRANS. SECONDARY
E	22-305	ANTENNA TRIMMER
F		BROADCAST OSC. (ON GANG)

DIAG NO	PART NO.	DESCRIPTION	
C-1	22-778	2 GANG VARIABLE	
C-2	22-250	.05 MFD.	200V
C-3	22-182	.0002 MFD	600V
C-4	22-212	.05 MFD	400V
C-5	22-162	.0001 MFD	600V
C-6	22-185	.01 MFD	200V
C-7	22-243	.01 MFD	400V
C-8	22-468	.002 MFD	600V
C-9	22-684	8 MFD DRY ELEC.	150
R-1	63-587	4700 OHM	1/4W
R-2	63-656	180 M OHM	1/4W
R-3	63-596	68 M OHM	1/4W
R-4	63-600	2.2 MEGOHM	1/4W
R-5	63-997	400 M OHM VOL. CONT. & SW.	
R-6	63-271	1 MEGOHM	1/2W
R-7	63-238	1000 OHM	1/4W

NOTE

All voltages measured from point indicated to chassis using a 1000 ohm per volt meter.

Antenna disconnected — volume control at minimum and condenser plates in full mesh.

All voltages measured using Zenith No. Z28 battery pack.

ALIGNMENT PROCEDURE

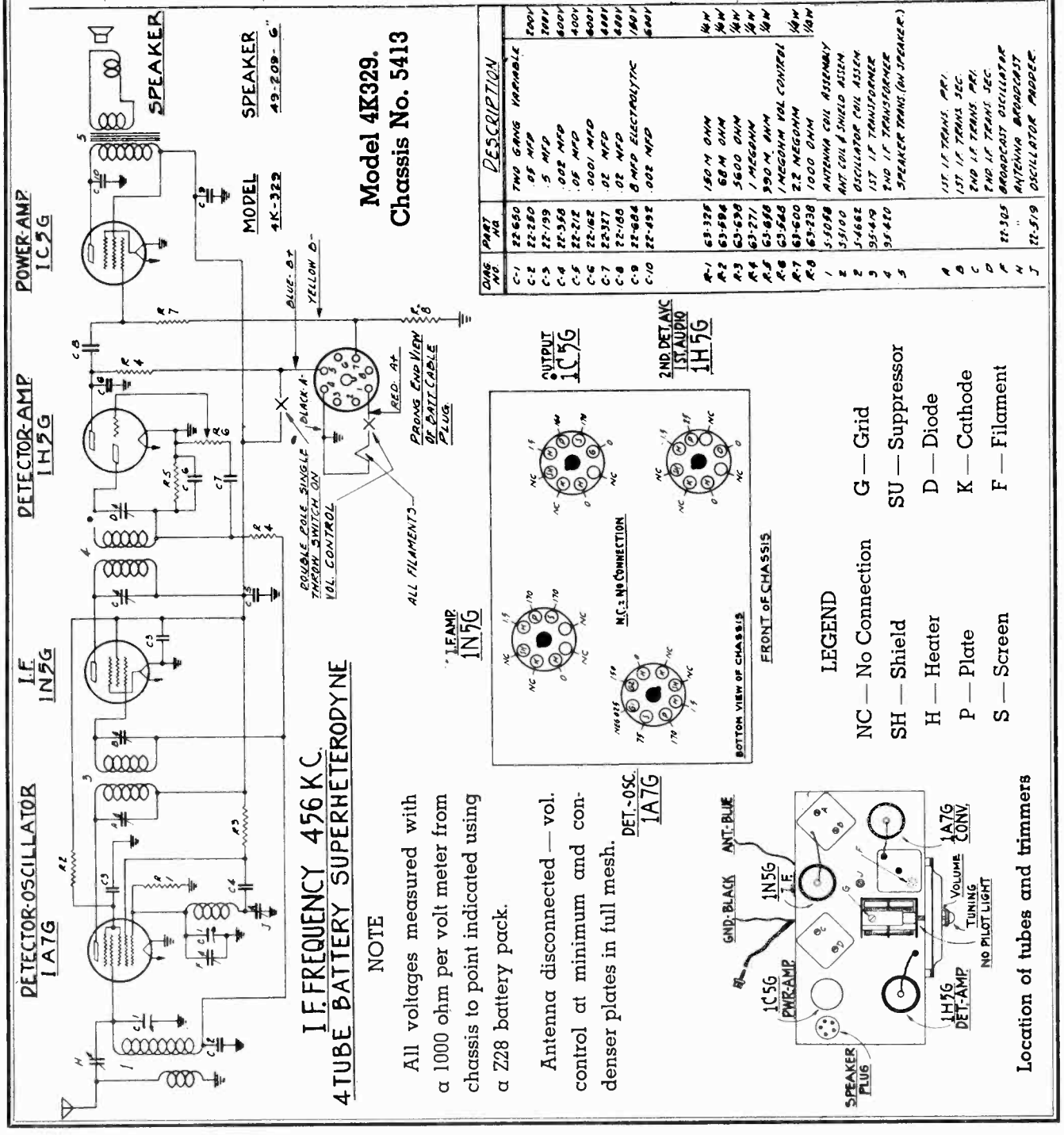
Operation	Connect Test Oscillator to	Dummy Antenna	Set Test Osc. to	Band	Set Dial At	Adjust Trimmers	Purpose
1	1st Det. Grid	1/2 Mfd.	455	Br'dc't	600	ABCD	I. F. Aligment
2	Rec. Ant. Lead	200 Mmfd.	1500	"	1500	F	Set Osc. to Scale
3	" " "	200 Mmfd.	1500	"	1500	G	Al'gment of Ant.

MODEL 4K329, Chas. 5413
Schematic, Voltage
Alignment, Socket
Trimmers

ZENITH RADIO CORP.

ALIGNMENT PROCEDURE

Operation	Connect Test Oscillator to—	Dummy Antenna	Set Test Osc. to	Band	Set Dial At	Adjust Trimmers	Purpose
1	1st Det. Grid	½ Mfd.	456	Br'dc't	600	ABCD	I. F. Algm't.
2	Rec. Ant. Lead	200 Mmfd.	1500	"	1500	F	Set Osc. to Scale
3	" " "	200 Mmfd.	1500	"	1500	G	Algm't of Ant.
4	" " "	200 Mmfd.	600	"	600	J	Rock gang & adj. for max. output
5	" " "	200 Mmfd.	1500	"	1500	FG	Rpt. 3 & 4



DWG NO	PART NO	DESCRIPTION	
C-1	22-650	TWO GANG VARIABLE	1200V
C-2	22-280	.05 MFD	1000V
C-3	22-199	.5 MFD	600V
C-4	22-358	.002 MFD	400V
C-5	22-212	.05 MFD	400V
C-6	22-162	.0001 MFD	400V
C-7	22-217	.02 MFD	400V
C-8	22-100	.02 MFD	400V
C-9	22-684	8 MFD ELECTROLYTIC	150V
C-10	22-492	.002 MFD	600V
R-1	63-325	150 M OHM	½W
R-2	63-594	68 M OHM	½W
R-3	63-630	3600 OHM	½W
R-4	63-271	1 MEGOHM	½W
R-5	63-658	990 M. OHM	½W
R-6	63-568	1 MEGOHM VOL CONTROL	1½W
R-7	63-600	2.2 MEGOHM	1½W
R-8	63-238	1000 OHM	1½W
1	5-3098	ANTENNA COIL ASSEMBLY	
2	5-5100	ANT. COIL & SHIELD ASSEM	
3	5-4662	OSCILLATOR COIL ASSEM	
4	95-419	1ST I.F. TRANSFORMER	
5	95-420	2ND I.F. TRANSFORMER	
6		SPEAKER TRANS. (ON SPEAKER)	
A		1ST I.F. TRANS. PRI.	
B		1ST I.F. TRANS. SEC.	
C		2ND I.F. TRANS. PRI.	
D		2ND I.F. TRANS. SEC.	
E	22-345	BROADCAST OSCILLATOR	
N	"	ANTENNA BROADCAST	
J	22-519	OSCILLATOR PADDER	

LEGEND

NC — No Connection
SH — Shield
H — Heater
P — Plate
S — Screen
G — Grid
SU — Suppressor
D — Diode
K — Cathode
F — Filament

NOTE

All voltages measured with a 1000 ohm per volt meter from chassis to point indicated using a Z28 battery pack.

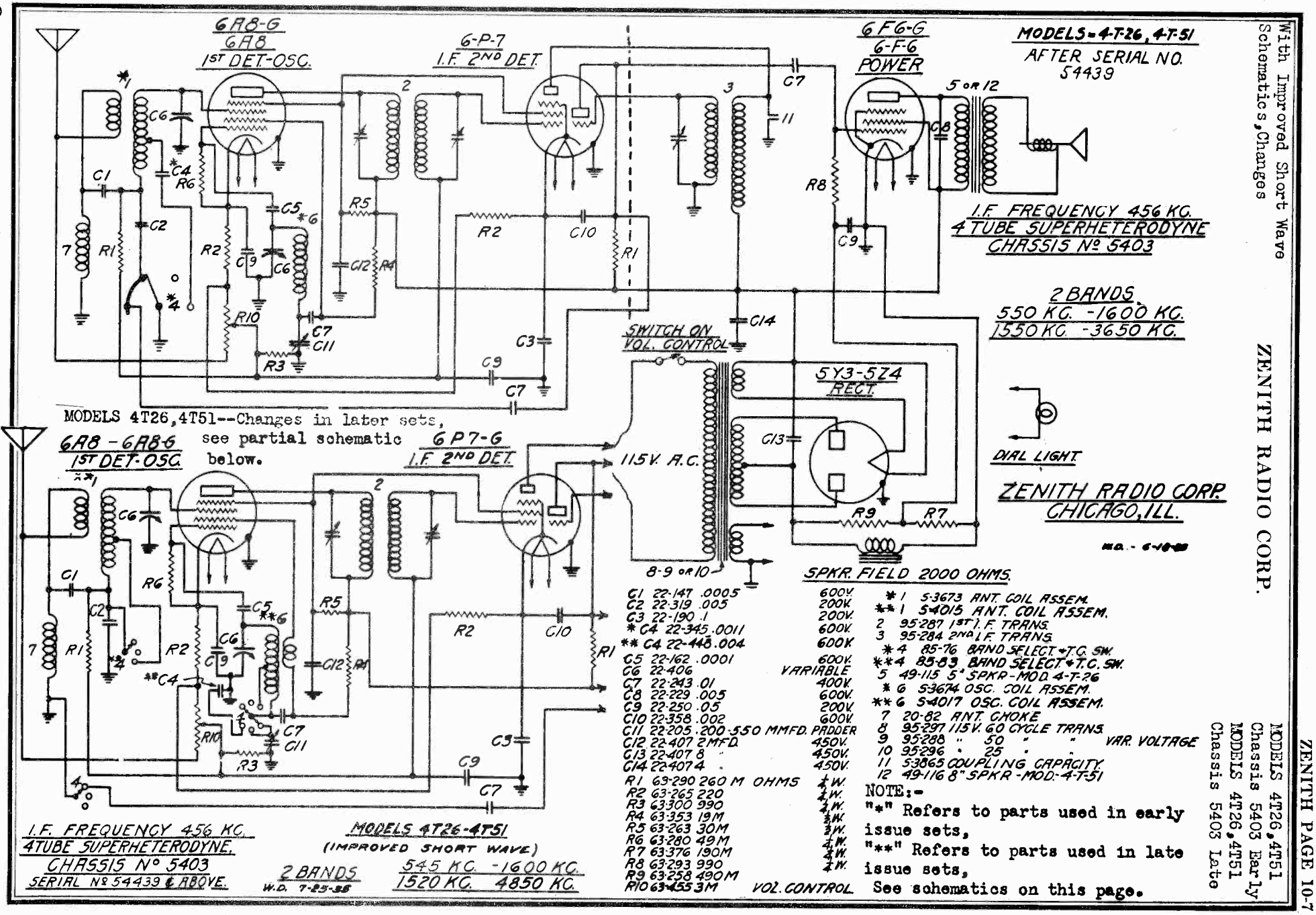
Antenna disconnected — vol. control at minimum and condenser plates in full mesh.

Location of tubes and trimmers

With Improved Short Wave Schematics, Changes

ZENITH RADIO CORP.

MODELS 4T26, 4T51 Chassis 5403 Early
MODELS 4T26, 4T51 Chassis 5403 Late



C1	22-147 .0005	
C2	22-319 .005	
C3	22-190 .1	
* C4	22-345 .0011	
** C4	22-448 .004	
C5	22-162 .0001	
C6	22-406	VARIABLE
C7	22-243 .01	400V.
C8	22-229 .005	600V.
C9	22-250 .05	200V.
C10	22-358 .002	600V.
C11	22-205 .200-550 MMFD.	PADDER
C12	22-407 2 MFD.	450V.
C13	22-407 8 "	450V.
C14	22-407 4 "	450V.
R1	63-290 260 M OHMS	½ W.
R2	63-265 220	½ W.
R3	63-300 990	½ W.
R4	63-353 19M	½ W.
R5	63-263 30M	½ W.
R6	63-280 49M	½ W.
R7	63-376 190M	½ W.
R8	63-293 990	½ W.
R9	63-258 490M	½ W.
R10	63-455 3M	VOL. CONTROL

* 1	5-3673	ANT. COIL ASSEM.
** 1	5-4015	ANT. COIL ASSEM.
2	95-287	1ST I.F. TRANS.
3	95-284	2ND I.F. TRANS.
* 4	85-76	BAND SELECT + T.C. SW.
** 4	85-83	BAND SELECT + T.C. SW.
5	49-115	5" SPKR-MOD. 4-T-26
* 6	5-3674	OSC. COIL ASSEM.
** 6	5-4017	OSC. COIL ASSEM.
7	20-82	ANT. CHOKE
8	95-297	115 V. 60 CYCLE TRANS.
9	95-288	" 50 " " VAR. VOLTAGE
10	95-296	" 25 " "
11	5-3865	COUPLING CAPACITY
12	49-116	8" SPKR-MOD. 4-T-51

NOTE:-
"*" Refers to parts used in early issue sets,
"**" Refers to parts used in late issue sets,
See schematics on this page.

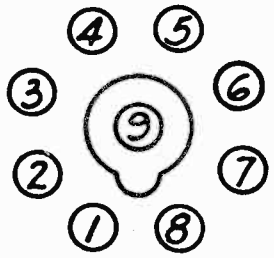
MODELS 4T26,4T51
Chassis 5403
Early,Late
Alignment,Voltage
Socket,Trimmers

ZENITH RADIO CORP.

Socket Voltages

TUBE	POSITION	1	2	3	4	5	6	7	8	9
6A8	1st Det. Osc.	0	6 AC	220	90	6	125	6 AC	14	0
6P7	I.F. 2nd Det.	0	6 AC	0	220	100	100	0	13	0
6F6	PWR	0	0	200	220	-1	-	6 AC	0	-
5Y3	Rect.	0	220	-	230 AC	-	230 AC	-	220	-

Line Voltage 110 Antenna and Ground Disconnected.

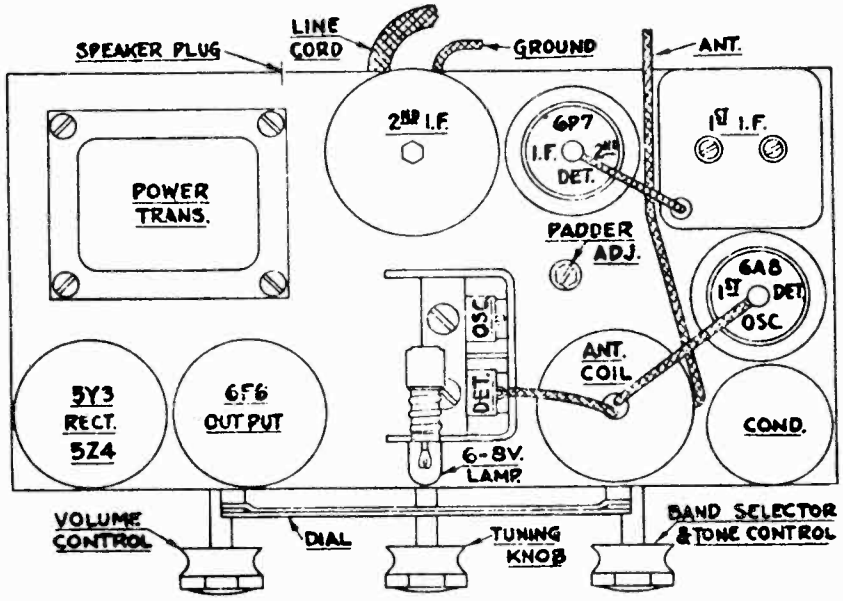


BOTTOM VIEW OF SOCKET

All voltages measured from point indicated to ground, using a 1000 ohm per volt D.C. meter (unless marked otherwise.)

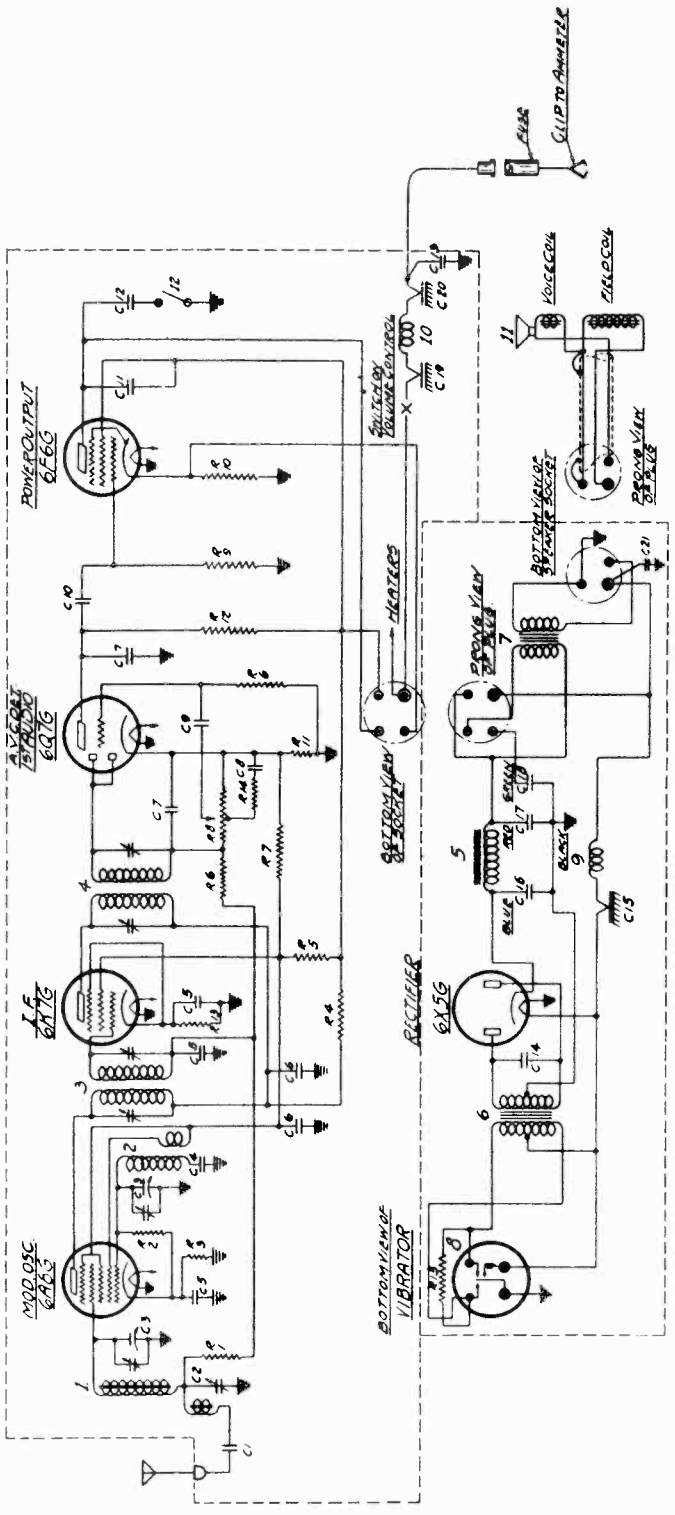
Alignment

(1) Balance I.F. transformer at 456 K.C.
(2) Place switch in left or broadcast position. Set dial pointer at 1500 K.C., and align trimmers on gang to resonance. Align broadcast padder at 540 K.C. slowly rocking pointer past 540 on dial to position giving strongest signal.
There are no adjustments for the short wave band.



ZENITH RADIO CORP.

MODEL 5M291, Chas. 5527
Schematic



DIAG NO	PART NO	DESCRIPTION
C 1	22-319	.03 MFD
C 2	22-441	400 KC ANTENNA TRIMMER
C 3	22-441	TWO GANG VARIABLE
C 4	22-441	OSCILLATOR PADDER
C 5	22-170	.05 MFD
C 6	22-170	.1 MFD
C 7	22-181	.00025 MFD
C 8	22-307	.005 MFD
C 9	22-435	.02 MFD
C 10	22-318	.005 MFD
C 11	22-318	.01 MFD
C 12	22-287	.25 MFD
C 13	22-406	.1 MFD
C 14	22-442	.1 MFD
C 15		7 MFD DRY ELECTROLYTIC
C 16	22-449	8 " " "
C 17		10 " " "
C 18	5-3737	400 MMFD LOW REACTANCE
C 19	22-447	400 " "
C 20		.0005 MFD
C 21		
R 1	21-717	570 OHMS
R 2	21-713	180 OHMS
R 3	21-704	360 OHMS
R 4	21-704	1.5 MEGOHM
R 5	21-847	1 MEGOHM
R 6	21-744	.5 MEGOHM
R 7	21-844	ANTENNA VOLUME CONTROL
R 8	21-779	570 OHMS
R 9	21-721	350 OHMS
R 10	21-743	900 OHMS
R 11	21-743	

DIAG NO	PART NO	DESCRIPTION
1	61-775	570 N OHM
2	61-750	180 OHM
3	61-713	47 N OHM
4	61-940	220 OHM
1	10-179	ANTENNA COIL
2	10-183	OSCILLATOR COIL
3	95-304	1ST I.F. TRANS
4	95-305	2ND " "
5	95-306	POWER CHOKE
6	95-307	POWER TRANS
7	95-308	VIBRATOR TRANS
8	100-111	HUM BALANCE COIL
9	20-178	HUM CHOKE COIL
10	20-178	NET HUM BALANCE COIL
11	49-118	8" DYNAMIC SPEAKER (8 M 227 FIRE WALL MINIATURE)
12	85-134	TONE CONTROL SWITCH

NOTE: 1ST AUDIO & ANT. TRIMMER ARE C1

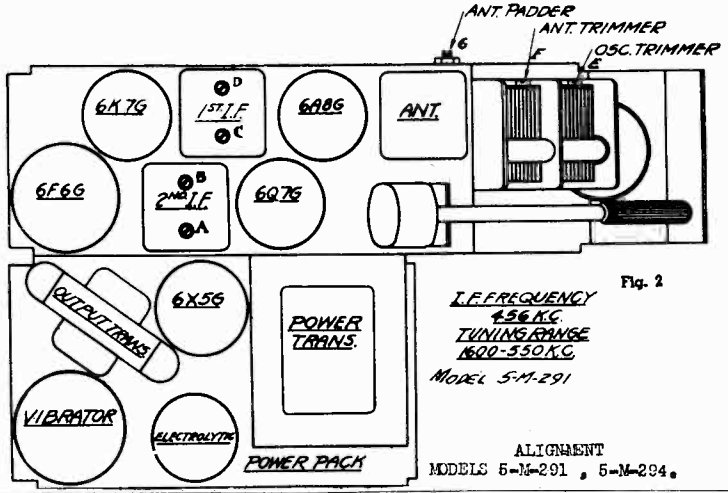
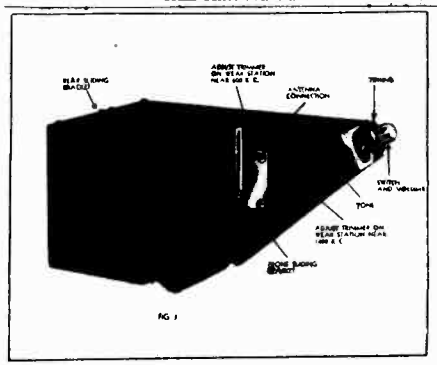


Fig. 2

ALIGNMENT
MODELS 5-M-291 , 5-M-294.

Operation	Connect Test Oscillator To	Dummy Antenna	Set Test Osc. To	Manual or Automatic Position	Set Gang Cond.	Adjust Trimmers	Purpose
1	1st Det. Grid	½ Mfd.	456	Manual	Max. Cap.	A.B.C.D.	I. F. Alignment
2	Rec. Ant. Lead	50 Mmfd.	1530	Manual	Min. Cap.	E	Trim Oscillator
3	Rec. Ant. Lead	50 Mmfd.	1400	Manual	1400	F	Trim Ant. Stage
4	Rec. Ant. Lead	50 Mmfd.	600	Manual	600	G	Adjust Ant. Padder For Max. Output
5	Connect Car Antenna to Set — Tune to Weak Station Around 1400 K. C. — Trim Antenna Trimmer "F" for Maximum Peak Output.						
6	With Set Connected to Car Antenna—Tune To Weak Station Around 600 K. C. —Trim Antenna Padder "G" for Maximum Peak Output.						



ANTENNA ALIGNMENT

(Models 5-M-291 and 5-M-294)

There is such a great variation in the capacity of different antennas that it is impossible to meet every condition without some means of variable antenna alignment. To accomplish this, 2 screw adjustments are provided on the receiver case as shown in Figure 3. After the set has been completely installed, the proper method of antenna alignment is as follows: Tune in a weak signal at or near 1400 K.C., and carefully adjust the lower screw as indicated in Figure 3 to loudest signal strength. Turn the tuning dial to a station at or near 600 K.C., and carefully adjust the upper left screw, also shown in Figure 3. Do not use a loud local signal for either of the adjstments. The adjustments at both 600 and 1400 K.C. should be repeated not only as a recheck but for more perfect alignment.

IMPORTANT — ANTENNA ALIGNMENT

5-M-294 — CHASSIS 5530

Due to the large variation in electrical capacity of different automobile antennas it is necessary to adjust the receiver to the particular antenna used after installation has been made for maximum performance. Model 5-M-294 is equipped with two adjusting screws to accomplish this alignment. The green tag on the side of the receiver case shows the location of the two adjusting screws.

To align, first turn the receiver on with the center knob shown in Fig. 3. Press the tuning knob IN. This places the tuning mechanism in the **manual** operating position. Tune to a weak station near 1400 K.C. and adjust the trimmer directly below the antenna connector to maximum volume. Next tune the receiver to a weak station near 600 K.C. and adjust the trimmer nearest the power pack case for maximum volume. Repeat the adjustments for greatest accuracy.

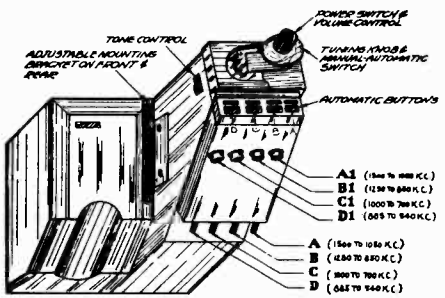


Fig. 5

AUTOMATIC

To set the automatic buttons, first pull the tuning knob OUT. This shifts the tuning mechanism to the **Automatic** position. Press Automatic button A and turn the volume up and with a small screw driver carefully adjust screw A at bottom of the Automatic unit shown in Fig. 3 to a local station between 1500 to 1050 K.C. Set to exact position of maximum volume and clearest tone. Next adjust trimmer A1 for maximum volume and clearest tone **on the same station.** It should be noted that there are two trimmer adjustments to each station button. To set the second button press B and tune trimmer B to a local station between 1250 to 850 K.C. Trim with adjustment B1 to best volume and tone on the same station. To set the third button press C and tune trimmer screw C to a station between 1000 to 700 K.C. and corresponding adjustment C1 again for maximum volume of the selected station. Follow the same procedure for the fourth button by pressing button D and using trimmers D and D1 on a local station between 885 to 540 K.C. After all four button have been set, cut the call letters of stations selected from the gummed call letter sheet supplied with the receiver. Remove the escutcheon over the automatic buttons by taking out the three screws which hold it in position. Remove the celluloid strip and paste the station call letters in their proper positions by wetting the back of the call letter sticker. The four outlines on the celluloid strip provide the exact points at which the gummed labels are placed. After the call letter stickers are attached replace the celluloid and the escutcheon plate.

SOCKET VOLTAGES

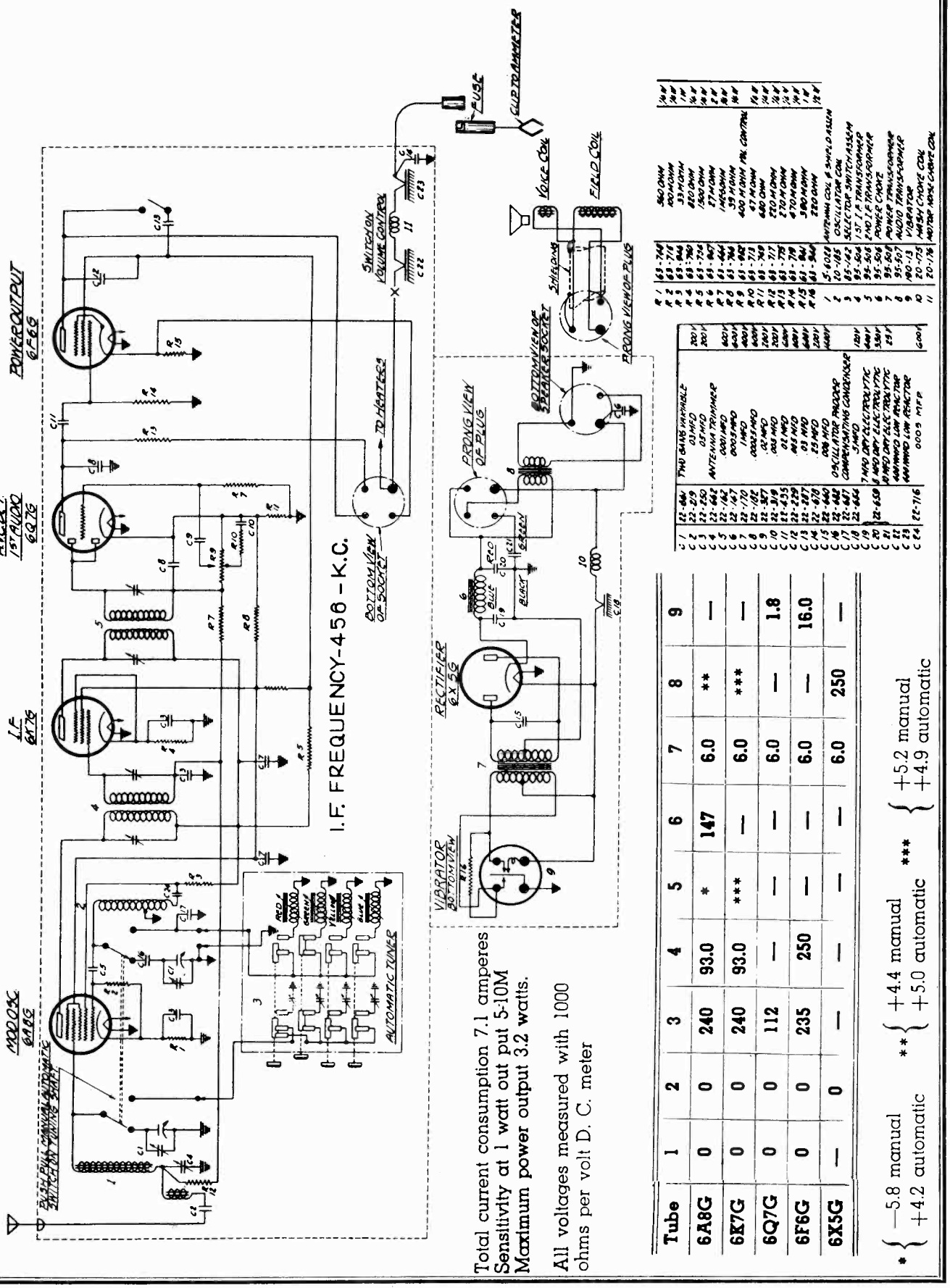
5X-230, 5-X-248, 5X-274 — CHASSIS 5523

TUBE	POSITION	1	2	3	4	5	6	7	8	9
6A8	1st Det. Osc.	0	10	146	50	0	132	5.5	2.5	0
6K7	I.F.	0	16.5	154	50	2	-	10.5	2.	0
6Q7	2nd Det.A.V.C.	0	0	25	0	0	-	5.	1.	0
6V6	Power	0	22	134	154	0	-	16	6	-
6X5	Rect.	0	28	A.C.	-	AC	-	22	166	-

All voltages measured from point indicated to ground using a 1000 Ohm per Volt meter, antenna and ground disconnected.
Line voltage 31.5 volts.
Consumption 3.9 amp.

ZENITH RADIO CORP.

MODEL 5M294, Chas. 5530
Schematic, Voltage



Tube	1	2	3	4	5	6	7	8	9
6A8G	0	0	240	93.0	*	147	6.0	**	—
6K7G	0	0	240	93.0	***	—	6.0	***	—
6Q7G	0	0	112	—	—	—	6.0	—	1.8
6F6G	0	0	235	250	—	—	6.0	—	16.0
6X5G	—	0	—	—	—	—	6.0	250	—

* { —5.8 manual, +4.2 automatic
** { +4.4 manual, +5.0 automatic
*** { +5.2 manual, +4.9 automatic

Total current consumption 7.1 amperes
Sensitivity at 1 watt out put 5-10M
Maximum power output 3.2 watts.

All voltages measured with 1000 ohms per volt D. C. meter

MODELS 5A318, 5A325
Chassis 5532A
Voltage, Tuner Data
Socket

ZENITH RADIO CORP.

MODEL 5S313B
Chassis 5535BT
Socket, Voltage

CHASSIS 5532A

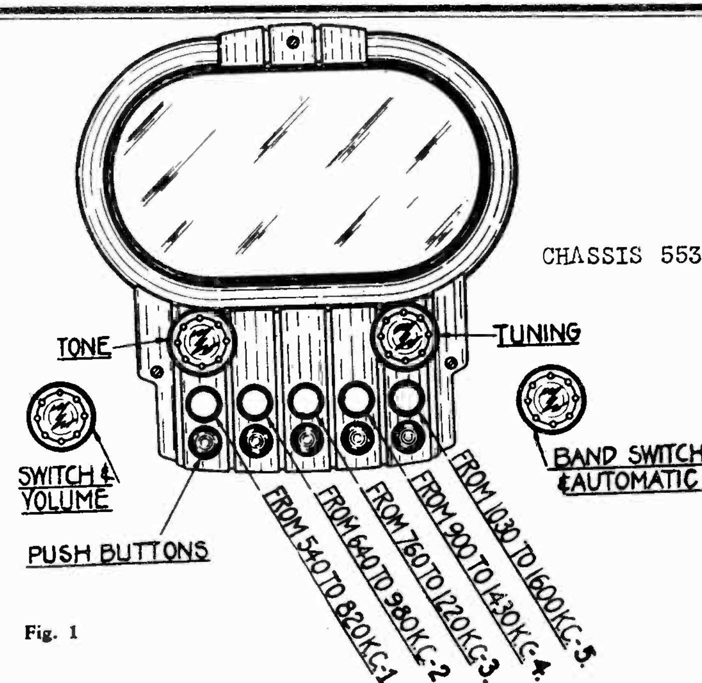


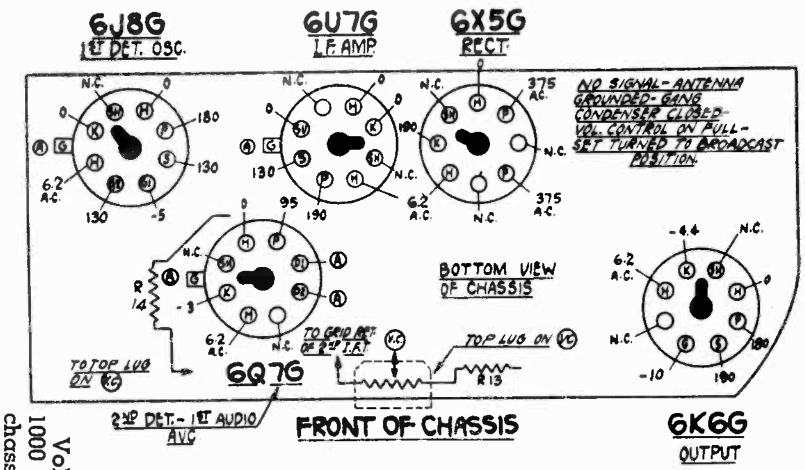
Fig. 1

CHASSIS 5532A **AUTOMATIC**

To set the buttons for automatic operation proceed as follows:

1. Select a station in the tuning range of the No. 1 button.
2. Place the band switch on BROADCAST and tune this station manually in the conventional manner.
3. Set the band switch to the AUTOMATIC position and press No. 1 button.
4. Remove the cap above the button by inserting a pin or your finger nail under the edge and pulling out.
5. Turn the exposed screw in either direction until the previously selected station is heard. (Recheck by switching back to BROADCAST.) Adjust the screw very carefully for best tone, greatest freedom from noise, and maximum volume.
6. Replace cap and cut the call letters of the station from the call sheet furnished with the receiver. Wet the rear surface of the tab, and place it in the space provided on the cap.
7. Follow the above operations in setting the remaining four buttons.
8. The call letter sheets should be preserved for use in the event it is desired to change any of the buttons to some other station.

CHASSIS 5535BT **SOCKET VOLTAGES**



(A) Bias for 6J8G—6U7G and diodes of 6Q7 measured across resistor R14.

(B) Bias for triode section of 6Q7G and 6K6G measured across R13 and R14.

Voltages measured with a 1000 ohm per volt meter from chassis to socket contacts. Antenna disconnected — volume control on full.

Line voltage 115 v.

LEGEND: N.C.—*No Connections*; S.H.—*Shield*; H.—*Heater*; P.—*Plate*; S.—*Screen*; S.U.—*Suppressor Grid*; G.—*Grid*; D.I. *Diode*; K.—*Cathode*.

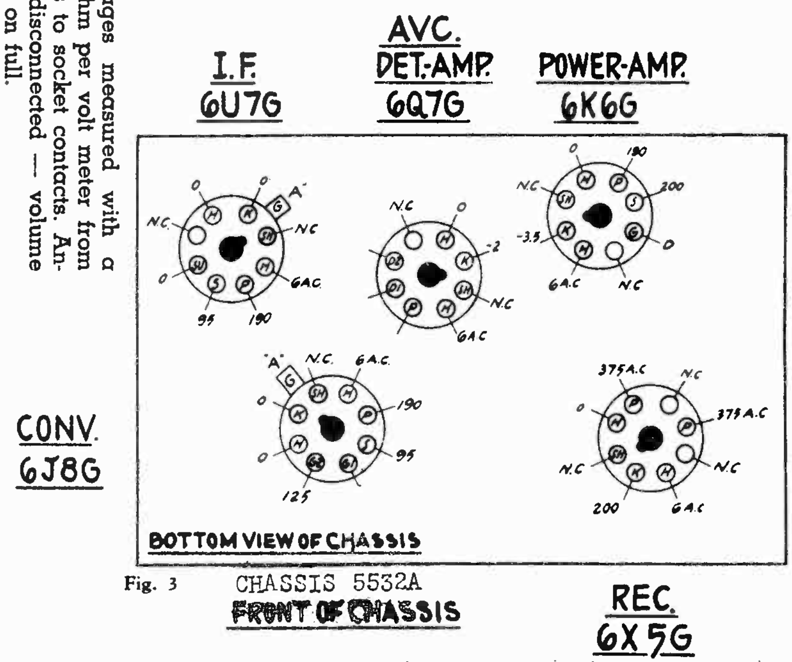


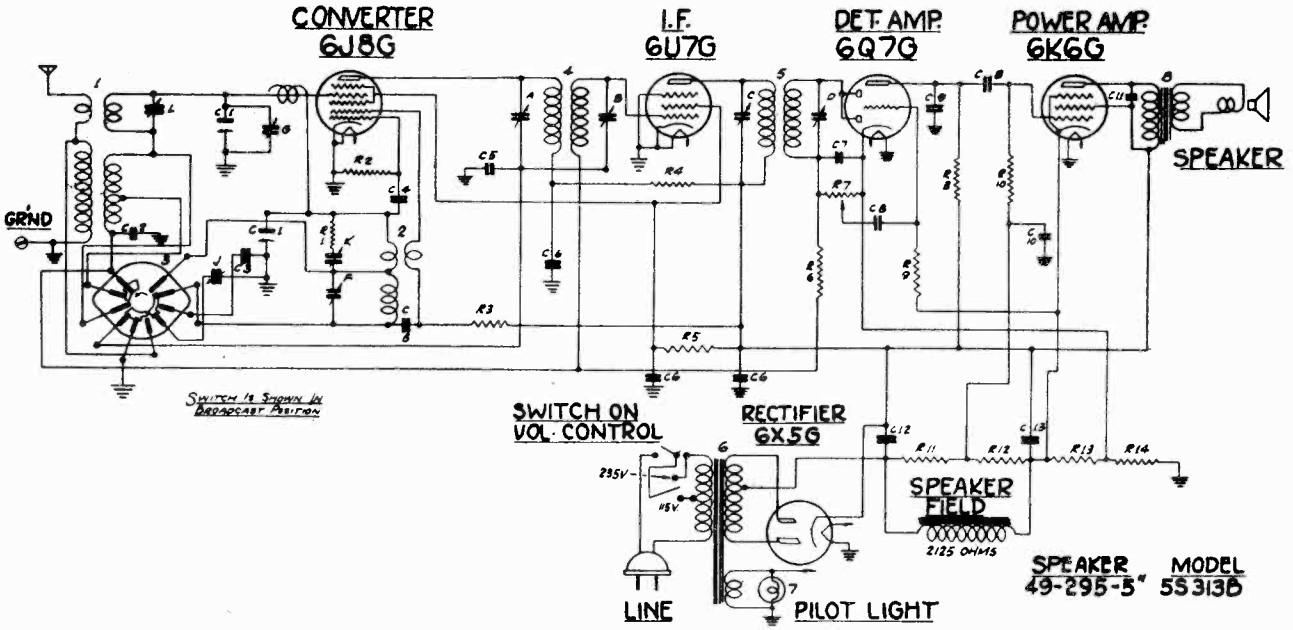
Fig. 3 CHASSIS 5532A
FRONT OF CHASSIS

All Voltage is taken with a 1000 ohm per volt meter from point indicated to ground. Line Volts 115 A.C. Vol. at minimum, no ant. Band sw on manual Broadcast position. NOTE "A" Grid Bias for 6U7G and 6V8G is—2 V. measured at "K" of 6Q7G.

MODEL 5S313B
Chassis 5535BT
Schematic

ZENITH RADIO CORP.

MODELS 5A318, 5A325
Chassis 5532A
Schematic



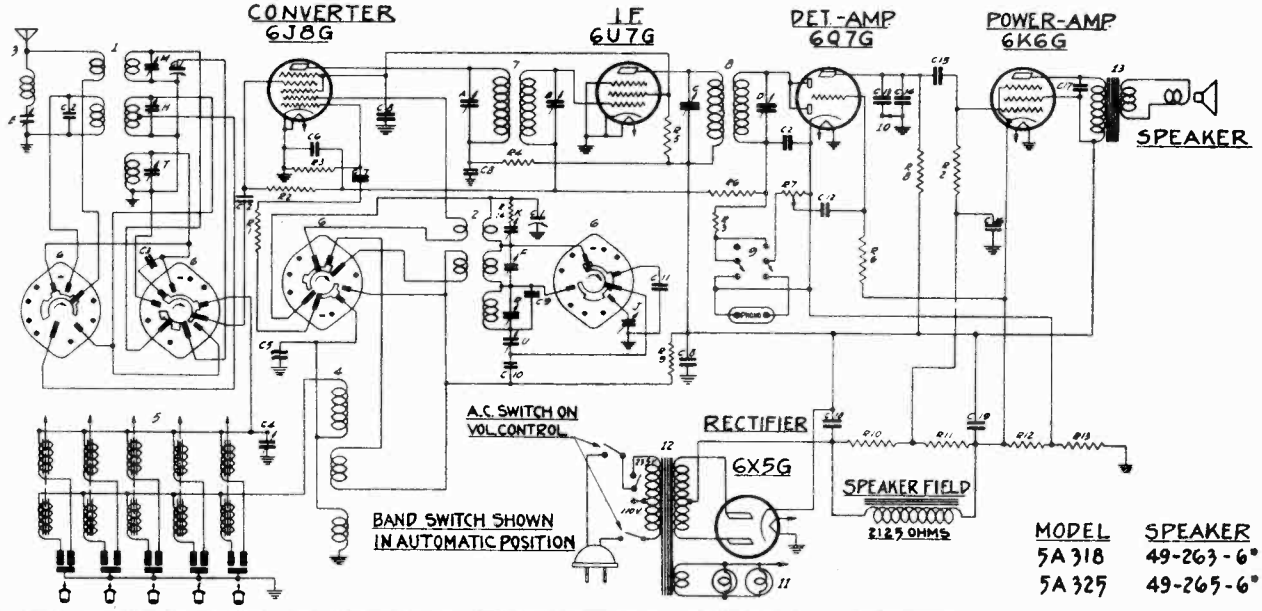
DIAG NO.	PART NO	DESCRIPTION		DIAG NO	PART NO	DESCRIPTION		DIAG NO	PART NO	DESCRIPTION
C-1	22-852	TWO GANG VAR		R-2	63-593	47M OHMS	1/4W	3	65-182	BAND SWITCH
C-2	22-818	.05MFD	400V.	R-3	63-1014	15M OHMS	2W	4	95-593	1ST I.F. TRANSFORMER
C-3	22-563	FIXED PADDER COND.		R-4	63-605	1000 OHMS	1/2W	5	96-596	2ND I.F. TRANSFORMER
C-4	22-889	60 MMFD	600V	R-5	63-208	12M OHMS	1W	6	95-570	POWER TRANSFOR. 85-125V 50CY.
C-5	22-352	.002MFD	600V	R-6	63-600	2.2 MEGOHMS	1/4W	7	100-36	PILOT LIGHT 25A-6.3V
C-6	22-819	.05 MFD	600V	R-7	63-1027	VOLUME CONTROL		8		SPEAKER TRANS
C-7	22-182	.0001MFD	600V	R-8	63-296	220M OHMS	1/4W			
C-8	22-811	.01 MFD	600V	R-9	63-271	1 MEGOHM	1/4W	A		1ST I.F. TRANS PRI
C-9	22-147	.0005MFD	600V	R-10	63-597	470M OHMS	1/4W	B		1ST I.F. TRANS SEC
C-10	22-824	.5MFD	200V	R-11	63-658	990M OHMS	1/4W	C		2ND I.F. TRANS PRI
C-11	22-812	.01MFD	1200V	R-12	63-260	100M OHMS	1/4W	D		2ND I.F. TRANS SEC.
C-12	22-775	8MFD ELECTROLYTIC	450V	R-13	63-563	80 OHMS WIREWOUND	1/4W	F		BROADCAST OSC (SEE NOTE)
C-13	22-776	8MFD ELECTROLYTIC	350V	R-14	63-686	150 OHMS WIREWOUND	1/2W	G		ANTENNA BROAD (ON GANG)
								J	22-463	BROADCAST PADDER
				1	S-6874	ANTENNA COIL ASSM.		K		SHORT WAVE OSC (SEE NOTE)
R-1	63-626	82 OHMS	1/4W	2	S-6875	OSCILLATOR COIL ASSM		L	82-788	SHORT WAVE DETECTOR

NOTE
TRIMMERS A & K MOUNTED ON BAKELITE STRIP #22-754

I.F. FREQUENCY 455 KC.
5 TUBE SUPERHETERODYNE
CHASSIS No. 5535 BT
ZENITH RADIO CORPORATION
CHICAGO, ILL.

Total power consumption 45 watts.

Power output 3.5 watts.



MODEL	SPEAKER
5A318	49-263-6"
5A325	49-265-6"

DIAG NO.	PART NO	DESCRIPTION		DIAG NO	PART NO	DESCRIPTION		DIAG NO	PART NO	DESCRIPTION
C-1	22-789	TWO GANG ADJUSTABLE		R-1	63-625	82 OHM	1/4 W	4	20-198	COMPENSATING COIL
C-2	22-182	.0001 MFD	600 V	R-2	63-587	470 MOHM	1/4 W	5	S-6176	AUTOMATIC TUNING UNIT ASS'M
C-3	22-189	150 MMFD	600 V	R-3	63-593	47 MOHM	1/4 W	6	89-172	BAND SELECTOR SWITCH
C-6	22-519	TRIMMER CONDENSER		R-4	63-583	1000 OHM	1/4 W	7	95-573	1ST I.F. TRANS
C-9	22-761	COMPENSATING COND		R-5	63-958	22 MOHM	1 W	8	95-574	2ND I.F. TRANS
C-6	22-212	.05 MFD	400 V	R-6	63-271	1 MEGOHM	1/4 W	9	89-171	PHONO SWITCH
C-7	22-127	.25 MMFD	600 V	R-7	63-998	220 MOHM VOL CONTROL	1 W	10	89-145	TONE CONTROL SWITCH
C-8	22-171	.05 MFD	600 V	R-8	63-296	220 MOHM	1/2W	11	100-36	PILOT LIGHT 6.3V .15A
C-9	22-795	60 MMFD CERAMIC		R-9	63-151	15 MOHM	1 W	12	95-523	POWER TRANSFORMER
C-10	22-350	.002 MFD	600 V	R-10	63-658	990 MOHM	1/4 W	13		SPEAKER TRANSFORMER
C-11	22-563	FIXED PADDER COND		R-11	63-260	100 MOHM	1/4 W			
C-12	22-196	.01 MFD	600 V	R-12	63-583	80 OHM WIREWOUND	1/4 W	A		1ST I.F. TRANS PRI
C-13	22-448	.006 MFD	600 V	R-13	63-686	150 OHM WIREWOUND	1/2 W	B		1ST SEC
C-14	22-147	.0005 MFD	600 V	R-14	63-821	39 OHM	1/4 W	C		2ND PRI
C-15	22-439	.02 MFD	600 V		S-6711	ANT COIL ASSEMBLY		D		2ND SEC
C-16	22-190	.1 MFD	200 V		S-6710	ANT COIL & FIELD ASSEM		E		WAVE TRAP SEE NOTE
C-17	22-790	.004 MFD	1000 V		S-6770	OSC COIL ASSEMBLY		F		BROADCAST OSC - SEE NOTE
C-18	22-779	8 MFD ELECTROLYTIC	450 V	1	S-6657	WAVE TRAP COIL		M		ANT BROADCAST - SEE NOTE
C-19	22-776	8 MFD "	350 V	2	20-199			J	22-519	BROADCAST PADDER SEE NOTE

DIAG NO.	DESCRIPTION
K	SHORT WAVE OSC - SEE NOTE
M	SHORT WAVE ANT - SEE NOTE
P	LONG WAVE OSC - SEE NOTE
T	LONG WAVE ANT - SEE NOTE
U	LONG WAVE PADDER - SEE NOTE

NOTE - TRIMMERS "H-M-T & U" ARE MOUNTED ON BAKELITE STRIP # 22-785 -

TRIMMERS "E-K-F & R" ARE MOUNTED ON BAKELITE STRIP # 22-784 -

Total power consumption 45 watts.

Power output 3.0 watts.

I.F. FREQUENCY 455 KC.
5 TUBE SUPERHETERODYNE
CHASSIS No 5532-A-
ZENITH RADIO CORPORATION
CHICAGO, ILLINOIS

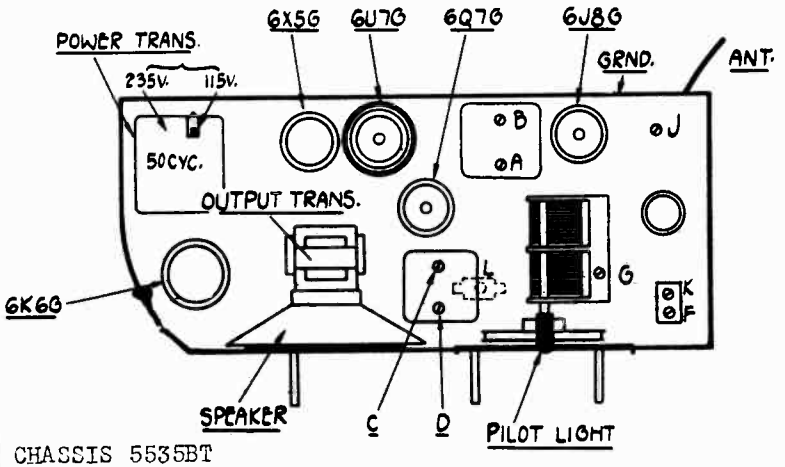
5 Tube A.C. receiver—Chassis No. 5535BT

GENERAL

This receiver is a modern five tube superheterodyne with a dual tuning range covering frequencies between 18.2 to 5.4 megacycles and 540 to 1750 kilocycles. The tuning is explained under "Operation."

UNDER NO CIRCUMSTANCES SHOULD THIS RECEIVER BE CONNECTED TO DIRECT CURRENT (D. C.).

This receiver is designed to operate on 50 to 100 cycle alternating current (A.C.) and may be adjusted for use on either 110 or 235 Volt power lines by means of the switch on top of the power transformer. The proper position of the switch for either voltage is marked on the transformer case.



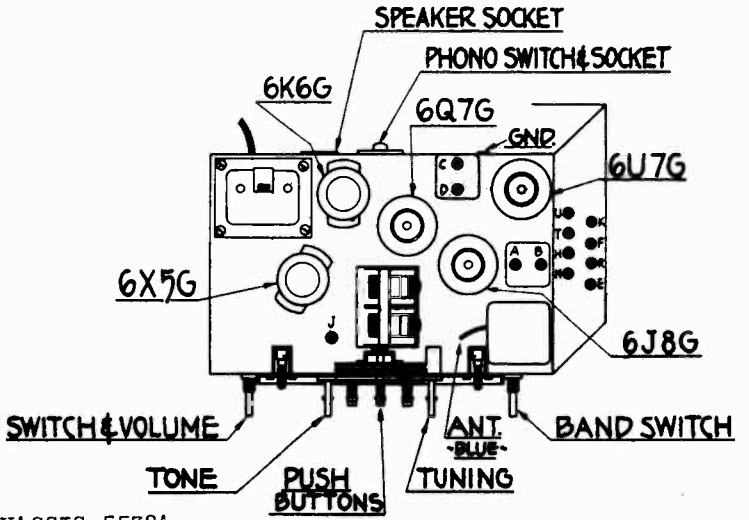
CHASSIS 5535BT

ALIGNMENT PROCEDURE

Operation	Connect Test Oscillator to	Dummy Antenna	Set Test Osc. to	Band	Set Dial At	Adjust Trimmers	Purpose
1	1st Det. Grid	½ Mfd.	455	Br'dc't	600	ABCD	I. F. Alignment
2	Rec. Ant. Lead	200 Mmfd.	1500	Br'dc't	1500	F	Set Osc. to Scale
3	Rec. Ant. Lead	200 Mmfd.	1500	Br'dc't	1500	G	Al'gment of Ant.
4	Rec. Ant. Lead	200 Mmfd.	600	Br'dc't	600	J	Rock gang & adj. for max. output
5	Rec. Ant. Lead	200 Mmfd.	1500	Br'dc't	1500	F • G	Repeat 2 & 3
6	Rec. Ant. Lead	400 ohms	18000	S. W.	18000	K	Set Osc. to Scale
7	Rec. Ant. Lead	400 ohms	18000	S. W.	18000	L	Rock gang & adj. for max. output

UNDER NO CIRCUMSTANCES SHOULD THIS RECEIVER BE CONNECTED TO DIRECT CURRENT (D. C.).

Chassis 5532A **only** is designed to operate on 25 to 100 cycle alternating current (A.C.) and may be adjusted for use on either 110 or 235 Volt power lines by means of the switch on top of the power transformer. The proper position of the switch for either voltage is marked on the transformer case.



CHASSIS 5532A

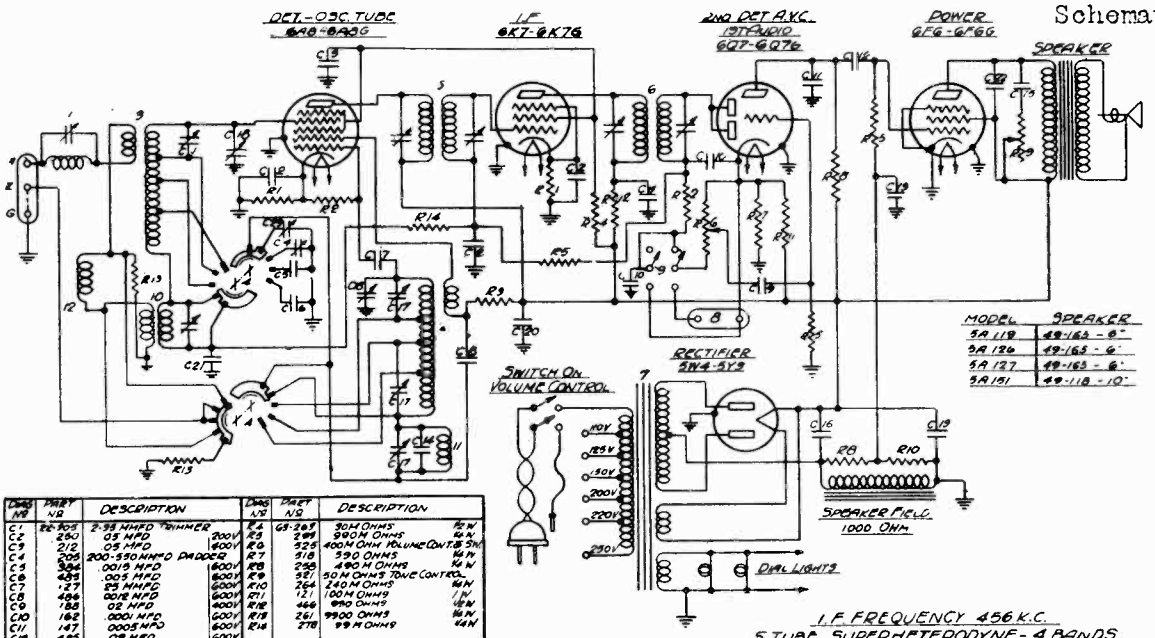
ALIGNMENT PROCEDURE

Operation	Connect Test Oscillator to—	Dummy Antenna	Set Test Osc. to— (Meters)	Wave Band	Set Dial to— (Meters)	Adjust Trimmers	Purpose
1	1st Det. Grid	½ Mfd.	660	Med.	500	ABCD	I.F. Alignment
2	Rec. Ant. Lead	200 Mmfd.	660	Med.	500	E	See Note
3	Rec. Ant. Lead	200 Mmfd.	200	Med.	200	F	Set Osc. to Scale
4	Rec. Ant. Lead	200 Mmfd.	200	Med.	200	H	Algmt. of Antenna
5	Rec. Ant. Lead	200 Mmfd.	500	Med.	500	J	Rock gang & adj. for max. output
6	Rec. Ant. Lead	200 Mmfd.		Med.		FH	Repeat 3 & 4
7	Rec. Ant. Lead	200 Mmfd.	800	Long	800	R	Set Osc. to Scale
8	Rec. Ant. Lead	200 Mmfd.	800	Long	800	T	Algmt. of Antenna
9	Rec. Ant. Lead	200 Mmfd.	1900	Long	1900	U	Rock gang & adj. for max. output
10	Rec. Ant. Lead	200 Mmfd.		Long		RT	Repeat 7 & 8
11	Rec. Ant. Lead	400 Ohms	17	Short	17	K	Set Osc. to Scale
12	Rec. Ant. Lead	400 Ohms	17	Short	17	M	Algmt. of Antenna

NOTE: If receiver is used in location subject to code interference adjust wave trap (E) for minimum interference with antenna, connected and receiver operating in Medium Wave position.

ZENITH RADIO CORP.

MODELS 5A119, 5A126
5A127, 5A151, Ch. 5517A
MODELS 5L228, 5L237
Chassis 5525A
Schematics



MODEL	SPEAKER
5A 119	49-165 - 8"
5A 126	49-165 - 6"
5A 127	49-165 - 6"
5A 151	49-118 - 10"

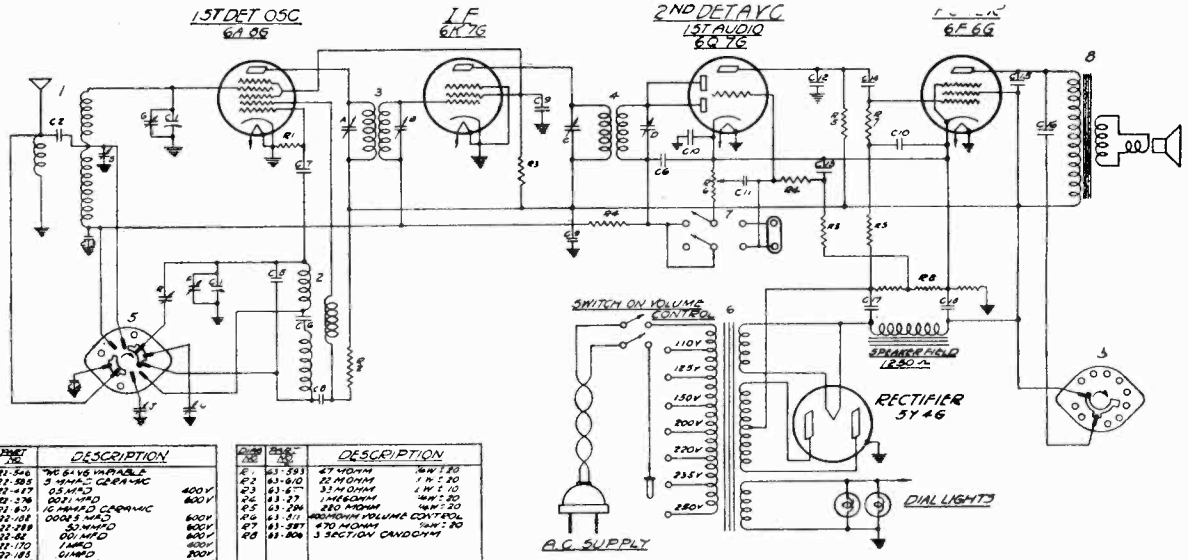
DWG NO	PART NO	DESCRIPTION		DWG NO	PART NO	DESCRIPTION
C1	22-305	2-95 MMFD TRIMMER		R1	63-287	30M OHMS 1/2W
C2	250	.05 MFD	200V	R2	299	990M OHMS 1W
C3	212	.05 MFD	400V	R3	325	400M OHM VOLUME CONT. & SW.
C4	505	200-350 MMFD PADDER		R4	518	590 OHMS 1W
C5	304	.0015 MFD	1600V	R5	298	490 M OHMS 1/2W
C6	483	.005 MFD	600V	R6	321	50 M OHMS TONE CONTROL
C7	127	53 MMFD	600V	R10	264	240 M OHMS 1/2W
C8	494	.002 MFD	600V	R11	121	100 M OHMS 1/2W
C9	188	.02 MFD	400V	R12	466	990 OHMS 1/2W
C10	162	.0001 MFD	600V	R13	261	9900 OHMS 1W
C11	147	.0005 MFD	600V	R14	278	99 M OHMS 1/2W
C12	435	.08 MFD	600V			
C13	398	.8 MFD	200V			
C14	521	60 MMFD	600V			
C15	328	.04 MFD	600V			
C16	294	16 MFD WET ELECT.	450V	1	20-189	WAVE TRAP ASSEMBLY
C17	324	2-95 MMFD TRIMMER		2	5-4618	OSCILLATOR COIL ASSEMBLY
C18	485	2 GANG VARIABLE COND.		3	5-4615	ANTENNA COIL ASSEMBLY
C19	305	16 MFD WET ELEC COND	385V	4	99-100	BAND SELECTOR SWITCH
C20	170	.1 MFD	400V	5	99-349	1ST I.F. TRANSFORMER
C21	487	.05 MFD	400V	6	94-950	2ND I.F. TRANSFORMER
C22	424	.005 MFD	600V	7	94-586	POWER TRANSFORMER 25 CYCLE ALL VOLT
C23	518	100-280 MMFD PADDER		8	447	PHONOGRAPH JACK
				9	99-99	PHONOGRAPH SWITCH
R1	63-268	400 OHMS 1/2W		10	20-140	L.W. ANTENNA COIL
R2	280	48 M OHMS 1/2W		11	20-139	L.W. OSCILLATOR COIL
R3	278	11 M OHMS 1/2W		12	20-167	L.W. ANTENNA PRIMARY COIL

I.F. FREQUENCY 456 K.C.
5 TUBE SUPERHETERODYNE - 4 BANDS
CHASSIS NO 5517A

BAND	COLOR	KILOCYCLES
A	Green	492-1640
B	Yellow	1750-6040
C	Red	5520-19000
D	Blue	148-400

The total consumption is 55 watts. Power output 3 watts.

FOR OTHER DATA, SEE INDEX



DWG NO	PART NO	DESCRIPTION	
C1	22-346	7MC 6-45 VARIABLE	
C2	22-585	3 MMFD CERAMIC	
C3	12-427	.05 MFD	400 V
C4	12-378	.0031 MFD	600 V
C5	22-601	IC MMFD CERAMIC	
C6	22-181	.0004 MFD	600 V
C7	22-338	53 MMFD	600 V
C8	22-62	.001 MFD	600 V
C9	22-170	.1 MFD	400 V
C10	22-185	.01 MFD	200 V
C11	12-327	.05 MFD	200 V
C12	12-147	.0025 MFD	600 V
C13	22-180	.1 MFD	200 V
C14	12-418	.02 MFD	600 V
C15	12-408	.005 MFD	600 V
C16	12-71	.05 MFD	400 V
C17	77-598	8 MFD DRY ELECTROLYTIC	450 V
C18		16 MFD DRY ELECTROLYTIC	450 V

VARIABLE TRIMMERS

A	1ST I.F. TRANS. PRIMARY
B	1ST I.F. TRANS. SECONDARY
C	2ND I.F. TRANS. PRIMARY
D	2ND I.F. TRANS. SECONDARY
F	BROADCAST OSCILLATOR 22-305
G	DET. OSC. BROADCAST (ON GANG)
J	BROADCAST PADDER 22-519
R	LONG WAVE OSC. (SEE NOTE)
S	LONG WAVE DETECTOR (SEE NOTE)
U	LONG WAVE PADDER 22-519

NOTE: TRIMMERS R, S AND U ARE LOCATED ON SWITCH STACK SEE FIG. 6.

DWG NO	PART NO	DESCRIPTION	
R1	63-593	47 M OHM	1/2W ± 20
R2	63-610	22 M OHM	1 W ± 20
R3	63-607	33 M OHM	1 W ± 10
R4	63-27	1 MEGOHM	1/2W ± 20
R5	63-594	220 M OHM	1/2W ± 20
R6	63-311	MEGOHM VOLUME CONTROL	
R7	63-587	470 M OHM	1/2W ± 20
R8	63-606	3 SECTION CANDOHM	
1	U 539	ANT COIL ASSEMBLY	
	U 5425	ANT COIL & SHIELD ASSEMBLY	
2	U 5356	OSC COIL ASSEMBLY	
3	95-457	1ST I.F. TRANSFORMER	
4	95-408	2 ND I.F. TRANSFORMER	
5	85-41	BAND SWITCH	
6	95-433	POWER TRANSFORMER 25 CYCLE ALL VOLTAGE	
7	85-39	RANGE SWITCH	
8		SPEAKER TRANSFORMER	

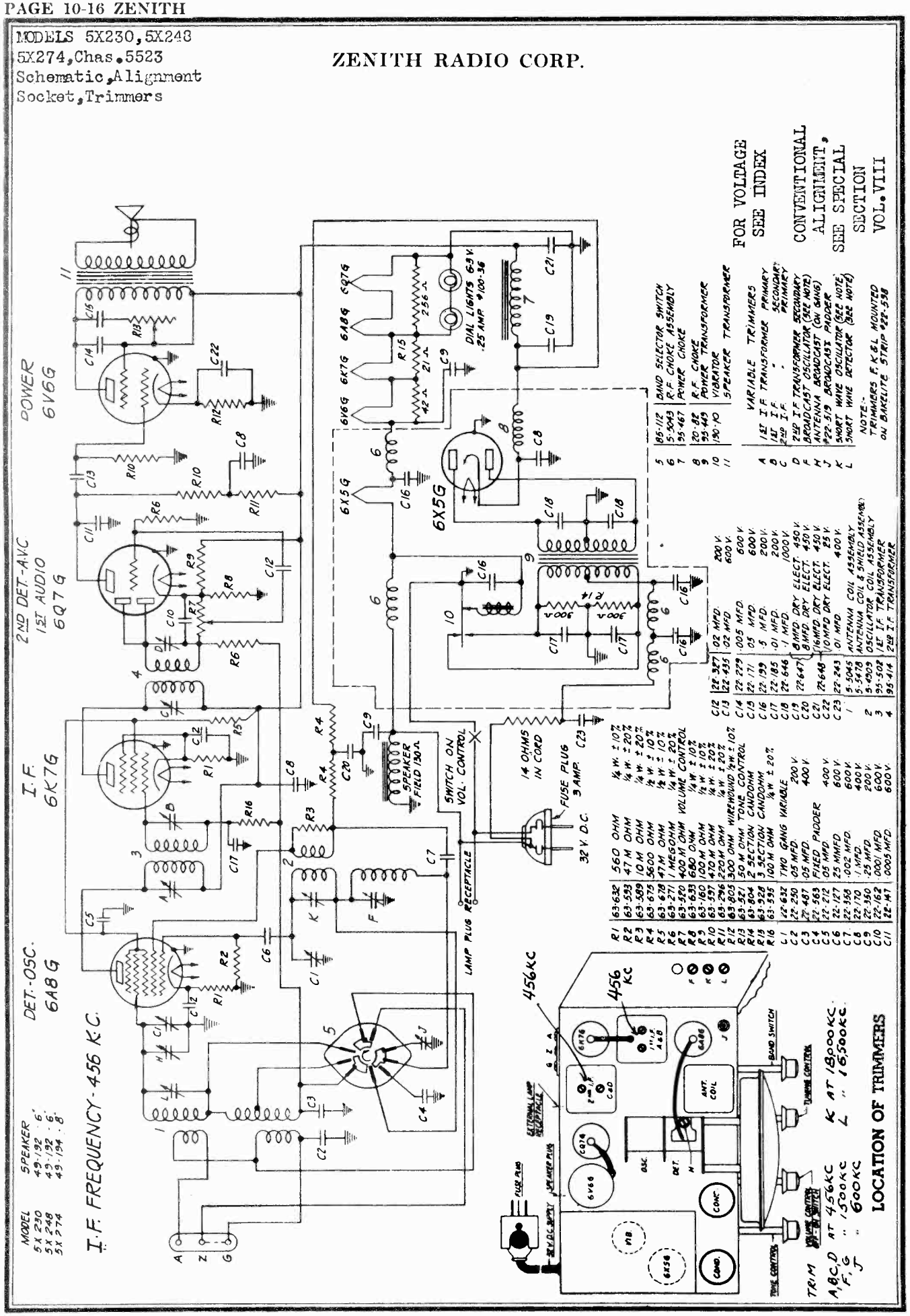
MODEL	SPEAKER
5L 228	49-180 6"
5L 237	49-180 6"

I. FREQUENCY 456 KC
5 TUBE SUPERHETERODYNE
2-BAND LONG WAVE
CHASSIS NO 5525A
ZENITH RADIO CORPORATION
CHICAGO, ILLINOIS

The total consumption is 65 watts.
Power output 4.5 watts.

MODELS 5X230, 5X248
5X274, Chas. 5523
Schematic, Alignment
Socket, Trimmers

ZENITH RADIO CORP.



MODEL | SPEAKER
5X230 | 49-192 · 6"
5X248 | 49-192 · 6"
5X274 | 49-194 · 8"

R1	63-632	560 OHM	½ W. ± 10%	
R2	63-533	47 M OHM	½ W. ± 20%	
R3	63-589	10 M OHM	½ W. ± 20%	
R4	63-675	3600 OHM	½ W. ± 10%	
R5	63-678	47 M OHM	½ W. ± 10%	
R6	63-271	1 MEGOHM	½ W. ± 20%	VOLUME CONTROL
R7	63-520	400 M OHM	½ W. ± 10%	
R8	63-633	680 OHM	½ W. ± 10%	
R9	63-160	100 M OHM	½ W. ± 20%	
R10	63-597	470 M OHM	½ W. ± 20%	
R11	63-296	220 M OHM	½ W. ± 20%	
R12	63-805	300 OHM	WIREWOUND ½ W. ± 10%	
R13	63-521	50 M OHM	TONE CONTROL	
R14	63-804	2 SECTION	CANDOHM	
R15	63-938	3 SECTION	CANDOHM	
R16	63-555	100 M OHM	½ W ± 20%	
C1	42-632	THO GANG	VARIABLE	
C2	22-230	.05 MFD.		200 V.
C3	22-481	.05 MFD.		400 V.
C4	22-563	FIXED PADDER		
C5	22-212	.05 MFD.		400 V.
C6	22-127	25 MMFD.		600 V.
C7	22-358	.002 MFD.		600 V.
C8	22-170	.1 MFD.		400 V.
C9	22-350	.25 MFD.		200 V.
C10	22-162	.001 MFD.		600 V.
C11	22-147	.0005 MFD.		600 V.
C12	22-327	.02 MFD.		200 V.
C13	22-435	.02 MFD.		600 V.
C14	22-229	.005 MFD.		600 V.
C15	22-171	.05 MFD.		600 V.
C16	22-139	.5 MFD.		200 V.
C17	22-185	.01 MFD.		200 V.
C18	22-646	.1 MFD.		1000 V.
C19	22-647	8 MFD DRY ELECT.		450 V.
C20		8 MFD DRY ELECT.		450 V.
C21	22-648	16 MFD DRY ELECT.		450 V.
C22		10 MFD DRY ELECT.		25 V.
C23	22-243	.01 MFD.		400 V.
1	5-5045	ANTENNA COIL ASSEMBLY		
2	5-5478	ANTENNA COIL & SHIELD ASSEMBLY		
3	5-4909	OSCILLATOR COIL ASSEMBLY		
4	95-502	1ST I.F. TRANSFORMER		
5	95-414	2ND I.F. TRANSFORMER		
5	85-112	BAND SELECTOR SWITCH		
6	5-5043	R.F. CHOKE ASSEMBLY		
7	95-467	POWER CHOKE		
8	20-82	R.F. CHOKE		
9	95-445	POWER TRANSFORMER		
10	30-10	VIBRATOR		
11		SPEAKER TRANSFORMER		

	VARIABLE TRIMMERS
A	1ST I.F. TRANSFORMER PRIMARY
B	1ST I.F. " SECONDARY
C	2ND I.F. " PRIMARY
D	2ND I.F. TRANSFORMER SECONDARY
F	BROADCAST OSCILLATOR (SEE NOTE)
H	ANTENNA BROADCAST (ON GANG)
J	#22-519 BROADCAST PADDER
K	SHORT WAVE OSCILLATOR (SEE NOTE)
L	SHORT WAVE DETECTOR (SEE NOTE)

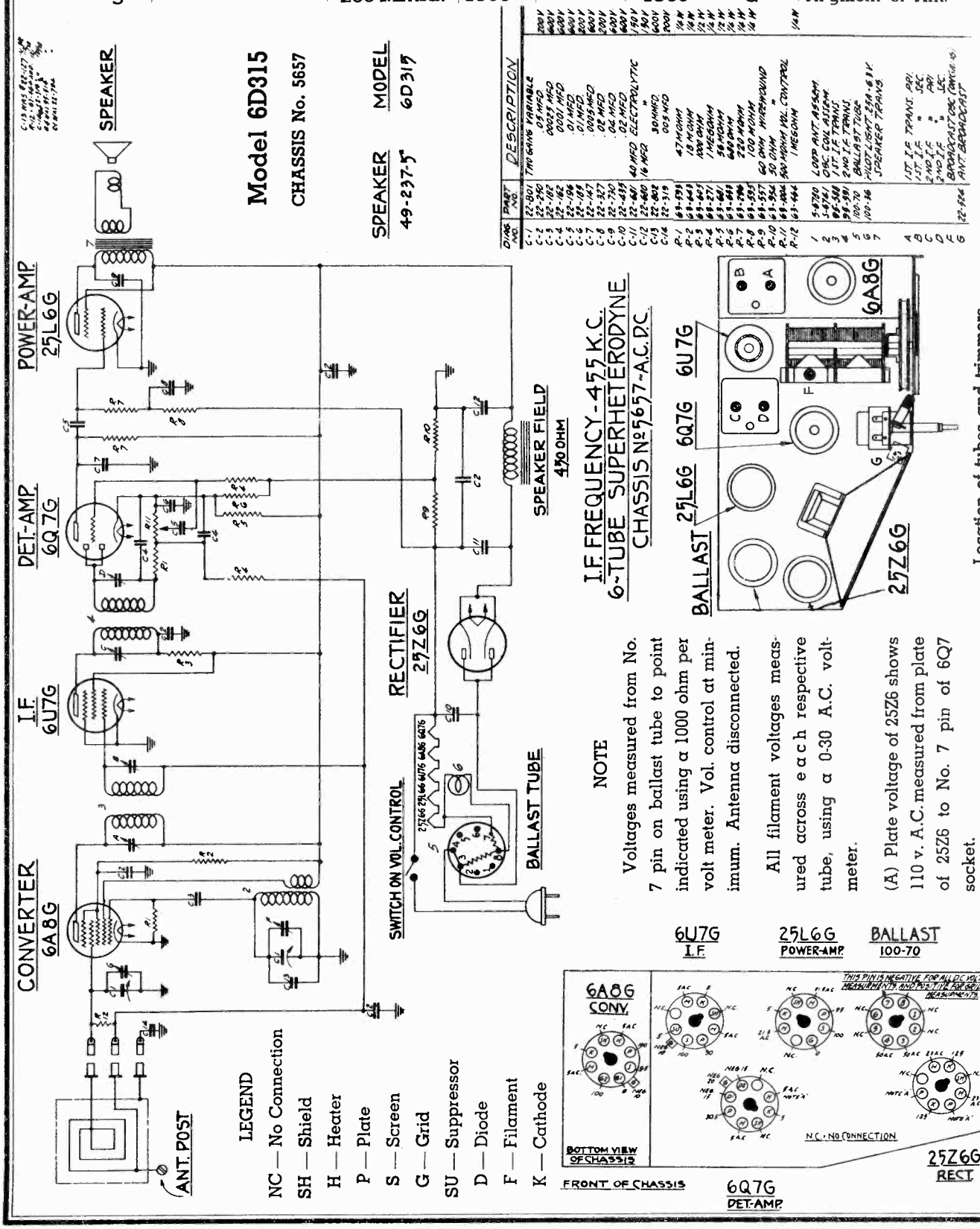
NOTE:- TRIMMERS F, K & L MOUNTED ON BAKELITE STRIP #22-538

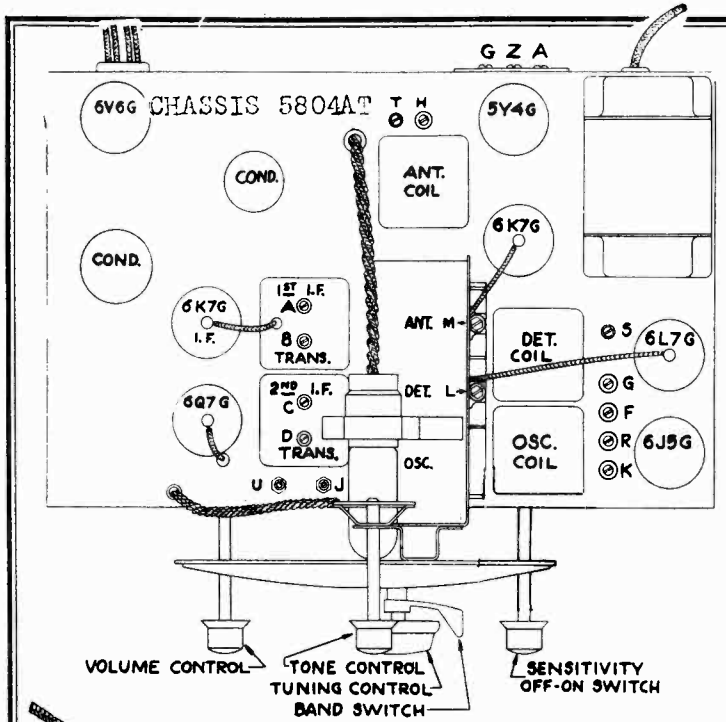
ZENITH RADIO CORP.

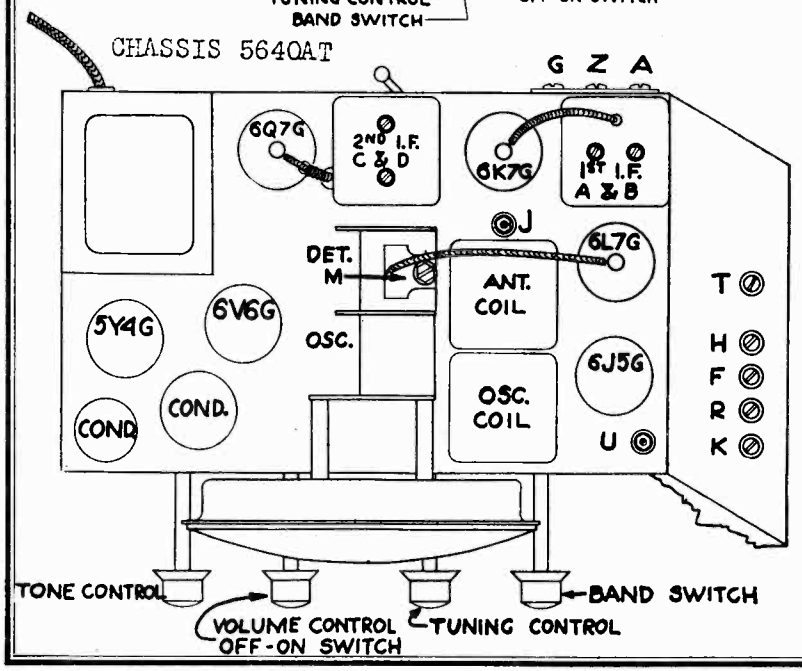
MODEL 6D315, Chas. 5657
Schematic, Voltage, Socket
Trimmers, Alignment

ALIGNMENT PROCEDURE

Operation	Connect Test Oscillator to	Dummy Antenna	Set Test Osc. to	Band	Set Dial At	Adjust Trimmers	Purpose
1	1st Det. Grid	1/2 Mfd.	455	Br'dc't	600	ABCD	I. F. Alignment
2	Rec. Ant. Lead	200 Mmfd.	1500	"	1500	F	Set Osc. to Scale
3	" " "	200 Mmfd.	1500	"	1500	G	Al'gment of Ant.







CHASSIS 5640, 5804A Secret Volume Governor

Where it is desired to limit the maximum volume of the receiver to a predetermined level such as for hospital use, use in public places, etc., this may be done as follows:

1. Tune the receiver carefully to a local station, and adjust the volume to the loudest desired setting.

2. Remove the knob by pulling directly away from the panel, and insert the short headless screw into the hole provided in the rear of the knob closest to the right side of the elongated cut-out around the volume control shaft.

3. It may be necessary to move the screw to the next hole in either direction before it is definitely determined what volume level is desired.

Alignment Procedure

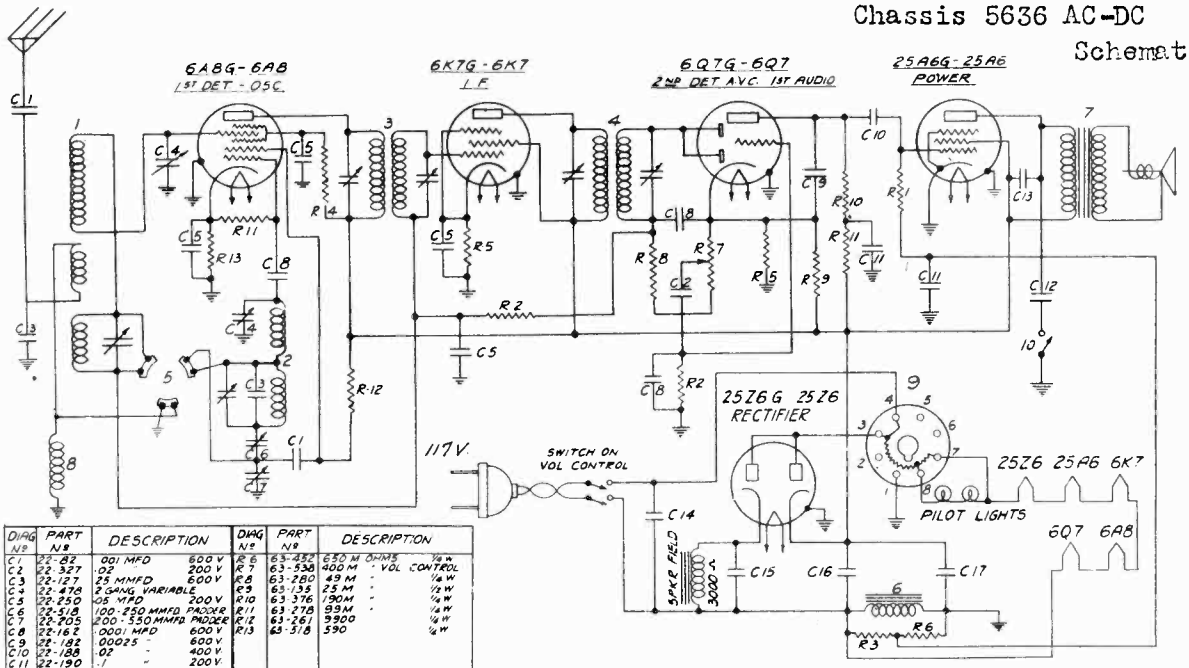
CHASSIS 5640AT AND 5804AT

Operation	Sig. Gen. Connected to	Dummy	Gen. Freq.	Band Switch	Receiver Dial	Trimmer	Remarks:
1	1st Det. Grid	½ mfd	456	Med. Wave	550KC	ABCD	I F Alignment
2	Rec. Ant. Post	400 Ohms	18000	S. W.	18000	K	Set. Osc. To Scale
3	Rec. Ant. Post	400 Ohms	18000	S. W.	18000	L—M	Rock Gang While Adj. for Max. Output
4	Rec. Ant. Post	200 mfd.	1500	Med. Wave	1500	F	Set. Osc. to Scale
5	" " "	200 "	1500	" "	1500	G—H	Adjust for Max. Output
6	" " "	200 "	550	" "	550	J	Rock Gang while Adjusting for Maximum Output
7	" " "	200 "	1500	" "	1500	F-G-H	Repeat 4 & 5
8	" " "	200 "	400	L. W.	400	R	Set. Osc. to Scale
9	" " "	200 "	400	L. W.	400	S—T	Adjust for Max. Output
10	" " "	200 "	166.7	L. W.	166.7	U	Rock Gang While Adjusting for max. Output
11	" " "	200 "	400	L. W.	400	R-S-T	Repeat 8 & 9

*MODEL CHASSIS 5804A ONLY

ZENITH RADIO CORP.

MODELS 6A203, 6A223, 6A229
6A239, 6A241, Ch. 5640AT
MODELS 6DL120 to 6DL122
Chassis 5636 AC-DC
Schematics



DIAG N°	PART N°	DESCRIPTION		DIAG N°	PART N°	DESCRIPTION
C1	22-82	.001 MFD	600 V	R6	63-452	650 M OHMS ½ W
C2	22-327	.02 "	200 V	R7	63-538	400 M " VOL CONTROL
C3	22-127	25 MMFD	600 V	R8	63-280	49 M " ½ W
C4	22-478	2 GANG VARIABLE		R9	63-135	25 M " ½ W
C5	22-250	.05 MFD	200 V	R10	63-376	190 M " ½ W
C6	22-518	100-250 MMFD PADDER		R11	63-278	99 M " ½ W
C7	22-705	200-550 MMFD PADDER		R12	63-261	9900 " ½ W
C8	22-162	.0001 MFD	600 V	R13	63-318	590 " ½ W
C9	22-182	.00025 "	600 V			
C10	22-188	.02 "	400 V			
C11	22-190	.1 "	200 V			
C12	22-212	.05 "	400 V			
C13	22-229	.005 "	600 V			
C14	22-455	.01 "	1200 V			
C15	22-517	4 "	250 V	1	20-144	ANT COIL ASSEMBLY
C16		16 "	250 V	2	20-145	OSC COIL ASSEMBLY
C17	22-516	8 "	250 V	3	95-378	1ST I.F. TRANS
				4	95-347	2ND I.F. TRANS
				5	85-101	BAND SELECT SWITCH
				6	95-345	POWER CHOKE
				7	49-141	SPEAKER
				8	20-88	ANTENNA CHOKE
				9	100-37	BALLAST TUBE (117V)
R1	63-290	260 M OHMS ½ W		10	85-102	TONE CONTROL SWITCH
R2	63-293	990 M " "				
R3	63-481	400 M " "				
R4	63-288	1.9 M " "				
R5	63-362	400 " "				

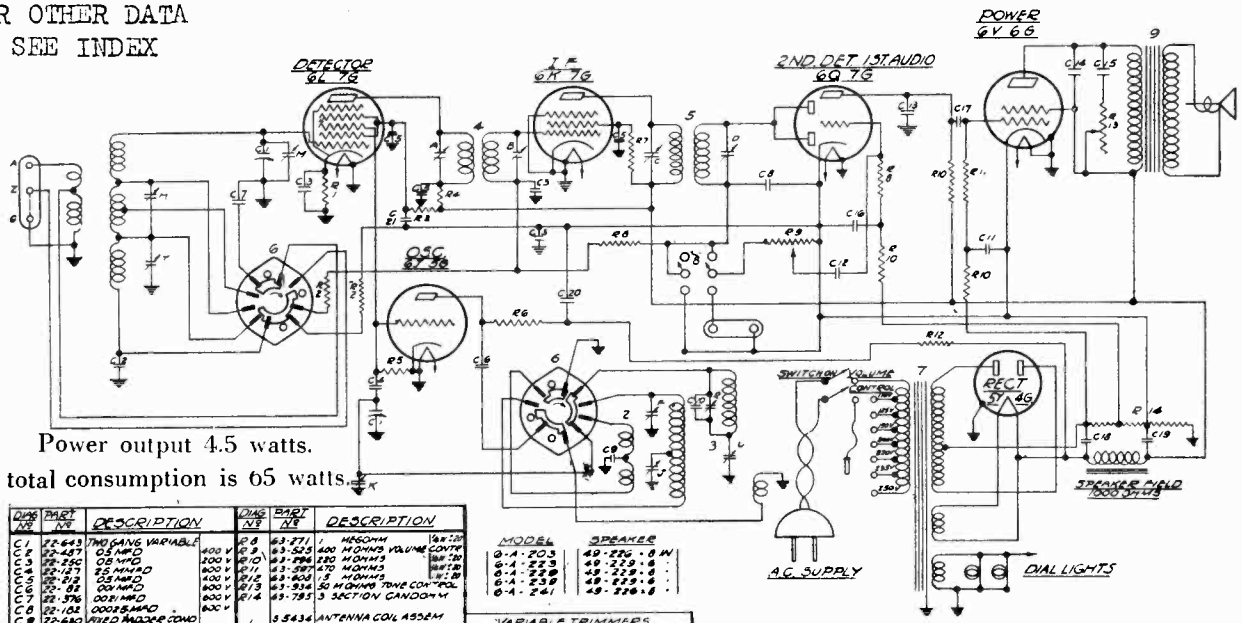
MODEL	SPEAKER
6DL 120	49-141 5
6DL 121	49-141 5
6DL 122	49-141 5

I F FREQUENCY 456 K C
6 TUBE SUPERHETERODYNE
CHASSIS N° 5636 AC-DC

ZENITH RADIO CORPORATION
CHICAGO ILLINOIS

Power Output 1.5 watts.
Current Consumption 44 watts

FOR OTHER DATA
SEE INDEX



Power output 4.5 watts.
The total consumption is 65 watts.

DIAG N°	PART N°	DESCRIPTION		DIAG N°	PART N°	DESCRIPTION
C1	22-643	TWO GANG VARIABLE		R8	63-271	1 MEGOHM ½ W 10%
C2	22-457	.05 MFD	400 V	R9	63-525	400 M OHMS VOLUME CONTROL ½ W 10%
C3	22-250	.05 MFD	200 V	R10	63-286	280 M OHMS ½ W 10%
C4	22-127	25 MMFD	600 V	R11	63-307	470 M OHMS 1 W 10%
C5	22-212	.05 MFD	400 V	R12	63-308	1.2 M OHMS 1 W 10%
C6	22-182	.001 MFD	600 V	R13	63-334	50 M OHMS TONE CONTROL
C7	22-376	.008 MFD	600 V	R14	63-795	3 SECTION CANDOHM
C8	22-182	.00025 MFD	600 V			
C9	22-640	FIXED PADDER .0040		1	5 S434	ANTENNA COIL ASSEM
C10	22-629	25 MMFD CERAMIC			5 S440	ANT COIL & SHIELD ASSEM
C11	22-795	.01 MFD	200 V	2	5 S445	SHORT WAVE OSC COIL
C12	22-327	.02 MFD	200 V	3	5 S436	OSC COIL 455 KCS
C13	22-147	.0005 MFD	600 V		5 S441	OSC COIL & SHIELD ASSEM
C14	22-196	.01 MFD	400 V	4	95-461	1ST I.F. TRANSFORMER
C15	22-171	.05 MFD	600 V	5	95-462	2ND I.F. TRANSFORMER
C16	22-180	.1 MFD	200 V	6	85-122	BAND SWITCH
C17	22-635	.02 MFD	600 V	7	93-450	POWER TRANS'R ALL VOLTAGES 25 CYCLE
C18	28-833	30 MFD ELECTROLYTIC	25 V			
C19		40 MFD ELECTROLYTIC	450 V	8	85-39	PHONO SWITCH
C20	22-657	4 MFD ELECTROLYTIC	450 V	9		SPEAKER TRANSFORMER
C21		8 MFD ELECTROLYTIC	350 V			
R1	63-629	330 OHMS	½ W 10%			
R2	63-595	1.0 M OHMS	½ W 10%			
R3	63-208	1.2 M OHMS	1 W 10%			
R4	63-605	1000 OHMS	½ W 10%			
R5	63-593	.47 M OHMS	½ W 20%			
R6	63-680	1.0 M OHMS	1 W 10%			
R7	63-381	100 M OHMS	½ W 10%			

MODEL	SPEAKER
6-A-203	49-226 - 8 W
6-A-223	49-228 - 6 "
6-A-229	49-229 - 6 "
6-A-239	49-229 - 6 "
6-A-241	49-230 - 6 "

	VARIABLE TRIMMERS
A	1ST I.F. TRANS'R PRIMARY
B	1ST I.F. TRANS'R SECONDARY
C	2ND I.F. TRANS'R PRIMARY
D	2ND I.F. TRANS'R SECONDARY
E	BROADCAST OSC (SEE NOTE)
F	ANT BROADCAST (SEE NOTE)
H	25-518 BROADCAST PADDER
K	22-383 SHORT WAVE OSC
M	SHORT WAVE ANT (ON GANG)
R	LONG WAVE OSC (SEE NOTE)
T	22-384 LONG WAVE ANT
U	22-388 LONG WAVE PADDER

NOTE - TRIMMERS A-F-H-E-R ARE MOUNTED ON BAND SWITCH N° 85-84

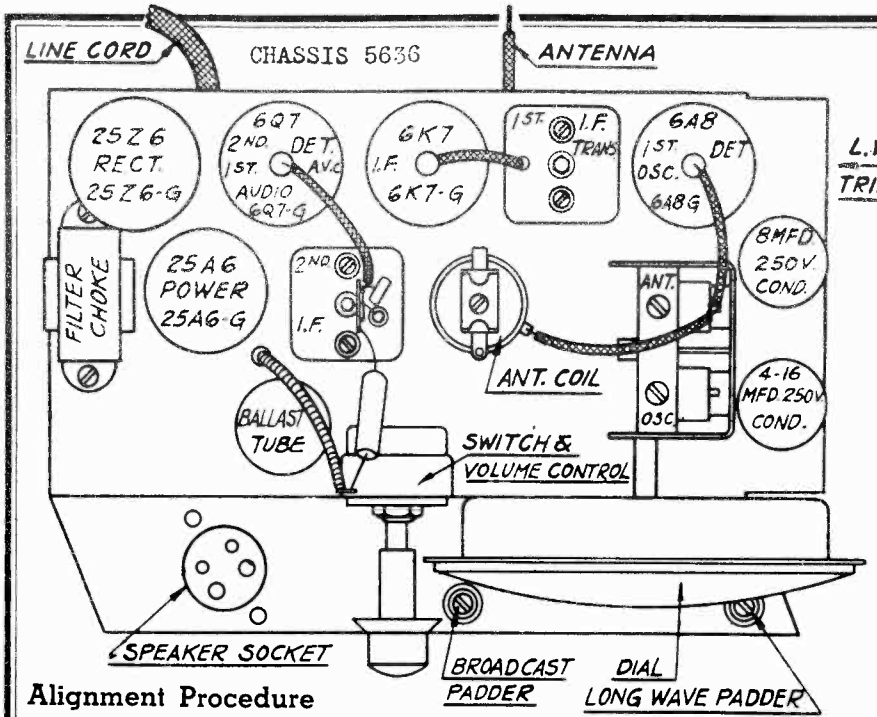
I F FREQUENCY 456 KC
6 TUBE SUPERHETERODYNE
CHASSIS N° 5640 AT
3 BAND LONG WAVE

ZENITH RADIO CORPORATION
CHICAGO, ILLINOIS.

BAND	KILOCYCLES
A	411 — 150
B	1538 — 432
C	23077 — 5660

MODELS 6DL120 to 6DL122
Chassis 5636
MODELS 7DA119,7DA126,
7DA127,7DA138,7DA148,
7DA162,7DA168,Ch.5708E
Alignment, Socket
Trimmers

ZENITH RADIO CORP.



Alignment Procedure

(1) Connect the output leads of the signal generator to the grid of the first detector and receiver ground. Also connect an output meter across the speaker transformer leads.

(2) Set the signal generator at 456 K. C. and carefully adjust the four I. F. trimmers to the point giving the highest reading of the output meter. These adjustments should be repeated several times to secure the greatest accuracy.

All adjustments should be made using as weak an output from the signal generator as possible in order to prevent the A.V.C. action from affecting the output readings.

(3) Change the signal generator leads to the antenna and ground terminals of the receiver.

(4) Set signal generator at 1500 K. C., switch receiver to broadcast band and adjust oscillator trimmer on gang for correct dial reading at 200 meters. Also adjust antenna trimmer on gang to resonance.

(5) Set signal generator to 600 K. C. and rock pointer past 500 meters on dial while adjusting the broadcast padder (adjacent to gang) to combination giving the greatest output reading.

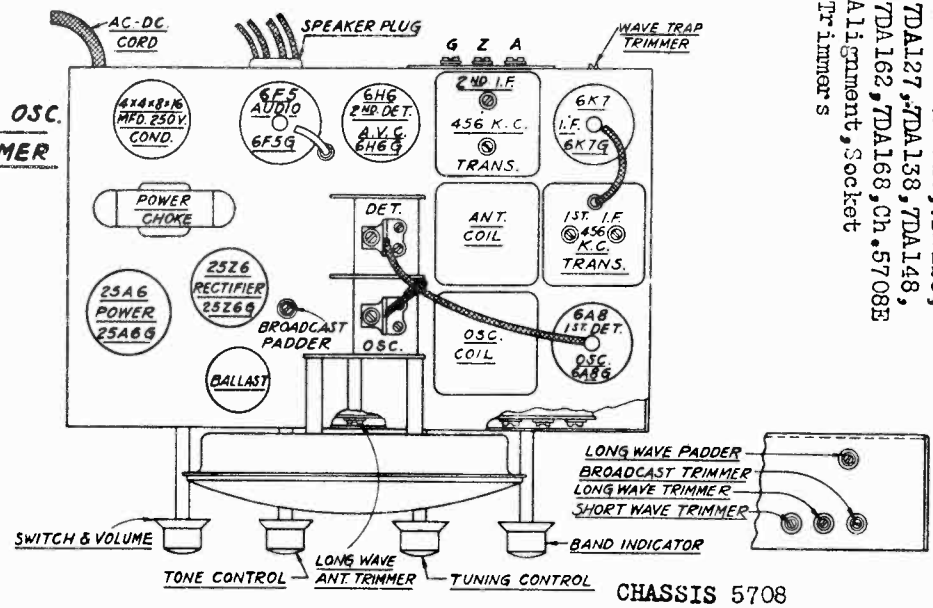
(6) Repeat operation No. 4.

(7) Set signal generator at 375 K. C. Switch receiver to long wave band and adjust long wave oscillator trimmer (located on oscillator coil underneath chassis) for correct dial reading at 800 meters. Also adjust trimmer on top of coil adjacent to gang lor greatest output reading.

(8) Set the signal generator at 167 K. C. Rock the pointer past 1800 meters on dial and adjust the long wave padder to point giving the highest output.

(9) Repeat operation No. 7

L.W. OSC. TRIMMER



CHASSIS 5708

ALIGNMENT PROCEDURE

(1) Connect the output leads of the signal generator to the grid of the first detector and receiver chassis. Also connect an output meter across the speaker transformer leads.

(2) Set the signal generator at 456 K.C. and carefully adjust the four I.F. trimmers to the point giving the highest reading of the output meter. These adjustments should be repeated several times to secure the greatest accuracy.

All adjustments should be made using as weak an output from the signal generator as possible in order to prevent the A.V.C. action from affecting the output readings.

(3) Change the signal generator leads to the antenna and chassis of the receiver.

(4) Adjust the wave trap (located on rear of chassis) for minimum output reading.

(5) Set signal generator at 6 M.C. Switch receiver to band B and adjust osc. trimmer on gang for correct dial reading at 50 meters.

(6) Set signal generator at 1400 K.C. Switch receiver to band A and adjust broadcast trimmer (see diagram) for correct dial reading at 215 meters. Also adjust det. trimmer on gang for greatest output reading.

(7) Set signal generator to 600 K.C. and rock pointer past 500 meters on dial while adjusting the broadcast padder (adjacent to gang) to combination giving the greatest output reading.

(8) Repeat operation No. 6.

(9) Set the signal generator at 17 M.C. Switch the receiver to band C and adjust short wave trimmer while rocking pointer past 17.5 meters on dial to combination giving the greatest output.

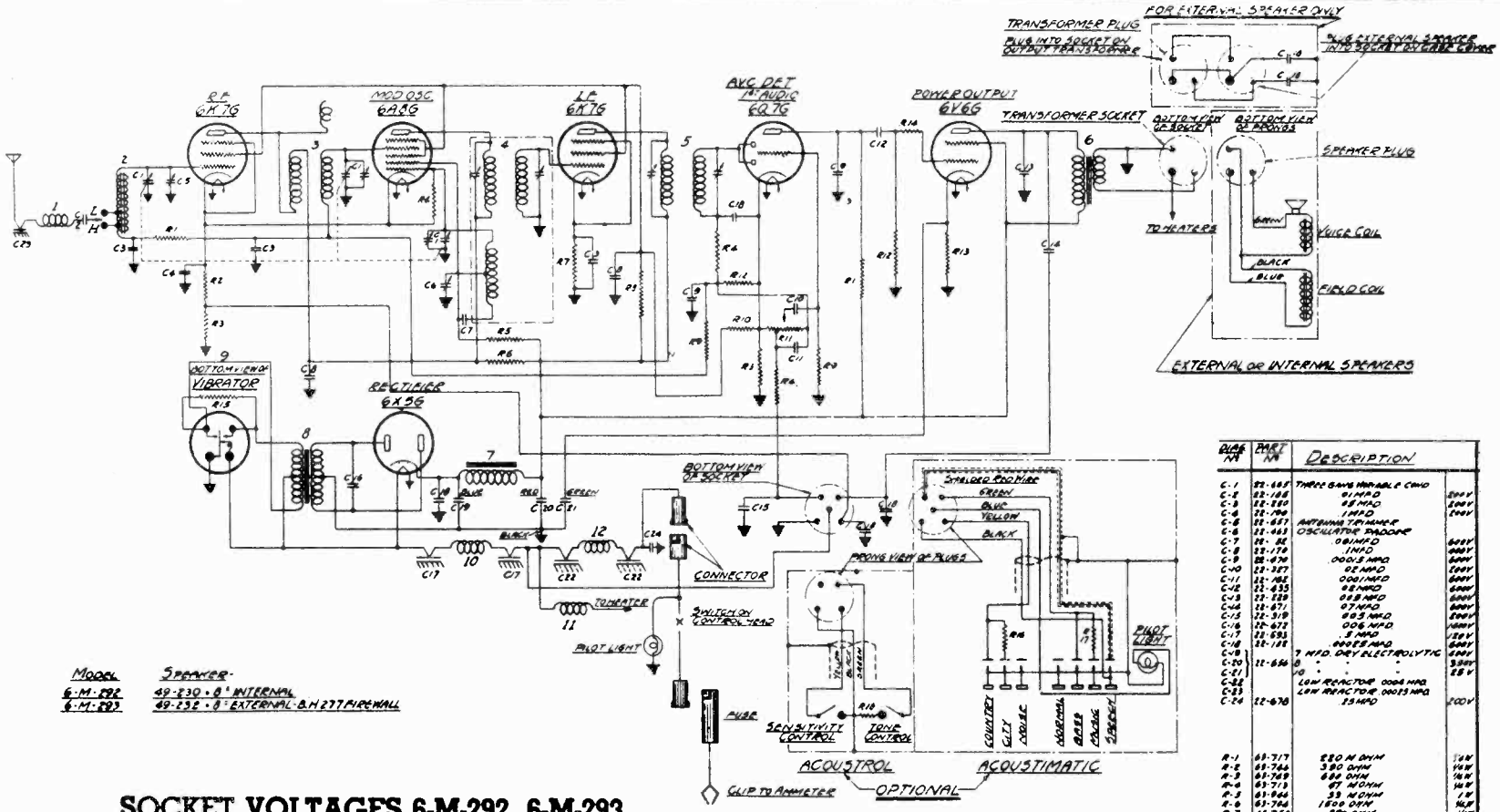
(10) Set the signal generator at 375 K.C. Switch receiver to Band D and adjust the long wave trimmer for correct dial reading at 800 meters. Also adjust the long wave ant. trimmer to resonance.

(11) Set the signal generator at 167 K.C. Rock the pointer past 1800 meters on dial and adjust the long wave padder to point giving the highest output.

(12) Repeat operation No. 10.

ZENITH RADIO CORP.

MODELS 6M292, 6M293
Chassis 5645
Schematic, Voltage



Model
6-M-292
6-M-293

Speaker-
49-230 • 8" INTERNAL
49-232 • 8" EXTERNAL-B.H.277 FIREWALL

BLOCK NO.	PART NO.	DESCRIPTION	
C-1	22-685	THREE GANG VARIABLE COND	
C-2	22-108	.01 MFD	400 V
C-3	22-550	.05 MFD	400 V
C-4	22-194	.1 MFD	200 V
C-5	22-687	ANTENNA TRIMMER	
C-6	22-463	OSCILLATOR PADDER	
C-7	22-86	.08 MFD	400 V
C-8	22-178	.1 MFD	400 V
C-9	22-679	.0005 MFD	400 V
C-10	22-327	.02 MFD	200 V
C-11	22-188	.0001 MFD	400 V
C-12	22-435	.05 MFD	400 V
C-13	22-539	.005 MFD	400 V
C-14	22-67	.01 MFD	400 V
C-15	22-519	.005 MFD	200 V
C-16	22-677	.006 MFD	400 V
C-17	22-693	.5 MFD	150 V
C-18	22-188	.0002 MFD	400 V
C-19	22-686	2 MFD. DRY ELECTROLYTIC	200 V
C-20			350 V
C-21			25 V
C-22		LOW REACTOR .0004 MFD.	
C-23		LOW REACTOR .00015 MFD.	
C-24	22-678	15 MFD	200 V
R-1	63-717	250 M OHM	1/2 W
R-2	63-746	350 OHM	1/2 W
R-3	63-749	600 OHM	1/2 W
R-4	63-713	.07 M OHM	1/2 W
R-5	63-944	.33 M OHM	1/2 W
R-6	63-764	1500 OHM	1/2 W
R-7	63-750	850 OHM	1/2 W
R-8	63-947	.27 M OHM	2 W
R-9	64-644	1.25 OHM	1/2 W
R-10	63-764	38 M OHM	1/2 W
R-11	63-980	1 MEGOHM VOLUME CONTROL	
R-12	63-718	470 M OHM	1/2 W
R-13	63-942	5300 OHM	1 W
R-14	63-987	150 OHM	1/2 W
R-15	63-960	220 OHM	1 W
R-16	63-761	1500 OHM	1/2 W
R-17	63-767	6700 OHM	1/2 W
R-18	63-709	12000 OHM	1/2 W
1	20-178	ANTENNA COIL	
2	20-178	ANTENNA COIL	
3	20-171	DETECTOR COIL	
4	3-6019	1ST I.F. & OSCILLATOR	
5	95-601	2ND I.F.	
6	95-699	OUTPUT TRANSFORMER	
7	94-497	INDUCTANCE	
8	95-698	POWER TRANSFORMER	
9	90-11	VIBRATOR	
10	20-175	HIGH FREQ. COIL	
11	20-186	ADJACENT CHOKE COIL	
12	3-6064	INTERFERENCE CHOKE COIL	

SOCKET VOLTAGES 6-M-292, 6-M-293

Tube	1	2	3	4	5	6	7	8	9
6K7G	0	6.0	250	78	*	—	0	*	
6A8G	0	6.0	250	78	**	132	0	*	
6K7G	0	0	250	78	-3.8	—	6.0	3.5	
6Q7G	0	0	95	0	—	—	6.0	1.6	
6V6G	0	6.0	240	250	—	—	0	11.5	
6X5G	—	0	—	—	—	—	6.0	255	

*Sensitivity position
- —4.96 country
- —8.0 city
- —9.5 noise

**Sensitivity position
- —18.5 country
- —17.5 city
- —15.0 noise

I.F. FREQUENCY

252½ —K.C.

Voltage at Battery 6.3
Voltage of Receiver 6.0
Antenna disconnected
All Voltages measured with 1000 ohm per volt meter
Total current consumption 7.4 amperes
Sensitivity at 1 watt output - 1 microvolt
Maximum power output 6 watts.

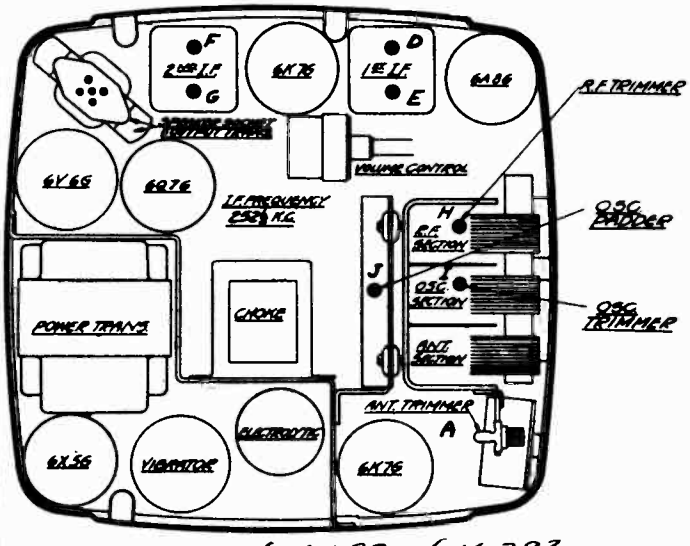
MODELS 6M292,6M293
Chassis 5645
Alignment,Socket
Trimmers
MODEL 6M295,Ch.5650
Alignment

ZENITH RADIO CORP.

MODELS 6-M-292, 6-M-293, 6-M-295

Operation	Connect Test Oscillator To	Dummy Antenna	Set Test Osc. To	Manual or Automatic Position	Set Gang Cond.	Adjust Trimmers	Purpose
1	1st Det. Grid	½ Mfd.	252.5	Manual	Max. Cap.	DEFG	I. F. Alignment
2	Rec. Ant. Lead	50 Mmfd.	1600	Manual	Min. Cap.	I	Trim Oscillator
3	Rec. Ant. Lead	50 Mmfd.	1400	Manual	1400	AH	Trim Ant. & R. F. Stage
4	Rec. Ant. Lead	50 Mmfd.	600	Manual	600	J	Rock Gang & Adjust Osc. Padder for Max. Output
5	Rec. Ant. Lead	50 Mmfd.	——	Manual	Tune To A Station Around 900 K. C. and Set Dial for Calibration		
6	Rec. Ant. Lead	50 Mmfd.	1000	Automatic	Range #2	Trim Ant. & R.F. of Automatic Unit — Trimmers "B" - "C"	
7	Connect Car Antenna to Set — Tune to Weak Station Around 1400 K. C. — Trim Antenna Trimmer "A" for Maximum Peak Output.						
8	Trim Automatic Antenna Trimmer "B" to Car Antenna on a Weak Station around 1000 K. C. on Range #2.						

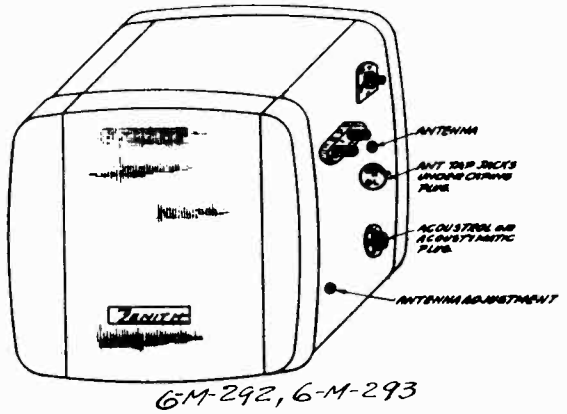
See tube layouts for location of aligning trimmers



6-M-292, 6-M-293

Fig. 7

Tube Position



6M-292, 6-M-293

Fig. 8

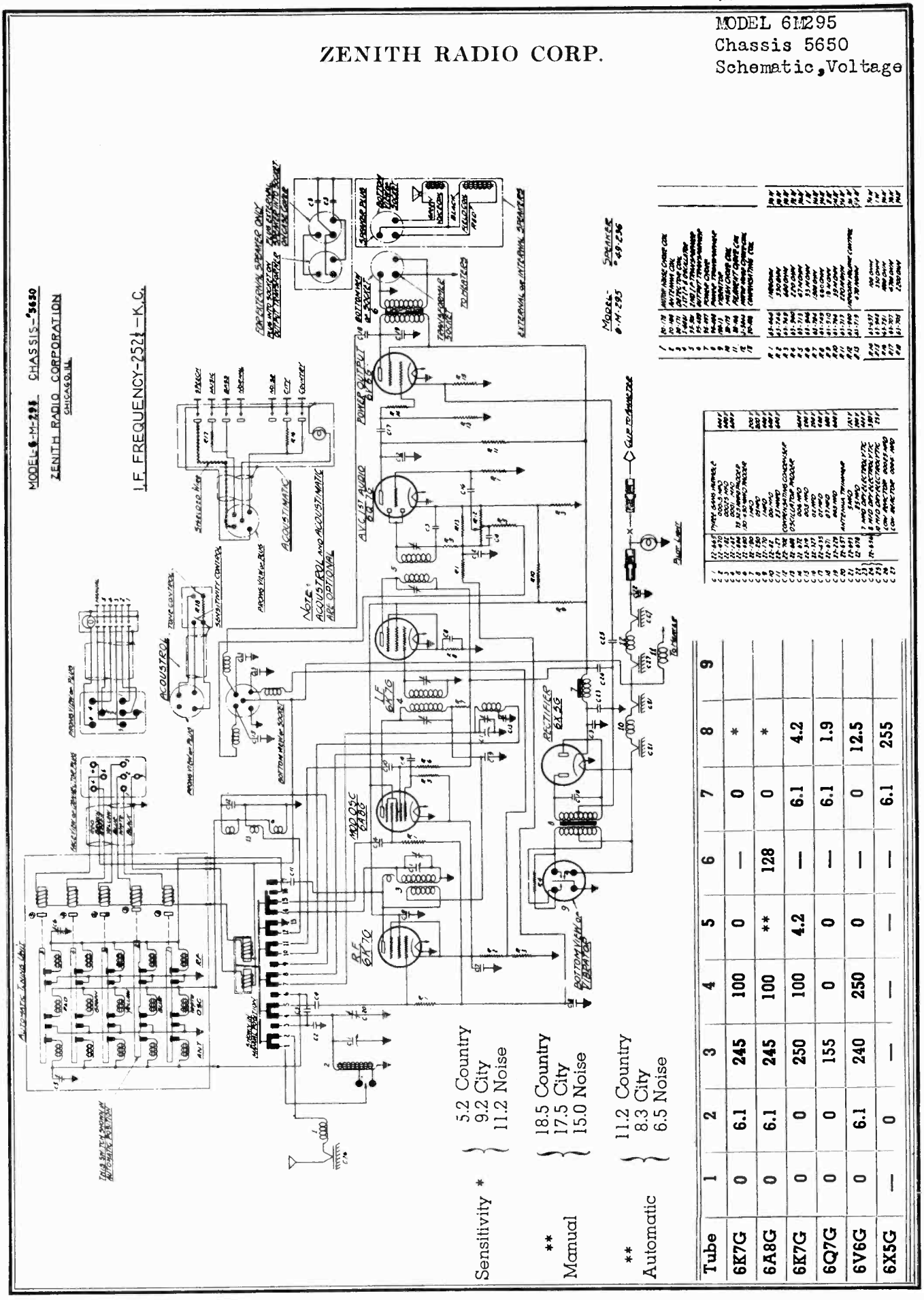
6M-292, 6-M-293

ANTENNA ALIGNMENT

Fig. 8 shows the location of the antenna tap jacks on the side of the receiver case. Remove the capping plug from over this jack assembly, and insert the antenna pin lead in the "H" or "L" position, depending on the capacity of the antenna being used The "H" position must be used for antennas with a capacity in the range of from 100 to 500 mmfd. The "L" connection must be used for low capacity antennas of from 0 to 125 mmfd. Compare this listing with that given under the various antennas, and the proper position will easily be recognized. After selecting the position desired, place the capping plug back over the hole to prevent motor noise from entering into the antenna circuit of the receiver. Connect the antenna proper by means of the Delco-Remy connector shown in Fig. 8.

ZENITH RADIO CORP.

MODEL 6M295
Chassis 5650
Schematic, Voltage



Tube	1	2	3	4	5	6	7	8	9
6K7G	0	6.1	245	100	0	—	0	*	
6A8G	0	6.1	245	100	**	128	0	*	
6K7G	0	0	250	100	4.2	—	6.1	4.2	
6Q7G	0	0	155	0	0	—	6.1	1.9	
6V6G	0	6.1	240	250	0	—	0	12.5	
6X5G	—	0	—	—	—	—	6.1	255	

MODEL 6M295
Chassis 5650
Socket, Trimmers
Antenna Data, Tuner

ZENITH RADIO CORP.

ANTENNA ALIGNMENT

Manual Tuning: Press the MANUAL button on the automatic key board. This disconnects the automatic system and allows operation of the receiver from the standard tuning mechanism. After adjusting the dial calibration accurately, turn the volume control up full and tune to a weak station near 1400 K.C. Adjust the antenna trimmer A (Fig. 8) to the point of greatest volume. This completes antenna alignment for manual operation. The trimmer does not have to be adjusted at any other point on the dial.

Automatic Tuning: Press automatic button 2 (Fig. 8) This will disconnect the manual tuning mechanism and place the automatic buttons into service. After button 2 has been pressed, turn adjusting screw 2 in either direction until a weak station between 1100 to 1000 K.C. is heard. Now adjust trimmers B and C on the automatic assembly for maximum signal strength of the weak station tuned in by the number 2 adjusting screw. The automatic is in complete resonance with the antenna over the entire automatic button range and need not be resonated at any other button setting. Adjusting screw 2 may now be tuned to a local station as outlined under "AUTOMATIC" with no further attention to adjustments B or C.

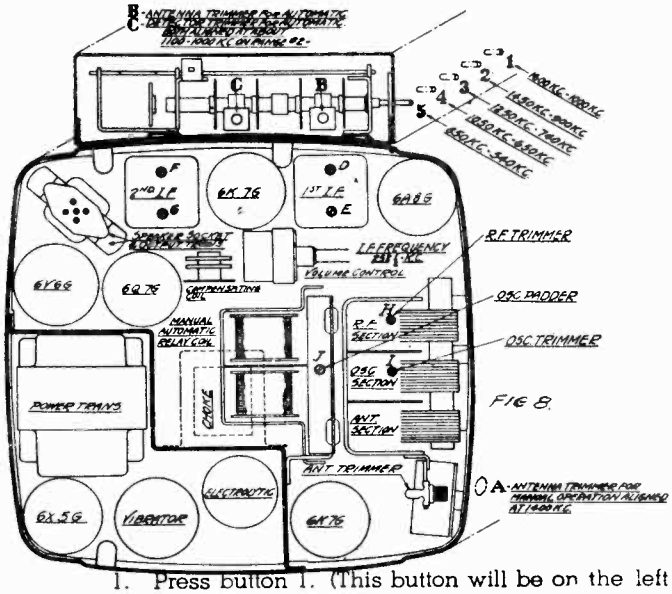


FIG 8.

AUTOMATIC

Study Fig. 8 carefully. Although simple in adjustment, best results will only be obtained if made accurately and by the following procedure.

1. Press button 1. (This button will be on the left if automatic unit is mounted on edge of instrument panel.)

2. Adjust automatic trimmer screw (until a desired local station between 1600 and 1000 K.C. is heard. Turn the screw slowly back and forth over the station as if tuning the dial of a receiver, for clearest reception and best tone quality and allow the screw setting to remain at that point.

3. Press button 2 and tune for a station between 1450 and 900 K.C. on automatic adjusting screw 2.

4. Follow above procedure for buttons 3, 4 and 5 using the ranges shown on Fig. 8.

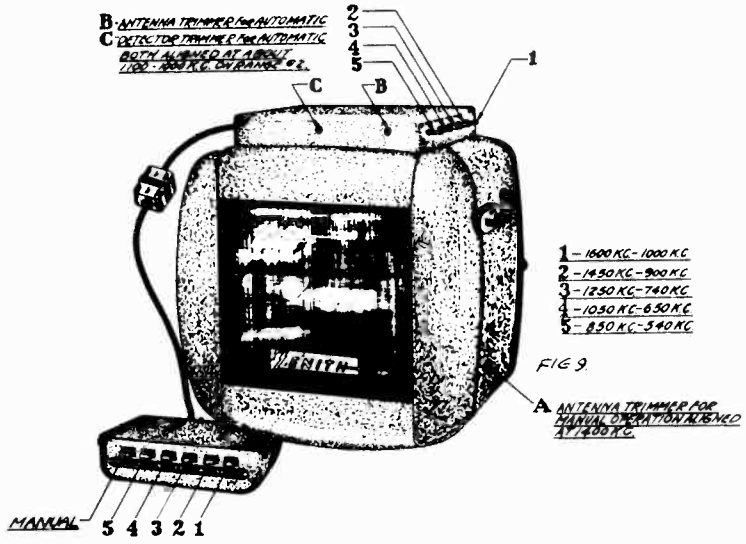
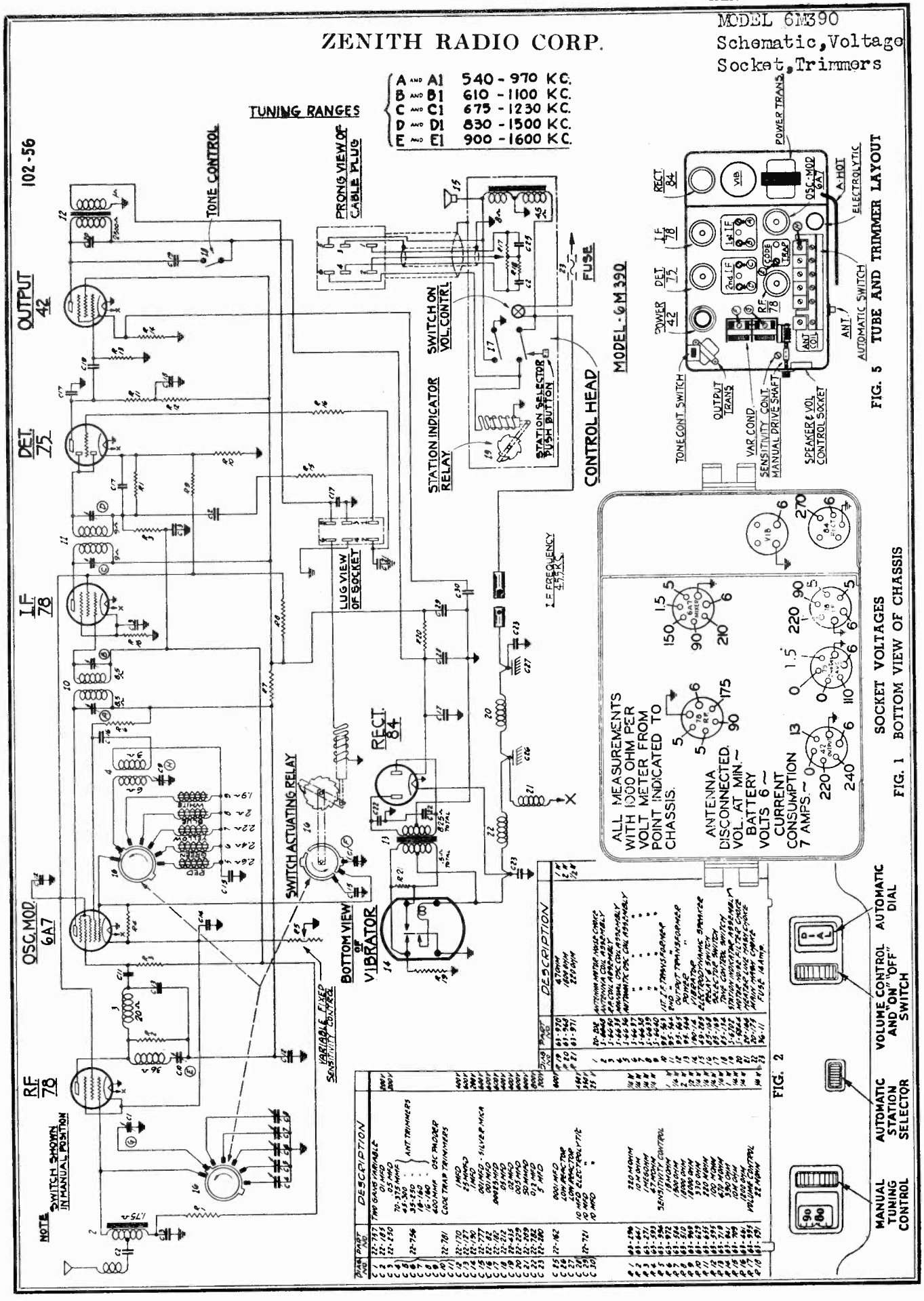


FIG 9.

5. Remove the chrome bezel over the parts adjacent to the automatic buttons and insert the station call letters cut from the sheet supplied. After placing the proper station calls in correct order over the port holes, fasten the escutcheon back in place.

6. Repeat careful adjustment of each automatic trimmer pressing the corresponding button in order from 1 to 5 to obtain best tone, loudest signal and greatest freedom from noise.



MODEL 6M390
Alignment, Trimmers
Tuner Data

ZENITH RADIO CORP.

NOTE: This receiver is equipped with a fixed-variable sensitivity control located on the chassis base below the tuning control shaft of the variable condenser. (See Fig. 5.) The control can be adjusted with a screw driver either from above or below the chassis, and is set at the factory to a position which gives a sensitivity of 10 microvolts at 1 watt output. In practice it is found advisable to hold the receiver to this level as any higher sensitivity might result in increased motor noise or excessive background noise. Unless laboratory equipment capable of accurately measuring the input and output of the receiver is available, it is not advisable to alter this setting.

MANUAL DIAL ADJUSTMENT: The manual control dial must be aligned with the receiver for correct calibration. To do this, turn the manual tuning knob in one direction as far as it will go. Now do the same in the opposite direction. Then tune in a station of known frequency, and note if the dial reading corresponds. If the frequency reading is not correct, hold the tuning knob firmly and move the dial drum with your fingers through the bezel to the correct frequency reading of the station being received.

AUTOMATIC DIAL SYNCHRONIZATION: Before setting the station adjusting screws for automatic tuning, it may be necessary to synchronize the automatic dial to the receiver which is done as follows: Turn on the receiver, and try to tune in a station with the manual tuning control. If no station can be picked up, push the automatic station selector button until a position is found where stations can be tuned in manually. Remove the automatic dial assembly by pulling out from the rear and turn the station indicator drum downward until the word "Dial" appears in the opening. The adjusting screws in the receiver can now be resonated for the stations shown around the automatic dial as the automatic button is operated. It is very important that these adjusting screws be set on a weak signal from the station so that the circuit may be sharply tuned. A very short piece of wire used as an antenna will hold down the signal strength. Always be sure the antenna characteristics are similar to actual car conditions. A 38 mmfd. condenser from antenna to ground will provide the necessary input capacity.

AUTOMATIC TUNING ADJUSTMENTS: 1. Turn the receiver on and allow it to operate until thoroughly heated. Loosen the screws holding the cover plate over the automatic adjustments, and slide it upward exposing the adjusting screws and recording strip. This plate is on the front of the receiver. (See Fig. 4.)

2. Push the automatic station selector button until the word "Dial" is at the automatic dial window. Tune in manually the station whose call letters are in the No. 1 position on the dial (the lowest frequency station—see Fig. 3) and note the program so that it can be identified. Push the automatic station selector button once, and this station's call letters will appear at the automatic window.

3. With a small screw driver, turn the station setting screw A (see Fig. 4) in the upper row to the right or left until that station is tuned in accurately. Now adjust the corresponding screw A1 in the lower row until maximum volume is obtained. Make these adjustments very carefully as it is quite easy to pass the resonant point due to the unusual selectivity of the receiver.

4. Press the automatic station selector button until "Dial" again is at the automatic window and tune in manually the station whose call letters are in the No. 2 position (the next higher frequency) on the automatic dial. Press the automatic station selector button twice to bring the No. 2 station's call letters in view, and adjust B and B1 screws to this station. Repeat this procedure until each of the five pairs of adjusting screws have been carefully set to their respective stations. It is necessary that the setting of the adjusting screws be repeated in the order given to be sure that they are properly set for maximum performance.

If the station setup on the automatic tuning dial should appear in the wrong position, the dial can easily be re-synchronized to the receiver as explained under "Dial Synchronization." If it is necessary to examine the automatic dial mechanism or change call letters it may easily be removed from the speaker housing by pressing the spring catch directly beneath the assembly and pulling out from the rear.

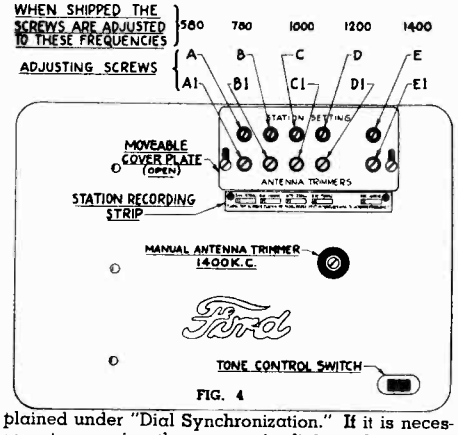


FIG. 4

If difficulty is experienced in setting the adjusting screws for the desired station, first turn the antenna trimmer screw down tight, and then adjust the station setting screw (oscillator) to the station, and follow with a readjustment of the antenna trimmer screw for resonance.

ALIGNMENT: I. F. Connect signal generator set at 455 K. C. through .1 mfd. condenser direct to 6A7 grid cap. Adjust I. F. trimmers A, B, C, D, (Fig. 5) to resonance. This should be done with the volume control of the receiver on full, and the generator signal reduced to a weak level.

Wave Trap: Remove signal generator lead from 6A7 grid, and attach to 78 R. F. tube grid. Using the same signal frequency of 455 K. C. carefully adjust the wave trap trimmer E for minimum response with a strong generator signal.

R. F. Press the automatic button to where the "Dial" position shows, or until the set can be tuned manually. Now rotate the manual tuning control until the condenser plates are completely out of mesh. Remove the generator lead from the 78 R. F. tube and connect it direct through a Zenith dummy antenna unit (Zenith part No. S6740) to the antenna socket on the receiver. Set the signal generator to 1580 K. C., and adjust the oscillator trimmer F on the gang condenser to resonance. Reset the signal generator to 1400 K. C. turn the dial until the signal is heard and adjust the gang condenser trimmer G to maximum response. Reset the signal generator to 600 K. C., and again turn the manual dial until the signal is heard. Rock the condenser gang slightly while adjusting padder H to maximum response at this point.

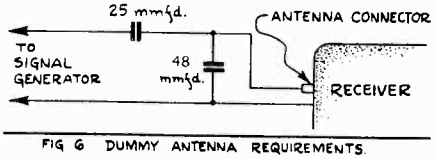


FIG 6 DUMMY ANTENNA REQUIREMENTS.

Figure 6 shows the dummy antenna requirements necessary where the special Zenith dummy connector S6740 is not available.

IMPORTANT: Unless certain dummy antenna capacities are employed with either the signal generator or in making adjustments on stations, the receiver will not respond properly. The values provided in the Zenith dummy antenna unit shown in Fig. 6 are identical with the conditions in the Ford car, and if adjusted accordingly the instrument will operate properly when reinstalled in the automobile. The Zenith dummy antenna S6740 is especially priced at 25c net to service stations. and should be purchased for use in servicing Zenith built Ford receivers.

ELECTRICAL SPECS: Rotomatic Tuning—Provides a means of selecting either manual or any one of five pre-selected stations using a single push-button. The automatically controlled circuits consist essentially of permeability tuned inductances in the oscillator circuit and mica type trimmers in the detector stage. Switching is accomplished electrically by coincidental solenoid operation of band-switch type segments.

Sensitivity—10 microvolts at 1 watt output. **Tuning range** 540—1580 K.C. **Power output**—3 watts measured at voice coil. **Speaker**—8" dynamic. **I.F.**—455 K.C. **Automatic**—Five positions and "Dial."

Tube complement—78 R.F., 6A7 mixer, 78 I.F., 75 2nd det. and audio, 42 output, 84 rectifier. **Current Consumption**—7 amp. at 6 volts.

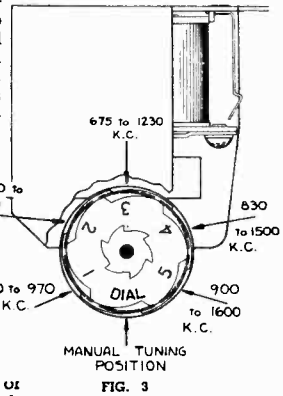


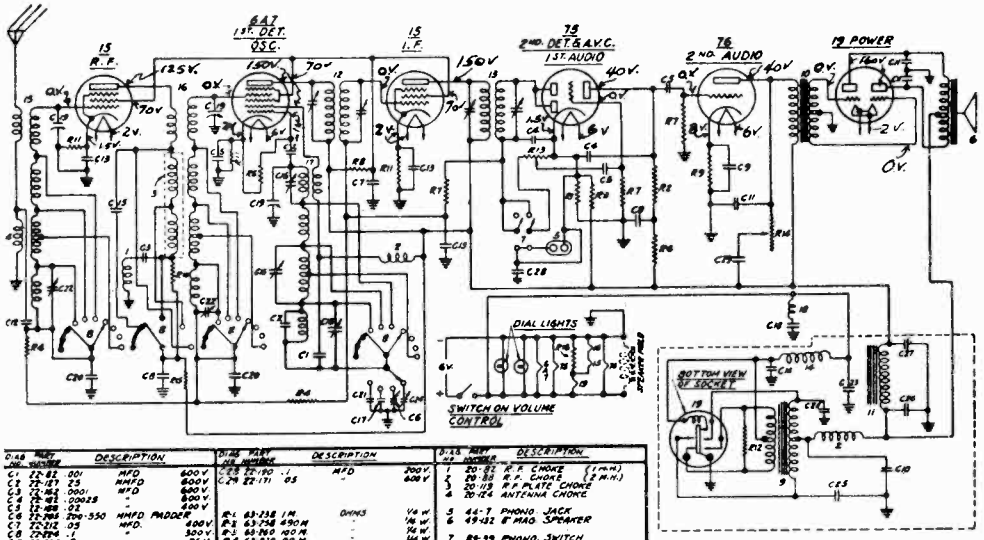
FIG. 3

Schematics, Voltage

ZENITH RADIO CORP.

MODELS 6VA27, 6VA62
Chassis 5629
MODELS 7DA119, 7DA126
7DA127, 7DA138, 7DA148
7DA162, 7DA168
Chassis 5708E

Band	Color	Kilocycles	Megacycles	Meters
A	Green	550- 1,740	55- 1.74	545 -172
B	Yellow	2,000- 7,000	2 - 7	150 - 42.8
C	Orange	150- 370	.15- .37	2,000 -800
D	Red	7,000-22,500	7 -22.5	42.8- 13.3



DIAG. REF. NO.	PART NUMBER	DESCRIPTION
C1	22-82	.001 MFD. 600 V.
C2	22-157	.25 MMFD 600 V.
C3	22-162	.0001 MFD 600 V.
C4	22-161	.00025 " 600 V.
C5	22-158	.02 " 400 V.
C6	22-266	270-550 MMFD PADDER "
C7	22-212	.05 MFD. 400 V.
C8	22-214	.1 " 200 V.
C9	22-225	.5 " 25 V.
C10	22-228	.5 " 600 V.
C11	22-229	.003 " 600 V.
C12	22-163	.01 " 600 V.
C13	22-230	.08 " 600 V.
C14	22-231	.5 " 200 V.
C15	22-267	.00005 " 600 V.
C16	22-264	2-35 MMFD. 3 GANG "
C17	22-265	.0011 MFD. 600 V.
C18	22-230	.25 " 200 V.
C19	22-269	436 MMFD. VARIABLE CONDENSER "
C20	22-410	.005 MFD 600 V.
C21	22-411	.0021 " 600 V.
C22	22-418	8-35 MMFD PADDER "
C23	22-420	.10 MFD. 25 V.
C24	22-424	50-180 MMFD PADDER "
C25	22-235	.01 MFD 1000 V.
C26	(CHASS)	2 " 250 V.
C27	(CHASS)	8 " 250 V.

DIAG. REF. NO.	PART NUMBER	DESCRIPTION
C28	22-170	.1 MFD 200 V.
C29	22-171	.05 " 600 V.
R1	63-738	1 M. OHMS 1/4 W.
R2	63-758	490 M " 1/4 W.
R3	63-760	910 M " 1/4 W.
R4	63-718	99 M " 1/4 W.
R5	63-728	49 M " 1/4 W.
R6	63-290	760 M. " 1/4 W.
R7	63-793	930 M " 1/2 W.
R8	63-853	1.9 M " 1/4 W.
R9	63-360	2 M " 1/4 W.
R10	63-361	3 M " 1/4 W.
R11	63-362	400 " 1/4 W.
R12	63-394	200 " 1/2 W.
R13	63-1434	250 M VOL CONTROL
R14	63-458	50 M. TONE CONTROL
R15	63-241	5 M. OHMS 1/2 W.
R16	63-417	100 " TAPPED TO 1/2 M.

DIAG. REF. NO.	PART NUMBER	DESCRIPTION
1	20-83	R.F. CHOKE (1 MH.)
5	20-118	R.F. CHOKE (2 MH.)
4	20-124	R.F. PLATE CHOKE
		ANTENNA CHOKE
5	44-7	PHONO. JACK
6	49-432	8" PMD. SPEAKER
7	88-99	PHONO. SWITCH
8	88-99	BAND SELECTOR SWITCH
9	53-305	RECTIFIER TRANSFORMER
10	53-311	AUDIO TRANSFORMER
11	53-324	FILTER CHOKE
12	53-323	I.F. TRANSFORMER (456 KC.)
13	85-578	2ND I.F. TRANSFORMER (456 KC.)
14	5-415	R.F. CHOKE ASSEMBLY
15	5-460	ANTENNA COIL ASSEMBLY
16	5-416	DETECTOR COIL ASSEMBLY
17	5-462	OSCILLATOR COIL ASSEMBLY
18	5-2718	R.F. CHOKE ASSEMBLY
19	130-6	VIBRATOR

I.F. FREQUENCY 456 - K.C.
6 TUBE SUPERHETERODYNE - 4 BANDS - ALL WAVE
CHASSIS NO 5629
MODEL 6VA27

ZENITH RADIO CORPORATION
CHICAGO. ILL.

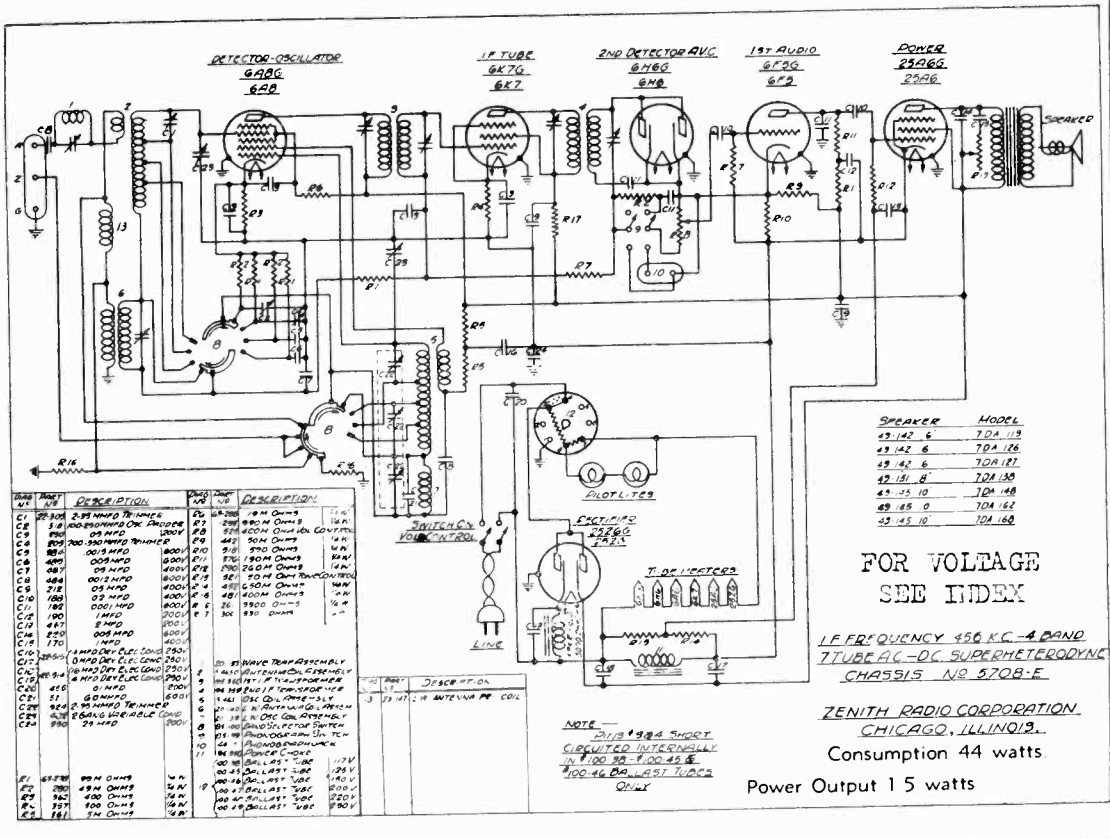
DECEMBER 30, 1935.

VOLTAGES AT SOCKET TERMINALS: - ANTENNA AND GROUND. DISCONNECTED
MEASURED FROM SOCKET TERMINALS TO GROUND WITH 1000 OHM PER VOLT D.C. METER.

FOR OTHER DATA
SEE INDEX

The tuning is divided into four bands represented by the four scales A B C and D on the dial. These letters correspond to the letters above the band indicator knob and show the range and scale in use.

BAND	COLOR	KILOCYCLES	MEGACYCLES	METERS
A	Green	492-1640	.492-1.640	610-183
B	Yellow	1750-6040	1.75-6.04	171-49.6
C	Red	5520-19000	5.52-19	54.4-15.8
D	Blue	148-400		2025-750



DIAG. REF. NO.	PART NO.	DESCRIPTION
C1	22-306	2-35 MMFD TRIMMER
C2	5-2	180-220 MMFD OSC. PADDER
C3	556	.05 MFD 200 V.
C4	554	200-550 MMFD TRIMMER
C5	557	.0015 MFD 600 V.
C6	480	.005 MFD 600 V.
C7	687	.09 MFD 400 V.
C8	484	.0012 MFD 600 V.
C9	718	.05 MFD 400 V.
C10	188	.02 MFD 400 V.
C11	192	.001 MFD 600 V.
C12	190	1 MFD 200 V.
C13	193	.8 MFD 200 V.
C14	220	.005 MFD 600 V.
C15	170	1 MFD 400 V.
C16	2854	1 MFD DRY ELEC. COND. 250 V.
C17	2854	8 MFD DRY ELEC. COND. 250 V.
C18	2854	16 MFD DRY ELEC. COND. 250 V.
C19	416	.01 MFD 200 V.
C20	51	8 MMFD 600 V.
C21	924	2-35 MMFD TRIMMER "
C22	4,38	3 GANG VARIABLE CONDENSER "
C23	990	.25 MFD 200 V.
C24	2854	1 MFD DRY ELEC. COND. 250 V.
C25	2854	8 MFD DRY ELEC. COND. 250 V.
C26	416	.01 MFD 200 V.
C27	924	2-35 MMFD TRIMMER "
C28	438	3 GANG VARIABLE CONDENSER "
C29	990	.25 MFD 200 V.
R1	63-738	1 M OHMS 1/4 W.
R2	780	490 M OHMS 1/4 W.
R3	962	910 M OHMS 1/4 W.
R4	957	99 M OHMS 1/4 W.
R5	761	49 M OHMS 1/4 W.

DIAG. REF. NO.	PART NO.	DESCRIPTION
R7	298	760 M OHMS 1/4 W.
R8	574	930 M OHMS 1/2 W.
R9	442	1.9 M OHMS 1/4 W.
R10	576	2 M OHMS 1/4 W.
R11	581	3 M OHMS 1/4 W.
R12	452	400 M OHMS 1/4 W.
R13	453	200 M OHMS 1/2 W.
R14	454	250 M OHMS VOL CONTROL
R15	36	50 M OHMS TONE CONTROL
R16	306	5 M OHMS 1/2 W.
		990 OHMS
		WAVE TRAP ASSEMBLY
	1410	ANTENNA COIL ASSEMBLY
	1411	1ST I.F. TRANSFORMER
	1412	2ND I.F. TRANSFORMER
	1441	OSC. COIL PARE-SILK
	1439	R.F. ANTENNA COIL ASSEMBLY
	1438	R.F. OSC. COIL ASSEMBLY
	81-100	BAND SELECTOR SWITCH
	81-99	PHONOGRAPH SWITCH
	5A	PHONOGRAPH JACK
	194-398	POWER CHOKE
	00-98	25Z5 - 25Z6
	00-45	BALLAST 280
	00-46	BALLAST 300
	00-47	BALLAST 280
	00-48	BALLAST 300
	00-49	BALLAST 280

Speaker	Model
49-142-6	7DA119
49-142-6	7DA126
49-142-6	7DA127
49-151-8	7DA138
49-145-10	7DA148
49-145-0	7DA162
49-145-10	7DA168

FOR VOLTAGE
SEE INDEX

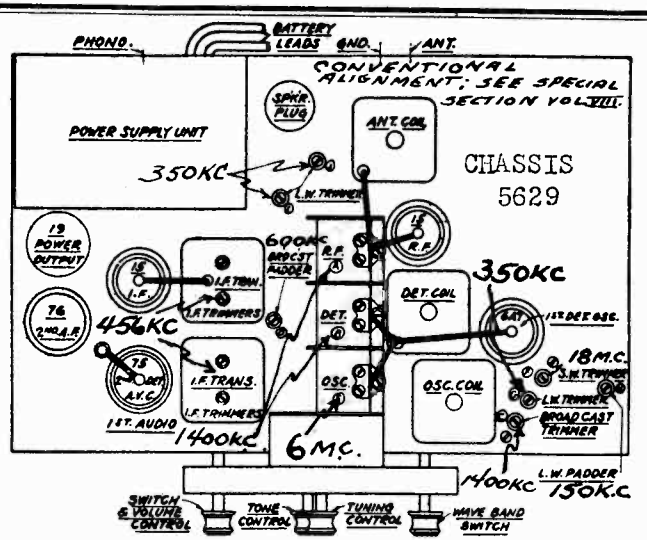
I.F. FREQUENCY 456 K.C. - 4 BAND
7 TUBE AC-DC SUPERHETERODYNE
CHASSIS NO 5708-E

ZENITH RADIO CORPORATION
CHICAGO, ILLINOIS.

Consumption 44 watts.

Power Output 15 watts

NOTE — 7H19 & 7H84 SHORT CIRCUITED INTERNALLY IN 7100 9A - 7100 45 & 7100 46 BA BALLAST TUBES ONLY



CHASSIS 5517A ALIGNMENT PROCEDURE

(1) Connect the output leads of the signal generator to the grid of the first detectot and receiver ground. Also connect an output meter across the speaker transformer leads.

(2) Set the signal generator at 456 K.C. and carefully adjust the four I.F. trimmers to the point giving the highest reading of the output meter. These adjustments should be repeated several times to secure the greatest accuracy.

All adjustments should be made using as weak an output from the signal generator as possible in order to prevent the A.V.C. action from affecting the output readings.

(3) Change the signal generator leads to the antenna and ground terminals of the receiver.

(4) Adjust the wave trap (located on rear of chassis) for minimum output reading.

(5) Set signal generator at 6 M.C. Switch receiver to band B and adjust osc. trimmer on gang for correct dial reading at 50 meters.

(6) Set signal generator at 1400 K.C. Switch receiver to band A and adjust broadcast trimmer (see diagram) for correct dial reading at 215 meters. Also adjust det. trimmer on gang for greatest output reading.

(7) Set signal generator to 600 K.C. and rock pointer past 500 meters on dial while adjusting the broadcast padder (adjacent to gang) to combination giving the greatest output reading.

(8) Repeat operation No. 6.

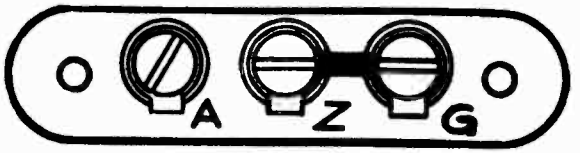
(9) Set the signal generator at 17 M.C. Switch the receiver to band C and adjust short wave trimmer while rocking pointer past 17.5 meters on dial to combination giving the greatest output.

(10) Set the signal generator at 375 K.C. Switch receiver to Band D and adjust the long wave trimmer for correct dial reading at 800 meters. Also adjust the long wave ant. trimmer to resonance.

(11) Set the signal generator at 167 K.C. Rock the pointer past 1800 meters on dial and adjust the long wave padder to point giving the highest output.

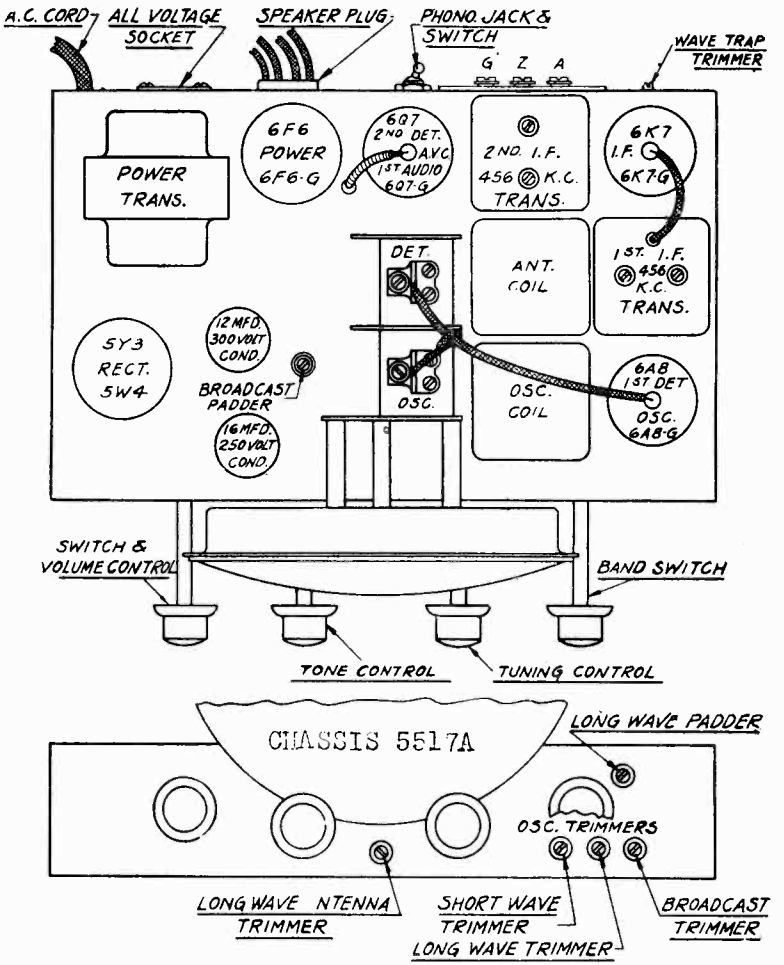
(12) Repeat operation No. 10.

CHASSIS 5517A **IMPORTANT!**



Connect ordinary single wire antenna to A. Jumper wire placed between Z and G (shipped from factory in this manner.)

When using a ZENITH DOUBLET ANTENNA, remove jumper wire between Z and G and attach doublet lead-in to A and Z.



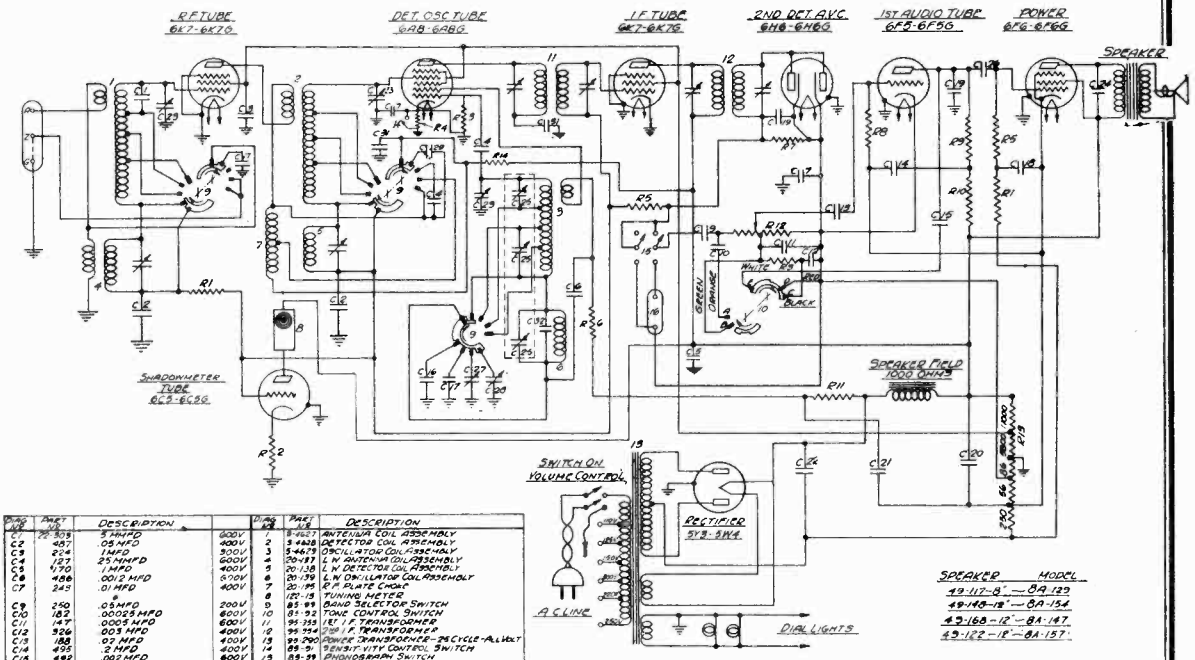
MODELS 8A232, 8A242, 8A244
8A262, Chassis 5804AT
Schematics

ZENITH RADIO CORP.

MODELS 8A129, 8A154, 8A147
8A157, Chassis 5802A

BAND	COLOR	KILOCYCLES	HEGACYCLES	METERS
A	Green	492-1640	.492- 1.640	610 -183
B	Yellow	1750-6040	1.75 - 6.04	171 - 49.6
C	Red	5520-19000	5.52 -19	54.4- 15.8
D	Blue	148-400		2025 -750

FOR OTHER DATA SEE INDEX



SPEAKER	MODEL
49-117-8"	8A-129
49-145-12"	8A-154
49-168-12"	8A-147
49-122-12"	8A-157

Ckt. No.	Part No.	Description		Ckt. No.	Part No.	Description	
C1	22-309	.5 MMFD	600V	1	5-4627	ANTENNA COIL ASSEMBLY	
C2	487	.05 MFD	400V	2	5-4628	DETECTOR COIL ASSEMBLY	
C3	224	.1 MFD	300V	3	5-4675	OSCILLATOR COIL ASSEMBLY	
C4	127	25 MMFD	600V	4	20-187	I.F. ANTENNA COIL ASSEMBLY	
C5	170	.1 MFD	400V	5	20-138	I.F. DETECTOR COIL ASSEMBLY	
C6	486	.001 MFD	600V	6	20-139	I.F. OSCILLATOR COIL ASSEMBLY	
C7	245	.01 MFD	400V	7	20-195	R.F. PLATE CHOKE	
C8	250	.05 MFD	200V	8	120-15	TUNING METER	
C9	182	.00025 MFD	600V	9	85-99	BAND SELECTOR SWITCH	
C10	147	.0005 MFD	600V	10	85-92	TONE CONTROL SWITCH	
C11	526	.003 MFD	400V	11	95-355	1ST. I.F. TRANSFORMER	
C12	188	.02 MFD	400V	12	95-354	2ND I.F. TRANSFORMER	
C13	498	.2 MFD	400V	13	99-290	POWER TRANSFORMER - 25 CYCLE - ALL VOLT	
C14	492	.002 MFD	600V	14	89-91	SENSITIVITY CONTROL SWITCH	
C15	485	.005 MFD	600V	15	89-95	PHONOGRAPH SWITCH	
C16	495	.005 MFD	600V	16	44-7	PHONOGRAPH JACK	
C17	394	.0015 MFD	600V				
C18	219	.03 MFD	200V				
C19	162	.0001 MFD	600V				
C20	22-49	8 MFD DRY ELEC COND	450V	R1	63-218	99 M OHMS	1/2W
C21	22-49	2 MFD DRY ELEC COND	450V	R2	303	700 OHMS	1/2W
C22	22-49	1/4 MFD WET ELEC COND	450V	R3	280	49 M OHMS	1/2W
C23	485	.5 GANG VARIABLE COND.		R4	300	990 OHMS	1/2W
C24	229	.005 MFD	600V	R5	293	990 M OHMS	1/2W
C25	324	2-95 MMFD TRIMMER		R6	273	1.1 M OHMS	1/2W
C26	455	.02 MFD	600V	R7	481	600 M OHMS	1/2W
C27	205	200-350 MMFD RADDER		R8	278	2 MEGOHMS	1/2W
C28	518	100-350 MMFD GRADDER		R9	268	4.990 M OHMS	1/2W
C29	320	650 MMFD	600V	R10	276	1.990 M OHMS	1/2W
				R11	295	1.9 M OHMS	1/2W
C31	212	.05 MFD	400V	R12	326	2 MEGOHM VOL CONTROL & SWITCH	
C32	321	.66 MMFD	600V	R13	515	CARBOHM RESISTOR	
				R14	466	990 OHMS	1/2W

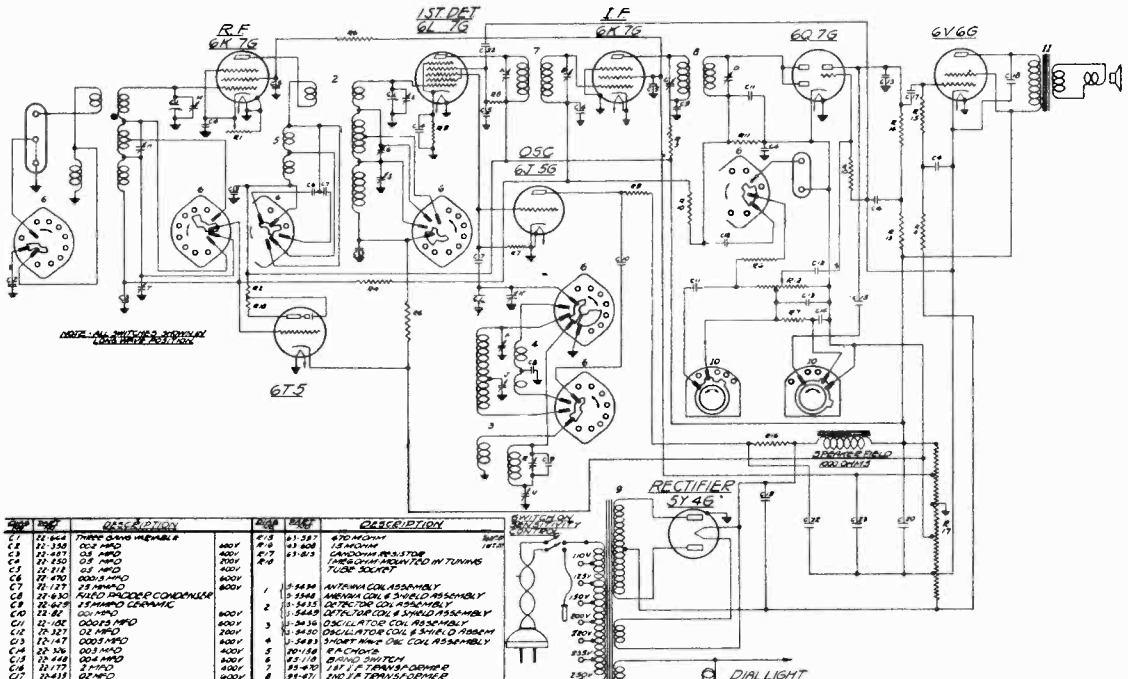
Consumption 85 watts.
Power Output 5 watts.

I.F. FREQUENCY 456 K.C.
8 TUBE SUPERHETERODYNE ~ 4 BAND
CHASSIS NO 5802A

ZENITH RADIO CORPORATION
CHICAGO, ILLINOIS.

The total consumption is 70 watts. Power output 4.5 watts.

BAND	KILOCYCLES	MEGACYCLES	METERS
Short Wave	23,076 — 5660	23 — 5.6	13 — 53
Standard Broadcast	1538 — 499	1.5 — .49	195 — 601
Long Wave	411 — 150	.41 — .15	729 — 1937
Phono —			



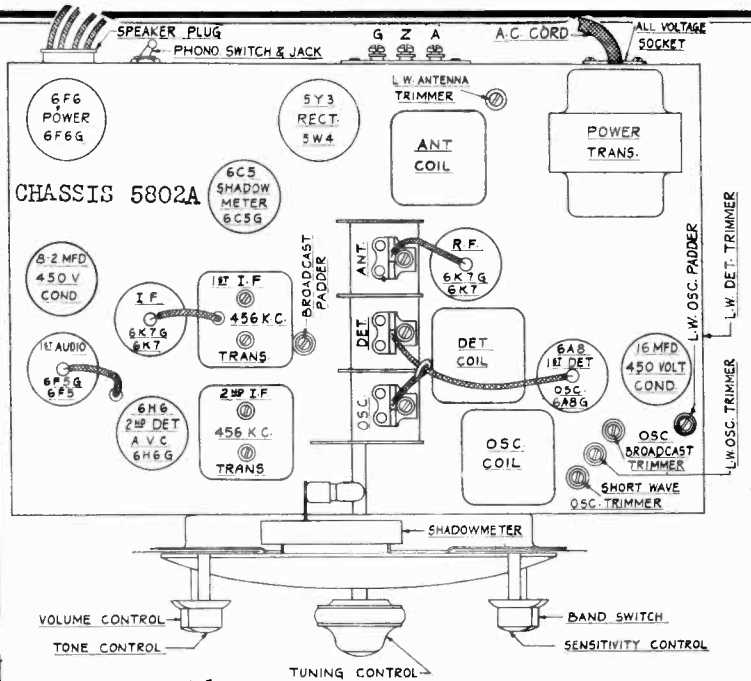
Ckt. No.	Part No.	Description		Ckt. No.	Part No.	Description	
C1	22-644	THREE GANG VARIABLE		R1	61-387	470 M OHM	
C2	22-338	.001 MFD	400V	R2	61-808	1.5 M OHMS	
C3	22-497	.05 MFD	400V	R3	61-803	CARBOHM RESISTOR	
C4	22-450	.05 MFD	200V	R4		THROUGH MOUNTED IN TUNING	
C5	22-816	.05 MFD	400V			TUBE SOCKET	
C6	22-490	.0005 MFD	600V				
C7	22-127	25 MMFD	600V	1	5-5434	ANTENNA COIL ASSEMBLY	
C8	22-630	RADIO PADDER CONDENSER		2	5-5548	ANTENNA COIL & SHIELD ASSEMBLY	
C9	22-629	450 MMFD CERAMIC			5-5435	DETECTOR COIL ASSEMBLY	
C10	22-82	.001 MFD	600V		5-5449	DETECTOR COIL & SHIELD ASSEMBLY	
C11	22-182	.00025 MFD	600V	3	5-5436	OSCILLATOR COIL ASSEMBLY	
C12	22-327	.02 MFD	200V		5-5450	OSCILLATOR COIL & SHIELD ASSEM	
C13	22-147	.0005 MFD	600V	4	5-5683	SHORT WAVE OSC. COIL ASSEMBLY	
C14	22-326	.003 MFD	400V	5	20-158	R.F. CHOKE	
C15	22-148	.0025 MFD	600V	6	85-15	BAND SWITCH	
C16	22-177	.2 MFD	400V	7	95-470	1ST I.F. TRANSFORMER	
C17	22-631	.02 MFD	600V	8	95-471	2ND I.F. TRANSFORMER	
C18	22-455	.01 MFD	200V	9	95-681	POWER TRANSF. 25 CYCLE - ALL VOLTAGE	
C19	22-633	8 MFD ELECTROLYTIC	475V	10	89-108	TONE CONTROL SWITCH	
C20		4 MFD ELECTROLYTIC	450V	11		SPEAKER FIELD WINDING	
C21	22-636	4 MFD ELECTROLYTIC	450V				
C22		4 MFD ELECTROLYTIC	150V			VARIABLE TRIMMERS	
C23		8 MFD ELECTROLYTIC	250V			1ST I.F. TRANS. PRIMARY	
						1ST I.F. TRANS. SECONDARY	
R1	63-812	SENSITIVITY CONTROL				2ND I.F. TRANS. PRIMARY	
R2	63-809	12 M OHM	1/2W			2ND I.F. TRANS. SECONDARY	
R3	63-803	1030 OHM	1/2W			BROADCAST OSC. (SEE NOTE)	
R4	63-333	100M OHM	1/2W			DETECTOR BROADCAST (SEE NOTE)	
R5	63-343	3.3 M OHM	1/2W			ANTENNA BROADCAST (SEE NOTE)	
R6	63-331	1000 OHM	1/2W			BROADCAST PADDER	
R7	63-331	1000 OHM	1/2W			SHORT WAVE OSC.	
R8	63-331	47 M OHM	1/2W			SHORT WAVE DETECTOR (SW & BC)	
R9	63-203	.2 M OHM	1/2W			SHORT WAVE ANTENNA (SW & BC)	
R10	63-632	10 M OHM	1/2W			LONG WAVE OSC.	
R11	61-171	1650 OHM	1/2W			LONG WAVE DETECTOR	
R12	63-838	2.8 M OHM	1/2W			LONG WAVE ANTENNA	
R13	63-934	2450 OHM VOL CONTROL				LONG WAVE PADDER	
R14	63-654	180 M OHMS	1/2W			NOTE - TRIMMERS ARE ADJUSTED AT FACTORY AND SEALED.	
R15	63-1096	2.2 M OHMS	1/2W				

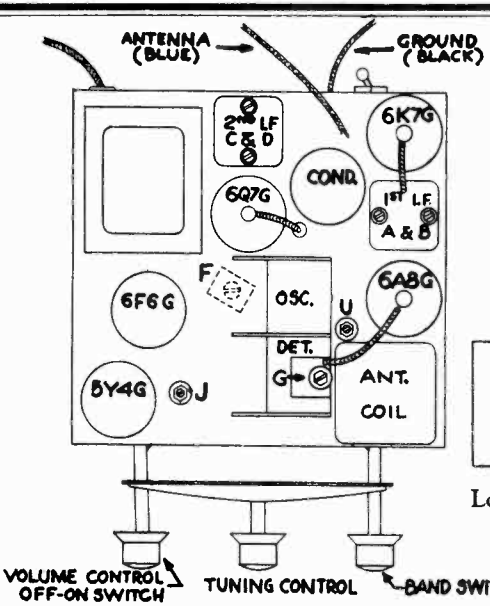
MODEL	SPEAKER
8-A-232	49-226-8 IN
8-A-242	49-226-8
8-A-244	49-227-10
8-A-262	49-220-12

I.F. FREQUENCY 456 KC.
8 TUBE SUPERHETERODYNE
3 BAND LONG WAVE
CHASSIS NO 5804AT
ZENITH RADIO CORPORATION
CHICAGO, ILLINOIS

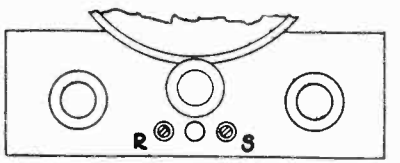
MODELS 5L228, 5L237
Chassis 5525
MODELS 8A129, 8A147
8A154, 8A157
Chassis 5802A
Alignment, Socket
Trimmers

ZENITH RADIO CORP.





CHASSIS 5525



Location of Tubes and Trimmers

CHASSIS 5525 Alignment Procedure

Operation	Sig. Gen. Connected to	Dummy	Gen. Freq.	Band Switch	Receiver Dial	Trimmer	Remarks
1	1st Det. Grid	½ mfd.	456KC	Med. Wave	550	ABCD	I F Alignment
2	Rec. Ant. Lead	200 mmfd	1500	Med. Wave	1500	F	Set Osc to scale
3	Rec. Ant. Lead	200 mmfd	1500	Med. Wave	1500	G	Adj. for Max. Output
4	" " "	" "	550	" "	550	J	Rock gang and adjust. for max. Output
5	" " "	" "	1500	" "	1500	F—G	Repeat two and three
6	" " "	" "	400	L. W.	400	R	Ser. Osc. to Scale
7	" " "	" "	400	L. W.	400	S	Adjust for Max. Output
8	" " "	" "	166.7	L. W.	166.7	U	Rock Gang while adjusting for Max. Output
9	" " "	" "	400	L. W.	400	R—S	Repeat six and seven

ALIGNMENT PROCEDURE

Chassis 5802-A

(1) Connect the output leads of the signal generator to the grid of the first detector and receiver chassis. Also connect an output meter across the speaker transformer leads.

(2) Set the signal generator at 456 K. C. and carefully adjust the four I. F. trimmers to the point giving the highest reading on the output meter. The output transformers are of a very high gain, selective type, and these adjustments should be repeated several times in order to secure maximum accuracy. All adjustments should be made using as weak an output from the signal generator as possible in order to prevent the A. V. C. action from affecting the output readings.

(3) Change the signal generator leads to the antenna and ground terminals of the receiver.

(4) Set signal generator at 6 M. C.—Switch receiver to Band B and adjust osc. trimmer on gang for correct dial reading at 50 meters.

(5) Set signal generator at 1500 K. C.—Switch receiver to band A and adjust broadcast trimmer for correct dial reading at 200 meters. Also adjust ant. and det. trimmer on gang to resonance.

(6) Set signal generator at 17.5 M. C.—Switch receiver to band C and adjust the short wave trimmer while rocking the pointer past 17 meters on the dial to the combination giving the greatest output.

(7) Set signal generator at 600 K. C.—Switch receiver to band A, and rock pointer past 500 meters on dial while adjusting the broadcast padder (located adjacent to gang condenser) to combination giving the greatest output reading.

(8) Repeat operation No. 5.

(9) Set signal generator at 375 K. C. Switch receiver to Band D and adjust long wave osc. trimmer for correct dial reading at 800 meters. Also adjust long wave det. and ant. trimmers (located on side and rear of chassis), for maximum output reading.

(10) Set signal generator at 150 K. C. and rock pointer past 2000 meters on dial while adjusting the long wave osc. padder to combination giving the highest output reading.

(11) Repeat operation No. 9.

ZENITH RADIO CORP.

MODEL 8S359, Ch. 5807
Schematic, Voltage
Socket, Trimmers

Model 8S359

CONVERTER 6A8G — I.F. 6K7G — DETECTOR 6J5G — AMP. 6F5G — AMP. 6P5G — PWR.-AMP. 6AC5G

SPEAKER 49-249-12" — MODEL 8-5-359

SPEAKER

INDICATOR 6U5

SPEAKER FIELD 1270 OHMS

SWITCH ON VOL. CONTROL

RECT. 6X5G

NOTE - SWITCH SHOWN IN BROADCAST POSITION.

I.F. FREQUENCY 455 K.C.
8-TUBE SUPERHETERODYNE
CHASSIS Nº 5807-A.C. 3-BAND

LEGEND

NC — No Connection
SH — Shield
H — Heater
P — Plate
S — Screen
G — Grid
SU — Suppressor
D — Diode
F — Filament
K — Cathode

All voltages measured from chassis to point indicated using a 1000 ohm per volt meter. Antenna disconnected. Volume control at minimum. Band switch on manual B.C. position.

Line voltage 114 v.

(A) Grid bias for 6A8 and 6K7 tubes measured from chassis to K of 6J5 tube is neg. 1.3 volts.

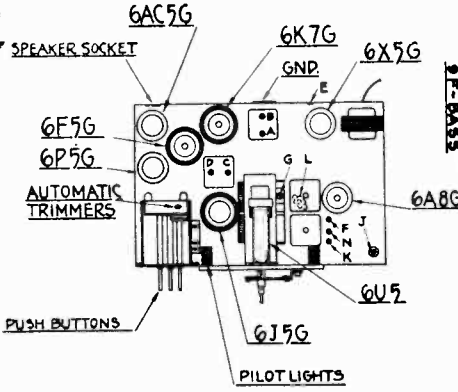
RECTIFIER 6X5G — I.F. AMP. 6K7G — OUTPUT 6AC5G

1ST. DET.-OSC. 6A8G — N.C.-NO CONNECTION — 2ND. DET.-AVC. 6J5G — 1ST. AUDIO 6F5G — OUTPUT 6P5G

VOLTS ACROSS SPEAKER FIELD APPROX. - 63 V.

BOTTOM VIEW OF CHASSIS

FRONT OF CHASSIS



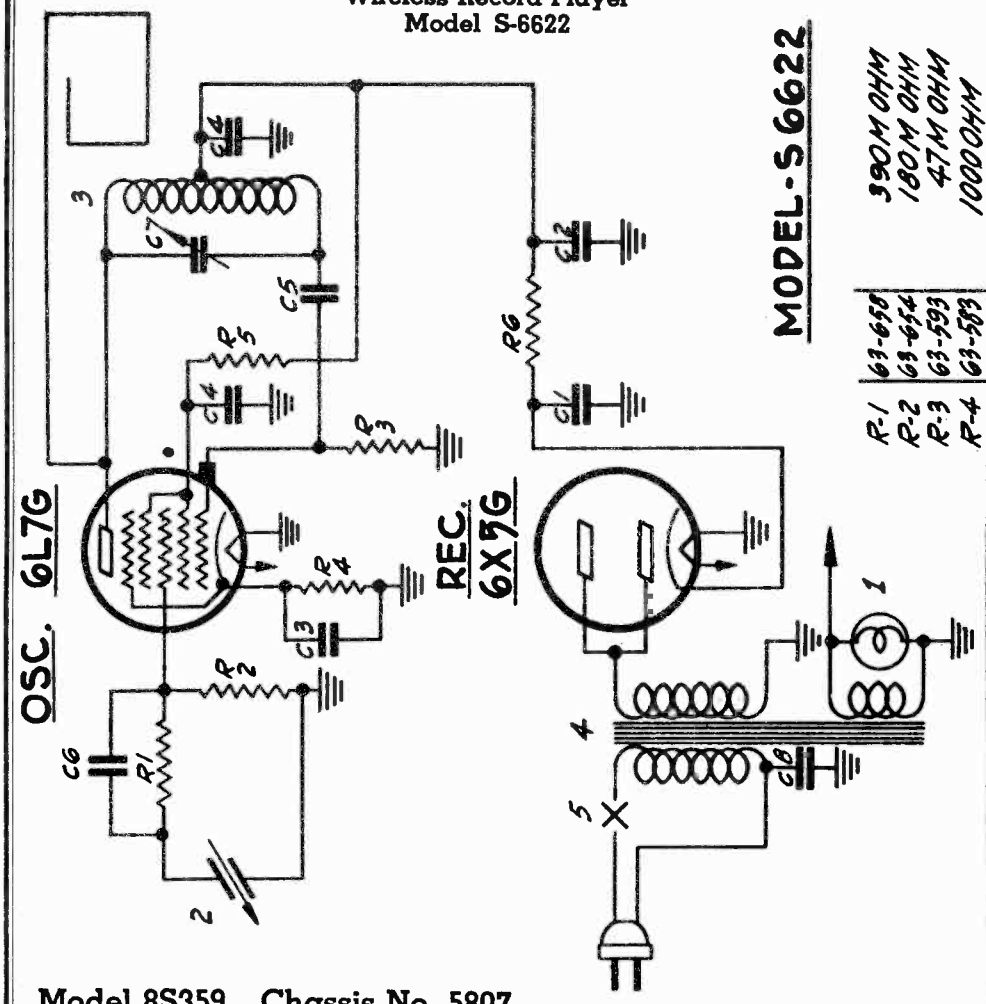
Location of tubes and trimmers

MODEL 8S359,Ch.5807
Alignment
MODEL S-6622
Wireless Record Player
Schematic

ZENITH RADIO CORP.

PHONOGRAPH OSCILLATOR

Wireless Record Player
Model S-6622



DIAG No	PART No	DESCRIPTION						
C-1 C-2	22-768	16MFD ELECTROLYTIC	200V	63-658	390M OHM	1/4W		
		40MFD "	150V	63-654	180M OHM	1/4W		
C-3	22-250	.05MFD	200V	63-593	47M OHM	1/4W		
C-4	22-196	.01 MFD	600V	63-583	1000OHM	1/4W		
C-5	22-182	.00025MFD	600V	63-587	4700OHM	1/4W		
C-6	22-147	.0005MFD	600V	63-964	4700OHM	1/2W		
C-7	22-463	TRIMMER						
C-8	22-525	.005MFD	1000V					

1	100-36	PILOT LIGHT-6.3V. .25A.	
2	142-14	PICK-UP ARM-COMPLETE	
	142-16	CRYSTAL UNIT ONLY	
3	S-6635	OSC. COIL ASSEM.	
4	95-567	POWER TRANS.	
5	95-170	SWITCH	

Model 8S359. Chassis No. 5807

ALIGNMENT PROCEDURE

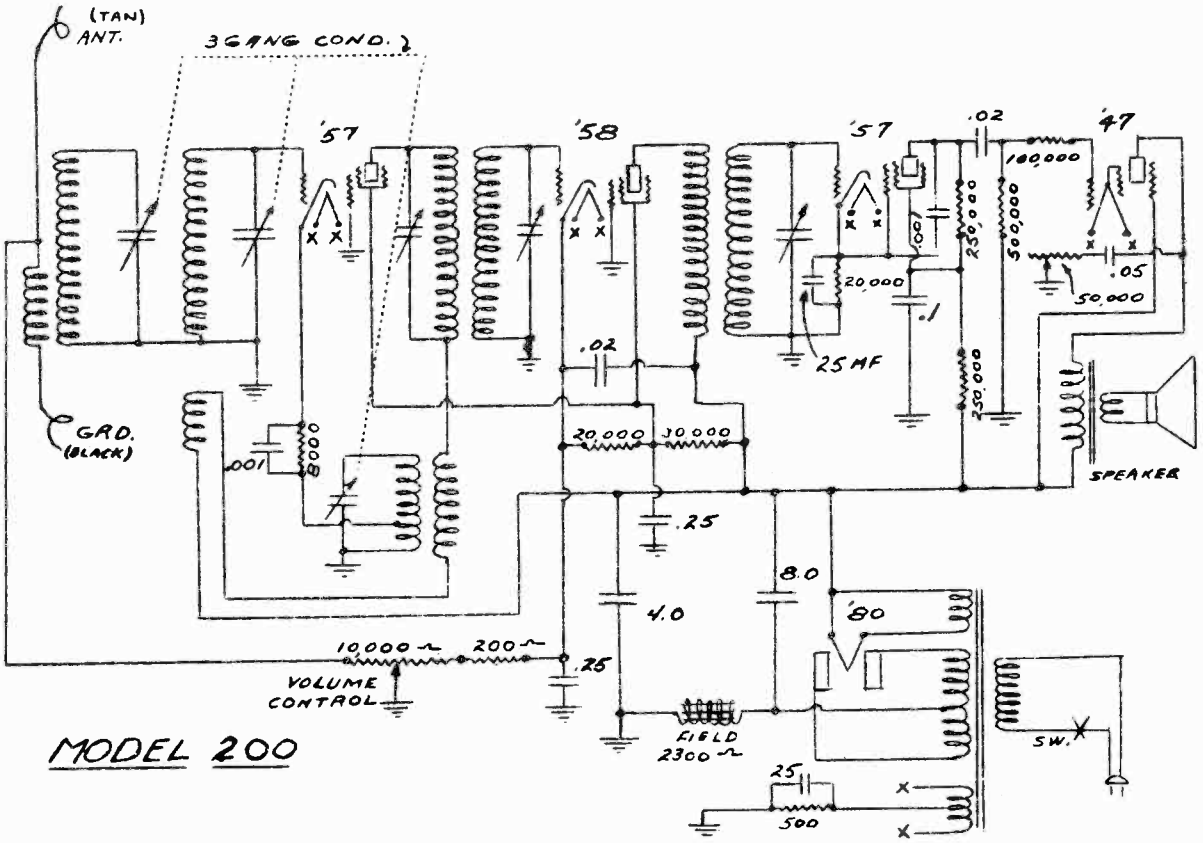
Operation	Connect Test Oscillator to	Dummy Antenna	Set Test Osc. to	Band	Set Dial At	Adjust Trimmers	Purpose
1	1st Det. Grid	1/2 Mfd.	455	Br'dc't	600	ABCD	I. F. Alignment
2	Rec. Ant. Post	200 Mmfd.	455	"	600	E	See Note
3	" " "	200 Mmfd.	1500	"	1500	F	Set Osc. to Scale
4	" " "	200 Mmfd.	1500	"	1500	G	Al'gment of Ant.
5	" " "	200 Mmfd.	600	"	600	J	Rock gang & adj. for max. output.
6	" " "	200 Mmfd.		"		FG	Repea 3 & 4
7	" " "	400 Ohms	18000	S.W.	18000	K	Set Osc. to Scale
8	" " "	400 Ohms	18000	S.W.	18000	L	Rock Gang & adj. for max. output.
9	" " "	400 Ohms	6000	Police	6000	N	Rock Gang & adj. for max. output.

NOTE: If receiver is used in location subject to code interference adjust wave trap (E) for minimum interference with antenna connected and receiver operating in broadcast band.

MODELS 834,1102,1106
Chassis 1002
Alignment,Notes

ZENITH RADIO CORP.

MODEL 200
Schematic



MODELS 1102,1106,and 834. CHASSIS 1002

All components used in these models as the same as those used in Zenith Chassis 1001 - 1001A excepting the following changes.

Parts added	Parts Deducted
26-75 Complete Dial and Drive Assem.	(26-66 Dial and Drive
26-73 Dial scale only	(26-67 Dial Scale only)
22-305 (2) 35 mfd. Condensers	(22-289 Condenser)
22-245 Padder	(22-225 Condenser)
S-3317 Long wave ant coil Assem.	(20-84 7 Meter coil)
S-3318 Long wave osc. coil ..	(S-3115 7 Meter coil)
S-3321 Long Wave Dectector Coil Assem.	

The long wave band has two trimmers on each stage. The oscillator stage has a trimmer and padder assembly of the nut and screw type. The nut is the trimmer and the screw is the padder.

The detector and R.F. stages each have two trimmers whose actions are dependent. The arrangement consists of a coupling condenser and a coil trimmer.

The coil trimmer can be distinguished in that one side is grounded. Maximum gain with this system is obtained by having the coupling condenser with as much capacity as possible and still be able to obtain a peak on the coil trimmer.

BALANCING PROCEDURE FOR LONG WAVE

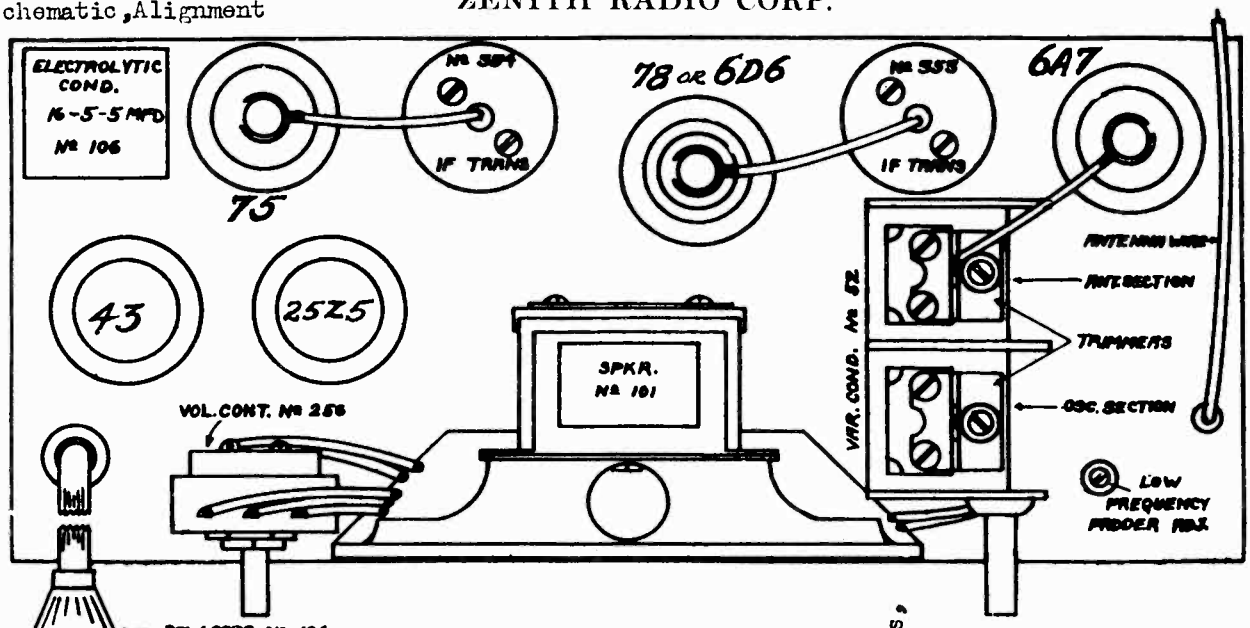
Connect service oscillator to antenna post and set at 375 KC. Set dial at 375 KC. Adjust nut on oscillator trimmer assembly to bring in signal. Open R.F. and detector coil trimmers as far as possible and still leave enough capacity for peaking (about 2 or 3 turns). Open coupling condensers until what appears to be resonance is obtained. Then repeak coil trimmers to resonance. Remember the resonance obtained by means od the coupling condensers is not true resonance and the coil trimmers must be re-adjusted for true resonance.

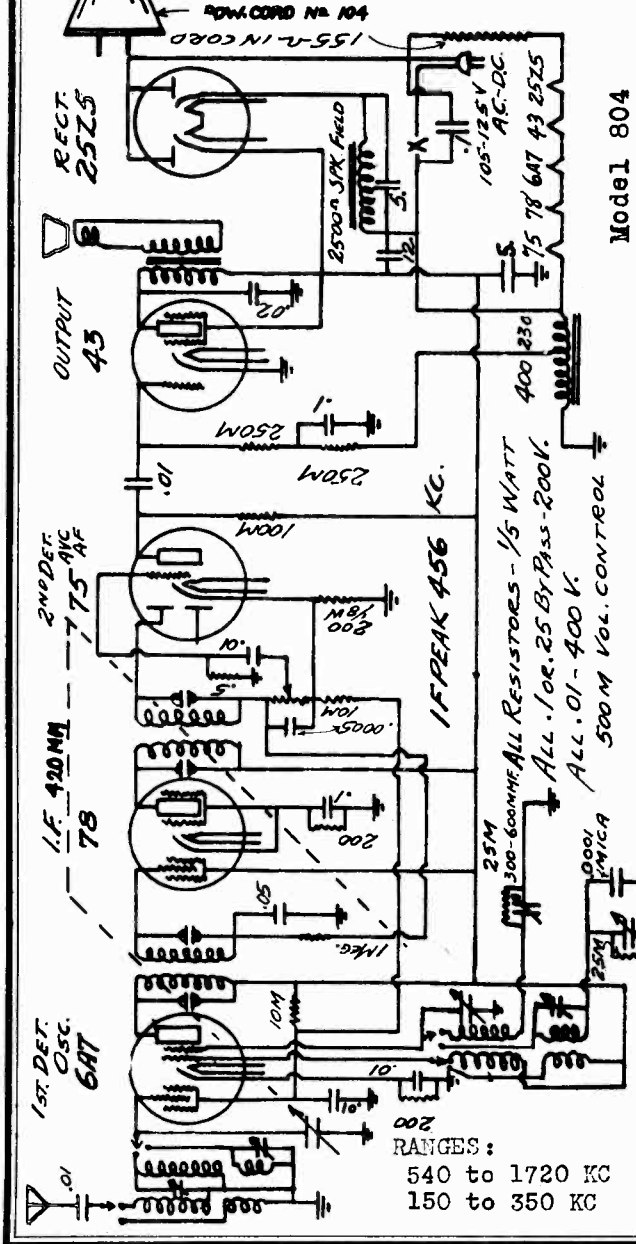
Move I.F. selector switch to 160 KC. and set dial at this point. Adjust padder screw in oscillator coil assembly for maximum gain, rocking condenser to reach this point, whereever it happens to fall. Repeak 375 KC. as it will be thrown off by the movements of the padder.

MODEL 804
Schematic, Alignment

ZENITH RADIO CORP.

Socket, Trimmers





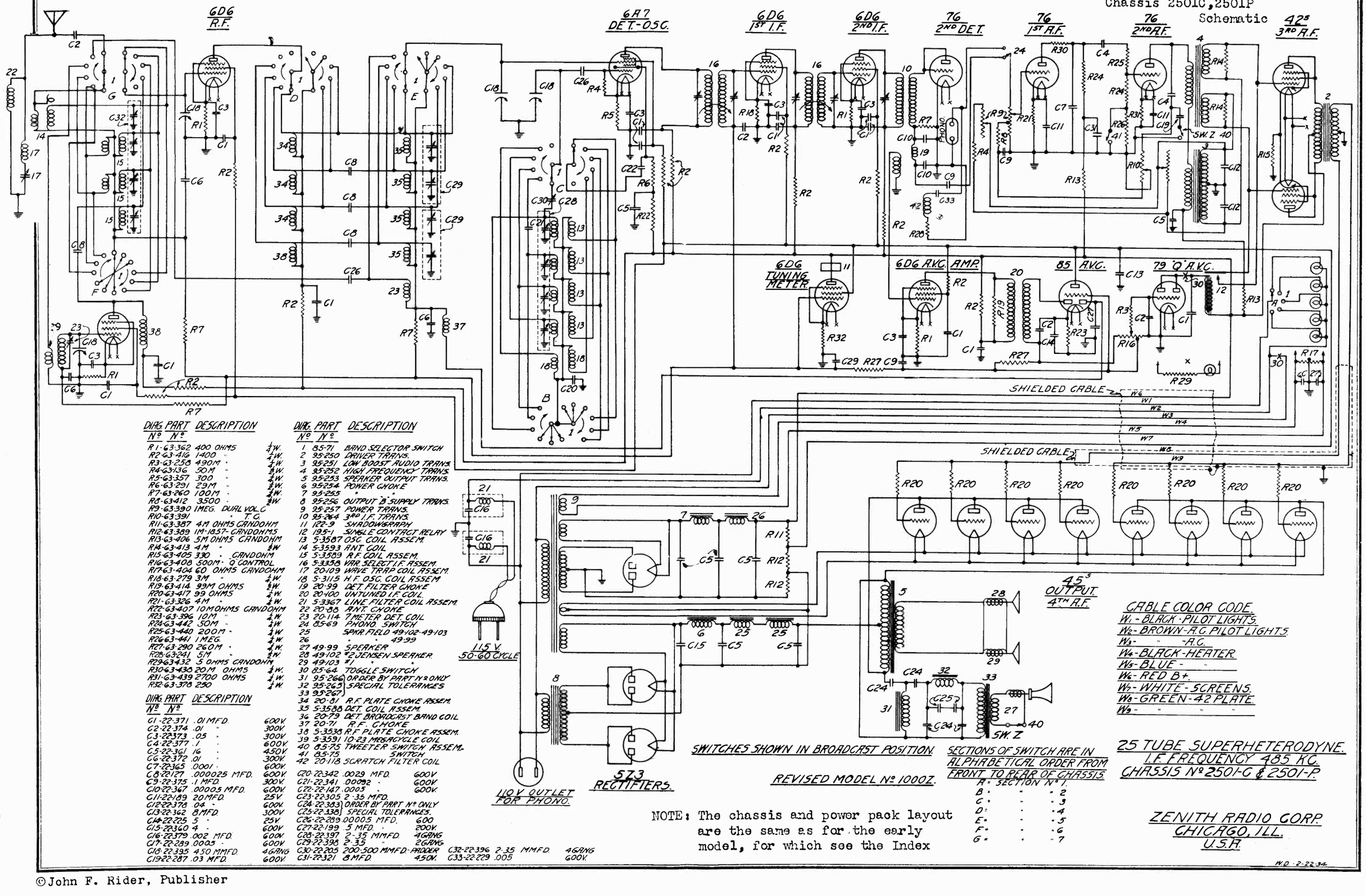
To align receiver, proceed as follows:

1. Peak I R transformer, applying a 456 KC note on the 6A7 control grid.
2. Turn variable condenser all the way open and apply a 1712 KC note to the antenna. Set oscillator trimmer on oscillator section of variable condenser first, then line up R F section.
3. Adjust low frequency padder at 600 KC, rocking condenser back and forth across 600 KC signal and adjust for maximum gain.
4. Go back and check 1400 KC alignment.
5. Long Wave- Apply 150 KC note to antenna. Set long wave oscillator and R F trimmers, through holes at front of chassis, for maximum gain.
6. Apply a 300 KC note to the antenna and adjust long wave padder, through hole on front of chassis, for maximum gain - rocking condenser back and forth while adjusting.
7. Go back and check 150 KC again for alignment.

NOTE: Supply cord of set gets warm while operating set, this is normal.
Make sure that all tubes are pushed firmly in their proper sockets.
Unreel antenna supplied with set, to full length and place along the floor or drop out of window, if an outdoor antenna is used, make sure connection to set antenna (brown wire) is good.
DO NOT ATTACH A GROUND WIRE TO THIS SET.
If necessary to service chassis, under no circumstances remove the chassis without first removing plug from receptacle.

ZENITH RADIO CORP.

MODEL 1000Z Stratosphere Revised
Chassis 2501C, 2501P
Schematic



DIAG. No	PART No	DESCRIPTION		DIAG. No	PART No	DESCRIPTION	
R1	63-362	400 OHMS	1/4W.	1	85-71	BAND SELECTOR SWITCH	
R2	63-416	1400 "	1/4W.	2	95-250	DRIVER TRANS.	
R3	63-258	490M "	1/4W.	3	95-251	LOW BOOST AUDIO TRANS.	
R4	63-136	50M "	1/4W.	4	95-252	HIGH FREQUENCY TRANS.	
R5	63-357	300 "	1/4W.	5	95-253	SPEAKER OUTPUT TRANS.	
R6	63-291	29M "	1/4W.	6	95-254	POWER CHOKE	
R7	63-260	100M "	1/4W.	7	95-255	" "	
R8	63-412	3500 "	1/4W.	8	95-256	OUTPUT "B" SUPPLY TRANS.	
R9	63-390	1MEG. DUAL VOL C		9	95-257	POWER TRANS.	
R10	63-391	" T.C.		10	95-264	3RD I.F. TRANS.	
R11	63-387	4M OHMS CANDOHM		11	122-9	SHADOWGRAPH	
R12	63-389	1M-1857- CANDOHMS		12	195-1	SINGLE CONTACT RELAY	
R13	63-406	5M OHMS CANDOHM		13	5-3587	OSC. COIL ASSEM.	
R14	63-413	4M "	1/4W.	14	5-3593	ANT. COIL	
R15	63-405	330 " CANDOHM		15	5-3589	R.F. COIL ASSEM.	
R16	63-408	500M " Q CONTROL		16	5-3358	VAR. SELECT I.F. ASSEM.	
R17	63-404	60 OHMS CANDOHM		17	20-109	WAVE TRAP COIL ASSEM.	
R18	63-279	3M "	1/4W.	18	5-3115	H.F. OSC. COIL ASSEM	
R19	63-414	99M OHMS	1/4W.	19	20-99	DET. FILTER CHOKE	
R20	63-417	99 OHMS	1/4W.	20	20-100	UNTUNED I.F. COIL	
R21	63-326	4M "	1/4W.	21	5-3367	LINE FILTER COIL ASSEM.	
R22	63-407	10M OHMS CANDOHM		22	20-88	ANT. CHOKE	
R23	63-396	10M "	1/4W.	23	20-114	7 METER DET. COIL	
R24	63-442	50M "	1/4W.	24	85-69	PHONO SWITCH	
R25	63-440	200M "	1/4W.	25		SPKR. FIELD 49-102-49-103	
R26	63-441	1MEG.	1/4W.	26		" " 49-99	
R27	63-290	260M "	1/4W.	27	49-99	SPEAKER	
R28	63-241	5M "	1/4W.	28	49-102	#2 JENSEN SPEAKER	
R29	63432	5 OHMS CANDOHM		29	49-103	#1 " "	
R30	63-430	20 M OHMS	1/4W.	30	85-64	TOGGLE SWITCH	
R31	63-439	2700 OHMS	1/4W.	31	95-266	ORDER BY PART No ONLY	
R32	63-378	250	1/4W.	32	95-263	SPECIAL TOLERANCES	
				33	95-267		
				34	20-81	R.F. PLATE CHOKE ASSEM.	
				35	5-3588	DET. COIL ASSEM.	
				36	20-79	DET. BROADCAST BAND COIL	
				37	20-71	R.F. CHOKE	
				38	5-3538	R.F. PLATE CHOKE ASSEM.	
				39	5-3591	10-23 MEG. CYCLE COIL	
				40	85-75	TWEETER SWITCH ASSEM.	
				41	85-75	SWITCH	
				42	20-118	SCRATCH FILTER COIL	

DIAG. No	PART No	DESCRIPTION	
C1	22-371	.01 MFD.	600V.
C2	22-374	.01 "	300V.
C3	22-373	.05 "	300V.
C4	22-377	.1 "	600V.
C5	22-361	16 "	450V.
C6	22-372	.01 "	300V.
C7	22-365	.0001 "	600V.
C8	22-127	.000025 MFD.	600V.
C9	22-375	.1 MFD.	300V.
C10	22-367	.00005 MFD.	600V.
C11	22-189	20 MFD.	25V.
C12	22-378	.04 "	600V.
C13	22-362	8 MFD.	300V.
C14	22-225	5 "	25V.
C15	22-360	4 "	600V.
C16	22-379	.002 MFD.	600V.
C17	22-289	.0005 "	600V.
C18	22-395	450 MMFD.	4GANG
C19	22-287	.03 MFD.	600V.
C20	22-342	.0029 MFD.	600V.
C21	22-341	.00092 "	600V.
C22	22-147	.0003 "	600V.
C23	22305	2-35 MFD.	
C24	22-333	ORDER BY PART No ONLY	
C25	22-338	SPECIAL TOLERANCES.	
C26	22-289	.00005 MFD.	600
C27	22-199	.5 MFD. "	200V.
C28	22-397	2-35 MMFD.	4GANG
C29	22-398	2-35 "	2GANG
C30	22205	200-500 MMFD.	PADDER
C31	22321	8 MFD.	450V.
C32	22-396	2-35 MMFD.	4GANG
C33	22-229	.005	600V.

SWITCHES SHOWN IN BROADCAST POSITION.

REVISED MODEL No 1000Z.

SECTIONS OF SWITCH ARE IN ALPHABETICAL ORDER FROM FRONT TO REAR OF CHASSIS.

A	SECTION No	1
B	"	2
C	"	3
D	"	4
E	"	5
F	"	6
G	"	7

CABLE COLOR CODE.

W1 - BLACK - PILOT LIGHTS.
W2 - BROWN - A.C. PILOT LIGHTS.
W3 - " - A.C.
W4 - BLACK - HEATER.
W5 - BLUE - "
W6 - RED B+.
W7 - WHITE - SCREENS.
W8 - GREEN - #2 PLATE.
W9 - " " "

25 TUBE SUPERHETERODYNE.
I.F. FREQUENCY 485 KC.
CHASSIS No 2501-C & 2501-P.

NOTE: The chassis and power pack layout are the same as for the early model, for which see the Index

ZENITH RADIO CORP.
CHICAGO, ILL.
U.S.A.

M.D. 2-22-34

Socket Voltages

TU3E	POSITION	Ef	Ek	Eg1	Eg2	Eg3	Ep
6D6	1st R. F.	6.3	3	0	100	3	300
6D6	2nd R. F.	6.3	3	0	100	3	300
6A7	1st Det.	6.3	3	0	100	-	300
	Osc.			3	-	-	130
6D6	1st I. F.	6.3	7	0	100	7	300
6D6	2nd I. F.	6.3	3	0	100	3	300
76	2nd Det.	6.3	0	0	-	-	0
76	1st A.F.	6.3	8	0	-	-	140
76	2nd A. F.	6.3	14	0	-	-	270
42	Driver	6.3	22	0	300	-	300
45	Power A.F.	2.5	63	0	-	-	330
79	Q.A.V.C.	6.3	0	0	-	-	250 Q on 0 Q off
6D6	Shadowmeter Amplifier	6.3	3	0	100	3	300
6D6	A.V.C.Amplf.	6.3	3	0	100	3	300
85	A.V.C.	6.3	0	0	-	-	100
523	Rect. Power Amplifier	5	-	-	-	-	-
523	Rect.for Upper Chassis	5	-	-	-	-	-

Line Voltage 112. Antenna and Ground shorted.

f - filament; k - cathode; g1 - control grid; g2 - screen grid; g3 - suppressor grid; p - plate.

Balance Procedure: Caution - Test set thoroughly for defective tubes, antenna and ground, check line voltage and chassis voltages before any attempt is made to rebalance. All balancing should be done with a calibrated oscillator capable of a steady signal and minimum attenuation of signal input strength. The screw driver used should be of non metallic type and output meter usually connected across plates of 45 tubes at point where the two green speaker wires come out of power pack.

Warning. Do not rebalance this chassis unless absolutely necessary as all chassis are balanced on an accurate signal generator before shipment. Set volume control in full on position, tone control on treble, high fidelity control in selective position. Band switch set on broadcast position, gang 580 K.C., approximately. Connect 485 K.C. service oscillator to grid of 6A7 and chassis ground, adjust I.F.transformers, to maximum output with minimum input signal. Rotate selectivity control to broad position, I.F. output should remain constant 6 K.C. plus and minus 485 K. C. Next, connect the same 485 K.C. signal directly across aerial and ground binding post. Balance wave trap to minimum signal. Gang set at 550.

Note: Refer to drawing of trimmer assembly to identify trimmers.

Set service oscillator at 600 K.C. Adjust broadcast padder "A" meanwhile rocking pointer past 600 K.C. on dial to combination giving greatest output.

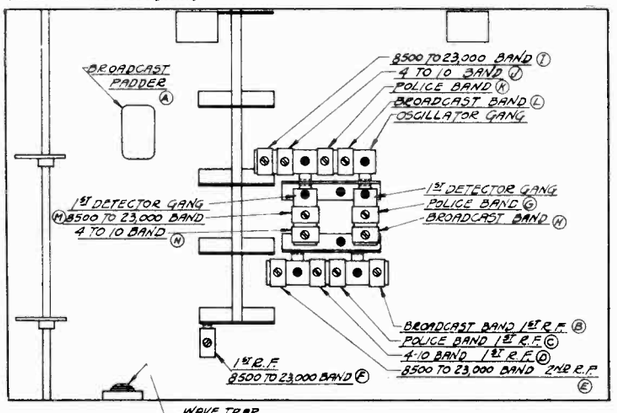
Set chassis dial to exactly 1400 K.C., and service oscillator to 1400 K.C. Balance "L" oscillator trimmer to scale. Reset oscillator to 600 K.C., rotate gang to 600 and re-check 600 padder for maximum output. Next, retune oscillator trimmer at 1400 K.C. Adjust detector trimmer "H" and R.F. trimmer "B" to maximum output.

Police or Orange band. Rotate chassis band switch to police band, gang should be rotated to 3 megacycles, oscillator to 3 megacycles also. Adjust oscillator trimmer "K" to scale, peak "G" detector and "C" R.F. trimmers to maximum peak.

Yellow band. Set dial and oscillator to 9 megacycles. Peak oscillator trimmer "J" for scale, "F" detector and "D" R. F. trimmers for maximum peak.

Red band. Set dial and oscillator at 21 megacycles, peak "I" oscillator for scale, "H" detector and "E" R.F., and trimmer "F" located at back of band switch for maximum peak. There are no adjustments on the Blue band.

On all short wave adjustments be careful not to balance the oscillator circuit to the image frequency of the signal. This is equal to signal frequency minus twice the I.F. frequency.

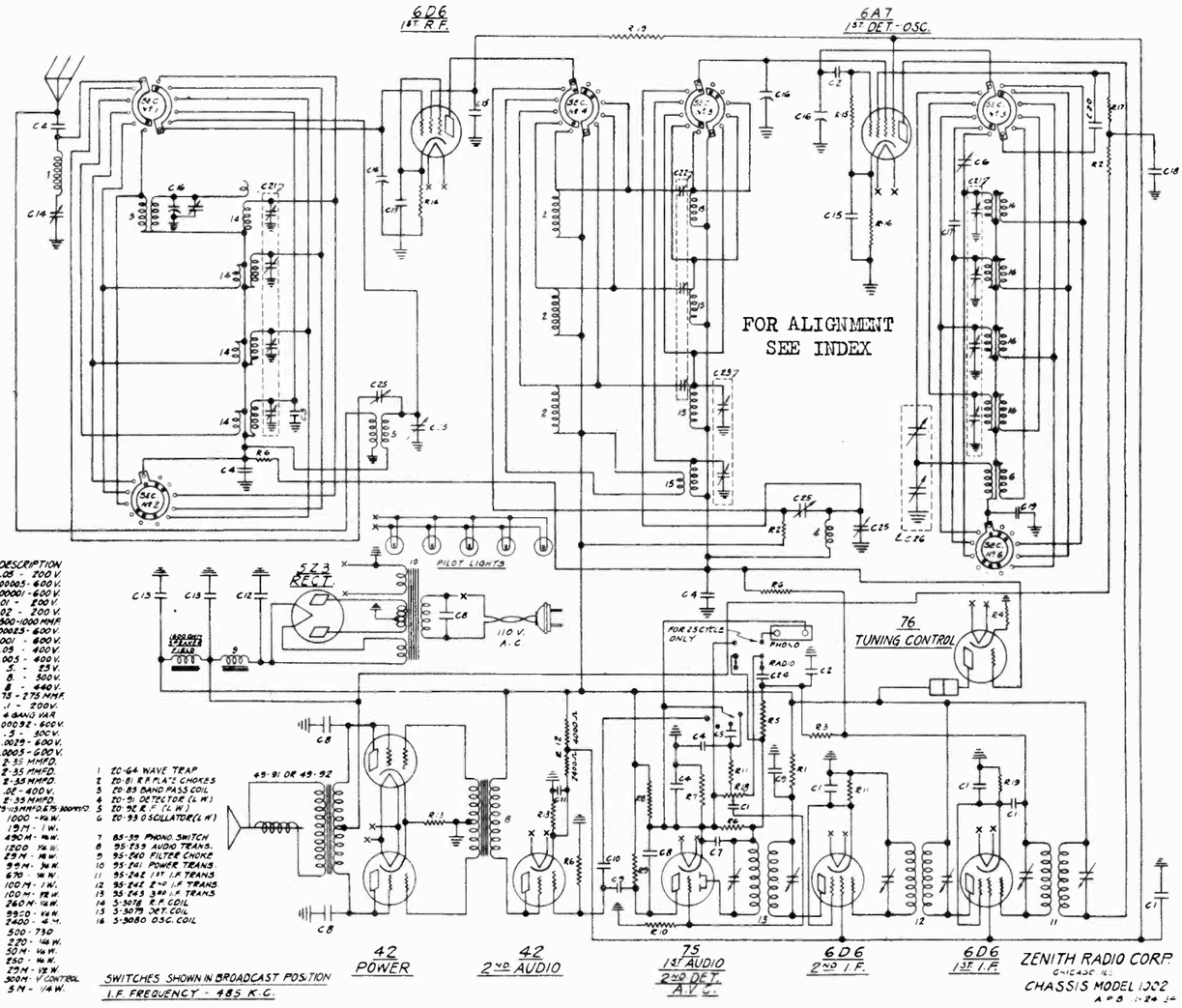


ADJUSTMENT DIAGRAM

RESISTANCE MEASUREMENTS - UPPER CHASSIS

TUBE	POSITION	HEATER	CATHODE	GRID	SCREEN	SUPPRESSOR	PLATE
6D6	1st. R. F.	20	350	600 M.	5 Meg.	350	1 Meg.
6D6	2nd. R. F.	20	350	600 M.	5 Meg.	350	1 Meg.
6A7	1st. Det.	20	275	600 M.	5 Meg.	-	1 Meg.
	Osc.			50 M.	-	-	1 Meg.
6D6	1st. I. F.	20	350	2	5 Meg.	350	1 Meg.
6D6	2nd. I. F.	20	3000	500 M.	5 Meg.	3000	1 Meg.
76	2nd Det.	20	0	100 M.	-	-	100 M.
76	1st. Aud.	20	4000	8000	-	-	1 Meg.
76	2nd. Aud.	20	3000	1 Meg.	-	-	1 Meg.
42	Driver	20	325	3000	-	-	1 Meg.
79	Q.A.V.C.	20	0	1 Meg.	-	-	1 Meg. Q on
6D6	Shadowmeter Amplifier	20	250	500 M.	5 Meg.	250	1 Meg.
6D6	A.V.C.Amplf.	20	250	2	5 Meg.	250	1 Meg.
85	A.V.C.	20	10M	250 M.	400 M.	500 M.	5 Meg.

All Measurements Made With Lower Chassis Disconnected.



DIAG. No.	PART No.	DESCRIPTION
C1	22-250	.05 - 200 V.
C2	22-289	.00025 - 600 V.
C3	22-283	.00001 - 600 V.
C4	22-185	.01 - 600 V.
C5	22-327	.02 - 200 V.
C6	22-292	300-1000 MMF.
C7	22-181	.00025 - 600 V.
C8	22-82	.001 - 600 V.
C9	22-212	.05 - 400 V.
C10	22-326	.005 - 400 V.
C11	22-223	.5 - 25 V.
C12	22-331	8. - 500 V.
C13	22-125	8 - 440 V.
C14	22-286	15 - 275 MFD.
C15	22-190	.1 - 200 V.
C16	22-339	4-44MMD VAR.
C17	22-341	.00032 - 600 V.
C18	22-228	.3 - 300 V.
C19	22-342	.0029 - 600 V.
C20	22-167	.0005 - 600 V.
C21	22-325	2-35 MMFD.
C22	22-324	2-35 MMFD.
C23	22-323	2-35 MMFD.
C24	22-188	.05 - 400 V.
C25	22-303	2-35 MMFD.
C26	22-345	25 MMFD & 75 MMFD & 300 MMFD
R1	63-338	1000 - 1/4 W.
R2	63-368	1 M - 1 W.
R3	63-258	4.90 M - 1/4 W.
R4	63-410	1200 - 1/4 W.
R5	63-281	2.9 M - 1/4 W.
R6	63-278	9.9 M - 1/4 W.
R7	63-379	670 - 1/4 W.
R8	63-380	100 M - 1 W.
R9	63-381	102 M - 1/2 W.
R10	63-290	260 M - 1/4 W.
R11	63-201	9900 - 1/4 W.
R12	63-382	2400 - 1/4 W.
R13	63-383	500 - 750
R14	63-263	270 - 1/4 W.
R15	63-372	50 M - 1/4 W.
R16	63-378	850 - 1/4 W.
R17	63-281	2.9 M - 1/2 W.
R18	63-384	500 M - V. CONTROL
R19	63-361	5 M - 1/4 W.

1	20-64 WAVE TRAP
2	20-81 R.F.A.F. CHOKES
3	20-85 BAND PASS COIL
4	20-91 DETECTOR (L.W.)
5	20-92 R. " (L.W.)
6	20-93 OSCILLATOR (L.W.)
7	85-39 PHONO SWITCH
8	95-733 AUDIO TRANS.
9	95-240 FILTER CHOKE
10	95-241 POWER TRANS.
11	95-242 1ST I.F. TRANS.
12	95-243 2ND I.F. TRANS.
13	95-243 3RD I.F. TRANS.
14	5-3078 R.F. COIL
15	5-3079 DET. COIL
16	5-3080 OSC. COIL

SWITCHES SHOWN IN BROADCAST POSITION
I.F. FREQUENCY - 485 K.C.

CHASSIS 5636 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	—	—	—	—	—	—	—	—	—

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

Line Voltage 112V (A.C.)

CHASSIS 5525A Socket Voltages

Tube	Position	1	2	3	4	5	6	7	8	9
6A8	Converter Osc.	0	6.3	244	97	—9	149	0	0	—.5
6K7	I. F.	0	6.3	246	97	0	—	0	0	—.5
6Q7	2nd Det. AVC 1st Audio	0	0	71	—2.5	—2.5	—	6.3	—2.5	—2.5
6F6	Power	0	0	231	246	—3.5	—	6.3	—2.5	—
5Y4	Rect.	0	—	AC	—	AC	—	316	316	—

All voltages measured from point indicated to ground using a 1000 ohm per volt meter, antenna and ground disconnected. Line voltage 117 v.

CHASSIS 5708E 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	—	—	—	—	—	—	—	—	—

Measured from point indicated to junction of filter choke and speaker field using a 1000 ohm per volt meter

Line Voltage 112 (A.C.)

CHASSIS 5640AT Socket Voltages

Tube	Position	1	2	3	4	5	6	7	8	9
6L7	1st Det	0	0	231	141	—10	—	6.3	2.5	0
6J5	Osc	0	6.3	129	—	—17	—	0	0	—
6K7	IF	0	6.3	234	65	0	—	0	0	0
6Q7	2nd Det Audio	0	0	88	—5	—5	—	6.3	—1	—2
6V6	Power	0	0	210	234	—2	—	6.3	—1.5	—
5Y4	Rect.	0	—	AC	—	AC	188?	288	288	—

CHASSIS 5802A SOCKET VOLTAGES

Tube	Position	1	2	3	4	5	6	7	8	9
6K7	R. F.	0	6AC	250	68	0	—	0	0	0
6A8	1st Det. Osc.	0	6AC	250	68	—4	150	0	0	0
6K7	I. F.	0	6AC	250	68	0	—	0	Local 5	0
6H6	2nd Det. A.V.C.	0	6AC	-3	-3	-3	—	0	-3	—
6F5	1st Audio	0	6AC	—	70	0	0	0	-3	-3
6F6	Power	0	6AC	235	250	-4	—	0	-4	—
6C5	Target Tuning Amp.	0	6AC	250	—	-5	—	0	4	—
5Y3 5W4	Rectifier	0	310	—	AC	—	AC	—	310	—

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

Line Voltage 112V.

CHASSIS 5804AT Socket Voltages

Tube	Position	1	2	3	4	5	6	7	8	9
6K7	RF	0	0	216	90	0	—	6.2	0	0
6L7	1st Det	0	0	216	130	—3	—	6.2	2	0
6J5	Osc	0	6.2	116	—	—3	—	0	0	—
6K7	IF	0	6.2	212	90	0	—	0	0	0
6Q7	2nd Det Audio	0	0	70	—2	—2	—	6.2	—2	—2
6V6	Power	0	0	210	216	—3	—	6.2	—4	—
5Y4	Rect	0	—	AC	—	AC	—	276	276	—
6T5	Eye		0	10	—2	216	—2	6.2		
			H	P	C.G	T	K	H		

ZENITH RADIO CORP.

CHASSIS 5517A 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	—	0	—	
5Y3 5W4	Rectifier	0	240	—	AC	—	AC	—	240	—

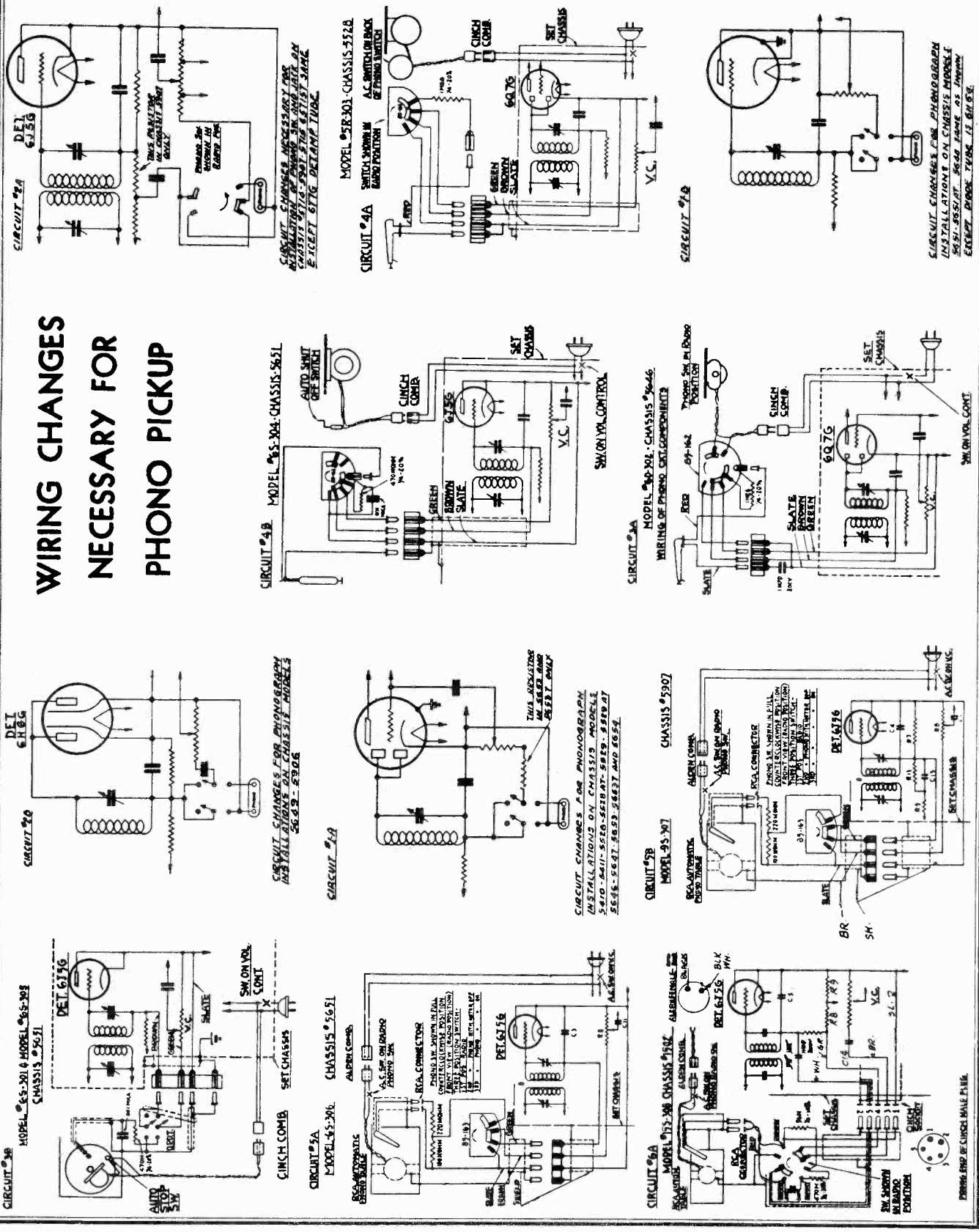
CHASSIS 5517A
CHASSIS 5525A
CHASSIS 5636
CHASSIS 5640AT
CHASSIS 5708E
CHASSIS 5802A
CHASSIS 5804AT

Voltage

MODEL Phono.Pick-up
Circuit Changes

ZENITH RADIO CORP.

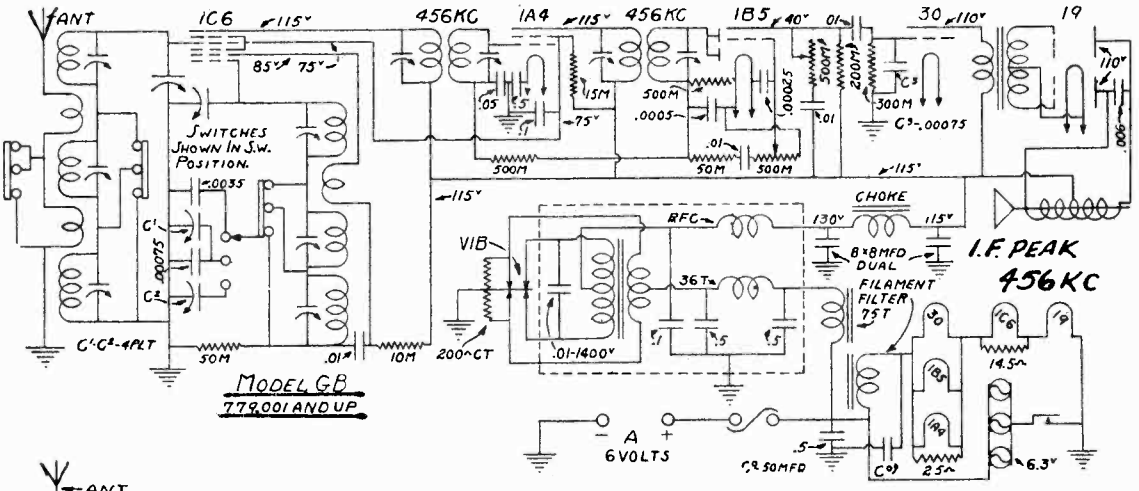
WIRING CHANGES NECESSARY FOR PHONO PICKUP



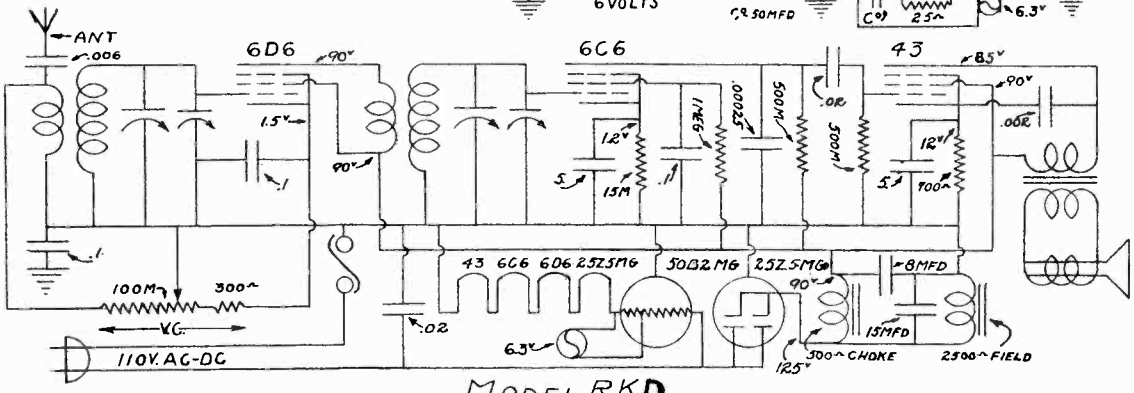
Schematics, Voltage

ZEPHYR RADIO CO.

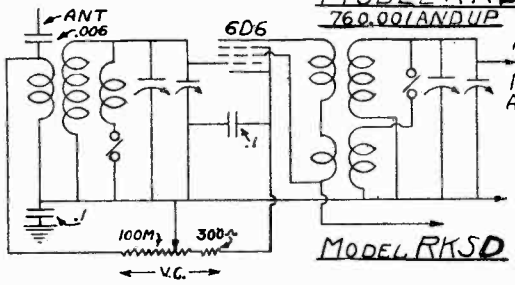
MODEL GB, Above Ser. 779001
MODELS DB, DF, Above 775,001
MODEL RKD, Above Ser. 760,001
MODEL RKSD



MODEL GB
779,001 AND UP



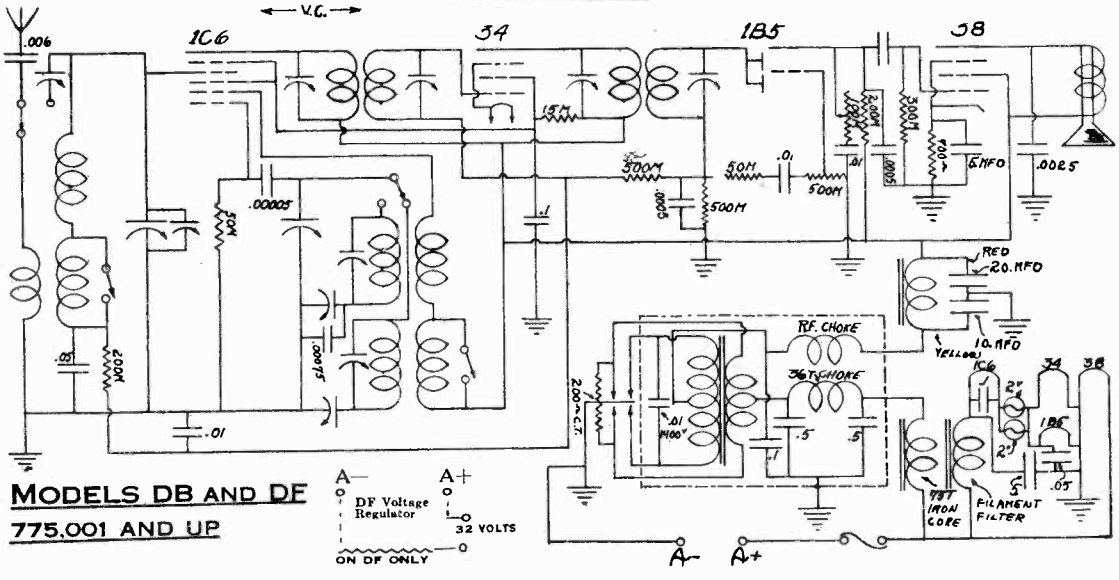
MODEL RKD
760,001 AND UP



ALL OTHER CONSTANTS ON MODEL RKS SAME AS MODEL RK.

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII

MODEL RKSD

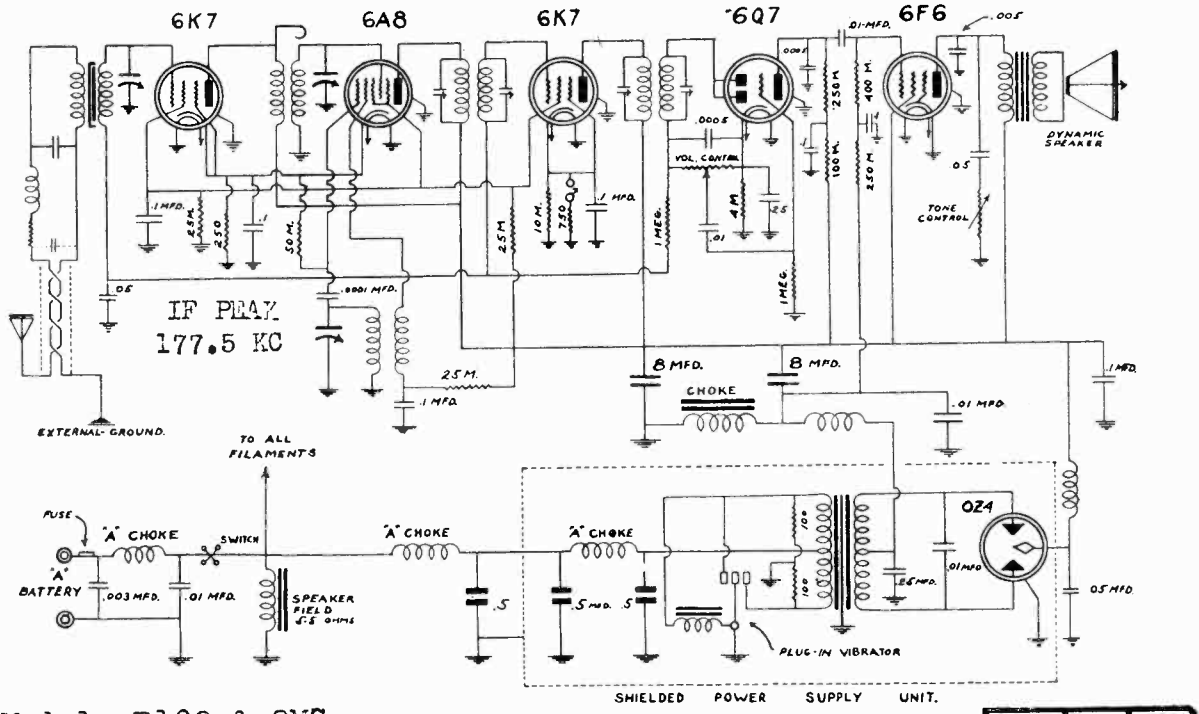


MODELS DB AND DF
775,001 AND UP

MODELS 2M7, B102
Schematic

ZEPHYR RADIO CO.

MODEL TSA105
Schematic, Socket
Trimmers, Alignment

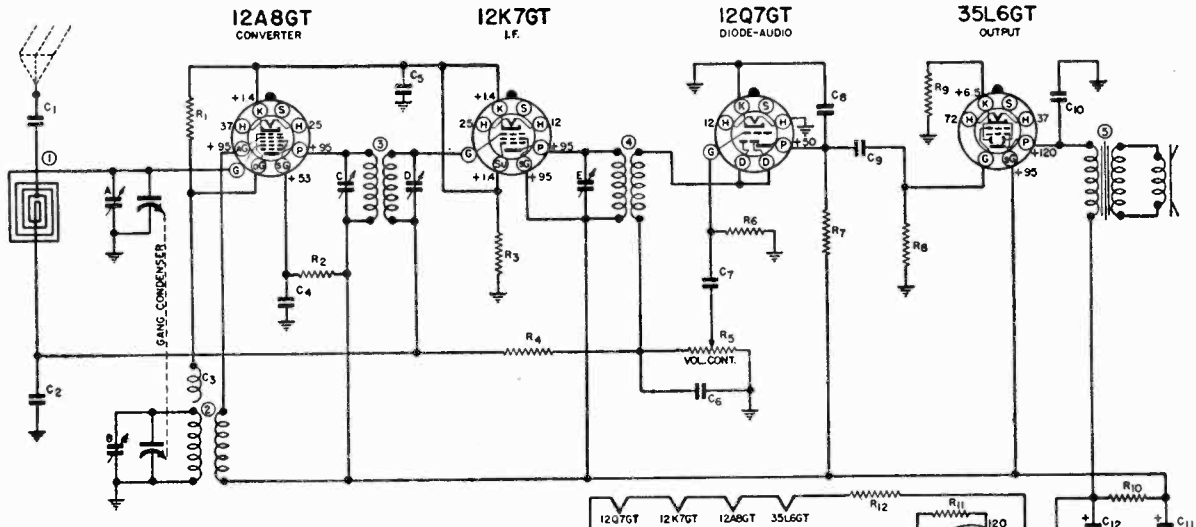


Models B102 & 2M7

CONVENTIONAL ALIGNMENT

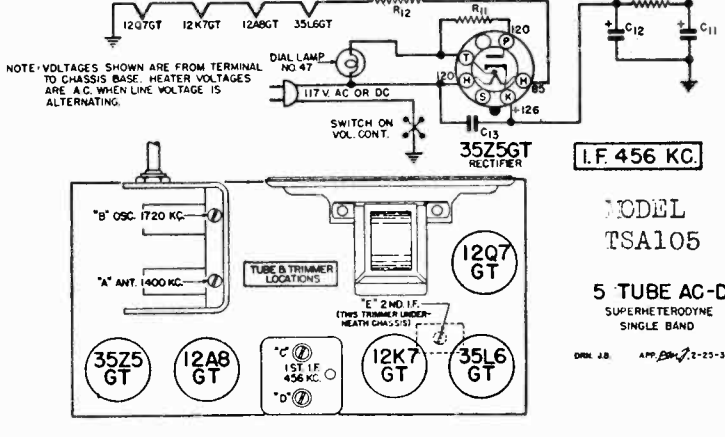
SEE SPECIAL SECTION VOL. VIII.

Rev by LWS dr by MT 1936



DIAG NO	PART NO	DESCRIPTION			DIAG NO	PART NO	DESCRIPTION	
R 1	N-1260	50,000 OHM	.5W.	20%	C 7	N-1344	.01 MFD.	400 V.
R 2	N-1460	30,000 OHM	.5W.	20%	C 8	N-1447	.0005 MFD.	400 V.
R 3	N-1615	100 OHM	.5W.	10%	C 9	N-1344	.01 MFD.	400 V.
R 4	N-1262	1 MEGOHM	.5W.	20%	C 10	N-1376	.02 MFD.	400 V.
R 5	N-1595	0.5 MEGOHM	VOL CONT.		C 11	N-1366	25 MFD. 150 V.	ELECTRO.
R 6	N-1263	10 MEGOHM	.5W.	20%	C 12		15 MFD. 150 V.	
R 7	N-1377	200,000 OHM	.5W.	20%	C 13	N-1346	.05 MFD.	400 V.
R 8	N-1264	500,000 OHM	.5W.	20%				
R 9	N-1616	250 OHM	.5W.	10%				
R 10	N-1617	2500 OHM	.5W.	20%	1	N-1594	ANTENNA COIL LOOP	
R 11	N-1614	50 OHM	.5W.	20%	2	N-1452	OSCILLATOR COIL	
R 12	N-1618	80 OHM	2W.	10%	3	N-1598	1ST. I.F. TRANSFORMER	
					4	N-1596	2ND. I.F. TRANSFORMER	
					5	N-1585	4" P.M. SPEAKER & TRANS.	
C 1	N-1344	.01 MFD.		400 V.	E	N-1597	2ND. I.F. TRIMMING COND.	
C 2	N-1345	.05 MFD.		200 V.				
C 3		CAPACITY INCLUDED IN OSCILLATOR COIL				N-1431	GANG CONDENSER	
C 4	N-1345	.05 MFD.		200 V.				
C 5	N-1351	.1 MFD.		200 V.				
C 6	N-1374	100 MMFD						

NOTE: VOLTAGES SHOWN ARE FROM TERMINAL TO CHASSIS BASE. HEATER VOLTAGES ARE A.C. WHEN LINE VOLTAGE IS ALTERNATING.



I.F. 456 KC.

MODEL TSA105

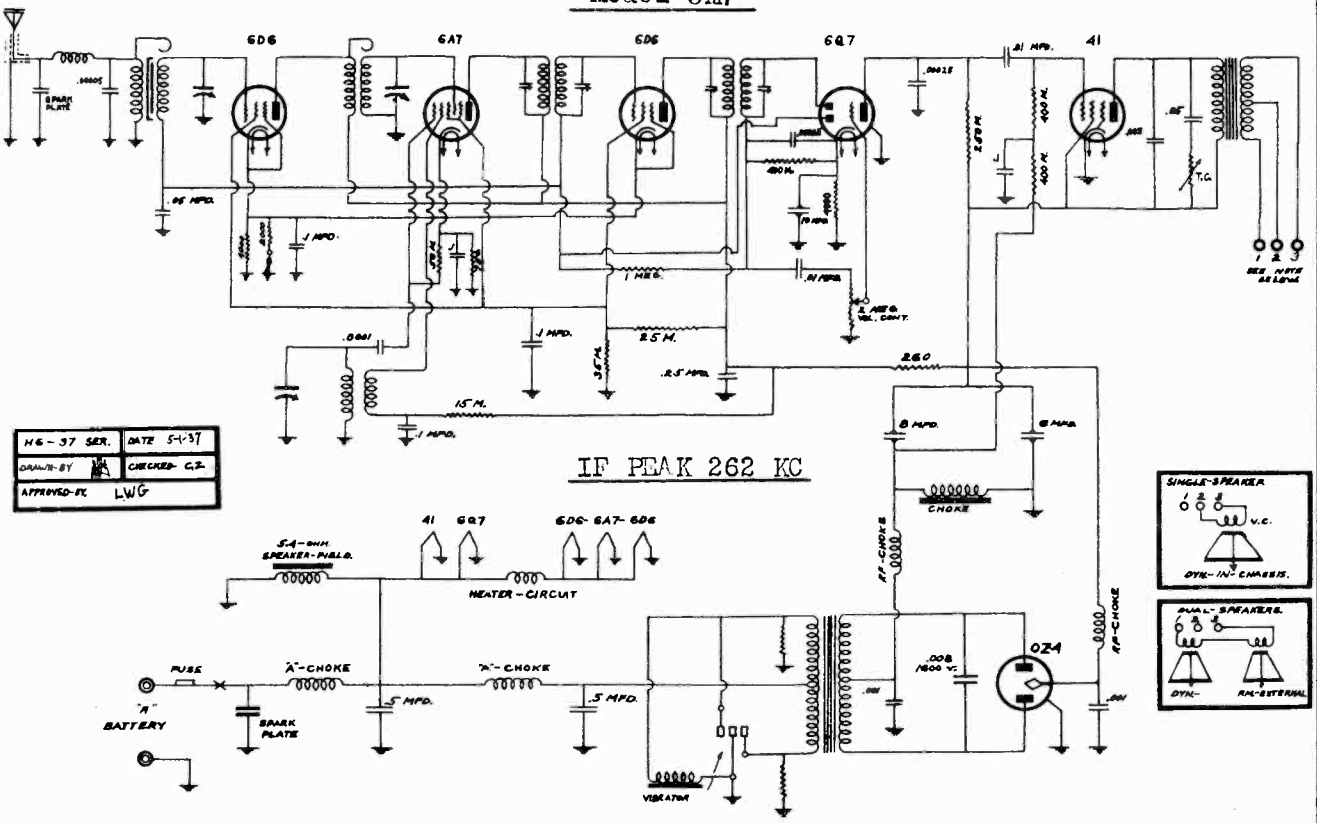
5 TUBE AC-DC
SUPERHETERODYNE
SINGLE BAND

DRN. J.B. APP. 2-25-39

ZEPHYR RADIO CO.

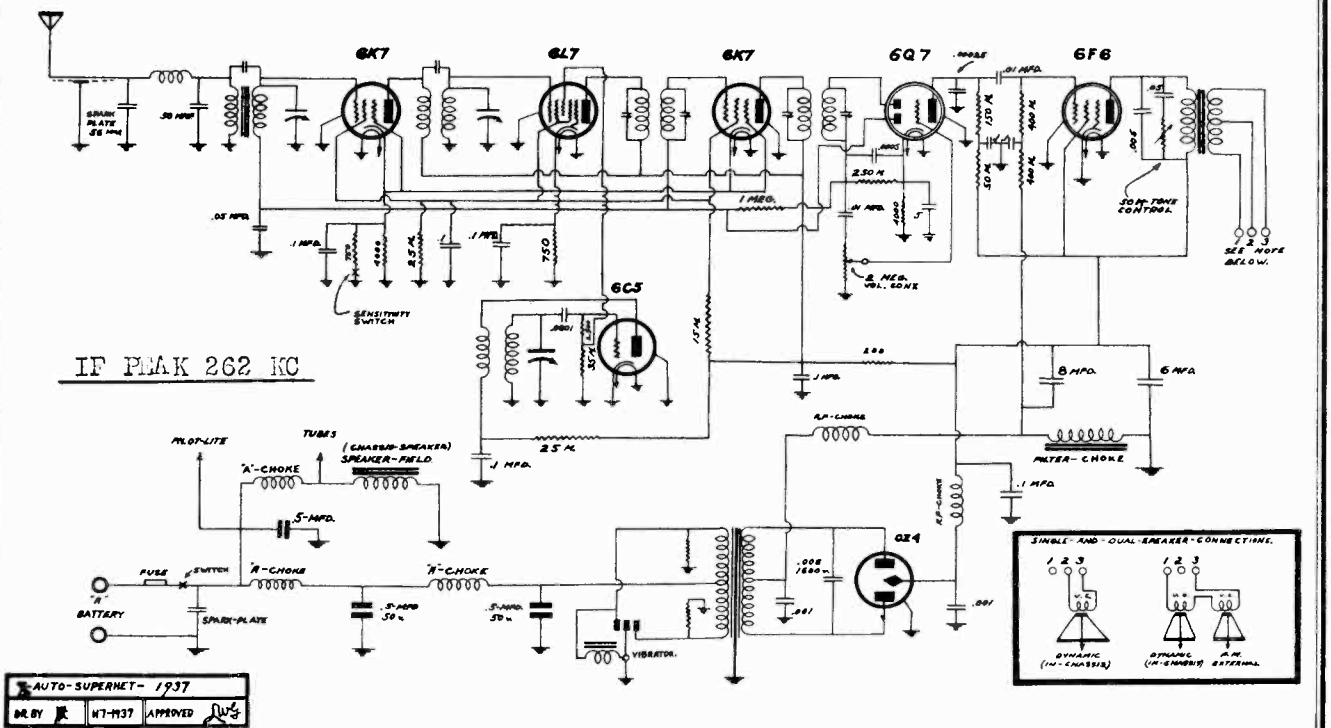
MODEL 3M7
MODEL 3M8
Schematics

Model 3M7

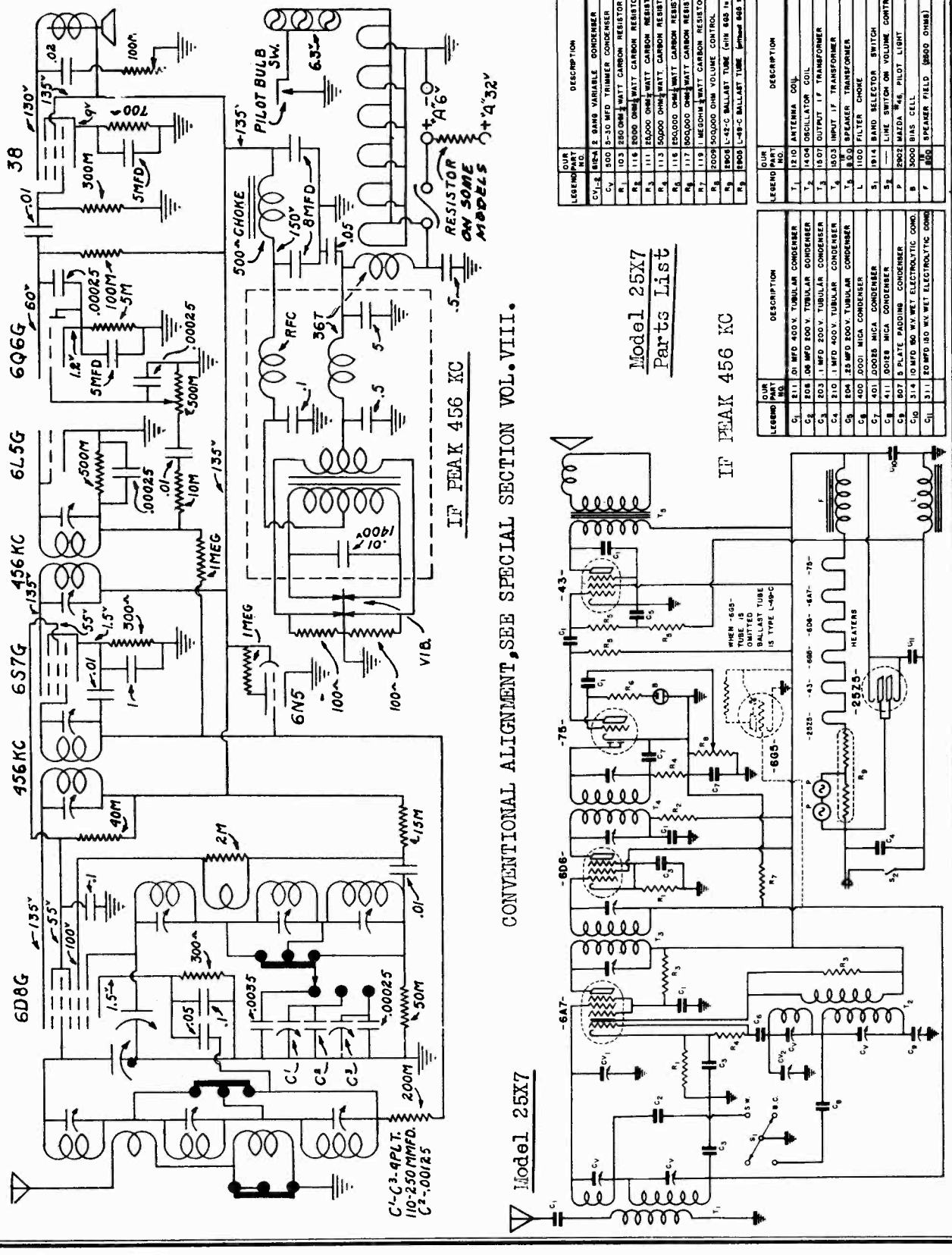


CONVENTIONAL ALIGNMENT, SEE SPECIAL SECTION VOL. VIII.

Model 3M8



MODEL 25X7
MODEL 30B7, Above Ser. 780001 ZEPHYR RADIO CO.
Schematics



LEGEND	OUR PART NO.	DESCRIPTION
C_{V1-3}	8164	2 GANG VARIABLE CONDENSER
C_V	500	5-30 MFD TRIMMER CONDENSER
R_1	103	250 OHM ½ WATT CARBON RESISTOR
R_2	116	2000 OHM ½ WATT CARBON RESISTOR
R_3	111	25,000 OHM ½ WATT CARBON RESISTOR
R_4	113	50,000 OHM ½ WATT CARBON RESISTOR
R_5	116	250,000 OHM ½ WATT CARBON RESISTOR
R_6	117	500,000 OHM ½ WATT CARBON RESISTOR
R_7	119	1 MEGOHM ½ WATT CARBON RESISTOR
R_8	2009	500,000 OHM VOLUME CONTROL
R_9	2906	L-42-C BALLAST TUBE (with 6B8 tube)
R_9	2905	L-49-C BALLAST TUBE (without 6B8 tube)

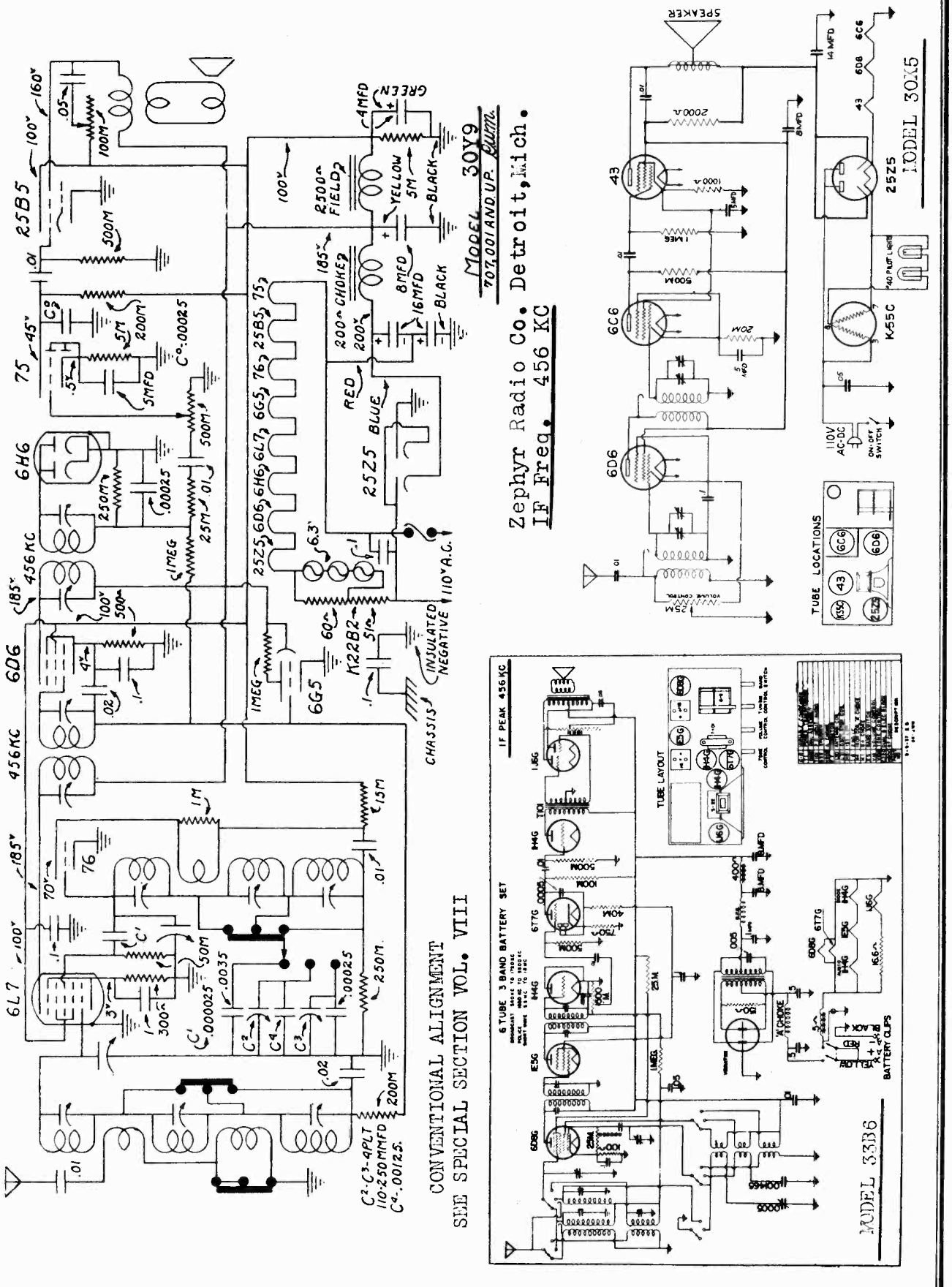
LEGEND	OUR PART NO.	DESCRIPTION
C_1	211	.01 MFD 400 V. TUBULAR CONDENSER
C_2	208	.06 MFD 200 V. TUBULAR CONDENSER
C_3	203	.1 MFD 200 V. TUBULAR CONDENSER
C_4	210	1 MFD 400 V. TUBULAR CONDENSER
C_5	204	.25 MFD 200 V. TUBULAR CONDENSER
C_6	400	.0001 MICA CONDENSER
C_7	401	.00025 MICA CONDENSER
C_8	411	.0025 MICA CONDENSER
C_9	507	5 PLATE PADDING CONDENSER
C_{10}	314	10 MFD 150 WV. WET ELECTROLYTIC COND.
C_{11}	311	20 MFD 150 WV. WET ELECTROLYTIC COND.

LEGEND	OUR PART NO.	DESCRIPTION
T_1	1210	ANTENNA COIL
T_2	1404	OSCILLATOR COIL
T_3	1507	OUTPUT I.F. TRANSFORMER
T_4	1503	INPUT I.F. TRANSFORMER
T_5	1800	SPEAKER TRANSFORMER
L	1100	FILTER CHOKE
S_1	1914	BAND SELECTOR SWITCH
S_2	—	LINE SWITCH ON VOLUME CONTROL
P	2902	MAZDA #46, PILOT LIGHT
B	3000	BIAS CELL
F	800	SPEAKER FIELD (2800 OHMS)

MODEL 33B6
Schematics, Socket

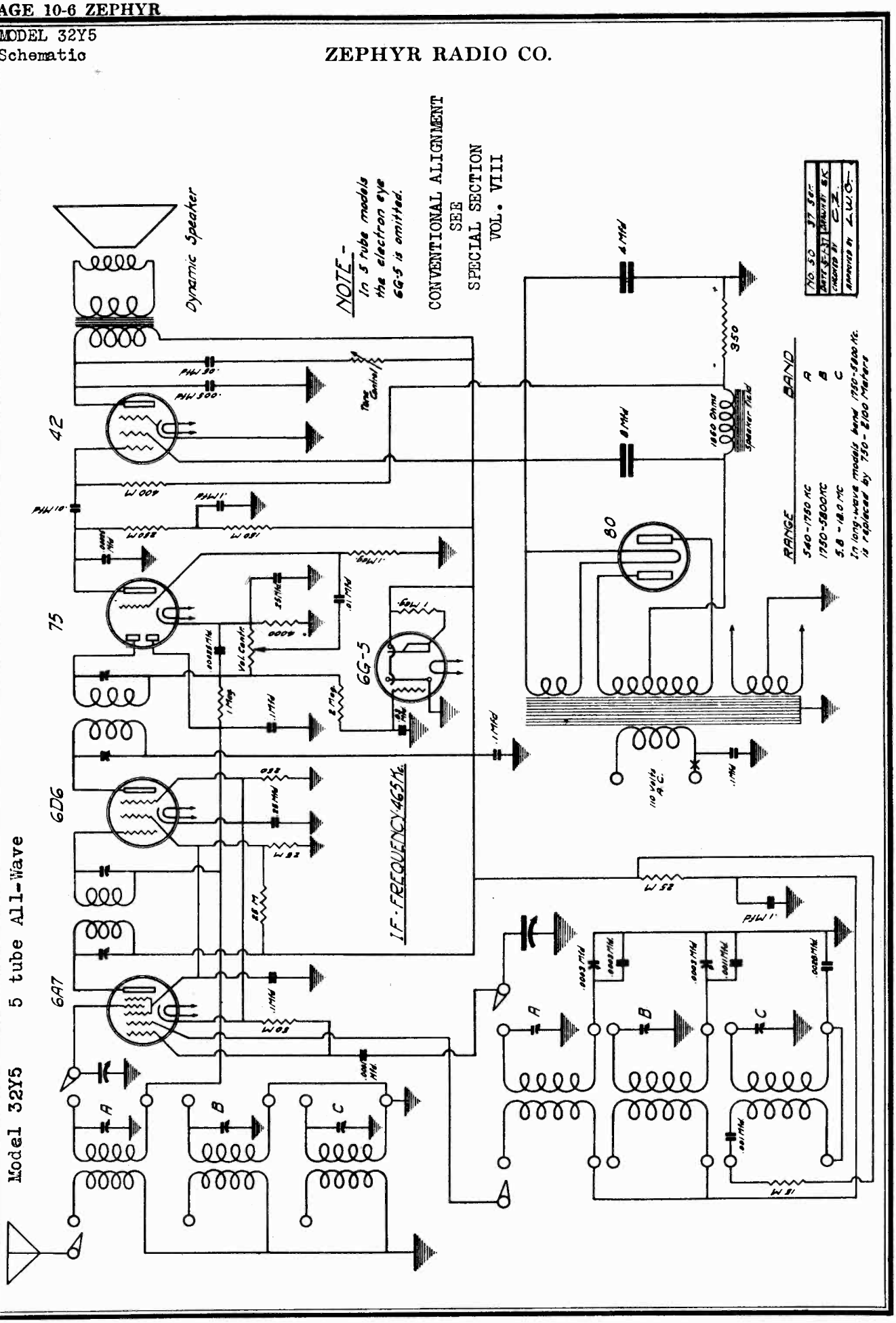
ZEPHYR RADIO CO.

MODEL 30X5
MODEL 30Y9
Above Ser. 707001



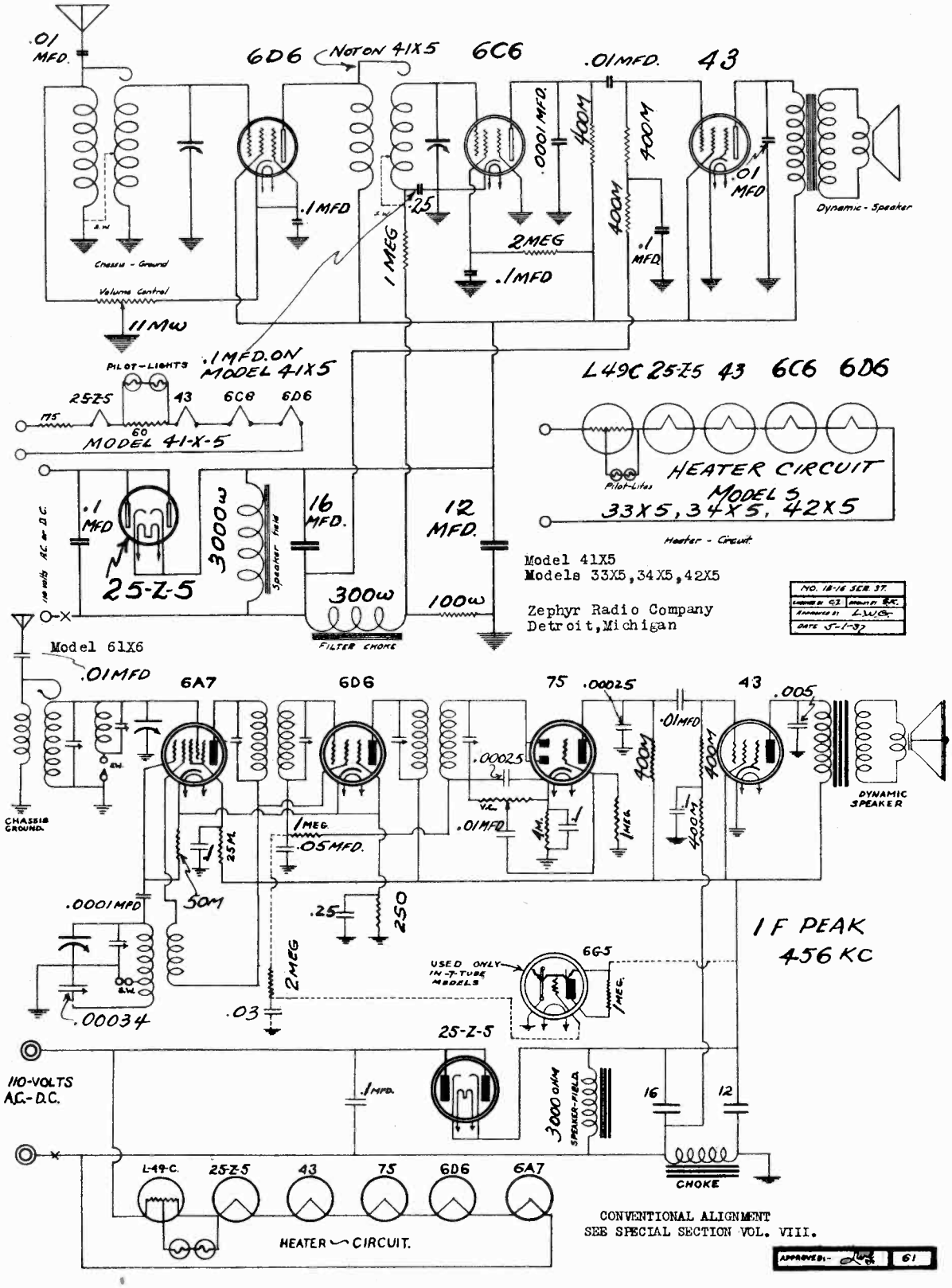
MODEL 32Y5
Schematic

ZEPHYR RADIO CO.



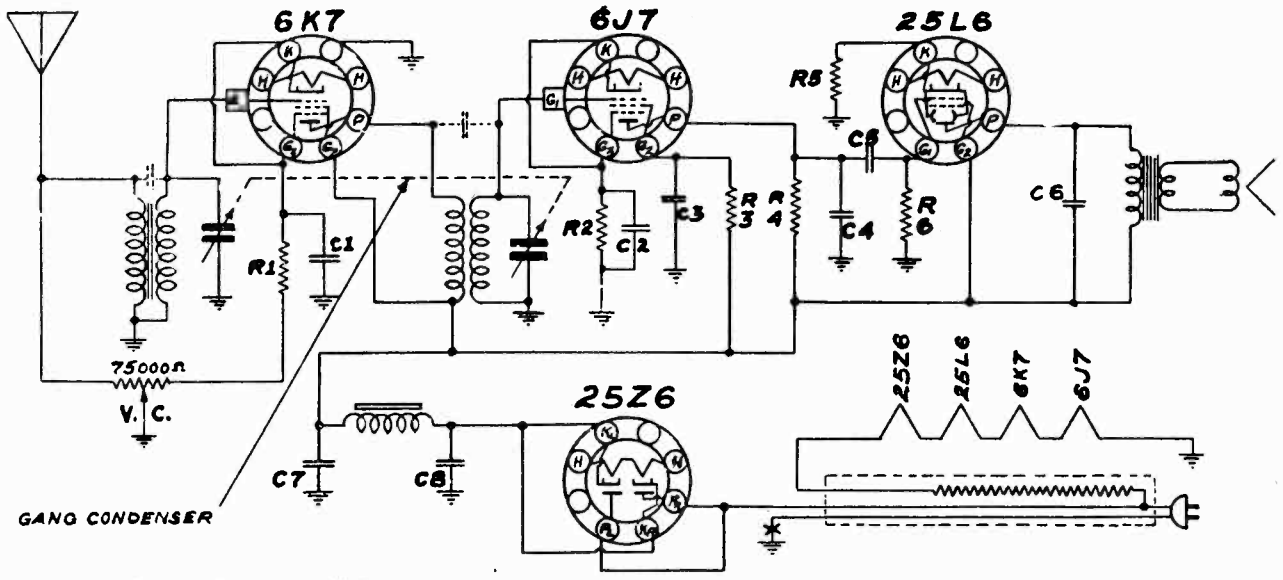
ZEPHYR RADIO CO.

MODELS 33X5,34X5,42X5
MODEL 41X5
MODEL 61X6
Schematics



MODEL 39X4
MODEL 39Y6
Schematics

ZEPHYR RADIO CO.



CAPACITORS

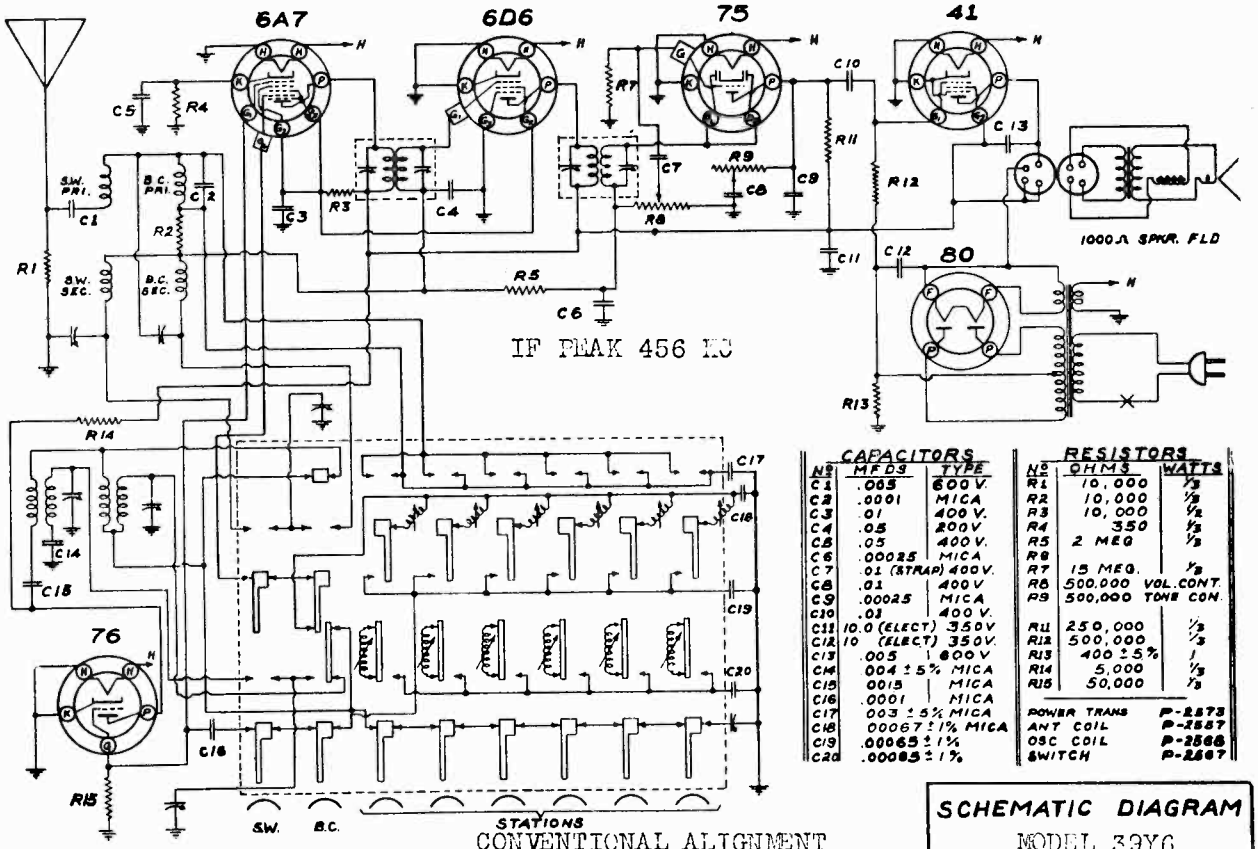
No	MFD.	TYPE	No	MFD.	TYPE
C1	.1	200V.	C5	.01	400V.
C2	.25	200V.	C6	.02	400V.
C3	.1	200V.	C7	10.0 }	ELECT.
C4	.00025	MICA	C8	30.0 }	

RESISTORS

No	OHMS	WATTS	No	OHMS	WATTS
R1	250	1/4	R4	500,000	1/4
R2	25,000	1/4	R5	110	1/2
R3	2,000,000	1/4	R6	500,000	1/4

RESISTANCE OF LINE CORD 173 OHMS

SCHEMATIC DIAGRAM
MODEL 39X4



CAPACITORS

No	MFDS	TYPE
C1	.065	600 V.
C2	.0001	MICA
C3	.01	400 V.
C4	.05	200 V.
C5	.05	400 V.
C6	.00025	MICA
C7	.01 (STRAP)	400 V.
C8	.01	400 V
C9	.00025	MICA
C10	.01	400 V.
C11	10.0 (ELECT.)	350 V
C12	10 (ELECT.)	350 V.
C13	.005	600 V
C14	.004 ± 5%	MICA
C15	.0015	MICA
C16	.0001	MICA
C17	.003 ± 5%	MICA
C18	.00067 ± 1%	MICA
C19	.00065 ± 1%	
C20	.00085 ± 1%	

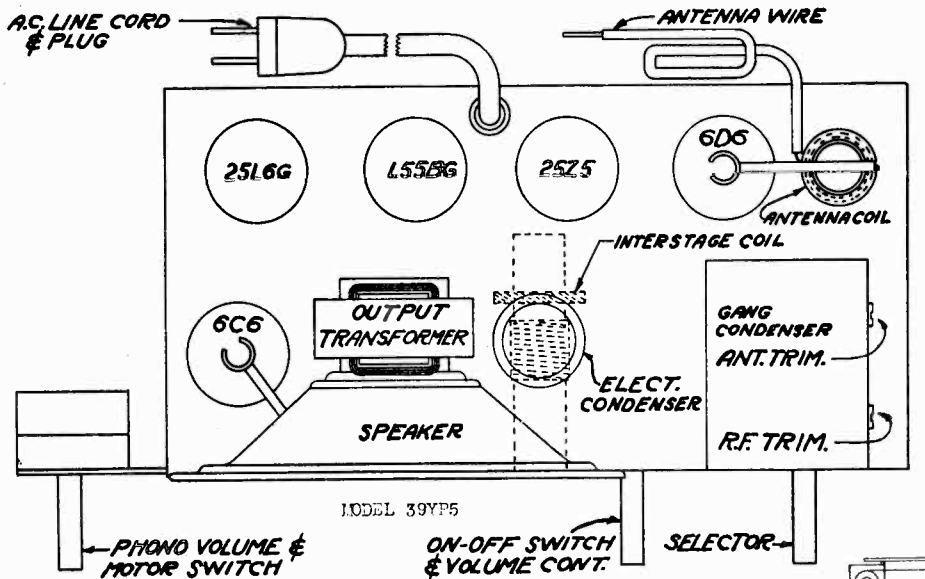
RESISTORS

No	OHMS	WATTS
R1	10,000	1/2
R2	10,000	1/2
R3	10,000	1/2
R4	350	1/2
R5	2 MEG	1/2
R6		
R7	15 MEG.	1/2
R8	500,000	VOL. CONT.
R9	500,000	TONE CON.
R11	250,000	1/2
R12	500,000	1/2
R13	400 ± 5%	1
R14	5,000	1/2
R15	50,000	1/2

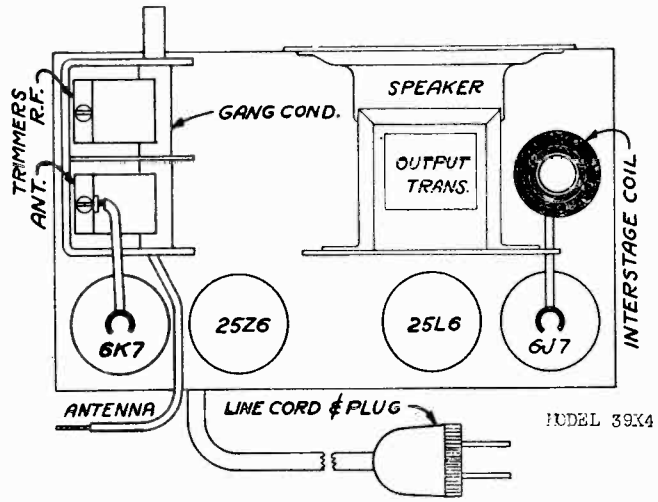
POWER TRANS	P-2573
ANT COIL	P-2557
OSC COIL	P-2566
SWITCH	P-2567

SCHEMATIC DIAGRAM
MODEL 39Y6

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII.



MODEL 39YP5



MODEL 39X4

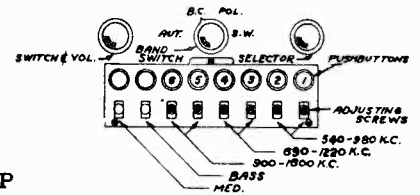
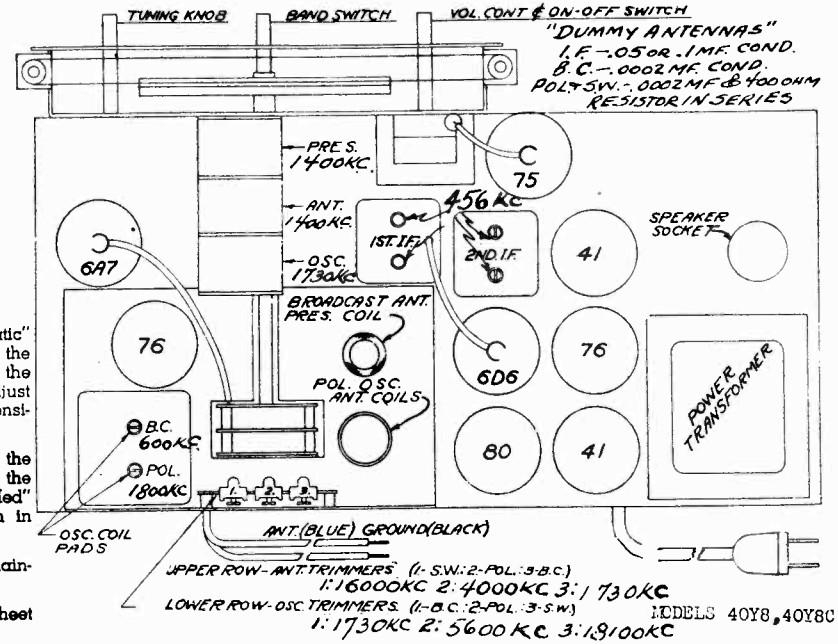


Fig. 1



MODELS 40Y8, 40Y8C

MODEL 39Y6

MODELS 40Y8, 40Y8C

PROCEDURE FOR SETTING UP AUTOMATIC PUSH BUTTONS

A glance at Fig. 1 will show that there are eight (8) push buttons, six (6) of which are for automatic use; the adjusting screws are located directly below these.

Fig. 1 also shows the tuning range or frequencies covered by each button.

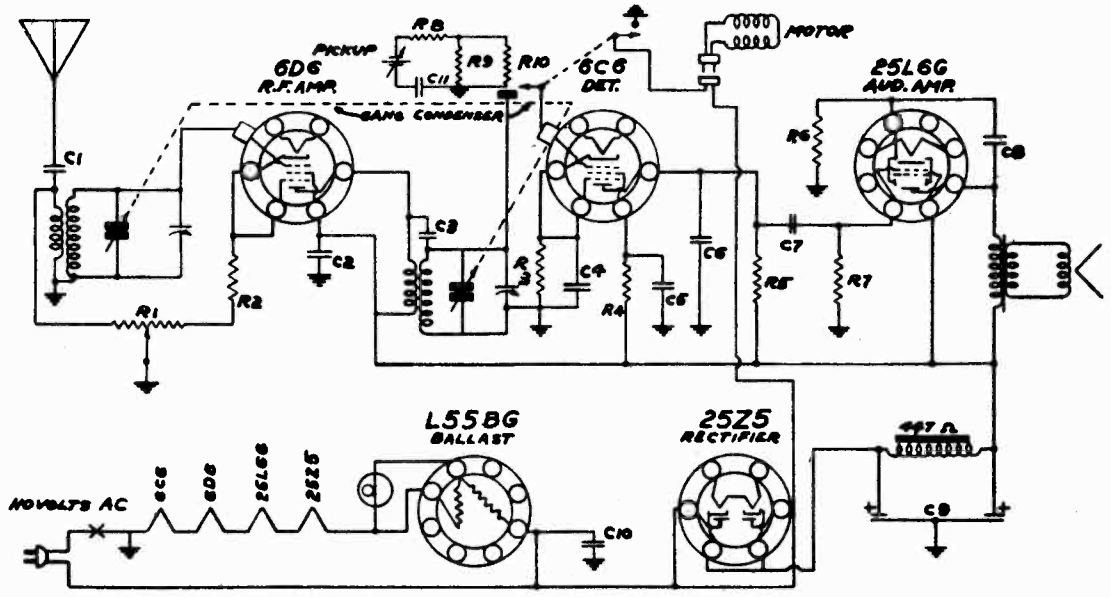
The remaining two (2) push buttons, located at the extreme left hand end of the push button plate are for tone control.

1. Choose a station having a frequency within the range of button No. 1 (540 K.C. to 930 K.C.)
2. With the middle knob in the "broadcast" position, tune this station conventionally by using the selector knob.
3. Now turn the middle knob to the "automatic" position and press button No. 1 and turn the adjusting screw in either direction until the previously selected station is heard. Adjust the screw for maximum volume and sensitivity.
4. Remove the call letters of the station from the call letter sheet furnished and insert in the window of the adjusting screw. Insert "Med" and "Bass" tabs in windows as shown in Fig. 1.
5. Repeat the above procedure for the remaining five (5) stations.

NOTE: It is advisable to retain the call letter sheet in case of station change later on.

MODEL 39YP5
MODELS 40Y8,40Y8C
Schematics

ZEPHYR RADIO CO.

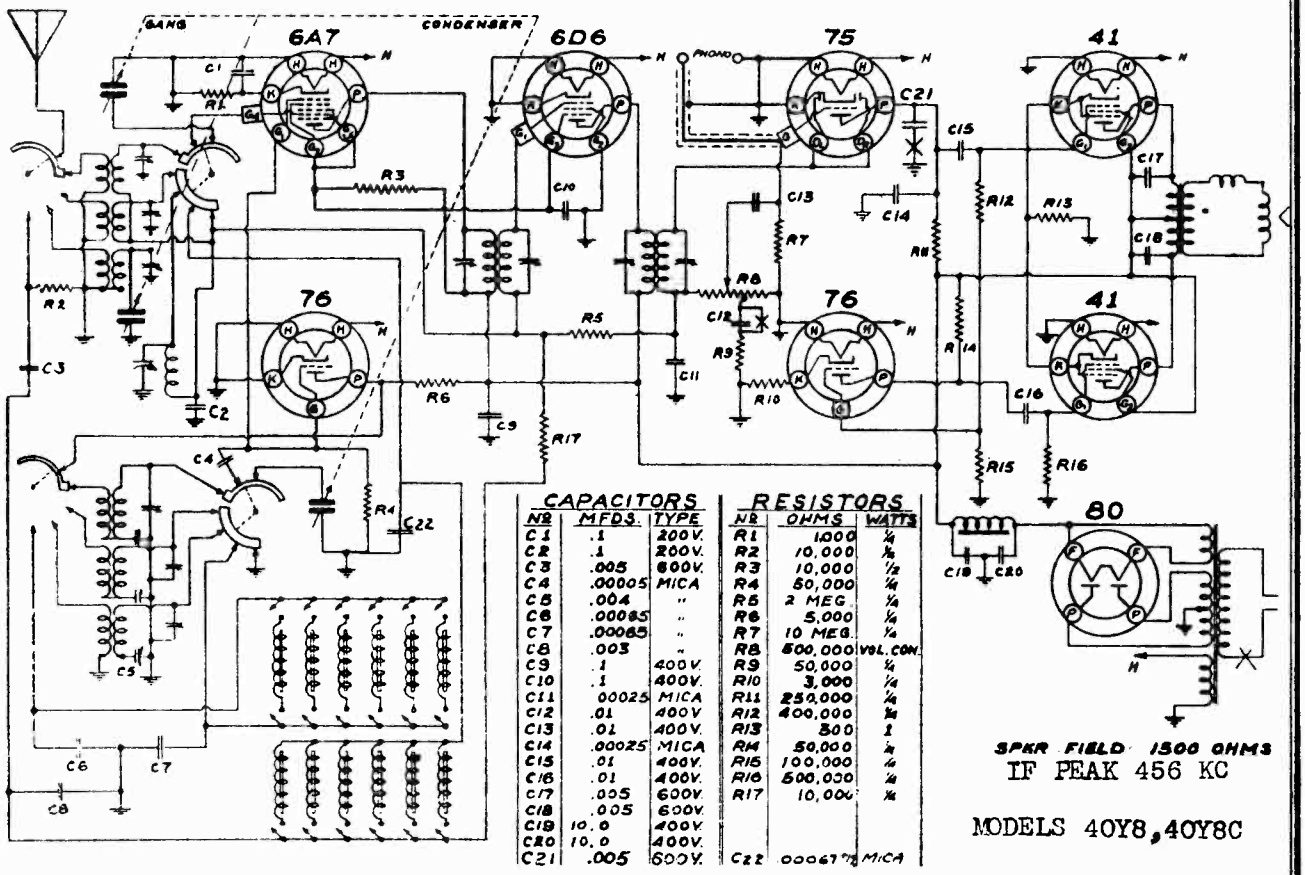


CONDENSERS		
NR	CAPACITY	TYPE
C1	.002 MFD.	400 V.
C2	.1 "	200 V.
C3	1.5 mmf.	GIMMIK
C4	.25 MFD.	200 V.
C5	.1 "	200 V.
C6	.0002 "	600 V.
C7	.01 "	400 V.
C8	.02 "	400 V.
C9	8-16 "	150 V. ELECT.
C10	.1 "	400 V.
C11	.005 "	600 V.

RESISTORS		
NR	OHMS	WATTS
R1	15,000	VOL. CONT.
R2	250	½
R3	25,000	½
R4	2,000,000	½
R5	500,000	½
R6	110	WIRE WOUND
R7	500,000	½
R8	1,000,000	½
R9	250,000	½
R10	500,000	PHONO VOL. CONT.

PHONO COMBINATION

MODEL 39YP5



CAPACITORS		
NR	MFDS.	TYPE
C1	.1	200V.
C2	.1	200V.
C3	.005	600V.
C4	.00005	MICA
C5	.004	"
C6	.00085	"
C7	.00065	"
C8	.003	"
C9	.1	400V.
C10	.1	400V.
C11	.00025	MICA
C12	.01	400V.
C13	.01	400V.
C14	.00025	MICA
C15	.01	400V.
C16	.01	400V.
C17	.005	600V.
C18	.005	600V.
C19	10.0	400V.
C20	10.0	400V.
C21	.005	600V.

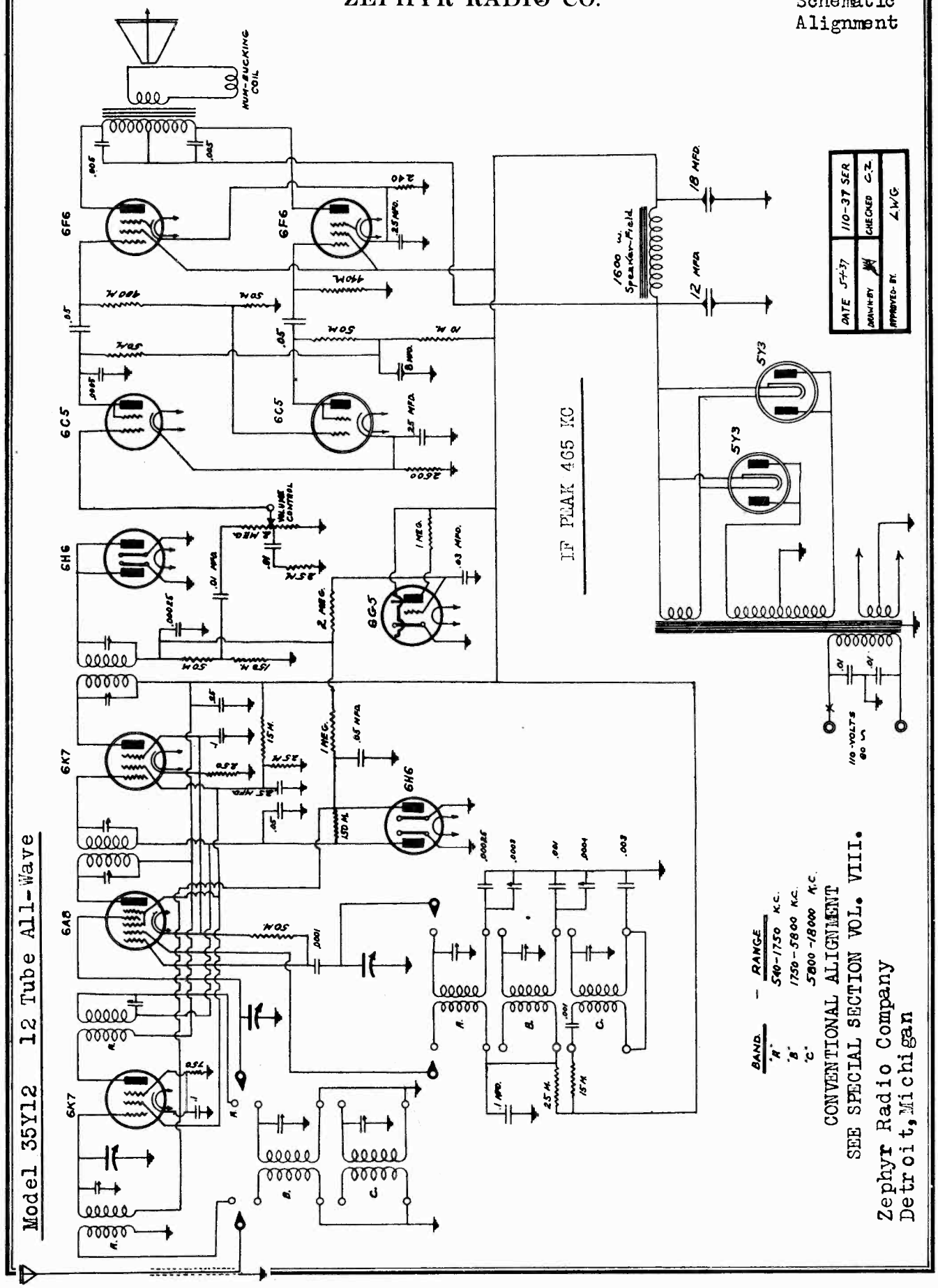
RESISTORS		
NR	OHMS	WATTS
R1	1000	½
R2	10,000	½
R3	10,000	½
R4	50,000	½
R5	2 MEG.	½
R6	5,000	½
R7	10 MEG.	½
R8	500,000	VOL. CON.
R9	50,000	½
R10	3,000	½
R11	250,000	½
R12	400,000	½
R13	300	1
R14	50,000	½
R15	100,000	½
R16	500,000	½
R17	10,000	½
C22	.00067	MICA

IF PEAK 456 KC

MODELS 40Y8,40Y8C

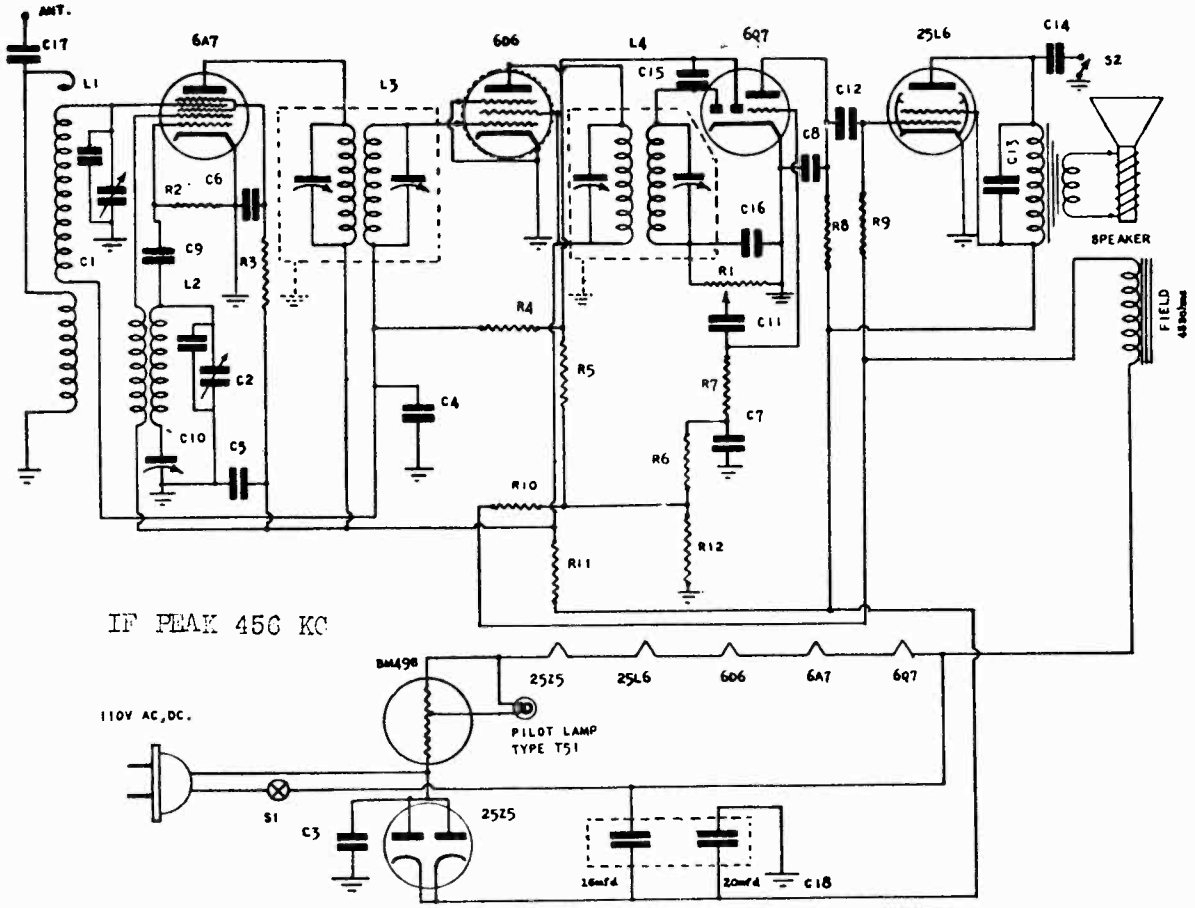
ZEPHYR RADIO CO.

MODEL 35Y12
Schematic
Alignment



MODEL 41X6
Schematic
Alignment

ZEPHYR RADIO CO.



ALIGNMENT PROCEDURE

I. F. Alignment. Connect a signal generator set at 456kc to the 6A7 input and connect an output meter to the speaker output. Using a weak signal tune the two I. F. condensers on the first I. F. coil and the two I. F. condensers on the output I. F. coil for maximum response.

R. F. Alignment. Connect the signal generator set at 1400kc to the antenna lead using a dummy antenna of 200mmf. Tune the set by means of the dial to 1400kc position. Adjust oscillator trimmer for this frequency. Pad at 600kc. Recheck 1400kc and trim antenna stage for maximum response. Repeating the alignment may result in improved sensitivity.

SCHEMATIC LOCATION	DESCRIPTION		PART NO.	LIST PRICE
L1	Antenna Coil		BA110	$0.50
L2	Oscillator Coil		BO110	.40
L3	1st I.F. Coil		LC110	.80
L4	2nd I.F. Coil		LC112	.80
——	Speaker		SD23	3.50
C1, C2	Tuning Condenser		CV25	1.80
C3, C4, C5, C6, C7	Fixed	.1mfd—200v	——	.20
C8, C9, C16	Mica	200mmfd	——	.20
C15	Mica	100mmfd	——	.20
C10	Variable Padder	550mmfd	——	.40
C11, C12, C13	Fixed Condenser	.01mfd—200v	——	.20
C14	Fixed	.02mfd—600v	——	.20
C17	Fixed	.002mfd—600v	——	.25
C18	Electrolytic Condenser Block		CE20	1.40
S1	Line Switch (On Vol. Control)		——	——
S2	Tone Control Switch		S12	.40
R1	Volume Control	¼ megohm	RV18	.80
R2	Resistors	50,000 ohms—¼ Watt	——	.15
R3	"	25,000 ohms—¼ Watt	——	.20
R4, R5	"	2 megohms—¼ Watt	——	.15
R6, R7	"	1 megohm—¼ Watt	——	.15
R8,	"	¼ megohm—¼ Watt	——	.15
R9	"	½ megohm—¼ Watt	——	.15
R10	"	100 ohms—½ Watt	——	.20
R11	"	30 ohms—¼ Watt	——	.20
R12	"	25 ohms—¼ Watt	——	.20

PRICES SUBJECT TO CHANGE WITHOUT NOTICE