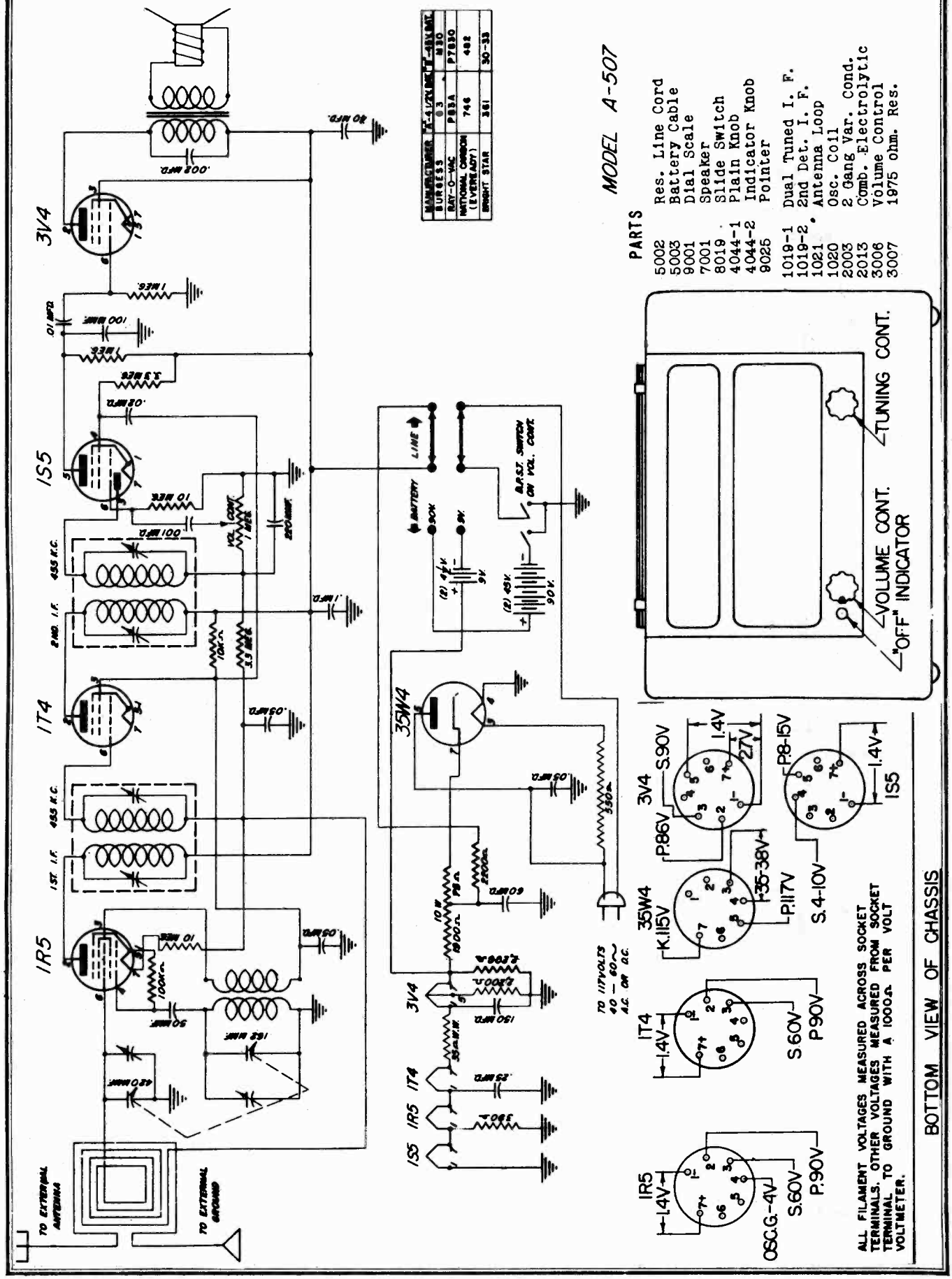
DEWALD RADIO

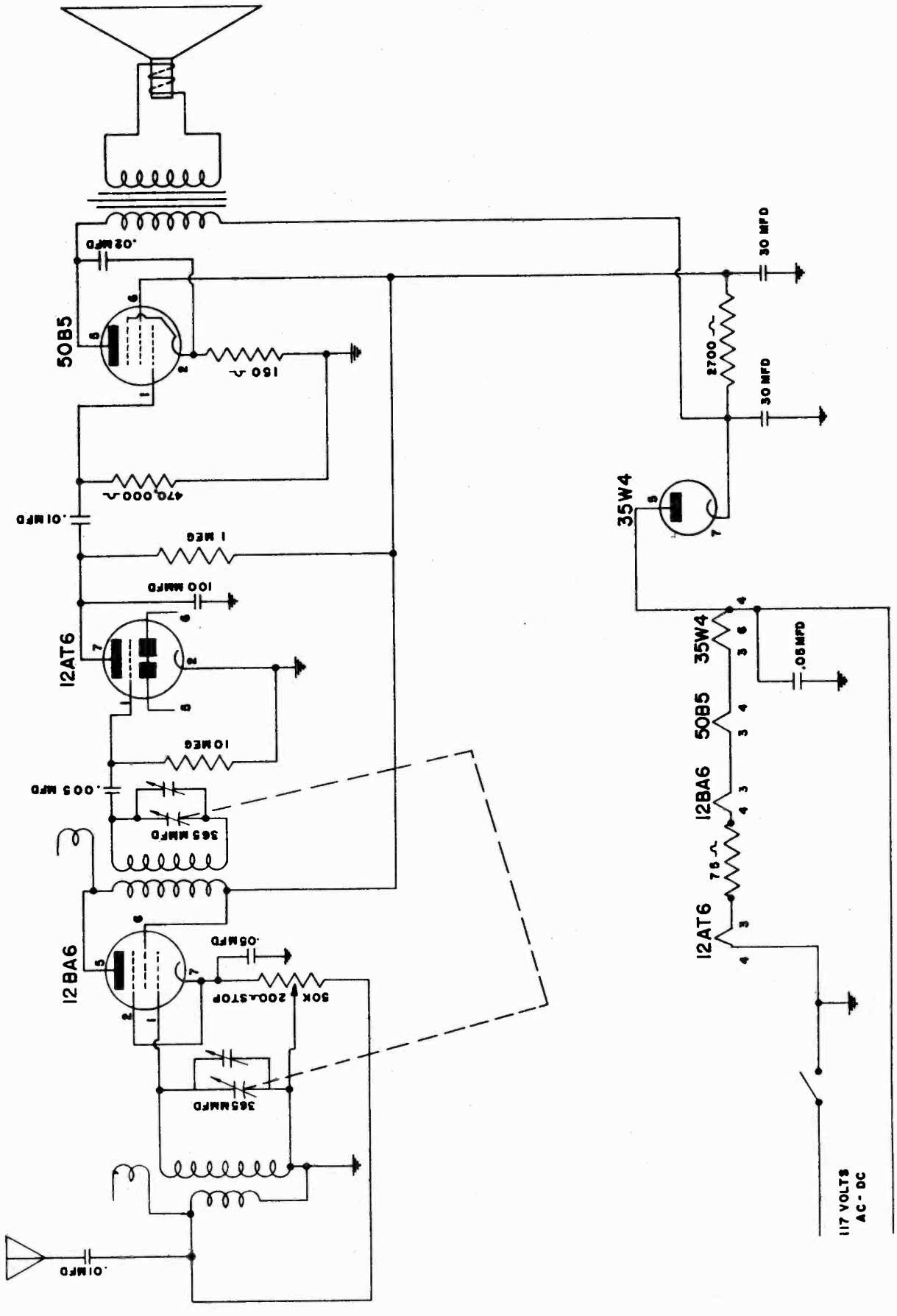
MODEL A-507



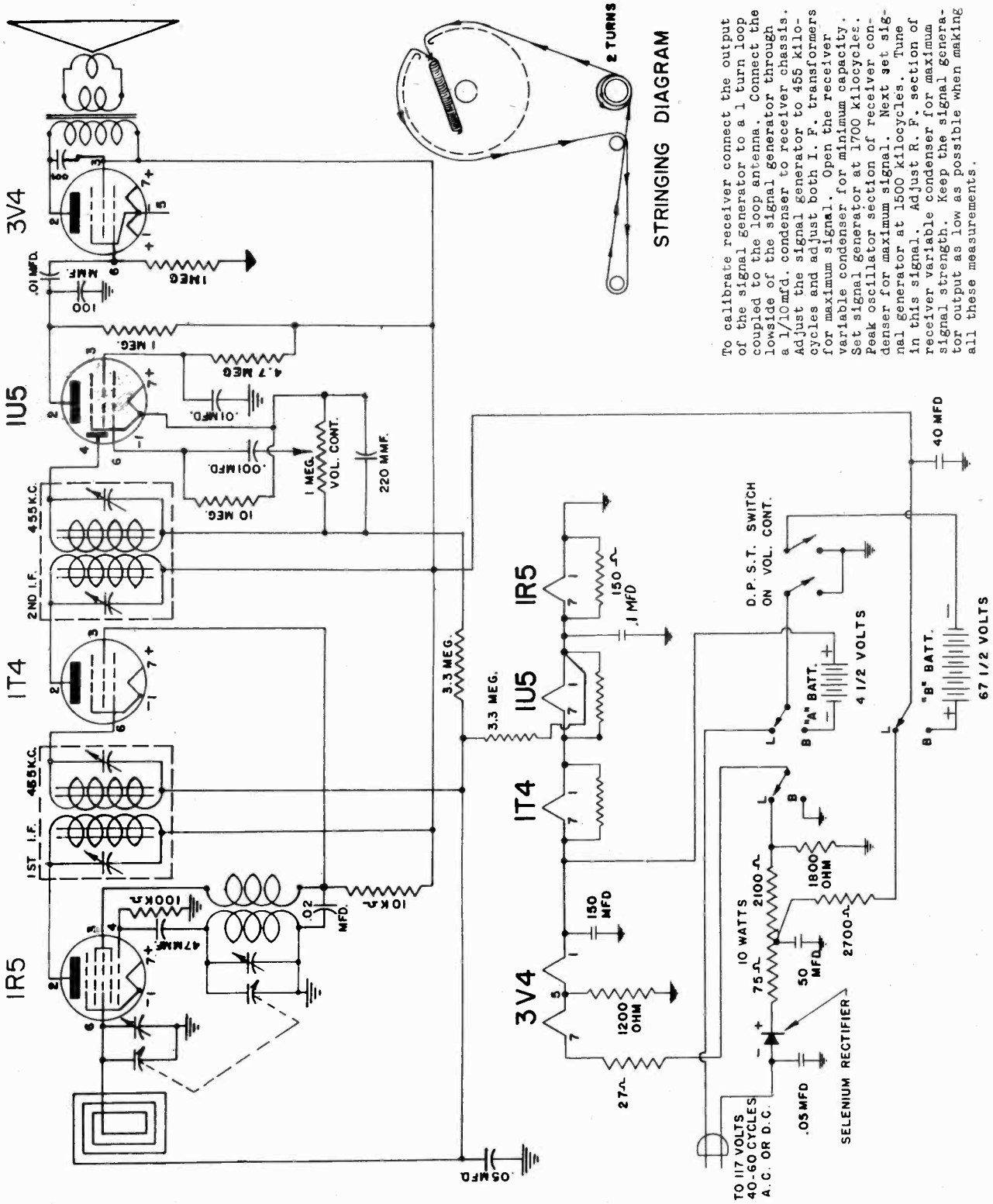
MANUFACTURER	A-4 UNIT	A-5 UNIT
BURGESS	6 3	830
RAY-O-VAC	P83A	P7830
NATIONAL CARBON (EVEREADY)	746	482
BRIGHT STAR	361	30-33

MODEL B-401

DEWALD RADIO

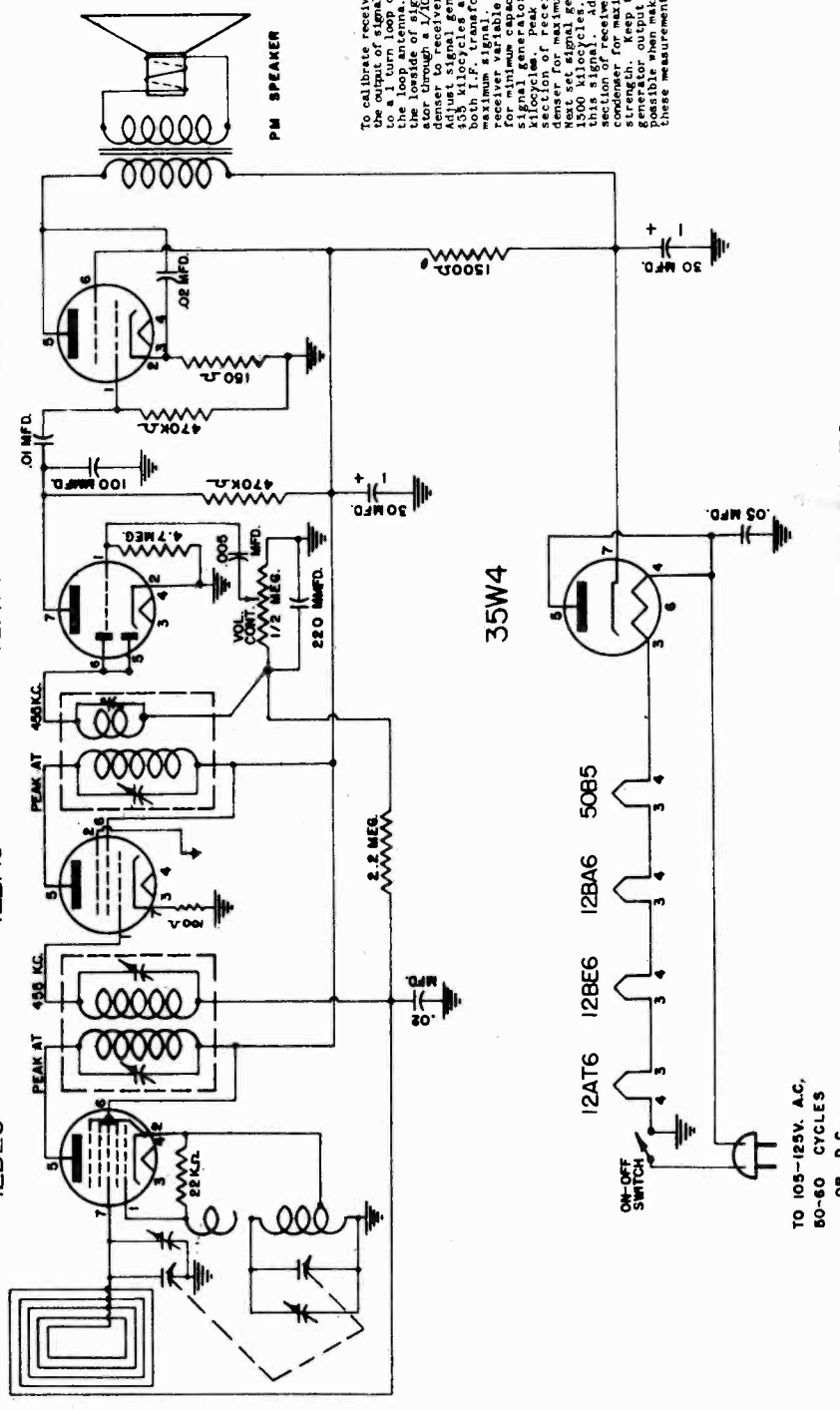


DEWALD RADIO MODEL B-504



MODEL B-506

DEWALD RADIO



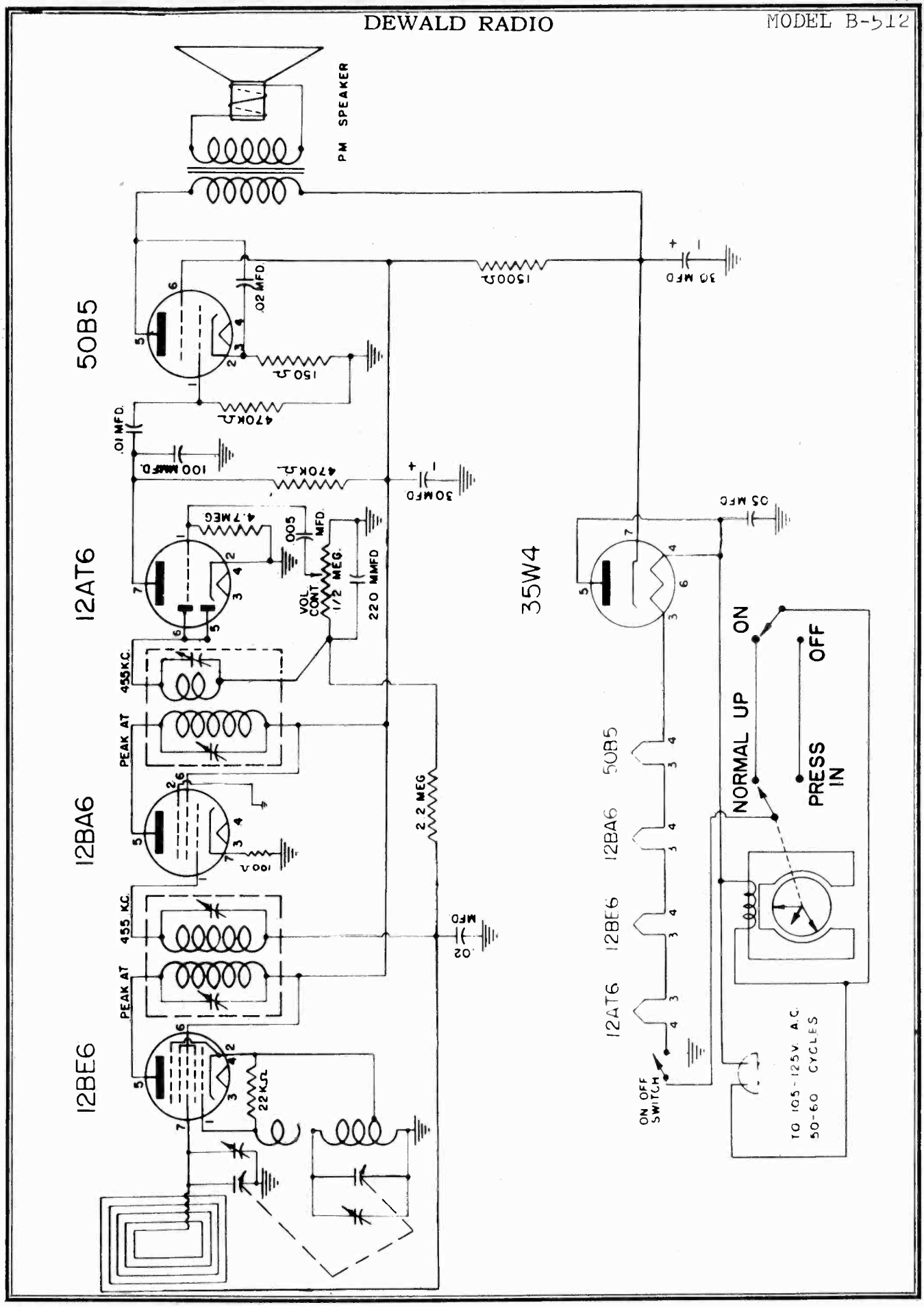
REPLACEMENT PARTS

1016	Looptenna	3000	¼ W. resistors
1028	oscillator coil	3001	2 W. resistors
1027-1	1st I.F. coil	3002	vol. cont. and switch
1002-3	2nd detector coil	5000	line cord
2000	paper condensers	7003	speaker
2012	mica condensers	9050	shaft
2002	comb. electrolytic	9818	bushing
2003	var. condenser	9762	drive spring
		#20	dial cord

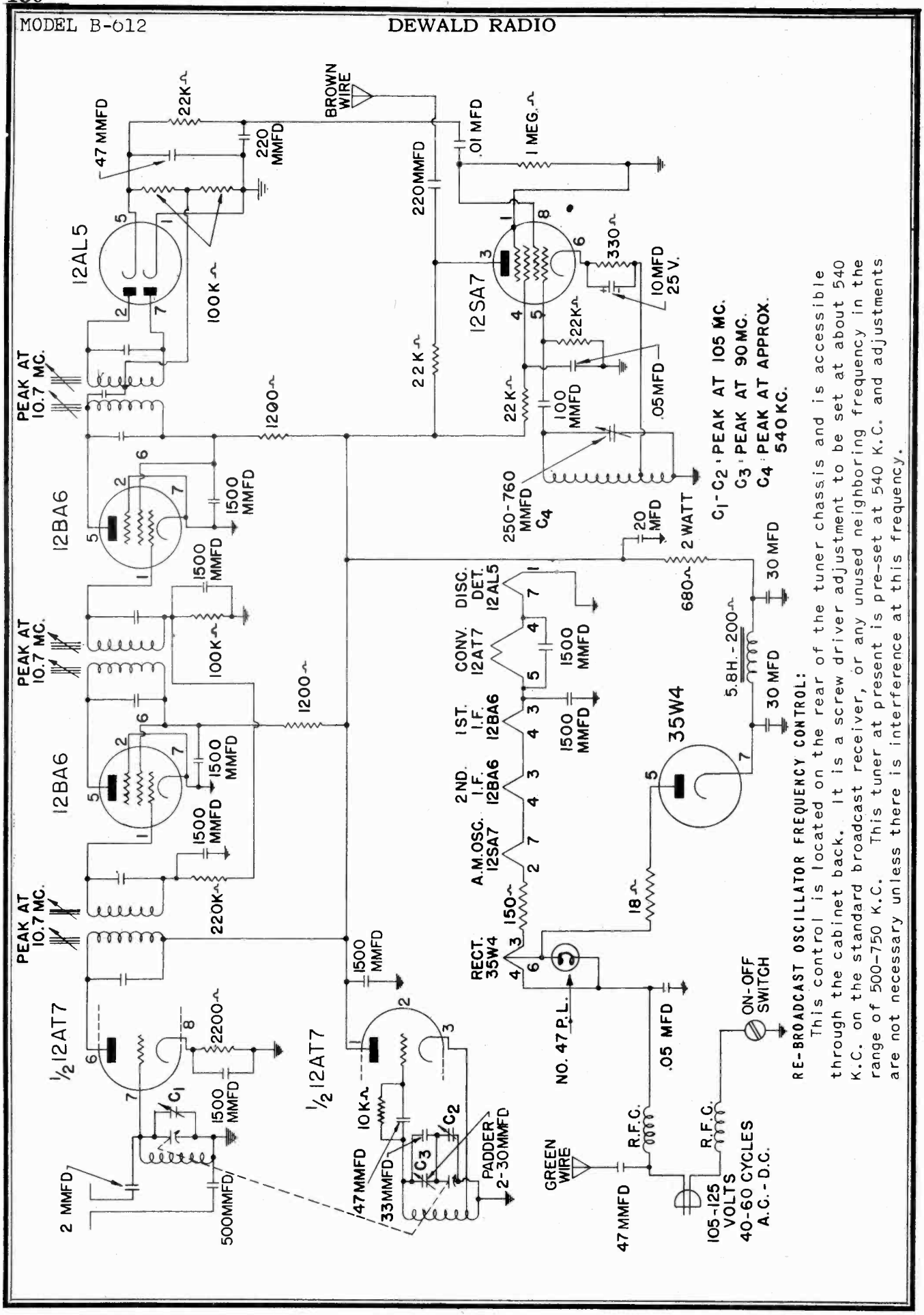
TUBES

1	35W4	CABINET	4053
1	50B5	KNOB	4055
1	12AT6	BACK	4059
1	12BA6		
1	12BE6		

DEWALD RADIO MODEL B-512



MODEL B-612 DEWALD RADIO



RE-BROADCAST OSCILLATOR FREQUENCY CONTROL:

This control is located on the rear of the tuner chassis and is accessible through the cabinet back. It is a screw driver adjustment to be set at about 540 K.C. on the standard broadcast receiver, or any unused neighboring frequency in the range of 500-750 K.C. This tuner at present is pre-set at 540 K.C. and adjustments are not necessary unless there is interference at this frequency.

OPERATION OF THE F. M. TUNER:

After the necessary installation has been made according to the instructions contained in the preceding paragraphs, the electric line cord of the Wireless Tuner may be plugged into an electric wall socket. Turn the ON-OFF switches of both the tuner and your radio receiver to the "ON" position. The brown wire coming out of the rear of the tuner is to be placed, approximately 1 foot near the radio receiver loop or antenna lead, if radio receiver has no loop. The radio receiver is to be set at 540 Kc or any nearby clear channel, and the re-broadcast oscillator frequency control slightly adjusted until a rushing sound is heard from your radio receiver. The volume for F. M. reception is regulated by the volume control of your own radio receiver.

Alignment of the Wireless Tuner

Insulated alignment tools are necessary. The output meter should be a D. C. vacuum tube voltmeter with a range of at least 20 volts. The signal generator should cover the frequencies of 10.7, 90 and 105 M. C. Allow the Wireless Tuner to warm up for at least 5 minutes before making any adjustments. The location of the adjustment screws is indicated clearly on the license label. Follow the following sequence.

I. F. ALIGNMENT:

Connect the signal generator through a .01 mfd condenser to the grid of the 12AT7 converter tube. Connect the low side of the generator through a 1/10th mfd. condenser to tuner chassis. Adjust signal generator to 10.7 mc. Connect VTVM to junction of 100 M -Ohm diode load resistors. Adjust primary and secondary slugs or trimmers of each I. F. for maximum D. C. voltage output. Remove VTVM lead from junction point and connect lead to pin 5 of 12AL5 tube. Adjust secondary slug or trimmer of discriminator for zero D. C. voltage output, (check proper zero set of VTVM. Meter should register reverse polarity when slug or trimmer is rotated through zero output.)

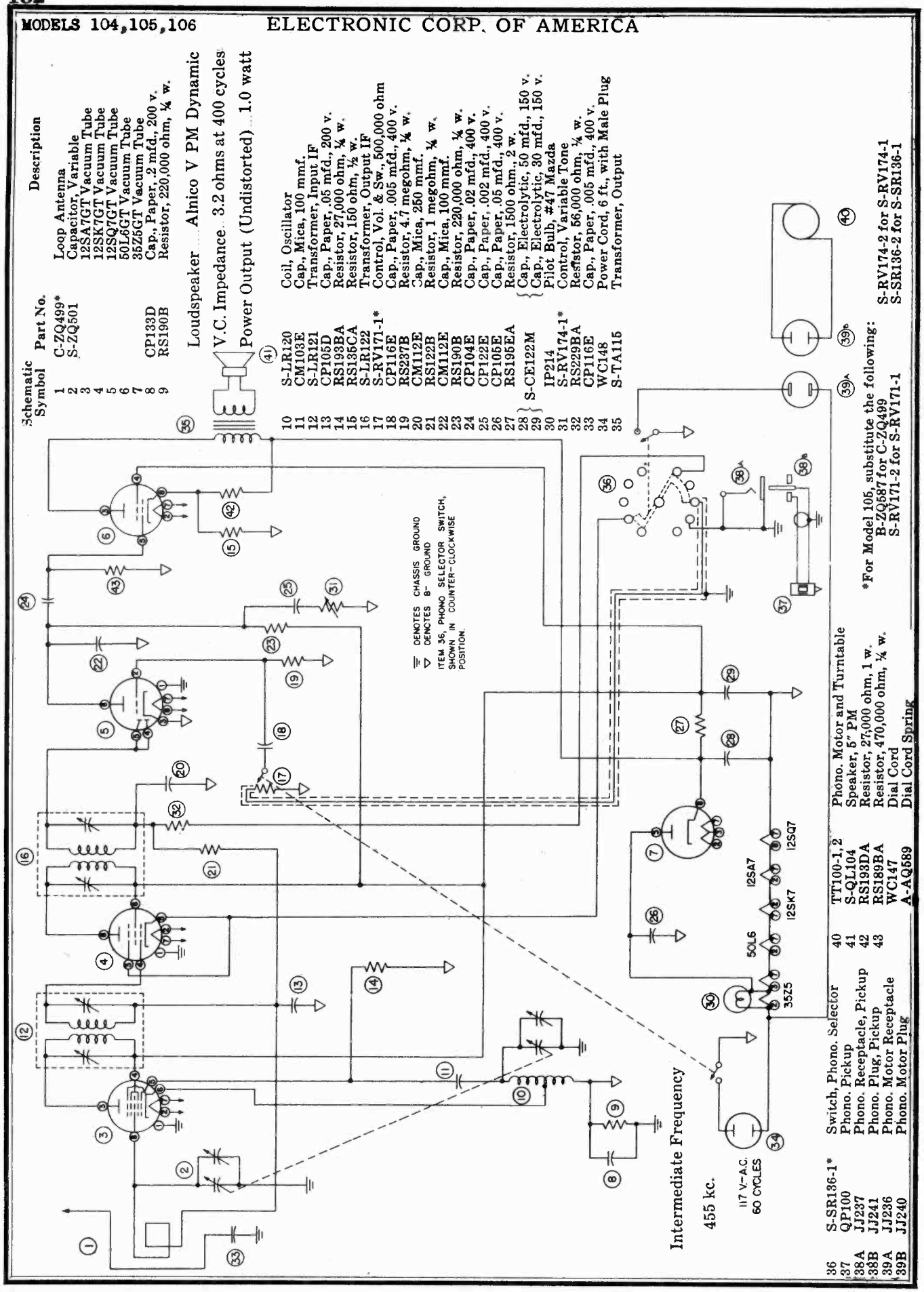
R. F. ALIGNMENT:

Remove signal generator leads from 12AT7 control grid. Connect in series with each generator lead a carbon 150 ohm resistor. Connect the high side generator lead to the red wire, in rear of tuner, and the low side generator lead to the orange wire. Adjust signal generator to 109 Mc. Open the tuner variable condenser for minimum capacity. Peak oscillator section of tuner condenser for maximum signal. Next set signal generator to 105 Mc. Tune in this signal. Adjust R.F. section of receiver variable condenser for maximum signal strength. To adjust the low frequency end, set the tuner and signal generator to 90 Mc. Peak the oscillator padder for maximum output. The variable condenser should be rocked during this operation. Keep the signal generator output as low as possible when making all of these measurements. It is extremely necessary in making the R.F. adjustments, that the fundamental oscillator signal be tuned in and not the image frequency. This can be checked by using a calibrated wavemeter.

REPLACEMENT PARTS

1038-1	I. F. Coil	3003	1/2 Watt Resistors
1038-2	Discriminator Coil	3005	4 Watt Pigtail Resistor
1040-2	R. F. Chokes	4016	Cabinet
1041	A. M. oscillator Coil	4069	Cabinet Back
1042	Filter Choke	4044-2	Knob
1043	Antenna Coil	5000	Line Cord
1044	F. M. oscillator Coil	6014	Dial Scale
2000	Paper Capacitors	8001	Pilot Lamp Socket
2005	Electrolytic	8003	Power Switch
2012	Ceramic Condensers	9762	Dial Spring
2023	Variable Condensers	2018	Electrolytic
2040	Trimmer Condensers	#47	Pilot Lamp

MODELS 104,105,106 ELECTRONIC CORP. OF AMERICA



Schematic Symbol	Part No.	Description
1	C-ZQ499*	Loop Antenna
2	S-ZQ501	Capacitor, Variable
3		12SA7GT Vacuum Tube
4		12SK7GT Vacuum Tube
5		12SQ7GT Vacuum Tube
6		50L6GT Vacuum Tube
7		35Z5GT Vacuum Tube
8	CP133D	Cap., Paper, .2 mfd., 200 v.
9	RS190B	Resistor, 220,000 ohm, ¼ w.
10	S-LR120	Coil, Oscillator
11	CM103E	Cap., Mica, 100 mmf.
12	S-LR121	Transformer, Input IF
13	CP105D	Cap., Paper, .05 mfd., 200 v.
14	RS193BA	Resistor, 27,000 ohm, ¼ w.
15	RS135CA	Resistor, 150 ohm, ½ w.
16	S-LR122	Transformer, Output IF
17	S-RV171-1*	Control, Vol. & Sw., 500,000 ohm
18	CP116E	Cap., Paper, .005 mfd., 400 v.
19	RS237B	Resistor, 4.7 megohm, ¼ w.
20	CM112E	Cap., Mica, 250 mmf.
21	RS122B	Resistor, 1 megohm, ¼ w.
22	CM112E	Cap., Mica, 100 mmf.
23	RS190B	Resistor, 220,000 ohm, ¼ w.
24	CP104E	Cap., Paper, .02 mfd., 400 v.
25	CP122E	Cap., Paper, .002 mfd., 400 v.
26	CP105E	Cap., Paper, .05 mfd., 400 v.
27	RS195EA	Resistor, 1500 ohm, 2 w.
28 }	S-CE122M	Cap., Electrolytic, 50 mfd., 150 v.
29 }		Cap., Electrolytic, 30 mfd., 150 v.
30	IP214	Pilot Bulb, #47 Mazda
31	S-RV174-1*	Control, Variable Tone
32	RS229BA	Resistor, 56,000 ohm, ¼ w.
33	CP116E	Cap., Paper, .005 mfd., 400 v.
34	WC148	Power Cord, 6 ft., with Male Plug
35	S-TA115	Transformer, Output

36	S-SR136-1*	Switch, Phono. Selector	40	TT100-1, 2
37	QP100	Phono. Pickup	41	S-QL104
38A	JJ237	Phono. Receptacle, Pickup	42	RS193DA
38B	JJ241	Phono. Plug, Pickup	43	RS189BA
39A	JJ236	Phono. Motor Receptacle		WC147
39B	JJ240	Phono. Motor Plug		A-AQ589

Phono. Motor and Turntable
Speaker, 5" PM
Resistor, 27,000 ohm, 1 w.
Resistor, 470,000 ohm, ¼ w.
Dial Cord
Dial Cord Spring

*For Model 105, substitute the following:
B-ZQ587 for C-ZQ499
S-RV171-2 for S-RV171-1
S-RV174-2 for S-RV174-1
S-SR136-2 for S-SR136-1

ALIGNMENT PROCEDURE

The following equipment is necessary to properly align this chassis:

1. A signal generator which will provide an accurately calibrated signal at the frequencies listed.
2. An output meter.
3. A non-metallic screwdriver.
4. Any loop similar to the one used in the receiver.

PROCEDURE

1. Mount the loop in a vertical position on a block of wood so that it may be coupled parallel to the set loop.
2. Connect the loop to the output terminals of the signal generator.

INPUT SIGNAL	DISTANCE BETWEEN GEN. AND SET LOOP	SET DIAL AT	TRIMMERS	PURPOSE
455 kc.	Close	HF end	1 2 3 4	Align IF
1720 kc.	Close	HF end	5	Set limit of band
1400 kc.	1½'	1400 kc.	6	Align antenna

SOCKET VOLTAGES

TUBE	POSITION	1	2	3	4	5	6	7	8
12SA7GT	Oscillator and Mixer	0	24 AC	84	84	–11*	0	125 AC	0
12SK7GT	IF Amplifier	0	24 AC	0	0	0	84	35 AC	84
12SQ7GT	2nd Det.–1st Audio	0	0	0	0	0	18	0	125 AC
50L6GT	Power Output	0	83 AC	108	84	0	0	35 AC	6
35Z5GT	Rectifier	0	117 AC	111 AC	0	111 AC	0	83 AC	117

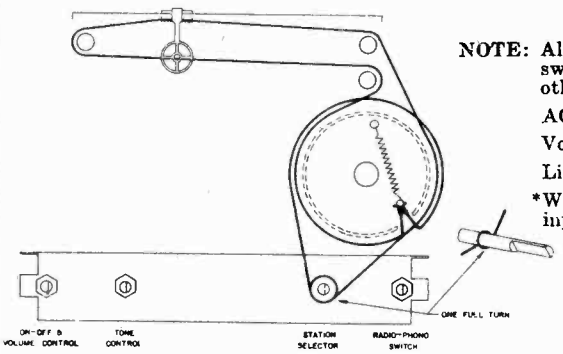
NOTE: All DC voltages measured with a 1000 ohm-per-volt meter from ON-OFF switch (—B) to socket contact indicated. All voltages are positive DC unless otherwise marked.

AC switch on.

Volume control in minimum position; no signal.

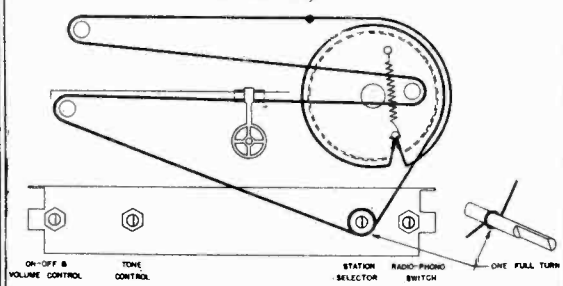
Line voltage 117 volts AC.

*When a vacuum tube voltmeter with approximately 10 megohms or higher input resistance is used.



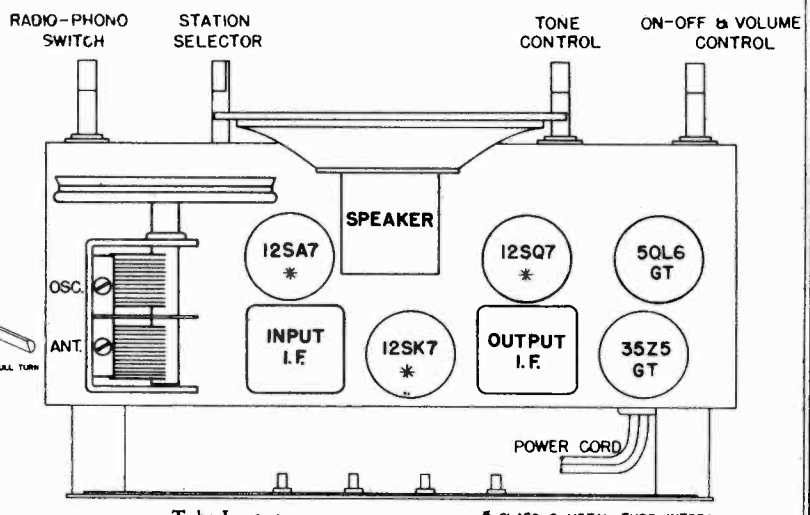
Dial Mechanism

Models 104, 106



Dial Mechanism

Model 105



Tube Layout

* GLASS & METAL TUBE INTERCHANGEABLE

MODEL 108

ELECTRONIC CORP. OF AMERICA

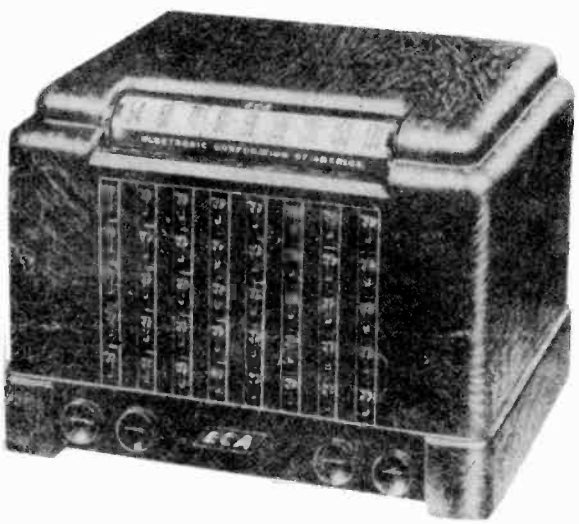
Service Parts List

NO.	PART NAME	PART NO.
1	Loop Antenna	C-ZQ-522*
2	Speaker	S-QL-105E*
8	Oscillator Coil	S-LR-120*
9	Input I.F. Transformer	S-LR-127*
10	Output I.F. Transformer	S-LR-128*
11	Output Transformer	S-TA-116*
12	Electrolytic Condenser	S-CE-126M*
13	Condenser, Mica, 100 mmf.	CM-103E
14	" " 250 mmf.	CM-112E
15	" Paper, .002 mf., 400 v.	CP-122E
16	" " .02 mf.	CP-104E
17	" " .05 mf.	CP-105E
18	" " .05 mf., 200 v.	CP-105D
19	" " .2 mf., 200 V.	CP-133D
20	Variable Capacitor and Drum	S-ZQ-500*
21	On-off Switch	S-SR-137*
22	Vol.Control, Tone Control, 500K ohms	S-RV-174-1*
23	Resistor, Fixed, 47K ohm, 1/4 w.	RS-186B
24	" " 33 " 1/4 w.	RS-220B
25	" " 82 " 1 w., 10%	RS-221D
26	" " 100 " 1/4 w.	RS-114B
27	" " 1500 " 1/2 w.,10%	RS-195C
28	" " 1500 " 2 w., 10%	RS-195E
29	" " 2.2K " 1/4 w.	RS-185B
30	Resistor,Fixed, 18K ohm, 1/4 w.,10%	RS-222B
31	" " 22K " 1/4 w.	RS-197B
32	" " 100K " 1/4 w.,10%	RS-120B
33	" " 220K " 1/4 w.	RS-190B
34	" " 470K " 1/4 w.,10%	RS-189B
36	" " 2.2 meg.	RS-223B
37	Pilot Bulb, G.E., 3 w., 110 v.	IP-115
38	Condenser, Paper, .005 mf., 200 v.	CP-116D
	Cabinet, Bakelite	E-AQ-640*
	Knob Assembly	A-ZQ-577*
	Dial Scale	C-NP-157-3*
	Pointer	A-AQ-761*
	Dial Cord Spring	A-AQ-589*
	Tuning Shaft	A-OQ-190-1*
	"C" Washer	HN-405*
	Dial Cord Bushing	A-HQ-772*
	Pilot Light Socket	S-XQ-164*
	Dial Background Plate	B-AQ-758*
	Loop Spacer Block	A-AQ-637*
	Felt Knob Washers	HN-365*
	Dial and Speaker Support	C-ZQ-619*
	5 Lug Terminal Panel	EQ-380*
	Line Cord and Plug	WC-148*

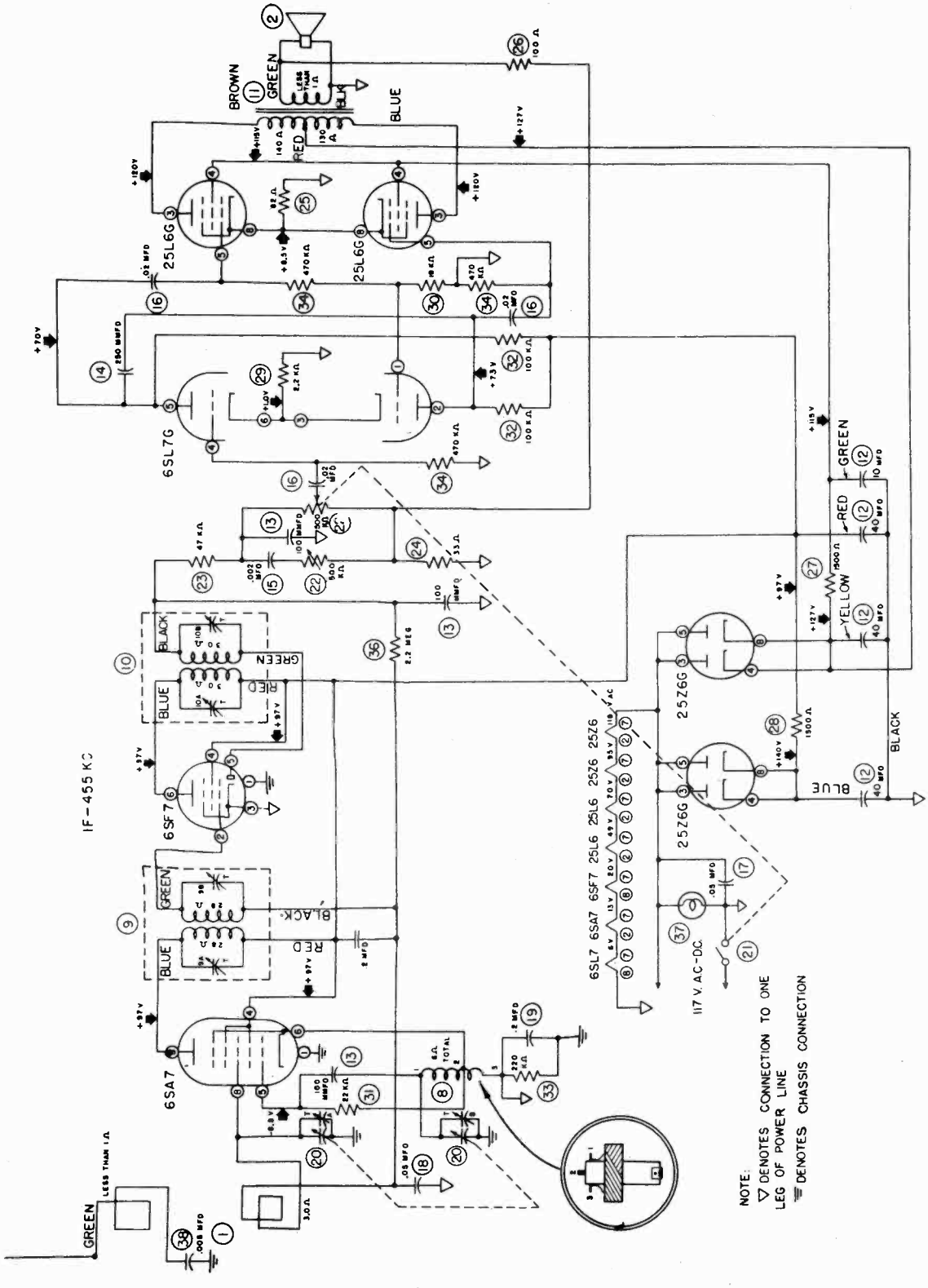
Note: All items followed by an asterisk (*) will be stocked by the Electronic Corporation of America. All unmarked items may be replaced by any high quality component of equal electrical value.

All DC voltage measurements in this Service Bulletin have been made with a 20,000 ohms per volt voltmeter, using B minus as a common reference point. All AC voltage measurements are with 1000 ohms per volt voltmeter. Line voltage was maintained at 117 volts for all voltage measurements. The condenser gang should be fully meshed and the volume control at its minimum point. Voltages may vary ±10% from the indicated nominal value.

Measurements of oscillator grid bias voltage should be made with a 50,000 ohm resistor in series with the negative probe of the meter, and the positive prod connected to B minus. Rotate the tuning condenser throughout its complete range with the meter connected. Absence of bias voltage at any point is an indication that the oscillator is not functioning.



CABINET	Plastic, Walnut Finish
CIRCUIT	7 Tube, Superheterodyne
FREQUENCY RANGE	540 to 1720 KC
INTERMEDIATE FREQ.	455 KC
POWER INPUT	110 to 125 V. AC-DC
POWER CONSUMPTION	60 Watts
ANTENNA	Built-in Loop
SPEAKER	Alnico V PM Dynamic 6"
V.C. IMPEDANCE	3.2 ohms at 400 Cycles
POWER OUTPUT	3 Watts Undistorted


6SL7G
25L6G
25L6G
6SF7
6SA7
25Z6G
25Z6G
6SL7 6SA7 6SF7 25L6 25L6 25Z6 25Z6
IF-455 KC
117 V. AC-DC
BROWN
GREEN
BLUE
RED
BLACK
YELLOW
NOTE:
▽ DENOTES CONNECTION TO ONE LEG OF POWER LINE
≡ DENOTES CHASSIS CONNECTION

MODEL 108

ELECTRONIC CORP. OF AMERICA

In order to make a proper alignment, the following equipment is required:

1. A signal generator capable of providing a modulated radio frequency output over the frequencies required.

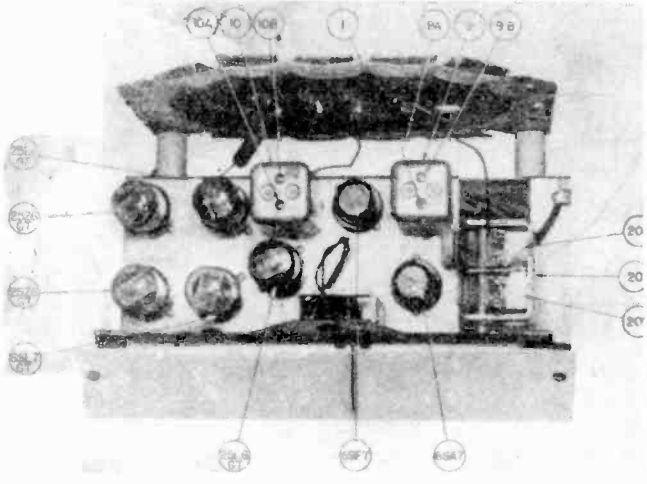
2. A suitable output meter or sensitive AC voltmeter with a .1 mfd series blocking condenser.

3. A coupling loop, made of three turns of stiff hookup wire, 4 inches in diameter, mounted on a suitable block of wood or stand.

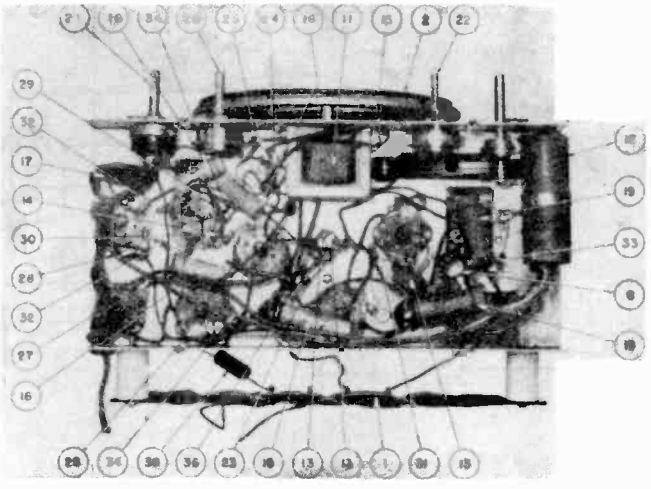
With the receiver on and the volume control at maximum, connect the signal generator to the coupling loop and bring the loop close to the receiver chassis. Adjust the signal generator output to minimum necessary to give a suitable indication on the output meter, which should be connected from B minus to the plate of one output tube. CAUTION: Make sure the output meter is isolated from DC by a series blocking condenser.

With the gang condenser fully meshed, adjust the pointer so that the left hand edge of the pointer saddle is one inch from the end of the dial frame. *(See Dial Installation drawing)* Using the dial scale contained in this Service Bulletin, align the pointer to the indicated reference mark with the pointer set as above. Then proceed with the alignment in accordance with the chart below:

SET SIGNAL GENERATOR AT	SET GANG	LOOP DISTANCE	ADJUST TRIMMER	TUNE FOR	OPERATION
455 KC	Meshed	Close	9a 9b 10a 10b	Max.	Align - I.F.
1720 KC	Fully Open	Close	20a	Max.	Align Oscillator
1400 KC	1400 KC	Close	20b	Max.	Align - R.F.



Chassis Top View

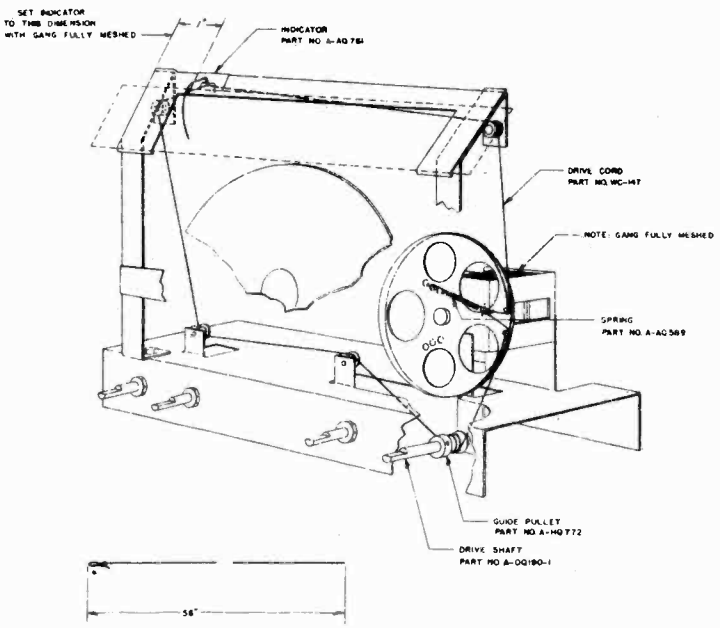


Chassis Underside View

Replacement of Dial Drive Cord

Completely remove remainder of defective dial cord. Inspect all pulleys and make sure they revolve freely. Determine that no grease or oil is present on any pulley surface. Attach the cord spring, part #A-AQ589, to one end of the drive cord. Fully mesh the gang condenser and hook the spring to the hole closest to the cord cutout on the dial drum. Proceed to string dial cord in accordance with the detail drawing. Take two full turns around the drive drum, part #A-HQ772. Pull the cord snug at this point. Wrap one complete turn around gang drum and pull cord snug. Securely tie free end of cord to the cord spring. Next, adjust spring tension by moving the hook end of the spring into the next spring hole.

Clip the pointer on to the dial cord with sufficient tension so as to prevent slippage and adjust pointer position, so that with fully meshed gang, the left edge of the pointer saddle is one inch from the edge of the dial support frame. Insert chassis in cabinet and check pointer and scale agreement. Then make final adjustment of pointer position. Remove the chassis and firmly crimp the pointer prongs on the dial cord, and secure with a small drop of speaker cement.



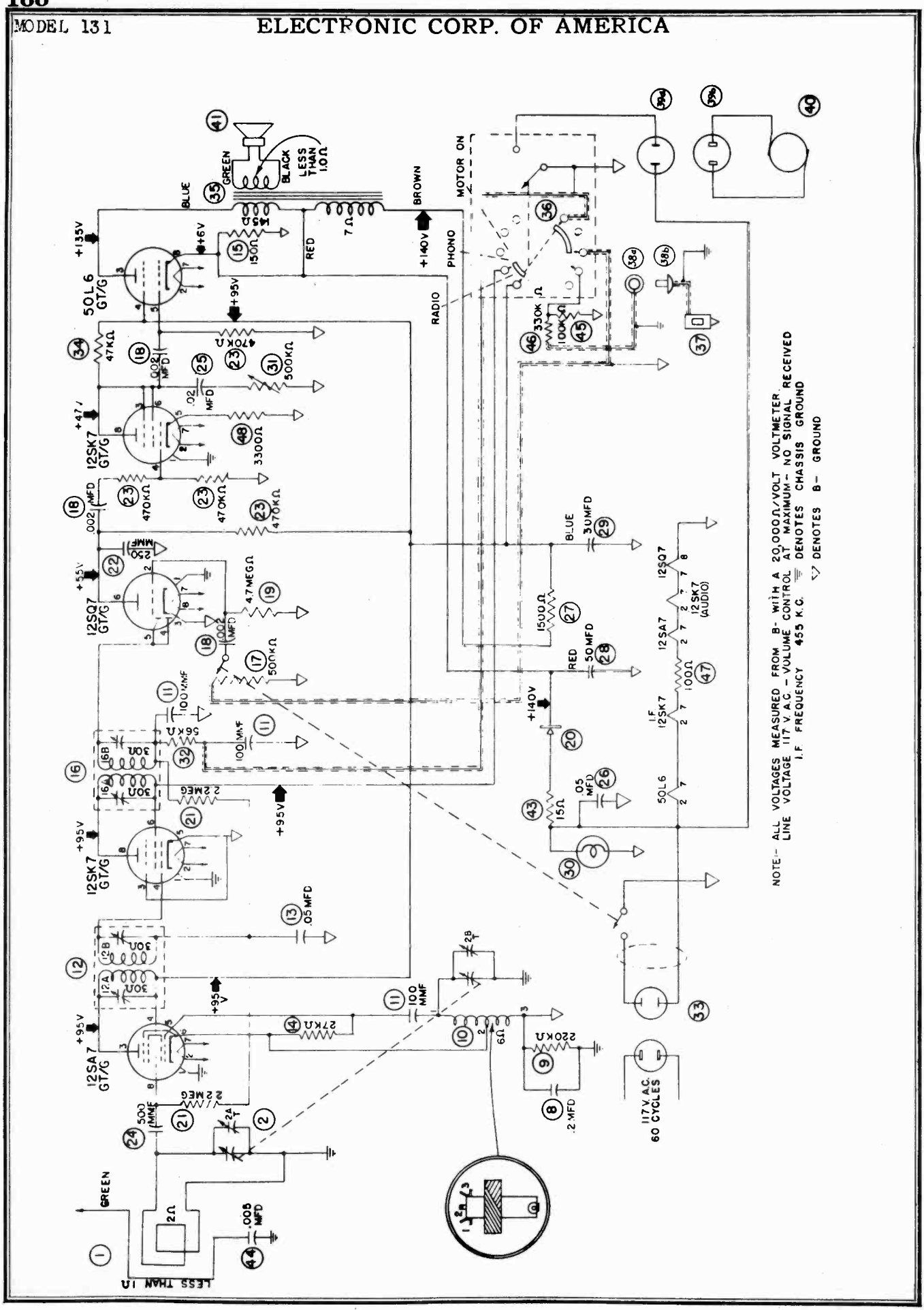
Replacement of Audio Output Transformers

When replacing the audio output transformer, original lead dress must be maintained. If either primary or secondary windings are reversed, the set will have a a severe audio oscillation, due to the inverse feedback network.

Replacement of I.F. Transformers

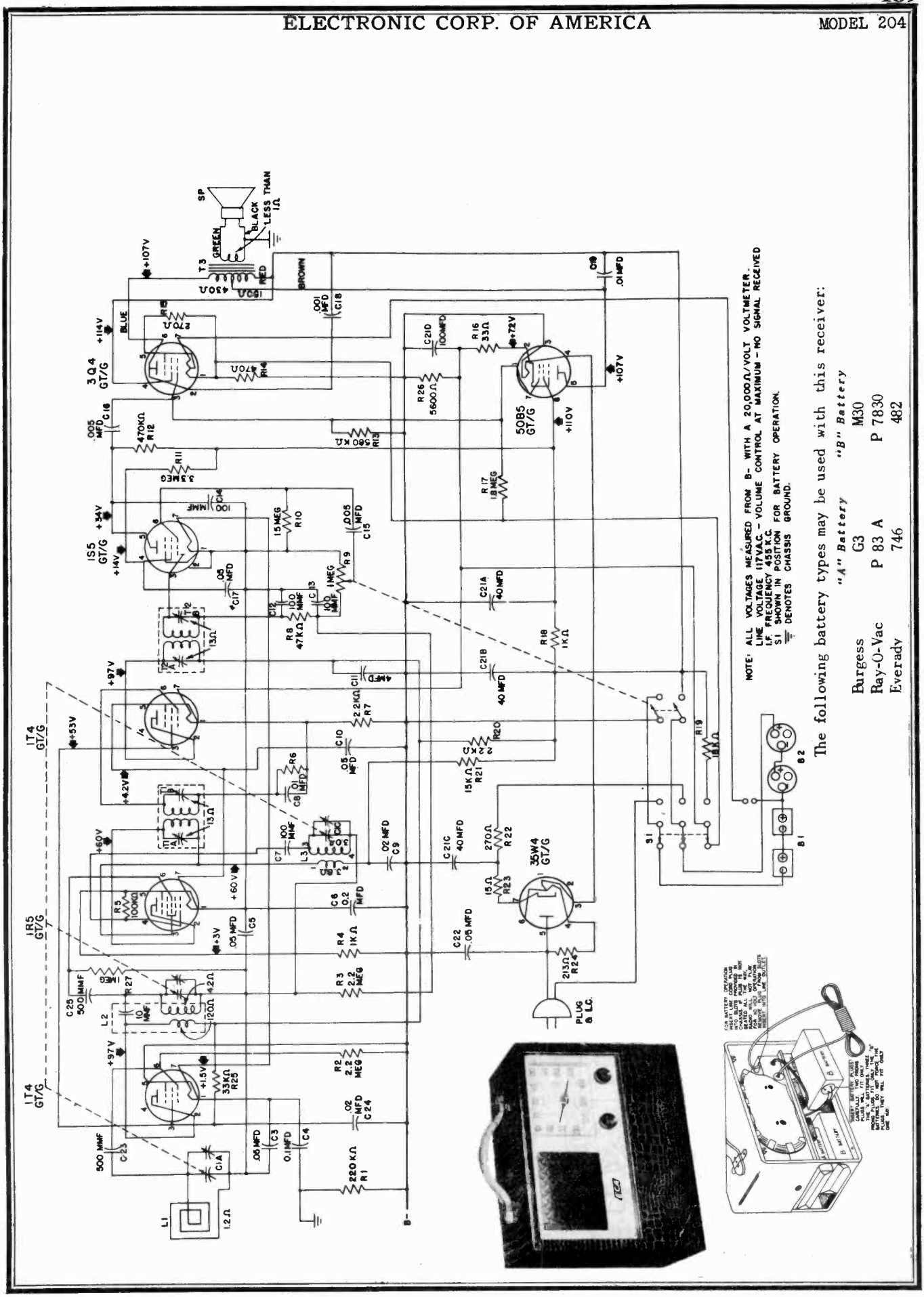
When replacing intermediate frequency transformers, either input or output, use caution to observe original lead dress.

MODEL 131 ELECTRONIC CORP. OF AMERICA



ELECTRONIC CORP. OF AMERICA

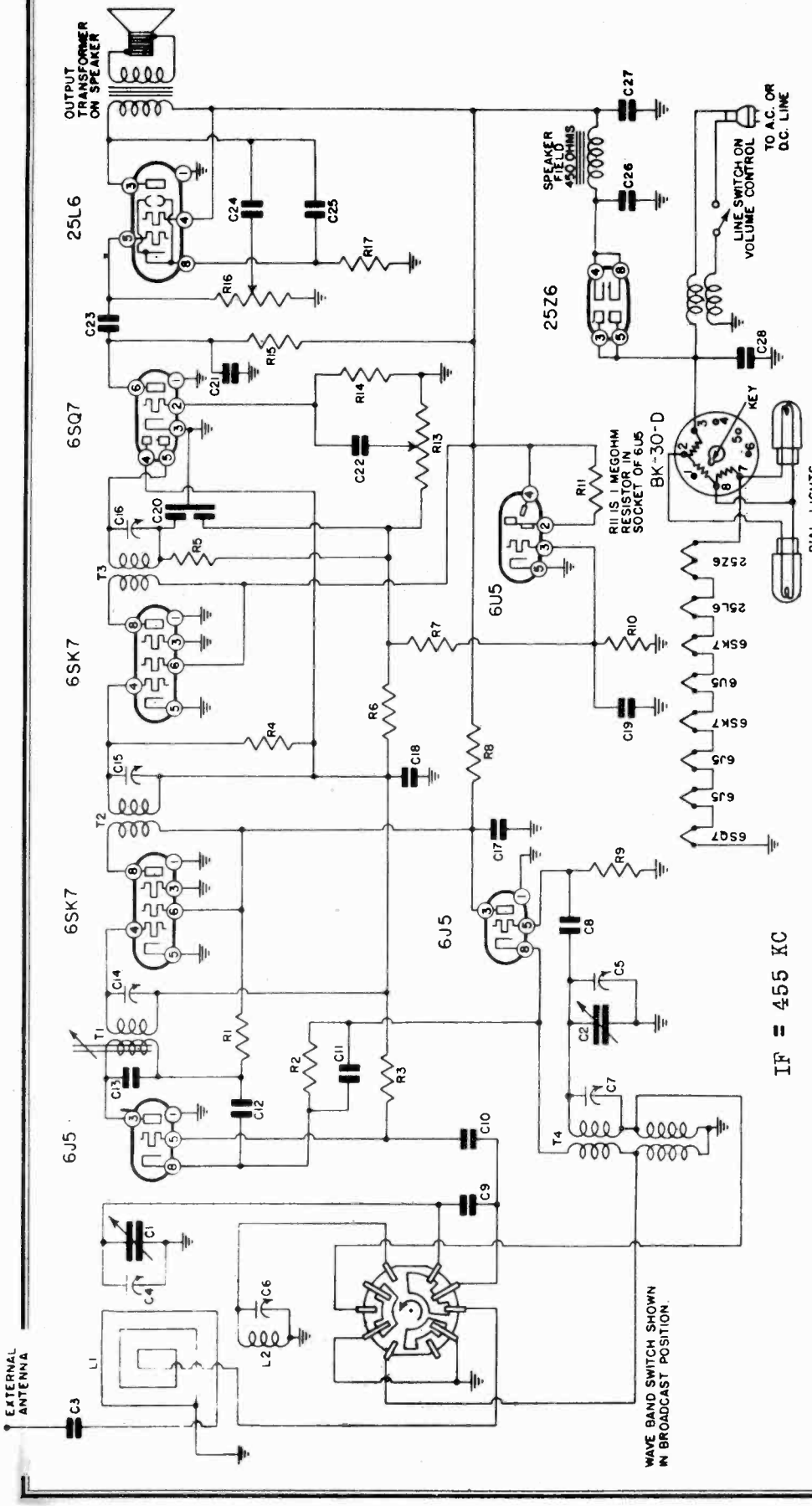
MODEL 204



The following battery types may be used with this receiver:

	"A" Battery	"B" Battery
Burgess	G3	M30
Ray-O-Vac	P 83 A	P 7830
Everady	746	482

MODEL 456, Chassis GP **EMERSON RADIO AND PHONO. CORP.**



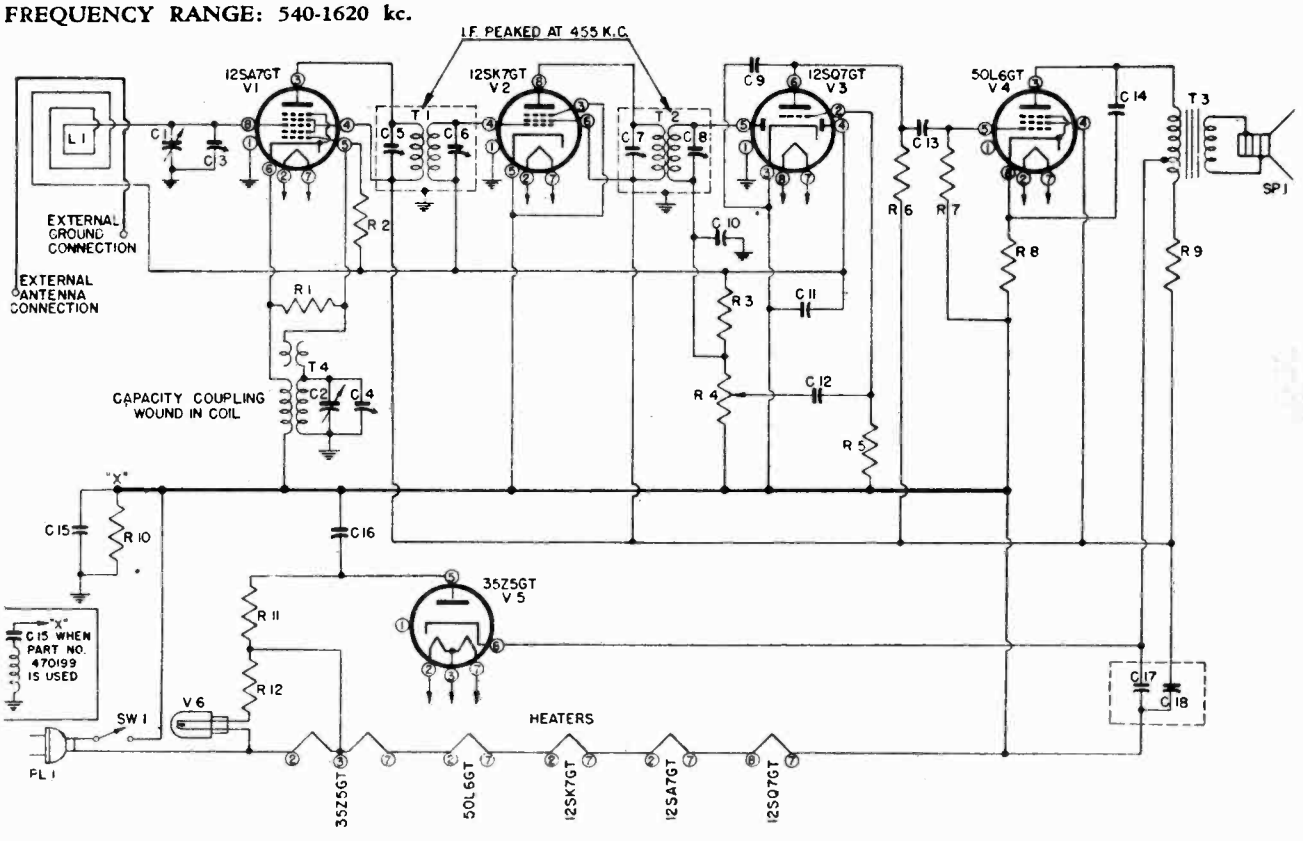
ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
L1	10RV-390	LOOP ANTENNA	C8	5LC-410A	.00011 mf MICA	C21	5AC-394	.0002 mf 600V	R6	92R-480	3.3 [illegible]
L2	10PT-649	S.W. ANTENNA COIL	C9	10PC-589	.00033 mf MICA	C22	5EC-274	.002 mf 600V	R7	92R-480	3.3 [illegible]
T1	10PT-651	1st I.F. TRANS.	C10	5LC-410A	.00011 mf MICA	C23	LC-65	.02 mf 400V	R8	PR-79	1000 [illegible]
T2	10PT-652	2nd I.F. TRANS.	C11	BC-12	.05 mf 200V	C24	5AC-394	.0002 mf 600V	R9	10TR-486	47,000 [illegible]
T3	10PT-653	3rd I.F. TRANS.	C12	EC-58	.01 mf 400V	C25	EC-58	.01 mf 400V	R10	3RR-276	10 MEG [illegible]
T4	10PT-650	OSC. COIL	C13	PART OF T1	TRIMMER	C26	6QC-437B	20 mf 150V DUAL	R11	PART OF 6U5	
C1, C2	10PC-578	VARIABLE	C14	PART OF T1	TRIMMER	C27		40 mf 150V		SOCKET	1 MEG
C3	5EC-274	.002 mf 600V.	C15	PART OF T2	TRIMMER	C28	LC-64	.05 mf 400V	R12		
C4	PART OF C1,2	TRIMMER	C16	PART OF T3	TRIMMER	R1	1R-65	10,000 [illegible]	R13	10NR-471	VOLUME CONTROL
C5	PART OF C1,2	TRIMMER	C17	BC-12	.05 mf 200V	R2	70R-394	2,200 [illegible]	R14	4ZR-327	15 MEG [illegible]
C6	PART OF L2	TRIMMER	C18	BC-12	.05 mf 200V	R3	92R-480	3.3 MEG [illegible]	R15	92R-478	470,000 [illegible]
C7	PART OF T4	TRIMMER	C19	BC-12	.05 mf 200V	R4	10TR-485	220,000 [illegible]	R16	10NR-472	TONE CONTROL
			C20	PART OF C-16		R5	PART OF T3	47,000 [illegible]	R17	3[illegible]-293	140 [illegible]

EMERSON RADIO & PHONO. CORP.

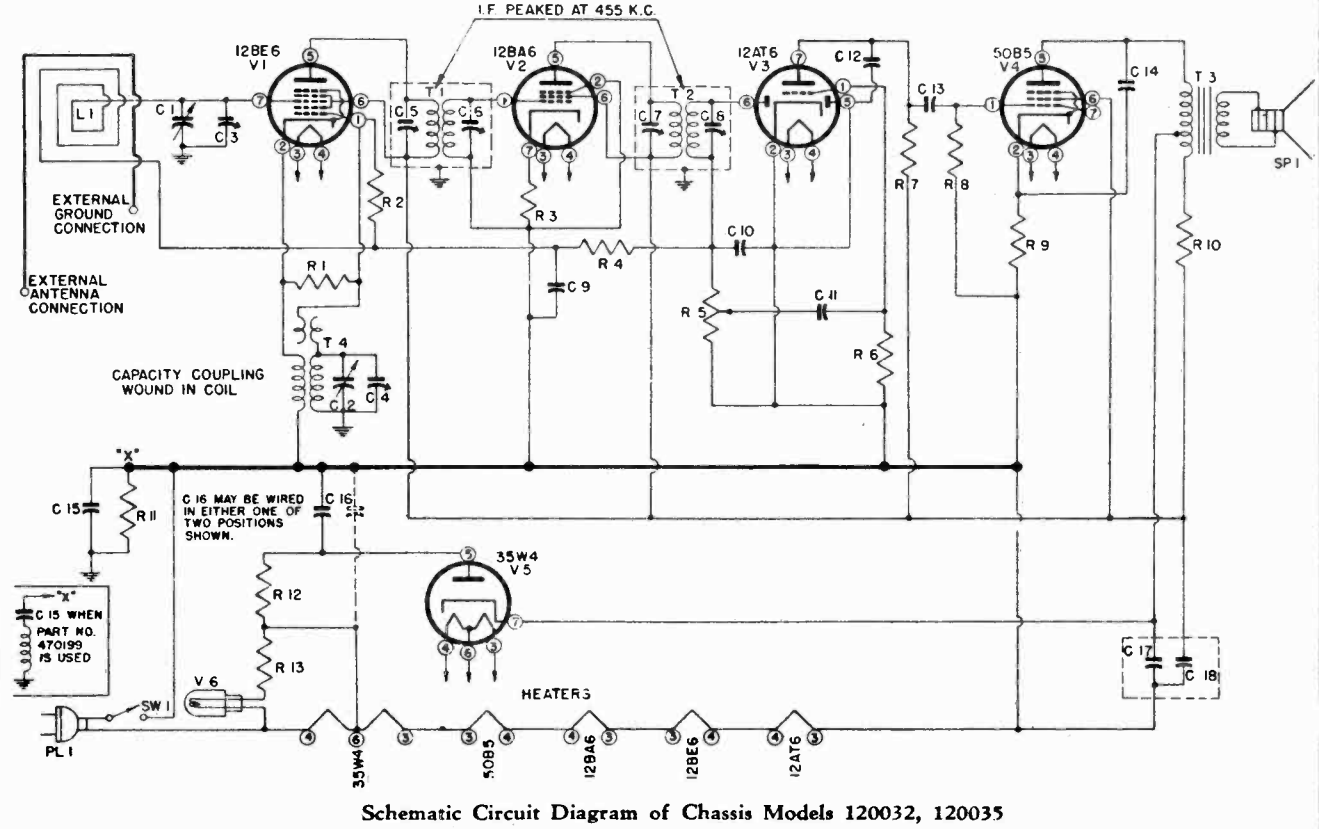
MODELS 503,510,510A,520,539
Chassis 120000,120029,120030,
120032,120035,120044

TYPE: Single-band superheterodyne.

FREQUENCY RANGE: 540-1620 kc.



Schematic Circuit Diagram of Chassis Models 120000, 120029, 120030, 120044



Schematic Circuit Diagram of Chassis Models 120032, 120035

MODELS 503,510,510A,520,539

EMERSON RADIO & PHONO. CORP.

CHASSIS 120000, 120029, 120030, 120044

Schematic Symbol	†Part No.	DESCRIPTION
C1, C2	900170	Two-gang variable condenser (chassis 120000)
C1, C2	900319	Two-gang variable condenser (chassis 120030 and 120044)
C1, C2	900290	Two-gang variable condenser chassis 120029)
*C3, C4		Trimmers, part of variable condenser
*C5, C6, C7, C8		Trimmers, part of i-f transformers
C9	920170	0.001 mfd., 600 volt condenser
C10	910000	0.00022 mfd. mica condenser
C11	920040	0.1 mfd., 200 volt condenser
C12	920010	0.002 mfd., 600 volt condenser
C13, C14	920020	0.02 mfd., 400 volt condenser
C15	920050	0.2 mfd., 200 volt condenser, or
C15	470199	0.2 mfd., 200 volt assembly (used only with midget i-f transformers 720525 and 720529)
C16	920030	0.05 mfd., 400 volt condenser
C17, C18	925009	50-50 mfd., 150 volt dual electrolytic condenser
L1	700000	Loop antenna, or
L1	700210	Loop antenna
*PL1		Plug, part of line cord
R1	310810	22,000 ohms, ¼ watt resistor
R2, R5	397000	15 meg., ½ watt resistor
R3	321330	3.3 meg., ¼ watt resistor
R4	390010	0.5 meg. volume control
R6, R7	321130	470,000 ohms, ¼ watt resistor
R8	340290	150 ohms, ½ watt resistor
R9	370490	1,000 ohms, 1 watt resistor
R10	321050	220,000 ohms, ¼ watt resistor
R11	340050	15 ohms, ½ watt resistor
R12	340010	10 ohms, ½ watt resistor
SP1	180000	P.M. speaker
*SW1		Line switch on volume control
T1	720000	First i-f transformer, or
T1	720525	First i-f transformer, midget
T2	720100	Second i-f transformer, or
T2	720529	Second i-f transformer, midget
T3	734000	Output transformer
T4	716010	Oscillator coil
	583010	Line cord

CHASSIS 120032, 120035

C1, C2	900319	Two-gang variable condenser
*C3, C4		Trimmers, part of variable condenser
*C5, C6, C7, C8		Trimmers, part of i-f transformers
C9	920040	0.1 mfd., 200 volt condenser
C10	910000	0.00022 mfd. mica condenser
C11	920010	0.002 mfd., 600 volt condenser
C12	920170	0.001 mfd., 600 volt condenser
C13, C14	920020	0.02 mfd., 400 volt condenser
C15	920050	0.2 mfd., 200 volt condenser, or
C15	470199	0.2 mfd., 200 volt assembly (used only with midget i-f transformers 720525 and 720529)
C16	920030	0.05 mfd., 400 volt condenser
C17, C18	925009	50-50 mfd., 150 volt dual electrolytic condenser
L1	700000	Loop antenna, or
L1	700210	Loop antenna
*PL1		Plug, part of line cord
R1	310810	22,000 ohms, ¼ watt resistor
R2, R6	397000	15 meg., ½ watt resistor
R3	340310	180 ohms, ½ watt resistor
R4	321290	2.2 meg., ¼ watt resistor
R5	390010	0.5 meg. volume control
R7, R8	321130	470,000 ohms, ¼ watt resistor
R9	340290	150 ohms, ½ watt resistor
R10	370490	1,000 ohms, 1 watt resistor
R11	321050	220,000 ohms, ¼ watt resistor
R12	340050	15 ohms, ½ watt resistor
R13	340010	10 ohms, ½ watt resistor
SP1	180000	P.M. speaker
*SW1		Line switch on volume control
T1	720000	First i-f transformer, or
T1	720525	First i-f transformer, midget
T2	720100	Second i-f transformer, or
T2	720529	Second i-f transformer, midget
T3	734000	Output transformer
T4	716010	Oscillator coil
	583010	Line cord

CABINET AND DIAL PARTS

* Not supplied separately.
† Specify part numbers when ordering.

807000	Pilot light
280103	Drive shaft
520019	Dial backplate, 320° dial numbers (Chassis 120000)
520500	Dial backplate, 180° dial numbers (Chassis 120029)
412600	Dial backplate, plain (Chassis 120035, 120030)
410004	Dial backplate, plain (Chassis 120032, 120044)
520513	Dial face, paper (Chassis 120032, 120044)
525010	Pointer (Chassis 120000, 120029)
525090	Pointer (Chassis 120030, 120032, 120035, 120044)
520080	Dial crystal (Chassis 120000, 120029, 120032, 120044)
520470	Dial crystal, printed (Chassis 120030, 120035)
460140	Knob (Model 503)
460470	Knob (Models 510, 539)
460150	Knob (Model 520)
450230	Ivory plastic front, square holes, (Model 520)
450250	Ivory plastic front, round holes, (Model 520)
450330	Black plastic front, square holes, (Model 510)
450350	Black plastic front, round holes, (Model 510)
140001	Cabinet (Model 503)
140000	Cabinet (Model 520)
140005	Cabinet (Model 510, 510A)
140069	Cabinet (Model 539)

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

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

Chassis 120000, 1200029, 120030, 120044 use metal or glass tubes. Chassis 120032 and 120035 use miniature tubes. Model 510A only uses chassis 120035.

MODELS 503,510,510A,520,539
MODELS 507,509,518,522,535
MODELS 525,552
MODELS 543,544

EMERSON RADIO & PHONO. CORP.

ALL MODELS

An oscillator with frequencies of 455, 600 and 1425 kc is required.

An output meter should be connected across the primary or secondary of the output transformer for observing maximum response.

Always use as weak a test signal as possible when aligning the receiver.

Plug the receiver into the power supply outlet in such a way that the ground side of the power line is connected to the receiver B—.

Location of Coils and Trimmer Adjustments

The first i-f transformer is mounted on top of the chassis deck to the right of the variable condenser. The trimmers are accessible through holes in the top of the can.

The second i-f transformer is mounted on top of the chassis between the variable condenser and the speaker. The trimmers are accessible through holes in the top of the can.

The trimmer for the antenna and the trimmer for the oscillator coil are located on the variable condenser. The trimmer on the front section is for the oscillator coil.

The oscillator coil is located underneath the chassis. The loop antenna acts as the antenna coil.

I-f Alignment

1. Rotate the variable condenser to the minimum capacity position.
2. Feed 455 kc to the converter grid (stator of the r-f section of the variable condenser) through a 0.1 mfd. condenser and adjust the four i-f trimmers for maximum response.

R-f Alignment

1. Connect the oscillator to a coil composed of three to four turns of wire wound in a circle approximately 12" in diameter. This coil should be held parallel to and in line with the loop antenna of the receiver at a distance of 15 to 20 inches.
2. Radiate a signal at 1425 kc, set the dial indicator to 1425 kc, and adjust the trimmers on the variable condenser for maximum response.
3. Radiate a 600 kc signal and tune in the signal on the receiver. Adjust the loose outside turn of the loop antenna for maximum response. This loose turn may be moved to either side of the center. Fasten it in the position which gives maximum response.
4. Repeat steps 2 and 3 until no further improvement is evident.

The following voltage readings are d-c measurements taken from B— (line switch) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (*), which should be taken with a d-c vacuum-tube voltmeter. Line voltage for these readings was 117 volts, 60 cycles, a.c. Measurements made with 117 volts d.c. will be lower than those given below. Take readings with the volume control set at minimum and the variable condenser closed.

	PIN NUMBER							
TUBE	1	2	3	4	5	6	7	8
12SA7			89	89	*—10			*—1.6
12SK7				*—1.6		89		89
12SQ7		*—0.7		*—1.6	—0.5	37.5		
50L6GT			110	89				6.2
35Z5GT				116		116		117
12BE6	*—8.0				92	92	*—1.3	
12BA6					92	92	1.7	
12AT6	*—0.6					*—0.45	*44	
50B5		5.65			110	92		
35W4	115						115	

* Not supplied separately.
† Specify part number when ordering.

CABINET AND DIAL PARTS

MODEL--507,509,518,522,535

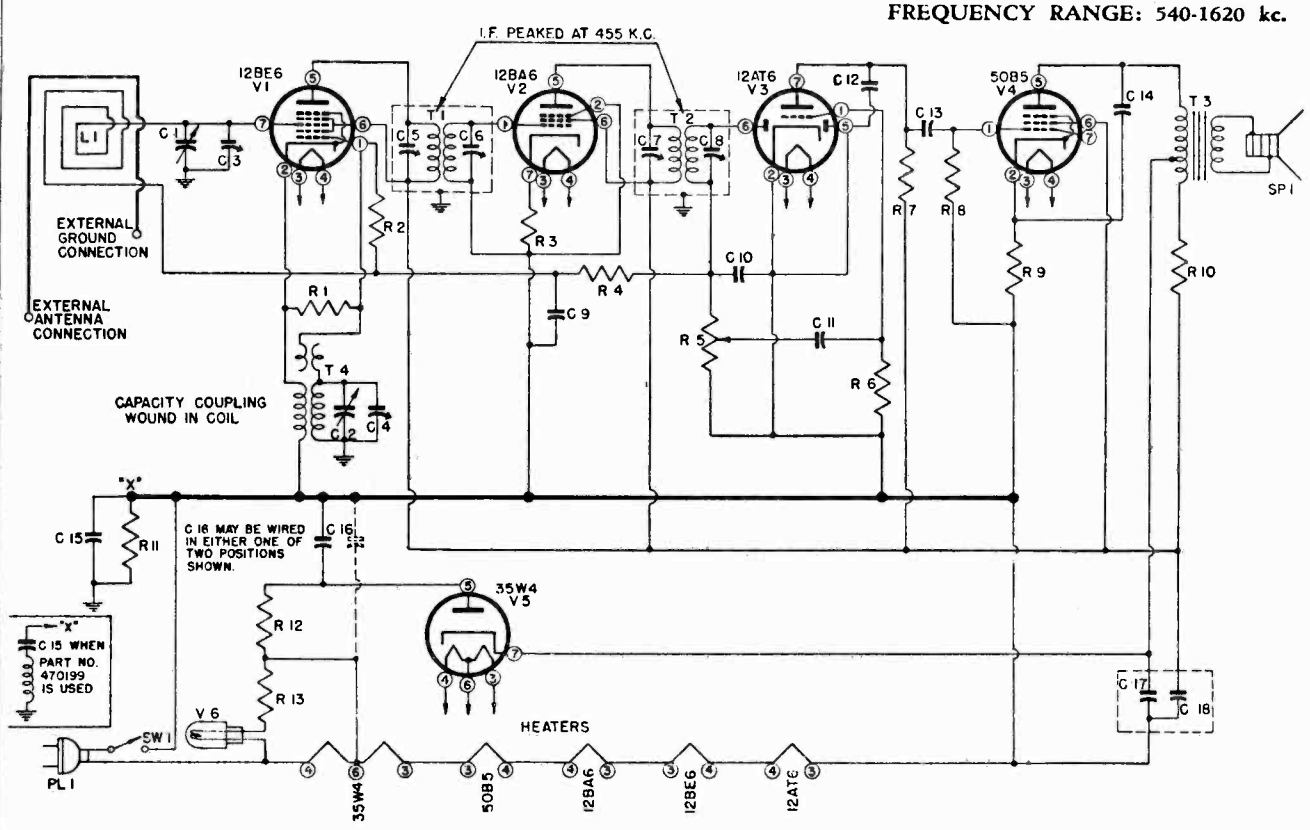
140015	Cabinet (Model 507)
140016	Cabinet (Model 509)
140034	Cabinet (Model 518)
140007	Cabinet (Model 522)
140070	Cabinet (Model 535)
450060	Back, molded (Model 507)
450080	Back, molded (Models 509, 518)
450050	Back, molded (Model 522)
560110	Back masonite (Model 507)
560220	Back, masonite (Models 509, 518)
560120	Back, masonite (Model 522)
575047	Back, wood (Model 535)
450000	Handle
460140	Knob (Models 507, 518, 535)
460470	Knob (Model 509)
460150	Knob (Model 522)
531009	Drive pulley
280003	Drive shaft
520499	Dial backplate (Models 507, 509, 518, 522)
520024	Dial backplate (Model 535)
520350	Dial crystal, stamped (Models 507, 509, 522), or
520190	Dial crystal, stamped (Models 507, 509, 522)
520440	Dial crystal (Model 518)
520025	Dial crystal (Model 535)
525080	Dial pointer (Models 507, 509, 518, 522)
525130	Dial pointer (Model 535
411040	Pointer hub (Model 535)

MODELS 507, 509, 518, 522, 535
Chassis 120004, 120045

EMERSON RADIO & PHONO. CORP.

TYPE: Single-band superheterodyne.

FREQUENCY RANGE: 540-1620 kc.



Schematic Circuit Diagram for Chassis 120004 and 120045

CHASSIS 120004 AND 120045

C1, C2	900160	Two-gang variable condenser	R1	310810	22,000 ohms, ¼ watt resistor
*C3, C4		Trimmers, part of variable condenser	R2, R6	397000	15 meg., ½ watt resistor
*C5, C6, C7, C8		Trimmers, part of i-f transformers	R3	340310	180 ohms, ½ watt resistor
			R4	321290	2.2 meg., ¼ watt resistor
C9	920040	0.1 mfd., 200 volt condenser	R5	390000	0.5 meg. volume control
C10	910000	0.00022 mfd. mica condenser	R7, R8	321130	470,000 ohms, ¼ watt resistor
C11	920010	0.002 mfd., 600 volt condenser	R9	340290	150 ohms, ½ watt resistor
C12	920240	0.0005 mfd., 600 volt condenser	R10	370490	1,000 ohms, 1 watt resistor
C13, C14	920020	0.02 mfd., 400 volt condenser	R11	321050	220,000 ohms, ¼ watt resistor
C15	920050	0.2 mfd., 200 volt condenser (Used when T1 and T2 are 720000 and 720100 respectively), or	R12	340050	15 ohms, ½ watt resistor
			R13	340010	10 ohms, ½ watt resistor
			SP1	180000	P.M. speaker
C15	479199	0.2 mfd., 200 volt condenser (Used when T1 and T2 are 720525 and 720529 respectively)	*SW1		Line switch on volume control
			T1	720000	First i-f transformer, or
			T1	720525	First i-f transformer, midget
C16	920030	0.05 mfd., 400 volt condenser	T2	720100	Second i-f transformer, or
C17, C18	925009	50-50 mfd., 150 volt dual electrolytic condenser, or	T2	720529	Second i-f transformer, midget
			T3	734000	Output transformer
C17, C18	925000	30-50 mfd., 150 volt dual electrolytic condenser	T4	716010	Oscillator coil
				807000	Pilot light, Mazda No. 47
L1	700000	Loop antenna, or		507090	Pilot light socket
L1	700200	Loop antenna		583010	Line cord
*PL1		Power plug, part of line cord			

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

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

EMERSON RADIO & PHONO. CORP.

MODELS 505,523
MODELS 525,552

MODEL--505,523

The following voltage readings are d-c measurements taken with a line voltage of 117 volts, 60 cycles from B— (chassis) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (*), which should be taken with a d-c vacuum-tube voltmeter. The readings with the volume control set at minimum and the variable condenser closed. All voltages are d.c. positive unless indicated otherwise. Voltages for 3Q4 are given for battery operation only. Readings for 50L6 and 35Z5 can be determined from 50B5 and 35W4 by referring to schematic diagram for proper pin connections.

Chassis 120002

TUBE	PIN NUMBER							
TYPE	1	2	3	4	5	6	7	8
1T4	1.2	88	56		1.2	*0.3	2.4	
1R5	2.4	88	56	-8	2.4	*1.5	3.7	
1T4	3.7	98	56		3.7	*2.3	4.9	
1S5			*-0.3	*19	*50	*-0.2	1.2	
3Q4	4.9	92	*1.1	98	4.9	92	4.9	
117N7			92	*1.1	98	6.25		125

Chassis 120020

TUBE	PIN NUMBER						
TYPE	1	2	3	4	5	6	7
1T4	1.32	90	50		1.32	*-0.2	2.55
1R5	2.55	90	50	*-7.0	2.55		3.85
1T4	3.85	98	50		3.85	*1.9	5.25
1S5			*-0.35	*24	*46	*-0.1	1.32
3Q4	6.1	88	*1.2	90	7.6	88	9.0
50B5	1.2	6.6	83AC	33AC	90	98	*1.2
35W4	1.32		83AC	117AC	117AC	108AC	129

Chassis 120041

TUBE	PIN NUMBER						
TYPE	1	2	3	4	5	6	7
1T4	1.32	90	50		1.32	*-0.2	2.55
1R5	2.55	90	50	*-7.0	2.55		3.85
1T4	3.85	98	50		3.85	*1.9	5.25
1S5			*-0.35	*24.0	46.0	*-0.1	132
3Q4	6.1	88	*1.2	90	7.6	88	9.0
50B5	1.2	6.6	33AC	83AC	90	98.0	1.2
35W4			83AC	117AC	117AC	108AC	129

MODEL-- 525,552

VOLTAGE ANALYSIS

The following voltage readings are d-c measurements taken from B— (line switch) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (*), which should be taken with a d-c vacuum-tube voltmeter. Line voltage for these readings was 117 volts, 60 cycles, a.c. Take readings with the volume control set at minimum and the variable condenser closed.

	PIN NUMBER							
TUBE	1	2	3	4	5	6	7	8
12SA7			89	89	*-10			*-1.6
12SK7				*-1.6		89		89
12SQ7		*-0.7		*-1.6	-0.5	37.5		
50L6GT			110	89				6.2
35Z5GT				116		116		117

CABINET AND DIAL PARTS

	807000	Dial light		520080	Crystal
	507217	Dial light socket		520200	Escutcheon
	531059	Drive pulley		140052	Cabinet (Model 525)
	280103	Drive shaft		140102	Cabinet (Model 552)
	520500	Dial backplate		460470	Knob
	525010	Dial pointer		430300	Knob, with indicator dot

† Specify part numbers when ordering.
* Not supplied separately.

POWER CONSUMPTION:

30 watts for the receiver.
20 watts for the phono motor.

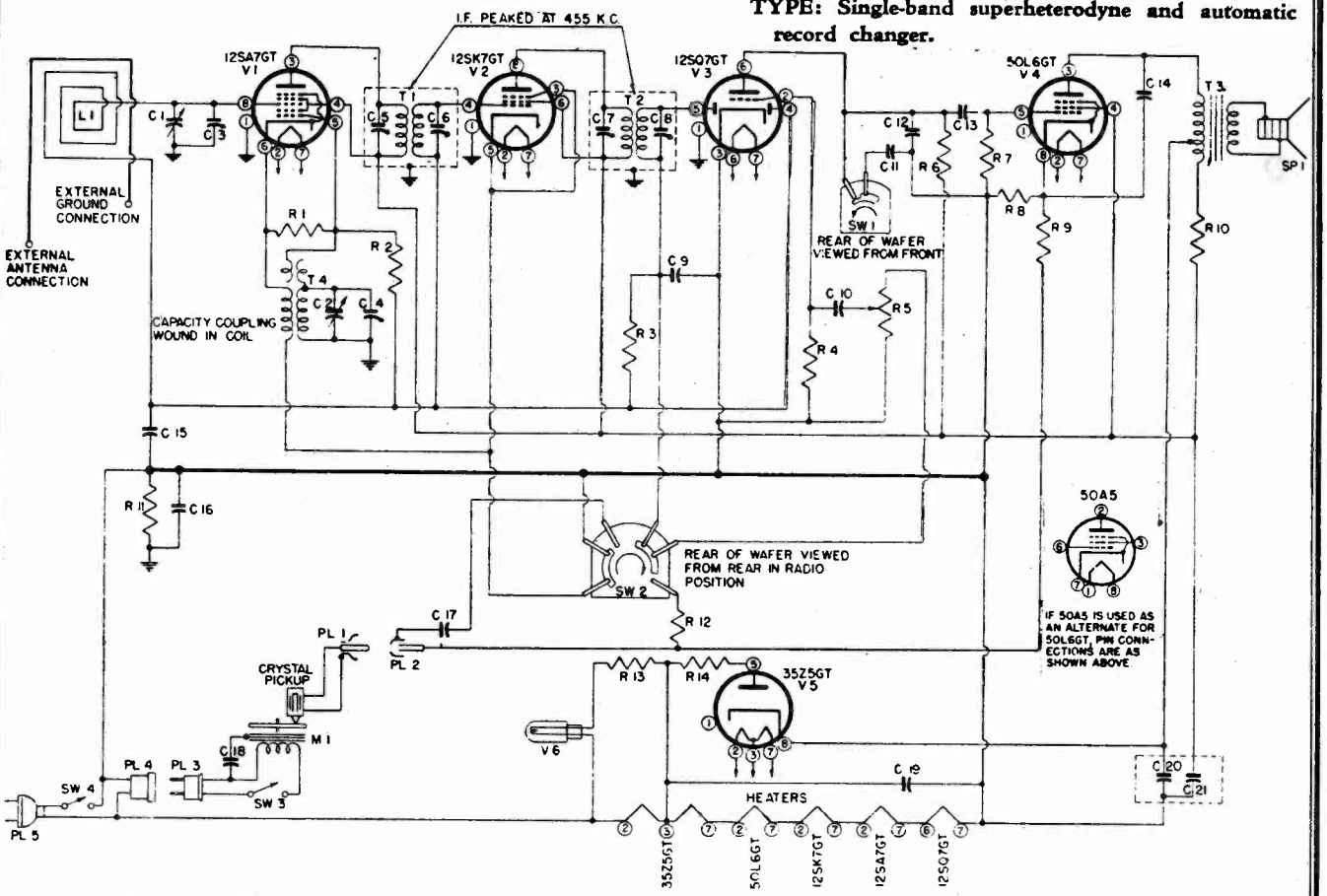
The color coding of the i-f transformer leads is as follows:

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

MODELS 525,552
Chassis 120037

EMERSON RADIO & PHONOGRAPH CORP.

TYPE: Single-band superheterodyne and automatic record changer.

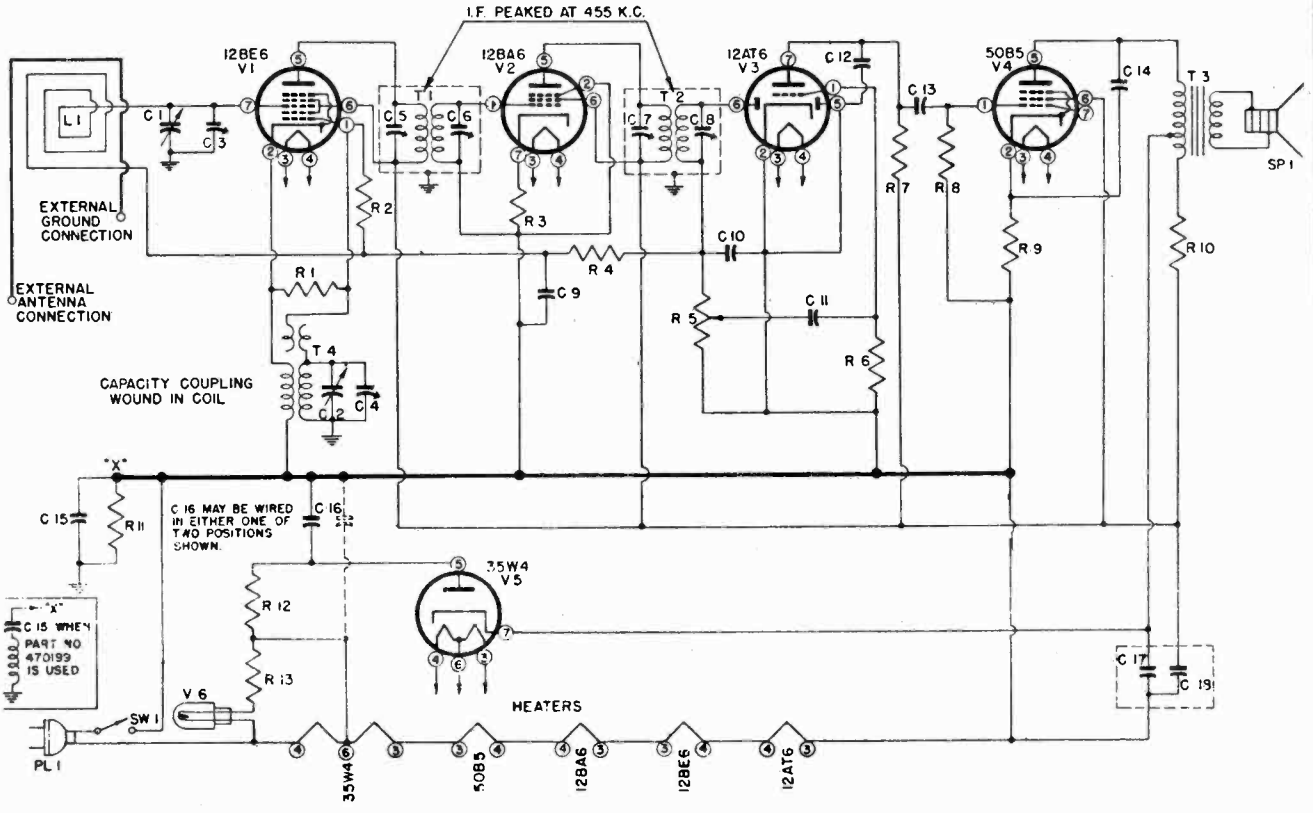


Schematic Symbol	†Part No.	DESCRIPTION
C1, C2	900290	Two-gang variable condenser
*C3, C4		Trimmers, part of variable condenser
*C5, C6, C7, C8		Trimmers, part of i-f transformers
C9	910000	0.00022 mfd. mica condenser
C10	920010	0.002 mfd., 600 volt condenser
C11	920515	0.002 mfd., 400 volt condenser
C12	920240	0.0005 mfd., 600 volt condenser
C13, C14	920020	0.02 mfd., 400 volt condenser
C15	920040	0.1 mfd., 200 volt condenser
C16	920050	0.2 mfd., 200 volt condenser (used only when T1 and T2 are 720000 and 720100 respectively)
C17, C19	920030	0.05 mfd., 400 volt condenser
C18	922090	0.05 mfd., 400 volt condenser (used up to serial No. 8,550,551), or
C18	922101	0.05 mfd., 400 volt condenser (used after serial No. 8,550,551)
C20, C21	925267	30-50 mfd., 150 volt dual electrolytic condenser (used up to serial No. 8,550,551), or
C20, C21	925110	30-50 mfd., 150 volt dual electrolytic condenser (used after serial No. 8,550,551)
L1	700000	Loop antenna, or
L1	700200	Loop antenna, or
L1	700210	Loop antenna
M1	819019	Automatic record changer
PL1	505040	Connector plug

Schematic Symbol	†Part No.	DESCRIPTION
PL2	508010	Pickup socket
*PL3		Polarized male plug, part of record changer
PL4	585070	Female plug and cable
*PL5		Power plug, part of line cord
R1	310810	22,000 ohms, ¼ watt resistor
R2, R4	397000	15 meg., ½ watt resistor
R3	321330	3.3 meg., ¼ watt resistor
R5	390010	0.5 meg. volume control
R6, R7	321130	470,000 ohms, ¼ watt resistor
R8	340290	150 ohms, ½ watt resistor
R9	321290	2.2 meg., ¼ watt resistor
R10	370490	1,000 ohms, 1 watt resistor
R11	321050	220,000 ohms, ¼ watt resistor
R12	321210	1 meg., ¼ watt resistor
R13	340010	10 ohms, ½ watt resistor
R14	340050	15 ohms, ½ watt resistor
SP1	180000	P.M. speaker
SW1	510130	Tone control switch
SW2	510390	Phono-radio switch
*SW3		Motor switch, part of record changer
*SW4		Line switch on volume control
T1	720000	First i-f transformer, or
T1	720525	First i-f transformer
T2	720100	Second i-f transformer, or
T2	720529	Second i-f transformer
T3	734200	Output transformer
T4	716010	Oscillator coil

MODELS 543,544
Chassis 120046

EMERSON RADIO & PHONOGRAPH CORP.



Schematic Circuit Diagram Chassis 120046

CHASSIS 120046

C1, C2	900013	Two-gang variable condenser	R2, R6	397000	15 meg., ½ watt resistor
*C3, C4		Trimmers, part of variable condenser	R3	340310	180 ohms, ½ watt desisteor
*C5, C6, C7, C8		Trimmers, part of i-f transformers	R4	321290	2.2 meg., ¼ watt resistor
			R5	390015	0.5 meg. volume control
C9	920040	0.1 mfd., 200 volt condenser	R7, R8	321130	470,000 ohms, ¼ watt resistor
C10	910000	0.00022 mfd. mica condenser	R9	340290	150 ohms, ½ watt resistor
C11	920010	0.002 mfd., 600 volt condenser	R10	370490	1,000 ohms, 1 watt resistor
C12	920240	0.0005 mfd., 600 volt condenser	R11	321050	220,000 ohms, ¼ watt resistor
C13, C14	920020	0.02 mfd., 400 volt condenser	R12	340050	15 ohms, ½ watt resistor
C15	920050	0.2 mfd., 200 volt condenser (used when T1 and T2 are 720000, and 720100 respectively), or	R13	340010	10 ohms, ½ watt resistor
			SP1	180000	P.M. speaker
			*SW1		Line switch on volume control
C15	470199	0.2 mfd., 200 volt assembly (used when T1 and T2 are 720525 and 720529 respectively)	T1	720000	First i-f transformer, or
			T1	720525	First i-f transformer, midget
			T2	720100	Second i-f transformer, or
C16	920030	0.05 mfd., 400 volt condenser	T2	720529	Second i-f transformer, midget
C17, C18	925009	50-50 mfd., 150 volt dual electrolytic condenser	T3	734000	Output transformer
			T4	716010	Oscillator coil
L1	700000	Loop antenna		583010	Pilot light
*PL1		Power plug, part of line cord		807000	Line cord
R1	310810	22,000 ohms, ¼ watt resistor		507090	Pilot light socket

CABINET AND DIAL PARTS

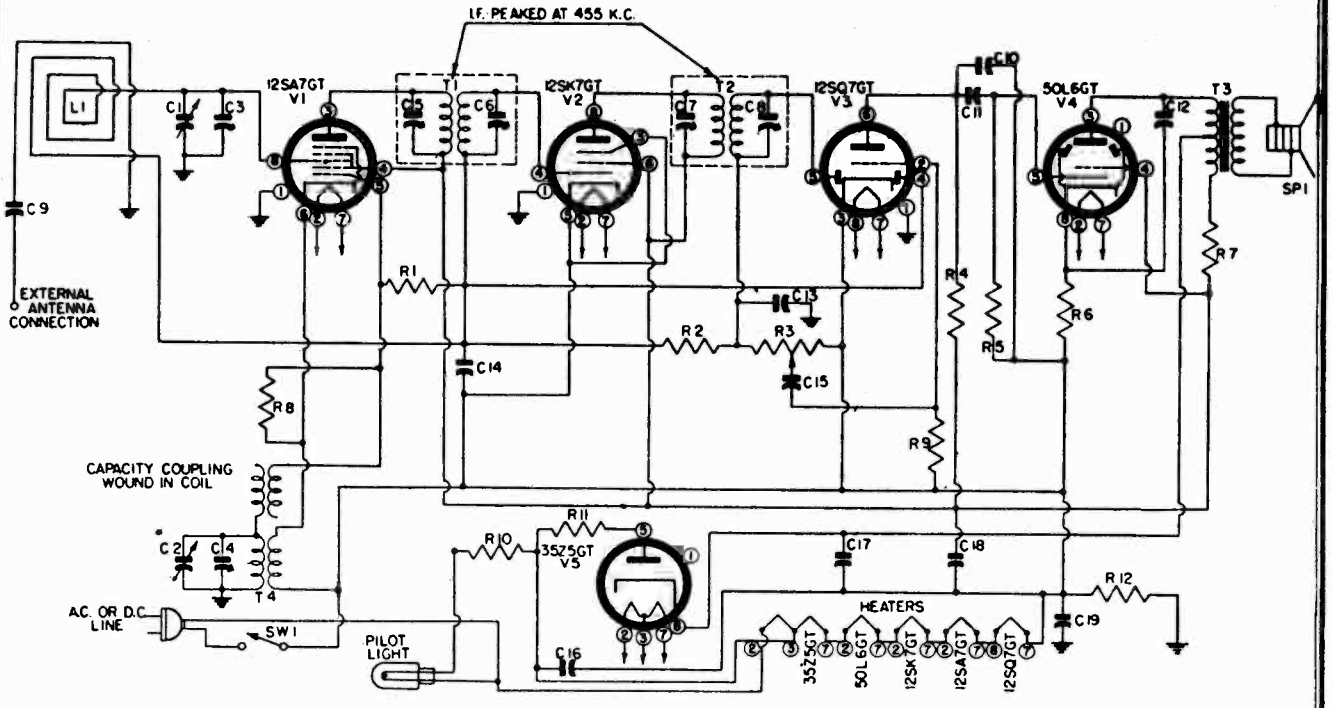
280024	Drive shaft	140082B	Cabinet, black
520033	Dial face	410090	Metal grille
525015	Dial pointer	520034	Dial crystal
140080B	Cabinet, ivory	460470	Knob

MODELS 543, 544
Chassis 120052

EMERSON RADIO & PHONOGRAPH CORP.

TYPE: Single-band superheterodyne.

FREQUENCY RANGE: 540-1620 kc.



Schematic Circuit Diagram Chassis 120052

CHASSIS 120052

Schematic Symbol	†Part No.	DESCRIPTION	Schematic Symbol	†Part No.	DESCRIPTION
C1, C2	900160	Two-gang variable condenser	R3	390015	0.5 meg. volume control
*C3, C4		Trimmer, part of variable condenser	R4, R5	321130	470,000 ohms, ¼ watt resistor
*C5, C6, C7, C8		Trimmers, part of i-f transformers	R6	340290	150 ohms, ½ watt resistor
			R7	370490	1000 ohms, 1 watt resistor
C9, C15	920010	0.002 mfd., 600 volt condenser	R8	310810	22,000 ohms, ¼ watt resistor
C10	920240	0.0005 mfd., 600 volt condenser	R10	340010	10 ohms, ½ watt resistor
C11, C12	920020	0.02 mfd., 400 volt condenser	R11	397040	15 ohms, 1 watt wire-wound resistor
C13	910000	0.00022 mfd. mica condenser	R12	321050	220,000 ohms, ¼ watt resistor
C14	920040	0.1 mfd., 200 volt condenser	SP1	180000	P.M. speaker
C16	920030	0.05 mfd., 400 volt condenser	*SW1		Line switch on volume control
C17, C18	925000	30-50 mfd., 150 volt dual electrolytic condenser	T1	720000	First i-f transformer
			T2	720100	Second i-f transformer
C19	920050	0.02 mfd., 200 volt condenser	T3	734000	Output transformer
L1	700000	Loop antenna, or	T4	716010	Oscillator coil
L1	700200	Loop antenna		583010	Line cord
R1, R9	397000	15 meg., ¼ watt resistor		807000	Pilot light
R2	321330	3.3 meg., ¼ watt resistor		507090	Pilot light socket

† Specify part numbers when ordering.
* Not supplied separately.

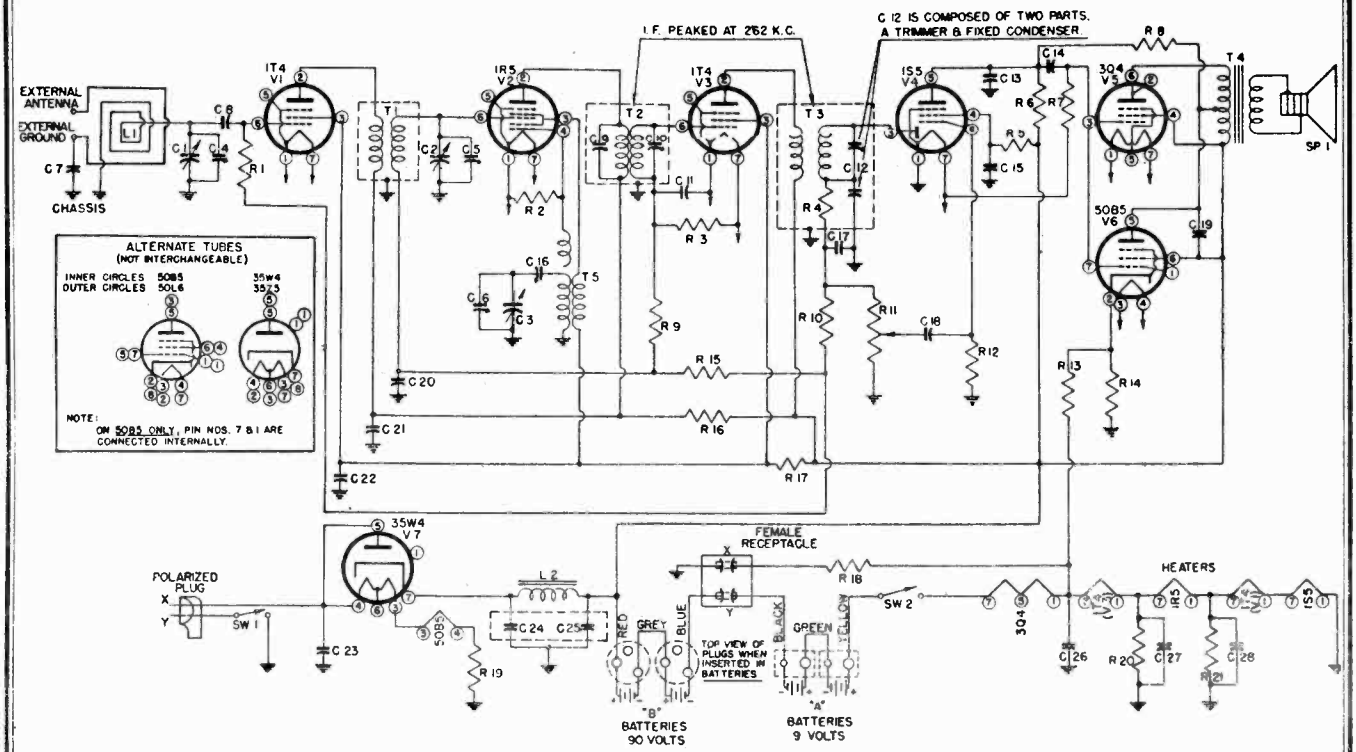
The color coding of the i-f transformer leads is as follows:

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

MODEL 505
Chassis 120020

EMERSON RADIO & PHONO. CORP.

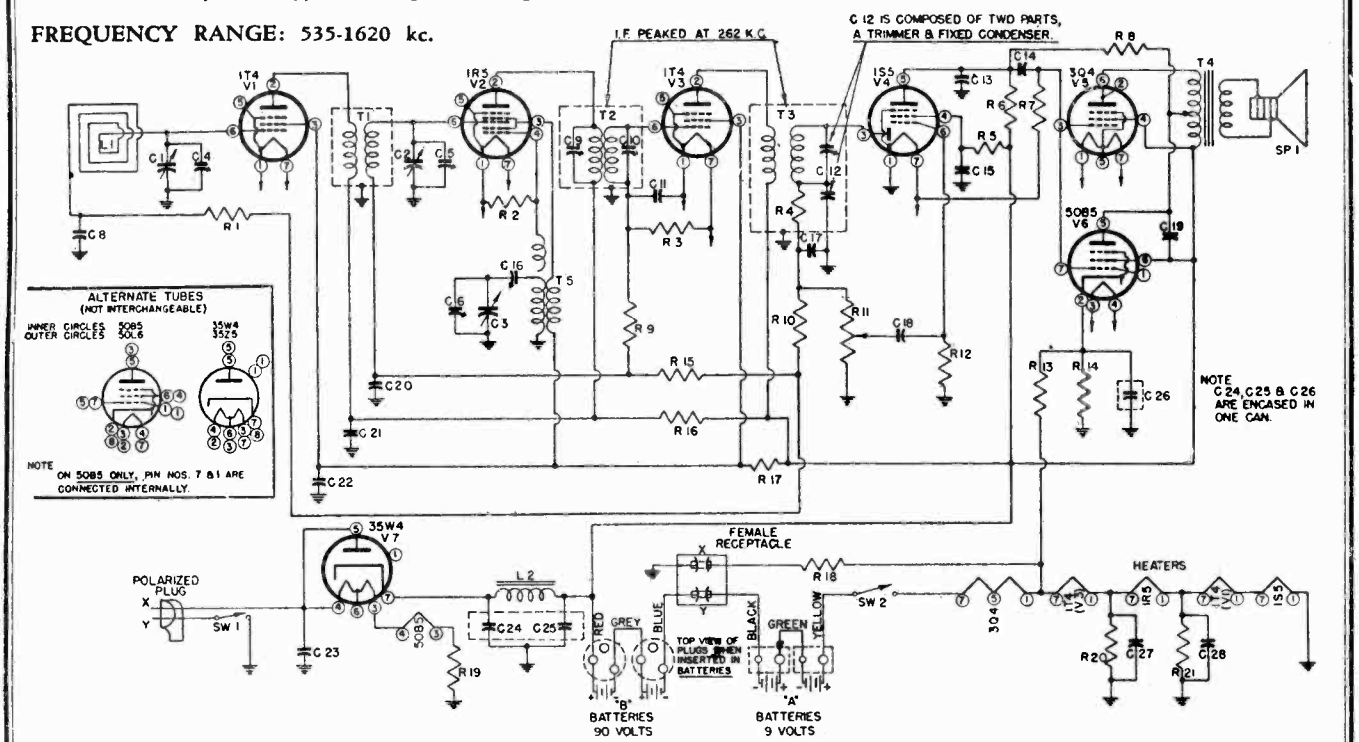
MODELS 505,523
Chassis 120041



Schematic Circuit Diagram Model 505, Chassis 120020

TYPE: Three-way (battery, a.c-d.c.) portable superheterodyne.

FREQUENCY RANGE: 535-1620 kc.



Schematic Circuit Diagram Models 505-523, Chassis 120041

Chassis 120020

C1, C7, C9, C10, C11, C12	900080	Three-gang variable condenser	R2	310970	100,000 ohms, ¼ watt resistor
			*R4		47,000 ohms, ¼ watt resistor part of second i-f transformer
		Trimmers, part of variable condenser	R6, R7	321130	470,000 ohms, ½ watt resistor
C18	920010	0.002 mfd., 600 volt condenser	R8	311250	1.5 meg., ½ watt resistor
C11	920060	0.05 mfd., 200 volt condenser	R10	321290	2.2 meg., ½ watt resistor
C10		Trimmers, part of first i-f transformer	R11	390020	0.5 meg. volume control
*C12		Trimmer and fixed condenser, part of second i-f transformer	R12	321450	10 meg., ½ watt resistor
			R13	310130	33 ohms, ½ watt resistor
	910050	0.0004 mfd. mica condenser	R14	310730	10,000 ohms, ½ watt resistor
C21	920020	0.02 mfd., 400 volt condenser	R16	340630	3,900 ohms, ½ watt resistor
C19	920090	0.01 mfd., 400 volt condenser	R17	340770	15,000 ohms, ½ watt resistor
	900110	Padding condenser	R18	340510	1,200 ohms, ½ watt resistor
	910010	0.00011 mfd. mica condenser	R19	394110	213 ohms, 6 watt resistor
C22, C28	920100	0.02 mfd., 200 volt condenser	R20	310570	2,200 ohms, ½ watt resistor
			R21	310450	680 ohms, ½ watt resistor
	920030	0.05 mfd., 400 volt condenser	SP1	180006	P.M. speaker
C24, C25	925050	20-40 mfd., 150 volt dual electrolytic condenser	*SW1		Line switch on volume control
			*SW2		Battery switch on volume control
C26	925090	100 mfd., 25 volt electrolytic condenser	T1	713000	R.F. coil
			T2	720170	First i-f transformer
	920110	0.25 mfd., 100 volt condenser	T3	720410	Second i-f transformer
	700080	Loop antenna	T4	734140	Output transformer
	737010	Filter choke	T5	716030	Oscillator coil
R1, R3, R5, R9, R15	311330	3.3 meg., ½ watt resistor			

Chassis 120041

Schematic Symbol	†Part No.	DESCRIPTION	Schematic Symbol	†Part No.	DESCRIPTION
C1, C2, C3	900080	Three-gang variable condenser	*R4		47,000 ohms, ½ watt resistor, part of second i-f transformer
*C4, C5, C6		Trimmers, part of variable condenser	R6, R7	321130	470,000 ohms, ½ watt resistor
C8, C14, C20, C21, C22, C28	920020	0.02 mfd., 400 volt condenser	R8	311250	1.5 meg., ½ watt resistor
			R10	321290	2.2 meg., ½ watt resistor
			R11	390020	0.5 meg. volume control
*C9, C10		Trimmers, part of first i-f transformer	R12	321450	10 meg., ½ watt resistor
C11	920060	0.05 mfd., 200 volt condenser	R13	310130	33 ohms, ½ watt resistor
*C12		Trimmer and fixed condenser, part of second i-f transformer	R14	310730	10,000 ohms, ½ watt resistor
			R16	340630	3,900 ohms, ½ watt resistor
C13	910050	0.0004 mfd. mica condenser	R17	340770	15,000 ohms, ½ watt resistor
C15, C19	920090	0.01 mfd., 400 volt condenser	R18	340510	1,200 ohms, ½ watt resistor
C16	900110	Padding condenser	R19	394110	213 ohms, 6 watt resistor, or
C17	910010	0.00011 mfd. mica condenser	R19	394170	213 ohms, 10 watt resistor
C18	920010	0.002 mfd., 600 volt condenser	R20	310570	2,200 ohms, ½ watt resistor
C23	920030	0.05 mfd., 400 volt condenser	R21	310450	680 ohms, ½ watt resistor
C24, C25, C26	925210	Electrolytic condenser: C24, C25—20-40 mfd., 150V.; C26—100 mfd., 25 V.	SP1	180012	P.M. speaker
			*SW1		Line switch on volume control
			*SW2		Battery switch on volume control
C27	920110	0.25 mfd., 100 volt condenser	T1	713012	R.F. coil
L1	700233	Loop antenna	T2	720500	First i-f transformer, or
L2	737067	Filter choke	T2	720510	First i-f transformer
R1, R3, R5, R9, R15	311330	3.3 meg., ½ watt resistor	T3	720490	Second i-f transformer, or
			T3	720520	Second i-f transformer
			T4	734150	Output transformer
R2	310970	100,000 ohms, ½ watt resistor	T5	716030	Oscillator coil

The cabinet is designed to house the complete set of batteries. The battery complement should be as follows:

Battery Type	Number Required	Eveready Part No.	Rayovac Part No.	Burgess Part No.
4½ volt "A"	2	746 (plug-in type)	P83A or EM-83 (plug-in type)	3G (plug-in type)
45 volt "B"	2	482 Minimax (plug-in type)	——	——

Model 505 uses chassis 120002, 120020, 120041. Model 523 uses chassis 120041.

IMPORTANT—Where excessive tube burn-out is encountered, the 50B5 tube should be replaced *only* with a new Emerson tube bearing the designation 274 on the tube base.

POWER CONSUMPTION: 30 watts (line operation).

CURRENT DRAIN:

"A" Battery—0.053 amp.

"B" Battery—0.013 amp.

An oscillator with frequencies of 262, 600 and 1425 kc is required.

An output meter should be connected across the primary or secondary of the output transformer for observing maximum response.

Always use as weak a test signal as possible, turning down the output of the test oscillator as the alignment of the receiver progresses.

Plug the receiver into the power supply in such a way that the ground side of the power line is connected to the receiver B—.

Location of Coils and Trimmer Adjustments

The oscillator coil (T5) is located beneath the chassis. The trimmer for the oscillator (C6) is on the middle section of the variable condenser.

The interstage coil (T3) is the shielded coil located under the chassis. Its trimmer (C5) is on the front section of the variable condenser.

The trimmer for the loop antenna (C4) is on the last section of the variable condenser (the section nearest the loop).

The i-f transformers are mounted on top of the chassis. The first i-f transformer (T2) is mounted next to the loop. The second i-f transformer (T3) is mounted next to the dial.

The series padder, C10 for chassis 120002 and C16 for chassis 120020 and 120041, is located on the chassis near the 1T4 tube.

I-f Alignment

Rotate the variable condenser to the minimum capacity position. Feed 262 kc to the converter grid and adjust the three i-f trimmers for maximum response. The signal should be fed through a 0.1 mfd. condenser.

Interstage Alignment

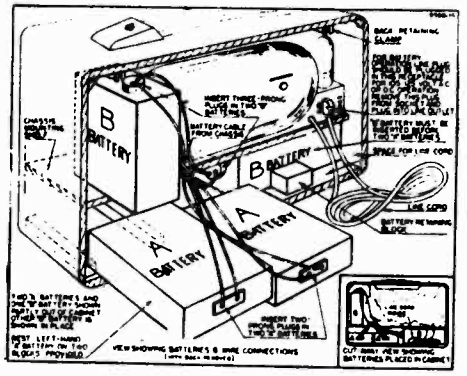
1. Set the dial indicator to 1425 kc, feed 1425 kc to the r-f grid, and adjust the oscillator and interstage trimmers for maximum response.
2. Set the dial indicator to 600 kc, feed 600 kc to the r-f grid, and adjust the oscillator padding trimmer by rocking in the signal for maximum response.
3. Repeat steps 1 and 2 until no further improvement is possible.

Loop Alignment

Connect the test oscillator to a coil composed of three or four turns of wire wound in a loop approximately 12" in diameter. This coil should be held parallel to and in line with the receiver's loop at a distance of 15 to 20 inches.

1. Radiate a signal at 1425 kc, tune in the signal on the receiver, and adjust the loop trimmer for maximum response.
2. Radiate signal at 600 kc, tune in the signal on the receiver, and adjust the loose outside turn of the loop antenna for maximum response. This loose turn may be moved to either side of the center. Fasten it in the position which gives maximum response.
3. Repeat steps 1 and 2 until no further improvement is possible.

Battery Installation



External Antenna

For loop antennas that do not have external antenna connection, wind one turn of insulated wire around or across the loop. Connect one end to an outside aerial. Connect the other end of a good ground or to chassis through a 0.002 mfd. condenser.

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

Grid—green Plate—blue

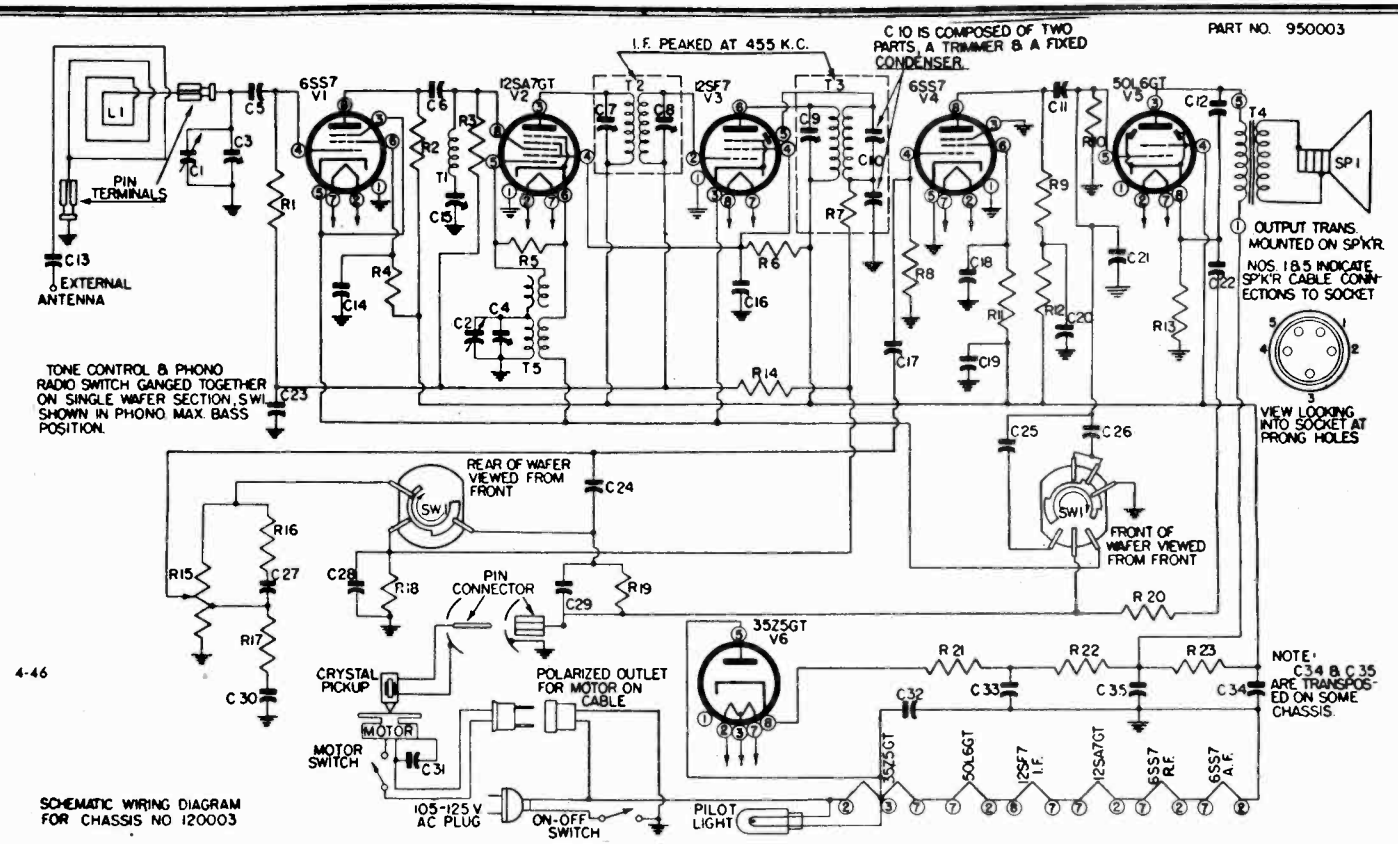
Grid return—black B+—red

CABINET AND DIAL PARTS

	525090	Pointer		520200	Escutcheon (Model 523)
	410929	Pointer hub		140002	Cabinet (Model 505)
	531009	Drive pulley		140053	Cabinet (Model 523)
	280133	Drive shaft		460470	Knob, black
	520039	Dial backplate (Model 505)		460140	Knob, brown
	520505	Dial backplate (Model 523)		450001	Handle, or
	460040	Dial crystal (Model 505)		450280	Handle
	520080	Dial crystal (Model 523)			

* Not supplied separately.

† Specify part numbers when ordering. When in doubt of chassis or model also include complete serial number.



The following voltage readings are d-c measurements taken from B— (chassis) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (*), which should be taken with a d-c vacuum-tube voltmeter. Line voltage for these readings was 117 volts, 60 cycles, a.c. Take readings with the volume control set at minimum, the variable condenser closed, and the phonograph-radio switch in the treble radio position.

	PIN NUMBER							
TUBE	1	2	3	4	5	6	7	8
6SS7(V1)				*-0.9		55		52
12SA7			92	84	*-8.6			*-0.82
12SF7				84		92		
6SS7(V4)				*-7.5		*9		*42
50L6GT			100	93		75		5.6
35Z5GT				115		108		120

The color coding of the i-f transformer leads is as follows:
Grid return—black Plate—blue
Grid—green B+—red

2—6SS7, r-f and a-f amplifiers
1—12SA7, pentagrid oscillator-modulator
1—12SF7, diode detector, i-f amplifier, a.v.c.
1—50L6GT, beam power output
1—35Z5GT, half-wave rectifier

POWER SUPPLY: A.C. only, 60 cycles.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION:
30 watts for the receiver.
20 watts for the phono motor.

An oscillator with frequencies of 455, 600, and 1425 kc is required.

An output meter should be connected across the primary or secondary of the output transformer for observing maximum and minimum response, as required.

Always use as weak a test signal as possible, turning down the output of the test oscillator as the alignment of the receiver progresses.

Turn the volume control on full and set the tone control in the most brilliant position.

Location of Coils and Trimmer Adjustments

The first i-f transformer (T2) is mounted on top of the chassis deck next to the 12SA7 tube. The trimmers (C7, C8) are accessible through holes in the top of the can.

The second i-f transformer (T3) is mounted on top of the chassis next to the 50L6 tube. The trimmers (C9, C10) are accessible through holes in the top of the can.

The trimmer (C2) for the oscillator coil (T5) is located on the rear section of the variable condenser.

The antenna trimmer (C3) is mounted on the variable condenser mounting bracket.

The oscillator coil is located underneath the chassis. The loop antenna acts as the antenna coil.

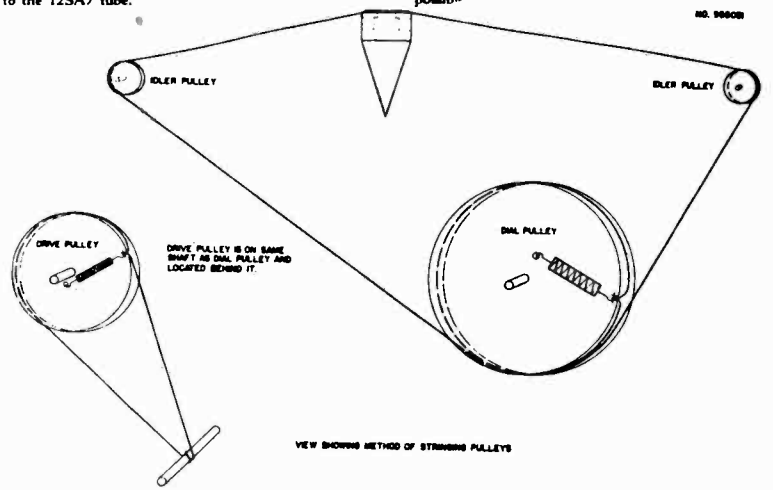
The wave trap (T1) is located on the top deck of the chassis base adjacent to the 12SA7 tube.

I-F Alignment and Wave Trap Alignment

1. Set the variable condenser to the minimum capacity position.
2. Feed 455 kc to the grid (pin 8) of the 12SA7 tube through a 0.01 mfd. condenser and adjust the four i-f trimmers (C7, C8, C9, C10) for maximum response.
3. Feed 455 kc to the external antenna lead and adjust the wave trap (T1, C15) for minimum response.

R-F Alignment

1. Set the variable condenser at maximum capacity and the front edge of the pointer opposite the maximum capacity marker on the lower edge of the dial plate. The markers are small triangular indentations on the front edge. Looking at the front of the set from left to right are calibration points for maximum capacity, 600 kc, 1425 kc, and 1600 kc.
2. Connect the test oscillator to a coil composed of three or four turns of wire wound in a circle approximately 12" in diameter. Place the coil parallel to and in line with the receiver loop at a distance of approximately 15 to 20 inches. During alignment procedure, make sure the relative positions of the receiver and loop are similar to actual operating positions when mounted on the cabinet.
3. Radiate a signal at 1425 kc, set the dial indicator opposite the 1425 kc marker, and adjust both oscillator and antenna trimmers for maximum response.
4. Radiate a 600 kc signal, tune in the signal on the receiver, and adjust the loose outside turn of the loop antenna for maximum response. This loose turn may be moved to either side of the center. Fasten it in the position which gives maximum response.
5. Repeat steps (3) and (4) until no further improvement is possible.



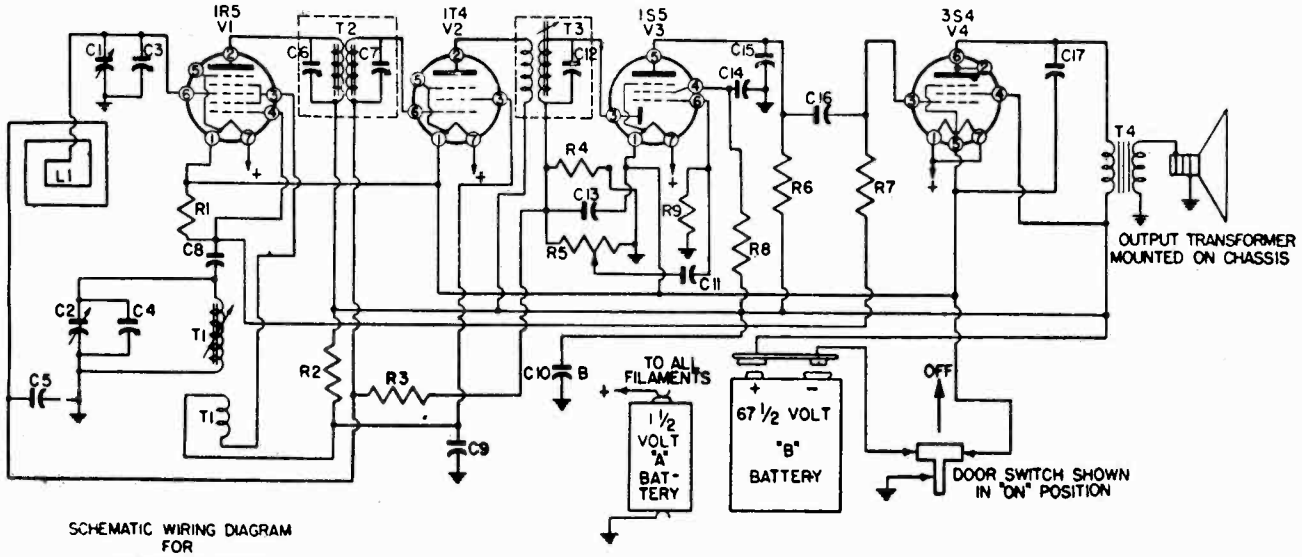
VIEW SHOWING METHOD OF STRINGING PULLEYS

Schematic Symbol	Part No.	DESCRIPTION
C1, C2	900180	Two-gang variable condenser
C3	900190	1.6 - 12 mmfd. trimmer
C4		Trimmer, part of C2
C5, C28	910000	0.00022 mfd. mica condenser
C6, C29	910010	0.00011 mfd. mica condenser
C7, C8		Trimmers, part of T2
C9		Trimmer, part of T3
C10		Trimmer and fixed condenser, part of T3
C11	920020	0.02 mfd., 400 V. condenser
C12, C25	920180	0.005 mfd., 400 V. condenser
C13, C17	920010	0.002 mfd., 600 V. condenser
C14, C18, C19, C20, C22	920060	0.05 mfd., 200 V. condenser
C15		Trimmer, part of T1
C16	925100	8 mfd. 150 V. electrolytic condenser
C21	910050	0.0004 mfd. mica condenser
C23	920040	0.1 mfd., 200 V. condenser
C24	910030	0.000026 mfd. mica condenser
C26	920010	0.002 mfd., 600 V. condenser
C27	910040	0.00025 mfd. mica condenser
C30	920170	0.001 mfd., 600 V. condenser
C31	920500	0.05 mfd., 200 V. condenser
C32	920030	0.05 mfd., 400 V. condenser
C33, C34, C35	925080	20, 40, 80 mfd., 150 V. multiple electrolytic condenser; C33—40 mfd., C34—20 mfd., C35—80 mfd.
L1	700070	Loop antenna
R1	321210	1 meg., ½ watt resistor
R2	310730	10,000 ohms, ½ watt resistor
R3, R5	310810	22,000 ohms, ½ watt resistor
R4	310850	33,000 ohms, ½ watt resistor
R6	340490	1,000 ohms, ½ watt resistor
R7		47,000 ohms, ½ watt resistor, part of T3
R8	321450	10 meg., ½ watt resistor
R9	321050	220,000 ohms, ½ watt resistor
R10, R16, R18, R19	321130	470,000 ohms, ½ watt resistor
R11, R20	321290	2.2 meg., ½ watt resistor
R12	310890	47,000 ohms, ½ watt resistor
R13	340290	150 ohms, ½ watt resistor
R14	321330	3.3 meg., ½ watt resistor
R15	390050	2.5 meg. volume control and switch
R17	320970	100,000 ohms, ½ watt resistor
R21	310050	15 ohms, ½ watt resistor
R22	397010	180 ohms, 1 watt ceramic resistor
R23	370410	470 ohms, 1 watt resistor
SP1	180004	Speaker, 6½" permanent magnet (less output transformer)
SW1	510100	Phono and tone switch
T1	708000	Wave trap
T2	720270	First i-f transformer
T3	720370	Second i-f transformer
T4	734030	Output transformer
T5	716050	Oscillator coil, or
	716060	Oscillator coil
	583090	Line cord
	140003	Cabinet, walnut
	140011	Cabinet, mahogany
	460470	Knob, volume and selector
	460300	Knob, phono-radio
	560080	Bottom cover
	819005	Record changer, or
	819003	Record changer
		DIAL PARTS
	807010	Pilot light No. 51
	507110	Pilot light socket
	411070	Dial plate
	525100	Pointer
	280153	Drive shaft
	587000	Drive cord spring, dial
	587070	Drive cord spring, variable condenser

*Not supplied separately.

EMERSON RADIO & PHONO. CORP. MODEL 508, Ch. 120008

NO. 950005



SCHEMATIC WIRING DIAGRAM FOR CHASSIS NO. 120008

FREQUENCY RANGE: 540-1600 kc.

NUMBER OF TUBES: Four.

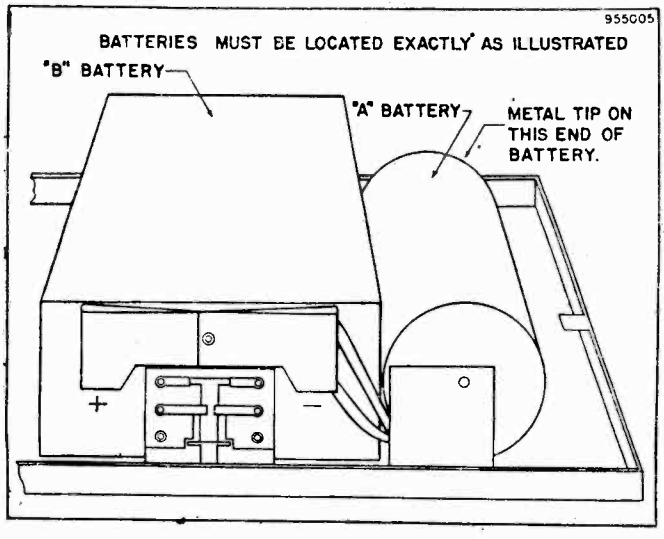
TYPE OF TUBES:
1—1R5, oscillator-modulator
1—1T4, i-f amplifier
1—1S5, 2nd detector, a.v.c., a-f amplifier
1—3S4, pentode output

POWER SUPPLY: "A" and "B" batteries.

VOLTAGE RATING:
"A" Battery—1.5 volts
"B" Battery—67.5 volts

CURRENT DRAIN:
"A" Battery—0.25 amp.
"B" Battery—0.0075 amp.

The receiver is turned on when the door is open and turned off when the door is closed.



1. Slide the button on the catch near the handle in the direction of the arrow. This loosens the rear cover, making the batteries accessible.
2. Insert batteries as shown in the accompanying diagram.
3. To reassemble fit the two slots on the end of the plastic shell opposite the handle to the tongues on the lower end of the metal frame. Keep the "B" battery in place.
4. Carefully close the shell until it fits and catches in place.

VOLTAGE ANALYSIS

The following voltage readings are d-c measurements taken from B— (chassis) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (*), which should be taken with a d-c vacuum-tube voltmeter. Take readings with the volume control set at minimum and the variable condenser closed. Use fresh batteries.

	PIN NUMBER						
TUBE	1	2	3	4	5	6	7
1R5		67.5	40	*-7.0		*-0.3	1.5
1T4		67.5	40			*-0.3	1.5
1S5			*-0.35	*16.5	*39	*-0.3	1.5
3S4	1.5	65	*-7.0	67.5		65	1.5

An oscillator with frequencies of 455, 600, 1500, and 1610 kc is required.

An output meter should be connected across the primary or secondary of the output transformer for observing maximum response.

Always use as weak a test signal as possible, turning down the output of the test oscillator as the alignment of the receiver progresses.

Turn the volume control on full.

Location of Coils and Trimmer Adjustments

The first i-f transformer (T2) is located next to the output transformer (T4). The trimmers (C6, C7) are accessible through holes in the top of the can.

The second i-f transformer (T3) is located between the 1T4 and 1S5 tubes. The single trimming core screw (C12) extends from the end of the can.

The oscillator coil (T1) is located next to the first i-f transformer. The trimmer for the oscillator (C4) is located on the smaller variable condenser section. The 600 kc oscillator core adjustment is the brass screw protruding from the end of the oscillator coil.

The loop antenna acts as the antenna coil. The trimmer for the loop (C3) is located on the larger section of the variable condenser.

I-F Alignment

1. Rotate the variable condenser to the minimum capacity position.
2. Feed 455 kc to the grid (pin 6) of the 1R5 tube through a 0.01 mfd. condenser.
3. Adjust the three i-f trimmer screws (C6, C7, C12) for maximum response. (Clip the test signal lead to the stator of the larger capacity section of the variable condenser.)

R-F Alignment

1. Connect the test oscillator to a coil composed of three or four turns of wire wound in a circle approximately 12 inches in diameter. This coil should be placed parallel to and in line with the receiver loop at a distance of approximately 15 to 20 inches.
2. Radiate a signal at 1610 kc, rotate the variable condenser to minimum capacity, and adjust the oscillator trimmer (C4), on the smaller section of the variable condenser, for maximum response.
3. Radiate a signal at 1500 kc, tune in the 1500 kc signal, and adjust the antenna trimmer (C3), on the larger section of the variable condenser, for maximum response.
4. Radiate a signal at 600 kc, set the dial indicator to 60, and adjust the oscillator coil core trimmer while rocking the variable condenser for maximum response.
5. Return to 1610 kc and check alignment. If readjustment is necessary, repeat steps (2) to (4) until no further improvement is noted.

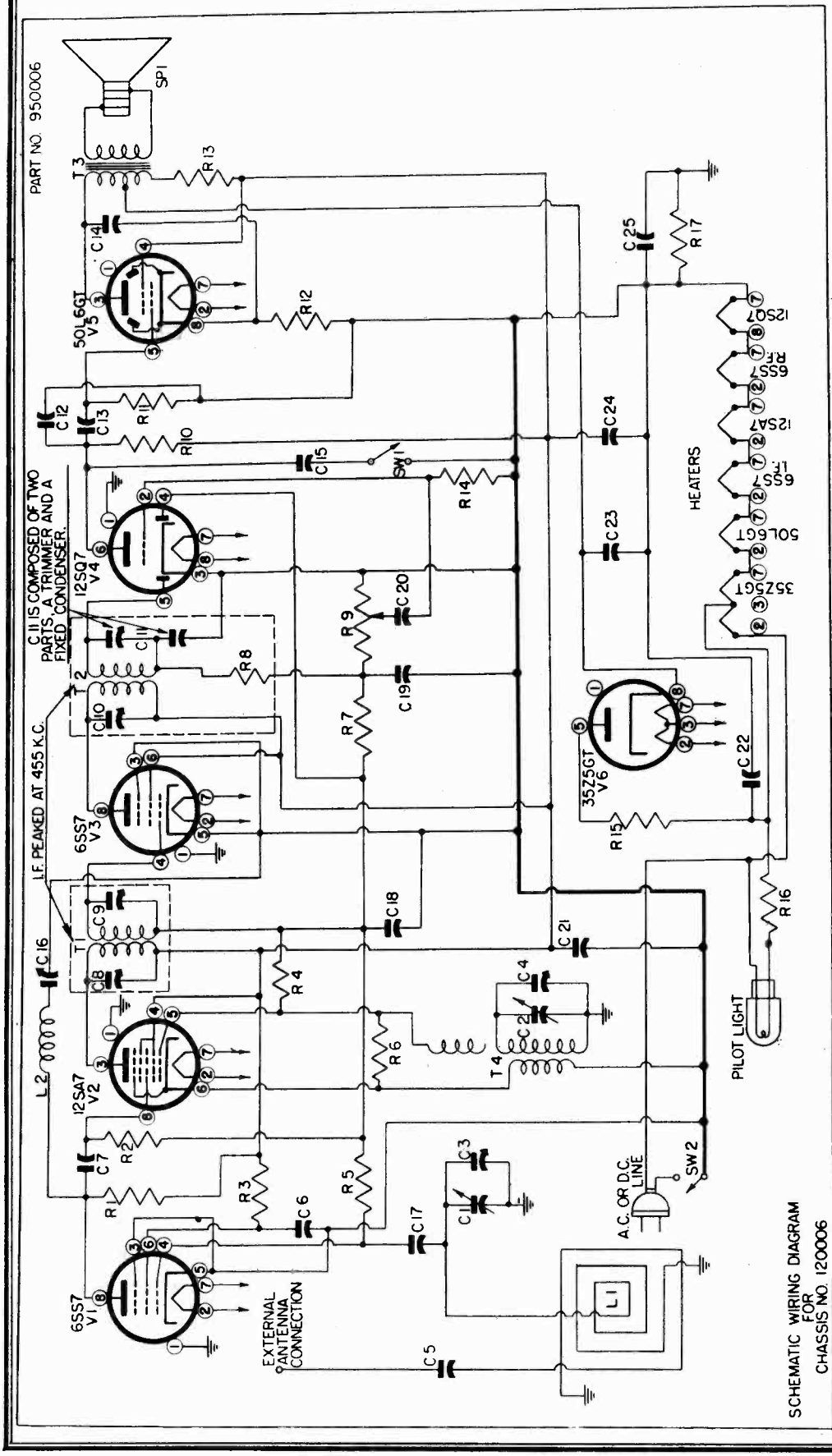
Battery Type	Number Required	Model
1½-volt "A"	1	Standard D-size flashlight cell (1⅛" diameter)
67½-volt "B"	1	Eveready "Minimax" No. 467

Schematic Symbol	Part No.	DESCRIPTION
C1, C2	900120	Variable condenser, or
C1, C2	900140	Variable condenser
*C3, C4		Trimmers, part of C1, C2
C5, C9, C14	920120	0.02 mfd., 100 V. roll-type condenser
*C6, C7		Trimmers, part of T2
C8	910110	0.0002 mfd. mica condenser, or
C8	928020	0.0002 mfd. ceramic condenser
C10	925070	8 mfd., 100 V. dry electrolytic condenser
C11, C17	920140	0.003 mfd., 150 V. roll-type condenser
*C12		Condenser, part of T3
C13, C15	928010	0.0001 mfd., ceramic condenser
C16	920130	0.001 mfd., 100 V. flat roll-type condenser
L1	700030	Loop assembly
R1	320970	100,000 ohms, ¼ watt resistor
†R2	310730	10,000 ohms, ¼ watt resistor
R3	321330	3.3 meg., ¼ watt resistor
R4, R7	321210	1 meg., ¼ watt resistor
R5	390040	Volume control 3 megohms
R6	321130	0.47 meg., ¼ watt resistor
R8	321370	4.7 meg., ¼ watt resistor
R9	321450	10 meg., ¼ watt resistor
T1	716040	Oscillator coil
T2	760240	First i-f transformer
T3	720260	Second i-f transformer
T4	734090	Output transformer
	180002	Permanent magnet dynamic speaker
	585000	"B" battery cable
	510040	Lid switch
	460020	Plastic shell (black)
	460030	Plastic door
	630000	Plastic loop cover (black)
	410389	Metal front (maroon)
	460050	Plastic tuning wheel (black)
	460060	Plastic volume wheel (black)
	595000	Leather handle
	410969	Release catch, male
	410959	Release catch, female

†Some units contain R2 resistors varying in value from 8200 to 22,000 ohms, as selected in production. *Not supplied separately

MODELS 512,515, 516,550,Ch. 120006,120056

EMERSON RADIO & PHONO. CORP.



SCHEMATIC WIRING DIAGRAM FOR CHASSIS NO. 120006

ITEM	PART NO. (DESCRIPTION)		
C1, C2	900070	TWO GANG VARIABLE CONDENSER	
C 3	PT. OF C1	TRIMMER	
C 4	PT. OF C2	TRIMMER	
C 5	920010	.002 MF	600 VOLT
C 6	920080	.05 MF	200 VOLT
C 7	910010	.00011 MF	MICA
C8, C9	PT. OF T1	TRIMMERS	
C 10	PT. OF T2	TRIMMER	
C 11	PT. OF T2	TRIMMER & FIXED CONDENSER	
C 12	910000	.00022 MF	MICA
C 13	920020	.02 MF	400 VOLT
C 14	920020	.02 MF	400 VOLT
C 15	920010	.002 MF	600 VOLT
C 16	PT. OF L2	TRIMMER	
C 17	910000	.00022 MF	MICA
C 18	920060	.05 MF	200 VOLT
C 19	910010	.00011 MF	MICA
C 20	920040	.002 MF	600 VOLT
C 21	920030	.05 MF	400 VOLT
C 22	920030	.05 MF	400 VOLT
C 23	921110	30 MF	150 V. DUAL ELECT. COND
C 24		50 MF	150 V. DUAL ELECT. COND
C 25	920080	2 MFD	200 VOLTS (USED ON 120056 ONLY)
	920410	2 MFD	600 VOLTS (USED ON 120006 ONLY)
L1	700010	LOOP ANTENNA	
L2	700060	495 K.C. WAVE TRAP	
R 1	310730	10,000 OHMS	1/4 WATT
R 2	340810	22,000 OHMS	1/4 WATT
R 3	310970	39,000 OHMS	1/4 WATT
R 4	397000	15 MEG.	1/4 WATT
R 5	321130	470,000 OHMS	1/4 WATT
R 6	310810	22,000 OHMS	1/4 WATT
R 7	321330	3.3 MEG.	1/4 WATT
R 8	PT. OF T2	47,000 OHMS	1/4 WATT
R 9	390180	.5 MEG. VOLUME CONTROL	
R 10	321130	470,000 OHMS	1/4 WATT
R 11	321130	470,000 OHMS	1/4 WATT
R 12	340890	150 OHMS	1/2 WATT
R 13	370490	1,000 OHMS	1 WATT
R 14	387000	15 MEG.	1/4 WATT
R 15	340960	15 OHMS	1/2 WATT
R 16	340910	10 OHMS	1/2 WATT
R 17	321080	220,000 OHMS	1/4 WATT
SP 1	180008	P.M. SPEAKER	
SW 1	390120	TONE CONTROL SWITCH	
SW 2	390200	ROTARY LINE SWITCH	

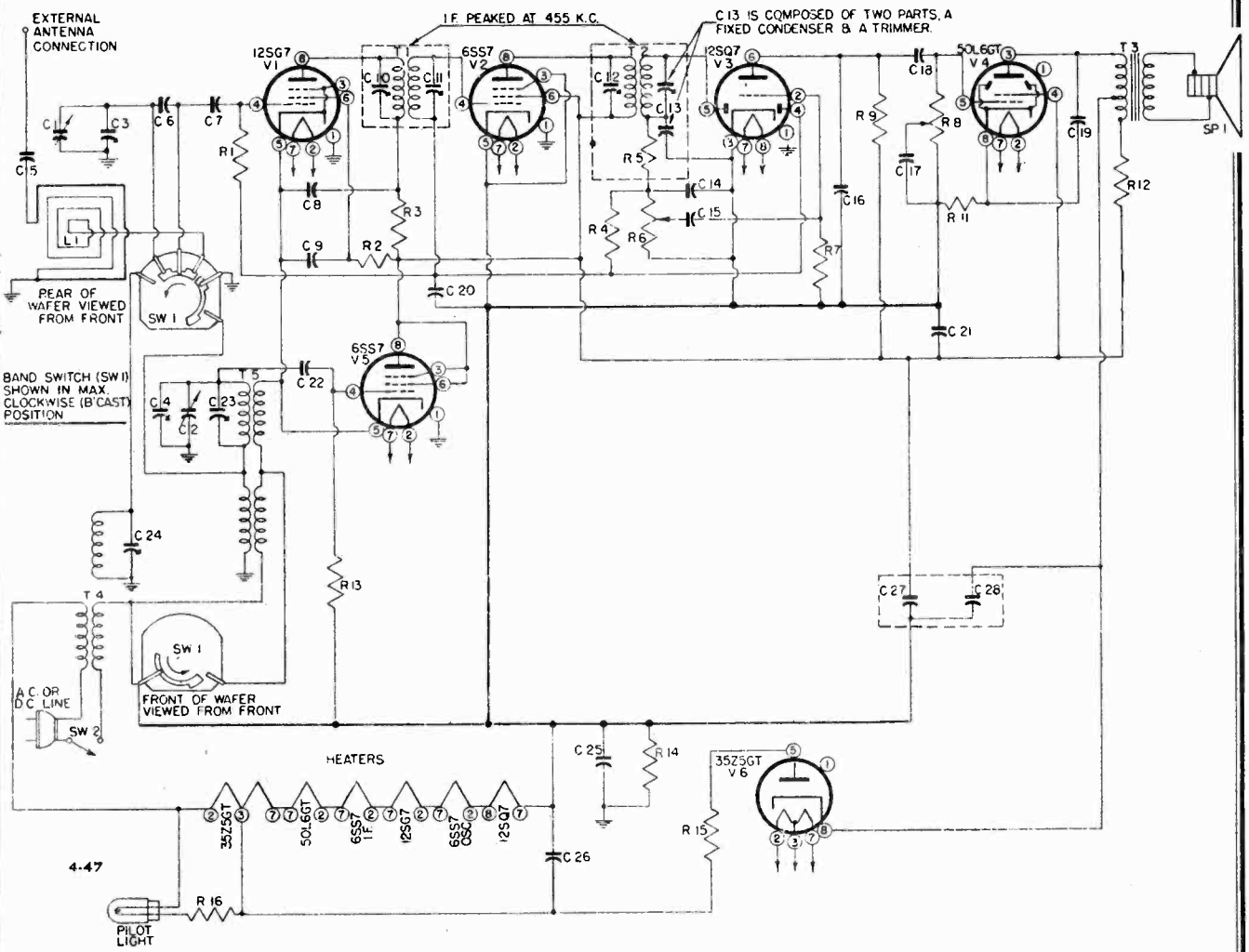
T 1	720360	FIRST I.F. TRANSFORMER	
T 2	720390	SECOND I.F. TRANSFORMER	
T 3	734080	OUTPUT TRANSFORMER	
T 4	718070	OSCILLATOR COIL	
V 1	800060	VACUUM TUBE (6SS7)	
V 2	800000	VACUUM TUBE (12SA7)	
V 3	800060	VACUUM TUBE (6SS7)	
V 4	800040	VACUUM TUBE (12SQ7)	
V 5	800070	VACUUM TUBE (50L6GT)	
V 6	800090	VACUUM TUBE (3525GT)	

Emerson 512, 515, 516, 550, Chassis 120006, 120056

These models using the 120056 chassis are the same as those mentioned above, except for the replacing of the octal tubes with the following loctal tubes:—7B7, 14B6, 14Q7, 50A5, and a 35Y4. The circuit diagram and the voltage readings remain the same, except for the base pin numbers.

EMERSON RADIO AND PHONO. CORP.

MODELS 513, 514, 534
Chassis 120007



DESCRIPTION

TYPE: Two-band superheterodyne.

FREQUENCY RANGE:

540-1620 kc. (555-185 meters)
8.8-12.2 mc. (16.3-24.5 meters)

TYPE OF TUBES:

1—12SG7, mixer
1—6SS7, oscillator
1—6SS7 or 7B7, i-f amplifier
1—12SQ7, diode detector, a-f amplifier, a.v.c.
1—50L6GT, beam power output
1—35Z5GT, half-wave rectifier

POWER SUPPLY: A.C. or D.C.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

GENERAL NOTES

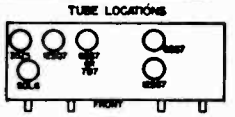
1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. The color coding of the i-f transformer leads is as follows:
   Grid—green Plate—blue
   Grid return—black B+—red
4. All models have self-contained antennas and do not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out of the rear near the line cord.
5. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.
6. Where 7B7 loctal tube is used in place of 6SS7 i-f amplifier, tube types are not interchangeable. Use same voltage data for both types.

Schematic Symbol	†Part No.	DESCRIPTION
C1, C2	900270	Two-gang variable condenser
*C3, C4		Trimmers, part of variable condenser
C5, C15, C17	920010	0.002 mfd., 600 volt condenser
C6	910080	0.00046 mfd. mica condenser
C7, C16	910000	0.00022 mfd. mica condenser
C8	920060	0.05 mfd., 200 volt condenser
C9, C18, C19	920020	0.02 mfd., 400 volt condenser
*C10, C11, C12		Trimmers, part of i-f transformers
*C13		Trimmer and fixed condenser, part of second i-f transformer
C14	910010	0.00011 mfd. mica condenser
C20	920040	0.1 mfd., 200 volt condenser
C21	920190	0.03 mfd., 400 volt condenser
C22	910160	0.00036 mfd. mica condenser
*C23		Trimmer, part of oscillator coil
*C24		Trimmer, part of short wave antenna coil
C25	920050	0.2 mfd., 200 volt condenser
C26	920030	0.05 mfd., 400 volt condenser
C27, C28	925012	30-30 mfd., 150 volt dual electrolytic condenser
L1	700130	Loop antenna
R1, R9, R10	321130	470,000 ohms, ½ watt resistor
R2	310890	47,000 ohms, ½ watt resistor
R3	310650	4,700 ohms, ½ watt resistor
R4	321330	3.3 meg., ½ watt resistor
*R5		47,000 ohms, ½ watt resistor, part of second i-f transformer
R6	390190	500,000 ohms volume control
R7	397000	15 meg., ¼ watt resistor
R8	390280	400,000 ohms tone control
R11	340290	150 ohms, ½ watt resistor
R12	370490	1,000 ohms, 1 watt resistor
R13	310810	22,000 ohms, ½ watt resistor
R14	321050	220,000 ohms, ½ watt resistor
R15	340050	15 ohms, ½ watt resistor
R16	340010	10 ohms, ½ watt resistor
SP1	180008	P.M. speaker
SW1	510330	Band switch
*SW2		Line switch on volume control
T1	720400	First i-f transformer
T2	720390	Second i-f transformer
T3	734100	Output transformer
T4	710010	Short wave antenna coil
T5	716100	Oscillator coil
	583160	Line cord
	807000	Pilot light, Mazda No. 47
	507215	Pilot light socket

* Not supplied separately.

† Specify part number when ordering.

TUBE LOCATIONS



VOTAGE ANALYSIS

The following voltage readings are d-c measurements taken from B— (line switch) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (*), which should be taken with a d-c vacuum-tube voltmeter. Line voltage for these readings was 117 volts, 60 cycles, a.c. Measurements made with 117 volts d.c. will be lower than those given below. Take readings with the volume control set at maximum and the variable condenser open and band switch in B.C. position. When the band switch is in the S.W. position, voltages marked (+) apply.

TUBE	PIN NUMBER 1	2	3	4	5	6	7	8
6S57 (V1)			95 95+	—12* —5.6+		95 95+		95 95+
6S57 (V3)				—3.8* —3.0+		65 65+		85 85+
12SK7				—3.3* —2.6+		95 95+		95 95+
12SQ7		—0.6* —0.6+		—3.3* —2.6+	—0.57* —0.5+	52* 52+		
50L6GT			112 112+	95 95+				5.35 5.35+
35W4GT				119 119+				119 119+

ADJUSTMENTS

An oscillator with frequencies of 455, 600, 1600 and 12,000 kc is required.

An output meter should be used across the voice coil or output transformer for observing maximum response.

Always use as weak a test signal as possible when aligning the receiver.

I-f Alignment

Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SG7 tube through a 0.1 mfd. condenser and adjust the four i-f trimmers for maximum response.

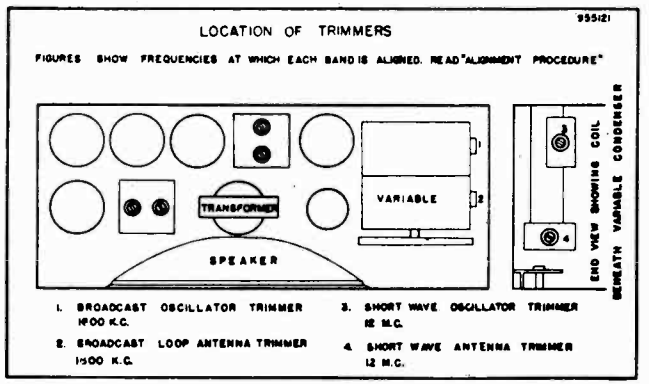
Note: The grid of the 12SG7 tube is the No. 4 pin.

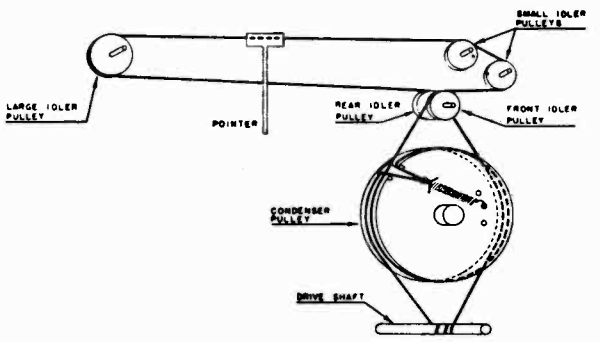
R-f Alignment

Rotate the wave-band switch counter-clockwise to the short-wave position. Set the dial pointer at 12 megacycles and using a 400 ohm carbon resistor as a dummy antenna feed 12 megacycles from the generator to the external antenna lead emerging from the rear of the chassis. Adjust first the short-wave oscillator trimmer and then the short-wave antenna trimmer for maximum response.

Rotate the wave-band switch clockwise to the broadcast position. Set the dial pointer at 160 and feed 1600 kc from the signal generator into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from the loop antenna and advance the signal generator until a deflection is obtained on the output meter. Adjust first the oscillator trimmer (rear section of the variable condenser) and then the antenna trimmer (front section of the variable condenser) for maximum response.

If the loop has been replaced it may be necessary to adjust the loop inductance as follows: Align at 1600. Set the pointer at 60 and feed 600 kc into the radiating loop. A portion of the outside turn of the loop may then be swung to either side of the center to give maximum response. Re-align at 1600.





CUT-AWAY VIEW SHOWING METHOD OF STRINGING PULLEYS.

MODELS 540, 564, 572

EMERSON RADIO AND PHONO. CORP.

MODEL 540A, Ch. 120042A

ALIGNMENT

To set pointer on Models 540 and 564, turn tuning slugs completely in and set pointer to top reference dot on right side of dial backplate. On Model 572 set pointer in extreme clockwise position. Use isolation transformer if available. If not, connect a condenser in series with low side of signal generator and chassis. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 7 (grid) of 12BE6. Low side to B—.	455 kc	Tuning slugs completely out.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to chassis.	1600 kc for Models 540 and 564. 1620 kc for Model 572	Bottom reference dot at right side of dial backplate for Models 540 and 564. Tuning slugs completely out on Model 572.	Across voice coil.	A5, A6	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to chassis.	1400 kc	Tune for maximum output.	Across voice coil.	Antenna coil (34)	Loosen screws on bracket of antenna coil (34). Adjust position of coil for maximum output. Tighten screws.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	-4.3 DC	0	12 AC	24 AC	100 DC	77 DC	-0.1 DC
2	12BA6	-0.1 DC	0	24 AC	35 AC	100 DC	100 DC	1.3 DC
3	12AT6	-0.7 DC	0	0	12 AC	-0.5 DC	0	57 DC
4	50B5	0	6.2 DC	35 AC	85 AC	115 DC	100 DC	0
5	35W4	122 DC	115 AC	85 AC	117 AC	110 DC	110 AC	122 DC

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	20,000	0	11	22	40,000	45,000	3.5 meg.
2	12BA6	3.5 meg.	0	22	32	40,000	40,000	100
3	12AT6	15 meg.	0	0	11	500,000	0	500,000
4	50B5	450,000	125,000	32	75	40,000	40,000	450,000
5	35W4	40,000	100,000	75	102	110	97	40,000

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2. D-C voltage measurements are at 20,000 ohms per volt; a-c voltages measured at 1,000 ohms per volt.
3. Socket connections are shown as bottom views.
4. Measured values are from socket pin to common negative.
5. Line voltage maintained at 117 volts for voltage readings.
6. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
7. Volume control at maximum, no signal applied for voltage measurements.

DESCRIPTION

TYPE: Single-band superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

1—12BE6, pentagrid oscillator-modulator
1—12BA6, first i-f amplifier
1—12AT6, diode detector, a-f amplifier, a.v.c.
1—50B5, beam power output
1—35W4, half-wave rectifier

POWER SUPPLY: A.C. or D.C.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. The color coding of the i-f transformer leads is as follows:

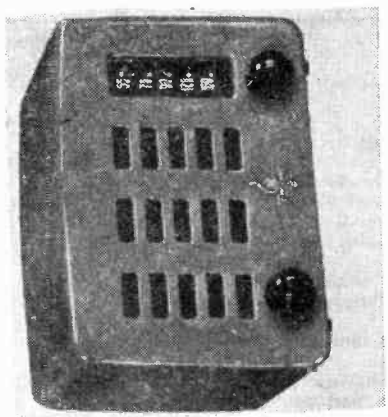
Grid—green	Plate—blue
Grid return—black	B+—red

MODEL 540A,
Ch.120042A

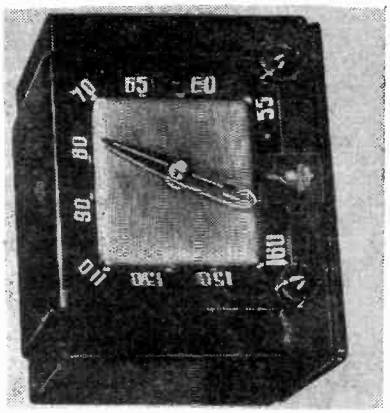
EMERSON RADIO AND PHONO. CORP.

MODELS 540, 564,
572 CHASSIS 120042,
120027, 120065

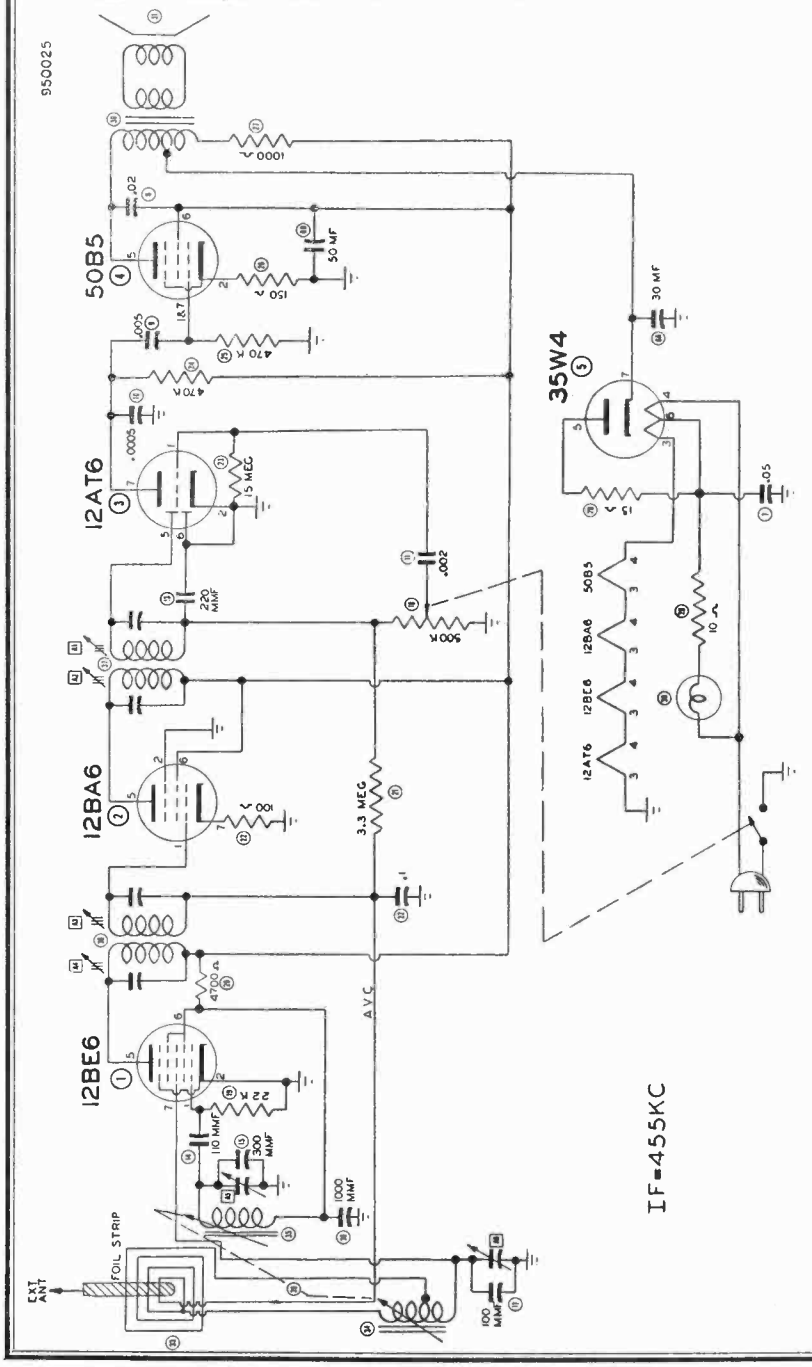
MODEL 540

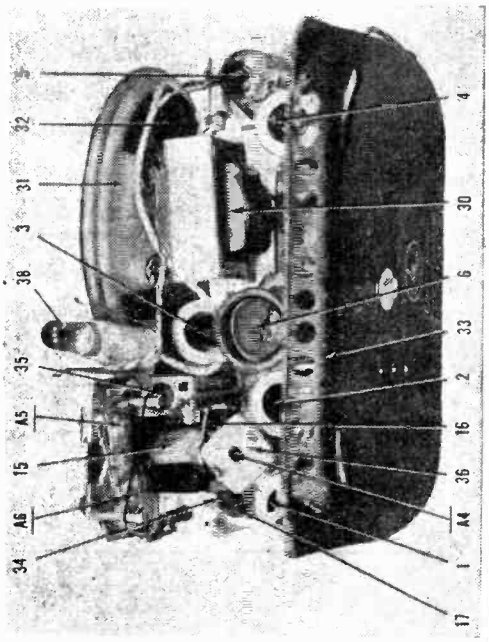


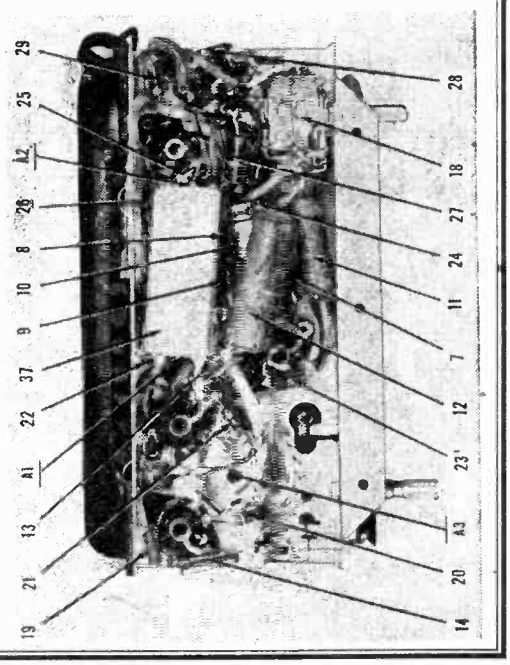
MODEL 564



MODEL 572







MODELS 540, 564, 572

EMERSON RADIO AND PHONO. CORP.

MODEL 540A, Ch. 120042A

REPLACEMENT PARTS LIST

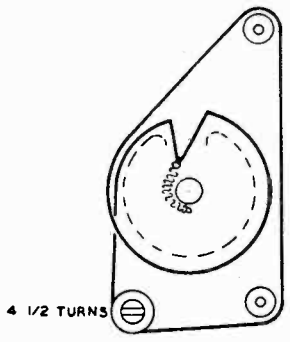
Symbol	†Part No.	DESCRIPTION
1	12BE6	Tube, converter
2	12BA6	Tube, i-f amplifier
3	12AT6	Tube, detector, a-f amplifier, a.v.c.
4	50B5	Tube, power output
5	35W4	Tube, rectifier
6A, 6B	925068	30-50 mfd., 150 volt electrolytic condenser (filter)
7	920030	0.05 mfd., 400 volt condenser (line bypass) (alternate part 920539)
8	920020	0.02 mfd., 400 volt condenser (output plate bypass) (alternate part 920540)
9	920180	0.005 mfd., 400 volt condenser audio coupling) (alternate part 920536)
10	920240	0.0005 mfd., 600 volt condenser (audio plate bypass)
11	920010	0.002 mfd., 600 volt condenser (audio coupling) (alternate part 920537)
12	920040	0.1 mfd., 200 volt condenser (a.v.c. filter) (alternate part 920538)
13	910000	220 mmfd., 500 volt mica condenser (diode filter)
14	910010	110 mmfd., 500 volt mica condenser (oscillator grid coupling)
15	910007	300 mmfd., 500 volt mica condenser fixed trimmer) (alternate part 910015)
16	910180	1000 mmfd., 300 volt mica condenser (oscillator feedback)
17	910008	80 mmfd., 500 volt mica condenser (fixed trimmer) (alternate ceramic condenser 928005)
18	390381	Volume control and line switch, 0.5 meg. (Model 540)
18	390029	Volume control and line switch, 0.5 meg. (Models 564, 572)
19	340810	22,000 ohms, ½ watt resistor (oscillator grid)
20	340650	4,700 ohms, ½ watt resistor (converter screen dropping)
21	351330	3.3 meg., ½ watt resistor (a.v.c. network)
22	340250	100 ohms, ½ watt resistor (i-f cathode bias)
23	397000	15 meg., ½ watt resistor (a-f grid load)
24	351130	470,000 ohms, ½ watt resistor (a-f plate load)
25	351130	470,000 ohms, ½ watt resistor (output grid load)
26	340290	150 ohms, ½ watt resistor (output cathode bias)
27	370490	1000 ohms, 1 watt resistor (filter)
28	340050	15 ohms, ½ watt resistor (rectifier ballast)
29	340010	10 ohms, ½ watt resistor (series pilot light)
30	734006	Output transformer
31	180018	Speaker, 4" P.M. (alternate part 180036)
*32		Speaker cone, part of speaker
33	700235	Loop antenna and rear cover (Model 540)
33	700013	Loop antenna and rear cover (Model 564)
33	700022	Loop antenna and rear cover (Model 572)
*34		Antenna coil, part of tuner assembly
*35		Oscillator coil, part of tuner assembly
36	720527	First i-f transformer (455 kc) (Model 540), or
36	720033	First i-f transformer (Models 564, 572), or
36	720053	First i-f transformer (Models 540, 564, 572)
37	720527	Second i-f transformer (455 kc) (Model 540), or
37	720033	Second i-f transformer (Models 564, 572), or
37	720053	Second i-f transformer (Models 540, 564, 572)
38	807000	Dial light, type 47
39	708147	Complete tuner assembly, includes items 34 and 35
	507214	Pilot light socket (Models 540, 564)
	507007	Pilot light socket (Model 572)
	583090	Line cord

CABINET AND DIAL PARTS

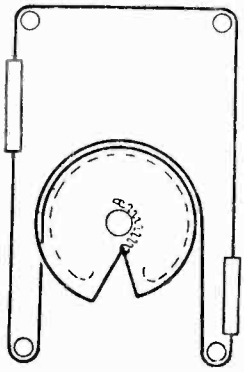
	140078	Cabinet, walnut (Model 540)
	140075	Cabinet, ivory (Model 540)
	140076	Cabinet, red (Model 540)
	140077	Cabinet, green (Model 540)
	140115	Cabinet, black (Model 540)
	140121	Cabinet, green onyx (Model 564)
	140139	Cabinet, red mottled (Model 564)
	140140	Cabinet, ebony (Model 564)
	140123	Cabinet, ivory (Model 572)
	140158	Cabinet, ebony (Model 572)
	140169	Cabinet, black and white mottled (Model 572)
	520004	Dial crystal (Model 540)
	520051	Dial crystal (Model 564 green onyx)
	520055	Dial crystal (Model 564 red and ebony)
	525207	Dial pointer (Models 540, 564)
	525026	Dial Pointer (Model 572)
	470319	Pointer shaft and pulley assembly (Model 572)
	520053	Dial backplate (Model 564 green onyx)
	520511	Dial backplate (Model 540 and Model 564 red and ebony)
	280509	Drive shaft
	460001	Knob, black (Models 540, 572)
	450015	Knob, brown (Model 564)
	450016	Knob, red (Model 564)
	450017	Knob, black (Model 564)
	410268	Metal grille, gold (Model 572)
	635001	Jewel indicator (Model 572)

† Specify part numbers when ordering.

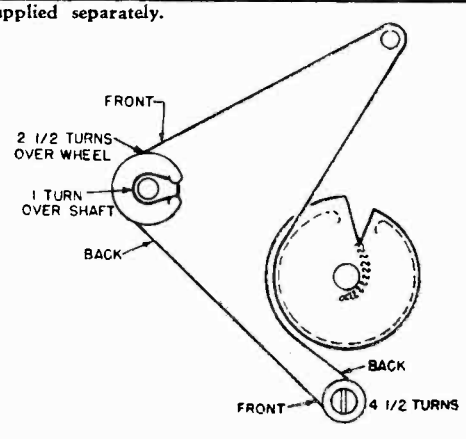
* Not supplied separately.



SLIDE RULE TYPE DIAL DRIVE



TUNING ASSEMBLY DRIVE



CLOCK FACE TYPE DIAL DRIVE

EMERSON RADIO AND PHONO. CORP.

MODEL 546, Chassis 120049

DESCRIPTION

TYPE: Single-band superheterodyne and automatic record changer.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

1—12BE6, pentagrid oscillator-modulator
1—12BA6, first i-f amplifier
1—12AT6, diode detector, a-f amplifier, a.v.c.
1—50B5, beam power output
1—35W4, half-wave rectifier

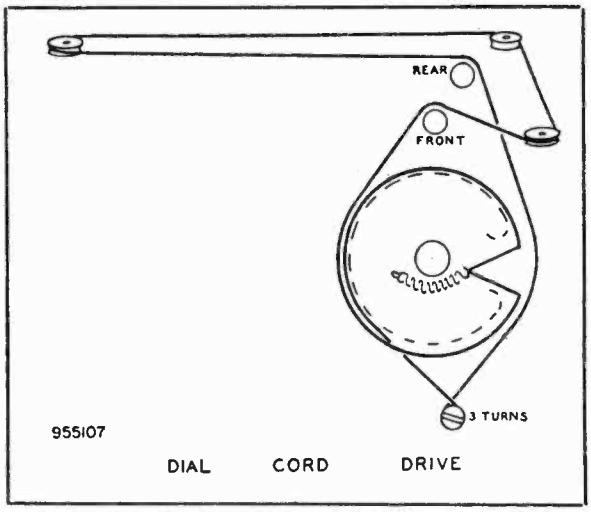
POWER SUPPLY: A.C. only, 60 cycles.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION:

30 watts for the receiver.
20 watts for the phono motor.

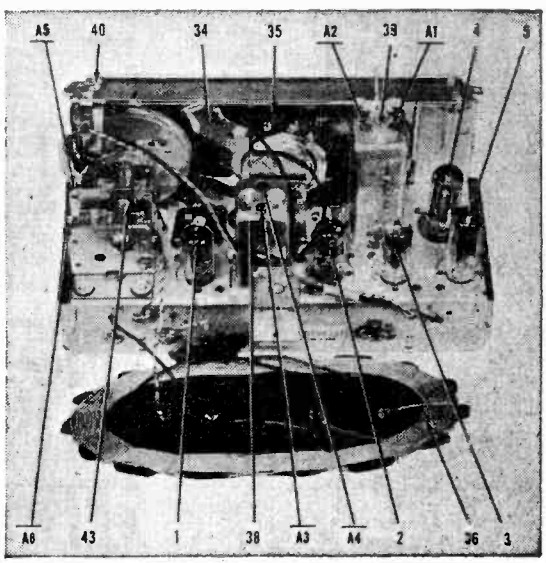
CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

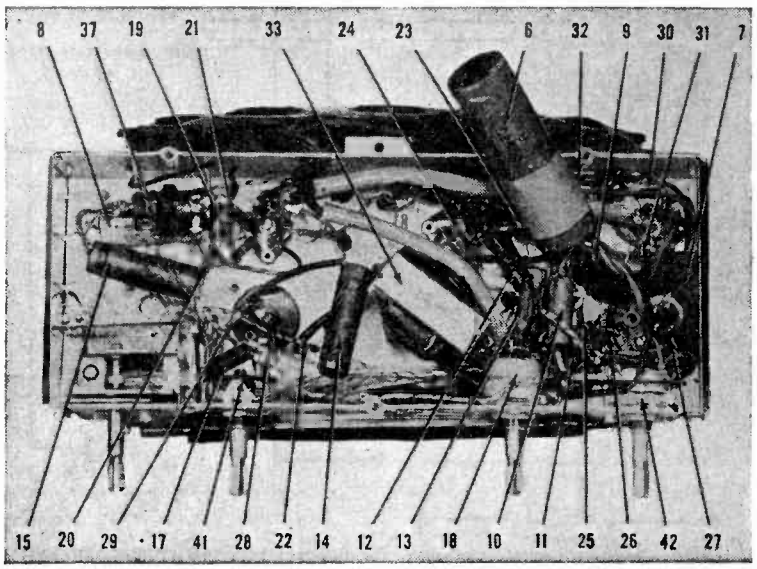


ALIGNMENT

Use an isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and B—. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

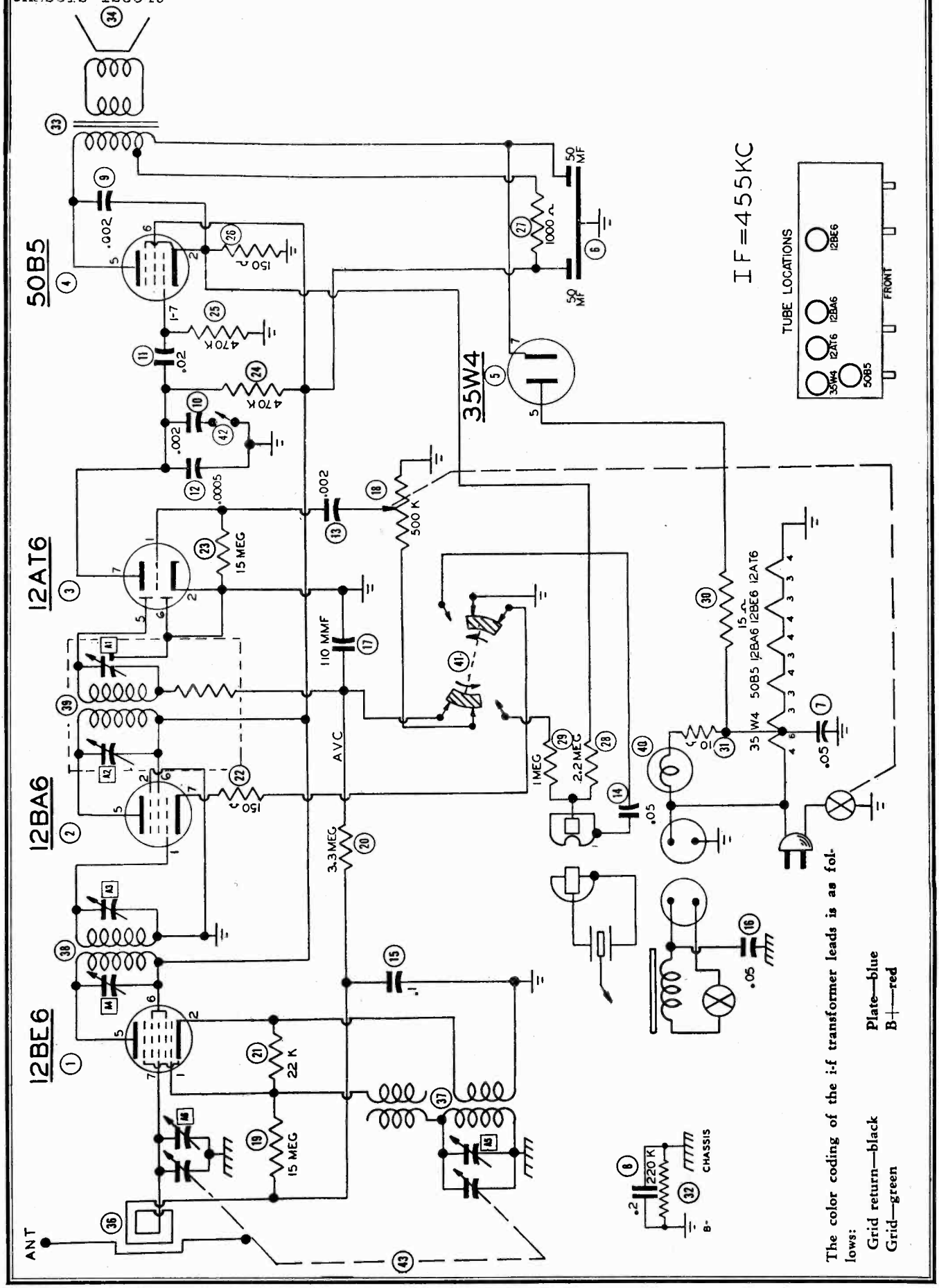
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 7 (grid) of 12BE6. Low side to B—.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6	Adjust for maximum output.





MODEL 546,
Chassis 120049

EMERSON RADIO AND PHONO. CORP.



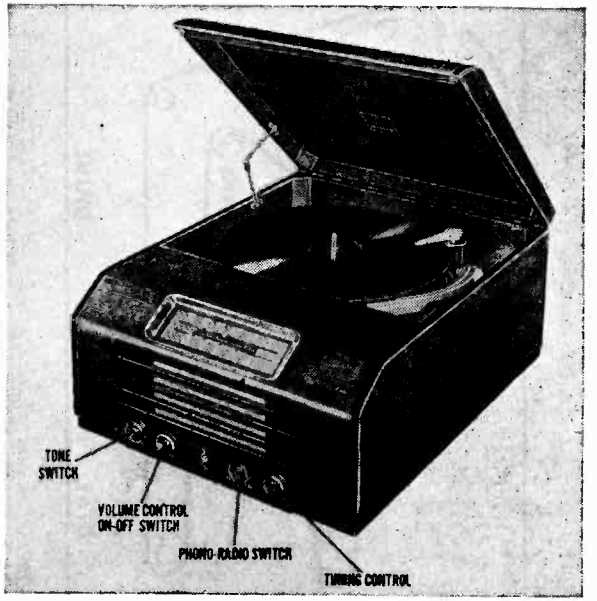
The color coding of the i-f transformer leads is as follows:

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

Symbol	†Part No.	DESCRIPTION
1	12BE6	Tube, converter
2	12BA6	Tube, i-f amplifier
3	12AT6	Tube, detector, a-f amplifier, a.v.c.
4	50B5	Tube, power output
5	35W4	Tube, rectifier
6A, 6B	925011	50-50 mfd., 150 volt electrolytic condenser (filter)
7	920030	0.05 mfd., 400 volt condenser (line bypass)
8	920050	0.2 mfd., 200 volt condenser (line isolation)
9	920020	0.02 mfd., 400 volt condenser (output plate bypass)
10	920010	0.002 mfd., 600 volt condenser (tone compensation)
11	920020	0.02 mfd., 400 volt condenser (audio coupling)
12	920240	0.0005 mfd., 600 volt condenser (audio plate bypass)
13	920010	0.002 mfd., 600 volt condenser (audio coupling)
14	920030	0.05 mfd., 400 volt condenser (phono isolation)
15	920040	0.1 mfd., 200 volt condenser (a.v.c. filter)
16	922101	0.05 mfd., 400 volt condenser (phono motor isolation)
17	910010	110 mmfd., 500 volt mica condenser (diode filter)
18	390190	Volume control and switch, 500,000 ohms.
19	397000	15 meg., ½ watt resistor (a.v.c. network)
20	351330	3.3 meg., ½ watt resistor (a.v.c. network)
21	340810	22,000 ohms, ½ watt resistor (oscillator grid)
22	340290	150 ohms, ½ watt resistor (i-f amplifier cathode)
23	397000	15 meg., ½ watt resistor (a-f grid)
24	351130	470,000 ohms, ½ watt resistor (a-f plate load)
25	351130	470,000 ohms, ½ watt resistor (output grid)
26	340290	150 ohms, ½ watt resistor (output cathode)
27	370490	1000 ohms, 1 watt resistor (filter)
28	351290	2.2 meg., ½ watt resistor (phono shunt)
29	351210	1 meg., ½ watt resistor (series phono)
30	340050	15 ohms, ½ watt resistor (rectifier ballast)
31	340010	10 ohms, ½ watt resistor (series pilot light)
32	351050	220,000 ohms, ½ watt resistor (line isolation)
33	734080	Output transformer
34	180008	Speaker, 4" x 6" oval P.M.
*35		Speaker cone, part of 180008
36	700000	Loop antenna
37	716010	Oscillator coil
38	720380	First i-f transformer
39	720019	Second i-f transformer
40	807000	Dial light
41	510391	Radio-phono switch
42	510120	Tone control switch
43	900270	2-gang variable condenser, 25-382 mmfd., 27-193 mmfd.
	507215	Pilot light socket
	583004	Line cord
	505040	Plug for phono pickup leads
	508010	Socket for phono pickup leads
	585072	Phono motor plug and cable
	819019	Record changer
	820034	Phono crystal cartridge

† Specify part numbers when ordering.

* Not supplied separately.



VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	—7 DC	0	13 AC	25 AC	97 DC	97 DC	—0.2 DC
2	12BA6	0	0	36 AC	25 AC	97 DC	97 DC	1.6 DC
3	12AT6	—0.6 DC	0	13 AC	0	—0.5 DC	0	39 DC
4	50B5	0	6 DC	87 AC	36 AC	115 DC	97 DC	0
5	35W4	117 AC	116 AC	87 AC	117 AC	111 AC	112 AC	122 DC

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	21,000	0.3	12	22	80,000	80,000	2.5 meg.
2	12BA6	18	0	33	22	80,000	80,000	140
3	12AT6	15 meg.	0	12	0	500,000	0	550,000
4	50B5	450,000	140	78	33	80,000	80,000	450,000
5	35W4	103	102	78	103	110	99	80,000

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1—Voltage readings are in volts and resistance readings in ohms unless otherwise specified.

2—D-C voltage measurements are at 200,000 ohms per volt; a-c voltages measured at 1000 ohms per volt.

3—Socket connections are shown as bottom views.

4—Measured values are from socket pin to common negative.

5—Line voltage maintained at 117 volts for voltage readings.

6—Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.

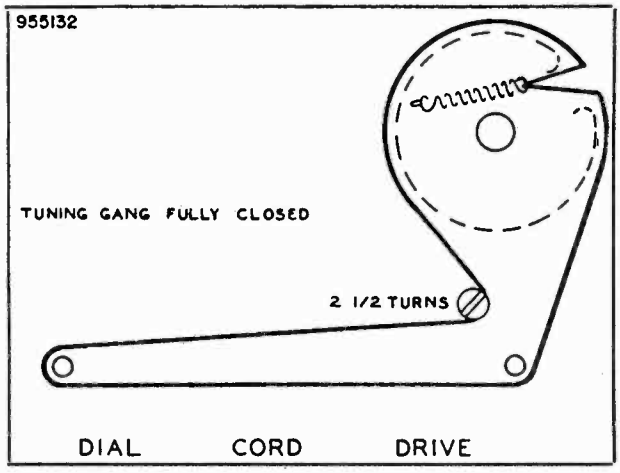
7—Volume control at maximum, no signal applied for voltage measurements.

EMERSON RADIO AND PHONO. CORP.

MODEL 547A, Chassis 120050A

GENERAL NOTES

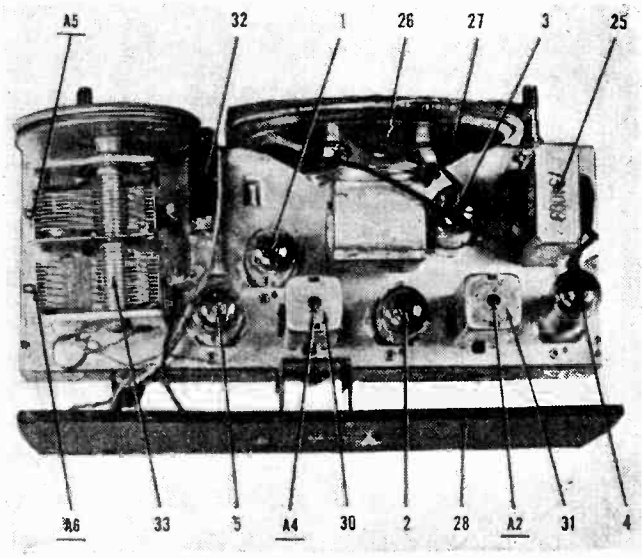
1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. All models have self-contained antennas and do not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear near the line cord. Use no ground connection.

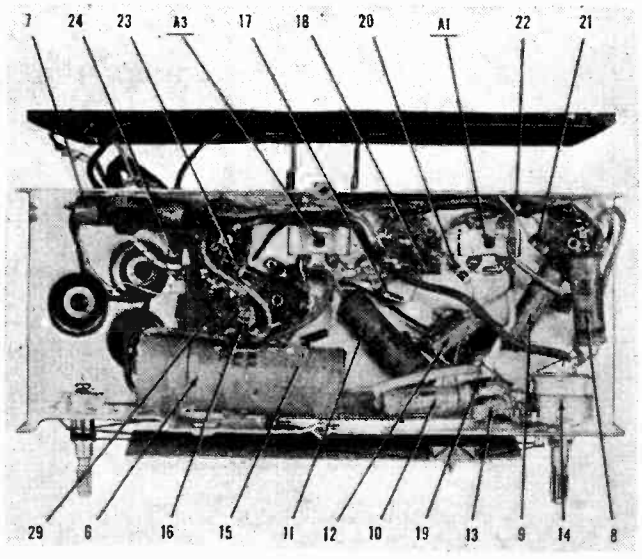


ALIGNMENT

To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and chassis. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

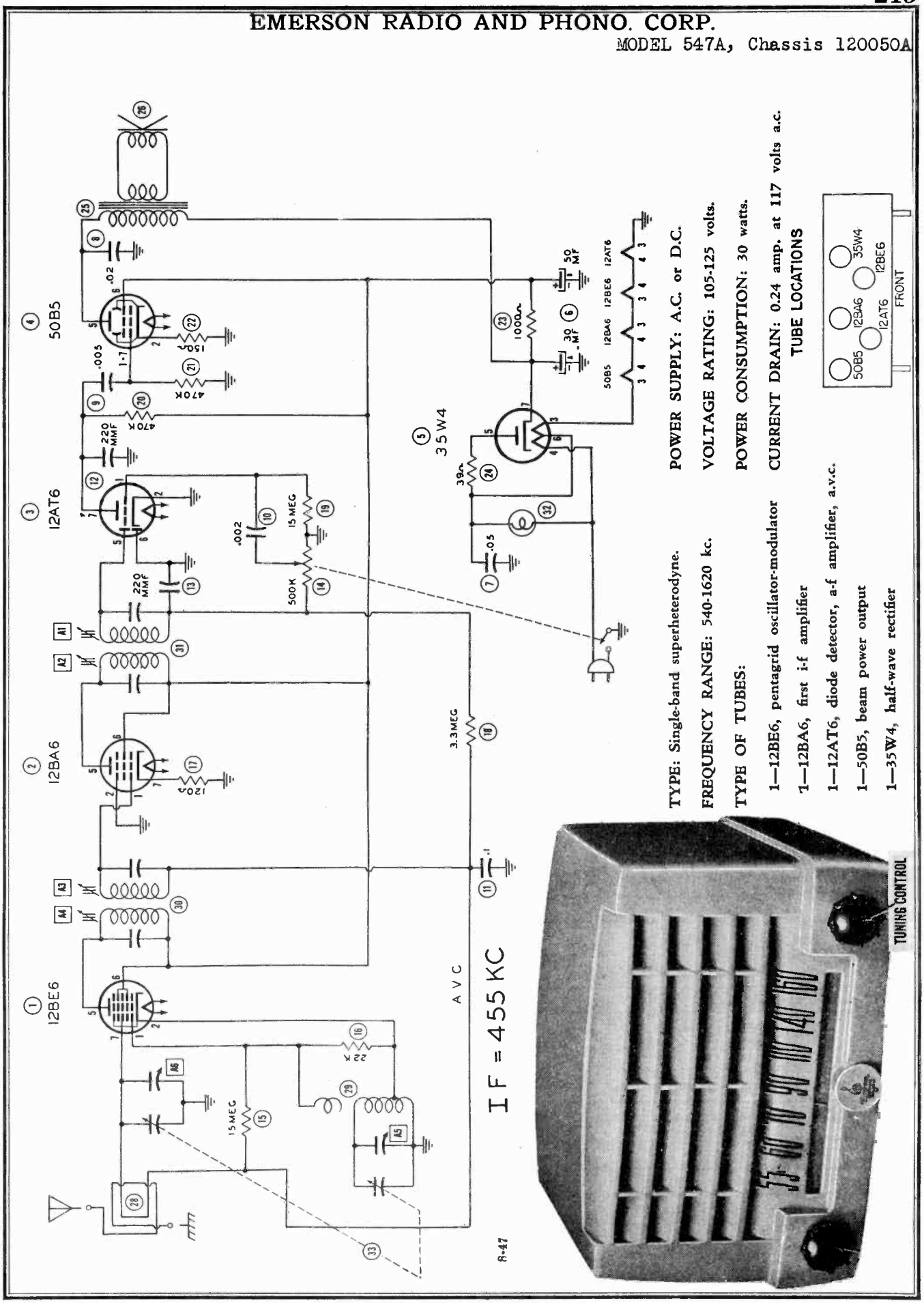
	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.1 mfd.	High side to stator of rear section of tuning condenser. Low side to chassis.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6	Adjust for maximum output.





EMERSON RADIO AND PHONO. CORP.

MODEL 547A, Chassis 120050A



TYPE: Single-band superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

1—12BE6, pentagrid oscillator-modulator

1—12BA6, first i-f amplifier

1—12AT6, diode detector, a-f amplifier, a.v.c.

1—50B5, beam power output

1—35W4, half-wave rectifier

POWER SUPPLY: A.C. or D.C.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

TUBE LOCATIONS

MODEL 547A,
Chassis 120050A

EMERSON RADIO AND PHONO. CORP.

REPLACEMENT PARTS LIST

Symbol	†Part No.	DESCRIPTION	Symbol	†Part No.	DESCRIPTION
1	12BE6	Tube, converter	17	340270	120 ohms, ½ watt resistor (i-f cathode)
2	12BA6	Tube, i-f amplifier			
3	12AT6	Tube, detector, a-f amplifier, a.v.c.	18	351330	3.3 meg., ½ watt resistor (a.v.c. network)
4	50B5	Tube, power output			
5	35W4	Tube, rectifier	19	397000	15 meg., ½ watt resistor (a-f grid)
6A, 6B	925061	30-50 mfd., 150 volt electrolytic condenser (filter)	20	351130	470,000 ohms, ½ watt resistor (a-f plate)
7	920030	0.05 mfd., 400 volt condenser (line bypass)	21	351130	470,000 ohms, ½ watt resistor (output grid)
8	920020	0.02 mfd., 400 volt condenser (output plate bypass)	22	340290	150 ohms, ½ watt resistor (output cathode)
9	920180	0.005 mfd., 400 volt condenser (audio coupling)	23	370490	1000 ohms, 1 watt resistor (filter)
			24	370150	39 ohms, 1 watt resistor (rectifier ballast)
10	920515	0.002 mfd., 400 volt condenser (audio coupling)	25	734009	Output transformer
11	920040	0.1 mfd., 200 volt condenser (a.v.c. filter)	26	180028	Speaker, 4 inch P.M. (alternate speaker 180032)
12	910000	220 mmfd., 500 volt condenser (a-f plate bypass)	*27		Speaker cone, part of 180028
			28	700006	Loop antenna
13	910000	220 mmfd., 500 volt condenser (diode filter) (200 mmfd. ceramic condenser 928011 alternate part for 12 and 13.)	29	716007	Oscillator coil
			30	720021	First i-f transformer (alternate part 720000A)
			31	720021	Second i-f transformer (alternate part 720100A)
14	390024	Volume control and switch, 500,000 ohms	32	807000	Dial light, type 47
			33	900015	Two-gang variable condenser
15	397000	15 meg., ½ watt resistor (a.v.c. network)		507003	Dial light socket
				583005	Line cord
*16		22,000 ohms, ½ watt resistor, part of 716007 (oscillator grid)			

† When ordering, state part numbers.

*Not supplied separately.

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2. D-C voltage measurements are at 20,000 ohms per volt; a-c voltage measured at 1,000 ohms per volt.
3. Socket connections are shown as bottom views.
4. Measured values are from socket pin to common negative.
5. Line voltage maintained at 117 volts for voltage readings.
6. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
7. Volume control at maximum, no signal applied for voltage measurements.

CABINET AND DIAL PARTS

140100	Cabinet, ivory
450112	Knob, brown
410124	Dial backplate, gold
525001	Dial pointer, red
280035	Drive shaft
587040	Dial cord spring

VOLTAGE READINGS

Symbol	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	*-6.7 DC	0	25 AC	12 AC	92 DC	92 DC	-0.1 DC
2	12BA6	-0.1 DC	0	25 AC	38 AC	92 DC	92 DC	0.8 DC
3	12AT6	-0.65 DC	0	0	12 AC	-0.3 DC	0	42 DC
4	50B5	0	5.7 DC	85 AC	38 AC	107 DC	92 DC	0
5	35W4	0	0	85 AC	117 AC	110 AC	112 AC	112 DC

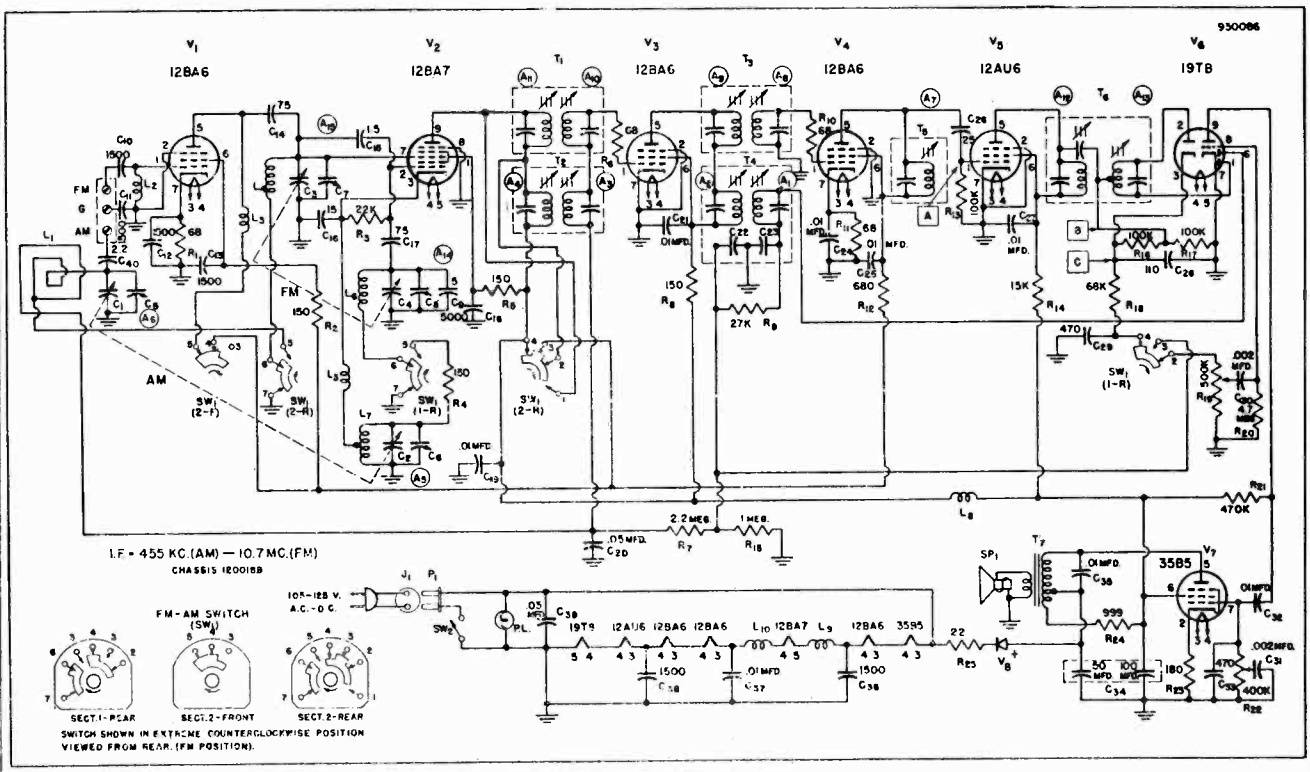
* Oscillator Grid Voltages Are Measured By Vacuum-Tube Voltmeter.

RESISTANCE READINGS

Symbol	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	24,000	0.6	26	13	700,000	700,000	3.5 meg.
2	12BA6	3.5 meg.	0	26	38	700,000	700,000	118
3	12AT6	15 meg.	0	0	13	500,000	0	1.2 meg.
4	50B5	480,000	150	90	38	700,000	700,000	480,000
5	35W4	inf.	inf.	90	120	150	118	700,000

MODELS 556, 557, 565, CHASSIS 120018B

EMERSON RADIO AND PHONO. CORP.



INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltages readings are in d.c. volts and resistance readings in ohms, unless otherwise specified.
2. D.c. voltage measurements are made at 20,000 ohms-per-volt and a.c. voltages are measured at 1000 ohms-per-volt.
3. Socket connections are shown as bottom views. Values are measured from socket pin to common negative.
4. Line voltage maintained at 117 volts a.c. for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in readings.
6. Volume control at maximum, with no signal applied and bandswitch in broadcast position (unless otherwise noted), for voltage measurements.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V1	12BA6	0	0	80AC	67AC	76*	78*	.8*	—	—
V2	12BA7	100	-.5	0	67AC	55AC	0	-.5	0	95
V3	12BA6	-.2	0	55AC	43AC	93	98	0	—	—
V4	12BA6	0	0	43AC	30AC	70*	70*	.6*	—	—
V5	12AU6	-.4	0	30AC	18AC	50	50	0	—	—
V6	19T8	-.5	-.4	5.5*	18AC	0	-.8	0	-.5	33
V7	35B5	0	6	117AC	80AC	132	100	NC	—	—

NC denotes "no connection"; * for bandswitch in FM position only.

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V1	12BA6	0	0	16	12	65K*	65K*	66	—	—
V2	12BA7	65K	24K	1	56	75	0	0	0	65K
V3	12BA6	2.8 meg.	0	56	44	65K	65K	0	—	—
V4	12BA6	68	0	44	32	65K	65K	68	—	—
V5	12AU6	100K	0	32	20	65K	65K	0	—	—
V6	19T8	90K	90K	150K	20	0	1 meg.	0	4 meg.	550K
V7	35B5	400K	190	112	80	65K	65K	NC	—	—

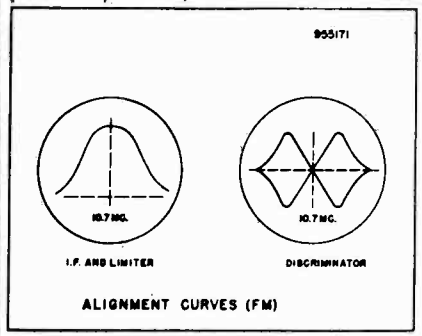
K—Kilohms; meg.—megohms.

REPLACEMENT PARTS LIST

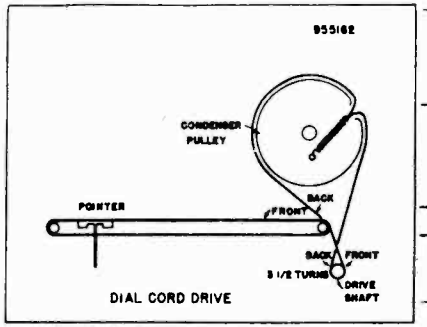
Symbol	†Part No.	DESCRIPTION	Symbol	†Part No.	DESCRIPTION
V1	12BA6	FM r-f amplifier	R12	340450	680 ohms, ½ watt resistor
V2	12BA7	FM and AM converter	R13, R16, R17	340970	100 kilohms, ½ watt resistor
V3	12BA6	FM and AM 1st i-f amplifier	R14	350770	15 kilohms, ½ watt resistor
V4	12BA6	FM 2nd i-f amplifier	R15	351210	1 megohm, ½ watt resistor
V5	12AU6	FM limiter	R18	350930	68 kilohms, ½ watt resistor
V6	19T8	FM disc., AM det., a.v.c., audio amp.	R19	390057	500 kilohms, volume control
V7	35B5	Power output	R20	351370	4.7 megohms, ½ watt resistor
V8	817101	Selenium rectifier	R21	351130	470 kilohms, ½ watt resistor
C1, C2, C3, C4	900045	Two-gang, four section, variable condenser (alt. part. 900400 A).	R22	390046	400 kilohms, tone control
C5, C6, C7, C8	*	Trimmers, part of C1-C2-C3-C4	R23	370110	180 ohms, 1 watt resistor
C9	928017	5 mmf., ceramic condenser	R24	394042	999 ohms, 3 watt wire wound
C10, C11, C12, C13, C36, C38	928006	1500 mmf., ceramic condenser	R25	380090	22 ohms, 1 watt resistor
C14, C17	928015	75 mmf., ceramic condenser	L1	700011	AM loop antenna (alternate part 700021) #
C15	915011	1.5 mmf., molded condenser	L2	710019	FM antenna coil
C16	928016	15 mmf., ceramic condenser	L3, L5, L9, L10	705002	FM oscillator choke
C18	928109	5000 mmf., ceramic condenser	L4	713024	FM r-f coil
C19, C21, C24, C25, C27	920092	.01 mfd., 200 volt paper condenser	L6	716013	FM oscillator coil
C20, C39	920030	.05 mfd., 400 volt paper condenser	L7	716015	AM oscillator coil
C22, C23	*	Part of T4 (2nd i-f, AM)	L8	705013	R-f choke
C26	928110	25 mmf., ceramic condenser	T1	720024	First i-f trans. (FM). (Alt. parts 720082, 720067) #
C28	910010	110 mmf., mica condenser	T2	720031	First i-f trans. (AM). (Alt. parts 720084, 720075) #
C29, C33	910014	470 mmf., mica condenser	T3	720025	Second i-f trans. (FM). (Alt. parts 720082, 720067) #
C30, C31	920515	.002 mfd., volt paper condenser	T4	720032	Second i-f trans. (AM). (Alt. parts 720085, 720076) #
C32, C35, C37	920090	.01 mfd., 400 volt paper condenser	T5	720069	Third i-f trans. (FM). (Alt. parts 720083, 720077) #
C34	925126	100-50 mfd., 150 volt elect. cond.	T6	708005	Disc. trans. FM). (Alt. parts 708012, 708013) #
C40	*	2.2 mmf., part of loop antenna L1	T7	734041	Output transformer
R1, R6, R10, R11	340210	68 ohms, ½ watt resistor	SW1	510037	Band switch, AM-FM
R2, R4, R5, R8	350290	150 ohms, ½ watt resistor	SW2	*	Line switch, part of vol. control
R3	340810	22 kilohms, ½ watt resistor	SP1	180031P	P.m. speaker, (6" oval)
R7	351290	2.2 megohms, ½ watt resistor	P1	505007	Line cord connector plug
R9	340830	27 kilohms, ½ watt resistor (may be part of T4)	J1	500005	Line cord interlock socket
				583202	Line cord and internal ant.

CABINET AND DIAL PARTS

†Part No.	DESCRIPTION	†Part No.	DESCRIPTION
140113	Cabinet, maroon plastic (Models 556, 557)	520071	Dial crystal
560041	Cabinet back (Models 556, 557)	410177	Dial backplate
140125	Cabinet, wood (Model 565)	280039	Dial drive shaft
560052	Cabinet back (Model 565)	530002	Dial drive cord (44")
460470	Knob, black	587070	Dial cord spring
		525017	Pointer
		410303	Speaker grille (Model 556)



ALIGNMENT CURVES (FM)



DIAL CORD DRIVE

ALIGNMENT INSTRUCTIONS

1. To position pointer, turn variable condenser fully closed and set pointer to reference mark on dial backplate at the low frequency end of the dial.
2. Volume control should be set at maximum position. The output of the signal generator should be no higher than necessary to obtain an output reading. Attenuate the signal input as alignment proceeds. Use an insulated alignment tool for all adjustments.
3. Use isolation transformer if available; otherwise connect a .1 mfd. condenser in series with low side of signal generator to chassis.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 mfd.	High side to Pin 7 (grid) of 12BA7. Low side to chassis.	455 KC.	Broadcast	Tuning condenser fully open.	Across voice coil.	A1, A2, (Trans. T4); A3, A4, (Trans. T2).	Adjust for maximum output. Reduce dummy antenna to .001 mfd. if isolation trans. is not used.
2		Loop	1600 KC.	Broadcast	Tuning condenser fully open.	Across voice coil.	A5, (Trimmer cond. C6).	Form loop of several turns of wire. Radiate signal into receiver loop. Adjust for maximum output.
3		Loop	1400 KC.	Broadcast	Tune for max. output.	Across voice coil.	A6, (Trimmer cond. C8).	Adjust for maximum output.

FM I-F and Disc. Alignment Using AM Signal Generator and VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1	.01 mfd.	High side to Pin 1 (grid) of 12BA6 2nd I-F (V4). Low side to chassis.	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "A". Common to chassis.	A7, (Trans. T5).	Adjust for maximum output.
2	.01 mfd.	High side to Pin 1 (grid) of 12BA6 1st I-F (V3). Low side to chassis.	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "A". Common to chassis.	A8, A9, (Trans. T3).	Adjust for maximum output.
3	.01 mfd.	High side to Pin 2 (osc. grid) of 12BA7 conv. (V2). Low side to chassis.	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "A". Common to chassis.	A10, A11, (Trans. T1).	Adjust for maximum output.
4	.01 mfd.	High side to Pin 1 (grid) of 12BA6 2nd I-F (V4). Low side to chassis.	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "B". Common to chassis.	A12, (Trans. T6).	Adjust for maximum output.
5	.01 mfd.	"	10.7 mc. (Unmodulated)	Frequency modulation	Tuning condenser fully open.	Connect d.c. probe to point "C". Common to chassis.	A13, (Trans. T6).	Adjust for zero output. Continue with FM r-f alignment.

FM I-F AND DISC. ALIGNMENT USING SWEEP SIGNAL GENERATOR AND OSCILLOSCOPE. Use frequency modulated signal, with 60 cycle modulation and 450 kc sweep. Use 120 cycle sawtooth sweep voltage in oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RADIO DIAL SETTING	CONNECT OSCILLOSCOPE	ADJUST	REMARKS
1	.01 mfd.	High side to Pin 1 (grid) of 12BA6 1st I-F (V3). Low side to chassis.	10.7 mc. (Unmodulated).	Frequency modulation	Tuning condenser fully open.	Vertical input to Point "A". Ground to chassis.	A7, A8, A9, (Trans. T5 and T3).	Adjust for maximum output (height) and symmetry as per I-F alignment curve shown (page 3).
2	.01 mfd.	High side to Pin 2 (osc. grid) of 12BA7 conv. (V2). Low side to chassis.	10.7 mc. (Unmodulated).	Frequency modulation	Tuning condenser fully open.	Vertical input to Point "A". Ground to chassis.	A10, A11, (Trans. T1).	Adjust for maximum output (height) and symmetry as per I-F alignment curve shown (page 3).
3	.01 mfd.	High side to Pin 1 (grid) of 12BA6 2nd I-F (V4). Low side to chassis.	10.7 mc. (Unmodulated).	Frequency modulation	Tuning condenser fully open.	Vertical input to Point "C". Ground to chassis.	A12, A13, (Trans. T6).	Alternately adjust A12 for maximum amplitude and A13 for maximum straightness of cross-over lines, with cross-over occurring at center of pattern as per discriminator alignment curve (page 3). Continue with FM r-f alignment.

FM R-F ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1	150 ohm resistor in series with each gen. lead.	High side to FM ant. term. Low side to chassis.	108.0 mc. (Unmodulated).	Frequency modulation	Tuning condenser fully open (108.0 mc.)	Connect d.c. probe to point "A". Common to chassis.	A14 (Trimmer cond. C8).	Adjust for maximum output.
2	"	"	106.0 mc.	Frequency modulation	Tune for maximum output.	"	A15 (Trimmer cond. C7).	Adjust for maximum output.

VOLTAGE ANALYSIS

The following voltage readings are d-c measurements taken from B— (chassis) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (*), which should be taken with a d-c vacuum-tube voltmeter. Take readings with the volume control set at minimum and the variable condenser closed. Use fresh batteries.

	PIN NUMBER						
TUBE	1	2	3	4	5	6	7
1R5		60	35	*-8		*-0.2	1.5
1T4		60	35			*-0.2	1.5
1S5			*-0.2	*17	*25	*-0.1	1.5
3S4	1.5	59	*-6.5	60		59	1.5

BATTERY REPLACEMENT

1. Slide the button on the release catch near the handle in the direction of the arrow. This loosens the bottom shell and permits it to be swung open on the hinge, making the batteries accessible.
2. Insert the batteries as shown in the above diagram.
3. To reassemble, hold the chassis face down with the batteries in place. Close the bottom shell over the chassis and press the handle end of the shell so that it snaps into place.

ADJUSTMENTS

An oscillator with frequencies of 455, 600, 1420, and 1620 kc is required.

An output meter should be connected across the primary or secondary of the output transformer for observing maximum response.

Always use as weak a test signal as possible, turning down the output of the test oscillator as the alignment of the receiver progresses.

Turn the volume control on full.

Location of Coils and Trimmer Adjustments

The first i-f transformer is located next to the 1R5 tube. The trimmers are accessible through holes in the top of the can.

The second i-f transformer is located between the 1T4 and 1S5 tubes. The single trimming core screw extends from the end of the can. Trimmers are accessible through holes in the top of the can.

The oscillator coil is located behind the on-off switch. The trimmer for the oscillator is located on the smaller variable condenser section. The 600 kc oscillator core adjustment is the brass screw protruding from the end of the oscillator coil.

The loop antenna acts as the antenna coil. The trimmer for the loop is located on the larger section of the variable condenser.

I-f Alignment

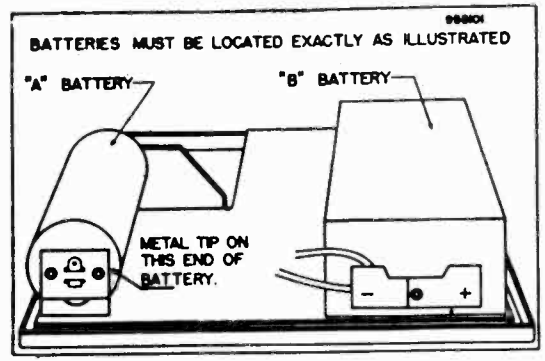
1. Rotate the variable condenser to the minimum capacity position.
2. Feed 455 kc to the grid (pin 6) of the 1R5 tube through a 0.01 mfd. condenser.
3. Adjust the four i-f trimmer screws for maximum response. (Clip the test signal lead to the stator of the larger capacity section of the variable condenser.)

R-f Alignment

1. Connect the test oscillator to a coil composed of three or four turns of wire wound in a circle approximately 12 inches in diameter. This coil should be placed parallel to and in line with the receiver loop at a distance of approximately 15 to 20 inches.
2. Radiate a signal at 1620 kc, rotate the variable condenser to minimum capacity, and adjust the oscillator trimmer, on the smaller section of the variable condenser, for maximum response.
3. Radiate a signal at 1420 kc, tune in the 1420 kc signal, and adjust the antenna trimmer, on the larger section of the variable condenser, for maximum response.
4. Radiate a signal at 600 kc, set the dial indicator to 60, and adjust the oscillator coil core trimmer while rocking the variable condenser for maximum response.
5. Return to 1620 kc and check alignment. If readjustment is necessary, repeat Steps 2 to 4 until no further improvement is noted.

CABINET AND DIAL PARTS

460029	Plastic bottom shell, black
460039	Plastic bottom shell, ivory
460069	Plastic bottom shell, green
460028	Plastic lid, black
460038	Plastic lid, ivory
460068	Plastic lid, green
630058	Plastic loop cover, black
410140	Metal front
460031	Knob, black
460037	Knob, ivory
460061	Knob, green
541170	Knob retaining clip
460009	Handle, extruded plastic
410519	Handle ring
410969	Release catch, male
410959	Release catch, female
411055	Reinforcing plate, cover release catch
540460	Rivet, male catch, cover to metal front
540160	Rivet, female catch, cover to metal front
540160	Rivet, male catch, shell to metal front
540360	Rivet, female catch, shell to metal front
410143	Lid hinge, spring loaded
410144	Lid hinge stop
540370	Rivet, lid hinge to lid
540160	Rivet, lid hinge to metal front
540470	Rivet, lid hinge to hinge stop
470259	Hinge assembly, shell to metal front
540160	Rivet, hinge to metal front
540370	Rivet, hinge to shell
520038	Dial crystal
520041	Dial backplate
525016	Dial pointer
280038	Drive shaft
587326	Dial drive spring

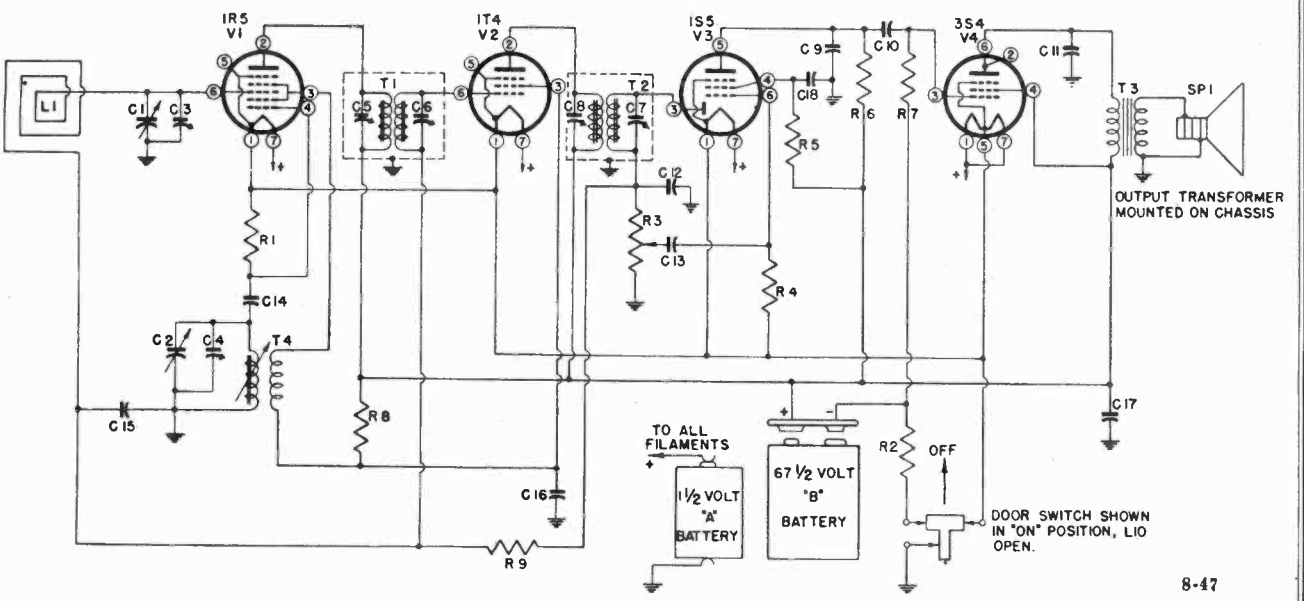


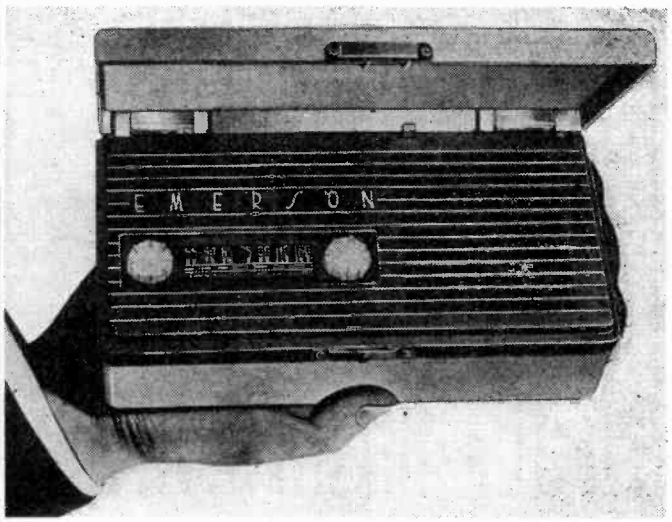
GENERAL NOTES

1. If replacements are made in the r-f section of the circuit, the receiver should be carefully realigned.
2. The receiver has a self-contained antenna and does not require additional antennas or ground connections.
3. The self-contained loop antenna has directional properties. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.
4. The receiver is turned on when the lid is open and turned off when the lid is closed. Always close the lid when the set is not in use.
5. Remove batteries as soon as they are exhausted. The "A" battery will require more frequent replacement than the "B" battery.
6. Replace the 1.5 volt "A" battery with a standard D-size flashlight cell (1—5/16" dia.). Replace the 67.5 volt "B" battery with Eveready Minimax No. 467 or equivalent.

EMERSON RADIO AND PHONO. CORP.

MODEL 558, Chassis 120058





DESCRIPTION

TYPE: Pocket portable (battery operated) superheterodyne.

FREQUENCY RANGE: 540-1600 kc.

TYPE OF TUBES:
- 1—1R5, oscillator-modulator
- 1—1T4, i-f amplifier
- 1—1S5, 2nd detector, a.v.c, a-f amplifier
- 1—3S4, pentode output

POWER SUPPLY: "A" and "B" batteries.

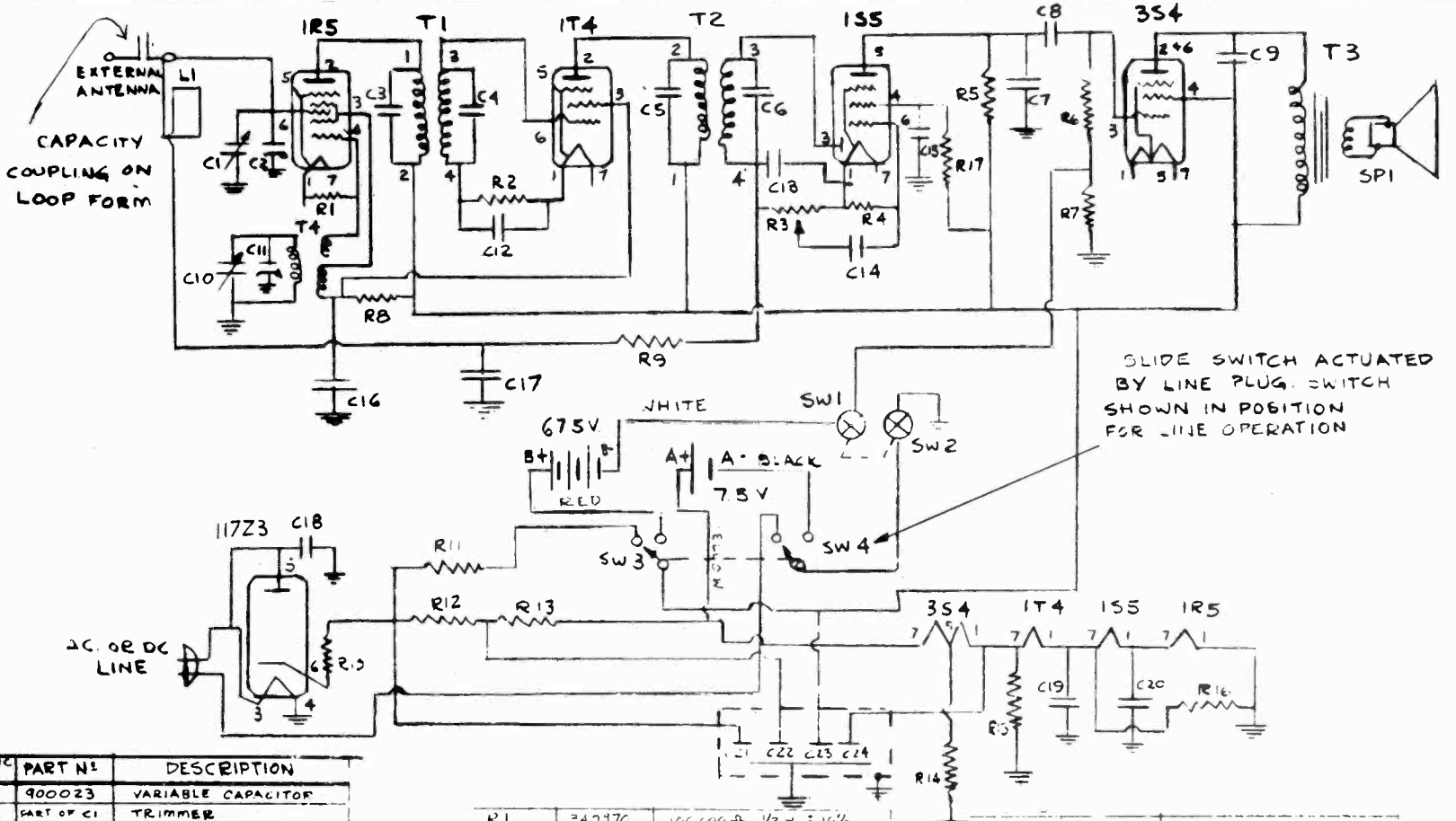
VOLTAGE RATING:
- "A" Battery—1.5 volts
- "B" Battery—67.5 volts

CURRENT DRAIN:
- "A" Battery—0.25 amp.
- "B" Battery—0.0075 amp.

REPLACEMENT PARTS LIST

Schematic Symbol	†Part No.	DESCRIPTION	Schematic Symbol	†Part No.	DESCRIPTION
C1, C2	900022	Two-gang variable condenser	R2	340470	820 ohms, ½ watt resistor
*C3, C4		Trimmers, part of variable condenser	R3	390025	1 meg., volume control
*C5, C6		Trimmers, part of first i-f transformer	R4	351450	10 meg., ½ watt resistor
			R5, R9	351330	3.3 meg., ½ watt resistor
*C7, C8		Trimmers, part of second i-f transformer	R6	351130	470,000 ohms, ½ watt resistor
			R7	351250	1.5 meg., ½ watt resistor
C9, C14	928013	100 mmfd., ceramic condenser	R8	340730	10,000 ohms, ½ watt resistor
C10, C13	920495	0.001 mfd., 200 volt condenser	SP1	180029	Speaker, 3-inch P.M.
C11	920496	0.005 mfd., 200 volt condenser	T1	720028	First i-f transformer, or
C12	928104	212 mmfd., ceramic condenser	T1	720034	First i-f transformer
C15	920494	0.05 mfd., 200 volt condenser	T2	720028	Second i-f transformer, or
C16	920120	0.02 mfd., 100 volt condenser	T2	720035	Second i-f transformer
C17	925063	16 mfd., 100 volt electrolytic condenser	T3	734011	Output transformer
			T4	716011	Oscillator coil
C18	920485	0.01 mfd., 100 volt condenser		510040	On-off lid switch
L1	700008	Loop antenna		540260	Rivet, lid switch
R1	350970	100,000 ohms, ½ watt resistor		585007	"B" battery cable

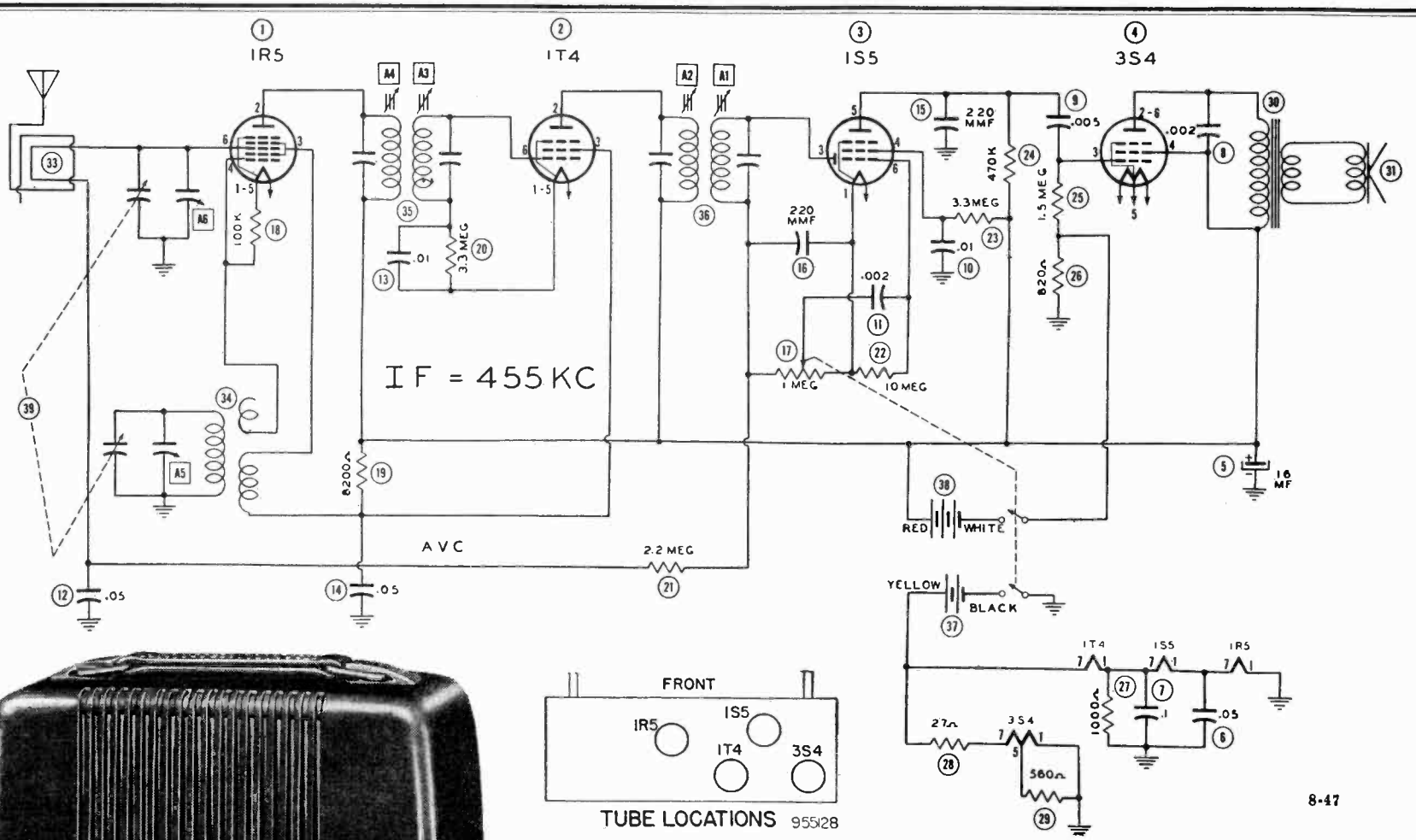
† Specify part numbers when ordering. * Not supplied separately.

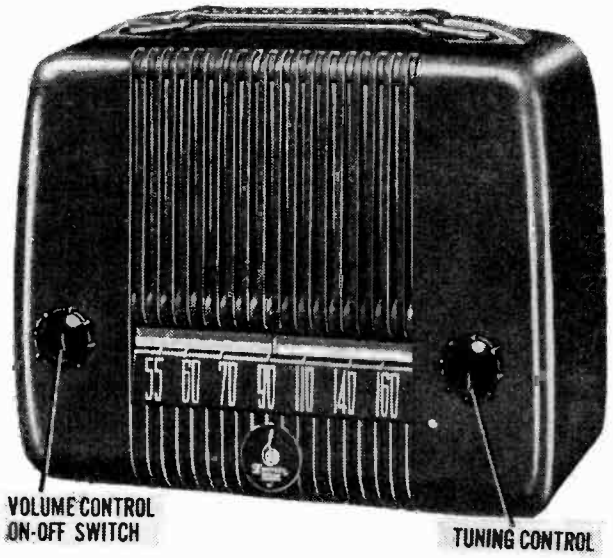


SCHEMATIC SYMBOL	PART Nº	DESCRIPTION
C1, C10	900023	VARIABLE CAPACITOR
C2	PART OF C1	TRIMMER
C3, C4	PART OF T1	CAPACITOR
C5, C6	PART OF T2	CAPACITOR
C7, C13	910000	220 MMF ± 20% MICA
C7, C13	928011	220 MMF 300V ± 20% CERAMIC
C8	920180	.005 MFD 400V
C9, C14	920515	.002 MFD 400V.
C11	PART OF C10	TRIMMER
C12, C15	920092	.01 MFD 200V
C16, C17, C20	920060	.05 MFD 200V
C18	922102	.05 MFD. 400V.
C19	920040	.1 MFD 200V.
C21	925059	40 MFD. 150 V. +100% -10%
C22		30 MFD 150 V. +100% -10%
C23		40 MFD 150 V. +100% -10%
C24		100 MFD 25 V. +250% -10%
L1	700009	LOOP ANTENNA

R1	340970	100,000 Ω 1/2 W ± 10%
R2, R17	351330	3.3 MEG Ω 1/2W ± 20%
R3	310026	VOLUME CONTROL
R4	351450	10 MEG Ω 1/2W ± 20%
R5	351130	470,000 Ω 1/2W ± 20%
R6	351250	1.5 MEG Ω 1/2W ± 20%
R7	342330	220 Ω 1/2 W ± 10%
R8	346710	8200 Ω 1/2W ± 10%
R9	351290	2.2 MEG Ω 1/2W ± 20%
R10	370170	47 Ω 1W ± 10%
R11	340610	3300 Ω 1/2 W ± 10%
R12, R13	394008	2200 Ω 8W ± 5%
R14, R15, R16	340490	1000 Ω 1/2W ± 10%
SP1 or	180030	SPEAKER
SP1	180034	SPEAKER
SW1, SW2	PART OF R3	D.P.S.T. SWITCH
SW3, SW4	510008	D.P.D.T. SLIDE SWITCH

T1	720525	FIRST I.F. TRANSFORMER
T2	720525	SECOND I.F. TRANSFORMER
T3	734013	OUTPUT TRANSFORMER
T4	716017	OSCILLATOR COIL
	140117	CABINET - ALLIGATOR
	140118	CABINET BACK - ALLIGATOR
	595009	BLACK HANDLE WITH RINGS
	450115	KNOB - BLACK
	585009	'B' BATTERY CABLE
	580038	PIN TERMINAL LEAD - AVC
	580039	PIN TERMINAL LEAD - GRID
	583012P	LINE CORD
	280037	DRIVE SHAFT
	530002	DRIVE CORD
	587040	SPRING - DRIVE CORD
	410124	DIAL BACK PLATE
	525019	DIAL POINTER - RED





TUBE LOCATIONS 95528

TYPE: Battery operated portable superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:
1—1R5, converter
1—1T4, i-f amplifier
1—1S5, detector, a-f amplifier, a.v.c.
1—3S4 or 3Q4, power output

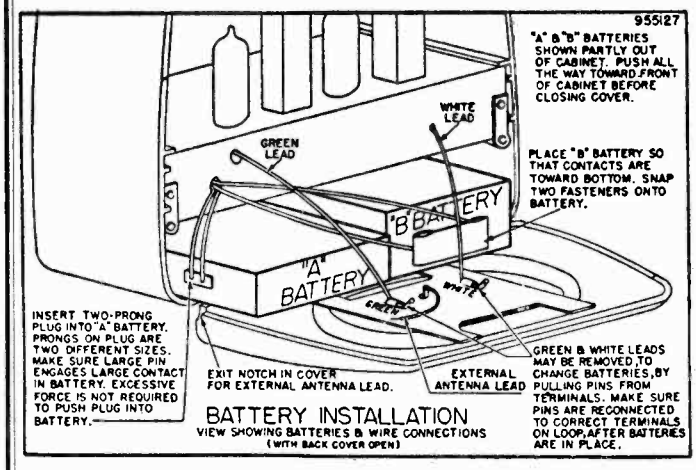
POWER SUPPLY: "A" and "B" batteries.

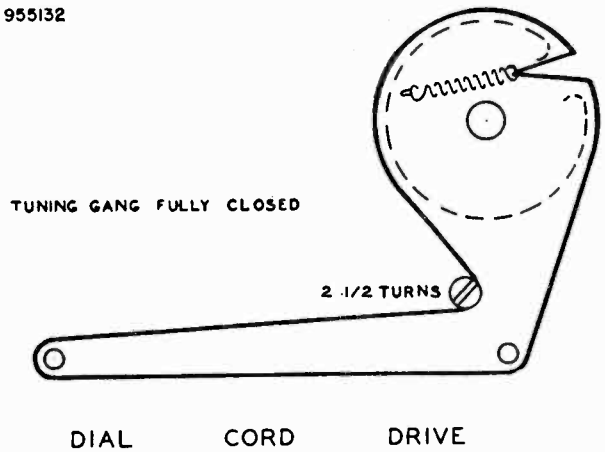
VOLTAGE RATING:
"A" Battery—4.5 volts
"B" Battery—67.5 volts

CURRENT DRAIN:
"A" Battery—104 ma.
"B" Battery—7.5 ma.

EMERSON RADIO AND PHONO. CORP.

MODEL 560, Chassis 120016

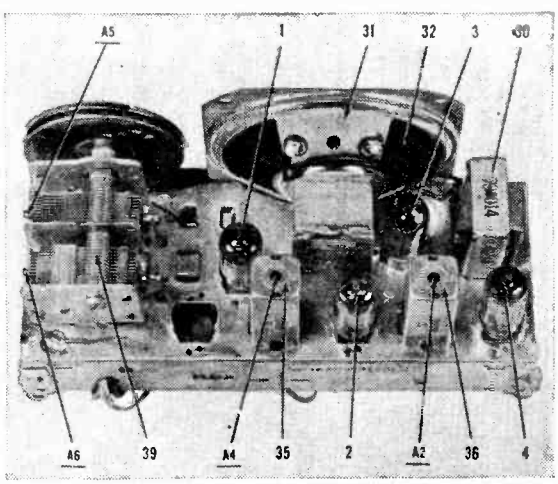


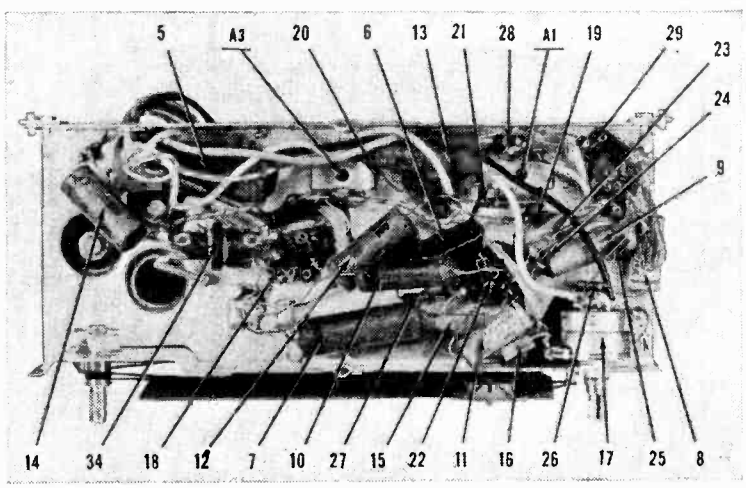


ALIGNMENT

To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate. Connect a 100,000 ohm resistor across the loop leads during Steps 1 and 2. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 mfd.	High side to rear stator of variable condenser. Low side to chassis.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2	0.1 mfd.	High side to rear stator of variable condenser. Low side to chassis.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3		Loop	1400 kc	Tune for maximum output.	Across voice coil.	A6	Disconnect 100,000 ohm resistor from loop leads. Connect loop leads to loop. Hold chassis in same relative position to loop as when chassis is mounted and rear door is closed. Radiate signal into loop. Adjust A6 for maximum output.





REPLACEMENT PARTS LIST

Symbol	† Part No.	DESCRIPTION
1	1R5	Tube, converter
2	1T4	Tube, i-f amplifier
3	1S5	Tube, detector, a-f amplifier, a.v.c.
4	3S4 or 3Q4	Tube, power output
5	925066	16 mfd., 100 volt electrolytic condenser (power supply bypass)
6	920060	0.05 mfd., 200 volt condenser (filament bypass)
7	920040	0.1 mfd., 200 volt condenser (filament bypass)
8	920515	0.002 mfd., 400 volt condenser (output plate bypass)
9	920180	0.005 mfd., 400 volt condenser (audio coupling)
10	920092	0.01 mfd., 400 volt condenser (a-f screen bypass)
11	920515	0.002 mfd., 400 volt condenser (audio coupling)
12	920060	0.05 mfd., 200 volt condenser (a.v.c. filter)
13	920092	0.01 mfd., 400 volt condenser (i-f grid filter)
14	920060	0.05 mfd., 200 volt condenser (decoupling filter)
15	910000	220 mmfd., 500 volt condenser (a-f plate bypass)
16	910000	220 mmfd., 500 volt condenser (diode filter) (Ceramic condenser 928011 alternate part for 15 and 16.)
17	390026	Volume control and switch, 1 meg.
18	340970	100,000 ohms, ½ watt resistor (oscillator grid)
19	340710	8200 ohms, ½ watt resistor (decoupling)
20	351330	3.3 meg., ½ watt resistor (i-f grid)
21	351290	2.2 meg., ½ watt resistor (a.v.c. network)
22	351450	10 meg., ½ watt resistor (a-f grid)
23	351330	3.3 meg., ½ watt resistor (a-f screen)
24	351130	470,000 ohms, ½ watt resistor (a-f plate)
25	351250	1.5 meg., ½ watt resistor (output grid)
26	340470	820 ohms, ½ watt resistor (bias), used with 3S4 output, or
26	340370	330 ohms, ½ watt resistor (bias); used with 3Q4 output
27	340490	1000 ohms, ½ watt resistor (filament network)
28	340110	27 ohms, ½ watt resistor (filament network)
29	340430	560 ohms, ½ watt resistor (filament network)
30	734014	Output transformer
31	180030	Speaker, 4-inch P.M.
*32		Speaker cone, part of 180030
33	700009	Loop antenna
34	716017	Oscillator coil
35	720525	First i-f transformer
36	720525	Second i-f transformer
37		"A" battery, 4.5 volts, Eveready 746 or equivalent
38		"B" battery, 67.5 volts, Eveready 467 or equivalent
39	900023	2-gang variable condenser
	585011	"B" battery cable
	585008	"A" battery cable
	580038	Pin terminal lead, a.v.c.
	580039	Pin terminal lead, grid

† Specify part numbers when ordering. * Not supplied separately.

CABINET AND DIAL PARTS

140110	Cabinet, maroon
140111	Cabinet back
595003	Handle, with rings, black
450115	Knob, black
280037	Tuning drive shaft
530002	Drive cord
587040	Drive cord spring
410124	Dial backplate, gold
525001	Dial pointer, red

GENERAL NOTES

1. If replacements are made in the r-f section of the circuit, the receiver should be carefully realigned.
2. The receiver has a self-contained antenna and normally does not require additional antenna or ground connection. For permanent home installations, however, in a location far removed from broadcasting stations, an additional outside antenna may be used. The outside antenna connection should be made to the colored lead at the rear of the cabinet. Use no ground connection.
3. The self-contained loop antenna has directional properties. It is important, therefore, once the station is tuned in, that the cabinet be rotated on its base back and forth through a quarter of a circle (90 degrees), and left at the position where the station is received with maximum volume.
4. Battery complement: Replace 4.5 volt "A" battery with Eveready No. 745 or equivalent. Replace 67.5 volt "B" battery with Eveready Minimax No. 467 or equivalent. Refer to battery installation diagram.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1R5	0	57	44	*5.2	0	0	1.45
2	1T4	2.8	57	44	0	2.8	0	4.4
3	1S5	1.45	0	0	12	27	0	2.8
4	3S4(or3Q4)	0	55	-1.3	57	1.5	55	3

* Oscillator Grid Voltages Are Measured By Vacuum-Tube Voltmeter.

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1R5	0	120,000	130,000	100,000	0	3.5 meg.	*
2	1T4	*	120,000	130,000	3.5 meg.	*	3.5 meg.	*
3	1S5	*	inf.	1.1 meg.	3.4 meg.	600,000	10 meg.	*
4	3S4(or3Q4)	0	120,000	1.5 meg.	120,000	*	120,000	*

* Do Not Use Ohmmeter To Measure Filament Resistances.

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1—Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2—Voltage measurements are d-c at 20,000 ohms per volt.
3—Socket connections are shown as bottom views.
4—Measured values are from socket pin to common negative.
5—Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6—Volume control at maximum, no signal applied for voltage measurements.

DESCRIPTION

TYPE: Single band (AM) superheterodyne

FREQUENCY RANGE: 540-1620 KC.

TYPES OF TUBES:

1—12SG7 converter
1—6SS7 oscillator
1—6SS7 i-f amplifier
1—12AT6 detector, a.v.c., a-f amplifier
1—50L6GT power output
1—35Z5GT rectifier

POWER SUPPLY: A.c. or d.c.

VOLTAGE RATING: 105-125 volts

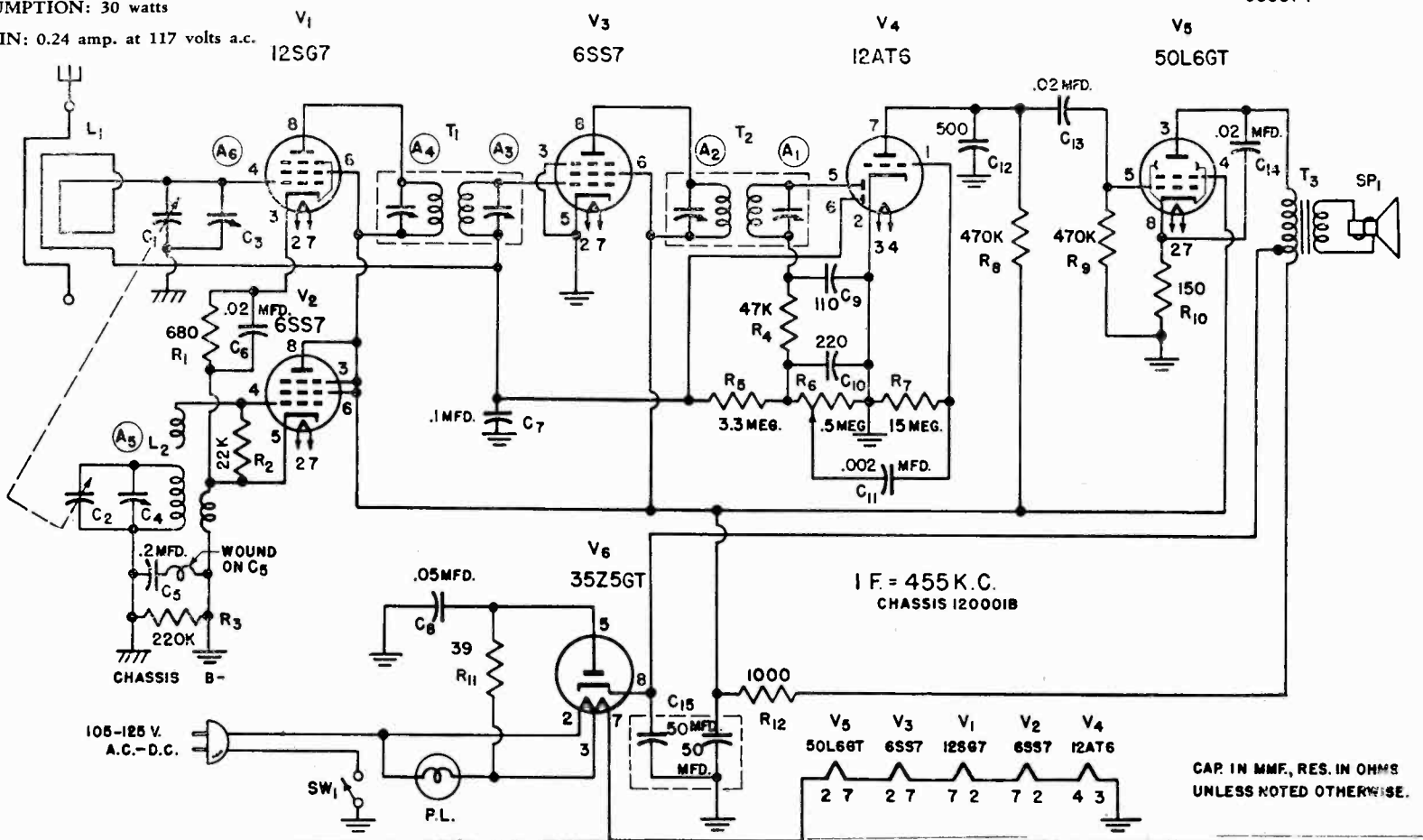
POWER CONSUMPTION: 30 watts

CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In aperating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. The receiver has a self-contained antenna, and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear near the line cord. Use no ground connection.
4. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is receiver with maximum volume.

950074



MODEL 561-615, CHASSIS 120001B

EMERSON RADIO AND PHONO. CORP.

INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltage readings are in d.c. volts and resistance readings in ohms unless otherwise specified.
2. D.c. voltage measurements are at 20,000 ohms-per-volt; a.c. voltages measured at 1,000 ohms-per-volt.
3. Socket connections are shown as bottom views.
4. Measured values are from socket pin to common negative (B—).
5. Line voltage maintained at 117 volts for voltage readings.
6. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
7. Volume control at maximum with no signal applied, for voltage measurements.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
V1	12SG7	0	18 AC	1.2	-.5	NC	86	30 AC	82
V2	6SS7	0	12 AC	88	3	0	86	18 AC	86
V3	6SS7	0	36 AC	0	-.5	0	86	30 AC	86
V4	12AT6	-.7	0	0	12 AC	-.5	-.5	45	—
V5	50L6GT	NC	86 AC	105	86	0	NC	36 AC	5.5
V6	35Z5GT	NC	117 AC	112 AC	112	110 AC	NC	86 AC	112

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
V1	12SG7	250 K	22	70	3.5 meg.	NC	150 K	33	150 K
V2	6SS7	250 K	15	150 K	22 K	0	150 K	22	150 K
V3	6SS7	250 K	40	0	3.5 meg.	0	150 K	33	150 K
V4	12AT6	10 meg.	0	0	16	480 K	3.5 meg.	600 K	—
V5	50L6GT	Inf.	90	150 K	150 K	420 K	Inf.	40	160
V6	35Z5GT	Inf.	120	118	150 K	160	NC	90	150 K

NC = no connection; K = kilohm; meg. = megohm; Inf. = infinity

ALIGNMENT PROCEDURE

1. To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate.
2. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and chassis.
3. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading.
4. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 4 (grid) of 12SG7 (V1). Low side to chassis.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2 (2nd i-f trans. T2) A3, A4 (1st i-f trans. T1)	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to chassis.	1620 kc	Variable condenser fully open.	Across voice coil.	A5 (Trimmer cond. C4).	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to chassis.	1400 kc	Tune for maximum output.	Across voice coil.	A6 (Trimmer cond. C3).	Adjust for maximum output.

REPLACEMENT PARTS LIST

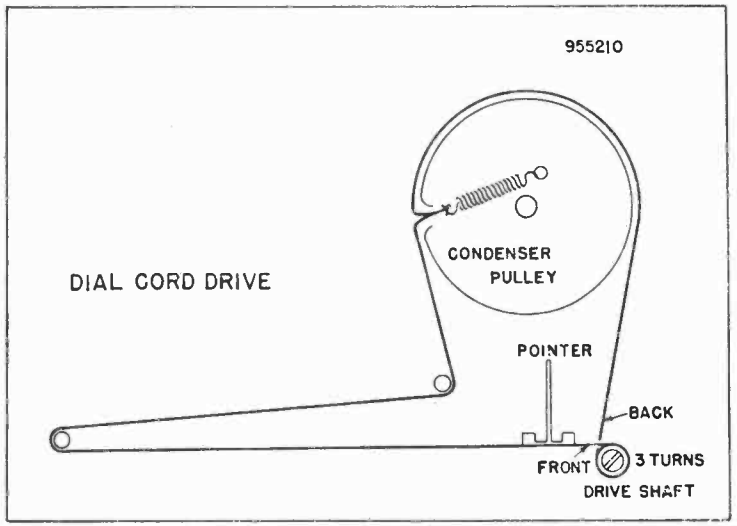
Symbol	†Patr No.	DESCRIPTION	Symbol	†Patr No.	DESCRIPTION
V1	12SG7	Converter	R2	340810	22 kilohms, ½ watt resistor
V2	6SS7	Oscillator	R3	351050	220 kilohms, ½ watt resistor
V3	6SS7	I-f amplifier	R4	340890	47 kilohms, ½ watt resistor
V4	12AT6	Detector, a.v.c., a-f amplifier	R5	351330	3.3 megohms, ½ watt rsistor
V5	50L6GT	Power output	R6	390044	.5 megohms, volume control
V6	35Z5GT	Rectifier	R7	351490	15 megohms, ½ watt resistor
C1, C2	900027	Two gang var. condenser	R8, R9	351130	470 kilohms, ½ watt resistor
C3, C4	*	Trimmers, part of var. cond.	R10	340290	150 ohms, ½ watt resistor
C5	920050	.2 mfd., 400 volt paper cond.	R11	370150	39 ohms, 1 watt resistor
C6	920100	.02 mfd., 200 volt paper cond.	R12	370490	1000 ohms, 1 watt resistor
C7	920040	.1 mfd., 200 volt paper cond.	L1	700000	Loop antenna
C8	920030	.05 mfd., 400 volt paper cond.	L2	716025	Oscillator coil
C9	910010	110 mmf., mica condenser	T1	720061	First i-f transformer
C10	910000	220 mmf., mica condenser	T2	720036	Second i-f transformer
C11	920010	.002 mmf., 600 volt paper cond.	T3	734043	Output transformer
C12	920240	500 mmf., 600 volt paper cond.	SP1	180045	P.m. speaker
C13, C14	920020	.02 mfd., 400 volt paper cond.	SW1	*	Line switch, part of vol. control
C15	925112	50-50 mfd., 150 volt electrolytic condenser	P.L.	807000	Dial light, 6-8 v., .15 amp.
				583014	Line cord
R1	340450	680 ohms, ½ watt resistor		507006	Dial light socket

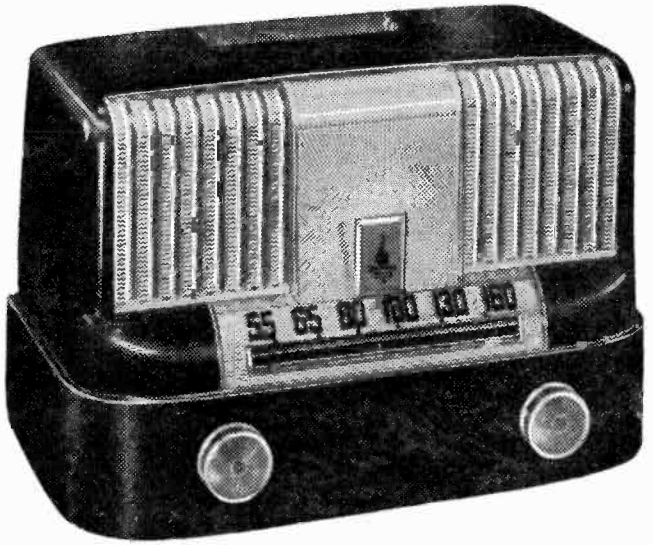
CABINET AND DIAL PARTS

†Part No.	DESCRIPTION
140119	Cabinet, ivory plastic
450310	Knob, ivory
460072	Speaker grille
525024	Pointer
520050	Dial backplate
280042	Dial drive shaft
530002	Dial cord (30")
587070	Dial cord spring

† Specify part numbers when ordering.

* Not supplied separately.

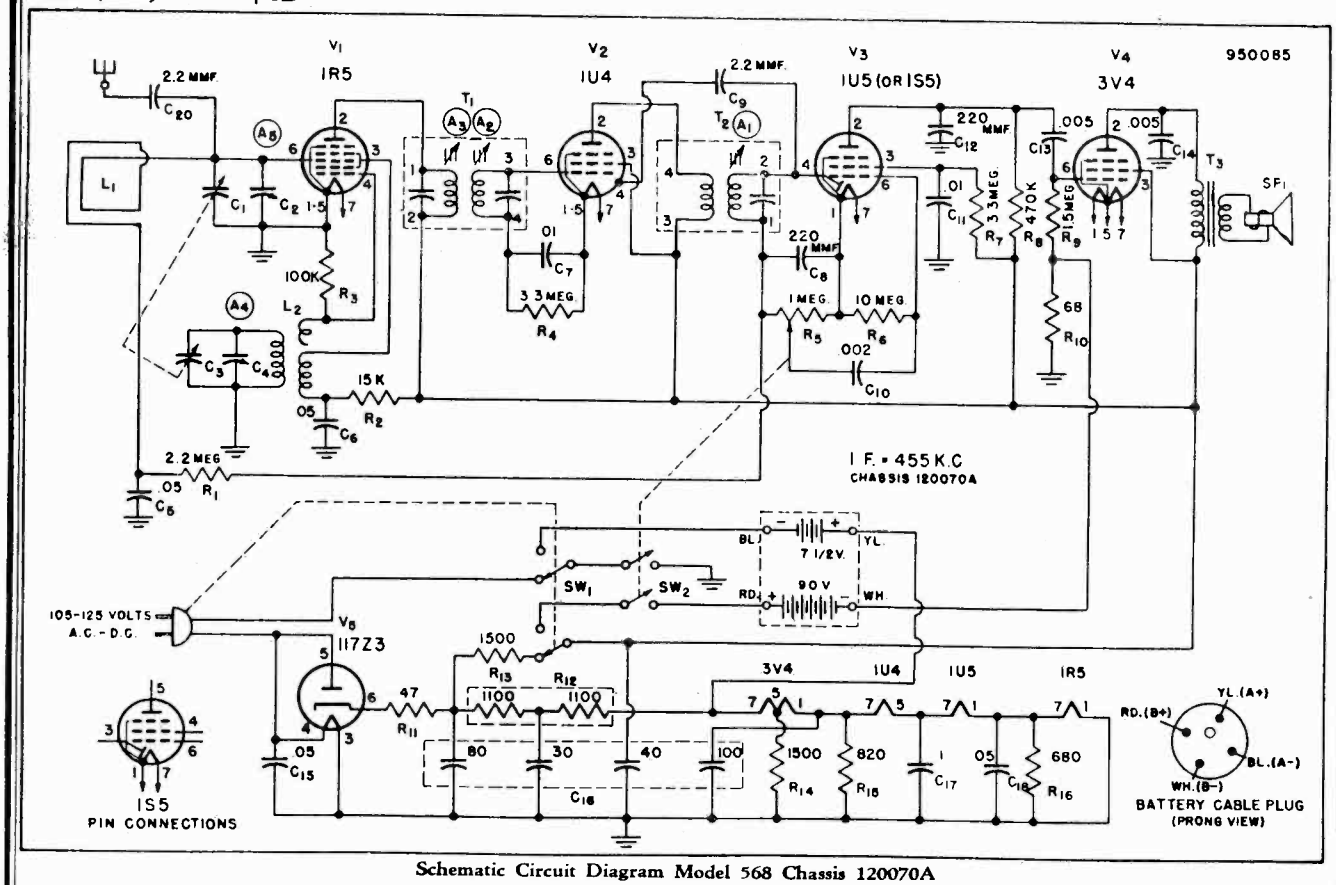




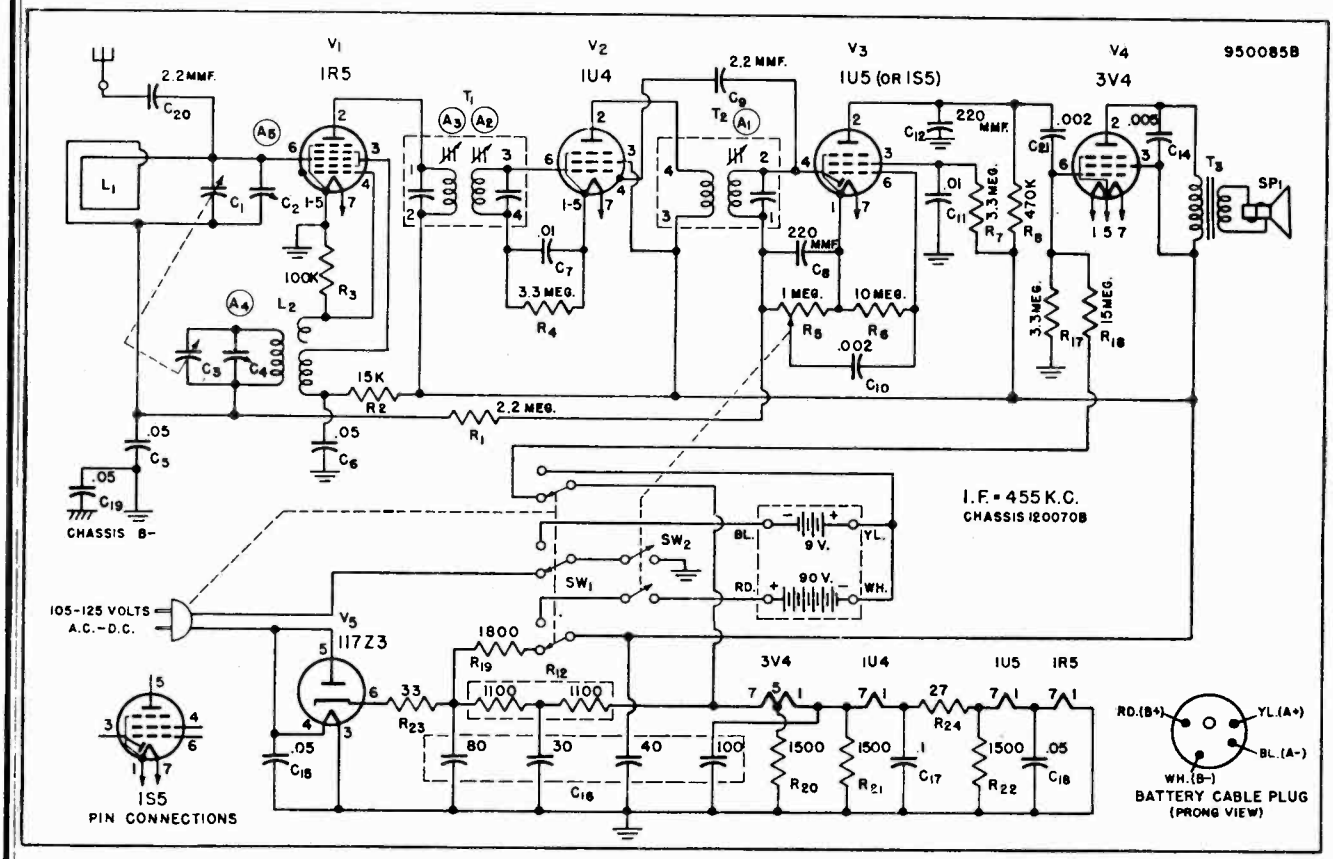
MODEL: 561 - 615

MODEL 568, CHASSIS 120070A, 120070B

EMERSON RADIO AND PHONO. CORP.



Schematic Circuit Diagram Model 568 Chassis 120070A



Schematic Circuit Diagram Model 568 Chassis 120070B

EMERSON RADIO AND PHONO. CORP. MODEL 568, CHASSIS 120070A, 120070B

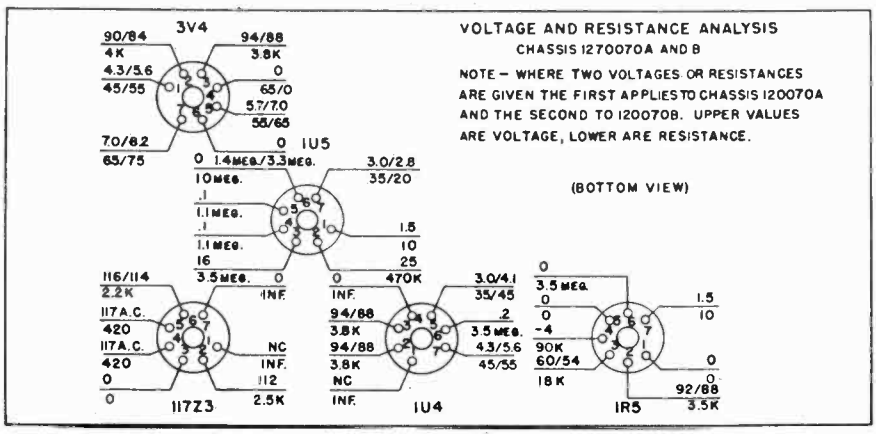
ALIGNMENT PROCEDURE

1. Use battery power when available. When a.c. power is used, connect the line cord through an isolation transformer if available. Otherwise connect a 0.1 mfd. condenser in series with the low side of the signal generator and B—.
2. Set the volume control at maximum. The output of the signal generator should be no higher than that necessary to obtain an output reading. Attenuate the signal input as alignment proceeds. Use an insulated alignment tool.
3. Maintain the loop in the same position relative to the chassis as when the receiver is in the cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 mfd.	High side to grid (pin 6) of V1 (1R5). Low side to chassis.	455 KC.	Variable condenser fully open.	Across voice coil	A1, (2nd i-f trans), A2, A3 (1st i-f trans.)	Adjust for maximum output. If a.c. is used, without an isolation transformer, reduce dummy antenna to 200 mmf. to reduce hum modulation.
2	200 mmf.	High side to external antenna lead. Low side to chassis.	1620 KC.	Variable condenser fully open.	Across voice coil	A4 (trimmer cond. C4.)	Adjust for maximum output.
3	200 mmf.	"	1400 KC.	Tune for maximum output.	Across voice coil	A5 (trimmer cond. C2).	Adjust for maximum output.

INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltage and resistance readings are measured for 117 volt a.c. line operation. Socket connections are shown as bottom views. Measurements are taken from socket pin to chassis (chassis 120070A) or socket pin to common negative (chassis 120070B).
2. Voltages are d.c. unless otherwise indicated, measured with a 20,000 ohms-per-volt meter. A.c. voltages are measured at 1000 ohms-per-volt.
3. For voltage measurements, set volume control at maximum; no signal applied.
4. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
5. On the voltage and resistance analysis diagram NC denotes no connection; K—kilohms; meg.—megohms; inf.—infinity.



DESCRIPTION

TYPE: Three way (battery, a.c., d.c.) portable superheterodyne.

FREQUENCY RANGE: 540-1620 KC.

TYPE OF TUBES:
1—1R5, pentagrid converter
1—1U4, i-f amplifier
1—1S5, or 1U5, detector, a.v.c., a-f amplifier
1—3V4, power output
1—117Z3 rectifier

POWER SUPPLY: Battery powerpack, or a.c., or d.c.

VOLTAGE RATING:
Line operation—105-125 volts, a.c. or d.c.
Battery operation—7½ volts (chassis 120070A);
9 volts (chassis 120070B) "A" supply
90 volts "B" supply

POWER CONSUMPTION: Line operation 20 watts

CURRENT CONSUMPTION:
"A" battery—.053 amp. (chassis 120070A)
.055 amp. (chassis 120070B)
"B" battery—.013 amp.
117 volts a.c.—.170 amp.

MODEL: 568

MODEL 568, CHASSIS 120070A, 120070B

EMERSON RADIO AND PHONO. CORP.

REPLACEMENT PARTS LIST

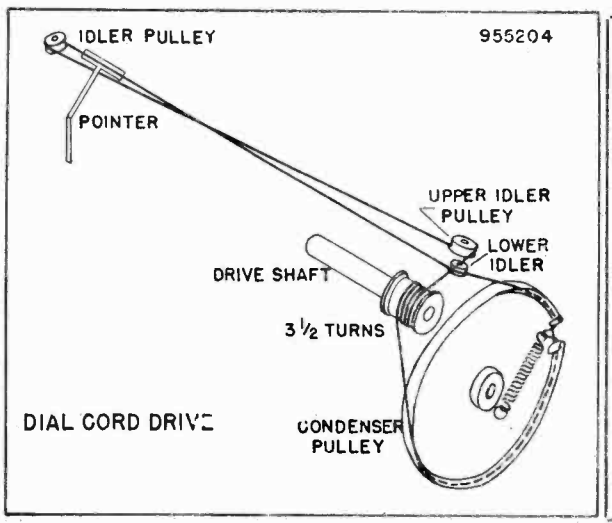
Symbol	†Part No.	DESCRIPTION
V1	1R5	Converter
V2	1U4	1-t amplifier
V3	1S5 or 1U5	Detector, a.v.c., a-f amplifier
V4	3V4	Power output
V5	117Z3	Rectifier
C1, C3	900043	Two-gang variable condenser
C2, C4	*	Trimmers, part of var. condenser
C5, C18	920060	.05 mfd., 200 volt condenser
C6, C15, C19	920539	.05 mfd., 400 volt condenser
C7, C11	920092	.01 mfd., 400 volt condenser
C8, C12	910000	220 mmf., mica condenser
C9, C20	915005	2.2 mmf., molded condenser
C10, C21	920515	.002 mfd., 400 volt condenser
C13, C14	920180	.005 mfd., 400 volt condenser
C16	925059	80-40-30-100 mfd., 150-150-150-25 volt electrolytic condenser
C17	920040	.1 mfd., 200 volt condenser
R1	351290	2.2 megohms, ½ watt resistor
R2	340770	15 kilohms, ± 10%, ½ watt res.
R3	350970	100 kilohms, ½ watt resistor
R4, R7	351330	3.3 megohms, ½ watt resistor
R5	390063	1 megohm, volume control
R6	351450	10 megohms, ½ watt resistor
R8	351130	470 kilohms, ½ watt resistor
R9	351250	1.5 megohms, ½ watt resistor
R10	340210	68 ohms, ± 10%, ½ watt resistor
R11	370170	47 ohms, ± 10%, ½ watt resistor
R12	394041	1100-1100 ohms, ± 5%, wire-wound resistor
R13, R14, R20, R21, R22	340530	1500 ohms, ± 10%, ½ watt resistor
R15	340470	820 ohms, ± 10%, ½ watt resistor
R16	340450	680 ohms, ± 10%, ½ watt resistor
R17	341330	3.3 meghoms, ± 10%, ½ watt resistor
R18	341490	15 megohms, ± 10%, ½ watt resistor
R19	340550	1800 ohms, ± 10%, ½ watt resistor
R23	370132	33 ohms, ± 10%, ½ watt resistor
R24	340110	27 ohms, ± 10%, ½ watt resistor
L1	700039△	Loop antenna
	700042□	" "
L2	716029	Oscillator coil
T1	720525	First i-f transformer (alternate parts 720051 or 720062) #
T2	720066	Second i-f transformer
T3	734039△	Output transformer
	734039A□	" "
SW1	510008△	Power changeover switch, d.p.d.t.
	510043□	" " " , t.p.d.t.
SW2	*	On-off switch, part of volume control
	585031△	Battery cable ("A" and "B")
	585033□	" " " " "
	583012P△	Line cord
	583017P□	" "
		Battery power pack unit (7½ or 9 volts "A" and 90 volts "B"). Eveready No. 753 or Rayovac No. AB994.

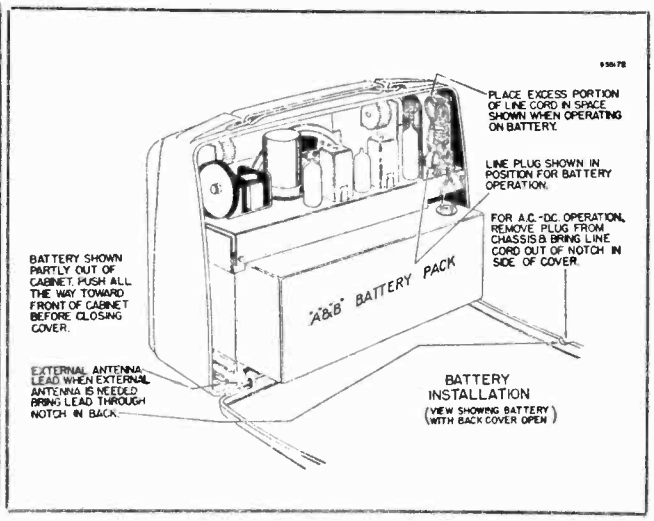
CABINET AND DIAL PARTS

†Part No.	DESCRIPTION
140182°	Cabinet
140183S°	Cabinet back, with hinge springs
460081°	Speaker grille
520092	Dial Crystal
520085	Dial backplate
595006°	Handle, with rings
460082°	Knob
808205	Cabinet catch clip
280079	Cover catch stud
525041	Dial pointer
280070	Drive shaft
530002	Drive cord (30")
587040	Drive cord spring

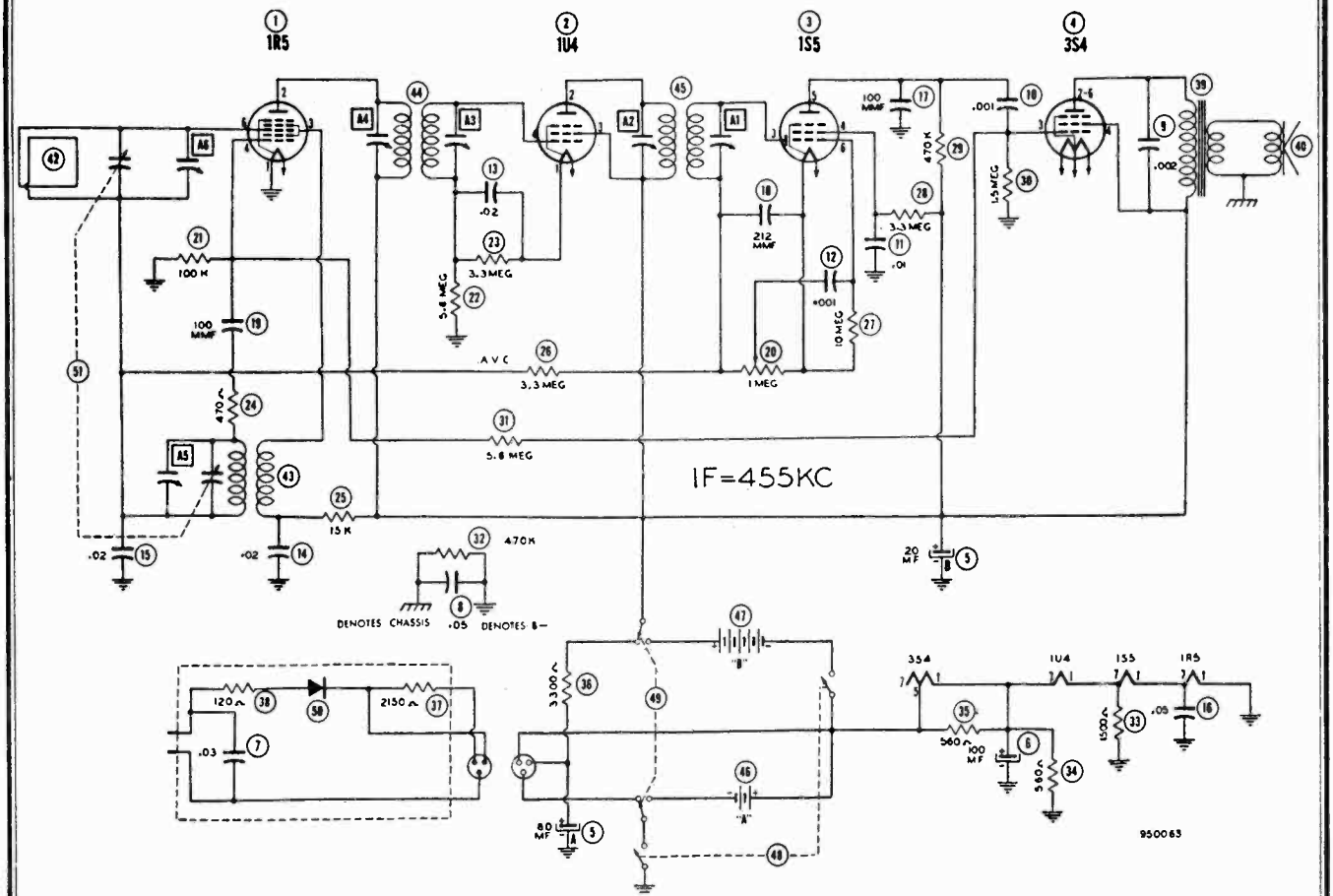
† State part numbers when ordering.
* Not supplied separately.
# Replace with parts having same number as that removed.

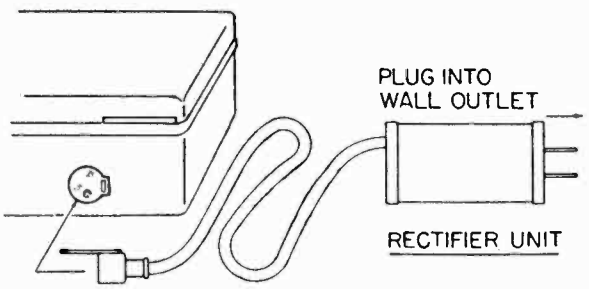
△ Used on chassis 120070A.
□ Used on chassis 120070B.
° Specify color when ordering.





EMERSON RADIO AND PHONO. CORP. MODEL 569, CHASSIS 120062A





POWER SUPPLY PLUG

PLUG INTO RECEPTACLE IN RECEIVER. INSERT PLUG ALL THE WAY.
FOR BATTERY OPERATION REMOVE PLUG.

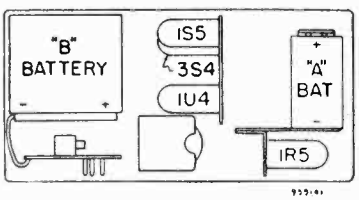
BATTERIES USED IN THIS RECEIVER		
TYPE	MANUFACTURER'S NUMBER	
6 Volt "A"	Olin No. 4919	Eveready No. 724
67½ Volt "B"	Olin No. 1712	Eveready No. 457

A.C.-D.C. OPERATION—Insert three-prong plug into socket on side of receiver. Plug Rectifier Unit into 105-125 volt wall outlet. Rectifier Unit will normally operate warm. Keep unit free from dust and in a well ventilated location. *OPERATE RECTIFIER UNIT IN HORIZONTAL POSITION ONLY.* If set is inoperative on D.C., reverse plug in wall outlet.

BATTERY OPERATION — Remove the three-prong plug from the receiver; the self-contained batteries will then supply power. Removal of Rectifier Unit from wall outlet is desirable.

BATTERY REPLACEMENT

TUBE AND BATTERY LOCATIONS



1. Remove power supply plug from set.
2. Slide the button on the release catch near the handle in the direction of the arrow. This loosens the bottom shell and permits it to be swung open on the hinge, making the batteries accessible.
3. Insert the batteries as shown in the diagram.
4. To reassemble, hold the chassis face down with the batteries in place. Close the bottom shell over the chassis and press the handle end of the shell so that it snaps into place.

INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1—DC Voltage measurements are at 20,000 ohms per volt; AC voltages measured at 1,000 ohms.
2—Socket connections are shown as bottom views.
3—Measured values are from socket pin to common negative.
4—Line voltage maintained at 117 volts for voltage readings.
5—Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6—Volume control at maximum; no signal applied for voltage measurements

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1R5	OV	78VDC	50VDC	†-3.2VDC	OV	OV	1.3VDC
2	1U4	2.5VDC	78VDC	78VDC	50VDC	2.5VDC	OV	3.8VDC
3	1S5	1.3VDC	78VDC	.2VDC	17VDC	26VDC	OV	2.5VDC
4	3S4	3.8VDC	75VDC	OV	78VDC	5.2VDC	75VDC	5.2VDC

† Taken with vacuum tube voltmeter.
NOTE: OV equivalent to zero volts.

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1R5	0 ohm	5400 ohm	20K ohm	100K ohm	0 ohm	4.3 meg.	*
2	1U4	*	5400 ohm	5400 ohm	20K ohm	*	2 meg.	*
3	1S5	*	5400 ohm	1 meg.	3.3 meg.	470K ohm	10 meg.	*
4	3S4	*	6000 ohm	1.5 meg.	5400 ohm	*	6000 ohm	*

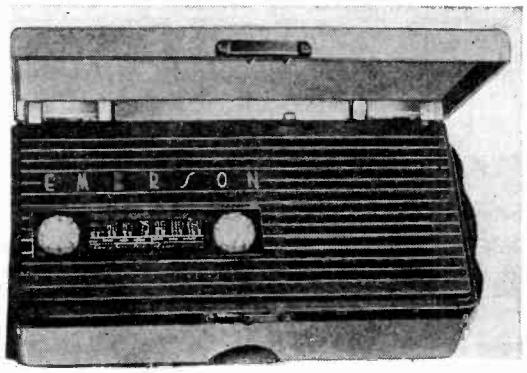
* Do not use ohmeter to measure filament resistance.

ALIGNMENT INSTRUCTIONS

Use battery power when available. If AC power is used, use an isolation transformer when available. If not, connect a .1 mfd. capacitor in series with low side of the signal generator and B—.

Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 mfd.	High side to Pin 6 (grid) of 1R5. Low side to B—.	455KC	Tuning cap. fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If AC power is used without an isolation transformer reduce dummy ant. to 200 mmf. to reduce hum modulation.
2		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3		"	600KC	Tune for maximum output.	"	A6	Rock tuning cap. and adjust for maximum output. Repeat Steps 2 and 3 until no further improvement can be made.



DESCRIPTION

TYPE: Three-way pocket portable superheterodyne.

FREQUENCY RANGE: 540-1600 kc.

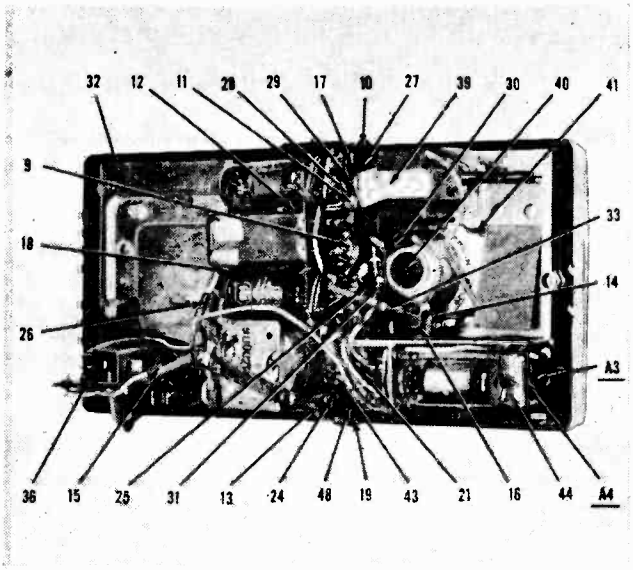
TYPE OF TUBES:
1—1R5, oscillator-modulator
1—1U4, i-f amplifier
1—1S5, 2nd detector, a.v.c., a-f amplifier
1—3S4, pentode output

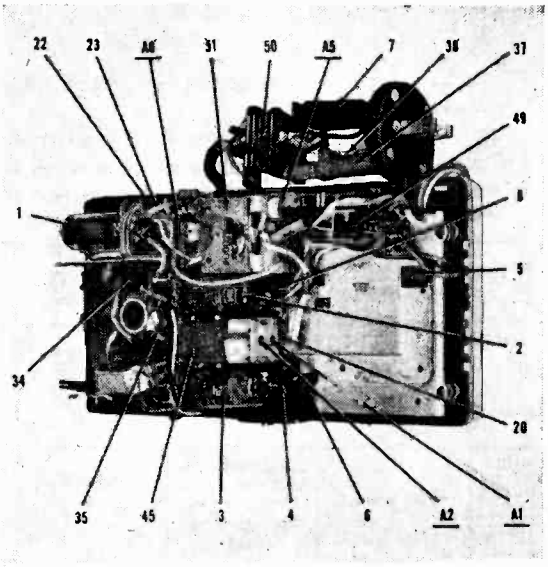
POWER SUPPLY: A.C.-D.C. (105-125 volts) or self-contained batteries

VOLTAGE RATING:
"A" Battery—6 volts
"B" Battery—67.5 volts

POWER CONSUMPTION: 11 watts

CURRENT DRAIN:
"A" Battery—60 ma.
"B" Battery—8 ma.





REPLACEMENT PARTS LIST

Symbol	† Part No.	DESCRIPTION
1	1R5	Converter
2	1U4	IF amplifier
3	1S5	Det.—AVC—audio amplifier
4	3S4	Power output
5A	925082	Filter (electrolytic), 80 mfd., 150 volt condenser
B		Filter (electrolytic), 20 mfd., 150 volt condenser
6	925083	Filament bypass (elect.), 100 mfd., 25 volt condenser
7	923006	Line filter, .03 mfd., 600 volt condenser
8	920494	Line isolation, .05 mfd., 200 volt condenser
9	920550	Output plate bypass, .002 mfd., 200 volt condenser
10	920497	Audio coupling, .001 mfd., 200 volt condenser
11	920499	AF screen bypass, .01 mfd., 100 volt condenser
12	920497	Audio coupling, .001 mfd.. 200 volt condenser
13	920498	IF grid filter, .02 mfd., 100 volt condenser
14	920498	Converter screen decoupling, .02 mfd., 100 volt condenser
15	920498	AVC filter, .02 mfd., 100 volt condenser
16	920494	Filament bypass, .05 mfd., 200 volt condenser
17	928013	AF plate bypass, 100 mmf., 300 volt condenser
18	928104	Diode RF filter, 212 mmf., 300 volt condenser
19	928013	Oscillator grid capacitor, 100 mmf., 300 volt condenser
20	390025	Volume control, 1 megohm, resistor
21	340970	Oscillator grid, 100K ohm, ½ watt resistor
22	341390	IF grid, 5.6 megohm, ½ watt resistor
23	351330	IF grid, 3.3 megohm, ½ watt resistor
24	340410	Parasitic suppressor, 470 ohm, ½ watt resistor
25	340770	Converter screen dropping, 15K ohm, ½ watt resistor
26	351330	AVC network, 3.3 megohm, ½ watt resistor
27	351450	AF grid, 10.0 megohm, ½ watt resistor
28	351330	AF screen, 3.3 megohm, ½ watt resistor
29	351130	AF plate, 470K ohm, ½ watt resistor
30	341250	Output grid, 1.5 megohm, ½ watt resistor
31	341390	Bias, 5.6 megohm, ½ watt resistor
32	351130	Line isolation, 470K ohm, ½ watt resistor
33	340530	Filament string, 1500 ohm, ½ watt resistor
34	370432	Filament string, 560 ohm, 1 watt resistor
35	370432	Filament string, 560 ohm, 1 watt resistor
36	340610	Filter string, 3300 ohm, ½ watt resistor
37	394019	Filament dropping, 2150 ohm, 10 watt resistor
38	394018	Rectifier ballast, 120 ohm, 3 watt resistor
39	734019	Output transformer
40	180029	3″ PM speaker
41		Cone—part of 180029
42	700008	Loop antenna
43	716021	Oscillator coil
44	720028	Input IF transformer
45	720028	Output IF transformer
46	Olin 4919	6-volt "A" battery
47	Olin 1712	67½" "B" battery
48	510019	On-off switch
49	510008	Change-over switch
50	817001	Dry disc rectifier
51	920029	2-gang tuning capacitor
	470330	Power supply unit
	585013	Plug and cable assembly
	585014	"B" battery cable
	460064	Plastic bottom shell, black
	460066	Plastic bottom shell, ivory
	460067	Plastic bottom shell, green
	460028	Plastic lid, black
	460038	Plastic lid, ivory
	460068	Plastic lid, green
	630058	Plastic loop cover, black
	410254	Metal front
	460031	Knob, black
	460037	Knob, ivory
	460061	Knob, green
	541170	Knob retaining clip
	460089	Handle, extruded plastic
	410519	Handle ring
	410298	Release catch, male
	410299	Release catch, female
	411055	Reenforcing plate, cover release catch
	410143	Lid hinge, spring loaded
	410144	Lid hinge stop
	470259	Hinge assembly, shell to metal front
	520038	Dial crystal
	520041	Dial backplate
	525016	Dial pointer
	280038	Drive shaft
	587326	Dial drive spring
	410150	"A" battery contact spring
	555000	"A" Battery contact assembly

MODEL 576,
CHASSIS 120069A

EMERSON RADIO AND PHONO. CORP.

ALIGNMENT

To set pointer turn tuning cap. fully closed and set pointer 2¼" from top right edge of dial backplate. This is calibration mark referred to below.

Use isolation transformer if available. If not, connect, a .1 mfd. capacitor in series with low side of signal generator and B—.

Volume control should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 mfd.	High side to Pin 7 (grid) of 12BE6. Low side to B—.	455KC	Tuning cap. fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy ant. to .001 mfd. to reduce hum modulation.
2	200 mmf.	High side to ext. ant. lead. Low side to ext. ground lead.	1600KC	4¼" from calibration mark.	"	A5	Adjust for maximum output.
3	200 mmf.	" "	1500KC	Tune for maximum output.	"	A6	" " " "

INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1—DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1000 ohms per volt.
2—Socket connections are shown as bottom views.
3—Measured values are from socket pin to common negative.
4—Line voltage maintained at 117 volts for voltage readings.
5—Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6—Volume control at maximum, no signal applied for voltage measurements.

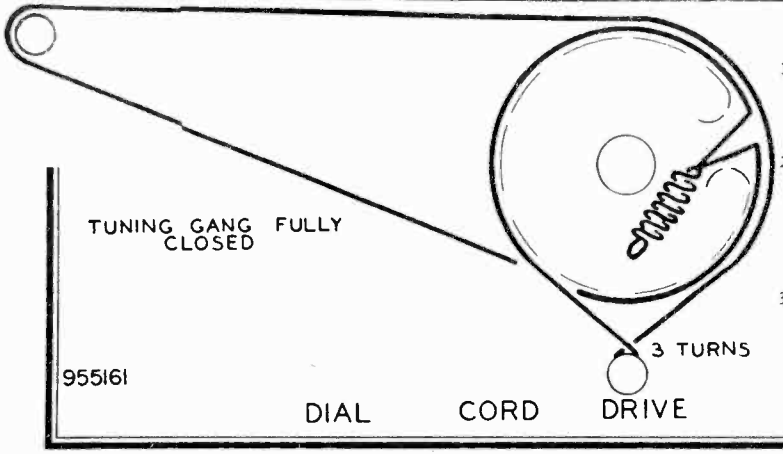
VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
1	12BE6	-14V DC†	0	27V AC	13V AC	95V DC	95V DC	1.1V DC	
2	12BA6	-1V DC	0	27V AC	40V AC	95V DC	95V DC	.7V DC	
3	12AT6	-.7V DC	0	0	13V AC	-.6V DC	0	46V DC	
4	50B5	0	5.8V DC	85V AC	40V AC	108V DC	95V DC	0	
5	35W4	0	115V DC	85V AC	117V AC	111V AC	113V AC	115V DC	

† Taken with vacuum tube voltmeter, Radio-Phono switch in radio position.

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
1	12BE6	22K ohm	.5 ohm	24 ohm	12 ohm	200K ohm	200K ohm	3.8 meg.	
2	12BA6	3.8 meg.	0 ohm	24 ohm	37 ohm	200K ohm	200K ohm	100 ohm	
3	12AT6	15 meg.	0 ohm	0 ohm	12 ohm	540K ohm	0 ohm	670K ohm	
4	50B5	470K ohm	150 ohm	85 ohm	37 ohm	200K ohm	200K ohm	470K ohm	
5	35W4	inf.	200K ohm	85 ohm	115 ohm	150 ohm	110 ohm	200K ohm	



GENERAL NOTES

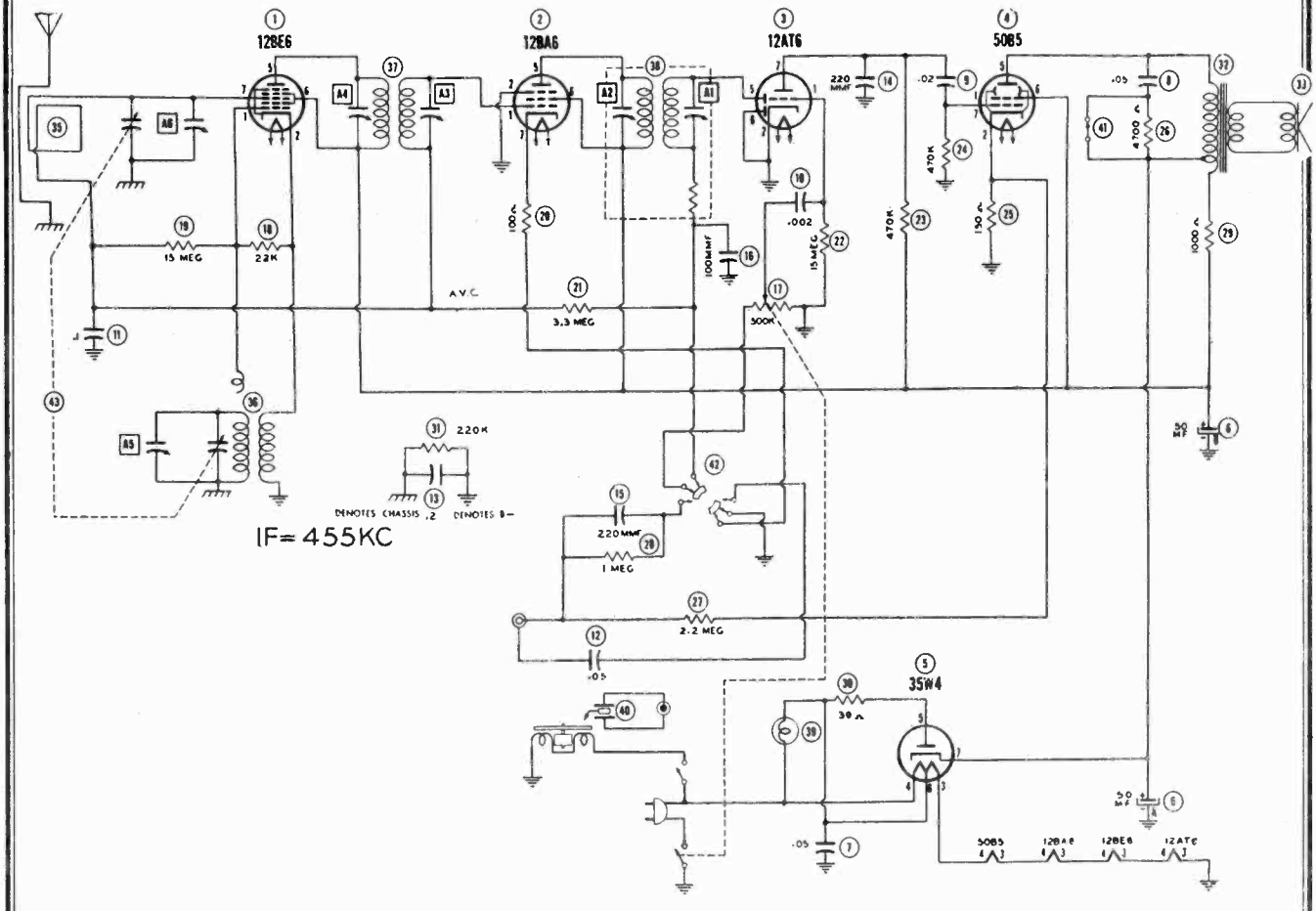
1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.

2. The color coding of the i-f transformer leads is as follows:

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

3. The receiver has a self-contained antenna and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna should be used. For this purpose a lead has been brought out of the rear near the line cord.

EMERSON RADIO AND PHONO. CORP. MODEL 576, CHASSIS 120069A



FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:
- 1—12BE6, converter
- 1—12BA6, i-f amplifier
- 1—12AT6, detector a.v.c.-a.f. amplifier
- 1—50B5, power output
- 1—35W4, rectifier

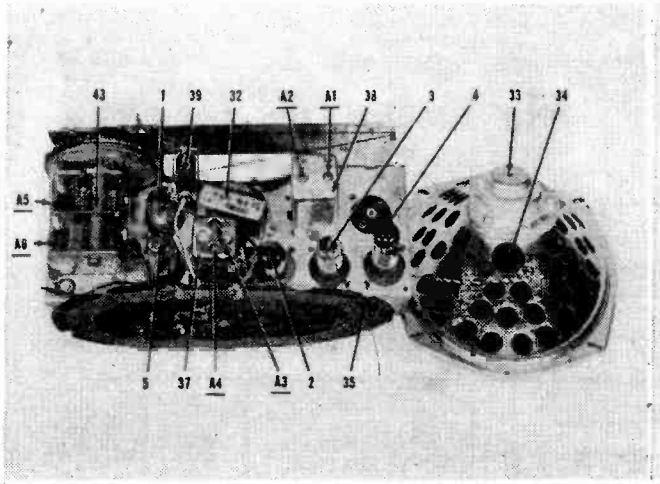
POWER SUPPLY: 60 cycle a.c.

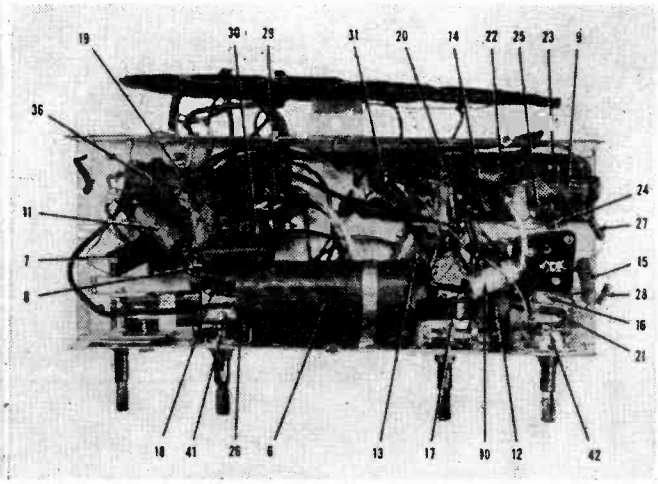
VOLTAGE RATING: 105-125 volts

POWER CONSUMPTION: 50 watts

CURRENT DRAIN: .43 amp. at 117 volts a.c.

EMERSON RADIO AND PHONO. CORP. MODEL 576, CHASSIS 120069A





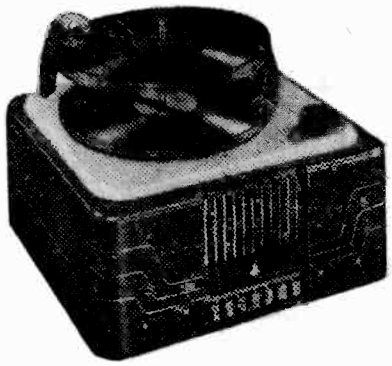
Symbol	†Part No.	DESCRIPTION
1	12BE6	Converter
2	12BA6	IF amplifier
3	12AT6	Detector - AVC - audio amplifier
4	50B5	Power output
5	35W4	Rectifier
6	925012	Filter (elect.), 50-50 mfd., 150 volt condenser
7	920030	Line filter, .05 mfd., 400 volt condenser
8	920030	Tone compensation, .05 mfd., 400 volt condenser
9	920020	Audio coupling, .02 mfd., 400 volt condenser
10	920010	Audio Coupling, .002 mfd., 600 volt condenser
11	920040	AVC filter, .1 mfd., 200 volt condenser
12	920030	Phono isolation, .05 mfd., 400 volt condenser
13	920050	Line isolation, .2 mfd., 200 volt condenser
14	910000	Audio plate bypass, 220 mmf., 300 volt condenser
15	910000	Phono tone compensation, 220 mmf., 300 volt condenser
16	910010	Diode r-f filter, 100 mmf., 300 volt condenser
17	390042	Volume control with switch, 500K ohm, resistor
18	340810	Oscillator grid, 22K ohms, ½ watt resistor
19	397000	AVC network, 15 megohms, ½ watt resistor
20	340250	IF cathode, 100 ohms, ½ watt resistor
21	351330	AVC network, 3.3 megohms, ½ watt resistor
22	397000	Audio grid, 15 megohms, ½ watt resistor
23	351130	Audio plate load, 470K ohms, ½ watt resistor
24	351130	Output grid, 470K ohms, ½ watt resistor
25	340290	Output cathode, 150 ohms, ½ watt resistor
26	340650	Tone compensation, 4700 ohms, ½ watt resistor
27	351290	Feedback, 2.2 megohms, ½ watt resistor
28	351210	Phono tone compensation, 1.0 megohms, ½ watt resistor
29	370490	Filter, 1000 ohms, ½ watt resistor
30	370150	Rectifier ballast, 39 ohms, ½ watt resistor
31	35150	Line isolation, 220K ohms, ½ watt resistor
32	734080	Output transformer
33	180037	6" x 9" oval speaker
*34		Cone (part of 180037)
35	700025	Loop antenna
36	716010	Oscillator coil
37	720220	Input i-f coil
38	720039	Output i-f coil
39	807000	Type 47 pilot lamp
40	L-70	Phono cartridge
41	510120	Tone switch
42	510391	Phono-radio switch
43	900070	2-gang variable capacitor
	520062	Dial glass
	525028	Dial pointer
	520061	Dial backplate
	280313	Dial drive shaft
	587070	Drive cord spring
	520064	Escutcheon
	460470	Plastic knob
	140149	Cabinet, mahogany
	140159	Cabinet, toasted mahogany
	507060	Pilot lamp socket
	508010	Pickup socket
	505040	Pickup plug
	583016	Line cord
	819031	Record changer
	819032	Record changer

* Not supplied separately.

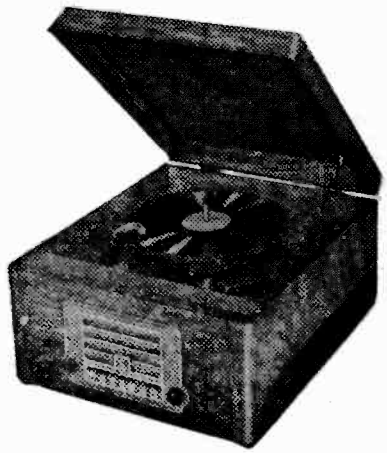
† Specify part numbers when ordering.

MODELS 579, 596,
CHASSIS 120034A

EMERSON RADIO AND PHONO. CORP.



MODEL 579



MODEL 596

REPLACEMENT PARTS LIST

Symbol	†Part No.	DESCRIPTION
V1	12BE6	Pentagrid converter
V2	12BA6	I-f amplifier
V3	12AT6	Detector, a.v.c., a-f amplifier
V4	50B5	Power output
V5	35W4	Rectifier
C1, C3	900023	Two-gang variable condenser
C2, C4	*	Trimmer, part of var. condenser
C5	*	Trimmer, part of loop antenna
C6, C7	920040	.1 mfd., 200 volt paper condenser
C8, C13, C15	920030	.05 mfd., 400 volt paper condenser
C9, C11	910000	220 mmf., mica condenser (alternate part 928104) #
C10	920515	.002 mfd., 400 volt paper condenser
C12	920180	.005 mfd., 400 volt paper condenser
C14	925061	30-50 mfd., 150 volt elect. condenser
R1, R7	351490	15 megohms, ½ watt resistor
R2	340810	22 kilohms, ½ watt resistor
R3	340250	100 ohms, ½ watt resistor
R4	351330	3.3 megohms, ½ watt resistor
R5	351210	1 megohm, ½ watt resistor
R6	390024	500 kilohms, volume control
R8, R9	351130	470 kilohms, ½ watt resistor
R10	340290	150 ohms, ½ watt resistor
R11	340730	10 kilohms, ½ watt resistor
R12	370150	39 ohms, 1 watt resistor
R13	370490	1000 ohms, 1 watt resistor
L1	700035	Loop antenna
L2	716026	Oscillator coil
T1, T2	720055	First and second i-f transformers
T3	734023	Output transformer
SP1	180032H	P.M. speaker
SW1	510027	Radio-phono switch, d.p.d.t.
SW2	510034	Tone control switch, s.p.s.t.
SW3	*	Line switch, part of volume control
SW4	*	Phono-motor switch, part of record changer
P1	505040	Phono pickup plug
J2	508010	Phono pickup socket
	583021	Line cord
	819032	Record changer (alternate part 819031) #
	807000	Dial light
	507003	Dial light socket

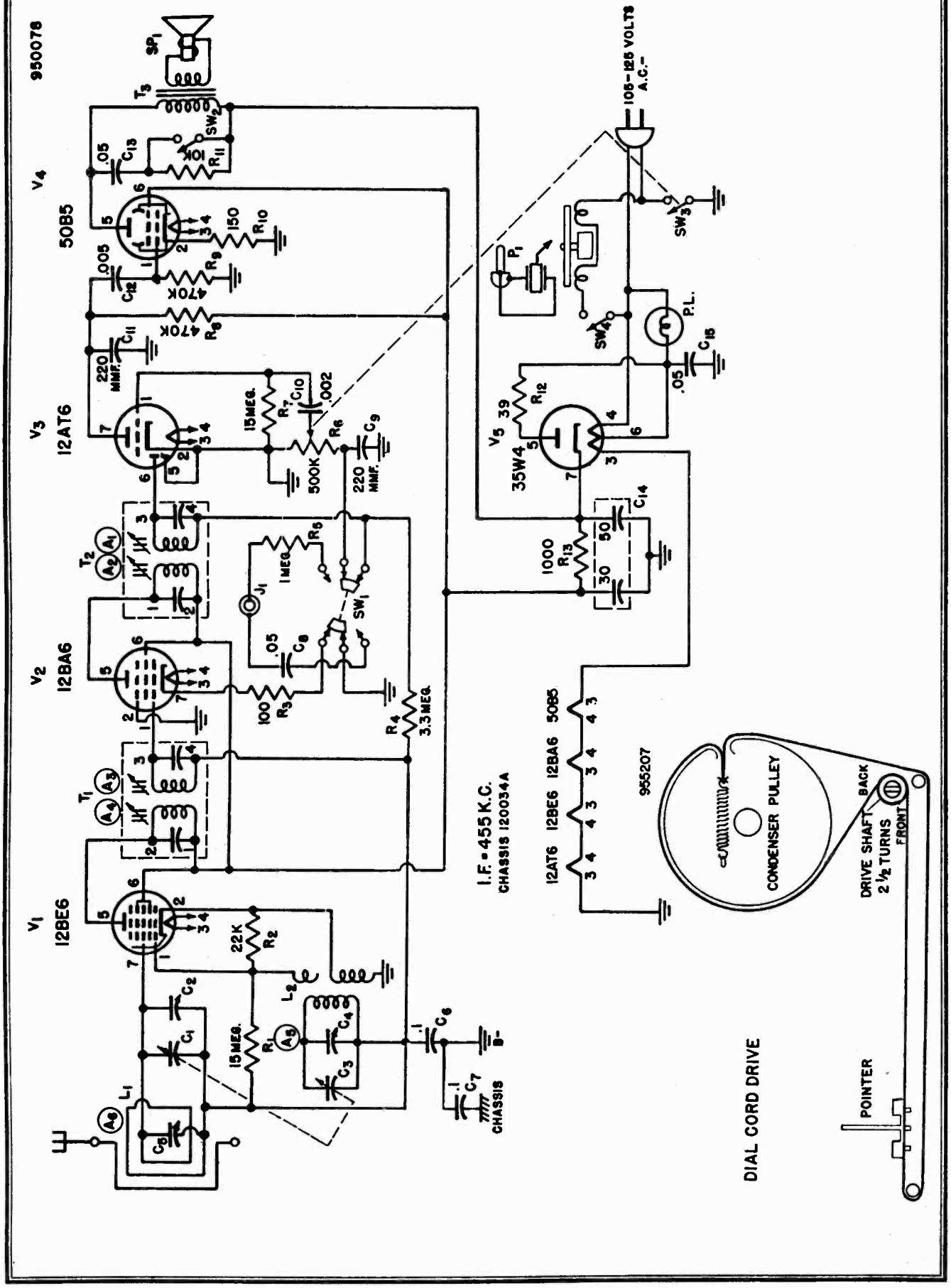
CABINET AND DIAL PARTS

520048	Dial backplate	
525023	Dial pointer	
280035	Drive shaft	
530002	Drive cord (26")	
587040	Drive cord spring	
140108	Cabinet, walnut plastic	
140196	Cabinet, walnut wood	
450115	Knob, black	
460076B	Speaker grille (Model 596 only)	

† Specify part numbers when ordering.
# Replace with part having same number as that removed.
* Not supplied separately.
Note: C9, C10, C11, C12 may be combined in one unit, part No. 470310, on some chassis.

MODELS 579, 596,
CHASSIS 120034A

EMERSON RADIO AND PHONO. CORP.



INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltages are d.c. volts; resistances in ohms unless otherwise indicated.
2. D.c. voltage measurements are at 20,000 ohms-per-volt; a.c. voltages are measured at 1000 ohms-per-volt.
3. Socket connections are shown as bottom viels. Values are measured from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Volume control at maximum; radio-phono switch in radio position; no signal applied for voltage measurements.
6. Nominal tolerance on component valves makes possible a variation of ± 15% in voltage and resistance readings.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V1	12BE6	—4.5	0	25 A.C.	13 A.C.	95	96	—.1
V2	12BA6	—.1	0	25 A.C.	38 A.C.	95	96	.4
V3	12AT6	—.5	0	0	13 A.C.	0	—.3	42
V4	50B5	0	6.5	82 A.C.	38 A.C.	107	96	NC
V5	35W4	0	NC	82 A.C.	117 A.C.	110 A.C.	112 A.C.	115

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V1	12BE6	24 K	.5	25	13	80 K	80 K	3 meg.
V2	12BA6	3 meg.	0	25	37	80 K	80 K	100
V3	12AT6	15 meg.	0	0	13	0	600 K	700 K
V4	50B5	550 K	150	82	37	80 K	80 K	Inf.
V5	35W4	0	Inf.	82	110	145	105	80 K

NC—no connection; K—kilohm; meg.—Megohm; Inf.—infinity.

ALIGNMENT INSTRUCTIONS

1. To position pointer, turn variable condenser fully closed and set pointer to reference mark at low-frequency end of dia backplate.
2. Use isolation transformer if available. If not, connect a .1 mfd. condenser in series with low side of signal generato and B—.
3. Volume control should be at maximum position; radio-phono switch in radio position. Output of signal generator shoul be no higher than necessary to obtain an output reading. Use an insulated screw driver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1 mfd.	High side to Pin 7 (grid) of 12BE6. Low side to B—.	455KC	Tuning cond. fully open.	Across voice coil.	A1, A2, A3, A4 (I-f trans. T2 and T1)	Adjust for maximum output. If isolation transformer is not used, reduce dummy ant. to .001 mfd. to reduce hum modulaltion.
2	200 mmf.	High side to ext. ant. lead. Low side to ext. ground	1600KC	Tuning cond. fully open.	Across voice coil.	A5 (Var. cond. trimmer C4).	Adjust for maximum output.
3		High side to ext. ant. lead. Low side to ext. ground	1400KC	Tune for maximum output.	Across voice coil.	A6 (Loop ant. trimmer C5).	Adjust for maximum output.

DESCRIPTION

TYPE: Single band superheterodyne and automatic record changer.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:
1—12BE6, pentagrid converter
1—12BA6, i-f amplifier
1—12AT6, detector, a.v.c., a-f amplifier
1—50B5, power output
1—35W4, rectifier

POWER SUPPLY: A.C. only, 60 cycles

VOTAGE RATING: 105-125 volts

POWER CONSUMPTION:
Receiver—30 watts
Phono motor—20 watts

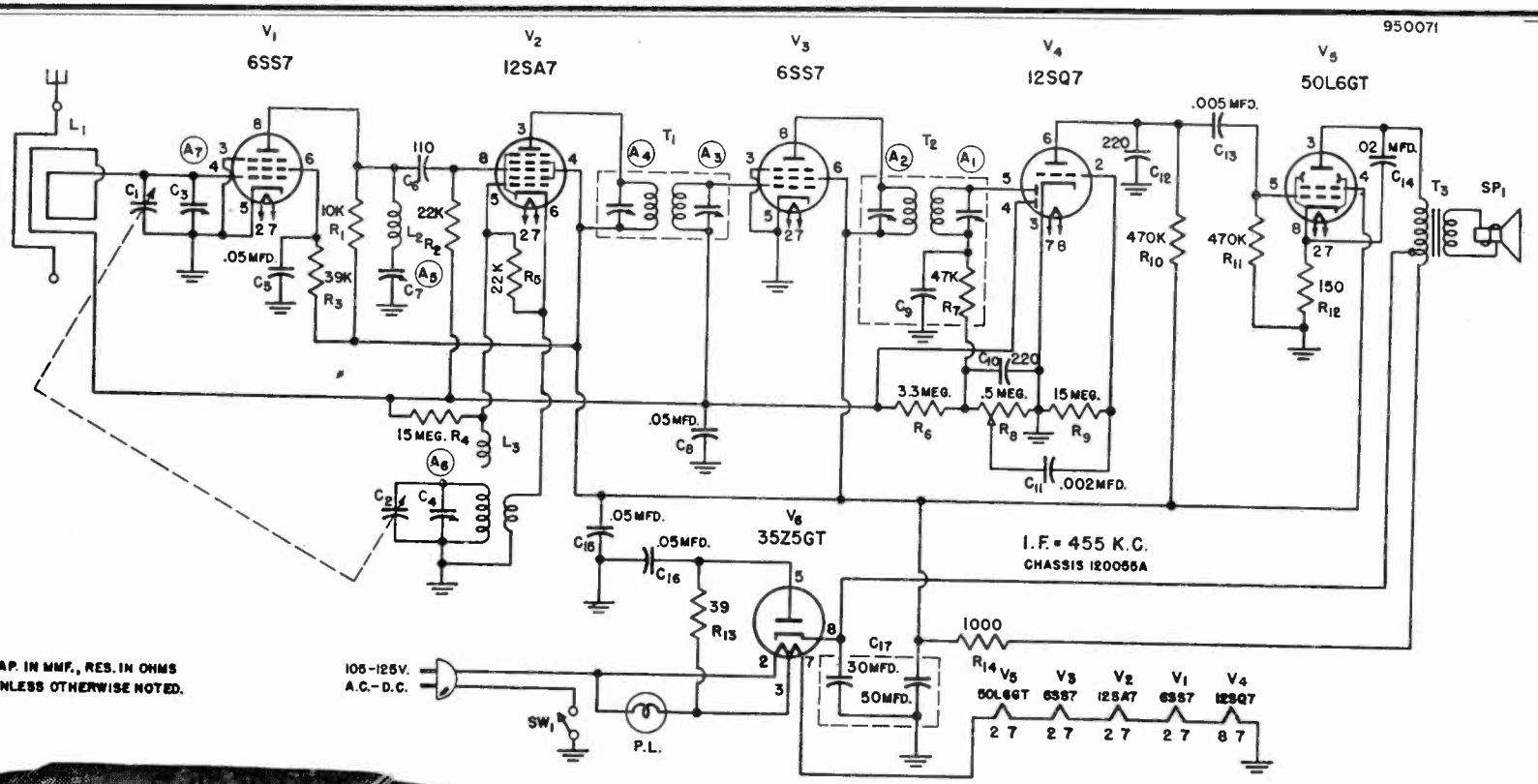
CURRENT DRAIN: 0.24 amp. (for receiver), at 117 volts a.c.

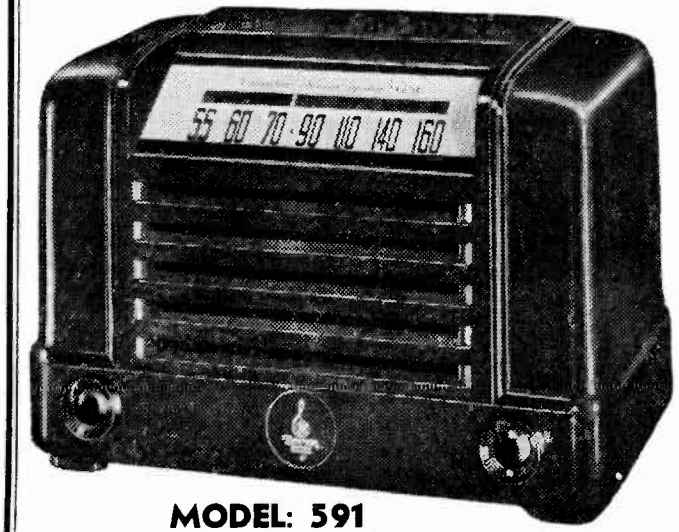
GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. The receiver has a self-contained antenna and does not require an additional antenna. For permanent installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be connected to the white lead (with colored tracer) at the rear of the cabinet. Connect a ground to the black lead, if desired.
3. The self-contained loop antenna has directional properties. It is important, therefore, once a station is tuned in, that the cabinet be rotated back and forth through a quarter-turn and left at that position where maximum volum is obtained.

DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type control knobs
2. Remove four corner cabinet supports
3. Disconnect phono-motor leads by unscrewing wirenut insulators. Remove phono pickup plug from chassis.
4. Remove remaining two screws holding chassis mounting plate to bottom of cabinet. Remove chassis from cabinet.
5. Remove two center screws holding chassis to mounting board.





MODEL: 591

DESCRIPTION

TYPE: Single band (AM) superheterodyne

FREQUENCY RANGE: 540-1620 kc.

TYPES OF TUBES:

1—6SS7 r-f amplifier
1—12SA7 converter
1—6SS7 i-f amplifier
1—12SQ7 detector, a.v.c., audio amplifier
1—50L6GT power output
1—35Z5GT rectifier

POWER SUPPLY: A.c. or d.c.

VOLTAGE RATING: 105-125 volts

POWER CONSUMPTION: 30 watts

CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. The receiver has a self-contained antenna and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out of the rear near the line cord.
3. The self-contained loop antenna has directional properties. It is important, therefore, once the station is tuned in, that the cabinet be rotated on its base back and forth through a quarter of a circle (90 degrees), and left at the position where the station is received with maximum volume.
4. The color coding of the i-f transformer leads is as follows:

Grid return—black	Plate—blue
Grid—green	Blue+—red

INSTRUCTIONS FOR VOLTAGE AND RESISTANCE READINGS

1. Voltages are in volts d.c.; resistances in ohms unless otherwise specified.
2. D.c. voltage measurements are at 20,000 ohms-per-volt; a.c. voltages measured at 1000 ohms-per-volt.
3. Socket connections are shown as bottom views.
4. Measured values are from socket pin to common negative (chassis).
5. Line voltage maintained at 117 volts for voltage readings.
6. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
7. Volume control at maximum with no signal applied, for voltage measurements.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
V1	6SS7	0	19 AC	0	-.6	0	55	12 AC	50
V2	12SA7	0	31 AC	83	85	-4.5	0	19 AC	-.5
V3	6SS7	0	37 AC	0	-.6	0	85	31 AC	83
V4	12SQ7	0	-9	0	-.4	0	52	0	12 AC
V5	50L6GT	NC	87 AC	100	85	0	NC	37 AC	5.8
V6	35Z5GT	NC	117 AC	113 AC	106	112 AC	NC	87 AC	106

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
V1	6SS7	0	26	0	2.8 meg.	0	100 K	19	60 K
V2	12SA7	0	40	45 K	45 K	25 K	0	26	2.8 meg.
V3	6SS7	0	47	0	2.8 meg.	0	45 K	40	45 K
V4	12SQ7	0	15 meg.	0	2.8 meg.	600 K	540 K	0	19
V5	50L6GT	Inf.	110	45 K	45 K	450 K	Inf.	47	150
V6	35Z5GT	Inf.	160	150	45 K	190	Inf.	110	45 K

NC = no connection; K = kilohm; meg. = megohm; Inf. = infinity

ALIGNMENT PROCEDURE

1. To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate.
2. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and chassis.
3. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading.
4. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 8 (grid) of 12SA7 (V2). Low side to chassis.	455 KC.	Variable condenser fully open.	Across voice coil.	A1, A2 (2nd I-f trans. T2). A3, A4 (1st I-f trans. T1).	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001 mfd. to reduce hum modulation.
2	0.1 mfd.	High side to external antenna lead. Low side to chassis.	455 KC.	Variable condenser fully open.	Across voice coil.	A5 (Trimmer) cond. C7).	Adjust for minimum output.
3	200 mmf.	"	1620 KC.	Variable condenser fully open.	Across voice coil.	A 6 (Trimmer) cond. C4).	Adjust for maximum output.
4	200 mmf.	"	1400 KC.	Tune for maximum output.	Across voice coil.	A7 (Trimmer) cond. C3).	Adjust for maximum output.

REPLACEMENT PARTS LIST

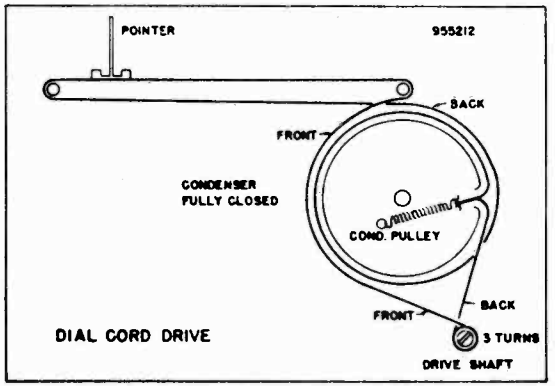
Symbol	†Part No	DESCRIPTION	Symbol	†Part No.	DESCRIPTION
V1	6SS7	R-f amplifier	R4, R9	351490	15 megohms, ½ watt resistor
V2	12SA7	Converter	R5	*	22 kilohms, part of L3
V3	6SS7	I-f amplifier	R6	351330	3.3 megohms, ½ watt resistor
V4	12SQ7	Detector, a.v.c., audio amplifier	R7	*	47 kilohms, part of T2
V5	50L6GT	Power output	R8	390053	.5 megohms, volume control
V6	35Z5GT	Rectifier	R10, R11	351130	470 kilohms, ½ watt resistor
C1, C2	900037	Two-gang variable condenser	R12	340290	150 ohms, ½ watt resistor
C3, C4	*	Trimmers, part of var. cond.	R13	370150	39 ohms, 1 watt resistor
C5, C8	920060	.05 mfd., 200 volt paper cond.	R14	370490	1000 ohms, 1 watt resistor
C6	910010	110 mmf., mica condenser	L1	700033	Loop antenna
C7	*	Trimmer, part of wave trap L2	L2	708060	Wave trap
C9	*	Part of 2nd i-f trans. T2	L3	716024	Oscillator coil
C10, C11, C12, C13	470310	220 mmf.—.002 mfd.—220 mmf.—.005 mfd.coupling cond. assembly	T1	720058	First i-f transformer
			T2	720390	Second i-f transformer
C14	920020	.02 mfd., 200 volt paper cond.	T3	734046	Output transformer
C15, C16	920030	.05 mfd., 400 volt paper cond.	SP1	180043	P.m. speaker, 4"
C17	925104	30-50 mfd., 150 volt elect. cond.	SW1	*	Line switch, part of vol. control
R1	340730	10 kilohms, ½ watt resistor	P.L.	807000	Dial light
R2	340810	22 kilohms, ½ watt resistor		507060	Dial light socket
R3	340870	39 kilohms ½ watt resistor		583070	Line cord

CABINET AND DIAL PARTS

†Part No.	
140210	Cabinet, walnut plastic
140213	Cabinet, ivory plastic
560190	Cabinet back
460470	Knob, black
525035	Pointer
520076	Dial glass
520078	Dial back plate
280313	Dial drive shaft
530002	Dial drive cord (39")
587070	Dial drive spring

† Specify part numbers when ordering.

* Not supplied separately.



MODELS 1002, 1003

EMERSON RADIO & PHONOGRAPH CORP.

An oscillator with frequencies of 455, 600 and 1425 kc is required.

An output meter should be connected across the primary or secondary of the output transformer for observing maximum response.

Always use as weak a test signal as possible when aligning the receiver.

Plug the receiver into the power supply outlet in such a way that the ground side of the power line is connected to the receiver B—

R-f Alignment

1. Connect the oscillator to a coil composed of three or four turns of wire wound in a circle approximately 12" in diameter. This coil should be held parallel to and in line with the loop antenna of the receiver at a distance of 15 to 20 inches.
2. Radiate a signal at 1425 kc, set the dial indicator to 1425 kc, and adjust the trimmers on the variable condenser (C3. C4) for maximum response.
3. Radiate a 600 kc signal and tune in the signal on the receiver. Adjust the loose outside turn of the loop antenna for maximum response. This loose turn may be moved to either side of the center. Fasten it in the position which gives maximum response.
4. Repeat steps 2 and 3 until no further improvement is evident.

Location of Coils and Trimmer Adjustments

The first i-f transformer (T1) is mounted on top of the chassis deck at the rear and to the right of the variable condenser. The trimmers (C5, C6) are accessible through holes in the top of the can.

The second i-f transformer (T2) is mounted on top of the chassis to the right of the speaker. The trimmers (C7, C8) are accessible through holes in the top of the can.

The trimmer for the antenna (C3) and the trimmer for the oscillator coil (C4) are located on the variable condenser. The trimmer on the front section is for the oscillator coil.

The oscillator coil (T4) is located underneath the chassis. The loop antenna acts as the antenna coil.

I-f Alignment

1. Rotate the variable condenser to the minimum capacity position.
2. Feed 455 kc to the converter grid (stator of the r-f section of the variable condenser) and adjust the four i-f trimmers (C5, C6, C7, C8) for maximum response.

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

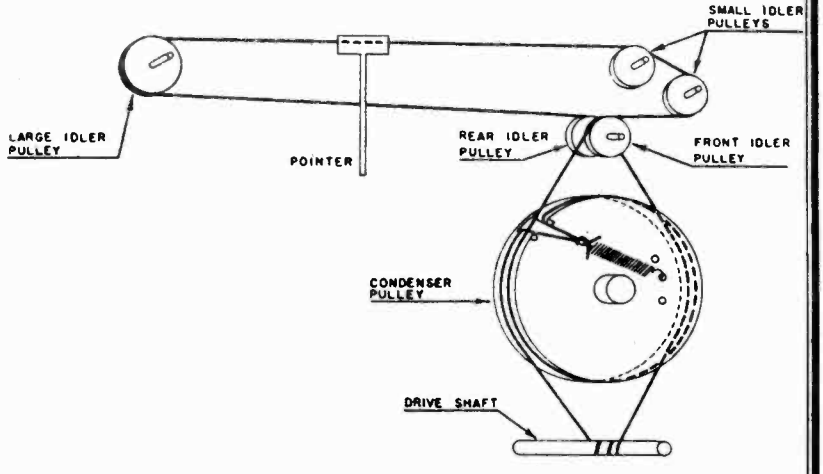
Grid—green	Plate—blue
Grid return—black	B+—red

The following voltage readings are d-c measurements taken from B— (line switch) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (*), which should be taken with a d-c vacuum-tube voltmeter. Line voltage for these readings was 117 volts, 60 cycles, a.c. Measurements made with 117 volts d.c. will be lower than those given below. Take readings with the volume control set at minimum and the variable condenser closed.

TUBE	PIN NUMBER							
	1	2	3	4	5	6	7	8
12SA7			89	89	*-10			*-1.6
6SS7(V2)				*-1.6		89		89
12SQ7		*-0.7		*-1.6	*-0.5	*52.0		
50L6GT			110	89				6.2
35Z5GT				116				117
6SS7(V6)			1.4		1.4	*40.0		89

CABINET, DIAL AND ACCESSORY PARTS

520480	Dial backplate
280313	Drive shaft
520450	Dial glass
525012	Pointer
140029	Cabinet (Model 1002)
560101	Cabinet back (Model 1002)
460470	Knob (Model 1002)
140054	Cabinet (Model 1003)
460140	Knob (Model 1003)
470222	Plug and cable with ear receiver, complete
585315	Plug and cable (for ear receiver 829001)
585122	Plug and cable (for ear receiver 829002)
508115	Socket for ear receiver plug
460005	Ear mold, or
460006	Ear mold
505057	Plug, less cover and screw
505058	Plug cover
204116	Machine screw
470220	Under-pillow speaker, with plug
829003	Under-pillow speaker, less plug



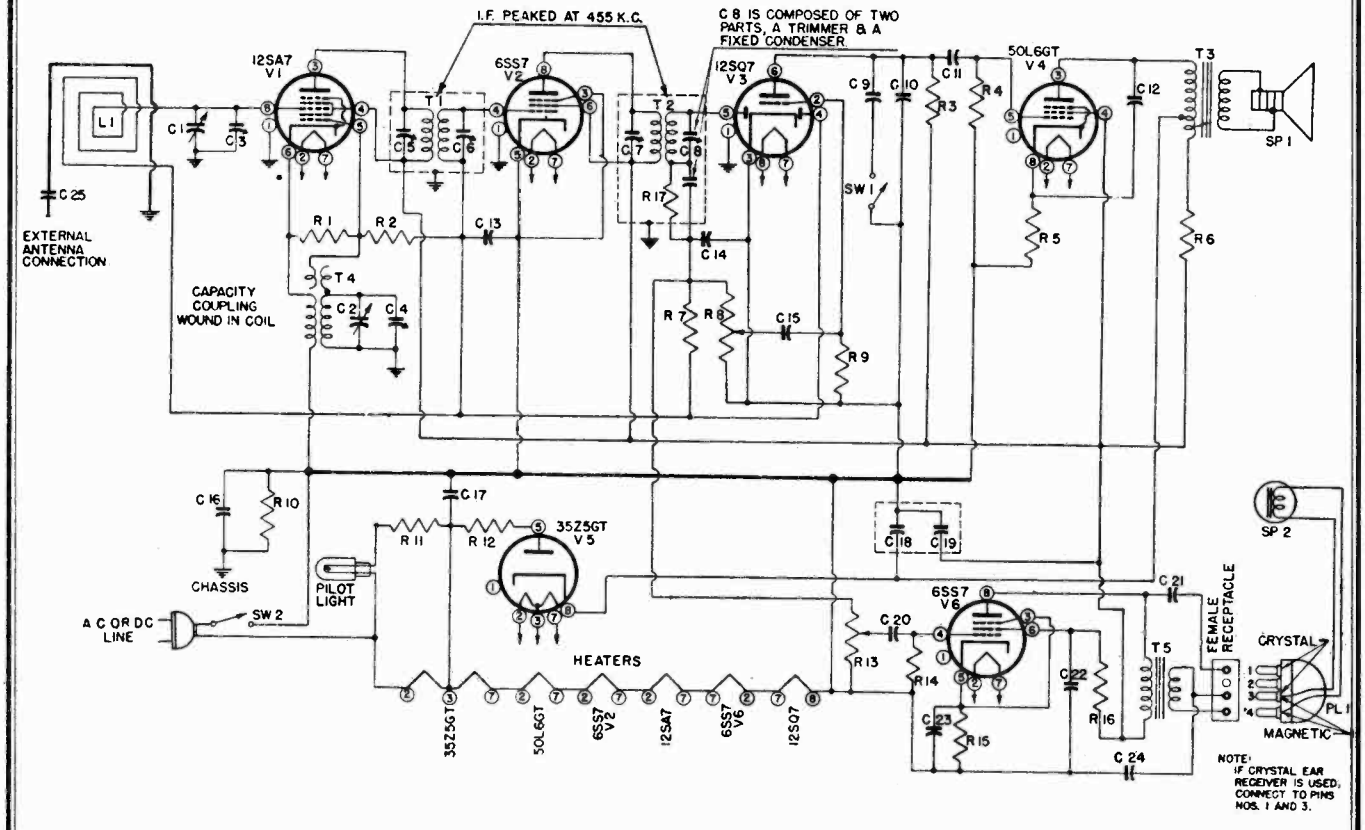
CUT-AWAY VIEW SHOWING METHOD OF STRINGING PULLEYS.

EMERSON RADIO & PHONOGRAPH CORP.

MODELS 1002, 1003
Chassis 129003

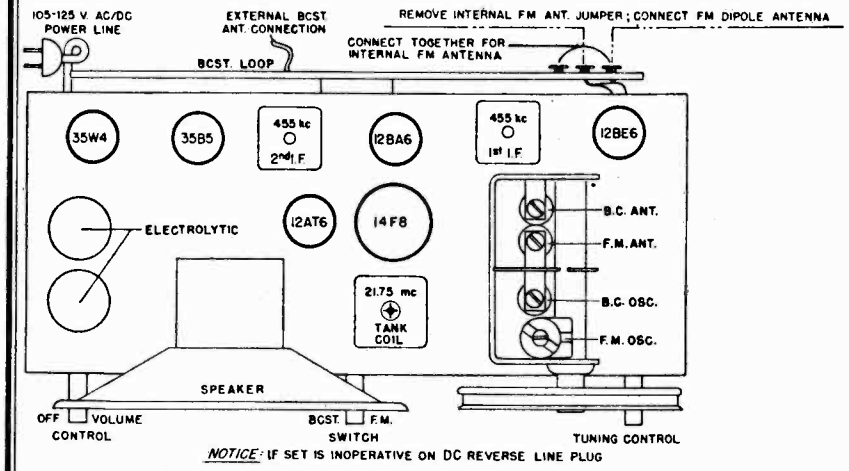
TYPE: Single-band superheterodyne with hearing aid receiver.

FREQUENCY RANGE: 540-1620 kc.



Schematic Symbol	†Part No.	DESCRIPTION
C1, C2	900070	Two-gang variable condenser
*C3, C4		Trimmers, part of variable condenser
*C5, C6, C7, C8		Trimmers, part of i-f transformers
C9, C15, C20, C25	920010	0.002 mfd., 600 volt condenser
C10	920240	0.0005 mfd., 600 volt condenser
C11, C12, C21	920020	0.02 mfd., 400 volt condenser
C13	920040	0.1 mfd., 200 volt condenser
C14	910010	0.00011 mfd. mica condenser
C16	920050	0.2 mfd., 200 volt condenser
C17, C24	920030	0.05 mfd., 400 volt condenser
C18, C19	925011	50-50 mfd., 150 volt dual electrolyti condenser
C22	920060	0.05 mfd., 200 volt condenser
C23	925180	10 mfd., 25 volt electrolytic condenser
L1	700000	Loop antenna
R1	340810	22,000 ohms, ½ watt resistor
R2, R9	397000	15 meg., ½ watt resistor
R3, R4	351130	470,000 ohms, ½ watt resistor
R5	340290	150 ohms, ½ watt resistor
R6	370490	1000 ohms, 1 watt resistor
R7, R14	351330	3.3 meg., ½ watt resistor
R8	390190	0.5 meg. volume control
R10	351050	220,000 ohms, ½ watt resistor
R11	340010	10 ohms, ½ watt resistor
R12	340050	15 ohms, ½ watt resistor

Schematic Symbol	†Part No.	DESCRIPTION
R13	390180	0.5 meg. volume control (sets below 8,767,450), or
R13	390014	2 meg. volume control (sets 8,767,450 and higher)
R15	340410	470 ohms, ½ watt resistor
R16	351050	220,000 ohms, ½ watt resistor (sets below 8,767,450), or
R16	340970	100,000 ohms, ½ watt resistor (sets 8,767,450 and higher)
SP1	180008	P.M. speaker
SP2	829001	Telex ear receiver (name imprinted), or
SP2	829002	American Earphone ear receiver (no imprint)
SW1	510120	Tone control switch
*SW2		Line switch on volume control
T1	720380	First i-f transformer
T2	720390	Second i-f transformer
T3	734080	Output transformer (used with speaker)
T4	716070	Oscillator coil (sets below 8,767,450), or
T4	716005	Oscillator coil (sets 8,767,450 and higher)
T5	734001	Output transformer (used with ear receiver)
	807000	Pilot light
	507215	Pilot light socket
	583150	Line cord



POWER SOURCE:

This receiver may be operated from either an AC or DC line, between 105 and 125 volts. On AC lines the frequency must be 50 to 60 cycles.

TUBE COMPLEMENT:

1 12BE6 — AM converter.
1 12BA6 — AM intermediate frequency amplifier.
1 12AT6 — AM demodulator and AVC; AM-FM 1st audio amplifier.
1 14F8 — FM oscillator-mixer-Super Regenerative I.F. amp.
1 35B5 — Audio output amplifier.
1 35W4 — Power rectifier.

INSTALLATION:

1. Antenna Connection.

AM—A self contained loop antenna is provided, which will give satisfactory reception on the standard broadcast band without requiring any additional external antenna. However, if stronger signals are desired from weak or distant stations an external antenna may be connected to the wire extending from the loop.

FM—A self contained line antenna system is provided for reception of stations appearing in the FM band. To use this line antenna a short wire jumper should be connected between the two outside screw terminals of the FM antenna panel, which is mounted on the broadcast loop antenna form. Should poor reception conditions make it necessary, an FM dipole antenna may be connected to the left hand and center screw terminals of the FM antenna panel. In such a case, the line antenna link should be disconnected.

2. Ground.

This set has been designed to operate without an external ground, and the use of any ground connection is not recommended.

3. Power Connection.

After making certain that the power circuit is rated between 105 and 125 volts extend the line cord to its full length and insert the plug into the nearest convenient outlet. If the supply is DC, and the set fails to operate, it may be necessary to reverse the plug connection to secure operation of the set.

OPERATION:

The left hand knob controls the ON-OFF power switch and volume level. To turn receiver on, rotate this knob in a clockwise direction. Within a few degrees of rotation an audible click will be heard, and the dial will become luminous. After a half minute of warm up the receiver will be in an operating condition. Further advance of this control in a clockwise direction will provide an increase in volume level.

The center knob controls the selection of AM or FM stations. When rotated to the counterclockwise position, operation in the AM (standard broadcast) band is provided. When this control is rotated to the clockwise position, FM stations may be tuned in.

The right hand or tuning knob enables the selection of any desired station as indicated on the calibrated dial. The upper row of numbers is calibrated directly in megacycles and covers the FM band. The lower scale is used to tune in stations in the standard broadcast band. Add one zero to the numbers on this scale to obtain the station frequency in kilocycles.

VI. SERVICE ADJUSTMENTS:

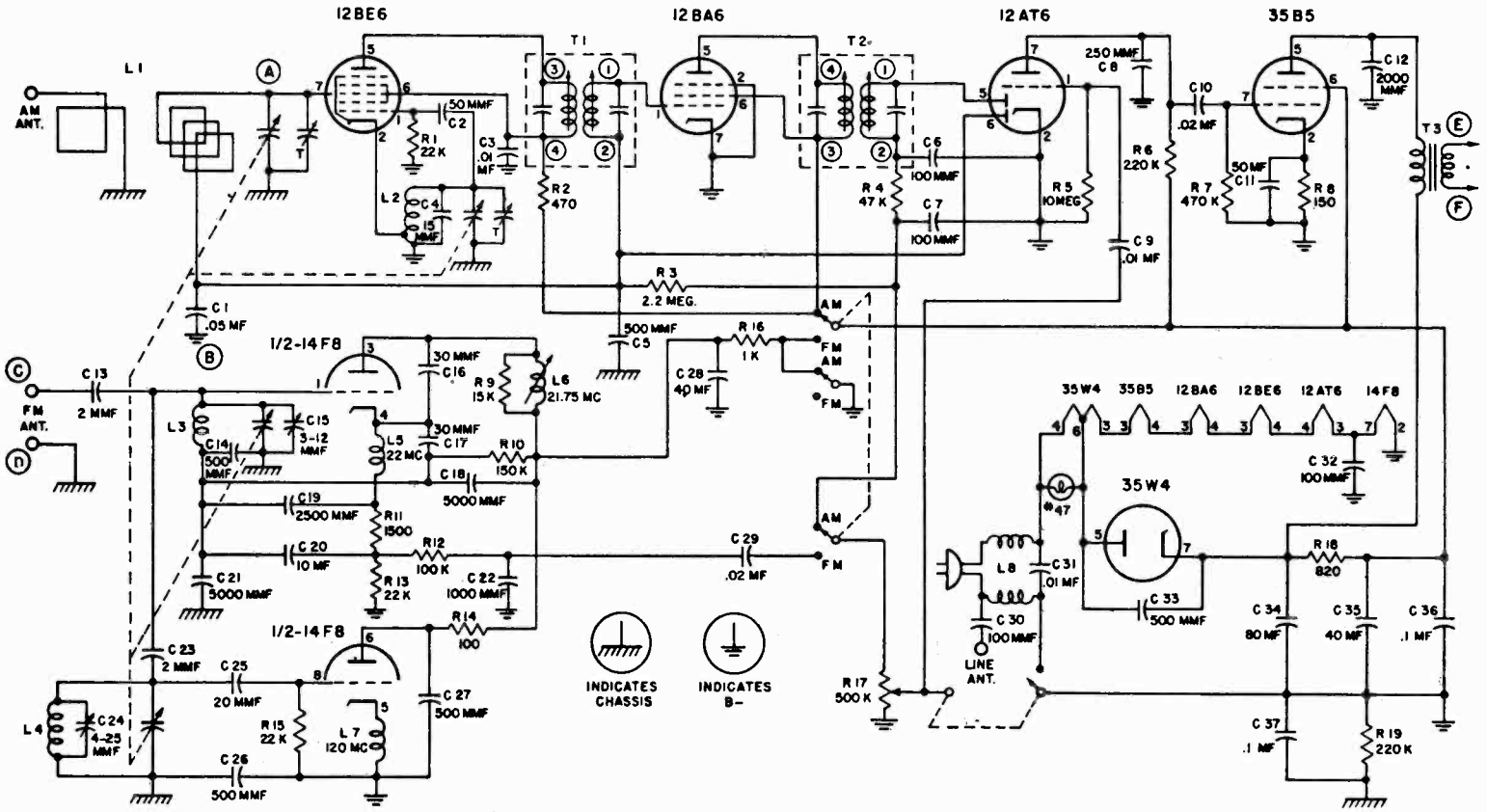
Alignment or adjustment of the various circuits of this receiver can only be made by a skilled radio technician with the proper equipment.

NOTE: Points A, B, C, D, E, and F are noted on the circuit diagram.

AM Equipment:

Equipment Required:
a) Broadcast Band Signal Generator.
b) Output Meter.

1. Set band switch at AM. Advance volume control to full volume setting.
2. Connect output meter across voice control at points "E" and "F".
3. Connect the "high" side of the Signal Generator to point "A" through a .01 mfd condenser. Connect the "ground" side to point "B". Adjust the Signal Generator to 455 kc and with the receiver switched on, adjust the first and second I.F. transformers for peak output as shown on the output meter. The signal injected into the receiver should be as small in magnitude as possible, consistent with a useful deflection on the output meter.



4. Connect the "high" side of the Generator to the antenna terminal with a 200 mmf condenser inserted in series. Connect the "ground" side of the Generator to point "B".
5. Tune receiver to 150 on the dial. Adjust Signal Generator to 1500 kc. Adjust BC oscillator and BC antenna trimmers for maximum output. Use a weak signal for final adjustment.

FM Equipment:

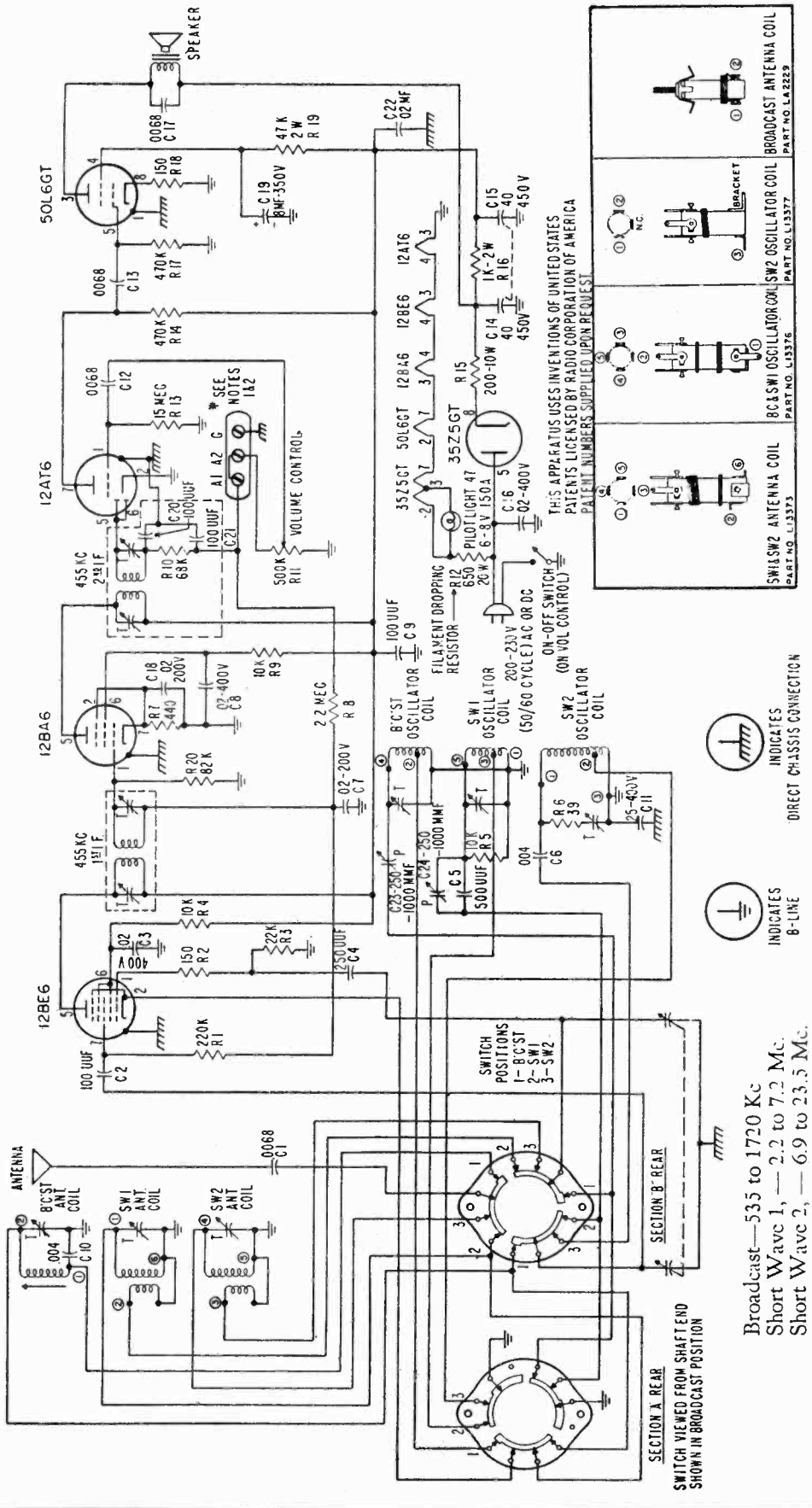
Equipment Required:

a) 21.75 kc oscillator.
b) FM Signal Generator for 88 to 108 megacycle range.
c) Output meter.

1. Connect output meter across points "E" and "F".
2. With set switched on and volume control at maximum, feed modulated 21.75 mc signal into terminals "C" and "D".
3. Adjust tank coil for maximum response on output meter.
4. Disconnect 21.75 kc oscillator and connect FM signal generator to points "C" and "D".
5. Set receiver dial to 88 megacycles and adjust Signal Generator for same frequency. Adjust spacing of FM oscillator coil for maximum signal response.
6. Tune receiver to 108 megacycles and adjust Signal Generator to same frequency. Adjust FM oscillator trimmer for maximum signal response.
7. Repeat operation 5 and 6.
8. Tune receiver to 90 megacycles and adjust Signal Generator for same frequency. Adjust spacing of the FM antenna coil for maximum signal response with minimum background noise. Slowly rock tuning control while performing this adjustment.
10. Repeat operations 8 and 9.

MODEL 502K

ESPEY MFG. COMPANY, INC.



Broadcast—535 to 1720 Kc
Short Wave 1, — 2.2 to 7.2 Mc.
Short Wave 2, — 6.9 to 23.5 Mc.

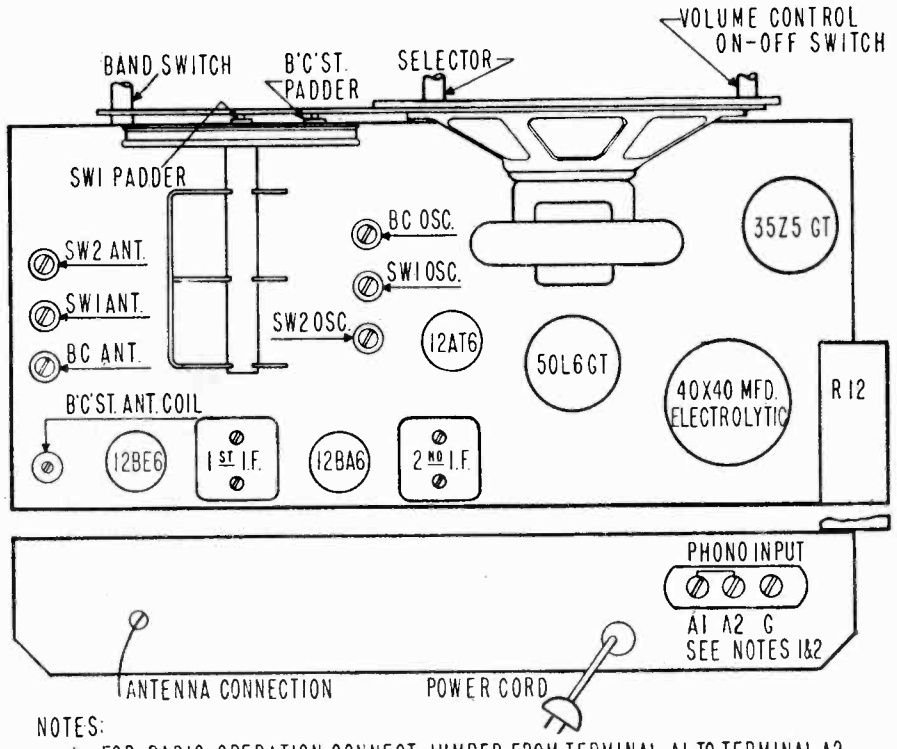
SCHEMATIC DIAGRAM (*figure 2*)

TUBE COMPLEMENT:

1 type 12BE6 — Converter, Oscillator
1 type 12BA6 — I.F. Amplifier
1 type 12AT6 — Detector, A.V.C., First Audio Amplifier
1 type 50L6GT — Beam power output
1 type 35Z5GT — Rectifier

FAILURE OF THE RADIO RECEIVER TO OPERATE MAY BE DUE TO:

1. No current at power socket.
2. Tubes not firmly in sockets.
3. Antenna not connected.
4. Defective tube.
5. Band Switch in wrong position.
6. "Phono" terminal jumper missing or or incorrectly connected.



NOTES:
1—FOR RADIO OPERATION CONNECT JUMPER FROM TERMINAL A1 TO TERMINAL A2.
2—FOR PHONO OPERATION REMOVE A1 TO A2 JUMPER, CONNECT PICKUP ACROSS TERMINAL A2 & G.

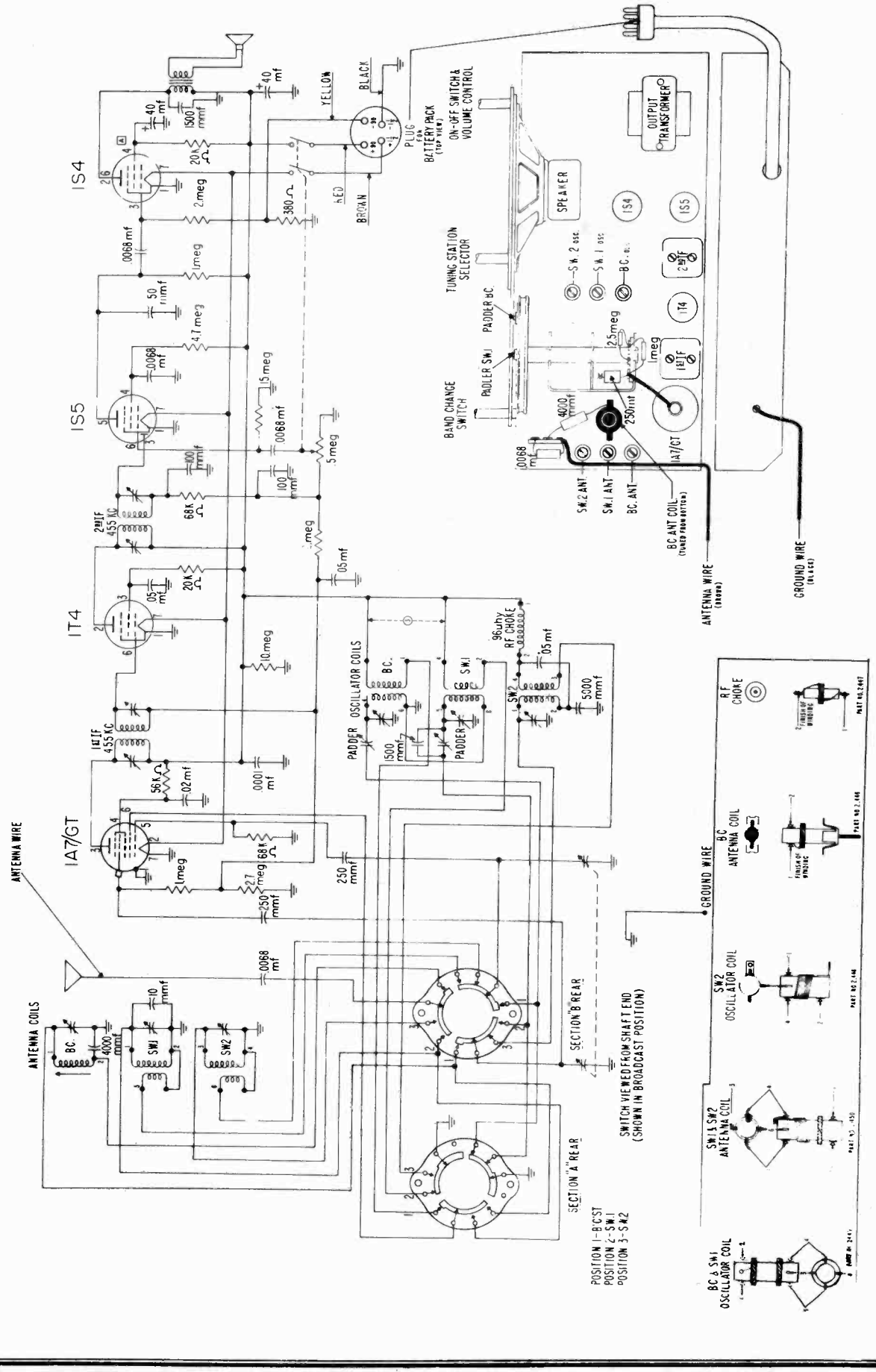
Figure 1 Tube and Trimmer Locations Radio Receiver Model 502K

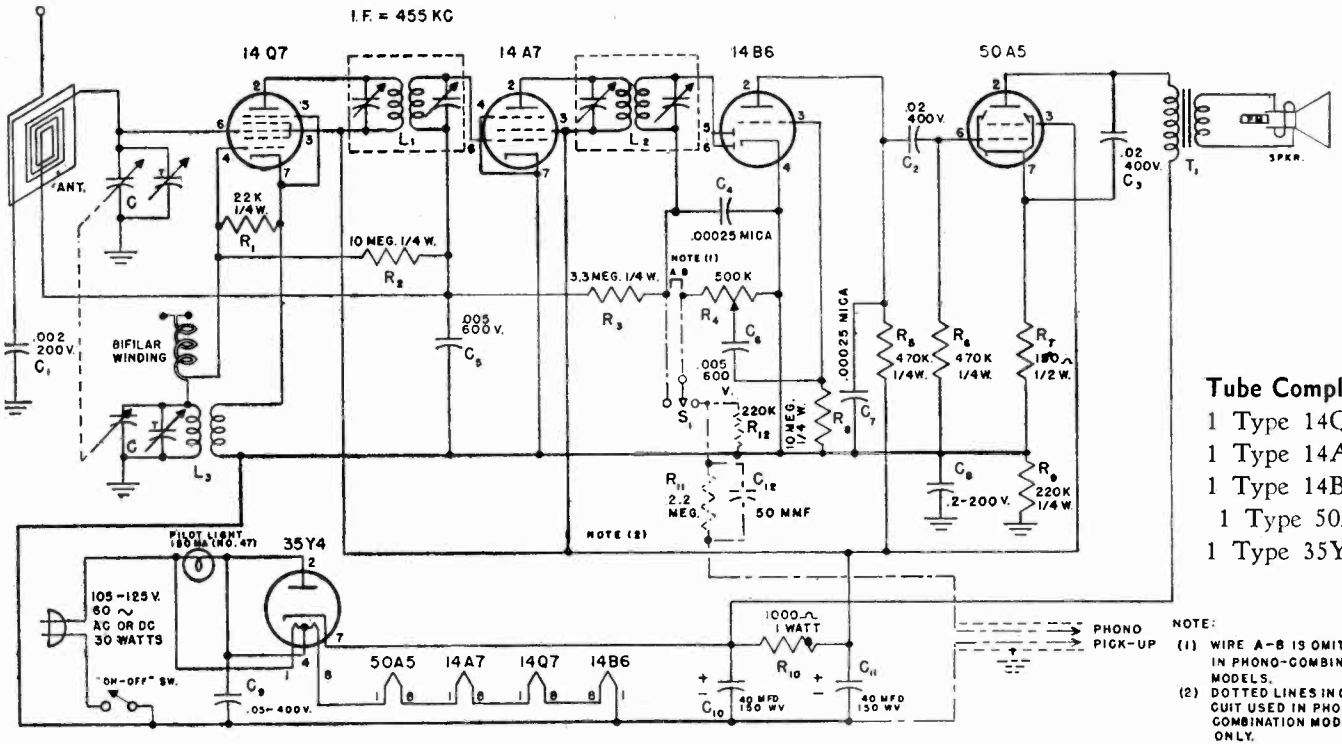
ALIGNMENT PROCEDURE:

Steps	Connect Output of Generator to	Tune Generator to	Band Switch to	Tune Radio to	Adjust the following for maximum peak output
1.	Tuning condenser stator (RF) in series with .05 mfd.	455 kc	Best	Quiet point on high frequency end of dial.	2nd and 1st transformers.
2.	Ant in series with 200 mmf.	1500 kc	Best	1500 kc on dial.	BC Osc. Trimmer
3.	Same as above	1500 kc	Best	Sig. (1500 kc).	BC Ant. Trimmer
4.	Same as above	600 kc	Best	600 kc on dial.	BC Osc. padder. Ant. Coil core.
5.	Same as above	1500 kc	Best	1500 kc on dial.	BC Osc. trimmer. BC Ant. trimmer.
6.	Ant. in series with 400 ohm Carbon resistor	6Mc	SW1	6Mc on dial.	SW1 Osc. trimmer**
7.	Same as above	6Mc	SW1	6Mc	SW1 Ant. trimmer.
8.	Same as above	2.5Mc	SW1	2.5Mc	SW1 Ant. trimmer. Rock in SW1 Osc. padder.
9.	Same as above	6Mc	SW1	6Mc (sig.)	SW1 Ant. trimmer. SW1 Osc. trimmer.
10.	Same as above	21Mc	SW2	21Mc	SW2 Osc. trimmer.** SW2 Ant. trimmer.
11.	Same as above	21Mc	SW2	Sig. (21 Mc).	SW2 Ant. trimmer.

*Before alignment set dial pointer on dial point marker with condenser plate fully meshed.
**Caution adjust to peak closest to minimum trimmer capacity.

MODEL 528 ESPEY MFG. COMPANY, INC.





NOTE:
(1) WIRE A-B IS OMITTED IN PHONO-COMBINATION MODELS.
(2) DOTTED LINES IN CIRCUIT USED IN PHONO-COMBINATION MODELS ONLY.

Tube Complement:

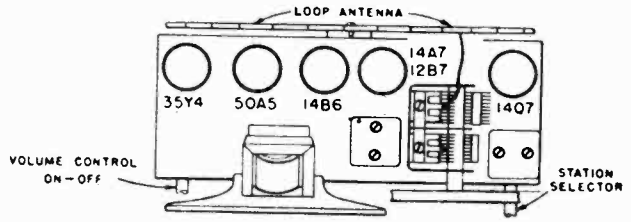
1 Type 14Q7—Oscillator—Converter.
1 Type 14A7—I. F. Amplifier,
1 Type 14B6—Det. A.V.C. and Amp.
1 Type 50A5—Power Amp.
1 Type 35Y4—Rectifier.

Alignment Procedure:

Steps	Connect output of oscillator to	Tune osc. to	Tune radio dial to	Adjust the following for max. peak output
1.	Tuning condenser stator (ant.) in series with .01 mfd.	455	Quiet point at high frequency end of dial.	1st and 2nd I. F. Transformers
2.	Antenna term. of Ant. loop in series with 100 mmf.	1720	Full clockwise (out of mesh)	Osc. trimmer
3.	Antenna term. of Ant. loop in series with 100 mmf.	1500	1500	Ant. trimmer

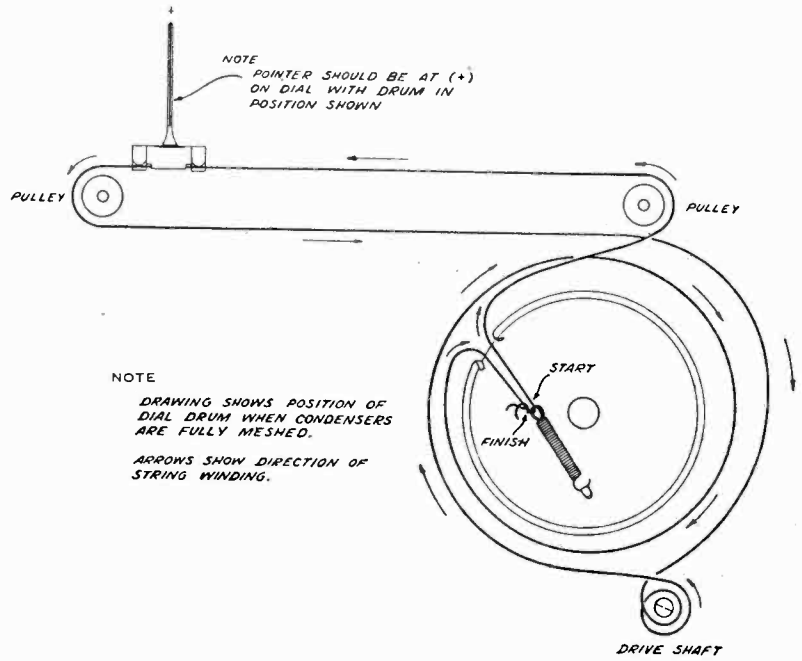
Output meter is connected across voice coil. Receiver volume is turned to maximum.

Fig. 1—Tube and Trimmer locations:



NOTE: Trimmers may be located on either long or short side of variable condenser.

Nylon cord of the tuning and dial system may be replaced by following the diagram below.

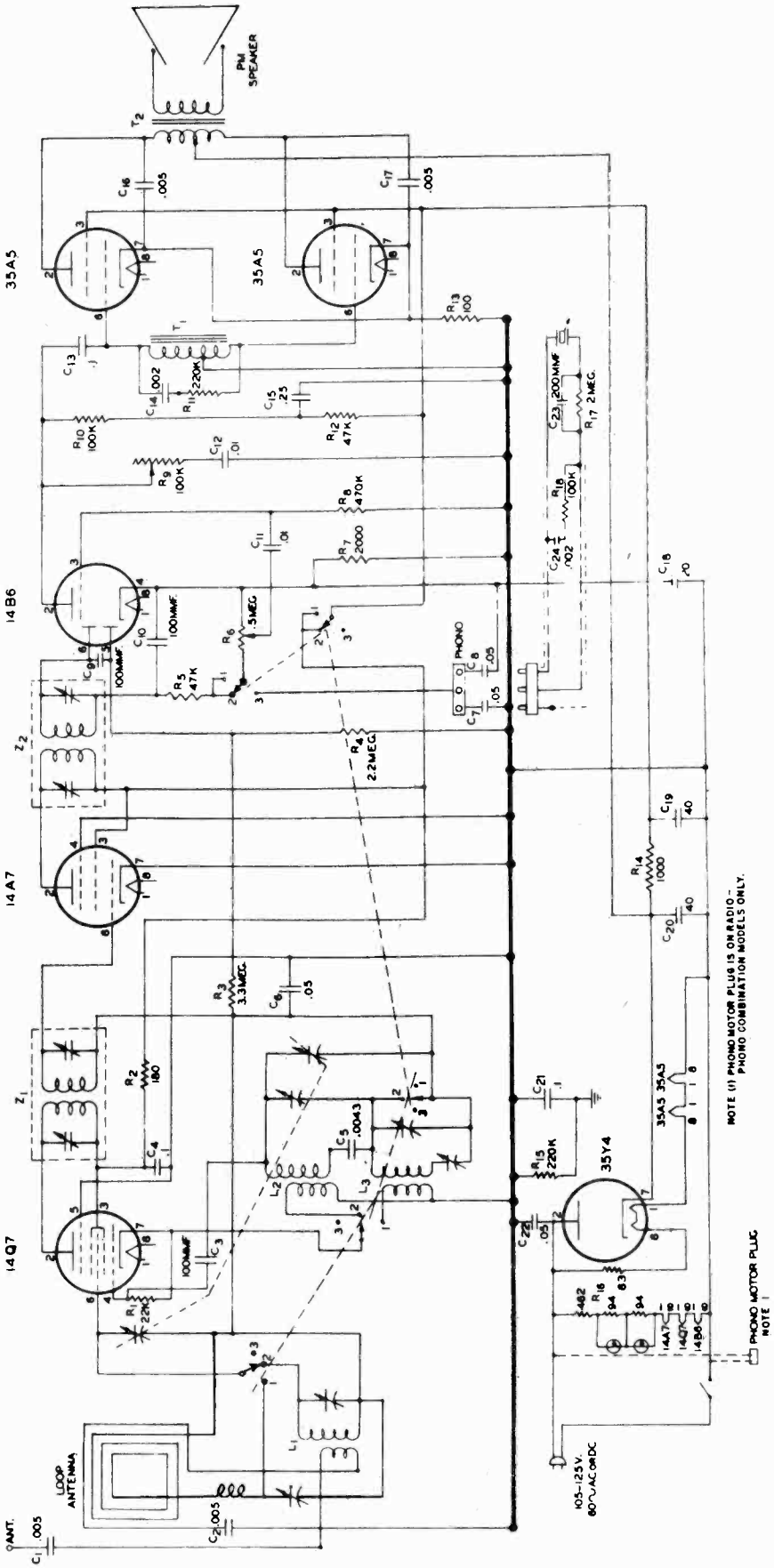


Parts List:	**Part No.**
C —Two gang variable cond. with trimmers.	C-6.032
C 1—.002 Mfd., 200V paper	
C 2—.02 Mfd., 400V paper	
C 3—.02 Mfd., 400V paper	
C 4—.00025 Mfd., mica	
C 5—.005 Mfd., 600V paper	
C 6—.005 Mfd., 400V (or 600V) paper	
C 7—.00025 Mfd., mica	
C 8—.25 Mfd. (or .20 Mfd.), 200V paper	
C 9—.05 Mfd., 400V, molded bakelite	
C10, 11—Dual 40 Mfd., 150V	A-25.019
*C12—50 Mmf., 20%	
R 1—22K, ¼W, 20%	
R 2—10 meg, ¼W, 20%	
R 3—3.3 meg, ¼W, 20%	
R 4—500K variable, audio taper, with SPST	A-9.066
R 5—470K, ¼W, 20%	
R 6—470K, ¼W, 20%	
R 7—150 ohms, ½W, 10%	
R 8—10 meg, ¼W, 20%	
R 9—220K, ¼W, 20%	
R10—1000 ohms, 2W (or 1W), 20%	
*R11—2.2 meg, ¼W, 20%	
*R12—220K, ¼W, 20%	
L 1—Transformer, IF input, 455KC	C-2.191-1
L 2—Transformer, IF output, 455KC	C-2.191-2
L 3—Coil, oscillator	B-2.192
Antenna, loop	B-5.006
Loudspeaker, PM, 5", Transformer to match 50A5	B-11.037
Pilot light, Mazda No. 47, 150 Ma.	

* Used in phono combinations only.

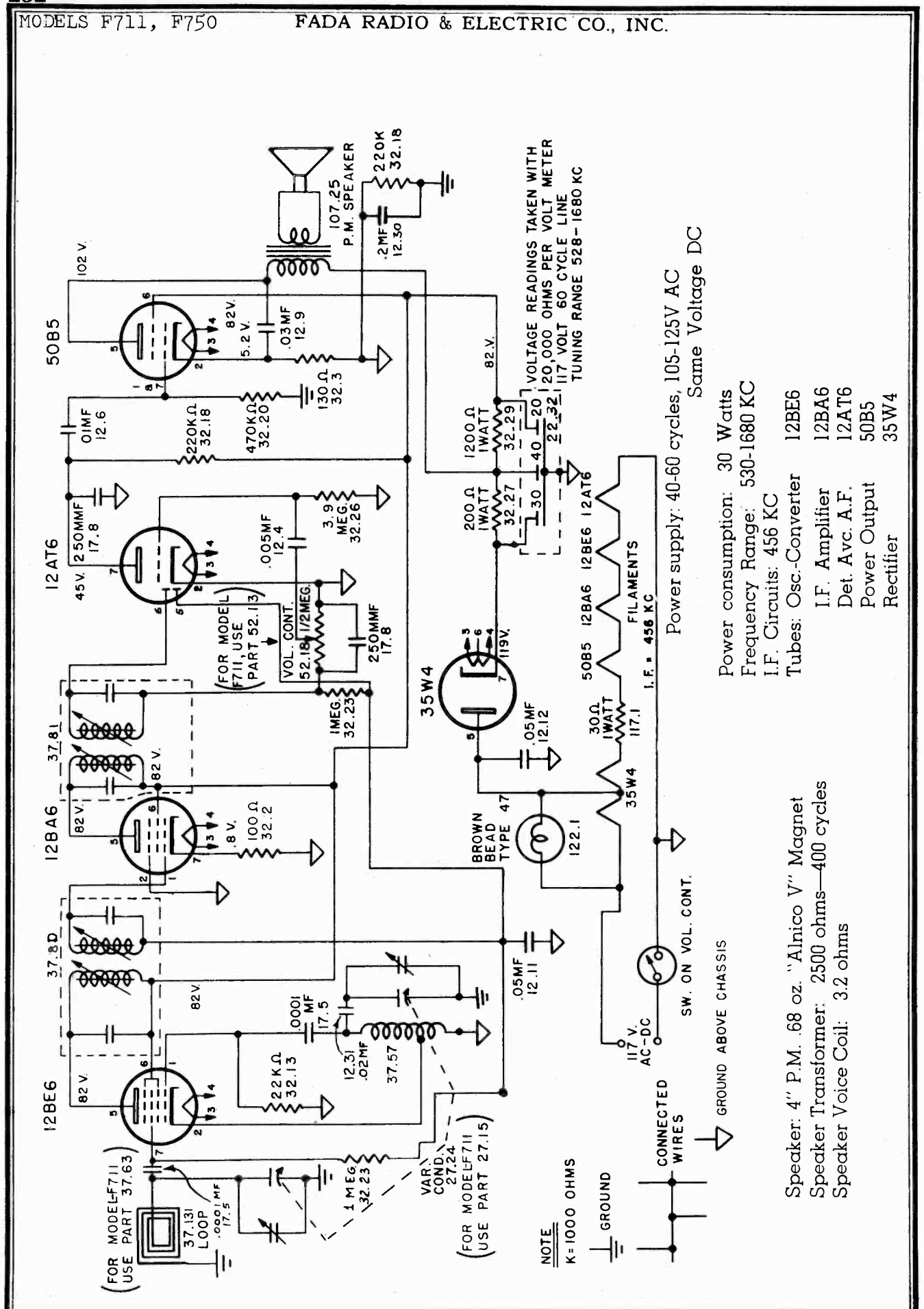
ESPEY MFG. CO. INC.

MODELS 6611,6613,6630,6632, 6634, Ch. FJ-97A



IF PEAK 455 KC

MODELS F711, F750 FADA RADIO & ELECTRIC CO., INC.



ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

Volume Control full on.

Low range A.C. meter connected across voice coil to indicate output.

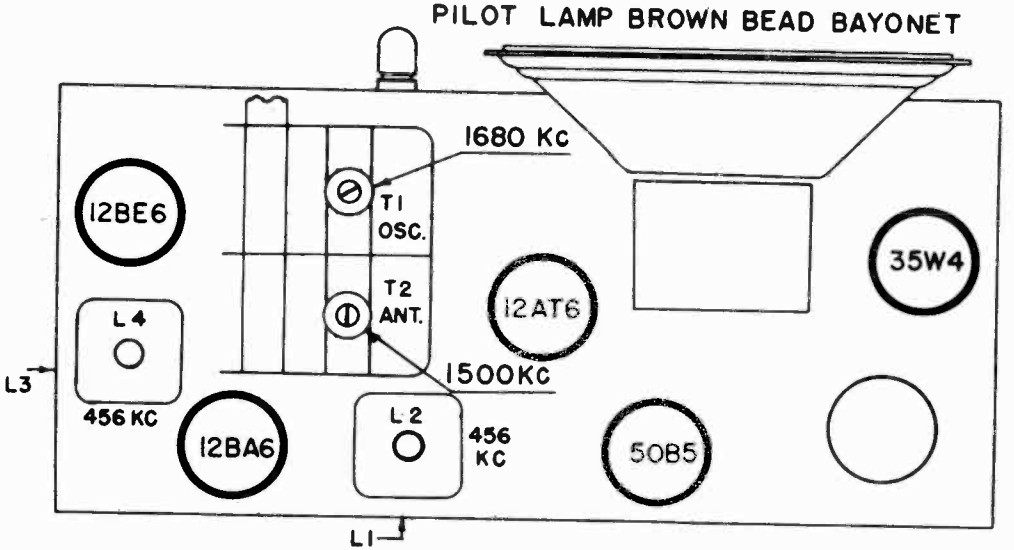
Keep signal generator attenuated so as to maintain 1 2 scale reading on output meter.

Make certain that dial pointer is exactly horizontal when variable condenser is fully meshed.

	Receiver Dial at:	Signal Generator	Dummy Antenna	Connect Signal Generator to:	Refer to Chassis Layout for Location of Trimmers
1	Full Open	Exactly 456 KC	.1 MF	Control Grid 12BE6 Tube (Top) Rear Section Variable Condenser	Adjust for Maximum Output L1, L2, L3 & L4
2	Full Open	Exactly 1680 KC		Radiating Loop (½ meter) 20" from Receiver Loop	Adjust for Maximum Output T1
3	Approx. 1500 KC	Approx. 1500 KC		Radiating Loop (½ meter) 20" from Receiver Loop	Adjust for Maximum Output T2
4	Approx. 600 KC	Approx. 600 KC		Radiating Loop (½ meter) 20" from Receiver Loop	Check tracking and bend slotted end plate (rear section) of variable, if necessary
5					

PARTS LIST

Part No.	Description
12.4	Tubular Condenser, .005 mf, 600 V
12.6	Tubular Condenser, .01 mf, 400 V
12.9	Tubular Condenser, .03 mf, 400 V
12.11	Tubular Condenser, .05 mf, 200 V
12.12	Tubular Condenser, .05 mf, 400 V
17.21	Mica Condenser, 100 mmf, ± 20%
17.22	Mica Condenser, 220 mmf, ± 20%
22.32	3 Section Electrolytic Condenser, 30-40-20 mf, 150 W.V.
27.24	Variable Condenser
37.37	Oscillator Coil
37.131	Loop Antenna & Back
37.80	Input I.F. Transformer, complete
37.81	Output I.F. Transformer, complete
52.18	Volume Control with Switch
72.1	Power Cord (Approved)
77.106	Dial Scale (Calibrated)
77.108	Dial Pointer
77.7	Dial Crystal
97.123W	Cabinet, Bakelite-Walnut
97.123V	Cabinet, Bakelite-Ivory
142.32W	Cabinet Knobs—Walnut
142.32V	Cabinet Knobs—Ivory
107.25T	4" P.M. Speaker with Transformer
107.25	4" P.M. Speaker less Transformer
42.25	Speaker Transformer for above U.L. approved
117.1	30 ohm 1 W. Resistor
12.30	.2 mf, 400 V.
12.31	.02 mf, 200 V.

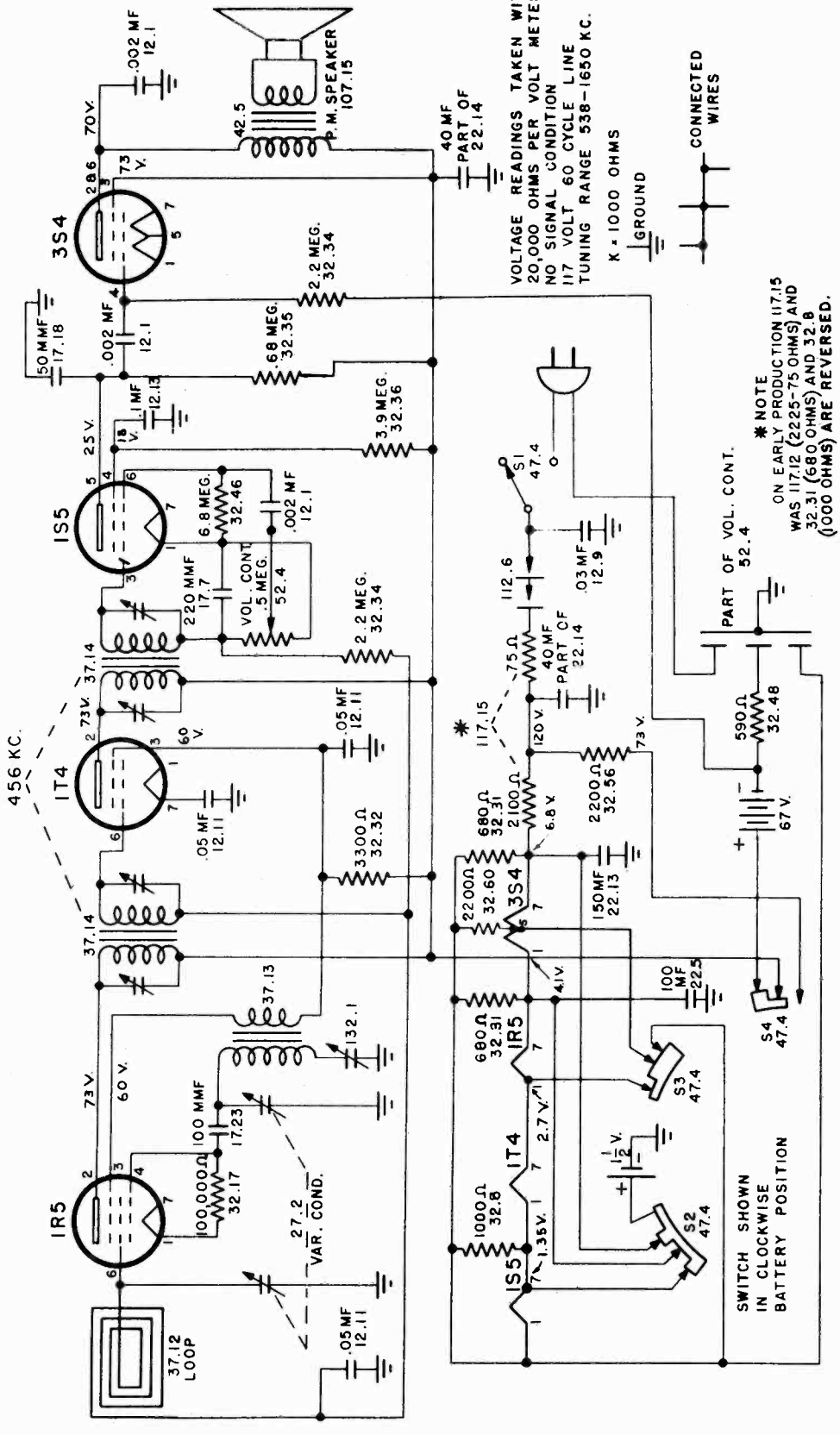


TUNING RANGE 530-1680K

TUBE LAYOUT F750

MODEL P-80 LATE

FADA RADIO & ELEC. CO. INC.



Rectifier, Selinium
Speaker 4" P.M. 1 oz. Alnico V Magnet.
Speaker Transformer 5500 ohms - 400 cycles
Speaker Voice Coil 3.2 ohms.

Power Supply: 105-125 V., 40-60 cycles AC
Same Voltage DC—Power Consumption 10 Watts
Battery Operation: 1—67½ V B — 2—1½ V D Cells in parallel
Frequency Range: 1640 — 530 KC
I.F. Circuits: 456 KC

Tubes: 1R5 Osc. Converter
1T4 I.F. Amplifier
1S5 Det. AVC A.F.
3S4 Power Output

PARTS LIST

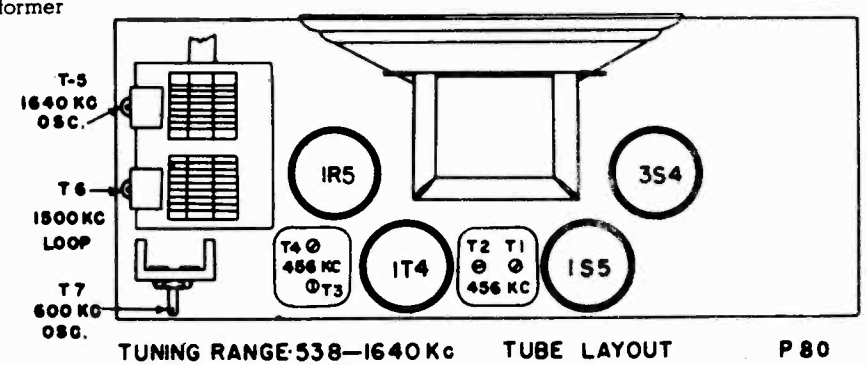
Part No.	Description
12.1	Tubular Condenser .002 mf 200 V
12.9	Tubular Condenser .03 mf 400 V
12.11	Tubular Condenser .05 mf 200 V
12.13	Tubular Condenser .1 mf 100 V
12.14	Tubular Condenser .1 mf 200 V
17.7	Ceramic Condenser 200 mmf ± 20%
17.18	Ceramic Condenser 50 mmf ± 20%
17.21	Ceramic Condenser 100 mmf ± 20%
22.5	Electrolytic Condenser 100 mf 15 V
22.13	Electrolytic Condenser 150 mf 15 V
22.14	Electrolytic Condenser 40-40 mf 150 V
27.2	Variable Condenser 2 gang
37.13	Oscillator Coil
37.14	Input & Diode I.F. Transformer
42.5	Speaker Transformer
47.4	Changeover Switch
52.4	Volume Control w/on-off switch
72.35	Power Cord
112.6	Rectifier Selinium
117.15	W. W. Resistor
132.1	Padder Condenser
142.6	Knob-Tuning — Ivory only
142.7	Knob-Pointer — Ivory only
142.8	Knob-Volume or Changeover — Ivory only
157.3	Loop & Cover Assembly
157.4	A. Battery Contact Assembly
92.25	B. Battery Connector
92.80	Spring Clip Phospher Bronze
92.81	Ball Knob
157.5	Cabinet Assembly — complete w/front & rear lid & hinges less loop & spring catch (Specify color)
107.15	4" Speaker 1 oz. less transformer
107.15T	4" Speaker 1 oz. with transformer

ALIGNMENT PROCEDURE

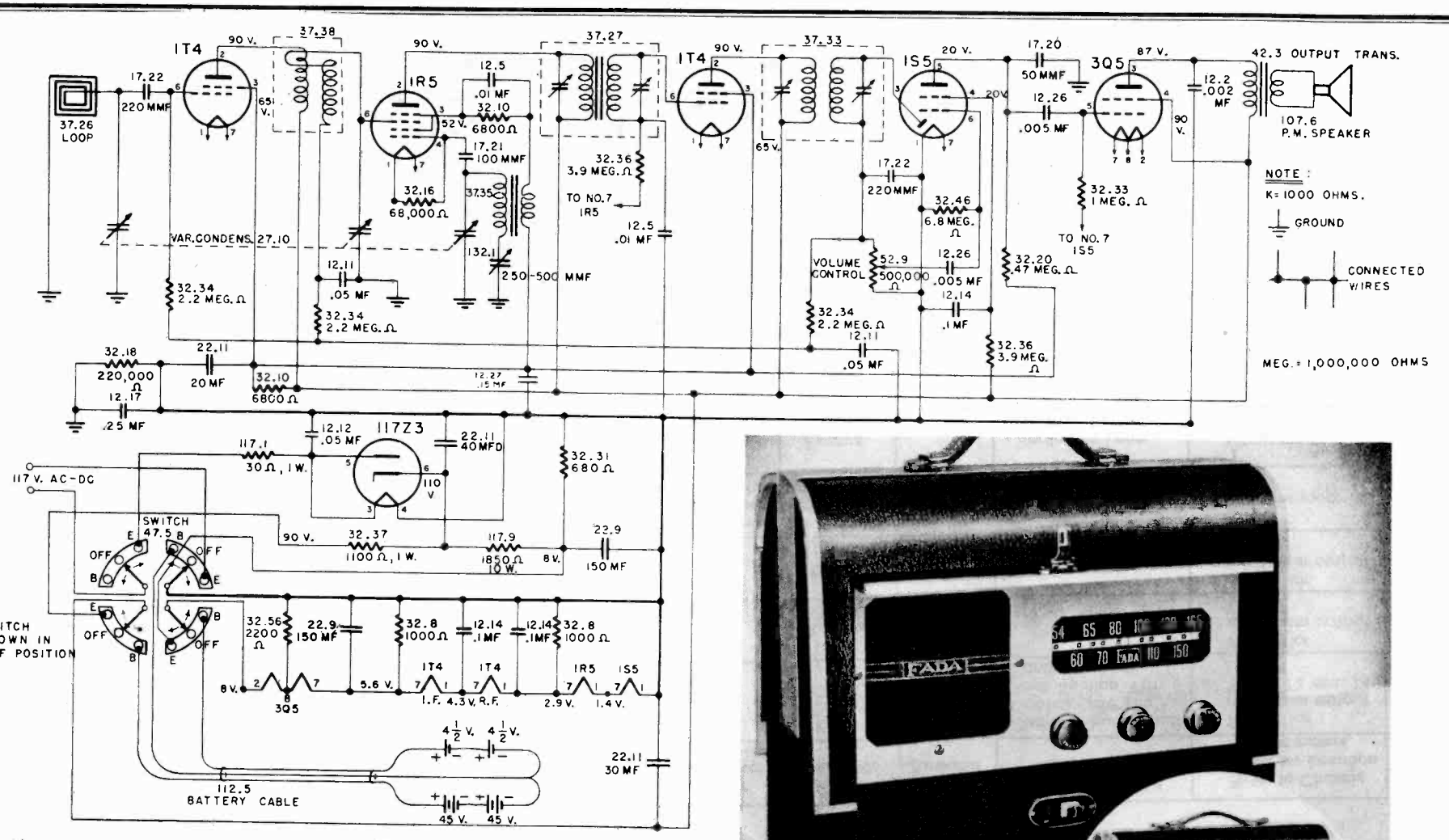
No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

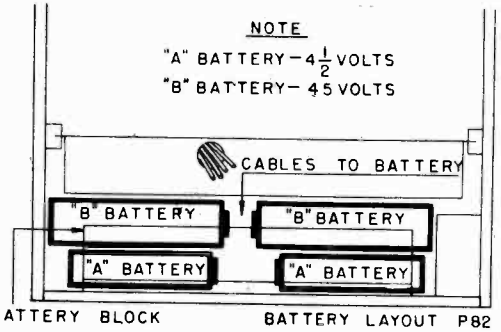
Disconnect Loop leads—Remove Chassis from Cabinet.
Volume Control full on.
Low range A.C. meter connected across voice coil to indicate output.
Keep signal generator attenuated so as to maintain ½ scale reading on output meter.
Use battery power when available.

Receiver Condenser at:	Signal Generator	Dummy Antenna	Connect Signal Generator to:	Refer to Chassis Layout for Location of Trimmers
1 Fully closed	Exactly 456 KC	.1 MF	Chassis Ground and Control Grid 1R5 Rear Section Var. Cond.	Adjust for maximum output T1, T2, T3, and T4.
2 Fully closed	Approx. 538 KC	.1 MF	"	Adjust for maximum output T7
3 Fully open	Exactly 1640 KC	.1 MF	"	Adjust for maximum output T5
Repeat Operations 2 and 3. The next two operations are performed with the chassis in the cabinet, the loop connected and tuning indicator in position.				
4 Approx. 1500 KC	Approx. 1500 KC		Radiating Loop 20" from Receiver	Adjust T6 for maximum output.
5 Approx. 600 KC	Approx. 600 KC		Radiating Loop 20" from Receiver	Adjust T7 for max. while rocking variable cond.



TUNING RANGE 538—1640 Kc TUBE LAYOUT P 80





ALL VOLTAGES MEASURED TO COMMON
VOLTAGE READINGS TAKEN WITH
20,000 OHMS PER VOLT METER
117 VOLT 60 CYCLE LINE
TUNING RANGE 538-1650 Kc

I.F. Circuits: 456 KC

Speaker Voice Coil: 3.2 ohms

Speaker Transformer:
8500 ohms — 400 cycles

ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

Volume Control full on.

Low range A.C. meter connected across voice coil to indicate output.

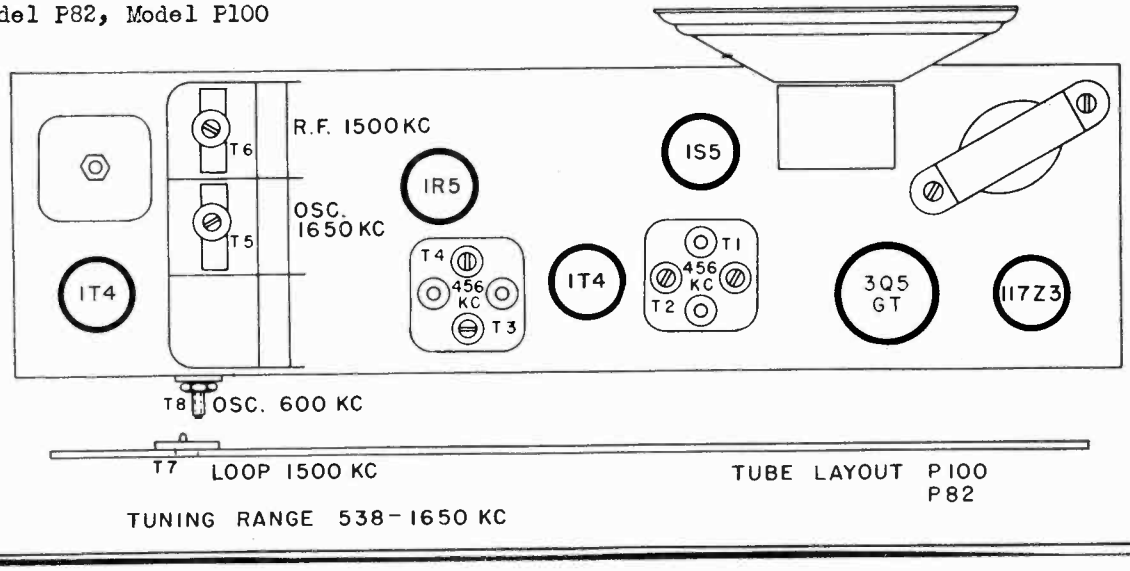
Keep signal generator attenuated so as to maintain ½ scale reading on output meter.

Make certain that dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

REMOVE CHASSIS BOTTOM PLATE

	RECEIVER DIAL AT:	SIGNAL GENERATOR	DUMMY ANTENNA	CONNECT SIGNAL GENERATOR TO:	REFER TO CHASSIS LAYOUT FOR LOCATION OF TRIMMERS
1	Fully closed	Exactly 456 KC	1. MF	Common Ground and Control Grid 1R5 top front section vari. cond.	Adjust for maximum output T1, T2, T3, and T4
2	Fully closed	Approx. 538 KC	1. MF	Control Grid 1T4 top rear section vari. condenser	Adjust for maximum output T8
3	Fully open	Exactly 1650 KC	1. MF	Control Grid 1T4 top rear section vari. cond.	Adjust for maximum output T5
	REPEAT OPERATIONS 2 and 3.				
4	Approx. 1500 KC	Approx. 1500 KC	1. MF	Control Grid 1T4 same as N. 3	Adjust for maximum output T6
	The next two operations are performed with the bottom plate on and the chassis in the cabinet — with lid closed				
5	Approx. 1500 KC	Approx. 1500 KC		Radiating Loop 20" from receiver	Adjust T7 for maximum output
6	Approx. 600 KC	Approx. 600 KC		Radiating Loop 20" from receiver	Adjust T8 for maximum while rocking variable condenser

Model P82, Model P100



Model P 82 Model P 100

Power Supply: 105-125V., 40-60 cyles AC
Same Voltage DC, 15 Watts Power Consumption
Battery Operation: 9 V.A. - 90 V.B
Frequency Range: 1650 - 540 KC
I.F. Circuits: 456 KC

Tubes: 1T4 R.F. Amplifier — 1S5 Det. Avc. A.F.
1R5 Osc. Converter — 3Q5 Power Output
1T4 I.F. Amplifier — 117z3 Rectifier

Speaker: 5" P.M., 1.47 oz. Alnico V Magnet
Speaker Transformer: 8500 ohms - 400 cycles
Speaker Voice Coil: 3.2 ohms

Part No.	Description
12.2	Tubular Condenser .002 mf 600 V
12.5	Tubular Condenser .01 mf 200 V
12.11	Tubular Condenser .05 mf 200 V
12.12	Tubular Condenser .05 mf 400 V
12.14	Tubular Condenser .1 mf 200 V
12.17	Tubular Condenser .25 mf 400 V
12.26	Tubular Condenser .005 mf 400 V
12.27	Tubular Condenser .15 mf 200 V
17.20	Mica Condenser 50 mmf ± 10%
17.22	Mica Condenser 220 mmf ± 10%
17.21	Mica Condenser 100 mmf ± 10%
22.9	Electrolytic Condenser 150-150mf 15 W V
22.11	Electrolytic Condenser 40-30-20 mf 150 W V
27.10	3 Section Variable Condenser 397 mmf
37.26	Loop Antenna w. Trimmer
37.27	Input I.F. Transformer
37.33	Diode I.F. Transformer
37.35	Oscillator Coil
37.38	R. F. Coil
52.9	Volume Control
47.5	Battery Electric Changeover Switch
77.54	Dial Pointer
77.50	Dial Scale (Calibrated)
97.92	Cabinet
42.3	Output Transformer
107.6	5" P. M. Speaker
117.9	1850 ohm 10 W W.W. Resistor
132.1	Padder Condenser
142.30	Tuning Knob
142.29	Volume Knob
142.28	Battery-Off-Electric Knob
	The following apply to Model P82 only.
97.51	Cabinet
117.1	30 ohm 1 W W.W Resistor
142.12	Tuning Knob (wood)
142.13	Volume Knob (wood)
142.14	Battery-Off-Electric Knob (wood)

Models 711 and 740

Power supply: 40-60 cycles, 105-125V AC
Same Voltage DC
Power consumption: 30 Watts
Frequency Range: 530-1680 KC
I.F. Circuits: 456 KC
Tubes: Osc.-Converter 12BE6
I.F. Amplifier 12BA6
Det. Avc. A.F. 12AT6
Power Output 50B5
Rectifier 35W4

Speaker: 4" P.M. 1 oz. "Alnico V" Magnet
Speaker Transformer: 2500 ohms—400 cycles
Speaker Voice Coil: 3.2 ohms

Part No.	Description
12.4	Tubular Condenser, .005 mf, 600 V
12.6	Tubular Condenser, .01 mf, 400 V
12.9	Tubular Condenser, .03 mf, 400 V
12.11	Tubular Condenser, .05 mf, 200 V
12.12	Tubular Condenser, .05 mf, 400 V
17.5	Mica Condenser, 100 mmf, ± 10%
17.8	Mica Condenser, 250 mmf, ± 20%
22.16	3 Section Electrolytic Condenser 30-40-20 mf, 150 W.V.
27.17	Variable Condenser
37.57	Oscillator Coil
37.56	Loop Antenna
37.62	Input I.F. Transformer, complete
37.62	Output I.F. Transformer, complete
52.15	Volume Control with Switch
72.1	Power Cord (Approved)
77.86	Dial Scale (Calibrated)
77.87	Dial Pointer
77.85	Dial Crystal
97.73W	Cabinet, Bakelite-Walnut
97.73V	Cabinet, Bakelite-Ivory
142.27W	Cabinet Knobs—Walnut
142.27V	Cabinet Knobs—Ivory
107.16T	4" P.M. Speaker with Transformer
107.16	4" P.M. Speaker less Transformer
42.1	Speaker Transformer for above
117.1	30 ohm 1 W. Resistor

Models 711 and 740

ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

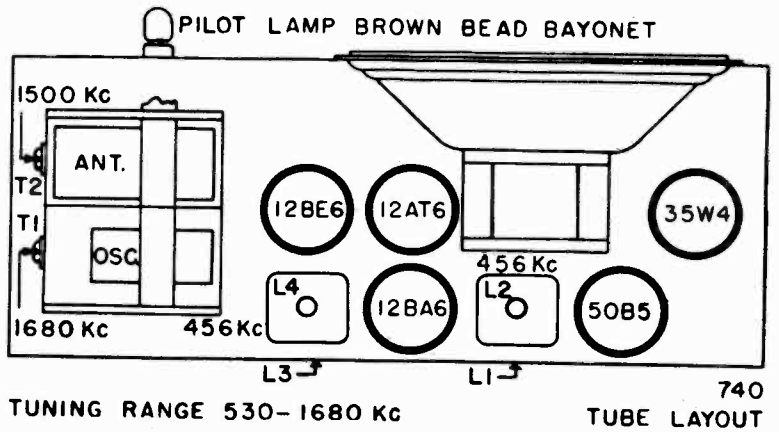
Volume Control full on.

Low range A.C. meter connected across voice coil to indicate output.

Keep signal generator attenuated so as to maintain 1/2 scale reading on output meter.

Make certain that dial pointer is exactly horizontal when variable condenser is fully meshed.

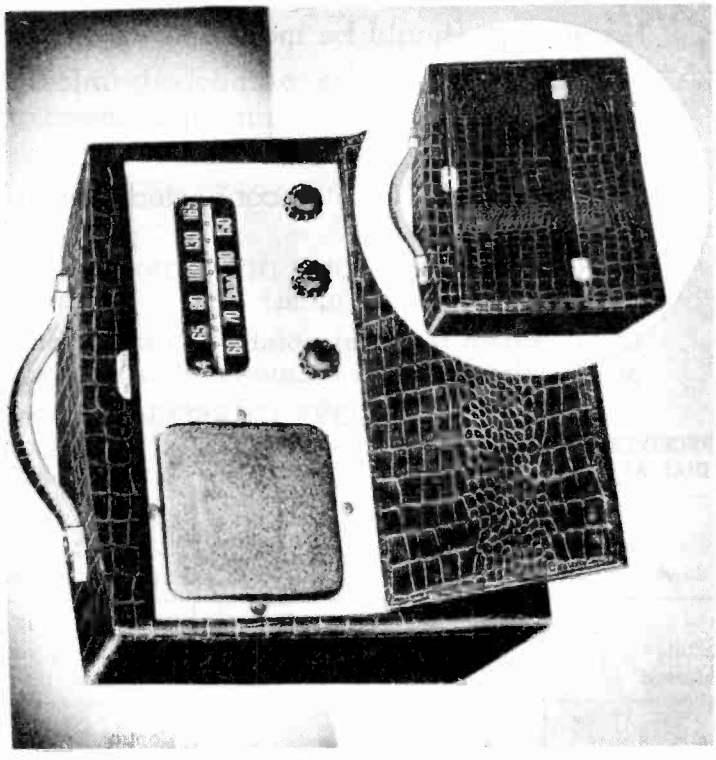
	Receiver Dial at:	Signal Generator	Dummy Antenna	Connect Signal Generator to:	Refer to Chassis Layout for Location of Trimmers
1	Full Open	Exactly 456 KC	1 MF	Control Grid 12BE6 Tube (Top) Front Section Variable Condenser	Adjust for Maximum Output L1, L2, L3 & L4
2	Full Open	Exactly 1680 KC		Radiating Loop (1/2 meter) 20" from Receiver Loop	Adjust for Maximum Output T1
3	Approx. 1500 KC	Approx. 1500 KC		Radiating Loop (1/2 meter) 20" from Receiver Loop	Adjust for Maximum Output T2
4	Approx. 600 KC	Approx. 600 KC		Radiating Loop (1/2 meter) 20" from Receiver Loop	Check tracking and bend slotted end plate (front section) of variable, if necessary.
5					

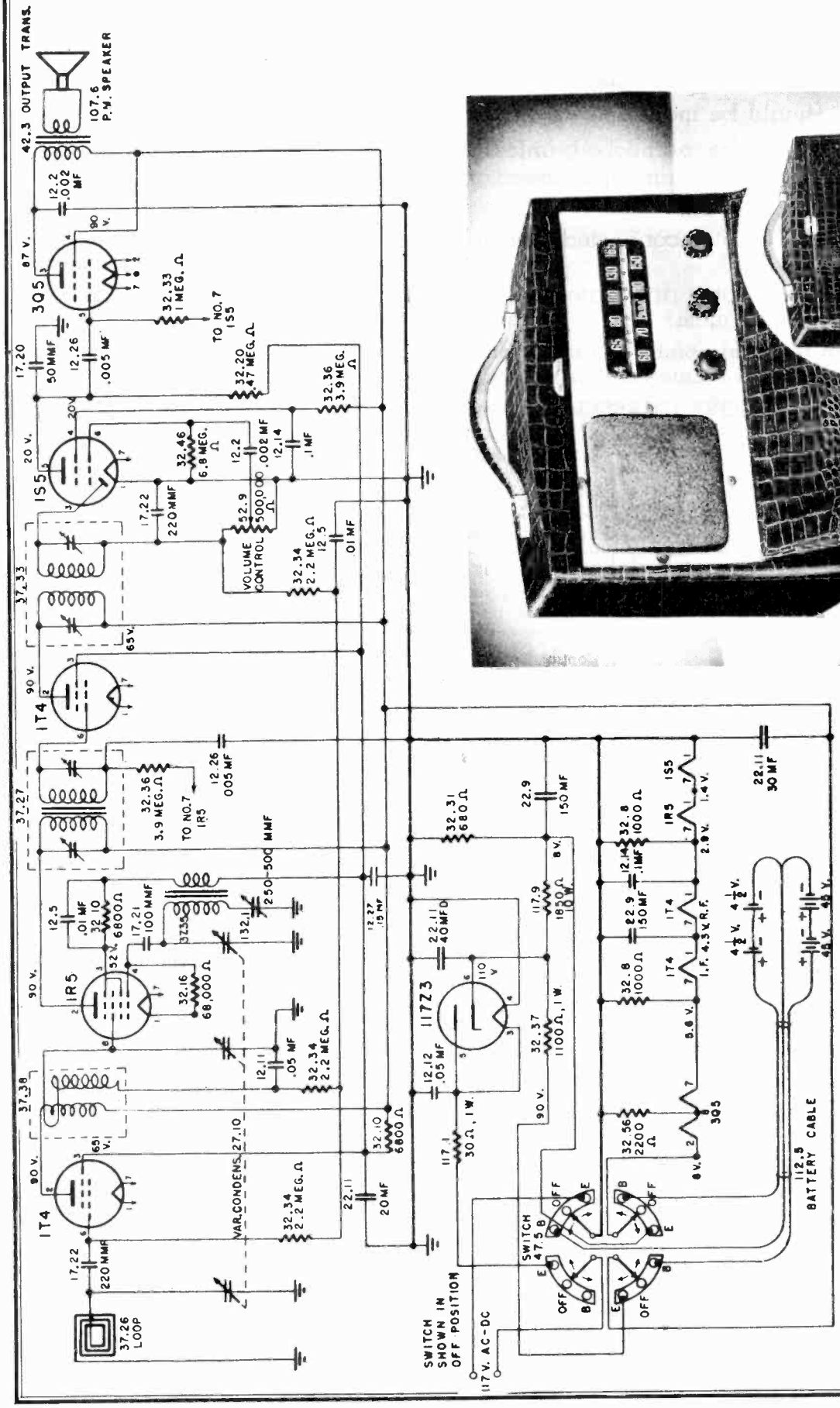


740
TUNING RANGE 530-1680 Kc
TUBE LAYOUT

FADA RADIO AND ELECTRIC CO., INC.

MODEL P100





ALIGNMENT PROCEDURE Model P 100

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

Volume Control full on.

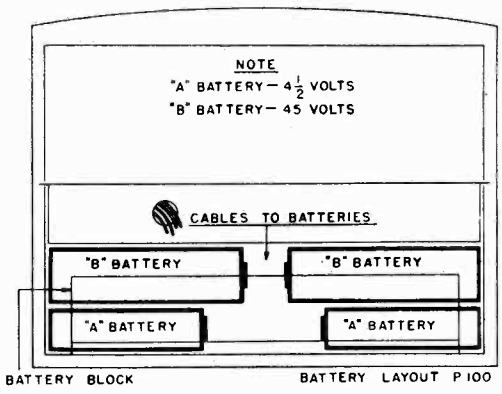
Low range A.C. meter connected across voice coil to indicate output.

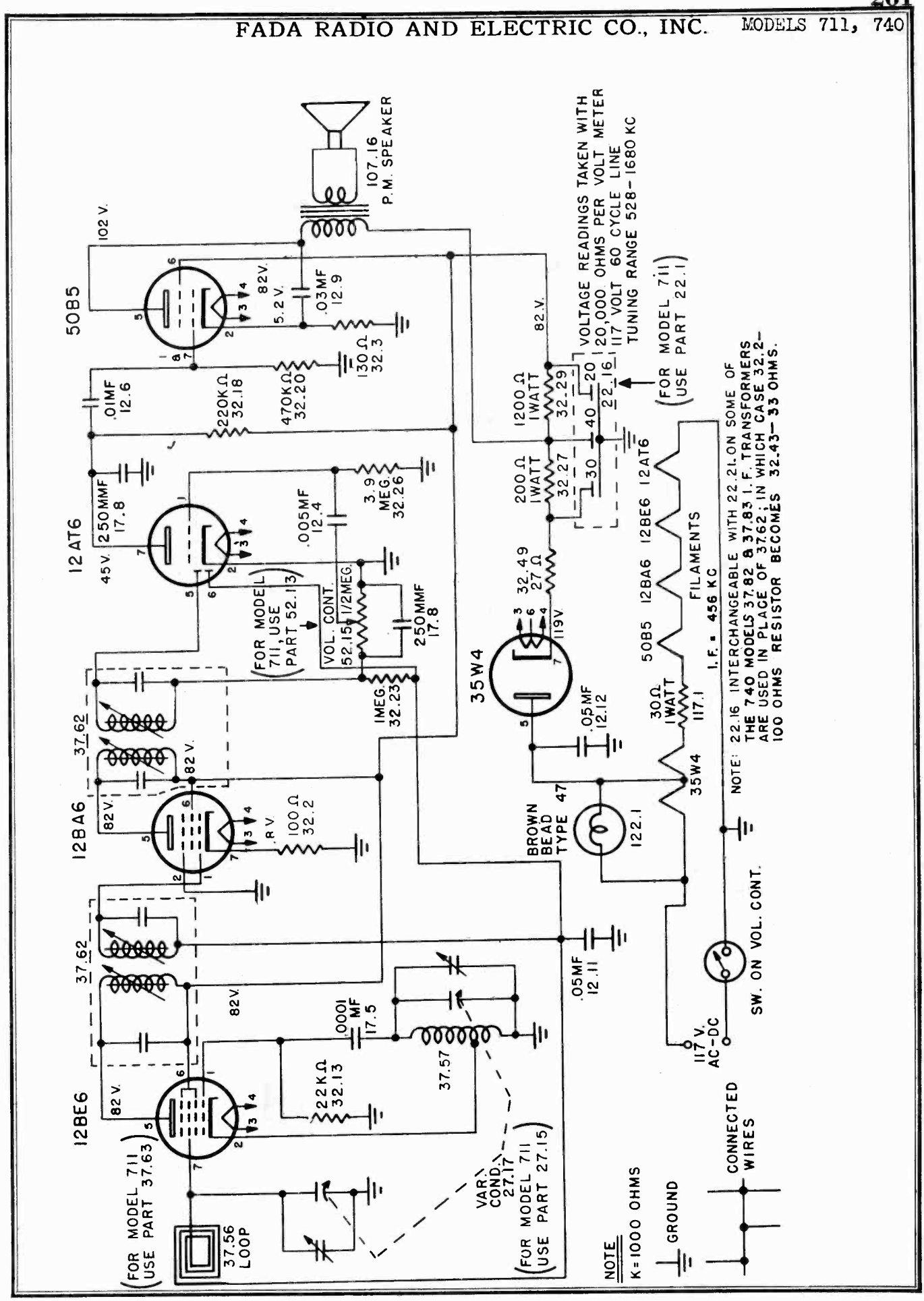
Keep signal generator attenuated so as to maintain 1/2 scale reading on output meter.

Make certain that dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

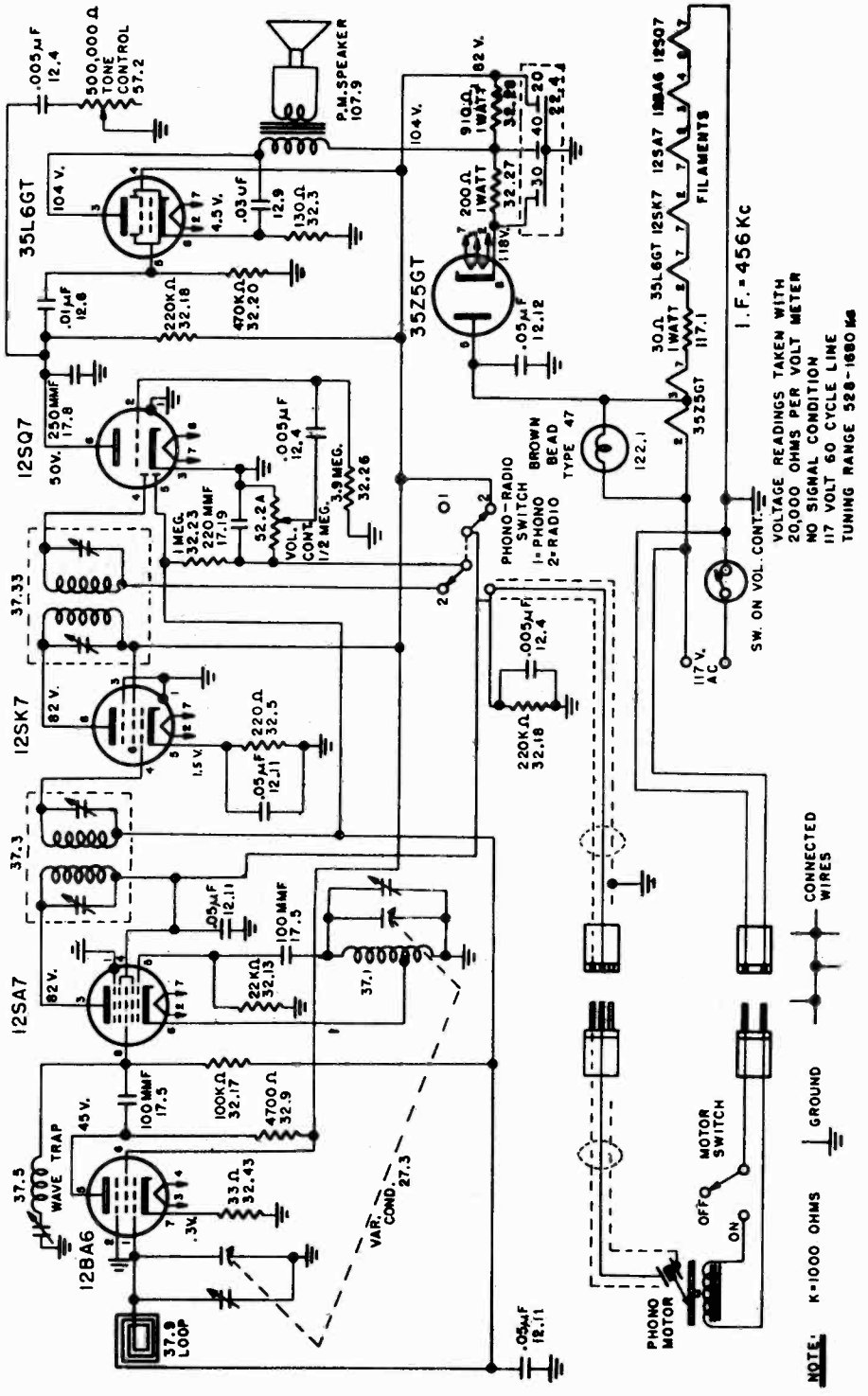
REMOVE CHASSIS BOTTOM PLATE

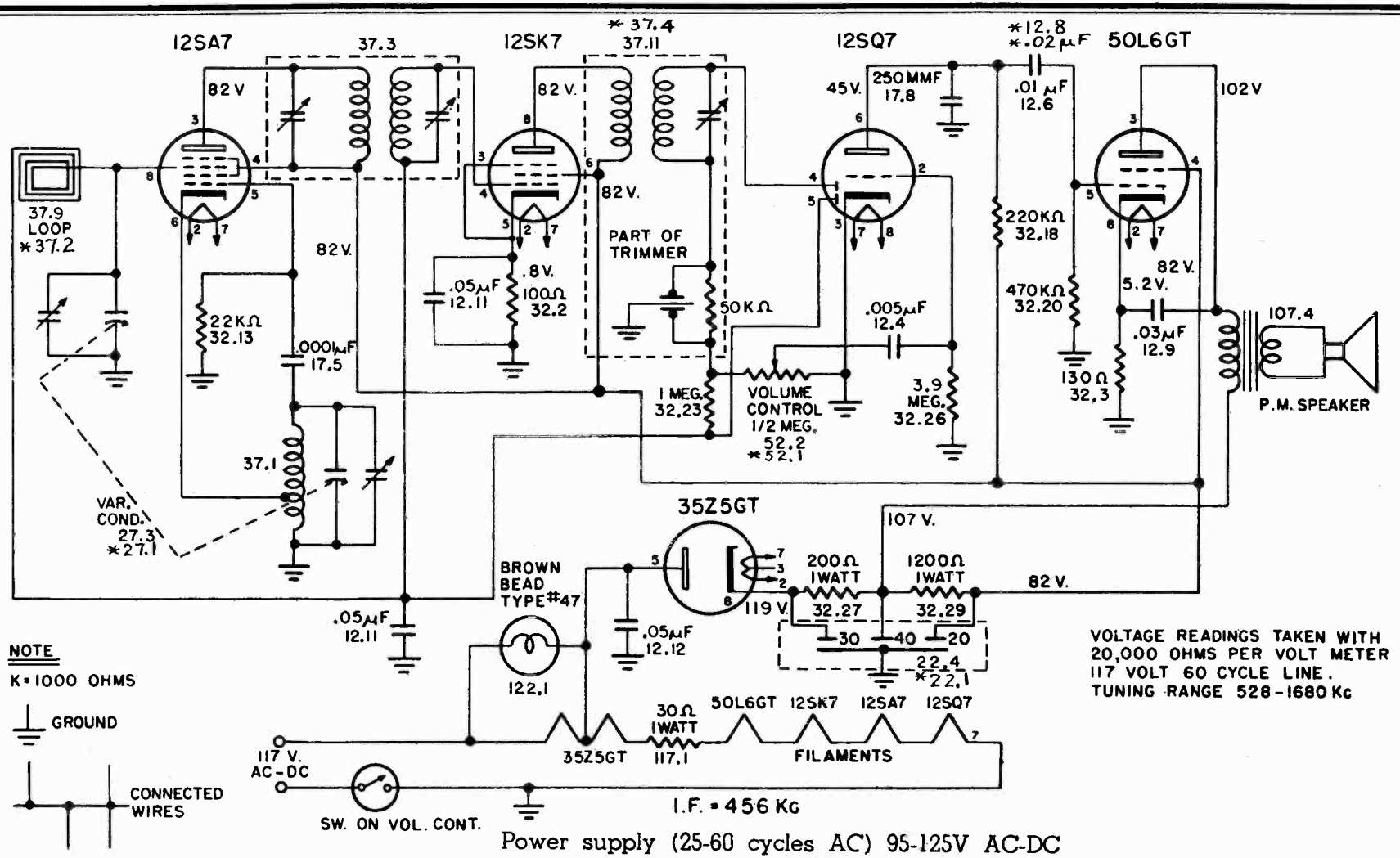
	RECEIVER DIAL AT:	SIGNAL GENERATOR	DUMMY ANTENNA	CONNECT SIGNAL GENERATOR TO:	REFER TO CHASSIS LAYOUT FOR LOCATION OF TRIMMERS
1	Fully closed	Exactly 456 KC	.1 MF	Common Ground and Control Grid 1R5 top front section var. cond.	Adjust for maximum output T1, T2, T3, and T4.
2	Fully closed	Approx. 538 KC	.1 MF	Control Grid 1T4 top rear section var. condenser	Adjust for maximum output T8
3	Fully open	Exactly 1650 KC	.1 MF	Control Grid 1T4 top rear section var. cond.	Adjust for maximum output T5
REPEAT OPERATIONS 2 and 3.					
4	Approx. 1500 KC	Approx. 1500 KC	.1 MF	Control Grid 1T4 same as No. 3	Adjust for maximum output T6
The next two operations are performed with the bottom plate on and the chassis in the cabinet — with lid closed					
5	Approx. 1500 KC	Approx. 1500 KC	.1 MF	Radiating Loop 20" from Receiver	Adjust T7 for maximum output
6	Approx. 600 KC	Approx. 600 KC		Radiating Loop 20" from Receiver	Adjust T8 for maximum while rocking variable condenser




107.16 P.M. SPEAKER
102 V.
50B5
82V.
5.2 V.
.03MF 12.9
130Ω 32.3
.01MF 12.6
220K.Ω 32.18
470K.Ω 32.20
12AT6
45 V.
250MMF 17.8
.005MF 12.4
3.9 MEG. 32.26
(FOR MODEL 711, USE PART 52.13)
VOL. CONT. 52.15 1/2MEG.
250MMF 17.8
1MEG. 32.23
37.62
82 V.
12BA6
100Ω 32.2
37.62
82V.
.0001 MF 17.5
22K Ω 32.13
12BE6
37.57
(FOR MODEL 711 USE PART 37.63)
37.56 LOOP
VAR. COND. 27.17
(FOR MODEL 711 USE PART 27.15)
35W4
32.49 27Ω
119V
.05MF 12.12
1200Ω 1WATT 32.29
200Ω 1WATT 32.27
82.V.
VOLTAGE READINGS TAKEN WITH 20,000 OHMS PER VOLT METER 117 VOLT 60 CYCLE LINE TUNING RANGE 528-1680 KC
(FOR MODEL 711 USE PART 22.1)
40
30
20
16
22
50B5 12BA6 12BE6 12AT6 FILAMENTS
30Ω 1WATT 117.1
I.F. = 456 KC
35W4
BROWN BEAD TYPE 47
122.1
.05MF 12.11
117 V. AC-DC
SW. ON VOL. CONT.
NOTE: 22.16 INTERCHANGEABLE WITH 22.21. ON SOME OF THE 740 MODELS 37.82 & 37.83 I.F. TRANSFORMERS ARE USED IN PLACE OF 37.62; IN WHICH CASE 32.2-100 OHMS RESISTOR BECOMES 32.43-33 OHMS.
NOTE
K=1000 OHMS
GROUND
CONNECTED WIRES

MODELS 602,637 FADA RADIO & ELEC. CO. INC.





VOLTAGE READINGS TAKEN WITH 20,000 OHMS PER VOLT METER 117 VOLT 60 CYCLE LINE. TUNING RANGE 528-1680 Kc

Power supply (25-60 cycles AC) 95-125V AC-DC

Power consumption 30 Watts

Tubes: Osc.-Converter	12SA7GT	Frequency Range 1680-530 KC
I.F. Amplifier	12SK7GT	I.F. Circuits 456 KC
Det. Avc. A.F.	12SQ7GT	Speaker 4" P.M. 1 oz. Alnico V Magnet
Power Output	50L6GT	Speaker Transformer 2500 ohms—400 cycles
Rectifier	35Z5GT	Speaker Voice Coil 3.2 ohms

MODELS 605 AND 609 ARE IDENTICAL WITH THE EXCEPTION OF THE .01-μF CONDENSER, NO. 12.6, WHICH IN MODEL 609 IS .02 μF, NO. 12.8. THOSE PARTS INDICATED BY AN ASTERISK(*) APPLY TO MODEL 609; OTHER PART NUMBERS ARE THE SAME FOR BOTH MODELS

MODEL 605
MODEL 609

ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:
Volume Control full on.
Low range A.C. meter connected across voice coil to indicate output.
Keep signal generator attenuated so as to maintain ½ scale reading on output meter.
Make certain that dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

MODELS 605 AND 609

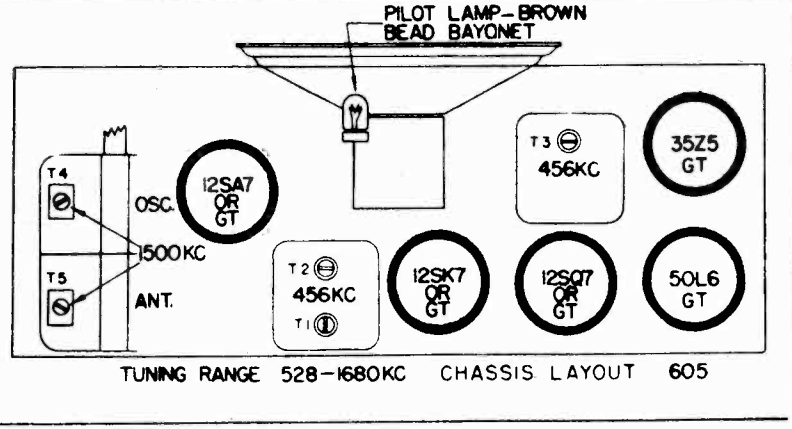
Receiver Dial at:	Signal Generator	Dummy Antenna	Connect Signal Generator to:	Refer to Chassis Layout for Location of Trimmers
1 Full Open 2	Exactly 456 KC	.1 MF	Control Grid 12SA7 Tube (Top) Rear Section Variable Condenser	Adjust for Maximum Output T1, T2 & T3
Exactly 1680 KC 3	Exactly 1680 KC		Radiating Loop (½ meter) 20" from Receiver Loop	Adjust for Maximum Output T4
Approx. 1500 KC 4	Approx. 1500 KC		Radiating Loop (½ meter) 20" from Receiver Loop	Adjust for Maximum Output T5
Approx. 600 KC 5	Aprox. 600 KC		Radiating Loop (½ meter) 20" from Receiver Loop	Check tracking and bend slotted end plate (rear section) of variable if necessary.

605 SERIES PARTS LIST

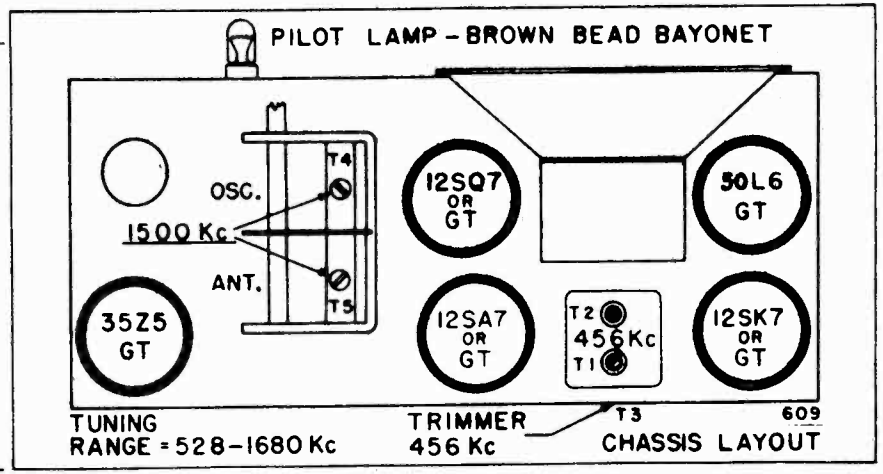
Part No.	Description
12.4	Tubular Condenser .005 mf 600 V
12.6	Tubular Condenser .01 mf 400 V
12.9	Tubular Condenser .03 mf 400 V
12.11	Tubular Condenser .05 mf 200 V
12.12	Tubular Condenser .05 mf 400 V
17.5	Mica Condenser 100 mmf ± 10%
17.8	Mica Condenser 250 mmf ± 20%
22.4	3 Section Electrolytic Condenser
27.3	Variable Condenser 30-40-20 mf
37.1	Oscillator Coil 150 W.V.
37.9	Loop Antenna
37.3	Input I.F. Transformer complete
37.11	Output I.F. Transformer complete
52.2	Volume Control w/switch
72.1	Power Cord (Approved)
77.16	Dial Pointer
77.18	Dial Scale (Calibrated)
97.12W	Cabinet—Walnut Bakelite
142.4W	Cabinet Knobs—Walnut
97.11	Cabinet Back
107.4	4" P.M. Speaker with Transformer
107.41	4" P.M. Speaker less Transformer
42.1	Speaker Transformer for Above
117.1	30 ohm 1 W Resistor

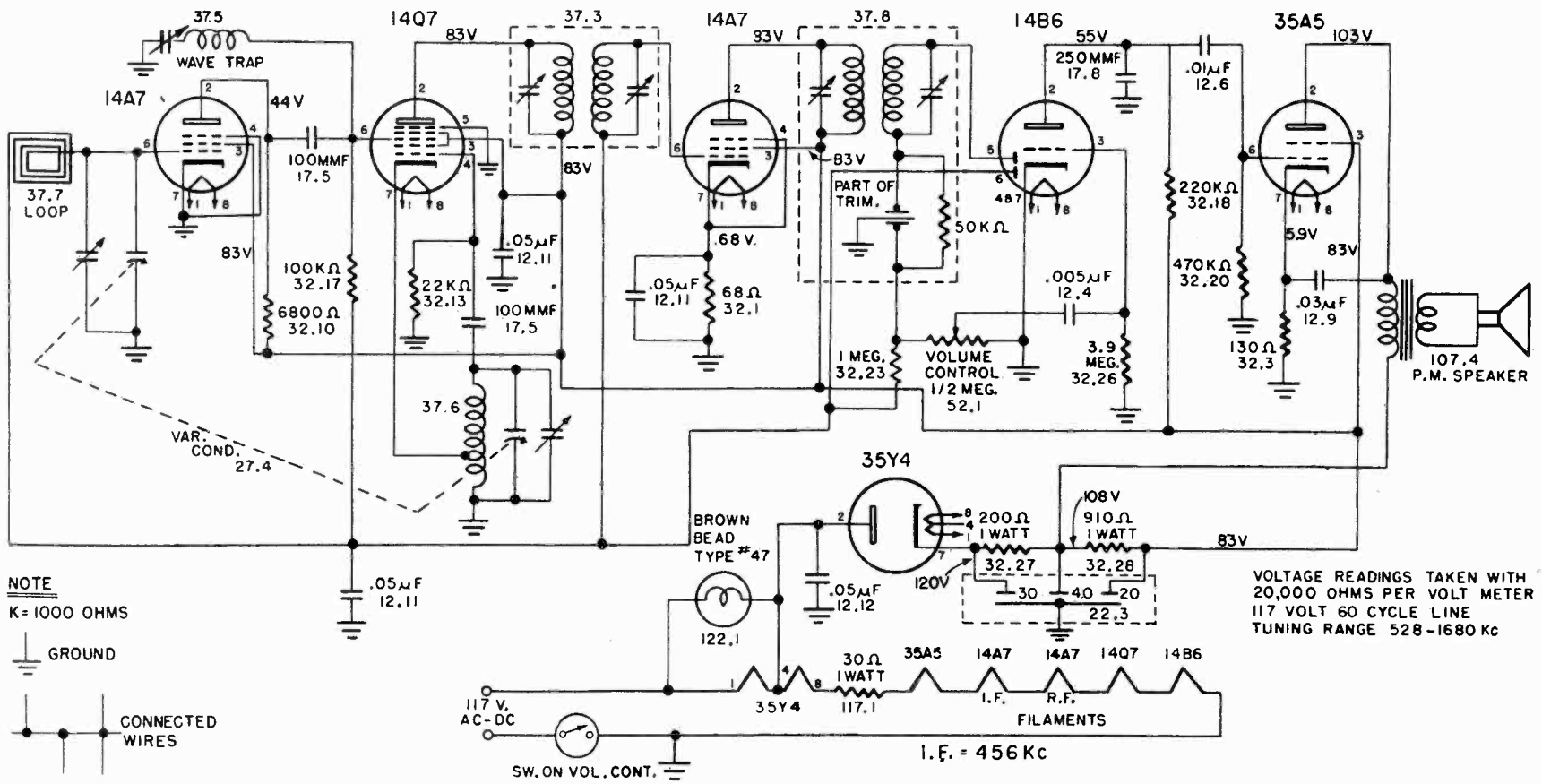
609 SERIES PARTS LIST

Part No.	Description
12.4	Tubular Condenser .005 mf 600 V
12.8	Tubular Condenser .02 mf 400 V
12.9	Tubular Condenser .03 mf 400 V
12.11	Tubular Condenser .05 mf 400 V
12.12	Tubular Condenser .05 mf 200 V
17.5	Mica Condenser 100 mmf ± 10%
17.8	Mica Condenser 250 mmf ± 20%
22.1	3 Section Electrolytic Condenser
27.1	Variable Condenser 30-40-20 mf
37.1	Oscillator Coil 150 W.V.
37.2	Loop Antenna
37.3	Input I.F. Transformer complete
37.4	Output I.F. Transformer complete
52.1	Volume Control with Switch
72.1	Power Cord (Aproved)
77.1	Dial Scale (Calibrated)
77.6	Dial Pointer
77.7	Dial Crystal
97.2W	Cabinet Bakelite—Walnut
97.2V	Cabinet Bakelite—Ivory
97.3	Cabinet Back
142.4W	Cabinet Knobs—Walnut
142.4V	Cabinet Knobs—Ivory
107.1	4" P.M. Speaker with Transformer
107.2	4" P.M. Speaker less Transformer
42.1	Speaker Transformer for above
117.1	30 ohm 1 W. Resistor



TUNING RANGE 528-1680KC CHASSIS LAYOUT 605





Power consumption 30 Watts

Frequency Range 1680-530 KC

Tubes: R.F. Amplifier 14A7
Osc. Converter 14Q7
I.F. Amplifier 14A7
Det. Avc. A.F. 14B6
Power Output 35A5
Rectifier 35Y4

Power supply (25-60 cycles AC) 95-125V AC-DC

Speaker 4" P.M. 1 oz. Alnico V Magnet

Speaker Transformer 2500 ohms—400 cycles

Speaker Voice Coil 3.2 ohms

ALIGNMENT PROCEDURE MODELS 652 AND 1000

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

Volume Control full on.

Low range A.C. meter connected across voice coil to indicate output.

Keep signal generator attenuated so as to maintain ½ scale reading on output meter.

Make certain that dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

ALIGNMENT DATA FOR MODELS 652 AND 1000 ARE SIMILAR WITH EXCEPTION OF STEPS 2 AND 3 IN COLUMNS SHOWING GENERATOR CONNECTIONS

	MODEL 652	MODEL 1000

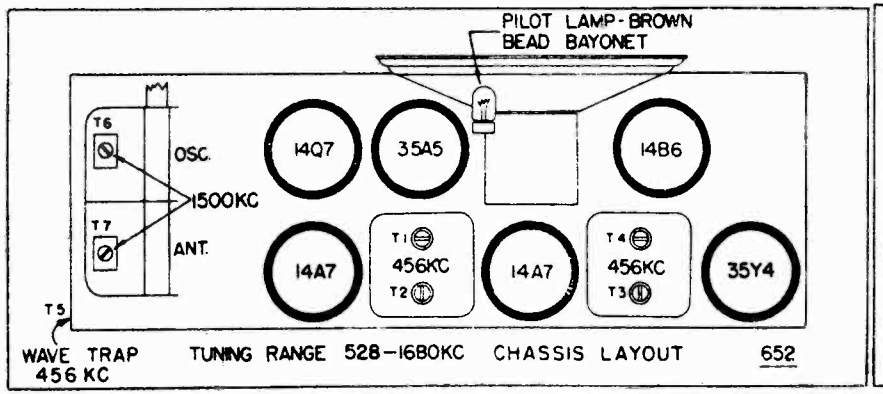
Receiver Dial at:	Signal Generator	Dummy Antenna	Connect Generator to:	Connect Signal Generator to:	Refer to Chassis Layout for Location of Trimmers
1 Full Open	Exactly 456 KC	.1 MF	Control Grid 14Q7 Tube Pin No. 6 on 14Q7 Socket	Control Grid 12SA7 Tube Pin No. 8 on 12SA7 Socket	Adjust for Maximum Output T1, T2, T3 & T4
2 Full Open	Exactly 456 KC	.1 MF	Control Grid 14A7 Tube (RF) (Top) Rear Section Variable Condenser	Control Grid 12SK7 Tube (R.F.) (Top) Rear Section Variable Condenser	Adjust for Minimum Output T5
3 Exactly 1680 KC	Exactly 1680 KC		Radiating Loop (½ meter) 20" from Receiver	Radiating Loop (½ meter) 20" from Receiver	Adjust for Maximum Output T6
4 Exactly 1500 KC	Exactly 1500 KC		Radiating Loop (½ meter) 20" from Receiver	Radiating Loop (½ meter) 20" from Receiver	Adjust for Maximum Output T7
5 Approx. 600 KC	Approx. 600 KC		Radiating Loop (½ meter) 20" from Receiver	Radiating Loop (½ meter) 20" from Receiver	Check tracking and bend slotted end plate (rear section) of variable if necessary.
6					

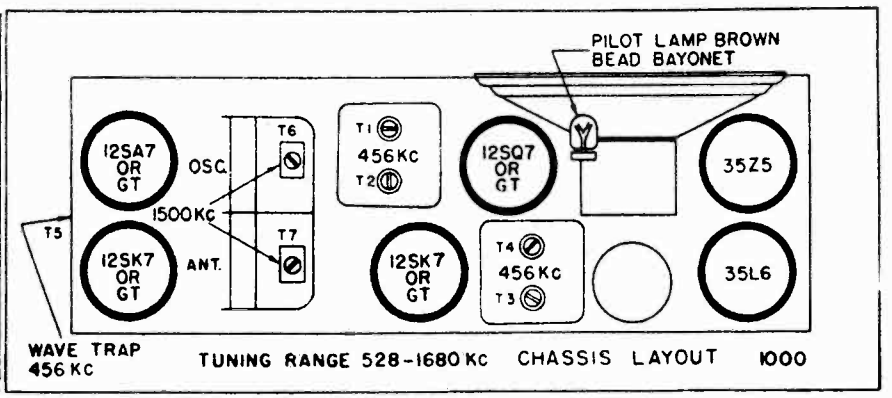
PARTS LIST 652 SERIES

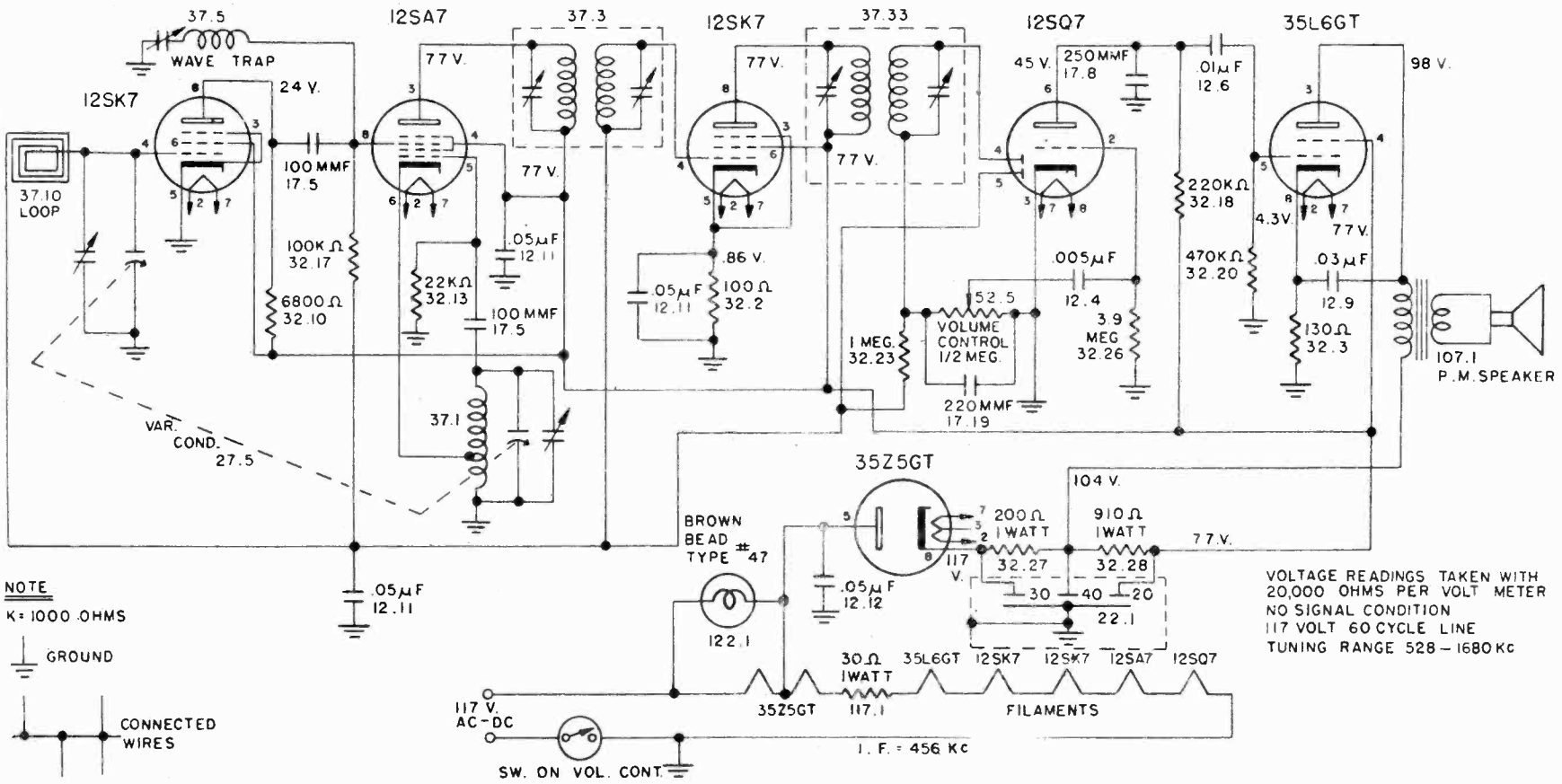
Part No.	Description	Part No.	Description
12.4	Tubular Condenser .005 mf 600 V	77.12	Dial Pointer
12.6	Tubular Condenser .01 mf 400 V	77.10	Dial Scale (Calibrated)
12.9	Tubular Condenser .03 mf 400 V	97.7A	Cabinet—Alabaster
12.11	Tubular Condenser .05 mf 200 V	97.7B	Cabinet—Red & Alabaster
12.12	Tubular Condenser .05 mf 400 V	97.7C	Cabinet—Blue & Alabaster
17.5	Mica Condenser 100 mmf ± 10%	97.7D	Cabinet—Maroon & Alabaster
17.8	Mica Condenser 250 mmf ± 20%	97.7E	Cabinet—Onyx
22.3	3 Section Electrolytic Condenser 30-40-20 mf	97.8	Cabinet Back
27.4	Variable Condenser 150 W.V.	142.3A	Cabinet Knobs Alabaster
37.6	Oscillator Coil	142.3B	Cabinet Knobs Onyx
37.7	Loop Antenna	142.3C	Cabinet Knobs Red
37.3	Input I.F. Transformer complete	107.4	4" Speaker with Transformer
37.8	Output I.F. Transformer complete	107.41	4" Speaker less Transformer
37.5	I.F. Trap	42.1	Speaker Transformer for above
52.3	Volume Control with Switch	117.1	30 ohm 1 W Resistor
72.1	Power Cord (approved)		

PARTS LIST 1000 SERIES

Part No.	Description	Part No.	Description
12.4	Tubular Condenser .005 mf 600 V		
12.6	Tubular Condenser .01 mf 400 V		
12.9	Tubular Condenser .03 mf 400 V		
12.11	Tubular Condenser .05 mf 200 V		
12.12	Tubular Condenser .05 mf 400 V		
17.5	Mica Condenser 100 mmf ± 10%		
17.8	Mica Condenser 250 mmf ± 20%		
22.1	3 Section Electrolytic Condenser 30-40-20 mf 150 W.V.		
27.5A	Variable Condenser		
37.1	Oscillator Coil		
37.10	Loop Antenna		
37.3	Input I.F. Transformer complete		
37.33	Output I.F. Transformer complete		
37.5	I.F. Trap		
52.5	Volume Control with Switch		
72.1	Power Cord (Approved)	97.16D	Cabinet Maroon & Alabaster
77.6	Dial Pointer	97.16E	Cabinet Onyx
77.21	Dial Scale (Calibrated)	142.5A	Cabinet Knobs Alabaster
77.22	Dial Crystal	142.5B	Cabinet Knobs Onyx
97.16A	Cabinet Alabaster	142.5C	Cabinet Knobs Red
97.16B	Cabinet Red & Alabaster	107.1	4" P.M. Speaker with Transformer
97.16C	Cabinet Blue & Alabaster	42.1	Speaker Transformer for above







Tubes: R.F. Amplifier 12SK7GT
Osc. Converter 12SA7GT
I.F. Amplifier 12SK7GT
Det. Avc. A.F. 12SQ7GT
Power Output 35L6GT
Rectifier 35Z5GT

Speaker 4" P.M. 1 oz. Alnico V Magnet

Speaker Transformer 2500 ohms—400 cycles

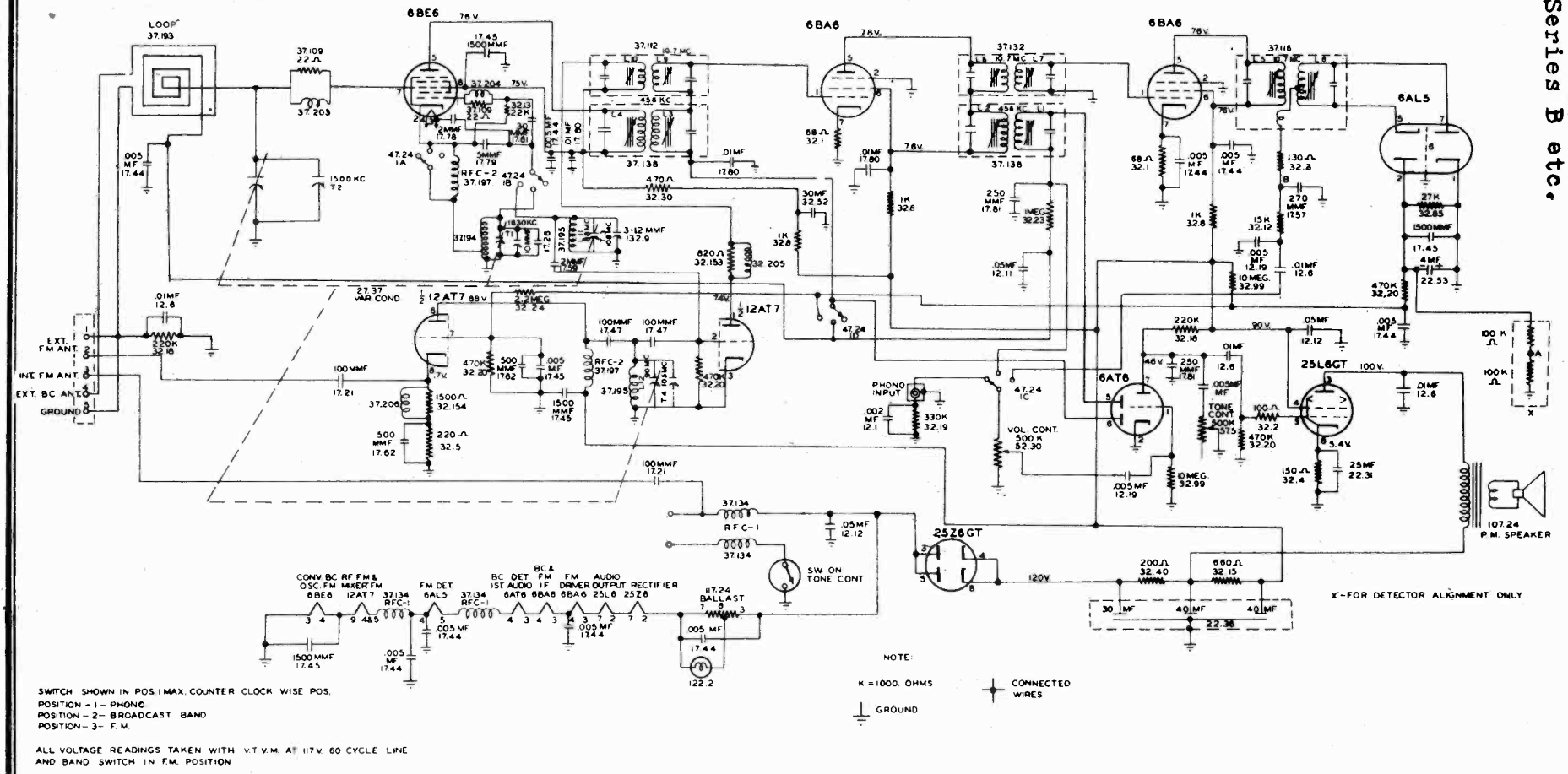
Speaker Voice Coil 3.2 ohms

Power supply (25-60 cycles AC) 95-125V AC-DC

Power consumption 30 Watts

Frequency Range 1680-528 KC

I.F. Circuits 456 KC



Power supply: 40-60 cycles, 105-125V AC
Same voltage on DC

Power consumption: 60 watts

Frequency Range: Standard Broadcast—535-1630 KC
FM—87.5-108.5 MC

Speaker: 6" 1.47 oz. Alnico V Magnet
Speaker Transformer: 2000 ohms 400 cycles.
Speaker Voice Coil: 3.2 ohms

Tubes: 12AT7 F.M. R.F. and Mixer
6BE6 Osc. F.M. Converter A.M.
6BA6 I.F. stage, A.M. and F.M.
6BA6 Driver F.M.
6AT6 A.M. Detector and First Audio
6AL5 F.M. Detector
25L6 GT Power output
25Z6 GT Rectifier
Ballast

REDUCE TO 97/8"

ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows.

A.M.

Band switch in A.M. position.
Volume Control and Tone Control in maximum clockwise position.
Low range A.C. meter connected across voice coil to indicate output.
Keep signal generator attenuated so as to maintain ½ scale reading on output meter.
Make certain that the dial pointer is exactly horizontal when variable condenser is fully meshed.

	Receiver Dial at	Signal Generator Frequency	Dummy Antenna	Connect Signal Generator To	Refer to Chassis Layout for Location of component to be adjusted
1	Variable Cond fully open	456 KC	1 MF	Control Grid 6BE6 tube, pin #7.	Adjust L1, L2, L3 and L4 for maximum output.
2	Variable Cond fully open	1630 KC	200 MMF	Terminal #4 on back of loop.	Adjust T1 for maximum output.
3	1500 KC	1500 KC	200 MMF	Terminal #4 on back of loop.	Adjust T2 for maximum output.
4	600 KC	600 KC	200 MMF	Terminal #4 on back of loop.	Check tracking and bend slotted end plate (last section) of variable if necessary.

F.M.

Band switch F.M. position. Allow at least 10 minutes "warming up" period.
Use a standard V.T.V.M. with zero center setting.
Use an A.M. signal generator with no modulation, taking harmonics if fundamentals are not available.
Keep signal generator attenuated so as to maintain approximately a 3 volt reading.
Make certain that the dial pointer is exactly horizontal when variable condenser is fully meshed.

	Receiver Dial at	Signal Generator Frequency	Signal Generator Connected to:	V.T.V.M. Connected to:	Refer to Chassis Layout for Location of Components to be adjusted
1	98 MC	10.7 MC	Control grid Pin #1 6BA6 (2nd. I.F.) Socket Series with .01 Condenser.	Across the two 100,000 ohm resistors marked X.	Adjust L5 and L6 for maximum output.
2	98 MC	10.7 MC	Junction of L12 and T4 in Series with .01 condenser.	"	Shunt L8 with a 680 ohm carbon resistor and adjust L7 for maximum output.
3	98 MC	10.7 MC	"	"	Shunt L7 with a 680 ohm carbon resistor and adjust L8 for maximum output.
4	98 MC	10.7 MC	"	"	Adjust L9, L10 and L5 for maximum output.
5	98 MC	10.7 MC	"	Ground lead of V.T.V.M. to point A on schematic and probe to point B.	Adjust L6 for zero output. (Check zero setting of V.T.V.M.) Meter should register reverse when slug is rotated through zero output.
6	108 MC	108 MC	Ground to terminal 1 and hot side to terminal 2 in series with a 270 ohm carbon resistor.	Same as step #1.	Adjust T3 for maximum output. Starting with the trimmer at minimum capacity use the first peak.
7	88 MC	88 MC	" "	"	Adjust L11 for maximum output.
8		Repeat steps 6 & 7 until L11 requires no further adjustment.			
9	105 MC	105 MC	Same as step #6	Same as step #1.	Adjust T4 for maximum output.
10	90 MC	90 MC	Same as step #6	Same as step #1	Adjust L12 for maximum output.
11		Repeat steps 9 & 10 until T4 requires no further adjustment.			

Caution: If any adjustments are made in the A.M.-I.F.'s after the F. M. I.F.'s have been aligned, it would be necessary to readjust the F.M. I.F.'s.

1 & 2 - EXT. F.M. ANT.
LINK 2 TO 3 FOR INT. F.M. ANT.
4 EXT. B.C. ANT.
5 GROUND.

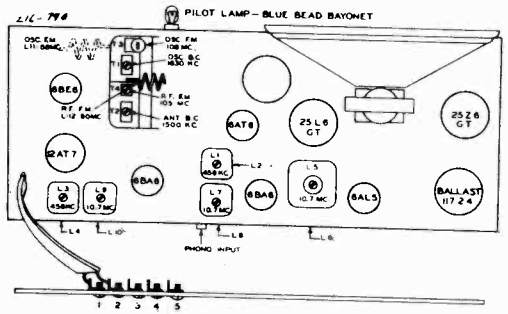
TUNING RANGE
B.C. - 534 KC. - 1630 KC.
F.M. - 87.6 MC. - 108.4 MC.

Note: In some receivers L5 and L6 are interchanged.

PARTS LIST

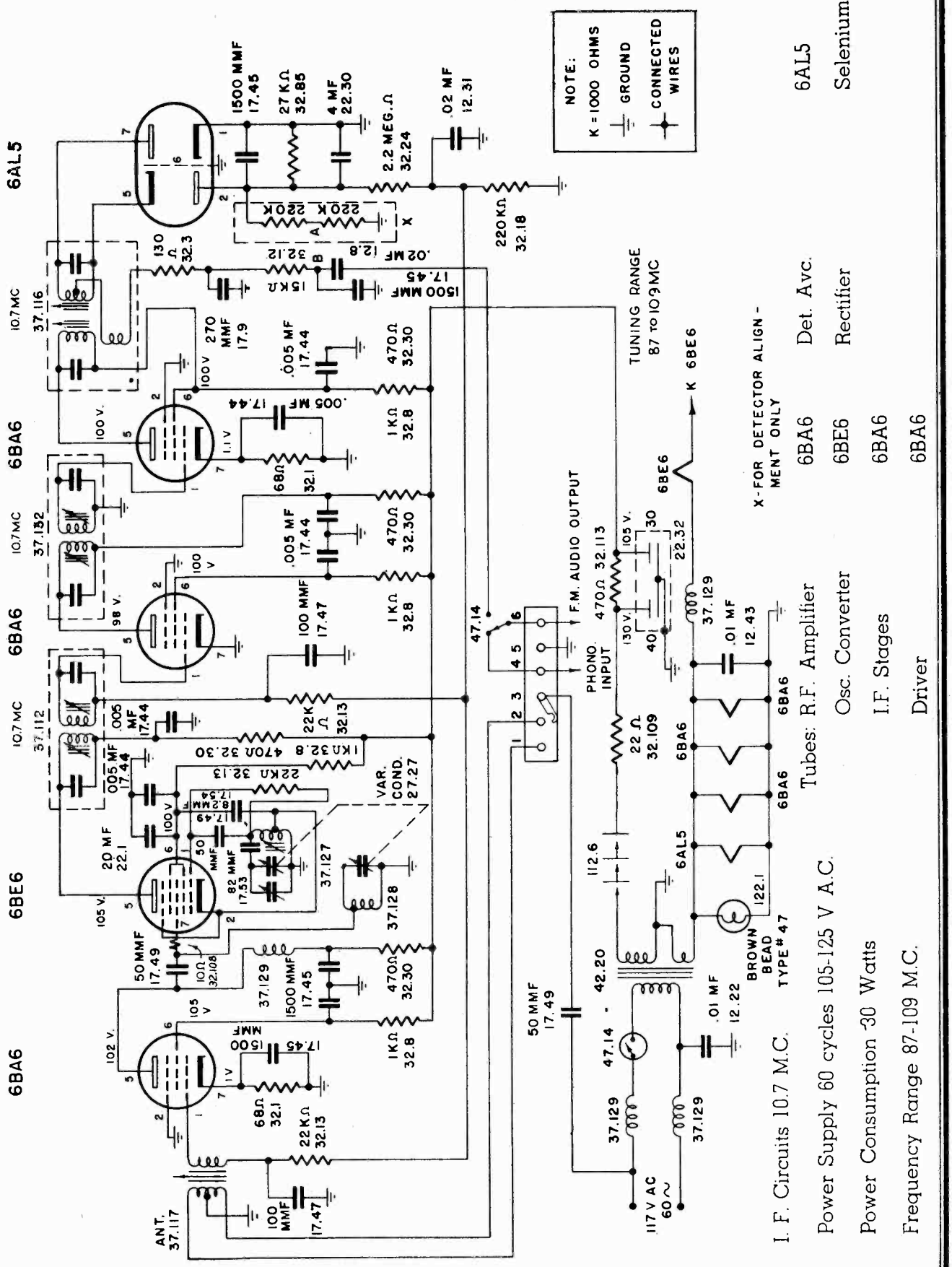
Part No.	Description
12.1	Tubular Condenser .002 200 W.V.
12.19	Tubular Condenser .005 400 W.V.
12.6	Tubular Condenser .01 400 W.V.
12.11	Tubular Condenser .05 200 W.V.
12.12	Tubular Condenser .05 400 W.V.
12.56	Tubular Condenser .005 200 W.V. ±10%
17.59	Ceramic Cond. 2 mmf ±.5 mmf Insul.
17.78	Ceramic Cond. 2 mmf ±.5 mmf Insul. M750
17.79	Ceramic Cond. 5 mmf ±.5 mmf Insul.
17.61	Ceramic Cond. 30 mmf ±10% Insul.
17.47	Ceramic Cond. 100 mmf ±10% "
17.21	Ceramic Cond. 100 mmf ±20% "
17.81	Ceramic Cond. 250 mmf ±20% "
17.57	Ceramic Cond. 270 mmf ±10% "
17.62	Ceramic Cond. 500 mmf. ±20% "
17.45	Ceramic Cond. 1500 mmf ±20% "
17.44	Ceramic Cond. 5000 mmf gmv "
17.80	Ceramic Cond. 10,000 mmf gmv "
17.46	Ceramic Cond. 10,000 mmf gmv "
17.28	Ceramic Cond. 10 mmf ±20% "
22.36	Electrolytic 30-40-40-150 W.V. Alum. Can
22.52	Electrolytic 30 mf 150 W.V. Alum. Tube
22.31	Electrolytic 25 mf 25 W.V. Alum. Tube
22.53	Electrolytic 4 mf 50 W.V. Alum. Tube
27.37	Variable Cond. With drum
32.109	Carbon Res. 22 ohm ½ W. ±10% Carbon
32.1	Carbon Res. 68 ohms ½ W. ±10% Carbon
32.3	Carbon Res. 130 ohms ½ W. ±10% Carbon
32.4	Carbon Res. 150 ohm ½ W. ±10% Carbon
32.5	Carbon Res. 220 ohm ½ W. ±10% Carbon
32.30	Carbon Res. 470 ohm ½ W. ±10% Carbon
32.153	Carbon Res. 820 ohm ½ W. ±20% Carbon
32.8	Carbon Res. 1000 ohm ½ W. ±10% Carbon
32.12	Carbon Res. 15000 ohm ½ W. ±10% Carbon
32.85	Carbon Res. 27000 ohm ½ W. ±10% Carbon
32.13	Carbon Res. 22000 ohm ½ W. ±10% Carbon
32.18	Carbon Res. 220,000 ohm ½ W. ±20% Carbon
32.19	Carbon Res. 330,000 ohm ½ W. ±20% Carbon
32.20	Carbon Res. 470,000 ohm ½ W. ±20% Carbon
32.23	Carbon Res. 1 megohm ½ W. ±20% Carbon
32.24	Carbon Res. 2.2 megohm ½ W. ±20% Carbon
32.99	Carbon Res. 10 megohm ½ W. ±20% Carbon
32.41	Carbon Res. 1000 ohm 1 W. ±10% Carbon
32.40	Carbon Res. 200 ohm 2 W. ±10% Carbon
32.115	Carbon Res. 660 ohm 2 W. ±10% Carbon
32.154	Carbon Res. 1500 ohm 2 W. ±20% Carbon
32.2	Carbon Res. 100 ohm ½ W. ±10% Carbon
37.116	Coil Ratio Det.
37.112	Coil F.M. 1st. I.F.
37.132	Coil F.M. 2nd I.F.
37.138	Coil B.C. 1st. & 2nd I.F.
37.194	Coil B.C. Oscl.
37.195	Coil F.M. Oscl. (Made at Fada)
37.196	Coil F.M. R.F. (Made at Fada)
37.193	Coil B.C. Loop
77.128	Crystal
77.125	Dial Plate
77.126	Dial Pointer
77.152	Dial Scale
77.5	Dial Cord
77.4	Dial Spring
77.124	Vernier Drive
97.138	Baffle Speaker
97.141	Grille Silk
97.130	Back
97.131W	Cabinet (Walnut)
97.131V	Cabinet (Ivory)
97.142	Metal Grille
107.24	Speaker with Trans. & Bracket 6" PM.
117.24	Ballast Tube
132.9	Ceramic Trimmer 3-12 mmf NPO
142.45V	Knob Band Selector (Ivory)
142.45W	Knob Band Selector (Walnut)
142.46V	Knob Tuning (Ivory)
142.46W	Knob Tuning (Walnut)
142.47W	Knob Volume (Walnut)
142.47V	Knob Volume (Ivory)
142.48W	Knob Tone AC-On-Off (Walnut)
142.48V	Knob Tone AC-On-Off (Ivory)

TUBE LAYOUT



MODEL 795
F.M. Tuner

FADA RADIO & ELECTRIC CO., INC.



ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that re-alignment is necessary. Then proceed as follows:

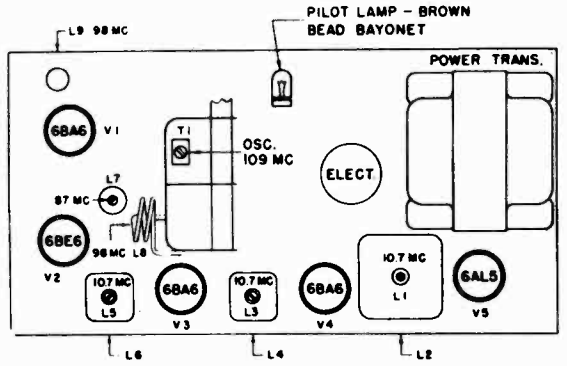
Remove chassis from cabinet, turn on tuner and allow at least 10 minutes "warming up" period.

Use a standard V.T.V.M. with zero center setting.

Use an A.M. signal generator with no modulation, taking hormonics if fundamentals are not available.

Keep signal generator attenuated so as to maintain a 3 V reading.

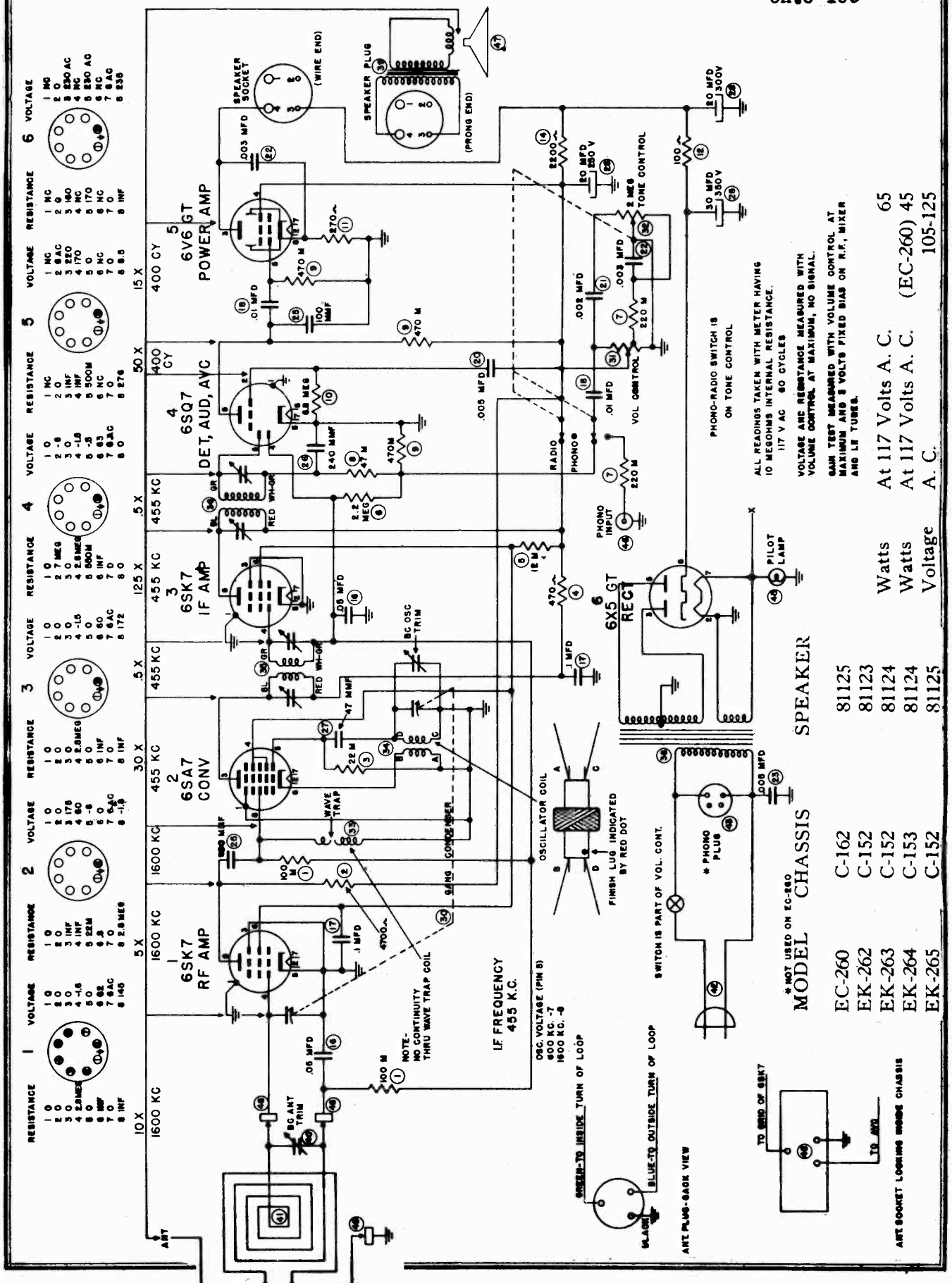
	Receiver Dial at:	Signal Generator Frequency	Signal Generator Connected to:	V.T. V.M. Connected to:	Refer to chassis Layout for location of trimmers.
1.	98 MC	10.7MC	Control Grid Pin #1 6BA6 (2nd I.F.) Socket Series with .01 cond.	Across the (2) 22000 ohm Resistors Pin #2 6AL5, Marked X.	Adjust L1, L2 for Maximum Output.
2.	98 MC	10.7MC	Control Grid Pin #7 6BE6 Socket Series with .01 Cond.	"	Shunt L4 with a 680 ohm ½ W carbon & adjust L3 for maximum output.
3.	98 MC	10.7MC	"	"	Shunt L3 with a 680 ohm ½ W carbon & adjust L4 for maximum output.
4.	98 MC	10.7MC	"	"	Adjust L5, L6 & L1 for maximum output.
5.	98 MC	10.7MC	"	Ground lead of V.T. V.M. to point A on schematic, and probe to point B.	Adjust L2 for zero output. (Check zero setting of V.T. V.M.) Meter should register reverse when slug is rotated through zero output.
6.	Variable Condenser Fully open.	109MC	Terminals 1 & 2 in series with (2) 130 ohm carbon ½ W resistors.	Same as Step #1	Adjust T1 for maximum output "Top" peak on trimmer.
7.	Variable Condenser Fully closed.	87 MC	"	"	Adjust L7 for maximum output.
8	Repeat steps 6 & 7 until L7 requires no further adjustment.				
9	98 MC	98 MC	Same as step #6	Same as Step #1	Adjust L8 & L9 for maximum output.



TUNING RANGE 87-109 MC TUBE LAYOUT

Part No.	Description
12.43	Tubular Condenser .01 mf 200 V
12.8	Tubular Condenser .02 mf 400 V
12.22	Tubular Condenser .01 mf 400 V
12.31	Tubular Condenser .02 mf 200 V
17.9	Mica Condenser 270 mmf ±10%
17.49	Ceramic Condenser 50 mmf ±10%
17.45	Ceramic Condenser 1500 mmf ±20%
17.44	Ceramic Condenser 5000 mmf Gmv. Disk type
17.53	Mica Condenser 82 mmf ±5%
17.47	Ceramic Condenser 100 mmf
17.54	Ceramic Condenser 8.2 mmf ±10% N 1800
22.30	Electrolytic Condenser 4 mf 50 WV
22.32	Electrolytic Condenser 30-40-20 mf 150 WV
27.22	Variable Condenser w/Drum
37.116	Coil Ratio Detector
37.112	Coil 1st. I.F. Transformer
37.132	Coil 2nd. I.F. Transformer
37.127	Coil Oscillator
37.128	Coil R. F.
37.117	Coil Antenna
37.129	Coil R. F. Choke
42.20	Power Transformer
47.14	Switch
77.16	Dial Pointer
77.123	Dial Scale
97.118	Cabinet Back
97.125W	Cabinet Walnut
97.125V	Cabinet Ivory
112.6	Selinium Rectifier
142.4W	Knob Walnut
142.4V	Knob Ivory

MODELS EC-260, Ch.C-162; EK-262, FARNSWORTH TELEV. & RADIO CORP. EK-263, EK-265, Ch.C152; EK-264, Ch.C-153



* NOT USED ON EC-260

MODEL CHASSIS		SPEAKER		
EC-260	C-162	81125		65
EK-262	C-152	81123		
EK-263	C-152	81124	Watts	At 117 Volts A. C.
EK-264	C-153	81124	Watts	At 117 Volts A. C. (EC-260) 45
EK-265	C-152	81125	Voltage	A. C. 105-125

FARNSWORTH TELEV. & RADIO CORP.

MODELS EC-260, Ch.C-162;EK-262, EK-263,EK-265, Ch.C-152;EK-264, Ch.C-153

A Signal Generator calibrated at 455 Kc., 600 Kc. and 1500 Kc., and an output indicator are necessary to properly align this set. All adjustments should be made with the volume control set for maximum and the tone control for maximum treble, keeping the signal generator output as low as possible to prevent A.V.C. action and false settings.

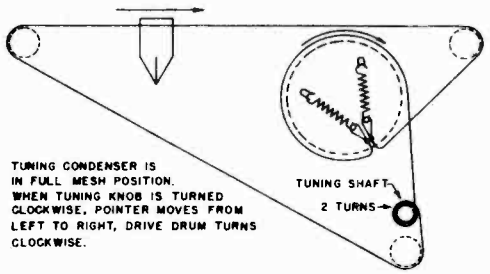
The low side of the signal generator is connected to the chassis.

TABULATION FOR ALIGNMENT

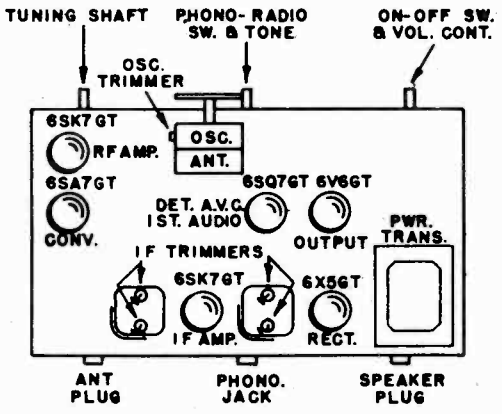
Steps	Connect High Side of Generator to	Set Generator At	Set Gang At	Adjust	Located	To Obtain
1	Set Volume Control at Maximum and Tone Control at Maximum Treble					
2	Stator of Ant. Section of Gang with .1 Mf. In Series	455 Kc.	Minimum	2nd. I.F. Transformer	Top of 2nd. I.F. Transformer	Maximum Output
3				1st. I. F. Transformer	Top of 1st. I.F. Transformer	
4	Ant. Lead With 250 Mmf. In Series*	1500 Kc.	1500 Kc.	Osc. Trimmer	On Gang	
5		1500 Kc.	1500 Kc.	Ant. Trimmer	On Loop	
6	Check Pointer Calibration on 600 Kc.					

*Antenna wire protrudes from loop.

DIAL STRINGING



CHASSIS LAYOUT



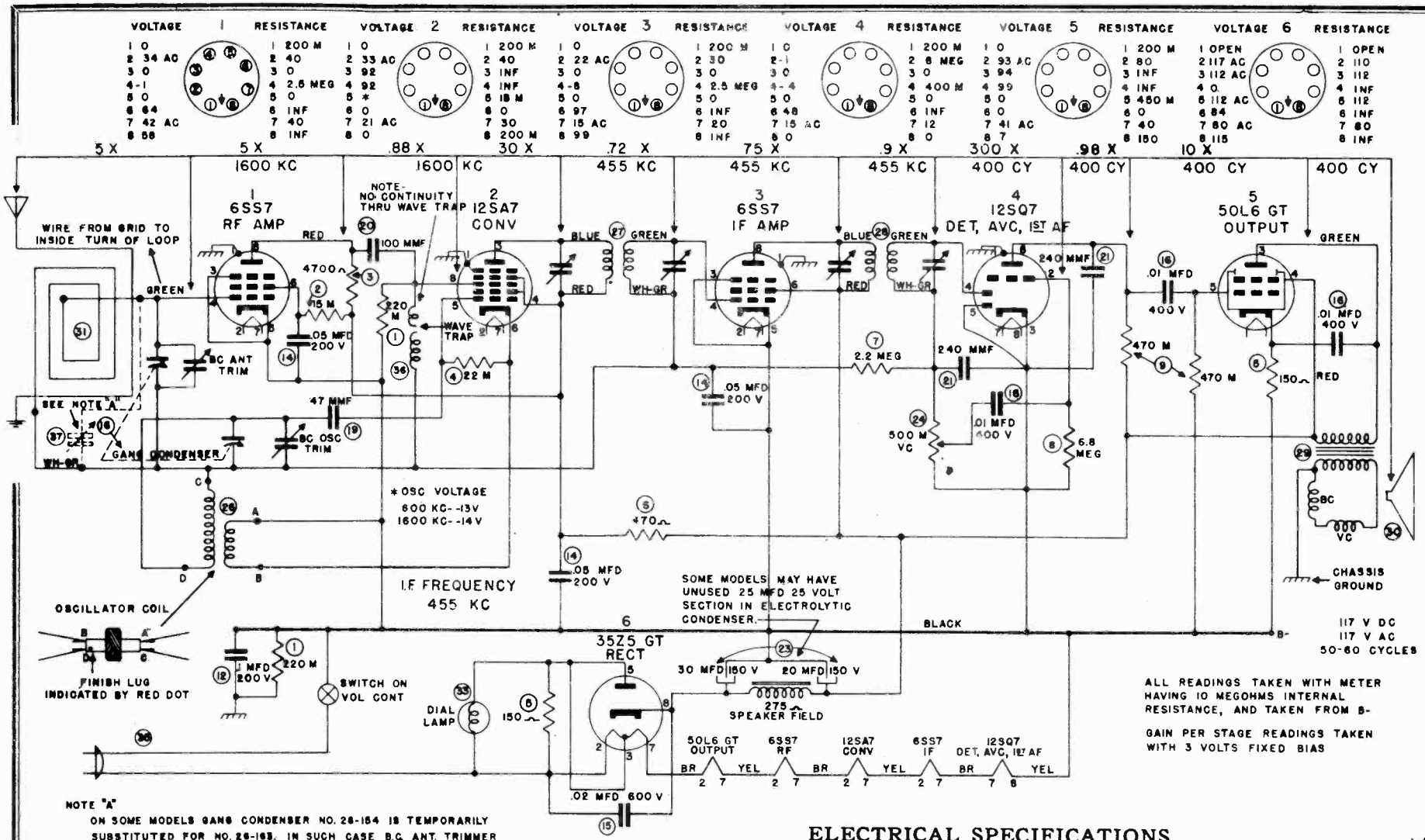
ET-064, ET-065, ET-066

Refer. No.	Part No.	Description
1	77216	220 M Ohms
2	77265	15 M Ohms
3	77211	4700 Ohms
4	77266	22 M Ohms
5	77259	150 Ohms
6	77261	470 Ohms
7	77270	2.2 Meg Ohms
8	77273	6.8 Meg Ohms
9	77217	470 M Ohms
12	25215	.1 Mfd. 600 V
14	25196	.05 Mfd. 600 V
15	25195	.02 Mfd. 600 V
16	25194	.01 Mfd. 600 V
18	09130	Two Gang Condenser & Drive Drum
19	25193	47 Mmfd. Mica
20	25188	100 Mmfd. Mica
21	25187	240 Mmfd. Mica
23	25022	Elect. Cond. 30 Mfd. & 20 Mfd
24	78048	500 M Volume Control
26	38483	Oscillator Coil Assembly
27	38536	1st. I.F. Transformer
28	38537	2nd. I.F. Transformer
29	94091	Output Transformer
30	81091	Speaker
31	38478	Loop and Back Cover Assembly
31	38479	Loop and Back Cover Assembly for ET-066
33	42186	Dial Lamp
35	27118	Line Cord
36	38484	Wave Trap
37	26233	Antenna Trimmer used with Gang Cond. #26154 Only
	41106	Drive Cord Assembly
	07316	Dial Pointer Assembly
	31265	Dial Scale
	31278	Dial Scale for ET-066
	59193	Knob
	59134	Knob fo ET-066
	H-239	Cabinet and Packing for ET-064
	H-240	Cabinet and Packing for ET-065
	H-235	Cabinet and Packing for ET-066

The Service Department policy is to furnish 1/2 Watt 5% Carbon Resistors and 600 Volt Tubular Condensers.

EC-260, EK-262, EK-263, EK-264, EK-265

Reference No.	Part No.	DESCRIPTION
1	77214	100 M Ohms
2	77211	4700 Ohms
3	77266	22 M Ohms
4	77261	470 Ohms
5	77155	12 M Ohms 2 Watt
6	77270	2.2 Megohms
7	77216	220 M Ohms
8	77213	47 M Ohms
9	77217	470 M Ohms
10	77273	6.8 Megohms
11	77174	270 Ohms 1 Watt
12	77258	100 Ohms
14	77301	2200 Ohms 2 Watt
16	25196	.05 Mfd. Tubular 600 V
17	25215	.1 Mfd. Tubular 600 V
18	25194	.01 Mfd. Tubular 600 V
20	25183	.005 Mfd. Tubular 600 V
21	25185	.002 Mfd. Tubular 600 V
22	25184	.003 Mfd. Tubular 600 V
23	25031	.005 Mfd. Line Buffer 600 V
25	25188	100 Mmf. Mica
26	25187	240 Mmf. Mica
27	25193	47 Mmf. Mica
28	25180	Electrolytic Capacitor 30 Mf. 350 V.-20 Mf. 300 V.-20 Mf. 250 V
30	15136	Gang Condenser and Drive Drum
31	78071	Volume Control
32	90148	Tone Control and Phono Switch
33	38484	Wave Trap
34	38483	Oscillator Coil
35	38535	1st. I. F. Transformer
36	38537	2nd. I. F. Transformer
38	94025	Power Transformer
39	94197	Output Transformer EC-260, EK-265
39	94198	Output Transformer EK-262
39	94199	Output Transformer EK-263, EK-264
40	26032	Antenna Trimmer
41	38533	Loop Antenna for EK-262 and EK-264
41	38545	Loop Antenna for EC-260, EK-263 and EK-265
42	27118	Line Cord
43	11210	Phono A.C. Cable and Plug
45	42185	Dial Lamp Mazda 44
46	80090	Phono Input Socket
47	81123	Speaker EC-260, EK-265
47	81124	Speaker EK-263, EK-264
47	81123	Speaker EK-262
48	80256	Antenna Socket
	80252	Antenna Plug
	80139	Molded Octal Tube Socket
	07348	Dial Pointer Assembly
	41106	Universal Drive Cord Kit
	31318	Dial Glass for EC-260, EK-264
	31280	Dial Glass for EK-262, EK-263, EK-265
	59211	Dial Escutcheon EC-260, EK-264
	59199	Dial Escutcheon EK-262, EK-263, EK-265
	58006	Dial Background for EK-262, EK-263, EK-265
	58039	Dial Background for EC-260, EK-264
	64360	Dial Light Current Supply Spring
	H-236	Cabinet and Packing for EC-260
	H-221	Cabinet and Packing for EK-262
	H-222-1	Cabinet and Packing for EK-263 Walnut
	H-222-2	Cabinet and Packing for EK-263 Blonde
	H-223	Cabinet and Packing for EK-265
	H-220-1	Cabinet and Packing for EK-264 Walnut
	H-220-2	Cabinet and Packing for EK-264 Blonde
	59134	Knob for EC-260, EK-262, EK-263 Walnut, EK-264 Walnut, EK-265
	59243	Knob for EK-263 Blonde, EK-264 Blonde
	71223	Phono Needle
	22147	F. U. Cable



ELECTRICAL SPECIFICATIONS

Watts	at 117 Volts A. C.	30
Voltage	A. C. or D. C.	105-125

Six Tube A. C. — D. C. Single Band Superheterodyne

Broadcast Band	540 Kc — 1620 Kc
Intermediate Frequency	455 Kc

MODEL	CHASSIS	SPEAKER
ET-064	C-158	81091
ET-065	C-158	81091
ET-066	C-159	81091

MODELS ET-064,
ET-065,Ch.C-158;
ET-066,Ch.C-159

FARNSWORTH TELEV. & RADIO CORP.

EQUIPMENT AND PROCEDURE FOR ALIGNMENT

To properly align this receiver, a signal generator calibrated at 455 Kc., 600 Kc., and 1500 Kc., and an output indicator are required. All adjustments should be made with the volume control set for maximum volume, keeping the signal generator output as low as possible to prevent A. V. C. action and incorrect alignment.

Connect the low side of the signal generator to one of the wires found at the rear of the set. The high side of the signal generator is connected to the other lead.

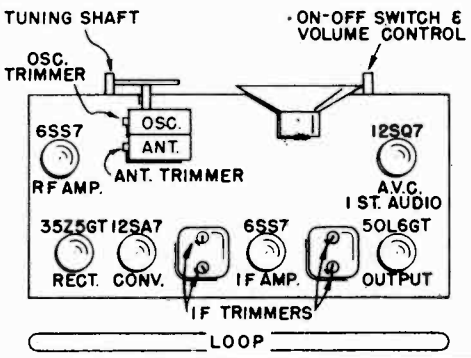
The loop should be spaced 3/4 inch from the chassis or the approximate position relative to the chassis as when installed in cabinet.

TABULATION FOR ALIGNMENT

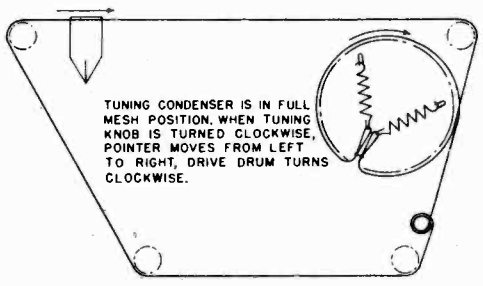
Steps	Dummy Antenna	Set Generator At	Set Gang At	Adjust	Located	To Obtain
1	Set Volume Control For Maximum Output					
2	100 MMF	455 Kc.	Minimum Capacity	2nd. I.F. Trimmers	Top of I.F. Transformer	Maximum Output
3				1st. I. F. Trimmers		
4		1500 Kc.	1500 Kc.	Osc. Trimmer	On Tuning Condenser	
5		1500 Kc.	1500 Kc.	Ant. Trimmer	On Tuning Condenser*	
6	Check Pointer Calibration at 600Kc.					

*On models using gang condenser #26154, the antenna trimmer is located on loop.

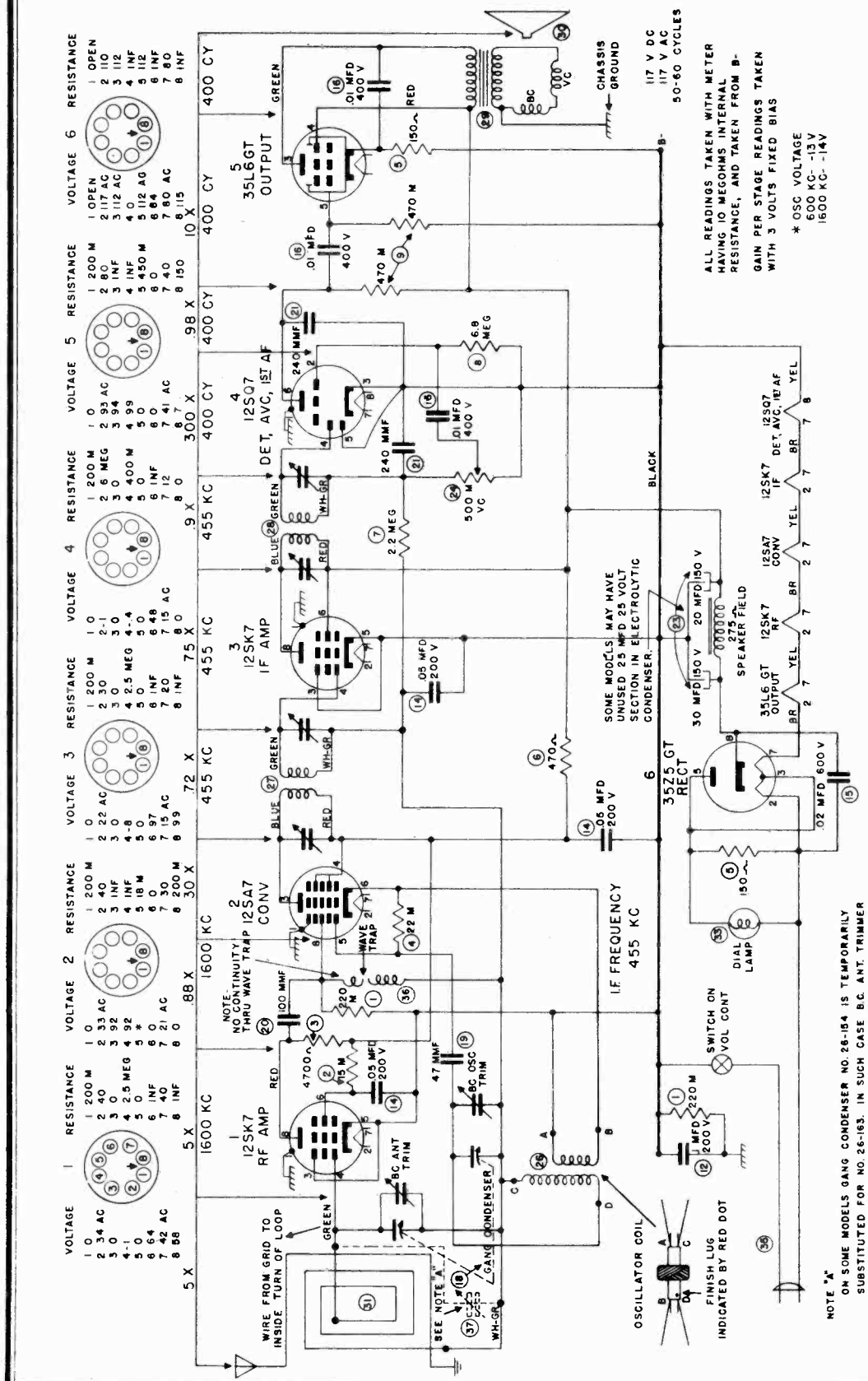
SIX TUBE LAYOUT



DIAL STRINGING

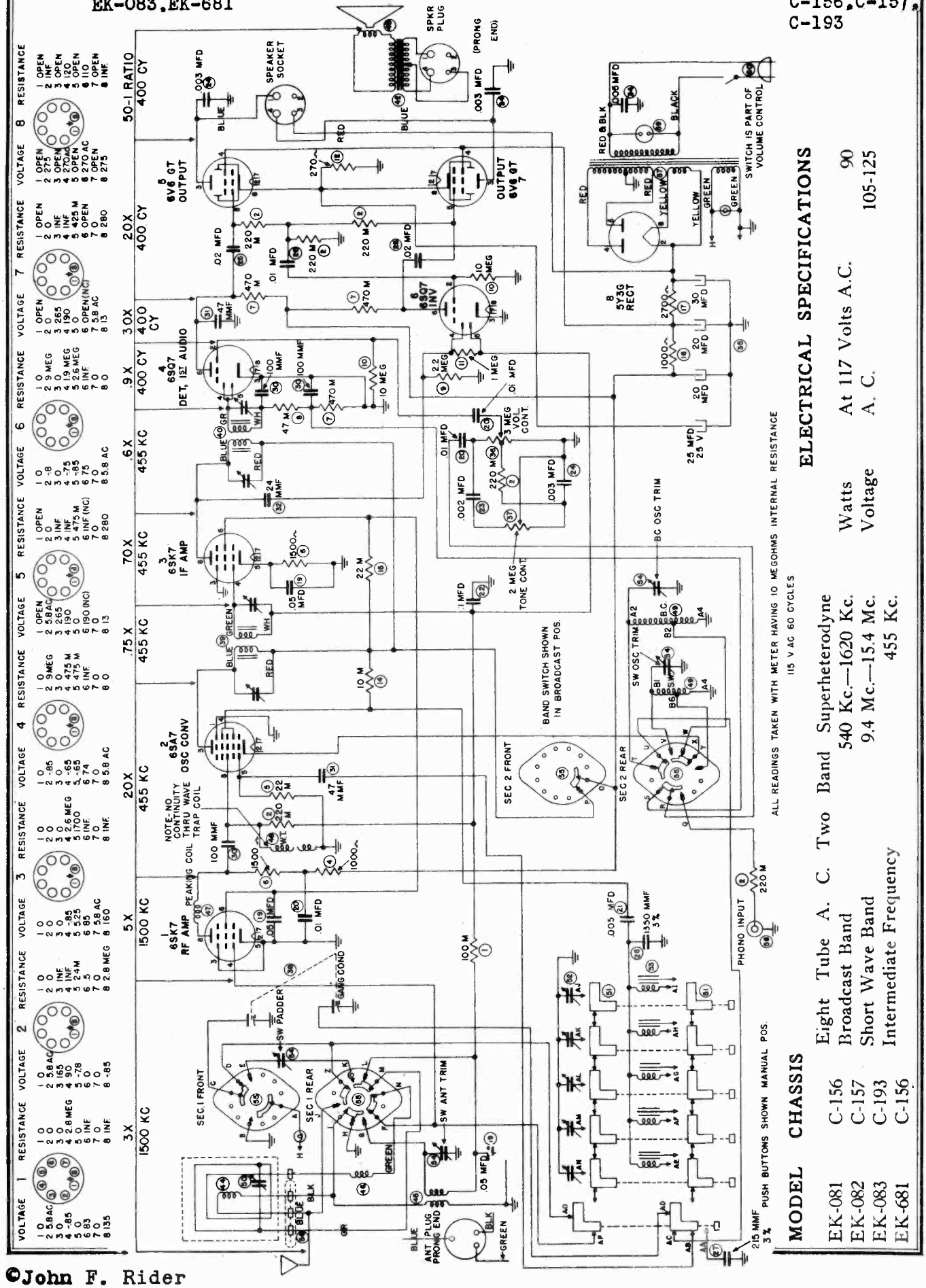


FARNSWORTH TELEV. & RADIO CORP. MODEL GT-060, GT-061, GT-064, GT-065



For alignment and additional data, see Model ET-064

MODELS EK-081, EK-082, EK-083, EK-681 — FARNSWORTH TELEV. & RADIO CORP. — Chassis C-156, C-157, C-193



ELECTRICAL SPECIFICATIONS

Eight Tube A. C. Two Band Superheterodyne		Watts	90
Broadcast Band	540 Kc.—1620 Kc.	Voltage	105-125
Short Wave Band	9.4 Mc.—15.4 Mc.	A. C.	
Intermediate Frequency	455 Kc.		

MODEL CHASSIS

EK-081	C-156
EK-082	C-157
EK-083	C-193
EK-681	C-156

EQUIPMENT AND PROCEDURE FOR ALIGNMENT

To properly align this receiver, a signal generator calibrated at 455 Kc., 1000 Kc., 1500 Kc., 1620 Kc., 9.7 Mc., 15 Mc., and 15.4 Mc; and also an output indicator are required. All adjustments should be made with the volume control set for maximum volume, keeping the generator output as low as possible to prevent A.V.C. action and false readings.

The loop should be placed in the approximate position relative to chassis as when the chassis is installed in the cabinet.

Connect the low side of the generator to the ground (black) wire and the high side of the generator to the antenna (red) wire.

CAUTION—Tighten S.W. oscillator trimmer screw for maximum capacity, then unscrew to second peak. Two peaks are usually found on the S.W. oscillator trimmer—one at 16.3 Mc., and one at 15.4 Mc. The lower frequency (15.4 Mc.) is used.

STEPS	USE IN SERIES WITH ANTENNA		SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1	SET VOLUME CONTROL AT MAXIMUM						
2	250 MMFD.	I. F.	455 Kc.	MINIMUM	2nd. I.F. TRIMMERS	TOP 2nd. I.F. TRANS.	MAXIMUM OUTPUT
3					1st. I.F. TRIMMERS	TOP 1st. I.F. TRANS.	
4		BROAD-CAST	1620 Kc.	1620 Kc.	B.C OSC. TRIMMER	See Chassis Layout	
5			1500 Kc.	1500 KC. Rock Gang	ANT. TRIMMER	ON LOOP	
6	SET POINTER AT 1000 Kc. AND CHECK POINTER CALIBRATION						
7	400 Ohms	SHORT WAVE	15.4 Mc.	MINIMUM	S.W. OSC. TRIMMER**	See Chassis Layout	
8			15 Mc.	15 Mc. Rock Gang	S.W. ANT. TRIMMER		
9			9.7 Mc.	9.7 Mc. Rock Gang	S.W. ANT. PADDER		
10	RECHECK 15.4 Mc.						

**See Caution above.

PUSH BUTTON SET UP

A Signal Generator should be used to prevent buttons being set up on wrong stations.

1. Remove the button escutcheon, exposing five pairs of adjusting screws. The small screw adjusts the oscillator and the large screw adjusts the antenna. (See PUSH BUTTON LAYOUT.)

2. Select the pair of adjustment screws covering the frequency of a wanted station.

3. Press the "Dial" button and manually tune in the desred station frequency.

4. Press the button selected for this frequency.

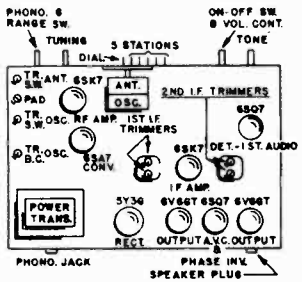
5. Adjust the lower screw of the pair selected for this frequency until the signal is heard most clearly.

6. Adjust the upper screw of the same pair until maximum volume is secured.

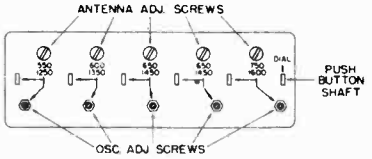
7. Press dial button, making certain original frequency is still tuned-in; check results on button just set up. If it is the same, proceed with the next button, until all are set up.

8. Recheck settings and correct any drift due to interaction between adjacent coils.

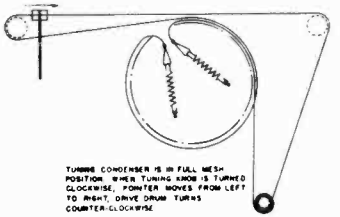
CHASSIS LAYOUT



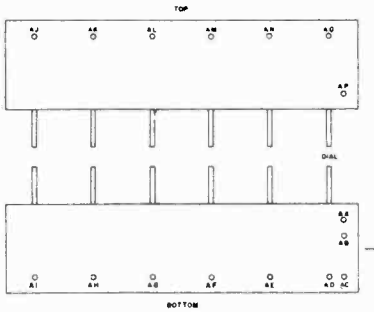
PUSH BUTTON LAYOUT



DIAL STRINGING



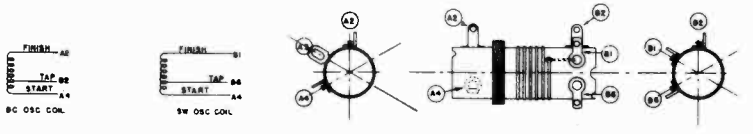
PUSH BUTTON TUNER SWITCH

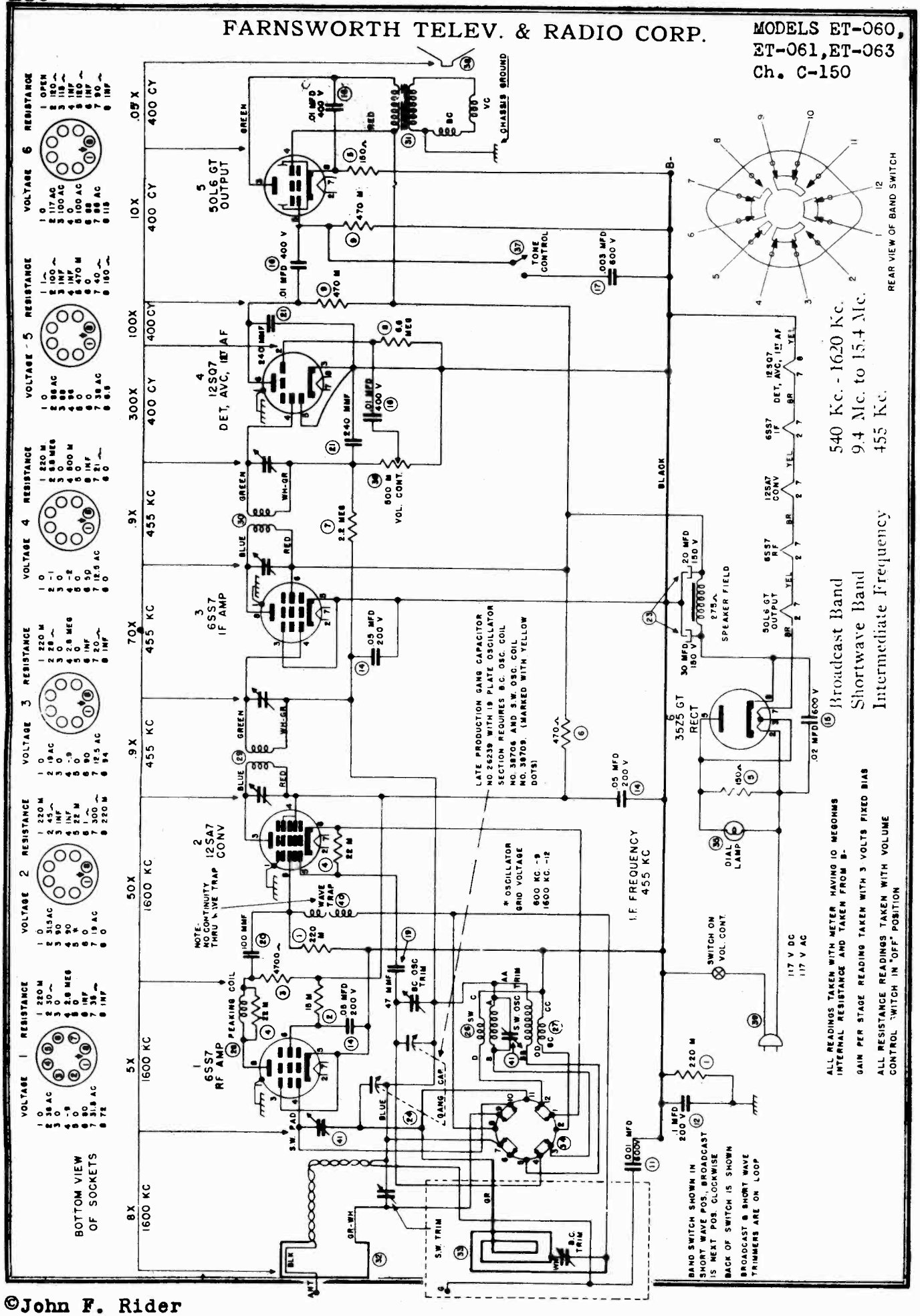


Refer. No.	Part No.	DESCRIPTION
1	77214	100 M Ohms
2	77216	220 M Ohms
4	77262	1000 Ohm
5	77266	22 M Ohms
6	77263	1500 Ohm
7	77217	470 M Ohms
8	77213	47 M Ohms
9	77270	2.2 Megohm
10	77274	10 Megohm
11	77218	1 Megohm
12	77189	270 Ohm 2 Watt
14	77013	10 M Ohms 2 Watt
15	77069	22 M Ohms 1 Watt
16	77304	1000 Ohm 2 Watt
17	77243	2700 Ohm 4.7 Watt Molded
19	25196	.05 Mfd. Tubular 600 Volts
20	25194	.01 Mfd. Tubular 600 Volts
21	25183	.005 Mfd. Tubular 600 Volts
22	25215	.1 Mfd. Tubular 600 Volts
23	25185	.002 Mfd. Tubular 600 Volts
24	25184	.003 Mfd. Tubular 600 Volts
25	25195	.02 Mfd. Tubular 600 Volts
27	25212	215 Mmf. Silver Mica Capacitor
28	25213	1350 Mmf. Silver Mica Capacitor
30	25188	100 Mmf. Mica
31	25193	47 Mmf. Mica
32	25192	24 Mmf. Mica
34	25031	.005 Buffer 600 Volts
35	25214	Electrolytic Capacitor 20-20-30-450 Volts: 25-25 Volts
36	78057	Volume Control
37	78072	Tone Control
38	26194	Gang Capacitor
39	38485	1st. I. F. Transformer
40	38486	2nd. I. F. Transformer
42	94195	Output Transformer
43	81126	Speaker
44	38546	Loop Antenna
45	38542	Short Wave Antenna Coil
46	38794	Antenna Loading Coil
47	38544	Peaking Coil
48	38484	Wave Trap
49	38543	S.W. and B.C. Oscillator Coil Ass'y
50	26032	Antenna Trimmer
51	90118	Push Button Switch
52	26175	P. B. Trimmer Strip
53	38405	P. B. Coil Strip
54	26195	Trimmer Strip
55	90175	Band Switch
58	80252	Antenna Plug
56	80256	Antenna Socket
57	94104	60 Cycle Power Transformer
57	94224	50 Cycle Power Transformer for 681 COY
58	80030	Phono Imput Socket
59	11210	Phono A.C. Cord and Socket
60	27118	Universal Line Cord
	80239	Rectifier Octal Socket
	80139	Molded Octal Socket
	22147	Phono Pickup Cable for EK-081 and EK-083
	22146	Phono Pickup Cable for EK-082
	31273	Glass Dial
	04055	Dial Background
	561397	Escutcheon
	07373	Dial Pointer
	59134	Knob
	42185	Dial Lamp (Mazda 44) 6 V., 250 Ma.
	41106	Drive Cord (42" Long) and springs
	17019	Drive Drum
	59249	Push Button Escutcheon
	59030	Push Button
	41101	Station Call Letter Tabs
	71223	Phono Needle
	H-224	Cabinet and Packing for EK-081
	H-225	Cabinet and Packing for EK-082
	H-267	Cabinet and Packing for EK-083

The Service Department policy is to furnish ½ watt 5% carbon resistors tubular condensers.

BROADCAST AND S. W. OSC. COILS




FARNSWORTH TELEV. & RADIO CORP.
MODELS ET-060, ET-061, ET-063
Ch. C-150
540 Kc. - 1620 Kc.
9.4 Mc. to 15.4 Mc.
455 Kc.
Broadcast Band
Shortwave Band
Intermediate Frequency
REAR VIEW OF BAND SWITCH
BOTTOM VIEW OF SOCKETS
1 6S7 RF AMP
2 12SA7 CONV
3 6SS7 IF AMP
4 12SQ7 DET, AVC, 1ST AF
5 50L6 GT OUTPUT
6 35Z5 GT RECT
* OSCILLATOR GRID VOLTAGE
600 KC. -9
1600 KC. -12
I.F. FREQUENCY 455 KC
LATE PRODUCTION GANG CAPACITOR NO 26239 WITH 19 PLATE OSCILLATOR SECTION REQUIRES B.C. OSC. COIL NO. 38704 AND S.W. OSC. COIL NO. 38709. (MARKED WITH YELLOW DOTS)
NOTE: NO CONTINUITY THRU WAVE TRAP
ALL READINGS TAKEN WITH METER HAVING 10 MEGOHMS INTERNAL RESISTANCE AND TAKEN FROM B-
GAIN PER STAGE READING TAKEN WITH 3 VOLTS FIXED BIAS
ALL RESISTANCE READINGS TAKEN WITH VOLUME CONTROL SWITCH IN "OFF" POSITION
BAND SWITCH SHOWN IN SHORT WAVE POS. BROADCAST IS NEXT POS. CLOCKWISE
BACK OF SWITCH IS SHOWN
BROADCAST & SHORT WAVE TRIMMERS ARE ON LOOP
117 V DC
117 V AC
SPEAKER FIELD
DIAL LAMP
TONE CONTROL
VOL. CONT.
SWITCH ON
GANG CAP.
SW. TRIM
B.C. TRIM
SW OSC TRIM
OSC TRIM
PEAKING COIL
WAVE TRAP
CHASSIS GROUND
ANT.
GND.

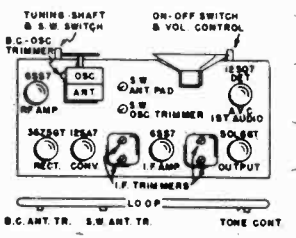
A Signal Generator calibrated at 455 Kc., 600 Kc., 1000 Kc., 1500 Kc., 15 Mc., 12.5 Mc., and 10 Mc., and an output indicator are required to properly align this receiver. All adjustments should be made with the volume control set for maximum, keeping the signal generator output as low as possible to prevent AVC action and incorrect adjustments.

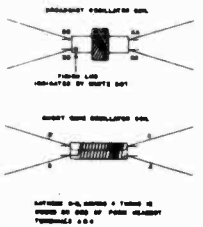
Connect the low side of the Signal Generator to the chassis through a .1 Mfd. condenser. Connect the high side to antenna lead at rear of set through dummy load of 100 MMF for Broadcast and 400 ohms for Shortwave.

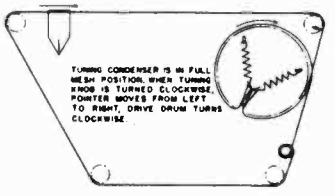
The loop antenna should be placed in approximately the position relative to chassis as when chassis is installed in cabinet.

When aligning the Shortwave Oscillator, use the peak found farthest out from maximum capacity on the oscillator trimmer. Use the peak nearest maximum capacity on the loop trimmer.

STEPS	DUMMY ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1	SET VOLUME CONTROL FOR MAXIMUM OUTPUT					
2	100 MMF.	455 Kc.	Minimum Capacity	2nd. I.F. Trimmers	Top of I.F. Transformer	Maximum Output
3				1st. I.F. Trimmers		
4		1500 Kc.	1500 Kc.	B.C. Osc. Trimmer	On Tuning Capacitor	
5		1500 Kc.	1500 Kc.	B.C. Ant. Trimmer	*On Loop Antenna	
6	Check Pointer for Calibration at 1000 Kc. and 600 Kc.					
	SHORT WAVE BAND					
7	400 Ohms	15 Mc.	Minimum Capacity	S.W. Osc. Trimmer	*Chassis Near Rear	Maximum Output
8		12.5 Mc.	12.5 Mc. Rock Gang	S.W. Ant. Trimmer	*On Loop	
9	Check	10 Mc.	10 Mc. Rock Gang	S.W. Ant. Padder	*Chassis Near Front	







Refer. No.	Part No.	DESCRIPTION
1	77210	220 M Ohms
2	77365	15 M Ohms
3	77311	4700 Ohms
4	77266	22 M Ohms
5	77259	150 Ohms
6	77261	470 Ohms
7	77270	2.2 Megohms
8	77273	6.8 Megohms
9	77217	470 M Ohms
11	25197	.001 Mfd. 600 V
12	25216	.1 Mfd. 600 V
14	25196	.05 Mfd. 600 V
15	25195	.02 Mfd. 600 V
16	25194	.01 Mfd. 600 V
17	25184	.003 Mfd. 600 V
19	25193	47 Mmf. Mica
20	25188	100 Mmf. Mica
21	25187	240 Mmf. Mica
23	25022	20 Mfd.—30 Mfd.—150 V. Elect. Cap.
24	26154	Gang Capacitor
24	26239	Gang Capacitor, (see note)
26	38549	S. W. Oscillator Coil (White dot) for 26154
26	35709	S. W. Oscillator Coil (Yellow dot) for 26239 (see note)
27	38483	B. C. Oscillator Coil (White dot) for 26154
27	38707	B. C. Oscillator Coil (Yellow dot) for 26239 (see note)
28	38550	Peaking Coil
29	38536	1st. I. F. Transformer
30	38537	2nd. I. F. Transformer
31	94091	Output Transformer
32	38535	S. W. Loop Assembly
33	38465	B. C. Loop and Back Cover Ass'y ET-060 and ET-061
33	38480	B. C. Loop and Back Cover Ass'y ET-063
34	90095	Band Switch
35	42186	Dial Lamp (Mazda 47)
36	78070	Volume Control
37	90073	Tone Control Slide Switch
38	81091	Speaker
39	27118	Line Cord
40	38484	Wave Trap
41	26214	B. C. and S. W. Antenna Trimmer Strip
	31276	Dial Background
	31319	Dial Window
	07334	Dial Pointer Assembly
	31277	Dial Scale for ET-060 and ET-061
	31279	Dial Scale for ET-063
	41106	Universal Drive Cord Kit
	56994	Drive Drum
	09195	Knob and Set Screw for ET-060 and ET-063
	09196	Knob and Set Screw for ET-061 Red
	09224	Knob and Set Screw for ET-061 Blue
	09225	Knob and Set Screw for ET-061 Black
	54118	Band Switch Lever ET-060 and ET-061
	54091	Band Switch Lever ET-063
	H-231	Cabinet and Packing for ET-060
	H-254	Cabinet and Packing for ET-061
	59168	Grille for ET-060
	59190	Grille for ET-061 Red
	59247	Grille for ET-061 Blue
	59248	Grille for ET-061 Black

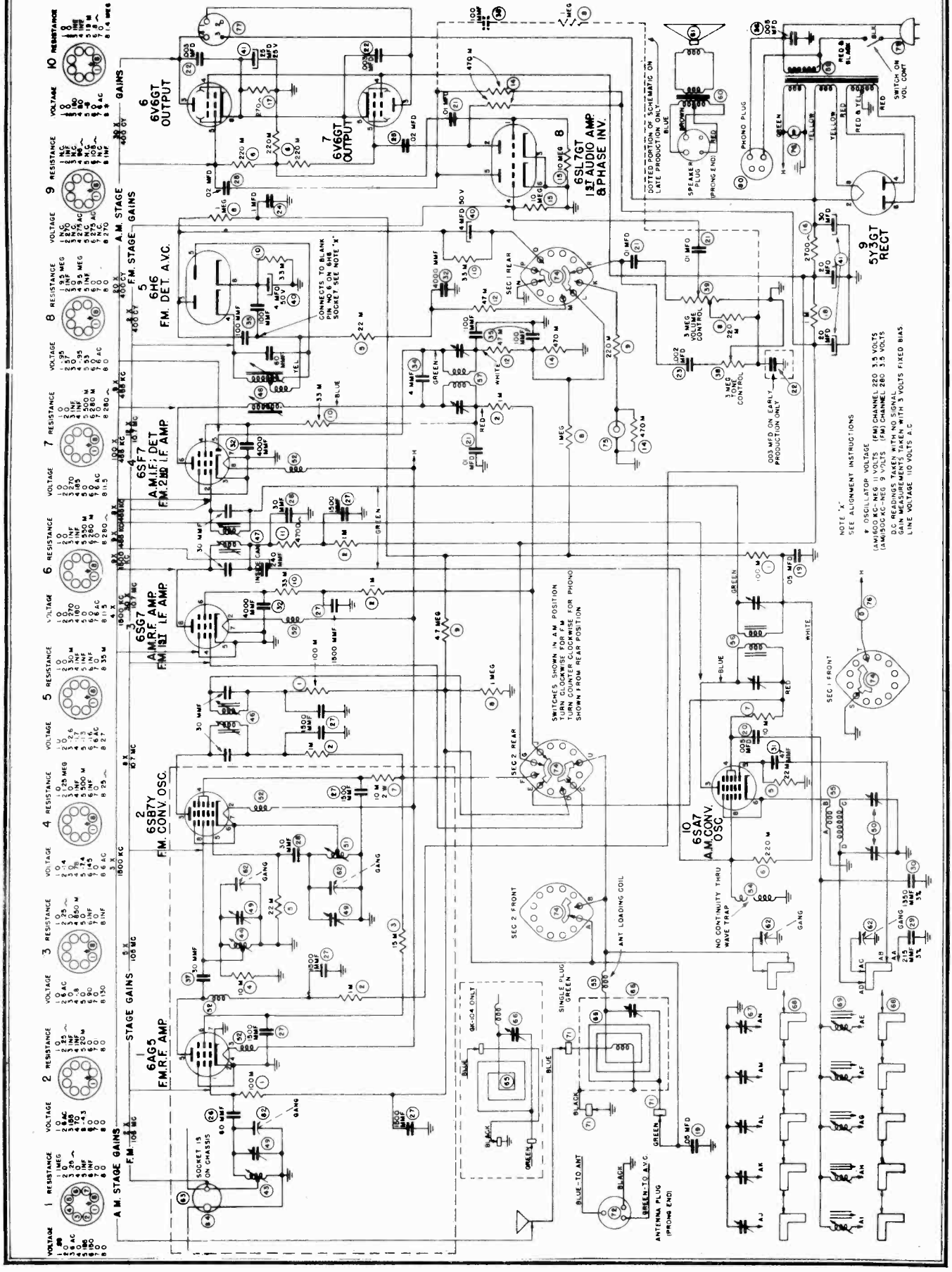
NOTE: Models with R.F. trimmer on loop require removal of R. F. trimmer from gang capacitor having such trimmer. Late production gang capacitor 26239 (identified by red dot) with 19 plate oscillator section requires B.C. Oscillator Coil 38706 and S.W. Oscillator Coil 38709 (Marked with yellow dots).

The parts shortage has resulted in the substitution of various types of tuning capacitors without change in part numbers stamped on them. In ordering replacement tuning capacitors for ET-060, 061, 063, 064, 065, 066, 069; EK-263, 264, and 265 the following suggestions should be observed:

Gang Capacitor with 21 plate oscillator section requires the removal of trimmer from R.F. section of gang if the loop antenna has a R. F. trimmer located on it. This capacitor uses B. C. oscillator coil No. 38483 and if a S. W. oscillator coil is used, requires S. W. oscillator coil No. 38549. Both of these coils have a white dot to indicate finish lug.

No. 23239 gang capacitor with 19 plate oscillator section (identified by red dot on rear) may require the removal of R. F. trimmer as explained above. This capacitor requires B. C. oscillator coil No. 38706 and S. W. oscillator coil (if used) No. 38709. These oscillator coils are marked with a yellow dot at the finish lug.

MODELS GK-100, GK-102 FARNSWORTH TELEV. & RADIO CORP.
GK-103, GK-104, GK-111
GK-112, GK-113, GK-114



Oscilliscope Alignment of FM Band

1. Equipment required will be an oscilliscope, a frequency modulated signal generator covering the range 87.5 to 108.5 mc on fundamentals, a sweep generator producing a signal of 10.7 mc and sweeping at least 150 kc each side of 10.7 mc, and an output meter.

2. The vertical or "Y" axis terminals of the oscilliscope should be connected between pin 3 of the 6H6 discriminator and ground. The sweep voltage of the sweep generator should be fed to the horizontal or "X" axis terminals of the oscilliscope. The 10.7 mc output of the sweep generator should be fed into the grid of the 6SF7 tube through a condenser of approximately 3300 Mmfd.

3. Remove the negative lead of the 4 mfd. electrolytic from pin #3 of 6H6 socket. Remove 6SL7 tube from socket. Turn the set on and turn both the tone control and the volume control all the way to the right. Detune the secondary of the third FM I.F. transformer by turning the bottom slug screw out as far as possible. Adjust the primary, top slug screw, until pattern (A) appears on the oscilliscope. Adjust the secondary, bottom slug screw, until pattern (B) is obtained on the oscilliscope and until both sides of this pattern are symmetrical.

4. Remove the 10.7 mc output of the sweep generator from the grid of the 6SF7 tube and connect to the grid of the 6SG7. Align the second FM I.F. transformer as in paragraph 3.

5. Connect the 10.7 mc output of the sweep generator to the signal grid of the 6SB7Y, (pin 8). Detune secondary of the first FM I.F. transformer and tune primary as before for pattern (A). Tune secondary for pattern (C) and make both sides of pattern as symmetrical as possible. This completes alignment of the FM I.F. transformers.

6. Reconnect the negative lead of the 4 mfd. electrolytic to pin #3 of the 6H6 socket and move the oscilliscope leads to pin #6 of the 6H6 socket and ground. With the sweep generator connected to the 6SB7Y signal grid as before, the discriminator pattern (D) should appear on the oscilliscope if the I.F. alignment instuctions have been followed carefuly. Remove the ocilliscope and sweep generator leads and reinstall 6SL7 tube in socket. Never adjust AM I.F. transformers without rechecking FM I.F. alignment.

7. Connect the 87.5 to 108.5 mc signal generator to the antenna socket of the receiver through a 300 ohm resistor. The generator should be frequency modulated at some frequency in the audible range. Connect output meter across secondary of output transformer. Tune receiver to channel 300 on FM dial. With signal generator set at 107.9 mc adjust oscillator trimmer condenser, third from front, for maximum reading on output meter. Set signal generator to 87.9 mc and tune receiver to channel 200 on FM dial. Adjust oscillator coil screw, third from front, (see chassis layout) for maximum reading on output meter. Recheck oscillator setting for channel 300.

8. Tune signal generator and receiver to 105 mc (channel 285 approx.). Adjust converter signal grid trimmer condenser, second from front, for maximum reading on output meter. Tune signal generator and receiver to 92 mc, (channel 220 approx.) and adjust converter coil screw, (second from front), to maximum reading on output meter. Recheck converter trimmer at 105 mc (channel 285 approx.).

9. Repeat operations of paragraph (7) for antenna trimmer condenser and coil. This completes FM R.F. alignment.

Alternate FM Alignment Procedure

Necessary Equipment:
Signal Generator
Voltohmyst (Vacuum Tube Voltmeter)

Connect voltohmyst from ground to pin #6 of 6H6 (audio-marked X on schematic). Connect generator tuned to 10.7 mc, to pin #4 on 6SG7. Turn secondary slug of 3rd. FM I.F. (closest to chassis) out as far as it will turn. Tune primary of 3rd IF for maximum positive voltage. Tune primary and secondary of the 2nd. FM I.F. for maximum output. Move generator to pin #8 of 6SB7Y and turn primary and secondary of 1st. FM I.F. for maximum output. Next tune secondary of 3rd. FM I.F. for zero voltage on voltohmyst. The I.F. is now aligned.

RF ALIGNMENT

With Voltohmyst connected between ground and pin #3 on 6H6 socket, connect generator between ground and small pin of dipole antenna socket. Use very short leads on generator and a 300 ohm resistor as a dummy antenna. Set generator at 87.5 mc and gang closed. Adjust oscillator slug for maximum voltage. Adjust generator to 108.5 mc and gang to minimum and adjust oscillator trimmer for maximum voltage. Go back and check low frequency end. Next set generator at 92 mc, tune in signal on receiver, approximately 220 on dial. Adjust converter and antenna slug for maximum voltage output. Set generator at 105 mc. Tune in signal on receiver, approximately 280 on dial. Tune converter and antenna trimmer for maximum voltage output. Check adjustment of antenna and conveter slugs at 92 mc.

PUSH BUTTON SETUP

A Signal Generator should be used to prevent buttons being set up on wrong stations. Allow set to warm up for one-half hour.

1. Remove the button escutcheon, exposing five pairs of adjusting screws. The small screw adjusts the oscillator and the large screw adjusts the antenna. (See PUSH BUTTON LAYOUT.)

2. Select the pair of adjustment screws covering the frequency of a wanted station.

3. Press the "Dial" button and manually tune in the desired station frequency or signal from generator.

4. Press the button selected for this frequency.

5. Adjust the lower screw of the pair selected for this frequency until the signal is heard most clearly.

6. Adjust the upper screw of the same pair until maximum volume is secured.

7. Press dial button, making certain original frequency is still tuned-in; check results on button just set up. If it is the same, proceed with the next button, until all are set up.

8. Recheck settings and correct any drift due to interaction between adjacent coils.

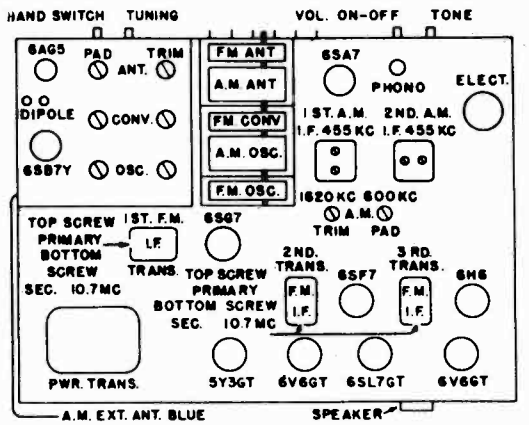
ALIGNMENT INSTRUCTIONS AM BAND

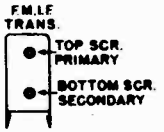
An output meter and a signal generator calibrated at 455 Kc., 600 Kc., 1500 Kc. and 1600 Kc., are required to properly align these receivers on AM band. Keep the output of the signal generator as low as possible to prevent AVC action and false settings. Connect the high side of the generator to the blue wire found at rear of set and low side to the black wire.

STEPS	DUMMY ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	
1	SET VOLUME AND TONE CONTROLS AT MAXIMUM					MAXIMUM OUTPUT
2	200 MMF.	455 Kc.	Minimum	2nd. I.F. Trimmers *	Top of I.F. Transformers	
3				1st. I.F. Trimmers *		
4		1600 Kc.	1600 Kc.	B. C. Osc. Trimmer	See Chassis Layout	
5		1500 Kc.	1500 Kc.	B. C. R. F. Trimmer	On Loop	
6		600 Kc.	600 Kc. Rock Gang	600 Kc. Padder	See Chassis Layout	
7		Recheck 1500 Kc.				

* Recheck after FM alignment.

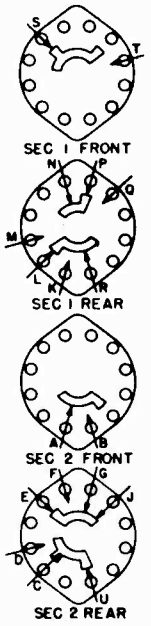
CHASSIS LAYOUT



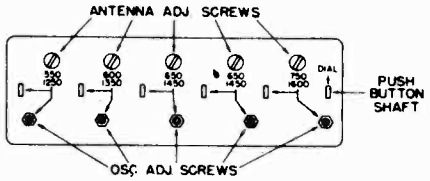


Letters on terminals of switches and coils shown on this page correspond to similiarly lettered terminals on the switches and coils shown in the circuit diagram.

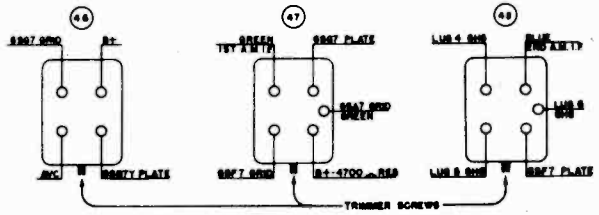
BAND SWITCH DECKS



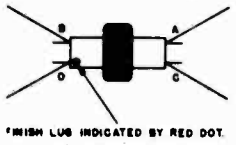
PUSH BUTTON LAYOUT



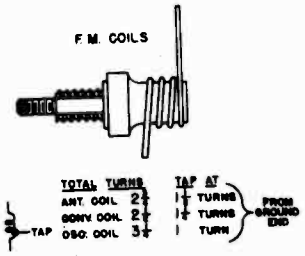
BOTTOM VIEW FM I.F. TRANS.



B.C. OSCILLATOR COIL



F.M. COILS



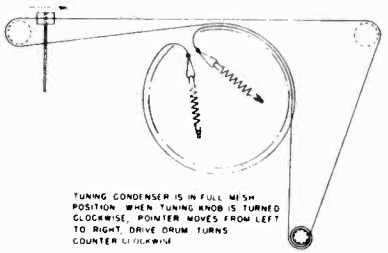
FARNSWORTH TELEV. & RADIO CORP.

MODELS GK-100, GK-102, GK-103, GK-104, GK-111, GK-112, GK-113, GK-114

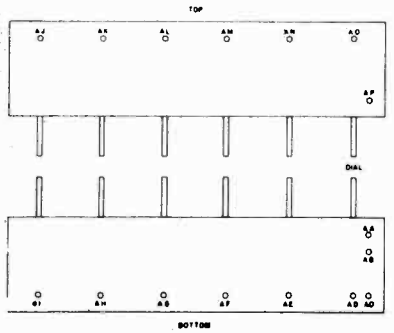
Ref. No.	Part No.	Description
1	77214	100 M Ohms
2	77262	1000 Ohms
3	77265	15 M Ohms
4	77212	10 M Ohms
5	77266	22 M Ohms
6	77216	220 M Ohms
7	77013	10 M Ohms, 2 Watt
8	77218	1 Megohm
9	77272	4.7 Megohms
10	77267	33 M Ohms
11	77211	4700 Ohms
12	77213	47 M Ohms
14	77217	470 M Ohms
15	77274	10 Megohms
16	77243	2700 Ohm Molded Resistor 4.7 Watt
17	77189	270 Ohm, 2 Watt
18	77304	1000 Ohms, 2 Watt
19	25196	.05 Mfd. 600 Volt
20	25183	.005 Mfd. 600 Volt
21	25194	.01 Mfd. 600 Volt
22	25184	.003 Mfd. 600 Volt
23	25185	.002 Mfd. 600 Volt
24	25215	.1 Mfd. 600 Volt
25	25195	.02 Mfd. 600 Volt
26	25333	60Mmf. Ceramic Capacitor, N-470
27	25273	1500 Mmf. Ceramic Capacitor
28	25329	30 Mmf. Ceramic Capacitory, N-750
29	25212	215 Mmf. Silver Mica Capacitor
30	25213	1350 Mmf. Silver Mica Capacitor
31	25193	47 Mmf. Mica Capacitor
32	25271	4000 Mmf. Ceramic Capacitor
33	25187	240 Mmf. Molded Mica Capacitor
34	25327	4 Mmf. Ceramic Capacitor
35	25188	100 Mmf. Mica Capacitor
36	25031	.005 Buffer Capacitor 600 V
37	25332	30 Mmf. Ceramic Capacitor, N-150
38	78072	Tone Control, 3 Megohms
39	78057	Volume Control, 3 Megohms
40	25316	4 Mfd., 50 V Electrolytic
41	25214	Electrolytic Capacitor 20 Mfd., 20 Mfd., 30 Mfd., 450 Volt, 20 Mfd., 25 Volt
43	38690	FM Antenna Coil
44	38691	FM Converter Coil
46	38683	1st. FM I.F. Transformer
47	38684	2nd. FM I.F. Transformer
48	38685	3rd. FM I.F. Transformer
49	26231	5-20 Mmf. Ceramic Trimmer, N-300
50	26240	BC Oscillator Trimmer Strip
51	38692	FM Oscillator Coil
52	38661	FM RF Choke
53	38845	Antenna Loading Coil
54	38484	Wave Trap Coil
55	38694	BC Oscillator Coil
56	38681	1st. AM I.F. Transformer
57	38682	2nd. AM I.F. Transformer
59	94204	Power Transformer
60	94195	Output Transformer
61	13772	Speaker
62	26237	Gang Capacitor
63	11325	FM Dipole and Plug
64	80361	FM Dipole Socket
65	38696	Loop Antenna for GK102 and GK103
65	38859	Loop Antenna for GK104
66	26031	Loop Antenna Trimmer GK102
66	26032	Loop Antenna Trimmer GK104
67	26175	Push Button Trimmer Strip
68	90118	Push Button Switch
69	38405	Push Button Coil Strip
71	80439	Loop Antenna Socket
72	80440	Antenna 3-Prong Plug
74	90214	Band Switch
75	80030	Phono Input Socket
76	42185	Dial Lamp, 250 Ma.
77	80385	Speaker Socket
79	27118	Line Cord for GK102
80	11210	Phono AC Socket and Cord

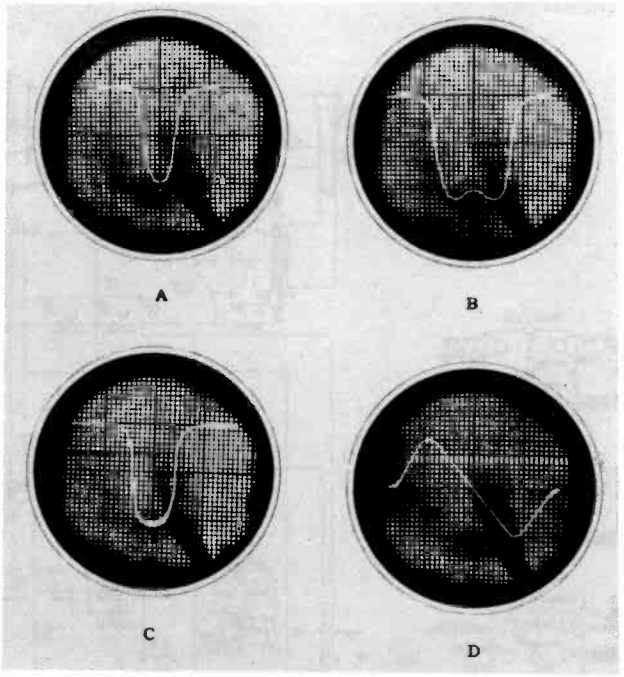
Part No.	Description
31338	Glass Dial
07373	Dial Pointer
561397	Dial Escutcheon
13529	Dial Lamp Spring Lead Assembly
59134	Knob for GK102 WA
59450	Knob for GK102 BL
59451	Knob for GK103 and GK104
17019	Drive Drum
41106	Drive Cord (42 inches) and Springs
59249	Push Button Escutcheon
59030	Push Button for GK102 WA, GK103 and GK104
59441	Push Button for GK102 BL
41101	Station Call Letter Kit
80325	Mica Filled Socket for 6SB7Y
80139	Molded Octal Socket
80239	Molded Octal Socket for Rectifier
80319	Miniature Tube Socket
80362	2-Prong FM Antenna Plug
22146	Pickup Cable GK102
22147	Pickup Cable GK103 and GK104
71223	Phono Needle
11326	Compartment Light Socket Assembly GK102 and GK103
H-270-1	Cabinet for GK102 WA
H-270-2	Cabinet for GK102 BL
H-273	Cabinet for GK104

DIAL STRINGING



PUSH BUTTON TUNER SWITCH



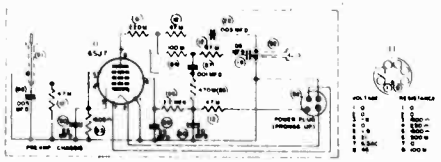


Oscilloscope patterns for FM alignment of Models GK-100, 102, 103, 104, 111, 112, 113, 114

The Farnsworth models GK-111, 112, 114 and 115 combination instruments are identical to the GK-100, 102, 103 and 104 except that the former employ the type P56MP record changer, the latter, the type P56.

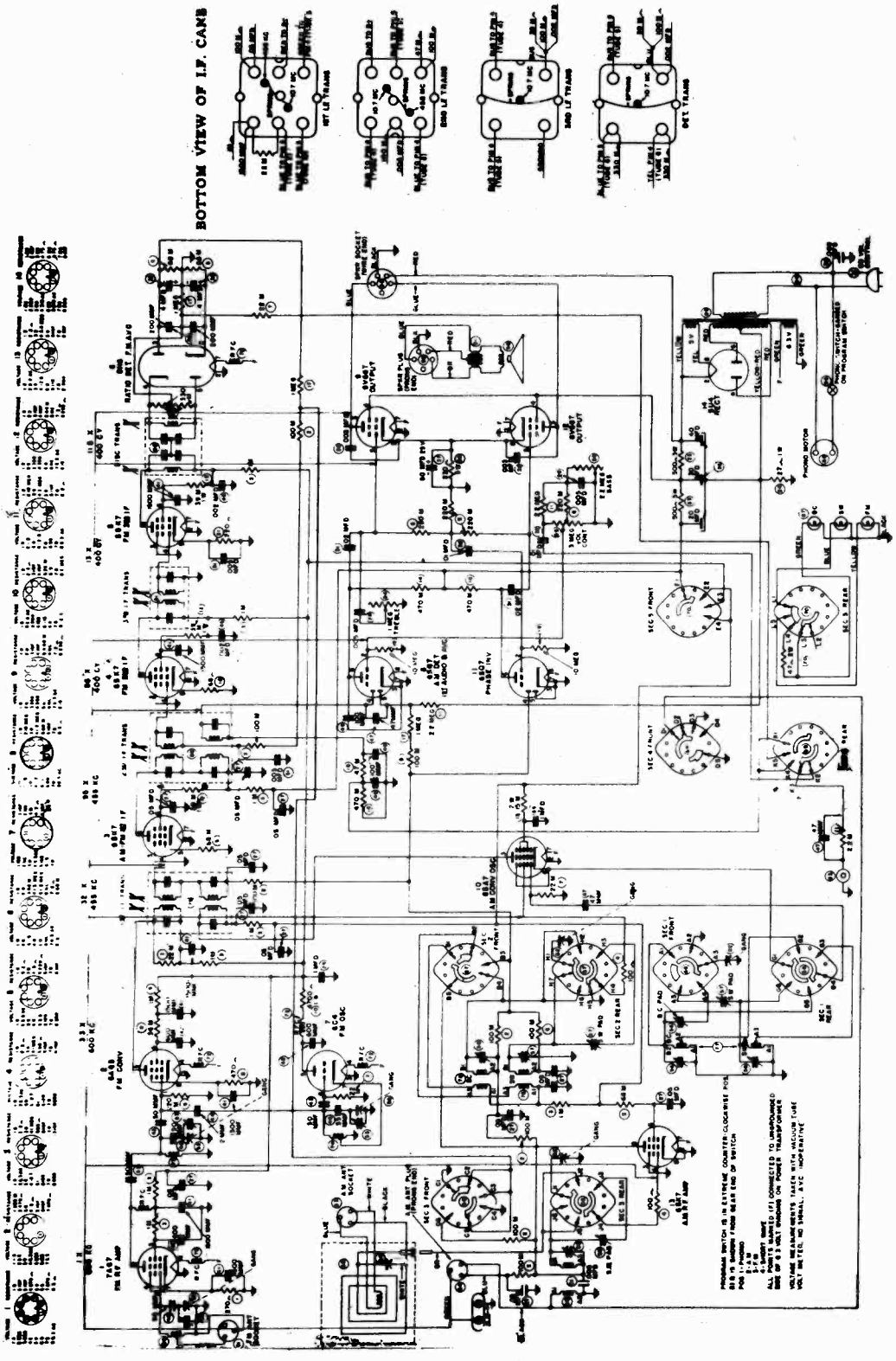
Parts list and preamplifier circuit for Models GK-111, 112, 113, 114

Part No.	Description
78057	Volume Control, 3 Megohms
94204	Power Transformer
94239	Output Transformer
13772	Speaker
38696	Loop Antenna for GK-102 and GK-103, GK-111, 112
38859	Loop Antenna for GK-114
26032	Loop Antenna Trimmer GK-114
22169	Pickup Cable
22170	Output Cable
22171	Power Adapter Cable
25431	Elec. Capacitor, 20 mfd, 450 v., 25 mfd, 25 v.
25432	.001 mfd, 200 V. Condenser
25433	.25 mfd, 600 V. Condenser
H-273	Cabinet for GK-114
H-291	Cabinet for GK-11 Mah.
H-292-1	Cabinet for GK-112 C
H-292-2	Cabinet for GK-112 Bl.



FARNSWORTH TELEV. & RADIO CORP.

MODELS GK-140,GK-141,
GK-142,GK-143,GK-144,



SETTING STATION TUNING BUTTONS

Allow the set to warm up for about one-half hour before beginning to set the push buttons.

Make a list of the eight stations to be set up.

Move the program switch to proper band for the station to be set-up.

Select a push button for this station.

Remove the push button, exposing the push button lock screw.

Loosen this lock screw with a screw driver. Tune in the desired station with the manual tuning knob.

Push the push button shaft all the way in with the screw driver engaged in the slot in the lockscrew. Firmly tighten the push button locking screw.

CAUTION—Do not use a large handle screw driver as damage may result. We recommend type of screw driver used for knob setscrew.

Continue setting each button the same way.

After all the stations are set up, replace the push buttons and place the station call letter tab found in the call letter kit on the proper button.

CAUTION

When setting up push bottons it is well to select a time when the stations are not carrying "Chain" programs as adjustments might be made on the wrong stations.

Alignment of AM Bands

EQUIPMENT REQUIRED

A calibrated signal generator having fundamental frequencies from 455 Kc to 15 MC. In addition to the signal generator a crystal calibrator is a great convenience.

The indicating device for showing correct alignment may be a high resistance A.C. voltmeter, a vacuum tube voltmeter or a Cathode Ray oscilloscope.

The A.C. voltmeter can be used either across the voice coil of the loud speaker or if the meter range is high enough, from plate to plate in the output stage (don't forget a condenser (0.1 Mfd.) to keep the D.C. out of the meter).

Special care must be employed when aligning the short wave band, for the adjustment of the shunt trimmer affects the adjustment of the series pad. At the high frequency end of the band it is possible to peak the oscillator trimmer (and the pad at the low frequency end) at the image so in the alignment instructions we have indicated the fundamental frequency and the correct oscillator setting for the image so by resetting the signal generator it is possible to see if the alignment is correctly made. In each case, the image is found at a frequency 910 Kc. higher than the fundamental.

Oscilloscope Alignment FM Band

FM IF ALIGNMENT

1. Equipment Required: Oscilloscope, 10.7 MC sweep generator, voltomyst, and RF signal generator.
2. Set band switch in FM position.
3. Make connection from vertical deflection amplifier of oscilloscope to pin #3 of 6H6 discriminator tube. Make certain that the 4MFD electrolytic condenser is disconnected from this same circuit. It is necessary that the lead to the oscilloscope be shielded, of low total capacity, and connection to receiver isolated by means of a 1 meg. resistor.
4. Connect sweep generator to last FM IF grid through a .1 MFD coupling capacitor.
5. Load primary of discriminator transformer with resistor of approximately 39000 ohms. Back out secondary slug (top slug) as far as it will turn. Align primary (bottom slug) to obtain curve similar to figure 1. This does not constitute a final alignment of discriminator, but is a convenient expedient to assist in I.F. alignment.
6. Shift connection of sweep signal generator to the grid of the second FM IF tube. NOTE: As alignment moves from stage to stage, reduce input instead of reducing oscilloscope gain.
7. Align third FM IF transformer for a symmetrical flat top pattern. (Fig. 2).
8. Shift signal generator to the grid of the first IF tube.
9. Align second IF transformer in same manner as described in Section 7. Note that the width of the nose of the curve is the same as before, but the sides have become steeper, as in Fig. 3.
10. Connect the signal generator to the grid of the converter tube grid in series with 10,000 ohm resistor and a .1MFD capacitor, or loosely couple by stray capacity of an insulated wire.
11. Align first FM IF transformer in the same manner as in Section 7. Note that the sides of the curve have further steepened, but that the nose of the curve has retained approximately the same width as in Fig. 3.
12. Connect 4 MFD electrolytic capacitor that was previously disconnected, and take off load resistor on discriminator primary.
13. Connect oscilloscope to audio output terminal of discriminator. There are several points where contact can be made and can be identified as the circuit connected to the terminal on the terminal board (nearest the discriminator transformer) to which the shielded lead is connected.
14. With sweep signal input to converter grid, align discriminator transformer for conventional discriminator pattern, as in Fig. 4.
15. Connect signal generator to converter tube grid through .1MFD capacitor. An unmodulated signal input of 65 microvolts at 10.7 Mc should develop .55 volt rise on the AVC line with voltohmyst connected to AVC line through 1 megohm resistor.

Alternate FM IF Alignment Procedure

Equipment necessary: RF Signal Generator and Vacuum tube voltmeter.

1. Connect V.T.V.M. from ground to audio lead of ratio detector (discriminator). Connect generator tuned to 10.7 mc. to grid of third FM IF tube through 0.1MFD capacity. Use minimum signal necessary for good indication in all following:
2. Turn secondary slug of ratio detector transformer (top slug) out as far as it will turn.
3. Tune primary for maximum output.
4. Connect generator to grid of second FM IF tube.
5. Tune primary and secondary of third FM IF transformer for maximum output.
6. Connect generator to grid of first FM IF tube.
7. Tune primary and secondary of second FM IF transformer for maximum output.
8. Connect generator to converter grid through 10,000 ohm resistor and 0.1 MFD capacitor.
9. Tune primary and secondary of first FM IF transformer for maximum output.
10. Tune secondary of ratio detector transformer for zero or minimum output.
11. The FM IF system should now be aligned. Tuning the signal generator equal amounts on each side 10.7 mc should produce equal deflections of opposite polarity on the VTVM. Deflections unequal by more than 10 per cent or so indicate inaccurate alignment.

FM RF Alignment

1. Equipment Required:
   a. RF Signal Generator. Range 88 to 108 MC.
   b. Output Meter.
   c. Insulated Screw Driver.
2. Connect RF signal generator in series with 400 ohm carbon resistor to "high" side of FM antenna socket. Connect output meter across voice coil of speaker.
3. Set tuning control for pointer to calibrate at the equivalent of half way between channels 300 and 301.
4. Apply 108 MC Signal.
5. Set converter and antenna trimmers at minimum capacity.
6. Adjust oscillator trimmer by tuning from maximum capacity to first signal that is heard, and peak for maximum output.
7. Adjust antenna and converter trimmers for maximum output.
8. Set tuning controls so dial pointer calibrates at the equivalent of half way between channels 200 and 201.
9. Apply 88 MC signal.
10. Adjust oscillator, converter, and antenna slugs to maximum output.
11. Repeat operations 3 to 10 inclusive. NOTE: The degree of adjustment required in the tuning of the oscillator slug will determine the number of times operations 3 to 10 must be repeated until no further gain in sensitivity is obtained.
12. Carefully tune across the entire FM band for the observance of the dead or weak spots that may be a resultant of improper alignment or defective components. This can be determined by carefully noting the degree of receiver noise, that is, high noise generally is accompanied by good sensitivity.

TABULATION FOR AM ALIGNMENT

STEPS	CONNECT GENERATOR		SET GENERATOR AT	SET GANG AT	ADJUST	TO OBTAIN
1	Set Tone and Volume Controls at Maximum					
2	Through .1 Mfd. *	Grid Conv. tube	455 Kc	Quiet Point	2nd. I.F. Slugs	MAXIMUM OUTPUT
3					1st. I.F. Slugs	
4	Through .1 Mfd.	RF of GANG	1500 Kc	1500 Kc	BC Osc. Trimmer	
5					BC Mixer Trimmer	
6			600 Kc	600 Kc	Osc. Padder *	
7	Check dial calibration at several frequencies. If not reasonably correct, adjust oscillator padder. See Note 1*					
8	#	Ext. Ant. Binding Post	1500 Kc	1500 Kc	Loop Trimmer	

#Through RMA dummy antenna.

* This adjustment should be made while gang is rocked.

SHORT WAVE RF

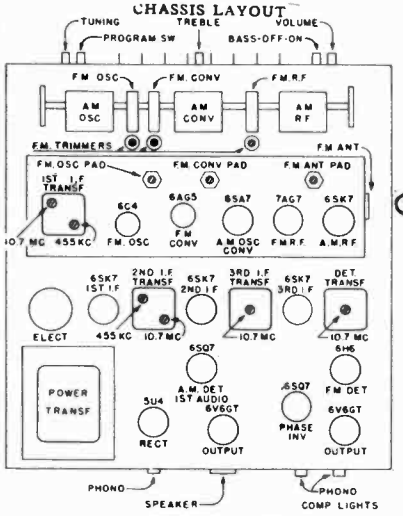
9	Place Band Switch in Short Wave position.					
10	Through 400 ohm resistor	External Antenna	15 MC	15 MC	SW Osc. Trimmer See Note 2	MAXIMUM OUTPUT
11				Image at 15.91 MC	SW Conv. Trimmer	
12					SW Ant. Trimmer	
13			9.4 MC	9.4 MC	SW Osc. Padder	
14				Image at 10.31 MC	SW Conv. Padder	
15					SW Ant. Padder	
16	Recheck Steps 10 to 15 inclusive.					

NOTE 1. After any adjustment of oscillator padder, repeat steps 4, 5 and 6.

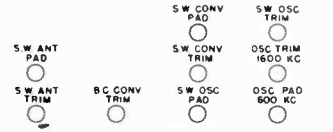
NOTE 2. Set oscillator trimmer to maximum capacity, then slowly loosen trimmer until 2nd signal is heard.

SIGNAL GENERATOR TO	DUMMY	MICROVOLTS INPUT	OUTPUT	GAIN
Ant.	330 ohms	20	.5 watt	1.5X
RF	.1 Mfd.	30	.5 watt	
Conv. Grid	.1 Mfd.	130	.5 watt	4.33X

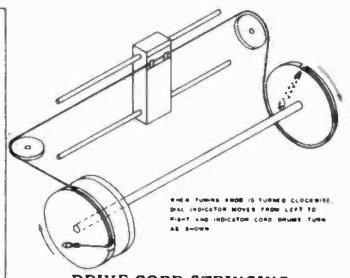
CHASSIS LAYOUT



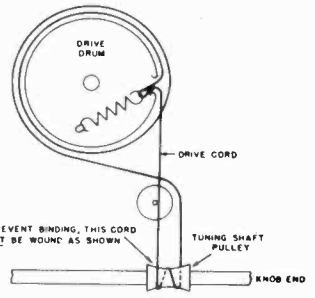
FRONT OF CHASSIS



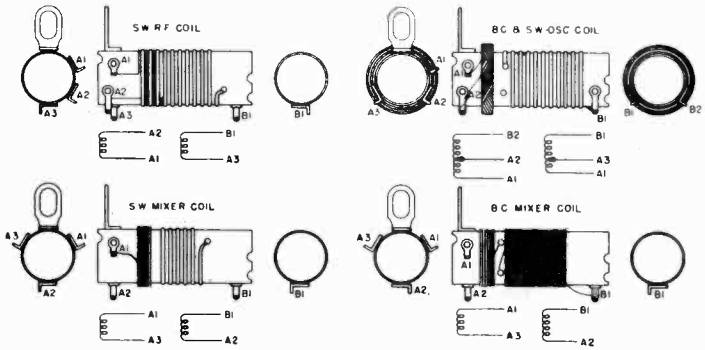
DIAL POINTER STRINGING



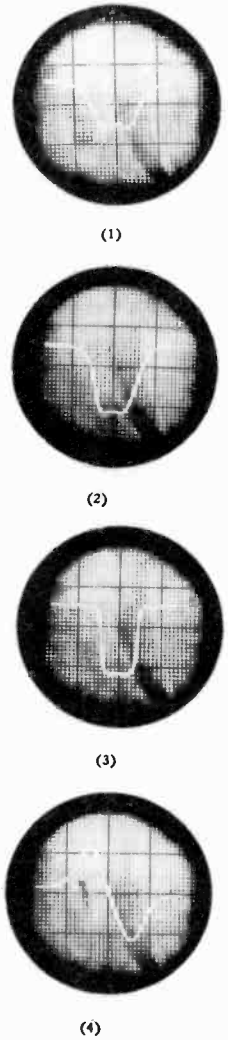
DRIVE CORD STRINGING



RF, OSCILLATOR AND MIXER COILS



FM GAIN MEASUREMENTS



EQUIPMENT REQUIRED

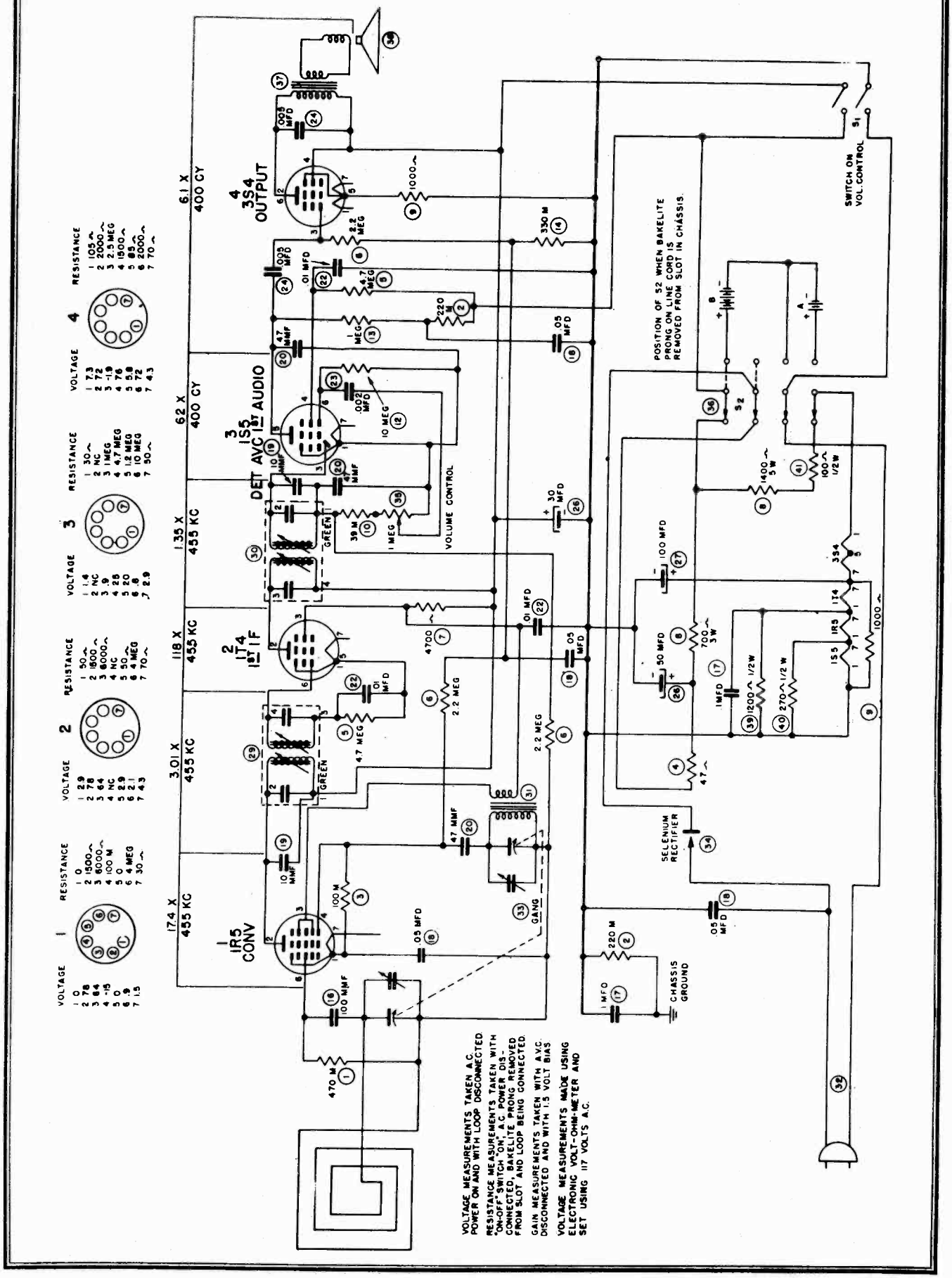
FM Signal Generator, modulated at 400 cycles, 22.5 Kc deviation.

Output Meter.

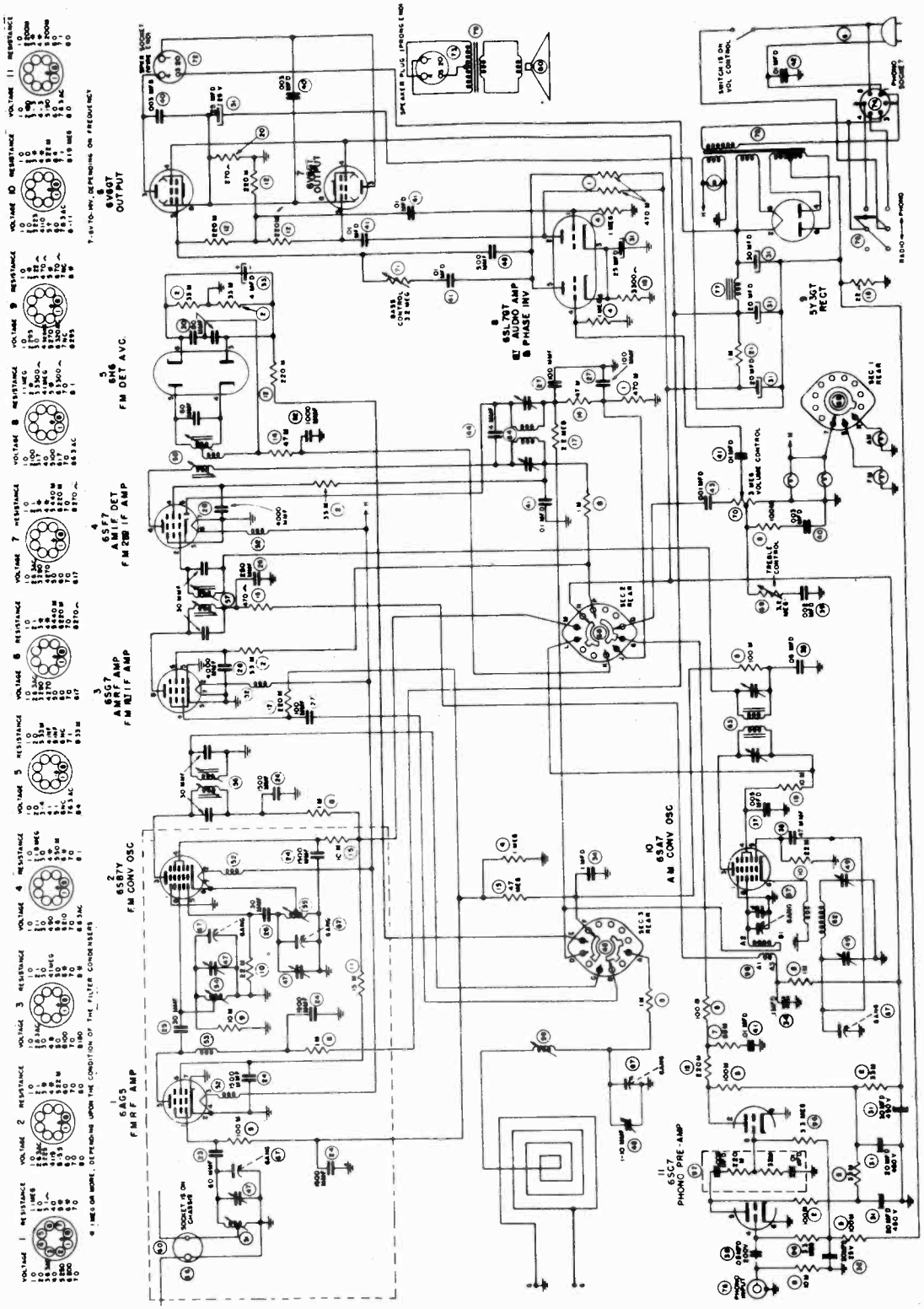
Output meter connected across secondary of output transformer, 4 ohms impedance. Signal generator connected at gang capacitor. Volume control, Bass control and Treble control at maximum.

Ref. No.	Part No.	DESCRIPTION
1	77323	270 Ohm Resistors
2	77214	100 M Ohm
3	77262	1000 Ohm
4	77258	100 Ohm
5	77305	68 M Ohm
6	77216	220 M Ohm
7	77266	22 M Ohm
8	77261	470 Ohm
9	77324	56 M Ohm
10	77429	4700 Ohm 1 Watt
11	77270	2.2 Megohms
12	77322	39 M Ohm 1 Watt
14	77217	470 M Ohm
15	77325	15 M Ohm 2 Watt
16	77213	47 M Ohm
17	77218	1 Megohm
18	77269	68 Ohm
19	77274	10 Megohms
20	77339	4.7 Ohms 2 Watt Wire Wound
21	77209	220 Ohm
22	77338	230 Ohms 5 Watt Wire Wound
23	77337	500 Ohms 5 Watt Wire Wound
24	77428	27 Ohm 1 Watt
25	77268	330 M Ohm
27	25196	.05 Mfd. Tubular Capacitor
28	25183	.005 Mfd. Tubular
29	25215	.1 Mfd. Tubular
30	25185	.002 Mfd. Tubular
31	25195	.02 Mfd. Tubular
32	25194	.01 Mfd. Tubular
33	25184	.003 Mfd. Tubular
34	25031	.005 Mfd. Buffer
36	25277	20 Mfd.,·30 Mfd., 40 Mfd., 450 Volt Electrolytic
37	25269	50 Mfd., 250 V. Electrolytic
38	25270	4 Mfd., 100 V. Electrolytic
40	25347	90 Mmf. Ceramic N-470
41	25273	1500 Mmf. Ceramic HiK "L"
42	25274	600 Mmf. Ceramic HiK "K"
43	25143	50 Mmf. Ceramic Zero Temp.
44	25275	2 Mmf. Ceramic Zero Temp.
45	25272	.002 Mfd. Molded Mica
46	25346	55 Mmf. Ceramic N-330
47	25193	47 Mmf. Molded Mica
49	25188	100 Mmf. Molded Mica
50	25318	200 Mmf. Molded Mica
51	25141	.005 Mfd. Molded Mica
52	26222	Gang Capacitor and Push Button Ass'y
53	26221	Ceramic Trimmer 1.5-7 Mmf.
54	26031	Antenna Trimmer
55	26226	No. 4 Trimmer Strip
56	26223	No. 1 Trimmer Strip
57	26224	No. 2 Trimmer Strip
58	26225	No. 3 Trimmer Strip
60	38671	FM R.F. Coil Assy.
61	80439	FM Antenna Socket
62	38679	Loop Antenna
63	80439	AM Antenna Socket
64	80440	AM Antenna Plug
65	38678	S.W. Antenna Coil
66	90246	Band Switch Wafer #1
67	90247	Band Switch Wafer #2
68	90248	Band Switch Wafer #3
69	90249	Band Switch Wafer #4
70	90250	Band Switch Wafer #5
72	38661	RF Choke
73	38672	FM Mixer Coil
74	38673	FM Osc. Coil
76	38676	SW Mixer Coil
77	38675	BC & SW Osc. Coil
78	38677	BC Mixer Coil
79	38621	1st. IF Transformer
80	38622	2nd. IF Transformer
81	38623	3rd. IF Transformer
82	38624	Discriminator Transformer
83	80030	Phono Input Socket
84	78103	1 Megohm Treble Control
85	78057	3 Megohm Volume Control
86	78101	2.2 Megohm Bass Control
87	42185	Dial Light
88	11274	Phono Motor Lead & Socket
89	94170	Power Transformer
90	81145	Speaker
91	94257	Output Transformer
92	80444	Speaker Plug
93	80244	Speaker Socket
94	27118	Line Cord
95	90244	Phono Switch
	90192	Band Switch
	13585	Compartment Light Assy. for GK 140
	42191	Compartment Lamp for GK 140
	09260	Segment Gear Assy.
	09262	Drive Gear Assy.
	09263	Pointer Drive Drum Assy.
	59254	Pointer
	31334	Dial Glass
	31327	S.W. Dial Glass
	55006	Dial Pointer Slider Bar
	22150	P.U. Cable
	31411	Volume Decal
	31412	Tuning Range & Switch Decal
	31413	Treble Decal
	41137	Push Button Spring Kit
	71223	Phono Needle
	59257	Push Button
	57134	Tuning Knob
	59111	Tone Control Knob
	92201	Felt Washer
	58046	Push Button Escutcheon
	H-242	Cabinet and Carton for GK 140
	H-275	Cabinet and Carton for GK 141 (Mah)
	H-276-1	Cabinet and Carton for GK 143 (Mah)
	H-276-2	Cabinet and Carton for GK 143 (Walnut)
	80370	Pilot Lamp Socket Assy.
	80139	Molded Octal Socket
	80239	Molded Octal Socket for Rectifier
	80319	Miniature Tube Socket
	80318	Molded Octal Socket (Loctal)
	41110	Call Letter Kit
	05096	Drive Cord Assy.

MODEL P-860 FARNSWORTH TELEV. & RADIO CORP.



FARNSWORTH TELEV. & RADIO CORP. MODELS N4, P4, Series, Capehart



MODELS 19N4, 24N4, 26N4, 31N4, 114N4, 116N4, 21P4, 24P4,

FARNSWORTH TELEV. & RADIO CORP.

MODELS 29P4, 30P4, 31P4, 116P4, 118P4

Model	Cabinet	Record Changer
118P4	Georgian	41E-MP
116P4	Sheraton	41E-MP
31P4	Hepplewhite	P-71
30P4	French Provincial	P-71
29P4	Early American	P-71
24P4	Hepplewhite	P-71
21P4	Chippendale	P-71
116N4		Capehart 41E
114N4	Early Georgian	41E
31N4	Sheraton	Panamuse P-63
26N4	Modern	P-63
24N4	Hepplewhite	P-63
19N4	Hepplewhite	P-63

"Whistles" and Heterodynes

Check IF rejection ratio by application of signal generator at the intermediate frequency to the antenna terminals.

A defective wave trap will cause heterodynes.

Low Volume

If low volume of N4 combinations is experienced, we suggest the following:

1. Test tubes.
2. Check alignment of the receiver.

RECEIVER SPECIFICATIONS

SECTION 1

RECEIVER FREQUENCIES

AM Broadcast Band	540 to 1600 Kc.	IF (AM Band)	455 Kc.
FM Band	87.5 to 108.5 Mc.	IF (FM Band)	10.7 Mc.

TUBE COMPLEMENT

Application	Type	Type	Application
FM RF Ampl.	6AG5	6H6	FM Detector, AVC
FM Converter-Osc.	6SB7Y	6SC7*	Phono Pre-Amplifier
AM RF Converter-Osc.	6SA7	6SL7	Audio Ampl., Phase Inverter
AM RF Ampl. FM 1st IF Ampl.	6SG7	6V6	Power Output
AM IF Ampl., AM Det., FM 2nd IF Ampl.	6SF7	5Y3GT	Rectifier

*The N4 Uses a 6J7 as Phono Pre-Amplifier,

POWER AND VOLTAGE REQUIREMENTS

185 Watts at 117 Volts ..... 60 Cycles 105 to 125 Volts ..... AC

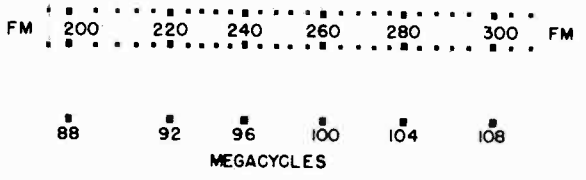
DIAL SCALE

The AM Band conventionally calibrated in Kilocycles

The conversion of FM Dial Scale readings to frequency may be made from the following analysis:

The FM band extends from 88 to 108 mc., each station channel 200 kc., in width, Channel 201, that lowest in frequency, has center frequency at 88.1 mc. Each succeeding channel is successively 200 kc., higher, so channel 202 is centered at 88.3 (200 kc. higher) channel 203 is centered at 88.5 mc., etc.

FM Band is marked with the new Channel Numbers



ANTENNAS

P4 & N4 series instruments both incorporate two internal antennas; a loop antenna used in broadcast band reception and a folded-dipole antenna used for FM reception.

These internal antennas are intended for use only in the presence of adequate field strength, as in large metropolitan areas where local stations supply the majority of desired programs. Neither a loop nor a dipole element which is within the confines of the cabinet can be considered as efficient signal pickup devices and, should field strength requirements be not fulfilled, it will be necessary, for satisfactory reception, to install an efficient outside antenna.

Both the loop and the dipole (internal or external) antennas exhibit certain characteristics of directivity, with which the experienced serviceman is familiar, which should be borne in mind when locating the receiver (or external antenna) in the home.

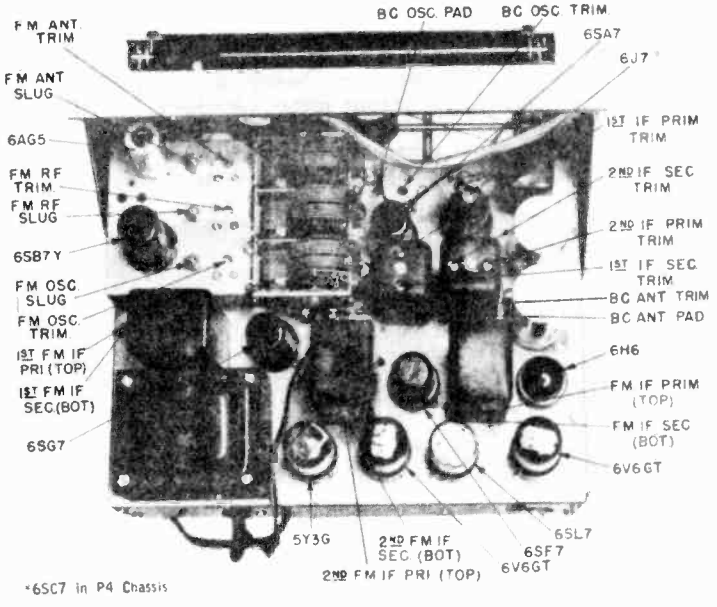
MODIFICATION KIT NO. 41140

The N4 tuner modification kit no. 41140 was issued for the purpose of revising the Phono Pre-Amplifier circuit of the tuner, in the field. This was so that P-71 record changers, using the variable reluctance pickup could be incorporated in N4 instruments already in the field. The kit is also applicable to N4 tuners that are used with the 41E record changers. A kit was also issued for the purpose of revising 41E changers to equal the new 41E-MP, by addition of the variable reluctance pickup, the Noise Eliminator and various other modernizations.

The N4 tuner which has been modified, following the instructions accompanying kit no. 41140, is the electrical equivalent of the P4 tuner

If the N4 tuner is of early production (C-175) then the circuit is different .

N4 tuners that have not been modified by modification kit no. 41140 will have the Phono Pre-Amplifier circuit



*6SC7 in P4 Chassis

ALIGNMENT OF THE RECEIVER

Two methods of alignment of P4 & N4 receivers are presented. Service shops possessing a suitable sweep generator and oscilloscope will effect a considerable saving of time by using the first method.

The alternate method using an amplitude modulated signal generator is preferred by some servicemen. This method requires careful attention to details to attain accurate alignment.

GENERAL INSTRUCTIONS

1. Adjustment of Dial Pointer

To prevent misalignment, do not proceed with alignment until dial pointer has been checked for correct mechanical adjustment

2. Test Signal Conditions

All alignment shall be done with only sufficient signal amplitude to provide satisfactory signal to noise ratio, and acceptable pattern size on oscilloscope or readable output on output meter. The use of excessively strong signal is almost certain to produce misalignment.

ALIGNMENT OF FM BAND

1. Equipment required will be an oscilloscope, a frequency modulated signal generator covering the range 87.5 mc to 108.5 mc on fundamentals, a sweep generator producing a signal of 10.7 mc and sweeping at least 150 kc each side of 10.7 mc, and an output meter.

2. The vertical or "Y" axis terminals of the oscilloscope should be connected between pin 3 of the 6H6 discriminator and ground. The sweep voltage of the sweep generator should be fed to the horizontal or "X" axis terminals of the oscilloscope. The 10.7 mc output of the sweep generator should be fed into the grid of the 6SF7 tube through a condenser of approximately 3300 mmfd.

3. Remove the negative lead of the 4 mfd. electrolytic from pin #3 of 6H6 socket. Remove 6SL7 tube from socket. Turn the set on and turn both the tone control and the volume control all the way to the right. Detune the secondary of the third FM IF transformer by turning the bottom slug screw out as far as possible. Adjust the primary top slug screw, until pattern (A) appears on the oscilloscope. Adjust the secondary, bottom slug screw, until pattern "B" is obtained on the oscilloscope and until both sides of this pattern are symmetrical.

4. Remove the 10.7 mc output of the sweep generator from the grid of the 6SF7 tube and connect to the grid of the 6SG7. Align the second FM IF transformer as in paragraph "3."

5. Connect the 10.7 mc output of the sweep generator to the signal grid of the 6SB7Y, (pin 8) detune secondary of the first FM IF transformer and tune primary as before for pattern (A). Tune secondary for pattern "C" and make both sides of pattern as symmetrical as possible. This completes alignment of the FM IF transformers.

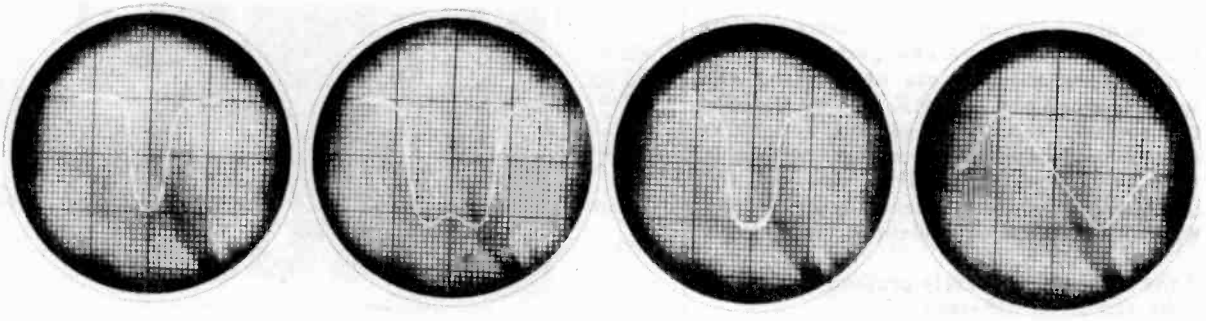
6. Reconnect the negative lead of the 4 mfd. electrolyitic to pin #3 of the 6H6 socket and move the oscilloscope leads to the middle terminal on third FM IF (to which tertiary winding connects) and ground. With the sweep generator connected to the 6SB7Y signal grid as before, the discriminator pattern (D) should appear on the oscilloscope if the IF alignment instructions have been followed carefully. Remove the oscilloscope and sweep generator leads and reinstall 6SL7 tube in socket. Never adjust AM IF transformers without rechecking FM IF alignment.

7. Connect the 87.5 to 108.5 mc signal generator to the antenna socket of the receiver through a 300 ohm resistor. The generator should be frequency modulated at some frequency in the audible range. Connect output meter across secondary of

output transformer. Tune receiver to channel 300 FM dial. With signal generator set at 107.9 mc adjust oscillator trimmer condenser, third from front, for maximum reading on output meter. Set signal generator to 87.9 mc and tune receiver to channel 200 on FM dial. Adjust oscillator coil screw, third from front, (see chassis layout) for maximum reading on output meter. Recheck oscillator setting for channel 300.

8. Tune signal generator and receiver to 105 mc (channel 285 approx.). Adjust converter signal grid trimmer condenser, second from front, for maximum reading on output meter. Tune signal generator and receiver to 92 mc, (channel 220 approx.) and adjust converter coil screw, (second from front), to maximum reading on output meter. Recheck converter trimmer setting at 105 mc (channel 285 approx.).

9. Repeat operations of paragraph (7) for antenna trimmer condenser and coil. This completes FM RF alignment.



A B C D

ALTERNATE FM ALIGNMENT PROCEDURE

Necessary Equipment:

Signal generator.

Vacuum tube voltmeter or DC voltmeter 20,000 ohms per volt.

FM IF ALIGNMENT

Adjust dial pointer as outlined in section VII.

Connect voltohmyst from ground to pin #3 of 6H6. Connect generator tuned to 10.7 mc to pin #4 on 6SG7. Turn secondary slug of third FM IF (closest to chassis) out as far as it will turn. Tune primary of third IF for maximum negative voltage. Tune primary and secondary of the second FM IF for maximum output. Move generator to pin #8 of 6SB7Y and tune primary and secondary of first FM IF for maximum output. Next tune secondary of third FM IF to balance to zero volts, using high resistance voltmeter connected to middle terminal of FM IF transformer (tertiary winding).

FM RF ALIGNMENT

With high resistance voltmeter connected between ground and pin #3 on 6H6 socket, connect generator between ground and small pin of dipole antenna socket. Use very short leads on generator and a 300 ohm resistor as a dummy antenna. Set generator to 108.5 mc and gang to minimum and adjust oscillator trimmer for maximum voltage. Go back and check low frequency end. Next set generator at 92 mc, tune in signal on receiver, approximately 220 on dial. Adjust converter and antenna slug for maximum voltage output. Set generator at 105 mfd. Tune in signal on receiver, approximately 280 on dial. Tune converter and antenna trimmer for maximum voltage output. Check adjustment of antenna and converter slugs at 92 mc.

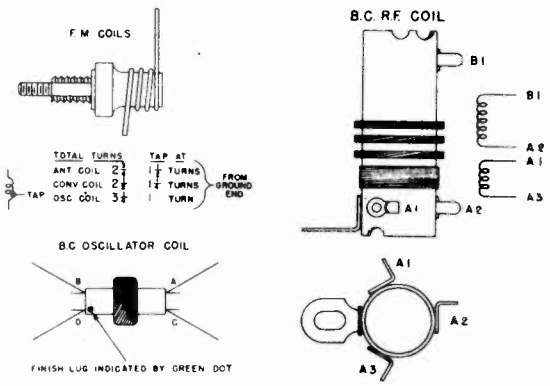
ALIGNMENT INSTRUCTIONS FOR AM BAND

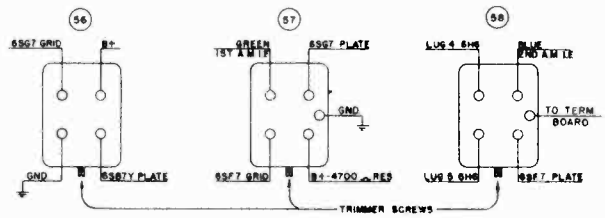
An output meter and a signal generator calibrated at 455 Kc., 600 Kc., 1500 Kc. and 1600 Kc., are required to properly align these receivers on AM band. Keep the output of the signal generator as low as possible to prevent AVC action and false settings. Connect the high side of the generator to the blue wire found at rear of set and low side to the white wire.

STEPS	DUMMY ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1	SET VOLUME AND TONE CONTROLS AT MAXIMUM					
2	.1 Mfd. to converter RF grid	455 Kc.	Minimum	2nd IF Trimmers*	Top of IF Transformers	MAXIMUM OUTPUT
3				1st IF Trimmers**		
4		1600 Kc.	1600 Kc.	B.C. Osc. Trimmer	See Trimmer Layout	
5	200 MMF.	1500 Kc.	1500 Kc.	B.C. RF Trimmer**	See Under Chassis	
6		1500 Kc.	1500 Kc.	B.C. Ant. Trimmer	On Loop	
7		600 Kc.	600 Kc. Rock Gang	600 Kc. Padder	See Trimmer Layout	
8		600 Kc.	600 Kc.	Peak loading coil slug	See Trimmer Layout	
9	Recheck 1500 Kc.					

* Recheck after FM alignment.
** Not used on early production.

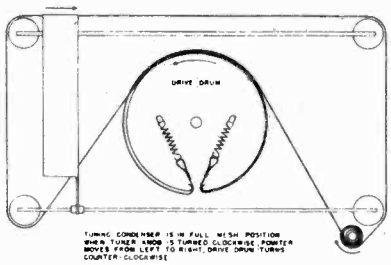
RECEIVER RF-IF COILS





Letters on terminals of coils correspond to similarly lettered terminals on the coils shown in the circuit diagram.

MAINTENANCE OF THE TUNER



1. Adjustments of Dial Pointer

a. Tune receiver to extreme low frequency end of dial and set pointer to index at the last calibration mark of either scale.

b. Carefully determine that the gang condenser plates are completely meshed with the pointer in this position.

Warning: This adjustment is extremely important if subsequent alignment is to provide accurate calibration.

NOTE: The pointer remains dark when the band switch is in the phonograph position.

c. Tune the dial across the entire range and observe that the pointer line is a single sharply defined line of uniform brilliance. If this is not obtained, it indicates that mechanical adjustment of the spacing of the light-box from the dial glass is necessary.

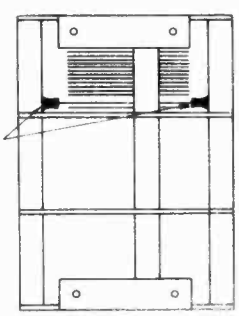
2. "Sticking" Light-Boxes

The traveling light-box may be sticking, causing dial slippage. This may be due to (a) lubricant on rods, (b) bent rods, (c) rough rods, (d) misalignment of rods.

(a) The rods must be free of all lubricants. Lubrication, momentarily helpful, causes gum to form at the light-box mounting, resulting in "sticking." Clean well with carbon tetrachloride.

(b) Bent rods must be accurately straightened or replaced.

(c) Rough portions of the rod surface should be cleaned with crocus cloth until perfectly smooth.



3. Dial Glass Plate

Paint scratched. This is due to the light-box assembly contacting the painted surface. Adjust the horizontal positioning of the light-box for optical focus of the projected line of light, so that (1) focus is maintained throughout the entire path of travel, (2) front of light-box assembly does not at any point touch the scale. The clamps which hold the glass rod in place may be clipped back if necessary.

Touch-up paint may be obtained at automobile service stations.

4. Control Knobs—Eccentric—Loose—How to Remove

A. Knobs eccentric (wobbly motion) or loose. This may be caused by pinching together the two halves of the split-shaft end. One-half section becomes bent toward the axis of the shaft to a greater degree than does the other. Re-form the split portions of the shaft so that they are symmetrical with respect to the axis of the shaft.

B. To remove control knobs.

Loop a heavy cord behind the knob, bringing out the two ends at opposite sides of the knob. Pull both ends firmly. If the cord (both ends) is brought out on one side only, there will be a tendency to cause the difficulty of 4A, above.

5. Microphonics and Feedback

A. Microphonic tubes.

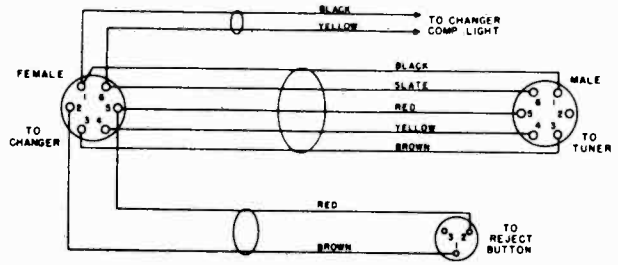
B. Check the variable condenser stator plates to ascertain whether they are loose. If so, apply a laquer cement to the clamp which holds the stator plates to the insulating material.

C. "Twin lead" to antenna binding posts may be stapled to cabinet in taut condition, whereby feedback is introducted mechanically. Re-staple the twin lead, leaving somewhat free and loose.

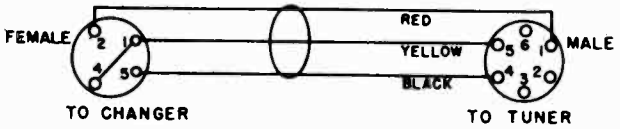
D. On FM, microphonics and howl may be caused by the lead from stator plate to sub-chassis assembly being taut. Re-solder with less tension in the flat ribbon lead.

NOTE: Oscillator trimmer may have to be readjusted.

E. If howl on the FM position persists, the following may alleviate the condition: Sponge rubber bits added as shown in sketch. Rubbers must be trimmed so that they will not touch rotor plates when the condenser is fully-meshed. Observe dial calibration for any change resulting from increased capacity.

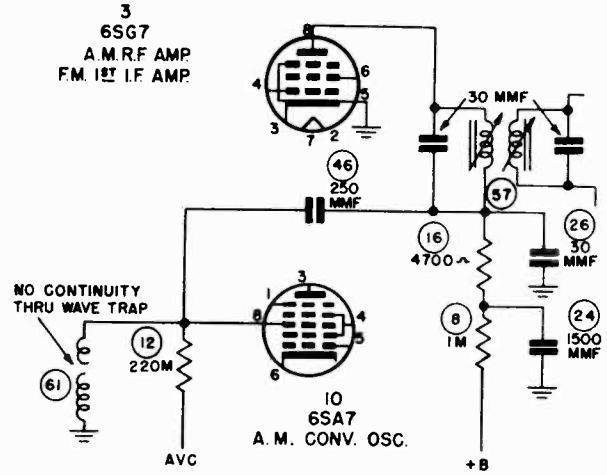


Record Changer AC Cable, Part No. 22182

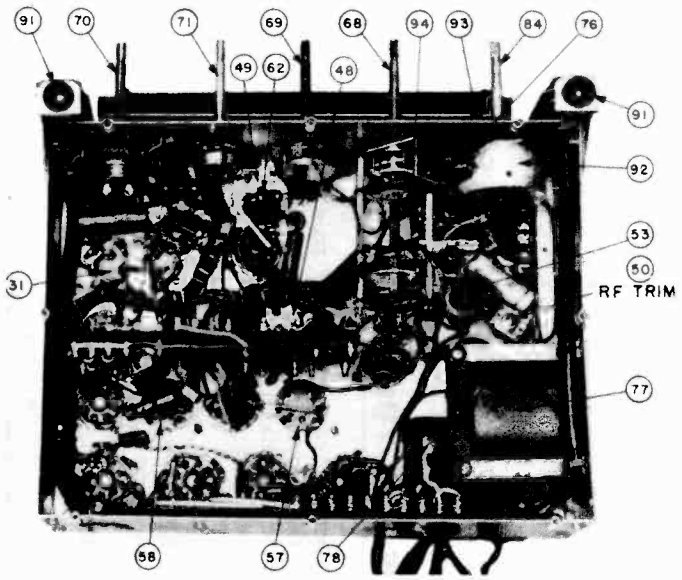


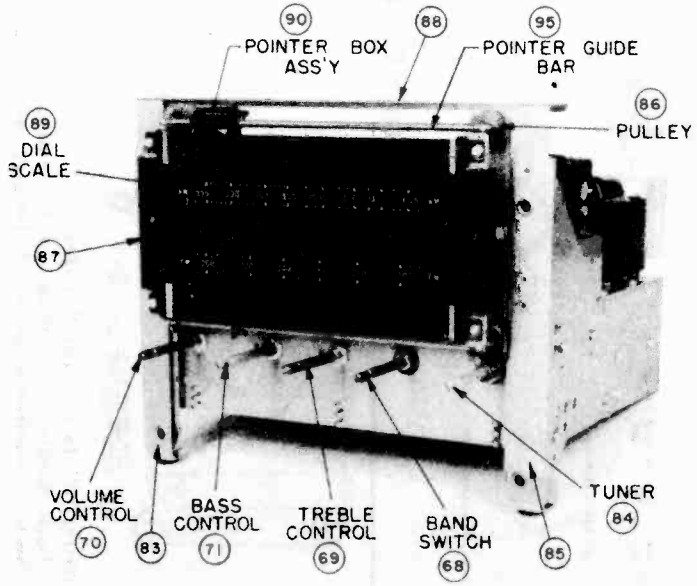
Record Changer AC Cable, Part No. 22184

CIRCUIT DIAGRAM MODIFICATIONS



Early production N4 tuners used a two gang broadcast tuning capacitor and wave trap connected as indicated in the RF portion of the schematic reproduced above:



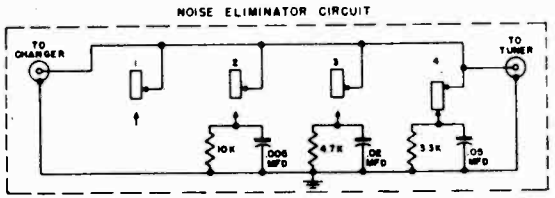


SPECIAL INFORMATION
P-4 SERIES

THE NOISE ELIMINATOR

P4 series instruments are divided into two groups, the instruments using the 41E-MP record changer (100P4 series) and those using the P-71 drop type record changer. The N4 series is also divided in a like manner.

The 41E-MP automatic record changer, used in the 100P4 series instruments, uses the new "Magnetic True Timbre" pickup, which is of the variable reluctance type. The Noise Eliminator used with these instruments is contained in a metal control box which is mounted on the inner wall of the record changer compartment. A schematic diagram of the noise eliminator circuit, as used in the 100P4 series is shown below:



On P4 series instruments using the P-71 record changer the noise eliminator circuit and selector switch are included on the changer itself.

RECORD CHANGER AC CABLES

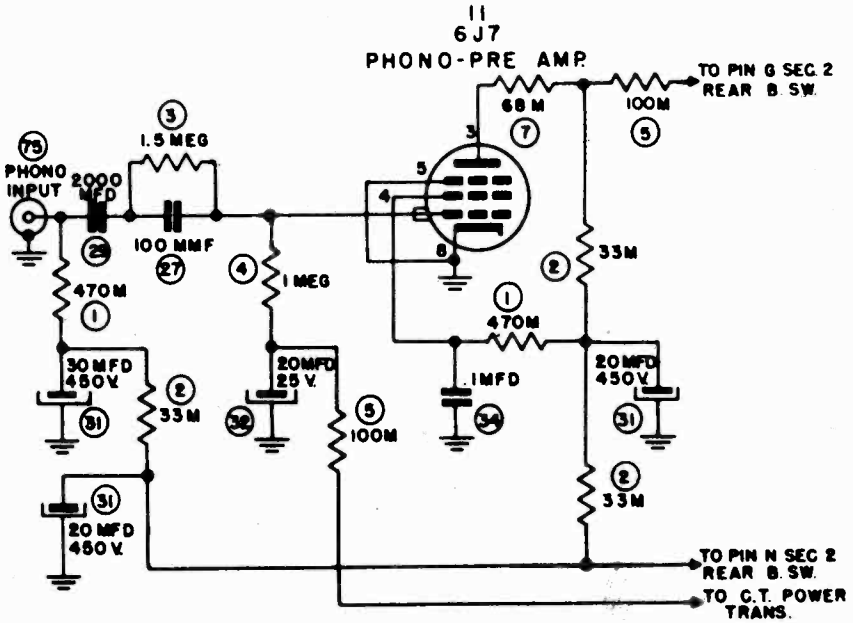
100P4 and 100N4 series instruments use the Record Changer AC Cable, part no. 22182. This cable is a multi-purpose cable, in that it not only supplies A.C. power to the 41E-MP record changer, but also supplies 110 volts to the record changer compartment light and in addition serves to connect the Reject Button to the record changer.

P4 instruments using the P-71 record changer and N4 instruments using the P-63 changer, both use the Record Changer AC Cable, part no. 22184. This cable serves merely as a power carrier to the record changer.

Schematic diagrams of both cables are shown

The 41E-MP & 41E record changers used in the P4 and N4 respectively are identified by a brown dot painted on the bearing cover plate of the main cam support bracket. Early production of the 41E, carrying either no dot or a red dot, are not directly interchangeable in the N4 and P4 without a modification in the wiring of the junction box. Reference should be made to the 41E manual.

This maintenance manual deals with the radio chassis of the instrument. For servicing information on the record changer, reference should be made to the manuals dealing with the 41E, P-71 or the P-63.



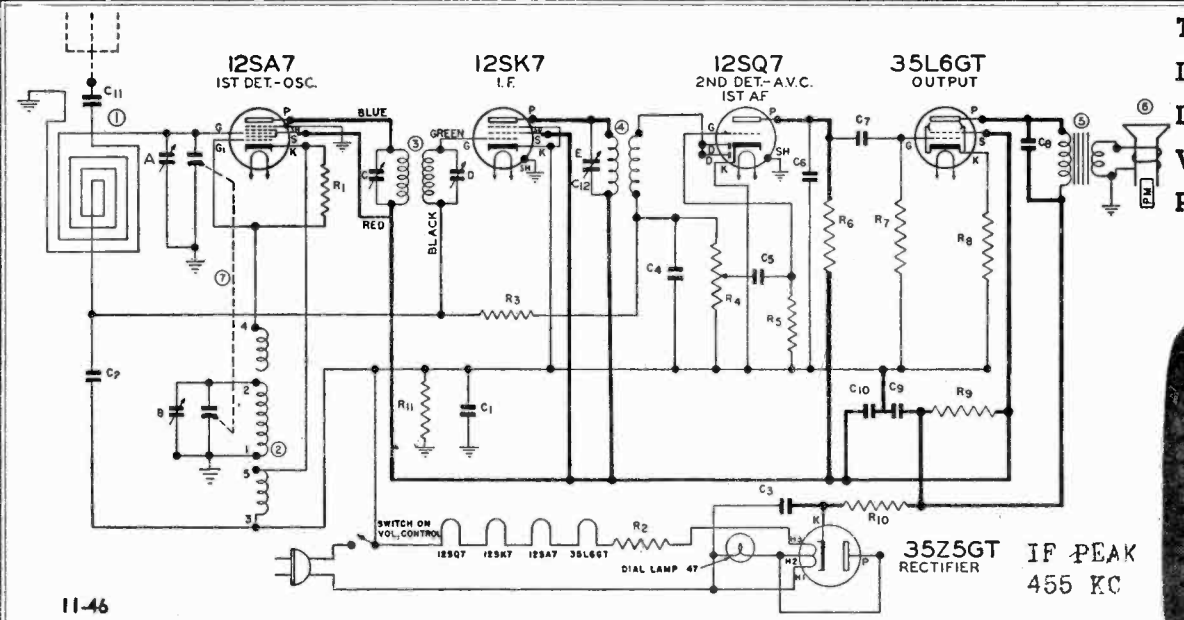
The N4 tuner is essentially the same as the P4 tuner, the schematic diagram with exception of the Phono Pre-Amplifier circuit. The Phono Pre-Amplifier, as used in the N4 tuner, is shown in that portion of the schematic reproduced above:

PARTS LIST

Ref. No.	Part No.	Description
1	77217	470M ohm Resistor
2	77267	33M ohm Resistor
3	77351	1.5 Meg ohm Resistor
4	77218	1 Meg ohm Resistor
5	77214	100M ohm Resistor
6		
7	77305	68M ohm Resistor
8	77262	1000 ohm Resistor
9	77212	10M ohm Resistor
10	77266	22M ohm Resistor
11	77265	15M ohm Resistor
12	77216	220M ohm Resistor
13	77272	4.7 Meg ohm Resistor
14	77213	47M ohm Resistor
15	77013	10M ohm 2 Watt Carbon Resistor
16	77211	4700 ohm Resistor (used on 2 gang chassis)
17	77270	2.2 Meg ohm Resistor
18	77210	3300 ohm Resistor
19	77360	22 ohm Resistor
20	77189	270 ohm 2 Watt Carbon Resistor
21	77440	1000 ohm 5 Watt Wire Wound Resistor
22	77261	470 ohm Resistor
23	25333	60 mmf Ceramic Capacitor N-470
24	25273	1500 mmf (350V-20%+50%) (Hi-"K") Ceramic Capacitor
25	25332	30 mmf Ceramic Capacitor +5% N-150
26	25329	30 mmf Ceramic Capacitor +5% N-750
27	25188	100 mmf Molded Mica Capacitor
28	25271	4000 mmf Molded Mica Capacitor
29	25295	2000 mmf Molded Mica Capacitor
30	25406	80 mmf Ceramic Capacitor
31	25214	Filter Condenser (30 Mfd., 20 Mfd. 20 Mfd., at 450 V., 25 Mfd., at 25V)
32	25269	50 Mfd., 25 Volt Electrolytic Condenser
33	25270	4 Mfd., 100 Volt Electrolytic Condenser
34	25215	.1 Mfd., 600 Volt Tubular Condenser
35	25193	47 mmf Molded Mica Capacitor
36		
37	25183	.005 Mfd., 600 Volt Tubular Condenser
38	25196	.05 Mfd., 600 Volt Tubular Condenser
39	25185	.002 Mfd., 600 Volt Tubular Condenser
40	25184	.003 Mfd., 600 Volt Tubular Condenser
41	25194	.01 Mfd., 600 Volt Tubular Condenser
42	25209	.01 Mfd., 600 Volt Condenser (Metal encased)
43	25197	.001 Mfd., 600 Volt Condenser
44	25327	4 mmf. Ceramic Capacitor
45	25189	500 mmf Mica Capacitor
46	25187	250 mmf Mica Capacitor (2 gang chassis)
47	26231	5-20 mmf Ceramic Trimmer Capacitor
48	26023	1-10 mmf Trimmer Condenser (Broadcast Antenna)
49	26240	Dual Trimmer Condenser Strip
50	26036	Trimmer Condenser for Broadcast Converter Coil
51	38690	FM Antenna Coil
52	38661	RF Choke
53	38913	Broadcast Converter Coil
54	38691	FM Converter Coil
55	38692	FM Osc. Coil
56	38824	1st FM Intermediate Freq. Trans.
57	38825	2nd FM Intermediate Freq. Trans.
58	38826	3rd FM Intermediate Freq. Trans.
59	38805	Loop Loading Coil Assy.
60	11325	FM Antenna & Plug Assy. (Mounted on Cabinet)
61	38484	Wave Trap Coil (Used with Two Gang Chassis)
62	38694	Broadcast Osc. Coil Assy.
63	38822	1st AM Intermediate Freq. Trans.
64	38823	2nd AM Intermediate Freq. Trans.
66	80361	Female Input Socket for FM Dipole
67	26275	Three Gang Tuning Condenser for C-226 N-4 Chassis and C-235 P-4 Chassis
	26237	Two Gang Tuning Condenser for C-175 N4 Chassis
68	90223	Band Switch
69	78123	Treble Tone Control
70	78101	Master Volume Control & Switch
71	78148	Bass Tone Control
72	80244	Five Prong Speaker Connecting Socket (Female)
73	80284	Five Prong Male Speaker Plug and Cap
74	80368	Six Prong Female Socket for Phono AC Cable
75	80030	Phono Signal Input Socket (Female)
76	90219	Phono AC Switch
77	94226	Filter Choke
78	94225	Power Transformer
79	94260	Output Trans. for 8115 Speaker on P4 & N4 series
80	81155	Speaker & Output Trans. Assy.
81	27118	AC Line Cord
82	25053	1000 mmf Capacitor
83	07524	Left Hand Dial Support Brkt. and Pulley Assy.
84	15174	Tuning Drive Shaft & Pulley Assy.
85	07525	Right Hand Dial Support Brkt. & Pulley Assy.
86	59279	Fibre Dial Cord Pulley
87	04070	Mount. Clamp for Dial Glass Scale
88	04098	Top Dial Support Angle Brkt.
89	13807	Dial Glass Scale Assy.
90	13631	Dial Pointer Box Assy.
91	62115	Rubber Grommet (on bottom of dial Support
92	55261	Tuning Fly Wheel
93	07410	Brg. Assy. for Lower Pointer Guide
94	58552	Mount. Brkt. for Phono AC Switch
95	55259	Guide Rod (upper & lower) for Pntr. Box Assy.
96	77207	3.3 Meg. Ohm Resistor
97	13889	Pre-Amp. Equalizer Assy.

MISCELLANEOUS PARTS LIST

Part No.	Description
07529	Dial cord and spring assy.
11382	AC phono cable & plug assy. (for two gang N4 chassis, C-175)
17019	Tuning drive drum
22183	AC phono cable and plug assy. for C-226, N4 Chassis and C-235, P4 Chassis
25187	Molded mica cap. 240 mmf +10%
25270	Tubular Elec. cap. 4 mfd. 100V
25325	Ceramic cap. 60 mmf. +5%
36927	Snap washer (for tuning drive shaft)
36936	Flange sleeve to mount tuning cond.
42185	Pilot light
54144	Bakelite mtg. wafer for fltr. cond.
54161	Ceramic spacer for mtg. trm. cond.
54193	Glass rod pointer for stat. pointer box
55260	Mtg. stud for fibre dial cord pulley
56183	Tuning shaft bearing
56518	Rear mtg. brkt. for tuning condenser
56523	Front mtg. brkt. for 2 gang tun. cond.
58302	Capacitor clip
58335	Min. tube shield
58446	Clamp to hold dial string to pntr. box
58524	Mtg. clip for glass rod sta. pointer
58880	Front mtg. brkt. for 3 gang cond.
59391	Plastic prism for sta. pntr. box
60315	N4 chassis bottom cover
62099	Rubber mtg. grommet for tuning cond.
64351	Spring only for dial cord
64382	Compression spring for pntr. guide bar
80139	Molded octal socket
80319	Miniature tube socket
80344	Pilot light socket and lead
2000-007	#2-56x5/16" R.H.M.S. (to mount plastic prism in pointer box)
2000-071	#3-48x1" lg. R.H.M.S. (adj. screw for pointer guide bar)
11325	Dipole antenna assy. (mounted on cab.)
13581	Speaker network term. board assy. (100 series P4 & N4)
22152	Pickup cable (100N4 & 100P4 series
22156	Pickup cable (for P4 & N4)
22182	Record changer AC cable (100N4 & 100 P4 series
22184	Record changer AC cable (P4 & N4 series)
31419	Escutcheon for Pan. N4 series
31429	Escutcheon for 100N4 & P4 series
36478	#3-48 x ¼" lg. Phillips F.H.M.S. to mount escutcheon mtg. plate
41130	Mounting screw kit for dial escutch.
58461	Special #3-48 tapped nut for escutch. mtg. plate
58546	Escutcheon mtg. plate (metal)
59316	Tuning and volume knob
59373	Tone control knob
80284	5 prong male speaker plug with cap
80362	2 prong male plug for FM dipole ant.
80366	3 prong female connector on phono AC cable (100N4 & 100P4 series)
80368	6 prong female plug and cap for phono AC cable (100N4 & 100P4 series)
80373	Male connector plug for reject switch cable (100N4 & 100 P4 series)
80422	Ant. and ground terminal strip
80463	6 prong male plug and cap for phono AC cable (100N4 & 100P4 series)
81155	Speaker and output trans. assy. (12")
81183	Cone and voice coil assy. (12")
81184	Treble speaker only (100N4 & 100P4)
90194	Reject switch (100N4 & 100P4)



TUNING RANGE	**535 to 1720 KC**
INTERMEDIATE FREQ	**455 KC**
LOUD SPEAKER	**4 Inch P.M. Dynamic**
VOICE COIL IMPEDANCE	**3.2 OHM at 400 Cycles**
POWER OUTPUT	**Undistorted - 0.8 Watts** **Maximum - - 1.4 Watts**

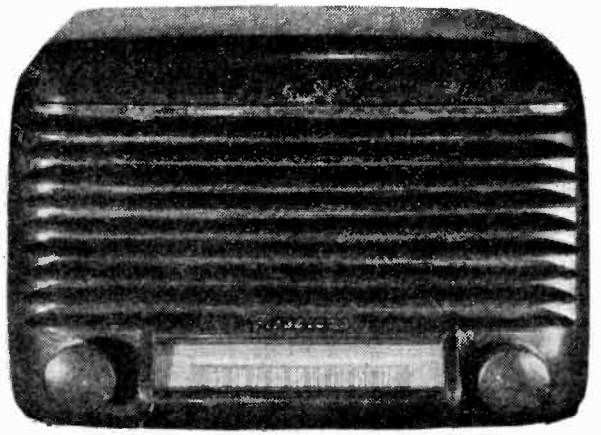


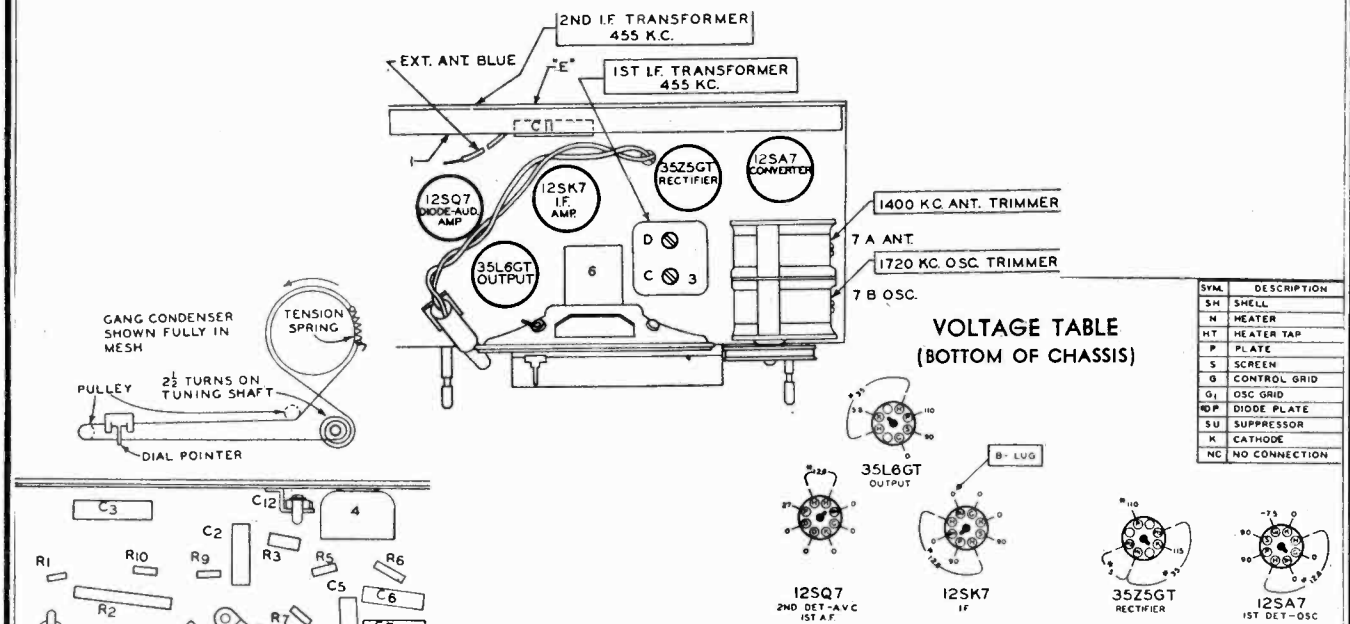
Diagram Number	Part No.	Part Name	Description	Price
1	N-5870	Antenna	Loop	$2.55
2	N-3298	Coil	Oscillator	1.05
3	N-4013	Coil	1st I. F.	2.10
4	N-4977	Coil	2nd I. F.	1.16
5	N-4011	Transformer	Output	2.25
6	N-4010	Speaker	4" P. M. Dynamic	3.44
7	N-4998	Condenser	Variable, 2 Gang & Pulley Assm.	4.15
C1	N-5160	Condenser	Paper .2 Mfd. 200 Volt	.32
C2	N-1345	Condenser	Paper .05 Mfd. 200 Volt	.19
C3	N-1346	Condenser	Paper .05 Mfd. 400 Volt	.20
C4	N-1374	Condenser	Mica .0001 Mfd. 500 Volt	.28
C5	N-4894	Condenser	Paper .005 Mfg. 600 Volt	.17
C6	N-4890	Condenser	Paper .0005 Mfd. 600 Volt	.26
C7	N-1344	Condenser	Paper .01 Mfd. 400 Volt	.17
C8	N-1376	Condenser	Paper .02 Mfd. 400 Volt	.18
C9-C10	**N-4015**	**Condenser**	**Electrolytic** **C9 35 Mfd. 150 Volt** **C10 30 Mfd. 150 Volt**	1.50
C11	N-1344	Condenser	Paper .01 Mfd. 400 Volt	.17
C12	N-4048	Condenser	Adjustable Trimmer	.45
R1	N-4025	Resistor	Carbon 22,000 Ohm 0.5 Watt	.08
R2	N-4023	Resistor	Carbon 82 Ohm 2.0 Watt	.20
R3	N-3175	Resistor	Carbon 1.0 Megohm 0.5 Watt	.08
R4	N-4014	**Volume Control with Switch**		1.62

Diagram Number	Part No.	Part Name	Description	Price
R5	N-4028	Resistor	Carbon 6.8 Megohm 0.5 Watt	.08
R6	N-4026	Resistor	Carbon 220,000 Ohm 0.5 Watt	.08
R7	N-4027	Resistor	Carbon 470,000 Ohm 0.5 Watt	.08
R8	N-4024	Resistor	Carbon 220 Ohm 0.5 Watt	.08
R9	N-5358	Resistor	Carbon 1,000 Ohm 1.0 Watt	.10
R10	N-4022	Resistor	Carbon 33 Ohm 0.5 Watt	.08
R11	N-1779	Resistor	Carbon 150,000 Ohm 0.5 Watt	.08

Part No.	Part Name	Description	Price
※150	**Cabinet**	**Walnut Plastic**	$2.24
N-1090	Cord	6 Ft. Rubber Line Cord	.55
N-4016	Dial Plate	Dial Back Plate Less Scale	.05
N-2655	Dial Cord	17" of 30 lb. Dial Drive Cord	.11
N-4018	Dial Scale	Calibrated Scale	.25
N-4020	Dial Shaft	Tuning Shaft	.13
N-4019	Dial Pointer	Dial Indicator	.10
N-3925	Dial Spring	Tension Spring for Drive Cord	.03
N-4093	Dial Ring	Ring for Drive Cord	.01
N-3923	Knob	For Walnut Cabinet	.05
N-4021	Pilot Lamp Socket	Pilot Lamp Socket Assembly	.22
N-1147	**Pilot Lamp**	**No. 47 Lamp, 6-8 Volts, .150 Amp.**	.16

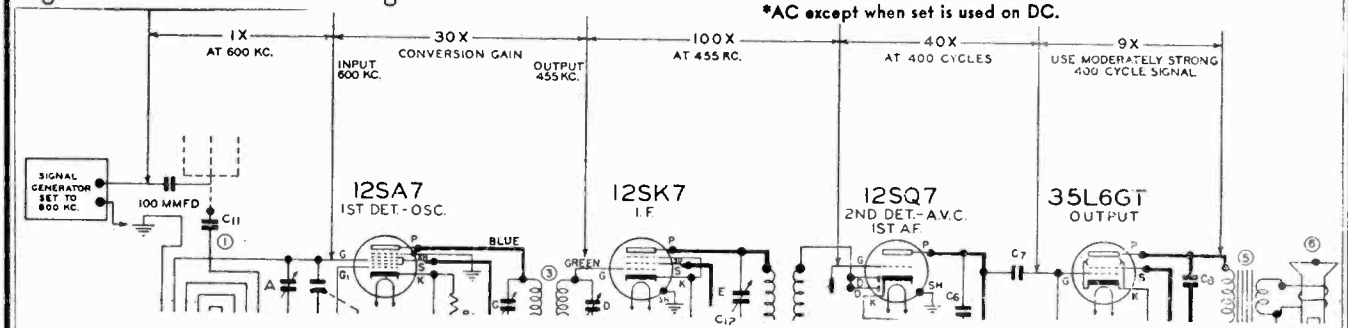
MODEL 4-A-1,
Mercury

THE FIRESTONE TIRE & RUBBER CO.



All Voltages except heaters are measured from socket contacts to common negative (Buss). Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.

***AC except when set is used on DC.**



For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third. Before starting alignment:

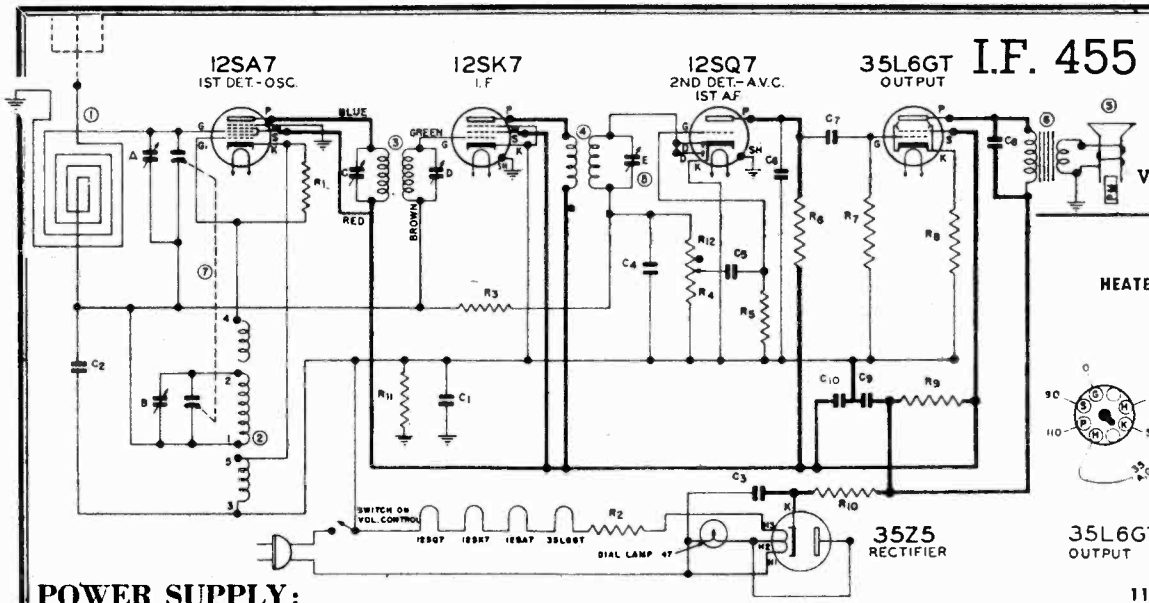
(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial pointer must be exactly even with the last dot at the low frequency end of the dial calibration. If dial pointer is incorrectly set, release pointer clip on dial cord and reposition pointer.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET

Steps	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to grid of tuning condenser. Low side to buss.	Adjust the second I F. transformer trimmer for maximum output—then adjust each of the first I. F. trimmers for maximum output.
2	Exactly 1720 K. C.	Exactly 1720 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	Adjust 1720 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.

I.F. 455 KC.



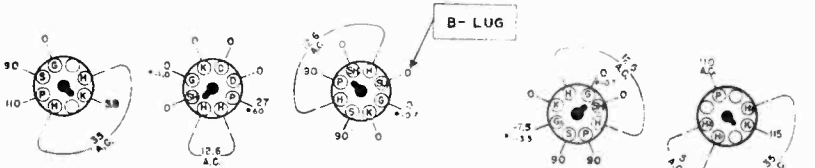
SOCKET VOLTAGES

Measured with voltmeter having sensitivity of 1000 ohms per volt except where indicated by (*).

VOLUME ON FULL WITH NO SIGNAL DIAL TURNED TO 540 KC.

BOTTOM VIEW OF CHASSIS

HEATER VOLTAGES MEASURED ACROSS SOCKET TERMINALS. ALL OTHER VOLTAGES MEASURED BETWEEN SOCKET TERMINALS AND B- LUG.



35L6GT OUTPUT | 12SQ7 2ND DET.-A.V.C. 1ST A.F. | 12SK7 I.F. | 12SA7 1ST DET.-OSC. | 35Z5GT RECTIFIER

117 VOLT 60 CYCLE A.C. POWER SUPPLY USED FOR THESE MEASUREMENTS.

POWER SUPPLY:

117 volts
50-60 cycles A.C. or D.C.
30 watts

SPEAKER:

4 inch P-M Dynamic
Voice coil impedance—3.2 ohms

PARTS LIST

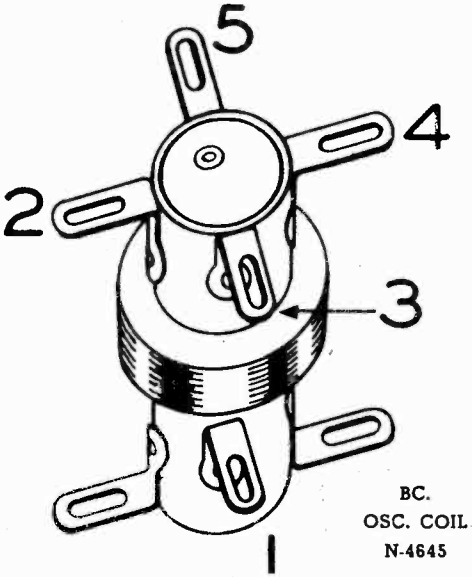
DIAGRAM NO.	PART NO.	DESCRIPTION
		CONDENSERS
C1	N-1345	Condenser .05 MFD 200 Volt
C2	N-1345	Condenser .05 MFD 200 Volt
C3	N-1346	Condenser .05 MFD 400 Volt
C4	N-1374	Condenser—Mica* .0001 MFD 500 Volt
C5	N-4894	Condenser .005 MFD 600 Volt
C6	N-4890	Condenser .0005 MFD 600 Volt
C7	N-1344	Condenser .01 MFD 400 Volt
C8	N-1376	Condenser .02 MFD 400 Volt
C9-C10	N-3302	Condenser—Electrolytic C9—35 MFD 150 Volt; C10—30 MFD 150 Volt
		RESISTORS
R1	N-4025	Resistor—Carbon 22,000 Ohm .5 Watt
R2	N-4023	Resistor—Carbon 82 Ohm 2.0 Watt
R3	N-1262	Resistor—Carbon 1.0 Megohm .5 Watt
R4	N 4843	Vol. Con., 500,000 ohm with switch—no shaft
	N-4999	Vol. Con., 500,000 ohm with switch & shaft
R5	N-4028	Resistor—Carbon 6.8 Megohm .5 Watt
R6	N-4026	Resistor—Carbon 220,000 Ohm .5 Watt
R7	N-4027	Resistor—Carbon 470,000 Ohm .5 Watt
R8	N-4024	Resistor—Carbon 220,000 Ohm .5 Watt
R9	N-3341	Resistor—Carbon 1,000 Ohm .5 Watt
R10	N-4022	Resistor—Carbon 33 Ohm .5 Watt
R11	N-4026	Resistor—Carbon 220,000 Ohm .5 Watt
R12		Resistor—Carbon (In Volume Control)

DIAGRAM NO.	PART NO.	DESCRIPTION
		OTHER ELECTRICAL PARTS
1	N-3875	Coil—Loop with Cabinet Back
2	N-4645	Coil—Oscillator
3	N-4813	Coil—1st I.F.
4	N-4846	Coil—2nd I.F.
5	N-4990	Speaker—4" P.M. Dynamic
6	N-3899	Transformer—Output
7A, 7B	N-5290	Condenser—Variable, 2 Gang & Pulley Assy
8	N-4048	Condenser—Trimmer—70 to 130 MMFD
		MISCELLANEOUS PARTS
143		Cabinet
N-5250		Cord, Dial Drive (3 feet required)
N-4749		Knob
N-1147		Lamp, Dial—Mazda 47 6-8 V. 150 Ma.
N-3881		Pointer, Dial
N-3879		Pulley, Idler
N-3926		Scale, Dial
N-3872		Shaft, Tuning
N-5184		Shaft, Volume Control — Use with N-4843 Vol. Control
N-3882		Socket, Dial Lamp—with leads
N-4666		Socket, Tube—Laminated
N-3229		Socket, Tube—Molded
N-4864		Speednut
N-2656		Spring, Dial Cord
N-4854		Terminal, Screw
N-3243		Washer, "C"—For Tuning Shaft

PRICE SUBJECT TO CHANGE WITHOUT NOTICE

REAR OF CHASSIS

Measured with vacuum tube volt meter.



NUMBERED TERMINALS IN ILLUSTRATION CORRESPOND TO SIMILARLY NUMBERED TERMINALS ON THE CIRCUIT DIAGRAM.

ALIGNMENT PROCEDURE

1. Remove the chassis and loop antenna from the cabinet at the same time. To accomplish this remove the two fasteners holding the top of the back to the cabinet and remove the two screws on the rear apron of the chassis.
2. Note that there are five calibrating lines stamped into the metal dial frame. When gang condenser is fully meshed, dial pointer should be in the position indicated by first line at the left. If it is set incorrectly, release pointer clip on dial cord and reposition pointer.
3. Connect an output meter across the speaker voice coil or from plate of 35L6GT tube to B— through a .1 Mfd condenser (see voltage chart for convenient B— connection).
4. Connect ground lead from signal generator to B— through a .25 Mfd. condenser.
5. Set volume control at maximum volume position and use a weak signal from the signal generator.

IMPORTANT—Align this receiver in exactly the order shown below.

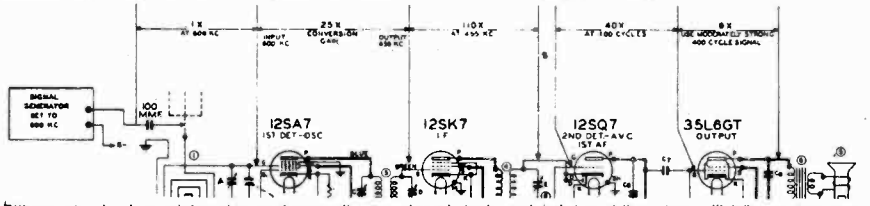
DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	CONNECT HIGH SIDE OF GENERATOR TO	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
.05 MFD. Paper Condenser	Control Grid of 12SA7	455 KC	Any point where it does not affect the signal.	E	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
				C-D	1st I.F.	
100 MMFD. Mica Condenser	External Antenna Blue Lead on Loop	1720 KC	Set pointer to extreme right.	B	Oscillator	Adjust for maximum output.
100 MMFD Mica Condenser	External Antenna Blue Lead on Loop	1400 KC	Tune to 1400 KC generator signal.	A	Antenna	Adjust for maximum output.
100 MMFD. Mica Condenser	External Antenna Blue Lead on Loop	600 KC	Tune to 600 KC generator signal.	—		Check sensitivity.

APPROXIMATE STAGE GAIN DATA

Be sure Ant. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

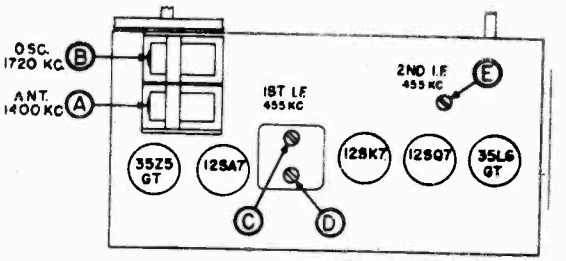
1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes).
2. For I.F. measurements connect negative terminal of a 3 volt battery (two 1½ volt cells in series) to A.V.C. lead and positive terminal to B —. This provides a definite operating point. IMPORTANT: Disconnect battery when measuring audio stage gains.
3. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.
4. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.

I.F. stage gains shown below are less than under normal operating conditions due to the use of 3 volts fixed bias in order to establish a definite operating point. Therefore, these values are not intended to indicate the full capability of a stage.



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

TOP VIEW OF CHASSIS



FREQUENCY RANGES:

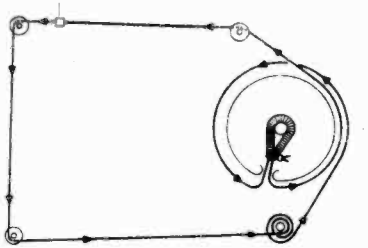
Standard Broadcast Band — 535-1720 K.C.

TUBE COMPLEMENT:

12SA7 ..... Osc.—1st Det.
12SK7 ..... I.F. Amp.
12SQ7 ..... 2nd Det.—A.V.C.—1st Audio
35L6GT ..... Power Output
35Z5GT ..... Rectifier

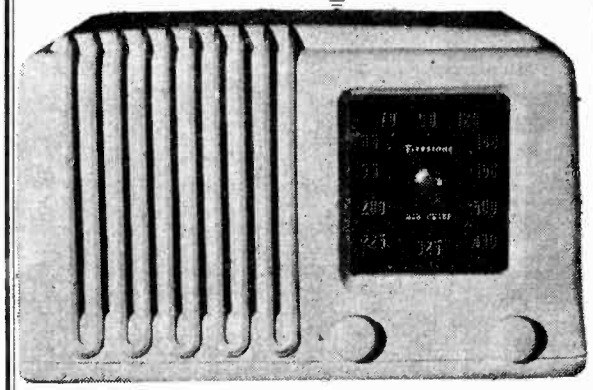
POWER OUTPUT:

Undistorted — 1.0 watts
Maximum — 1.3 watts



DIAL AND POINTER DRIVE CORD ARRANGEMENT

To string dial cord, set gang condenser to fully meshed position and use following parts:
[illegible] Tension Spring
[illegible] Cord (3 feet)



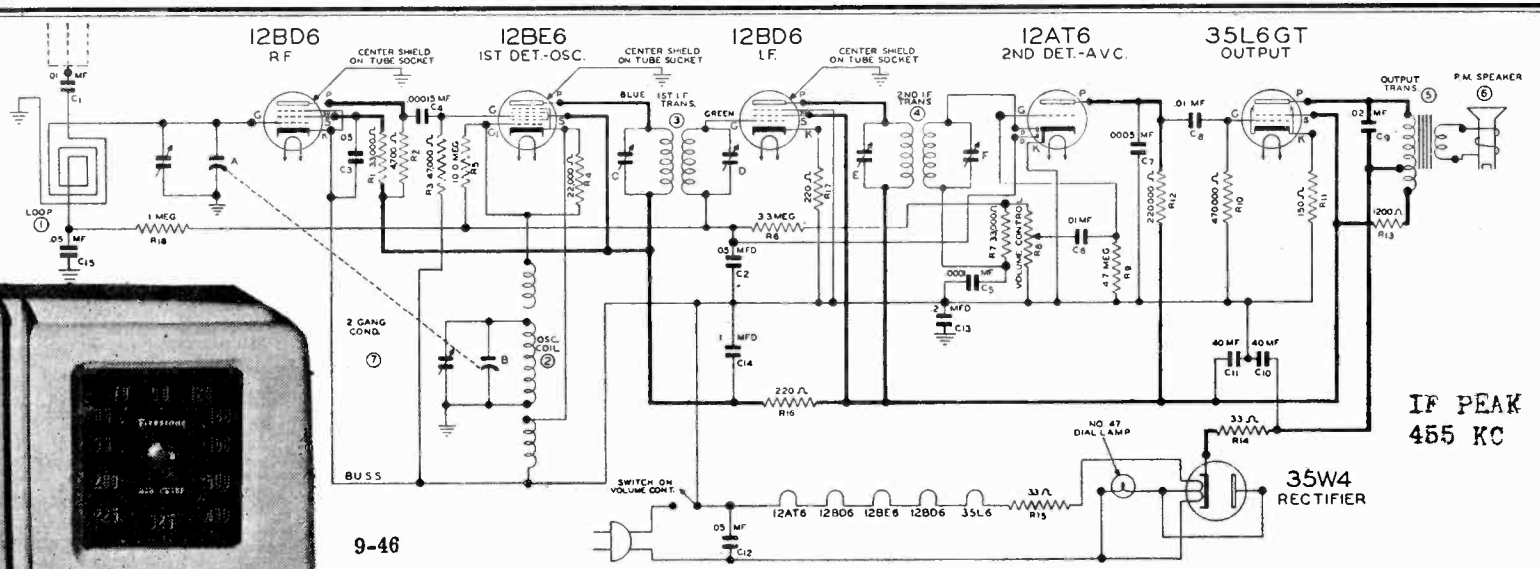


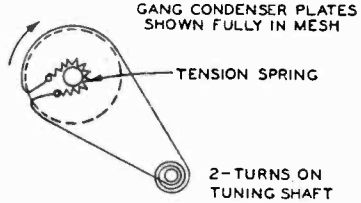
Diagram Number	Part No.	Part Name	Description
1	N-3784	Antenna	Loop
2	N-3298	Coil	Oscillator
3	N-3816	Coil	1st I. F.
4	N-3804	Coil	2nd I.F.
5	N-4875	Transformer	Output
6	N-3781	Speaker	5" P.M. Dynamic
7	N-5081	Condenser	Variable, 2 Gang & Pulley Assm.
C1	N-1344	Condenser	Paper .01 Mfd. 400 Volt
C2	N-1345	Condenser	Paper .05 Mfd. 200 Volt
C3	N-1345	Condenser	Paper .05 Mfd. 200 Volt
C4	N-2383	Condenser	Mica .00015 Mfd. 500 Volt
C5	N-1374	Condenser	Mica .0001 Mfd. 500 Volt
C6	N-1344	Condenser	Paper .01 Mfd. 400 Volt
C7	N-4890	Condenser	Paper .0005 Mfd. 600 Volt
C8	N-1344	Condenser	Paper .01 Mfd. 400 Volt
C9	N-1376	Condenser	Paper .02 Mfd. 400 Volt
C10-C11	**N-5051**	**Condenser**	**Electrolytic**
			C10-40 Mfd. 150 Volt
			C11-40 Mfd. 150 Volt
C12	N-1346	Condenser	Paper .05 Mfd. 400 Volt
C13	N-5160	Condenser	Paper .2 Mfd. 200 Volt
C14	N-1351	Condenser	Paper .1 Mfd. 200 Volt
C15	N-1345	Condenser	Paper .05 Mfd. 200 Volt
R1	N-4064	Resistor	Carbon, 33,000 Ohm 0.5 Watt
R2	N-4278	Resistor	Carbon, 4,700 Ohm 0.5 Watt
R3	N-4063	Resistor	Carbon, 47,000 Ohm 0.5 Watt
R4	N-4025	Resistor	Carbon, 22,000 Ohm 0.5 Watt
R5	N-1263	Resistor	Carbon, 10.0 Megohm 0.5 Watt
R6	N-4085	Resistor	Carbon, 3.3 Megohm 0.5 Watt
R7	N-4064	Resistor	Carbon, 33,000 Ohm 0.5 Watt
R8	**N-4076**	**Volume Control—With Switch**	
R9	N-4061	Resistor	Carbon, 4.7 Megohm 0.5 Watt
R10	N-4027	Resistor	Carbon, 470,000 Ohm 0.5 Watt
R11	N-3663	Resistor	Carbon, 150 Ohm 0.5 Watt
R12	N-4026	Resistor	Carbon, 220,000 Ohm 0.5 Watt
R13	N-4900	Resistor	Carbon, 1,200 Ohm 1.0 Watt
R14	N-4022	Resistor	Carbon, 33 Ohm 0.5 Watt
R15	N-4628	Resistor	Carbon, 33 Ohm 1.0 Watt
R16	N-5348	Resistor	Carbon, 220 Ohm 0.5 Watt
R17	N-5632	Resistor	Carbon, 220 Ohm 0.5 Watt
R18	N-1262	Resistor	Carbon, 1.0 Megohm 0.5 Watt

art No.	Part Name	Description
✱134	**Cabinet**	**Ivory Plastic**
N-4074	Cabinet Back	For Ivory Plastic Cabinet
N-1090	Cord	6 Ft. Rubber Line Cord
N-4055	Dial Plate	Dial Back Plate less Scale
N-2655	Dial Cord	M19" of 30 lb. Dial Drive Cord
N-4054	Dial Scale	Calibrated Scale
N-3787	Dial Shaft	Tuning Shaft
N-3238	Dial Shaft Bushing	Bushing for Tuning Shaft
N-4053	Dial Pointer	Dial Indicator
N-3332	Dial Spring	Tension Spring for Drive Cord
N-3887	Knob	For Ivory Cabinet
N-4075	Pilot Lamp Socket	Pilot Lamp Socket Assembly
N-1147	**Pilot Lamp**	**No. 47 Lamp, 6-8 Volts, 150 Amp.**

LOUD SPEAKER — **5 Inch P.M. Dynamic**

VOICE COIL IMPEDANCE — **3.2 OHM at 400 Cycles**

POWER OUTPUT — **Undistorted - 0.8 Watts**
Maximum - - 1.4 Watts



TUNING RANGE 535 to 1720 KC

INTERMEDIATE FREQ 455 KC

MODEL 4-A-3, Diplomat

THE FIRESTONE TIRE & RUBBER CO.

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

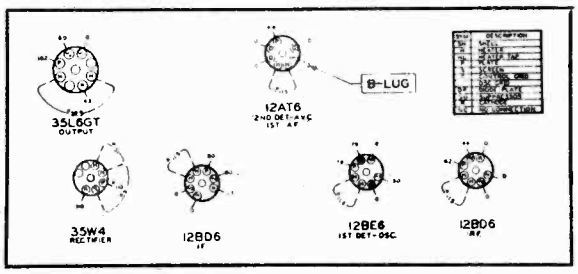
(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last dot at the low frequency end of the dial calibration. If dial needle does not point exactly to last dot move to correct position.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

VOLTAGE TABLE

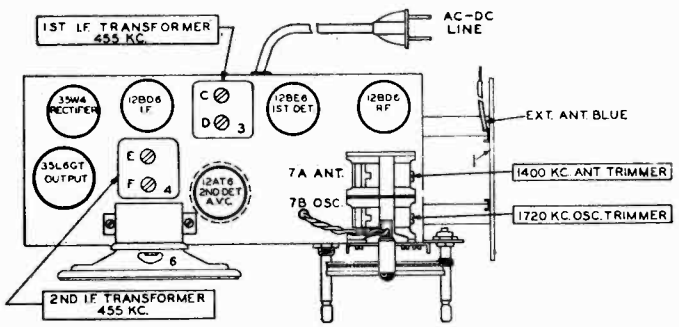
(Bottom of Chassis)

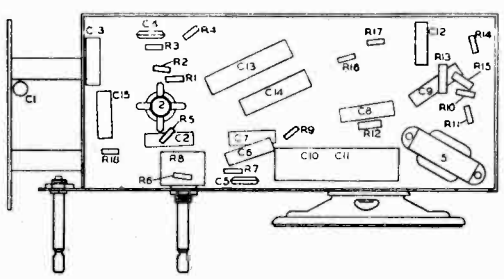


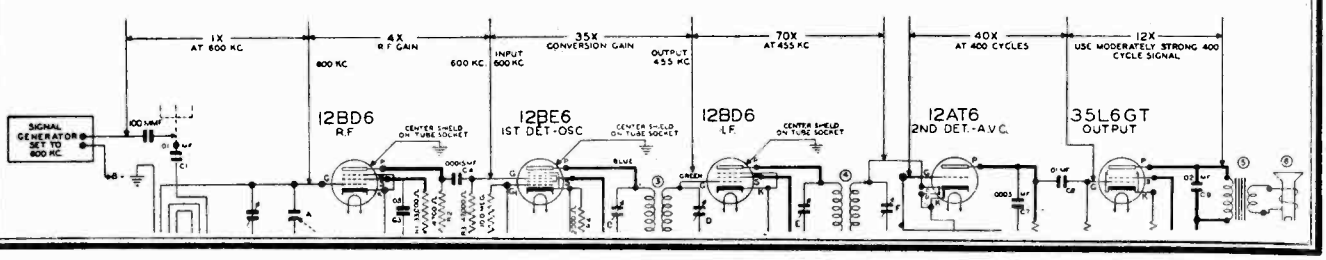
REAR OF CHASSIS

All Voltages except heaters are measured from socket contacts to common negative (Buss). Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.
***AC except when set is used on DC.**

Steps	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to grid of tuning condenser. Low side to buss.	Adjust each of the second I. F. transformer trimmers for maximum output—then adjust each of the first I. F. trimmers for maximum output.
2	Exactly 1720 K. C.	Exactly 1720 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	Adjust 1720 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.

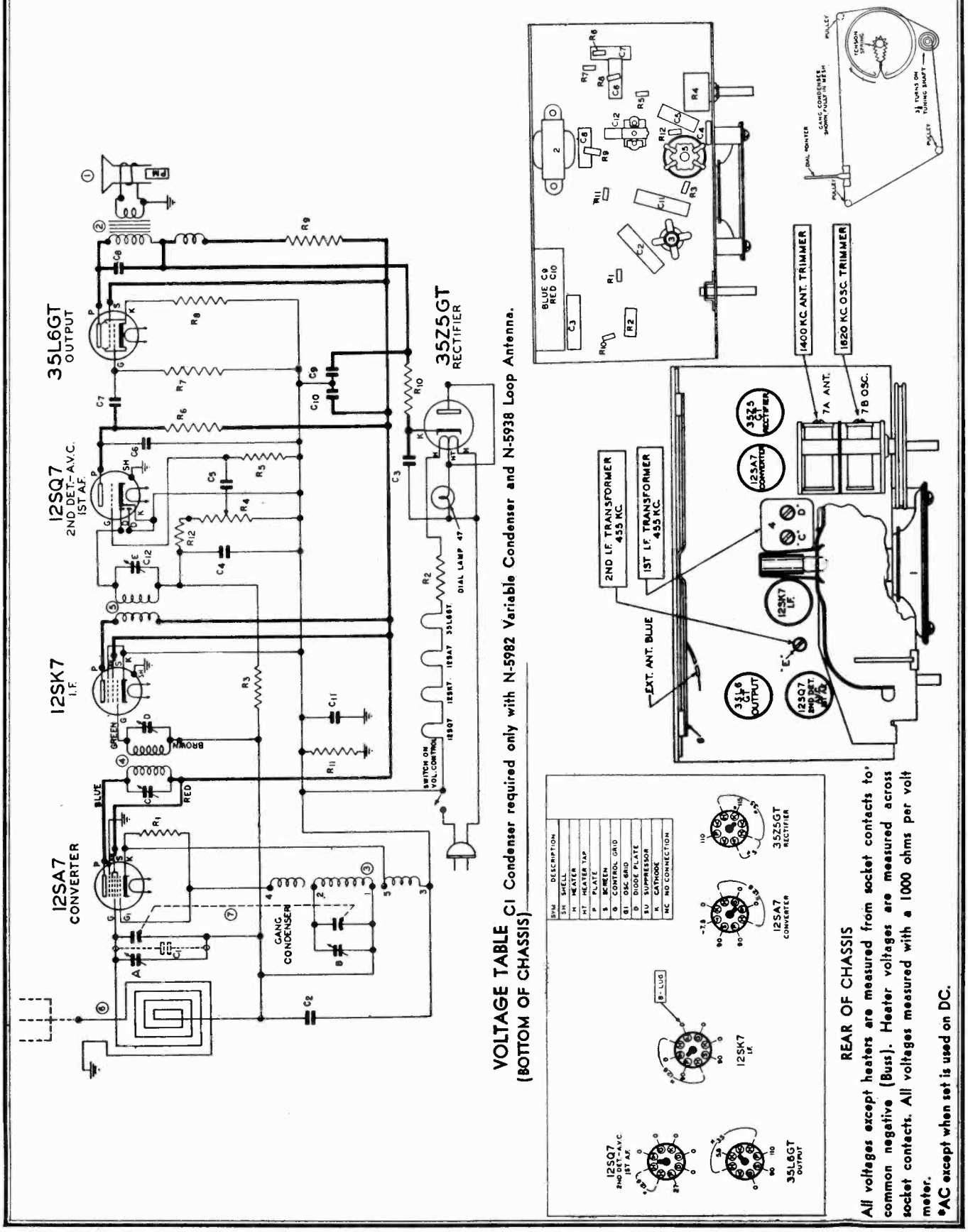






THE FIRESTONE TIRE & RUBBER CO.

MODEL 4A-10, Reporter



VOLTAGE TABLE (BOTTOM OF CHASSIS)

C1 Condenser required only with N-5982 Variable Condenser and N-5938 Loop Antenna.

All voltages except heaters are measured from socket contacts to common negative (Buss). Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.

*AC except when set is used on DC.

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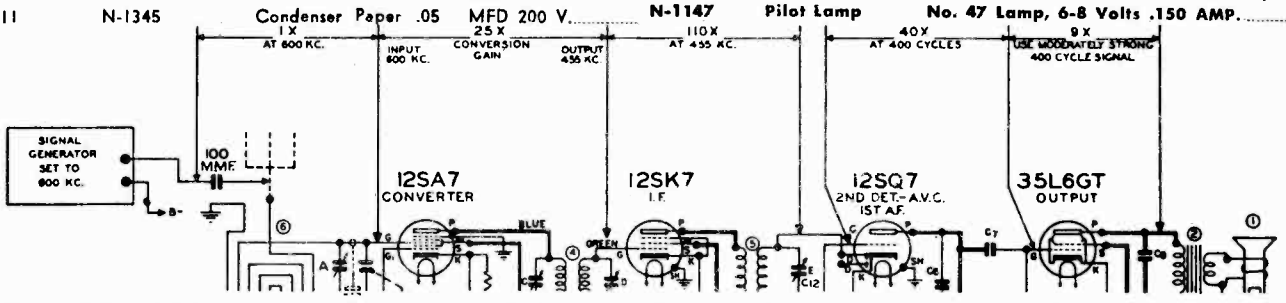
MODEL 4A-10, Reporter

Diagram Number	Part No.	Part Name	Description
1	N-4318	Speaker	4" P.M. Dynamic
2	N-4875	Transformer	Output
3	N-4810	Coil	Oscillator
4	N-4813	Coil	1st I.F.
5	N-4846	Coil	2nd I.F.
6	N-5183	Antenna	Loop
7	N-5181 or	Condenser	Variable, 2 Gang & Pulley Assem. N-5936 Variable Condenser N-4294 Pulley
6	N-5938	Antenna	Loop
7	N-5982	Condenser	Variable, 2 Gang & Pulley Assem N-5286 Variable Condenser N-4294 Pulley
C1	N-1681	Condenser	Mica .00001 MFD 500 V.
C2	N-1345	Condenser	Paper .05 MFD 200 V.
C3	N-1346	Condenser	Paper .05 MFD 400 V.
C4	N-1374	Condenser	Mica .0001 MFD 500 V.
C5	N-4894	Condenser	Paper .005 MFD 600 V.
C6	N-4890	Condenser	Paper .0005 MFD. 600 V.
C7	N-1344	Condenser	Paper .01 MFD 400 V.
C8	N-1376	Condenser	Paper .02 MFD 400 V.
C9-C10	**N-5193**	**Condenser**	**Electrolytic C9 - 35 MFD 150 V. C10 - 30 MFD 150 V.**
C11	N-1345	Condenser	Paper .05 MFD 200 V.
C12	N-2649	Condenser	Adjustable Trimmer
R1	N-4025	Resistor	Carbon 22,000 ohm .5 W.
R2	N-4023	Resistor	Carbon 82 ohm 2.0 W.
R3	N-1262	Resistor	Carbon 1.0 Megohm .5 W.
R4	**N-5185**	**Volume Control with Switch**	
R5	N-4028	Resistor	Carbon 6.8 Megohm .5 W.
R6	N-4026	Resistor	Carbon 220,000 ohm .5 W.
R7	N-4027	Resistor	Carbon 470,000 ohm .5 W.
R8	N-4067	Resistor	Carbon 180 ohm .5 W.
R9	N-5358	Resistor	Carbon 1,000 ohm 1.0 W.
R10	N-4022	Resistor	Carbon 33 ohm .5 W.
R11	N-4026	Resistor	Carbon 220,000 ohm .5 W.
R12	N-4087	Resistor	Carbon 47,000 ohm .5 W.
※228	**Cabinet**		**Ivory Plastic**
N-1090	Cord		6 Ft. Rubber Line Cord
N-5177	Dial Plate		Dial Back Plate less Scale
N-5250	Dial Cord		3' of 30 lb. Dial Drive Cord
N-5182	Dial Scale		Calibrated Scale
N-4037	Dial Shaft		Tuning Shaft
N-5939	Dial Pointer		Dial Indicator
N-3332	Dial Spring		Tension Spring for Drive Cord
N-5041	Knob		For Ivory Cabinet
N-4075	Pilot Lamp Socket		Pilot Lamp Socket Assembly
N-1147	**Pilot Lamp**		**No. 47 Lamp, 6-8 Volts .150 AMP.**



Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. **For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)**
2. **Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)**
3. **When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.**

ALIGNMENT PROCEDURE

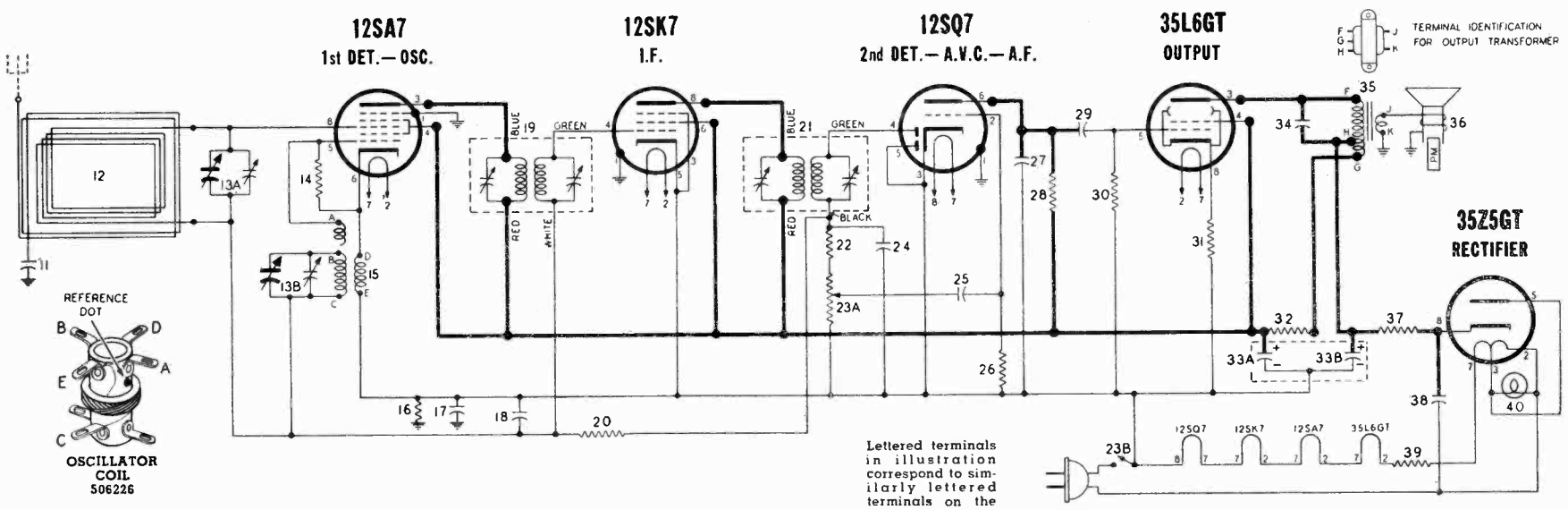
For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third. Before starting alignment:

(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial pointer must be exactly even with the last dot at the low frequency end of the dial calibration. If dial pointer is incorrectly set, release pointer clip on dial cord and reposition pointer.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

Steps	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to grid of tuning condenser. Low side to buss.	Adjust the second I. F. transformer trimmer for maximum output—then adjust each of the first I. F. trimmers for maximum output.
2	Exactly 1620 K. C.	Exactly 1620 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	Adjust 1620 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.

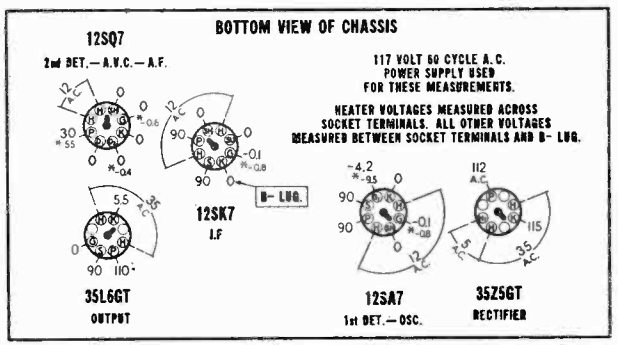


I.F. 455 KC.

SOCKET VOLTAGES

Measured with voltmeter having sensitivity of 1000 ohms per volt except where indicated by (*). The (*) symbol designates a vacuum tube voltmeter measurement.

VOLUME ON FULL WITH NO SIGNAL DIAL TUNED TO 540 KC.



PARTS LIST

DIAGRAM NO.	PART NO.	DESCRIPTION
		CONDENSERS
11	512002	Condenser—.002 Mfd. 600 volt
13-A, B	506219	Condenser—variable gang (with drum)
17, 18	502153	Condenser—.05 Mfd. 200 volt
24	502931	Condenser—ceramic 100 Mmfd. 500 volt
25	502479	Condenser—.006 Mfd. 600 volt
27	504727	Condenser—mica 500 Mmfd. 500 volt
29	502151	Condenser—.01 Mfd. 400 volt
33-A, B	506222	Condenser—electrolytic A—30 Mfd. 150 volt B—35 Mfd. 150 volt
34	502152	Condenser—.02 Mfd. 400 volt
38	502157	Condenser—.05 Mfd. 400 volt
		RESISTORS
14	510061	Resistor—carbon 22,000 Ohms ¼ watt
16	510079	Resistor—carbon 220,000 Ohms ¼ watt
20	510091	Resistor—carbon 1 Meg. ¼ watt
22	510067	Resistor—carbon 47,000 Ohms ¼ watt
23-A, B	506206	Volume control 500,000 Ohms (with switch)
26	510096	Resistor—carbon 6.8 Meg. ¼ watt
28	510079	Resistor—carbon 220,000 Ohms ¼ watt
30	510085	Resistor—carbon 470,000 Ohms ¼ watt
31	510123	Resistor—carbon 180 Ohms ½ watt ± 10%
32	510137	Resistor—carbon 1000 Ohms ½ watt
37	510210	Resistor—carbon 33 Ohms 1 watt
39	510617	Resistor—wire wound 82 Ohms 2 watt ± 10%

DIAGRAM NO.	PART NO.	DESCRIPTION
		COILS & TRANSFORMERS
12	506208	Loop antenna
15	506226	Coil—oscillator
19	506209	Transformer—1st I.F.
21	506210	Transformer—2nd I.F.
35	506221	Transformer—output
		OTHER ELECTRICAL PARTS
36	506212	Speaker—P.M. dynamic (4")
40	118921	Lamp dial (Mazda No. 47) 6-8 V. 150 Ma.
		MISCELLANEOUS PARTS
	505165	"C" washer—for tuning shaft
	506228	Cabinet
	114955	Clip—retainer on end of dial cord
	506230	Clip—retains cabinet back to chassis
	500497	Clip—retains cabinet back to cabinet
	117057	Cord—dial drive (4 ft. required)
	506216	Dial scale
	506218	Diffuser—light
	506215	Knob
	506217	Pointer
	119087	Ring for dial cord
	170162	Screw—#8-32 x ⅜" retains chassis
	506207	Shaft—tuning
	506211	Socket—dial light (with leads)
	116690	Socket—octal base
	506220	Socket—octal (rectifier)
	161384	Spring—dial cord tension

MODEL 4-A-10 LATE THE FIRESTONE TIRE & RUBBER CO.

SPECIFICATIONS

TUBE COMPLEMENT

12SA7	1st Det. — Osc.
12SK7	I. F. Amplifier
12SQ7	2nd Det. — A.V.C. — 1st A.F.
35L6GT	Power output
35Z5GT	Rectifier

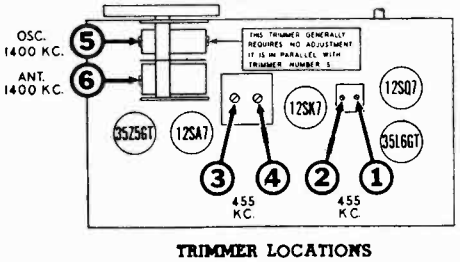
CABINET DIMENSIONS	10-5/8" x 7-1/16" x 6-21/32"
WEIGHT	6 pounds 8 ounces
POWER SUPPLY	105 to 125 volts AC-DC
FREQUENCY RANGE	540 to 1600 KC.
I. F. FREQUENCY	455 KC.
SPEAKER	4 inch P-M Dynamic
VOICE COIL IMPEDANCE	3.2 ohms
POWER OUTPUT	Undistorted — 0.8 watts Maximum — 1.2 watts

ALIGNMENT PROCEDURE

1. Remove chassis and loop antenna (on cabinet back) from cabinet—allow loop to remain attached to chassis.
2. With the gang condenser fully meshed, dial pointer should be in the position indicated by the last division below 55 on the dial. If it is incorrectly, release pointer clip on dial cord and reposition pointer.
3. Couple the signal generator to the receiver by connecting its output to several turns of wire formed in a circular shape so that it may be placed adjacent and parallel to the receiver loop antenna.
4. Connect an output meter across the speaker voice coil or from the plate of the 35L6GT tube to B— through a 0.1 Mfd. condenser.
5. Set volume control at maximum volume position and use a weak signal from the signal generator.

DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER OR SLUG NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
None	Connect directly to coupling turn as instructed in Step 3 above.	455 KC	Any point where it does not affect the signal.	1-2	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
				3-4	1st I.F.	
None	Connect directly to coupling turn as instructed in Step 3 above.	1400 KC	1400 KC	5	Broadcast Oscillator	Adjust for maximum output.
None	Connect directly to coupling turn as instructed in Step 3 above.	1400 KC	Tune to 1400 KC generator signal	6	Broadcast Antenna	Adjust for maximum output.

TOP VIEW OF CHASSIS

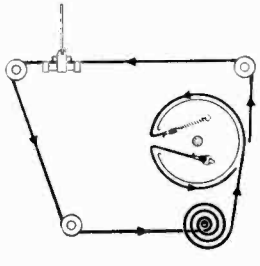


TRIMMER LOCATIONS

DIAL AND POINTER DRIVE CORD ARRANGEMENT

To string dial cord, turn the main drive drum to maximum counter - clockwise position and use following parts:

114955 Clip on end of cord
117057 Cord (4 feet)
119087 Ring for dial cord
161384 Tension Spring

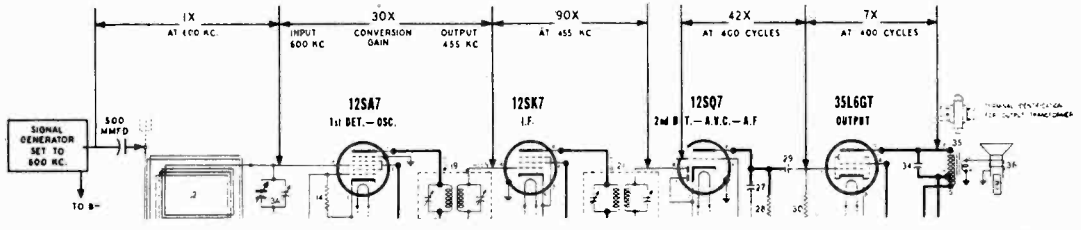


STAGE GAIN MEASUREMENT PROCEDURE

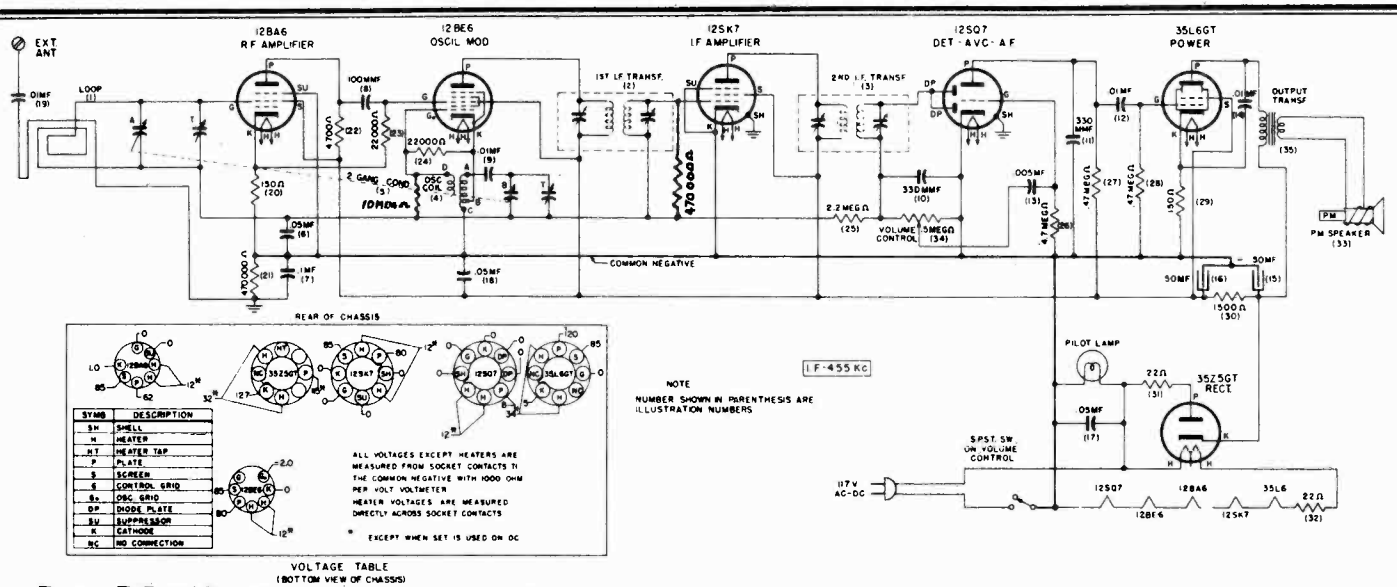
REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver may be measured with an A.C. Vacuum Tube Voltmeter or a "channel" type instrument containing a tuned and calibrated amplifier.

PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F. and I.F. stages are carefully and accurately aligned by utilizing the alignment procedure given above.
2. Connect Signal Generator as shown below.
3. The values of stage gain which are given here were measured with a fixed bias of 3 volts on the control grids of all R.F. and I.F. tubes which are connected to the A.V.C. circuit. Therefore, these values are not intended to indicate the full capability of a stage but they will serve as a convenient basis for determining proper operation. In order to duplicate the fixed bias voltage, connect the negative terminal of a 3 volt battery to A.V.C. at terminal "C" of the oscillator coil and connect the positive battery lead to B— in receiver chassis.
4. Set Signal Generator for operation at 600 Kc with 400 cycle modulation and carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
5. R.F. and I.F. circuits are slightly de-tuned when contact is made with an instrument probe and this action, which is indicated by a change in the output meter reading, may seriously affect the gain measurement. Therefore, it is important to adjust the associated circuit trimmer for a maximum output meter reading and to set the input signal level to a convenient reference point on the gain measuring instrument while the probe is making contact. After removing the probe it is again necessary to adjust the trimmer so as to obtain the same output meter reading and thereby assure that the signal voltage at the specified point has not changed as a result of circuit de-tuning.
6. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.

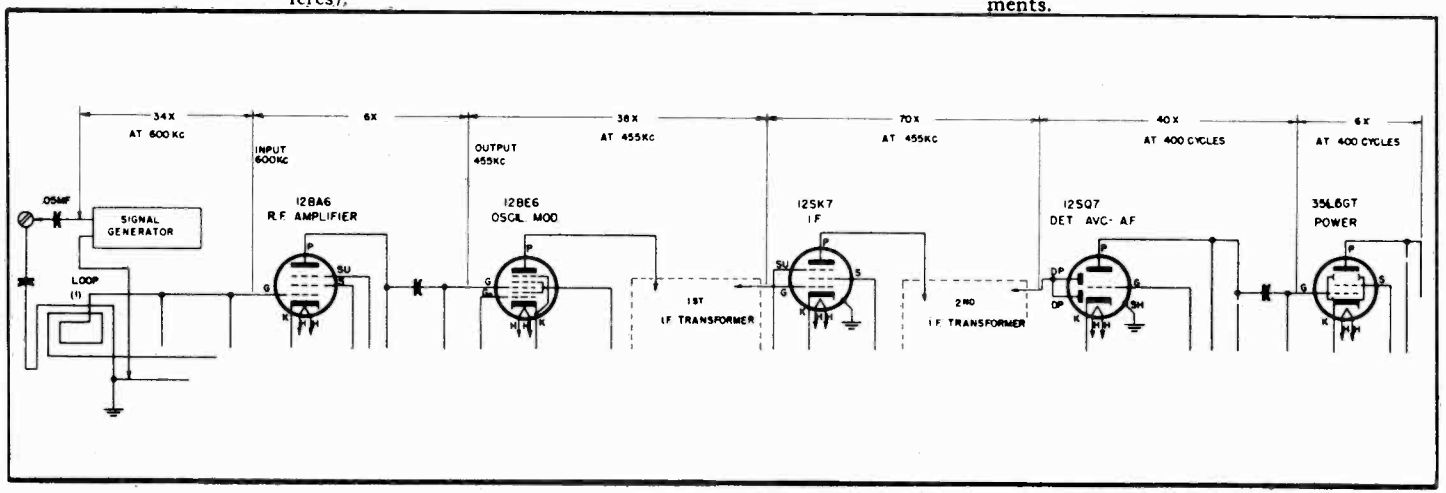


DIFFERENCES in tube characteristics, torelance of parts, adjustment of tuned circuits and variations in line voltage will influence stage gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.



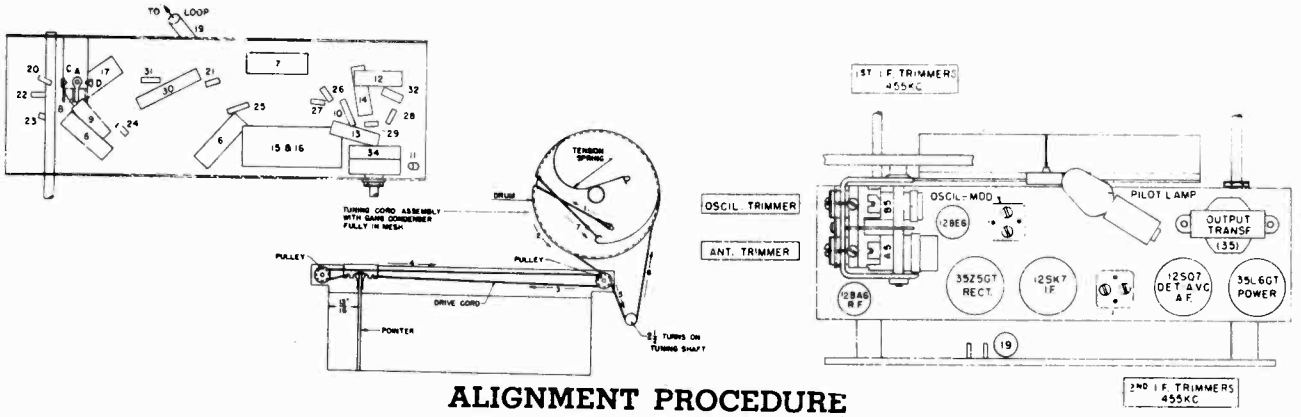
Be sure R-F and I-F stages are accurately aligned before measuring gain. R-F gains can be measured with a "channel" type instrument containing a tuned and calibrated R-F amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC signal with 400 cycle modulation (use nearby frequency if local station interferes).
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning).
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

MODEL 4-A-11 THE FIRESTONE TIRE & RUBBER CO.



ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly $\frac{1}{16}$" from edge of dial plate. If dial needle does not have this position, move to correct one.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

Steps	Set receiver dial to:	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD condenser	High side to rear stator plates of tuning condenser. Low side to B minus.	Adjust each of the second I-F transformer trimmers for maximum output—then adjust each of the first I-F trimmers for maximum output.
2	Minimum Capacity	Exactly 1620 K. C.	.00025 MFD condenser	Antenna terminal. Receiver chassis.	Adjust 1620 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	Antenna terminal. Receiver chassis.	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.

PARTS LIST

Ill. No.	Part No.	Part Name	Description
1	RAB-064	Antenna	Loop and back of cabinet.
2	RTL-075	Coil	1st I-F transformer
3	RTL-051	Coil	2nd I-F transformer
4	RLC-058	Coil	Oscillator coil
5	RCT-027	Condenser	Tuning, two gang
6, 18	UCC-028	Condenser	Tubular, .05 Mfd. 400V.
7	UCC-030	Condenser	Tubular, .1 Mfd. 400V.
8	UCU-028	Condenser	Tubular, .0001 Mfd. 500V.
9, 12, 19	UCC-025	Condenser	Tubular, .01 Mfd. 400V.
10, 11	UCU-040	Condenser	Mica, .00033 Mfd.
13	UCC-022	Condenser	Tubular, .005 Mfd. 400V.
14	UCC-040	Condenser	Tubular, .01 Mfd. 600V.
15, 16	RCE-050	Condenser	Dry Elec. 2 x 50 Mfd. 150V.
17	UCC-045	Condenser	Tubular, .05 Mfd. 600V.

Ill. No.	Part No.	Part Name	Description
20, 29	URD-029	Resistor	Carbon, 150 Ohm ½W.
21, 27, 28	URD-113	Resistor	Carbon, 470000 Ohm ½W.
22	URD-065	Resistor	Carbon, 4700 Ohm ½W.
23, 24	URD-081	Resistor	Carbon, 22000 Ohm ½W.
25	URD-129	Resistor	Carbon, 2.2 Megohm ½W.
26	URD-137	Resistor	Carbon, 4.7 Megohm ½W.
30	URF-053	Resistor	Carbon, 1500 Ohm 2W.
31	URD-089	Resistor	Carbon, 22 Ohm ½W.
32	URE-009	Resistor	Carbon, 22 Ohm 1W.
33	UOP-420	Speaker	4 inch speaker.
34	RRC-063	Volume Control	With S.P.S.T. Switch.
35	RTO-039	Transformer	Output Transformer for speaker
	URD-145	Resistor	Carbon, 10 Megohm ½W
	URD-113	Resistor	Carbon, 470000 Ohm ½W

MISCELLANEOUS PARTS

RAU-027 CABINET—Plastic cabinet

RDC-032 CORD—Dial cord

RAX-022 DIAL PLATE ASSEMBLY—Dial back plate assembly

RDS-057 DIAL SCALE—Calibrated scale

RMU-038 DIAL SHAFT—Drive shaft

RDP-037 DIAL POINTER—Dial indicator

RMS-119 DIAL SPRING—Tension spring for drive cord

RDK-115 KNOB

RJS-001 PILOT LAMP SOCKET

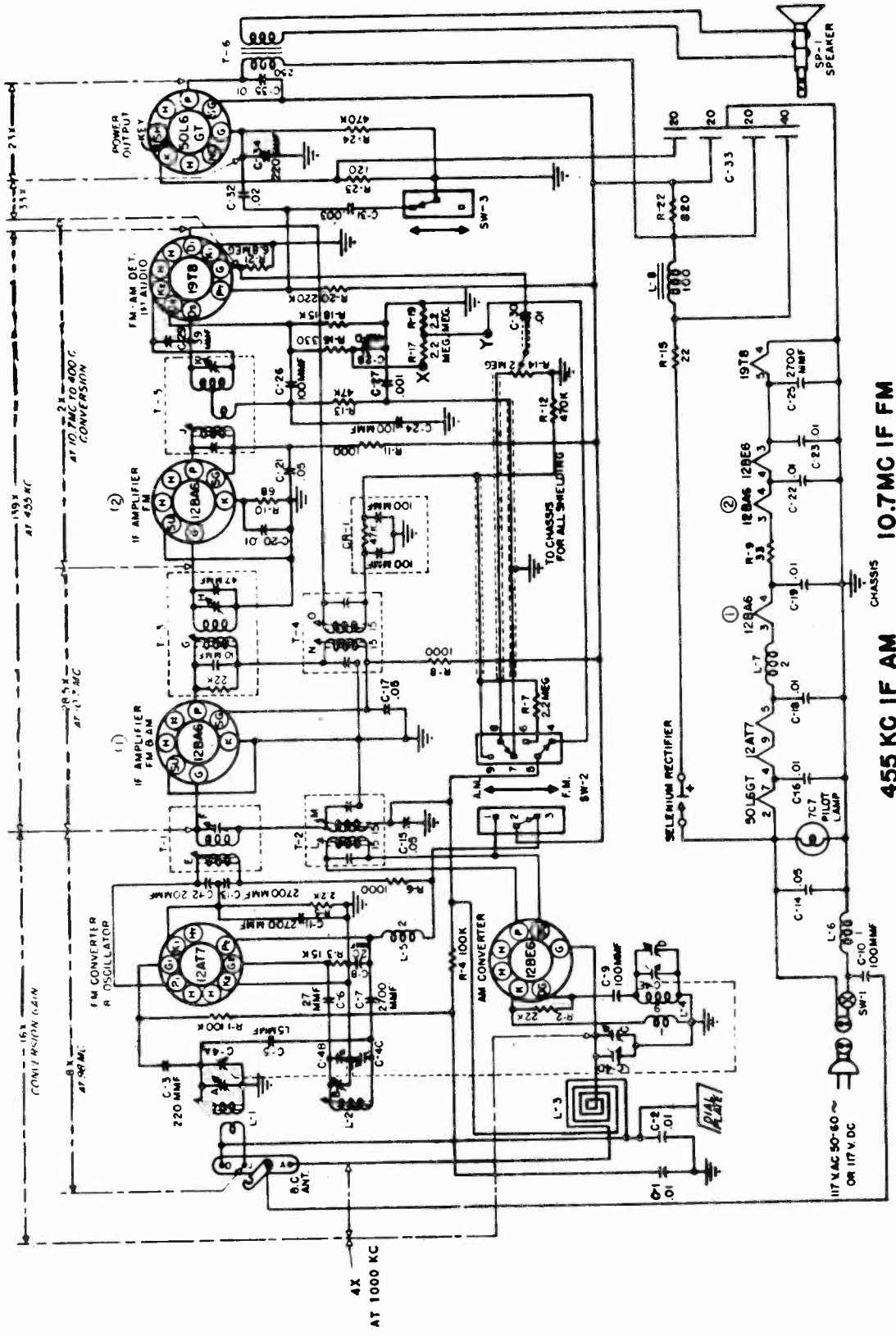
RMW-015 PULLEY—Dial drive pulley

RWL-017 POWER CORD

RJS-006 TUBE SOCKET

RJS-100 TUBE SOCKET—Miniature

THE FIRESTONE TIRE & RUBBER CO. MODEL 4-A-12, THE NARRATOR



MODEL 4-A-12,
THE NARRATOR

THE FIRESTONE TIRE & RUBBER CO.

ALIGNMENT PROCEDURE

The chassis and loop should remain in their normal position in the cabinet when making loop adjustment. With the gang condenser fully meshed, the dial pointer should be in the position indicated by the last division below 55 on the dial. If it is set incorrectly, slide the pointer along the dial cord to correct position.

Connect an output meter across the speaker voice coil. Connect the ground side of signal generator to B—. Set the volume control at maximum volume position and use a weak signal from the signal generator.

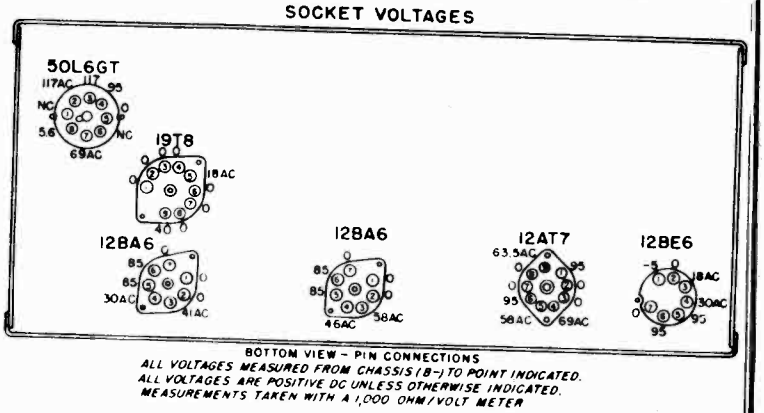
CAUTION: The chassis of this receiver is connected directly to one side of the line. Use an isolation transformer between the 117-volt AC line and AC input to the radio to avoid shock.

Step No.	Band Switch Position	SIGNAL GENERATOR Frequency	SIGNAL GENERATOR Type of Modulation	Dummy Antenna	Connect High Side of Signal Generator to	Radio Dial Setting	Trimmer Letter	Trimmer Description	Type of Adjustment
1	AM	455 kc	30% AM	0.1 mfd. Condenser	12BE6 Grid Pin No. 7	Any position where it does not affect the signal.	N - O L - M	2nd IF 1st IF	Adjust for maximum output, then repeat adjustment.
2	AM	1620 kc	30% AM	0.1 mfd. Condenser	12BE6 Grid Pin No. 7	Gang condenser completely out of mesh.	D	Oscillator	Adjust for maximum output.
3	AM	1400 kc	30% AM	RMA Loop		Tuned to 1400 kc generator signal.	C	Loop Antenna	Adjust for maximum output.
4	FM	10.7 mc	CW	0.1 mfd. Condenser	12BA6 Driver Grid Pin No. 1	High frequency end.	J	Ratio Detector Primary	Adjust for maximum AVC between Point X on wiring diagram and chassis, using Electronic Voltmeter. (See Note 1.)
5	FM	10.7 mc	CW	0.1 mfd. Condenser	12BA6 Driver Grid Pin No. 1	High frequency end.	K	Ratio Detector Secondary	See Note 1. Adjust for zero position (using Electronic Voltmeter) from point "Y" on the wiring diagram to the top of the volume control.
6	FM	10.7 mc	CW	0.1 mfd.	12AT7 Grid Pin No. 7	High frequency end.	G - H E - F	2nd IF 1st IF	Adjust for maximum AVC. (See Note 1.)
7	FM	108.5 mc	30% FM	300 ohm Carbon resistor	Antenna Terminal J with jumper disconnected.	High frequency end.	B	FM Oscillator	Adjust for maximum output. (See Note 2.)
8	FM	87.5 mc	30% FM	300 ohm Carbon resistor	Antenna Terminal J with jumper disconnected.	Low frequency end.	L_2	FM Oscillator	Adjust for maximum output. (See Note 2.)
9	FM	108 mc	30% FM	300 ohm Carbon resistor	Antenna Terminal J with jumper disconnected.	Tuned to 108 mc generator signal.	A	FM Antenna	Adjust for maximum output. (See Note 2.)
10	FM	87 mc	30% FM	300 ohm Carbon resistor	Antenna Terminal J with jumper disconnected.	Tune to 87 mc generator signal.	L_1	FM Antenna	Adjust for maximum output. (See Note 2.)
11	Repeat operations 9 and 10 if an appreciable change is made in the adjustment of L_1.								

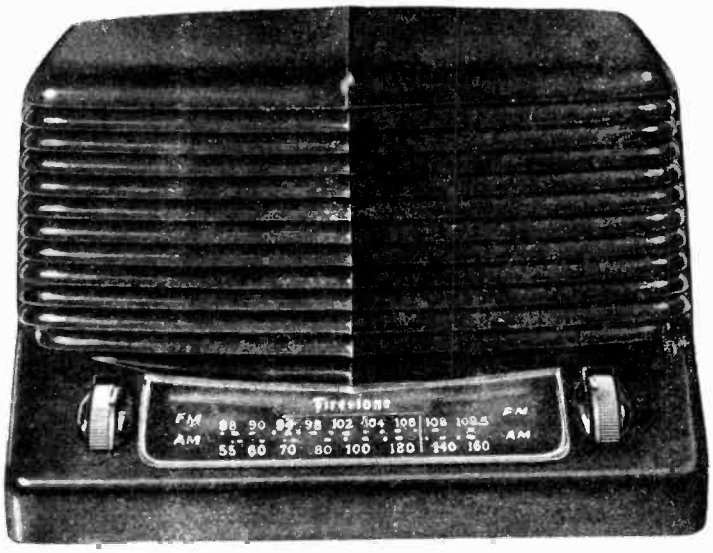
NOTE 1—Adjust input voltage to give approximately 4 volts AVC before final adjustment is made. For steps 4 and 6—Voltmeter common lead to chassis. For step 5—Voltmeter common lead to point "Y" on wiring diagram. The desired zero position is at the point where the meter indicates a polarity change from plus to minus or vice versa.

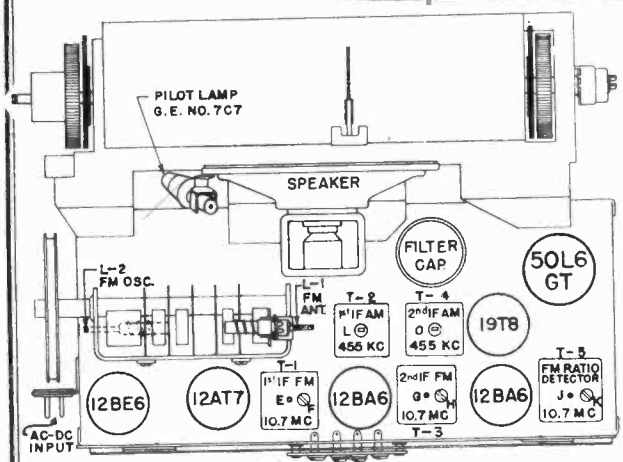
NOTE 2—For all tests requiring an FM signal, the generator output (22.5 kc deviation, 400 cycles) must be adjusted to give approximately 50 milliwatts receiver output before final adjustments are made.

SOCKET VOLTAGES: Measured with voltmeter having sensitivity of 1000 ohms per volt. Tone control in treble position. Volume on full with no signal. 117 volt, 60 cycle AC power input. All voltages measured from chassis (B-) to points indicated. Voltage measurements are positive DC unless otherwise indicated.

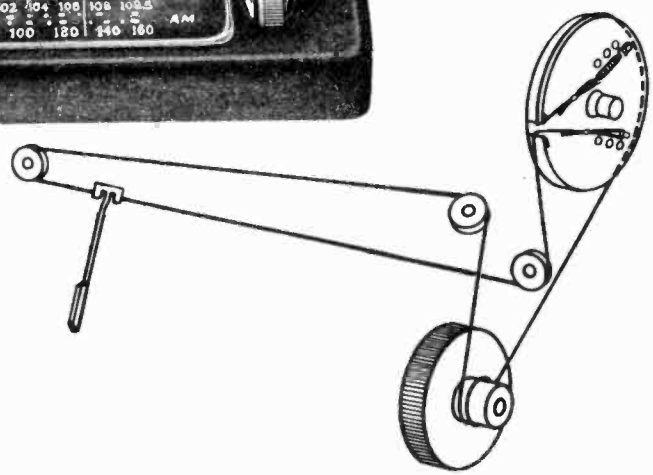


THE FIRESTONE TIRE & RUBBER CO. MODEL 4-A-12, THE NARRATOR



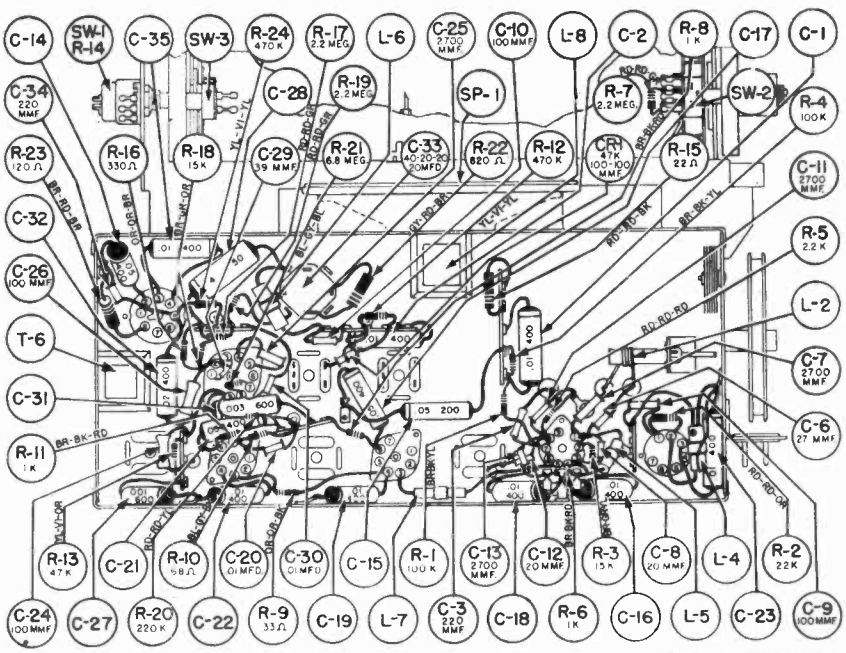


SIDE VIEW OF VARIABLE CAPACITOR



DRIVE CABLE ARRANGEMENT: To string dial cable, set the gang condenser to fully meshed position. Use the following parts for assembly:

B-55402-2	Cable Assembly
A-51787	Spring, Cable
B-59580	Pointer Assembly



STAGE GAIN DATA

Be sure RF and IF stages are accurately aligned before measuring gain. RF gains can be measured with a "channel" type instrument containing a tuned and calibrated RF amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe the following precautions:

1. For all gain measurements, use 1000 KC signal with 400 cycle modulation (use nearby frequency if local station interferes).
2. Be sure radio is carefully tuned to generator signal. (Use weak signal for sharp tuning.)
3. When using a "channel" type instrument, carefully tune it for maximum output at the desired frequency before making measurements.

Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain masurements.

FREQUENCY RANGE:

540-1600 KC (AM)
88-108 MC (FM)

POWER SUPPLY:

105-125 volts
50-60 cycles AC or
105-125 volts DC
38 watts

SPEAKER:

5-inch PM
Voice coil impedance—
3.2 ohms at 400 cycles

TUNING CONDENSER:

5-section gang

POWER OUTPUT:

Undistorted—1.0 watt
Maximum—2.0 watts

TUBE COMPLEMENT:

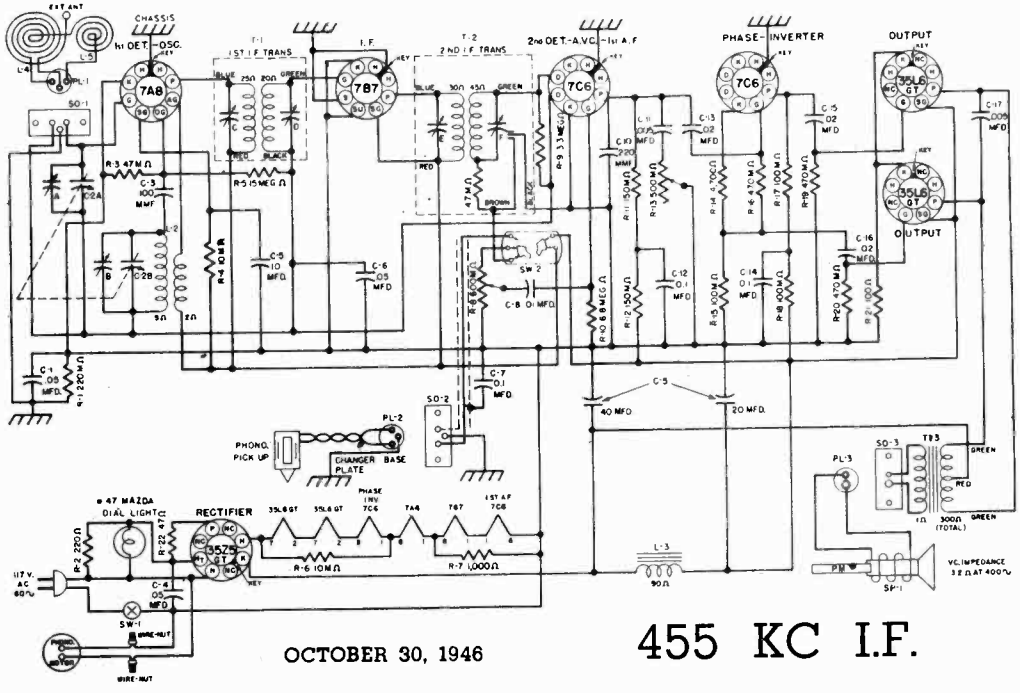
12AT7—FM Conv. and Osc.
12BE6—AM Converter
12BA6—I. F. Amplifier (FM-AM)
12BA6—I. F. Amplifier (FM)
19T8—Detector—1st Audio
50L6GT—Power Output

Symbol	Part No.	DESCRIPTION
		CAPACITORS
C-1, 2, 16, 18, 19, 22, 23, 35	BD410103	Capacitor, Paper, .01 Mfd., 400 volt
C-3	B-58810-8	Capacitor, Ceramic 220 mmf., ±20%
C-4A, B, C, D, E	C-59663-1	Capacitor, Variable (5-Section)
C-5	B-51839-3	Capacitor, 1.5 mmf., ±20%
C-6	B-58808-2	Capacitor, Ceramic 27 mmf., ±20%
C-7, 11, 13, 25	B-58815-6	Capacitor, Ceramic 2700 mmf., ±20%
C-8	B-58807-12	Capacitor, Ceramic 20 mmf., ±10%
C-9	B-58809-16	Capacitor, Ceramic 100 mmf., ±20%
C-10	B-58804-18	Capacitor, Ceramic 100 mmf., ±20%
C-12		Capacitor, 20 mmf. (Part of T-11)
C-14, 17, 21	BD410503	Capacitor, Paper .05 Mfd., 400 volt
C-15	BD210503	Capacitor, Paper .05 Mfd., 200 volt
C-20, 30	B-58814-2	Capacitor, Ceramic .01 Mfd., ±20%
C-24, 26	B-58813-18	Capacitor, Ceramic 100 mmf., ±10%
C-27	BD610102	Capacitor, Paper .001 Mfd., 600 volt
C-28	B-55520-3	Capacitor, Electro., 4 Mfd., 50 volt
C-29	B-58805-6	Capacitor, Ceramic 39 mmf., ±10%
C-31	BD610302	Capacitor, Paper .003 Mfd., 600 volt
C-32	BD410203	Capacitor, Paper .02 Mfd., 400 volt
C-33	A-55521	Capacitor, Electro., 40-20-20 Mfd., 150 volt, 20 Mfd., 25 volt
C-34	B-58812-5	Capacitor, Ceramic 220 mmf., ±20%
CR-1	B-58852-1	Capristor, 100-100 mmf., 47K ohms ½ watt
		RESISTORS
R-1, 4	BR17B104	Resistor, 100K ohms, ±20% ⅓ watt
R-2	BR17B223	Resistor, 22K ohms, ±20% ⅓ watt
R-3	BR17B153	Resistor, 15K ohms, ±20% ⅓ watt
R-5	BR17B222	Resistor, 2.2K ohms, ±20% ⅓ watt
R-6, 8, 11	BR17B102	Resistor, 1000 ohms, ±20% ⅓ watt
R-7, 17, 19	BR17B225	Resistor, 2.2 meg., ±20% ⅓ watt
R-9	BR17E330	Resistor, 33 ohms, ±20% 1 watt
R-10	BR17B680	Resistor, 68 ohms, ±20% ⅓ watt
R-12, 24	BR17B474	Resistor, 470K ohms, ±20% ⅓ watt
R-13	BR17B473	Resistor, 47K ohms, ±20% ⅓ watt
R-14	B-55585-1	Control, 2 meg. (Vol. & Sw.)
R-15	BR17E220	Resistor, 22 ohms, ±20% 1 watt
R-16	BR16B331	Resistor, 330 ohms, ±10% ⅓ watt
R-18	BR16B153	Resistor, 15K ohms, ±10% ⅓ watt
R-20	BR17B224	Resistor, 220K ohms, ±20% ⅓ watt
R-21	BR17B685	Resistor, 6.8 meg., ±20% ⅓ watt
R-22	BR16E821	Resistor, 820 ohms, ±10% 1 watt
R-23	BR16E121	Resistor, 120 ohms, ±10% 1 watt

Symbol	Part No.	DESCRIPTION
		COILS AND TRANSFORMERS
L-1	B-59692	Coil Assy., FM Ant.
L-2	B-59693	Coil Assy., FM Osc.
L-3	D-59681	Coil Assy., Loop
L-4	B-57842	Coil Assy., AM Osc.
L-5	B-59572	Coil Assy., RF Choke
L-6	B-57931	Coil Assy., RF Choke
L-7	B-57931	Coil Assy., RF Choke
L-8	B-51726-1	Choke, Filter
T-1	B-59665-1	Trans. Assy., 1st I.F. FM
T-2	C-59694	Trans. Assy., 1st I.F. AM
T-3	B-59680-1	Trans. Assy., 2nd I.F. FM
T-4	C-59564	Trans. Assy., 2nd IF. AM
T-5	B-59695-1	Trans. Assy., Ratio Det.
T-6	C-59563-1	Transformer, Output
		MISCELLANEOUS PARTS
	C-59560	Back-Cabinet Assembly
	C-59688	Back
	D-58069-1	Cord Assembly
	B-59561	Insulator
	B-59559-1	Pin, Guide
	A-5243	Socket, 2-Prong
	A-55447	Socket, Shell and Bracket Assembly
	E-59660-1	Cabinet, Plastic
	A-55451-1	Clip, Tube Hold-Down
	B-55380-2	Clip, Tuning Knob Retainer
	A-51163	Clip, Tuning Shaft Retainer
	D-59671-1	Dial, Crystal Plastic
	B-55121-2	Fastener, for Loop Back
	A-59672	Insulator, Chassis Mounting
	C-59658-1	Knob, Tuning Control
	C-59659-1	Knob, Volume Control
	A-55431	Lamp, Pilot G.E. No. 7C7
	B-59580	Pointer Assembly Dial
	B-58069-1	Power Cord
	A-58612	Rectifier, Selenium
	B-55440-2	Socket, Dial Lamp (with Leads)
SP-1	D-59657	Speaker, 5-inch P.M.
	A-51787	Spring, Dial Cable Tension
	B-55122-1	Stud, Cabinet Back Mounting
SW-1		Switch (Part of R-14)
SW-2	A-55506	Switch, Band (2-Position)
	A-55507	Switch, Tone Control

MODEL 4-A-17

THE FIRESTONE TIRE & RUBBER CO.



OCTOBER 30, 1946

455 KC I.F.

ALL SOCKETS AND PLUGS SHOWN FROM PIN END VIEW
ALL SWITCHES SHOWN IN COUNTERCLOCKWISE POSITION, SHAFT END VIEW

SYMBOL	PART NO.	DESCRIPTION
		CAPACITORS
C-1	BD410503	Capacitor—.05 Mfd., 400 volt
C-2A, B	C-57243-1	Capacitor—Variable gang
C-3	BM74A101	Capacitor—Mica 100 Mmfd. ± 20%
C-4	BD410503	Capacitor—.05 Mfd., 400 volt
C-5	A-56154	Capacitor—Electrolytic 40-20-10 Mfd., 150 volt.
C-6	BD210503	Capacitor—.05 Mfd., 200 volt
C-7	BD410104	Capacitor—0.1 Mfd., 400 volt
C-8	BD410103	Capacitor—.01 Mfd., 400 volt
C-10	BM74A221	Capacitor—Mica 220 Mmfd. ± 20%
C-11	BD610302	Capacitor—.005 Mfd., 600 volt
C-12	BD410104	Capacitor—0-1 Mfd., 400 volt
C-13	BD410203	Capacitor—.02 Mfd., 400 volt
C-14	BD410104	Capacitor—0.1 Mfd., 400 volt
C-15	BD410203	Capacitor—.02 Mfd., 400 volt
C-16	BD410203	Capacitor—.02 Mfd., 400 volt
C-17	BD610502	Capacitor—.005 Mfd., 600 volt
		RESISTORS
R-1	BR17B224	Resistor—Carbon, 220,000 Ohms, 1/3 watt
R-2	BR17C221	Resistor—Carbon, 220 Ohms, 1/2 watt
R-3	BR17B473	Resistor—Carbon, 47,000 Ohms, 1/3 watt
R-4	BR17B103	Resistor—Carbon, 10,000 Ohms, 1/3 watt
R-5	BR17B156	Resistor—Carbon, 15 Meg., 1/3 watt
R-6	BR17E103	Resistor—Carbon, 10,000 Ohms, 1 watt
R-7	BR17B102	Resistor—Carbon, 1,000 Ohms, 1/3 watt
R-8	B-56142-1	Control—Dual Potentiometer, with switch 500,000 Ohms, (V. C.)
R-9	BR17B335	Resistor—Carbon, 3.3 Meg., 1/3 watt
R-10	BR17B685	Resistor—Carbon, 6.8 Meg., 1/3 watt
R-11	BR17B154	Resistor—Carbon, 150,000 Ohms, 1/3 watt
R-12	BR17B154	Resistor—Carbon, 150,000 Ohms, 1/3 watt
R-13	B-56142-1	Control—500,000 Ohms, (T. C.) part of R-8
R-14	BR17B472	Resistor—Carbon, 4,700 Ohms, 1/3 watt
R-15	BR17B104	Resistor—Carbon, 100,000 Ohms, 1/3 watt
R-16	BR17B474	Resistor—Carbon, 470,000 Ohms, 1/3 watt
R-17	BR17B104	Resistor—Carbon, 100,000 Ohms, 1/3 watt
R-18	BR17B104	Resistor—Carbon, 100,000 Ohms 1/3 watt
R-19	BR17B474	Resistor—Carbon, 470,000 Ohms, 1/3 watt
R-20	BR17B474	Resistor—Carbon, 470,000 Ohms, 1/3 watt
R-21	BR16C101	Resistor—Carbon, 100 Ohms, ± 10% 1/2 watt
R-22	BR17G470	Resistor—Carbon, 47 Ohms ± 20% 2 watt

SYMBOL	PART NO.	DESCRIPTION
		COILS AND TRANSFORMERS
L-4, 5	D-57259	Loop Antenna assembly
L-2	B-56143	Coil—Oscillator assembly
L-3	B-51726-1	Filter Choke, 80 ma.
T-1	B-51010-3	Transformer—1st I.F.
T-2	B-51011-3	Transformer—2nd I.F.
T-3	B-57253-1	Transformer—Output
		OTHER ELECTRICAL PARTS
SW-1		Switch—power part of R-8 and R-13
SW-2	B-56156-1	Switch—Radio-Phono
SP-1	C-57272	Speaker—6" x 9" Permanent Magnet
	A-6158	Lamp—Dial Mazda No. 47
		MISCELLANEOUS PARTS
	B-57275-1	Background for dial
	A-54848	Bushing—Strain relief (power cord)
	A-56155	Bushing—Tuning control shaft
	E-57270-1	Cabinet
	B-51330-1	Channel rubber—mtg. for Dial scale
	B-55402-1	Dial Cable assembly (includes clips at end of cable)
	B-57269-1	Dial scale—plastic
	B-51427-2	Grommet—rubber; mtg., for variable gang
	B-51124-1	Knob—Volume & switch, tuning or radio-phono
	B-56138-1	Knob—Tone Control
	BN751V02	Palnut—No. 3/8-32; for mtg., controls
	BN770S02	Palnut—No. 10-24; for mtg., record changer
	A-57271	Plug—3 Prong—Phono pick-up connection
	B-55130-9	Pointer
	B-58069-1	Power Cord
	BP934G02	Screw—No. 4 x 1/2"; for mtg., loop & back
	BP928N02	Screw—No. 8 x 1 1/8"; for mtg., chassis
	BS016S09	Screw—No. 10-24 x 1"; for mtg., record changer
	A-56136	Shaft—tuning control
	A-54726	Socket—octal base
	A-54900	Socket—loctal base
	A-57273	Socket—3 Prong; Phono pick-up & loop antenna
	A-57258	Socket—2 Prong; speaker connection
	A-6182-5	Socket—dial lamp (with leads)
	A-51331	Spring—Mtg., for channel rubbers
	A-51787	Spring—dial cable tension
	A-50147	Spring—conical; for mtg., record changer
	BF13NT05	Washer—flat; for mtg., record changer
	B-50156-1	Washer—rubber; for mtg., record changer
	A-54492	Washer—"C"; tuning shaft
	A-1089	Washer—cup; variable gang mtg.
	B-50964-3	Wirenut—phono motor power connection

1. The chassis, record changer and loop should remain in their normal position in the cabinet when making loop adjustment.
2. With the gang condenser fully meshed, dial pointer should be in the position indicated by the last division below 55 on the dial. If it is set incorrectly, slide pointer along dial cord to correct position.
3. Connect output meter across speaker voice coil.
4. Connect the ground of signal generator to B–.
5. Set volume control at maximum volume position and use a weak signal from the signal generator.
6. Radio-Phono switch in Radio position.

NOTE: For best results, it is advisable to use an isolation transformer between the 117 V. AC line and AC input to receiver.

DUMMY ANT.	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER LETTER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
0.1 Mfd. Condenser	7A8 Grid	455 KC	Any point where it does not affect the signal	F-E D-C	2nd IF 1st IF	Adjust for maximum output. Then repeat adjustment.
0.1 Mfd. Condenser	7A8 Grid	1620 KC	Gang condenser completely out of mesh.	B	Oscillator	Adjust for maximum output.
RMA Loop		1400 KC	Tuned to 1400 kc Generator signal	A	Loop Antenna	Adjust for maximum output.

FREQUENCY RANGE:

540-1600 KC.

POWER SUPPLY

117 volts
60 cycles A.C.
55 watts (including changer)

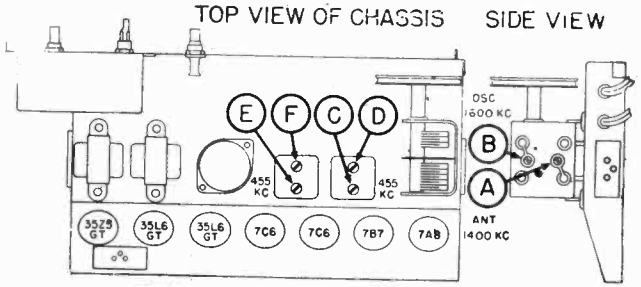
POWER OUTPUT:

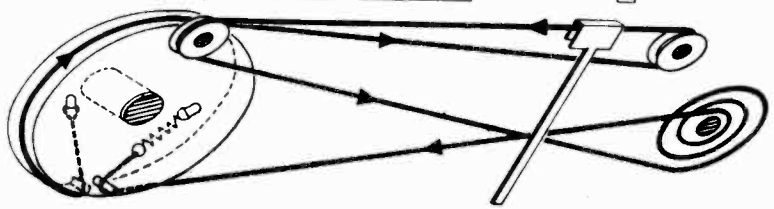
Undistorted—1.6 watts
Maximum —2.2 watts

SPEAKER:

6 x 9 elliptical type PM
Voice coil impedance—
3.2 ohms at 400 cycles

TOP VIEW OF CHASSIS SIDE VIEW





DIAL AND POINTER DRIVE CABLE ARRANGEMENT

To string dial cable, set gang condenser to fully meshed position, using the following parts:

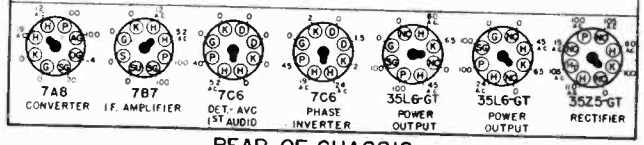
A-51726-1 Spring, cable
B-55402-1 Cable assembly

SOCKET VOLTAGES

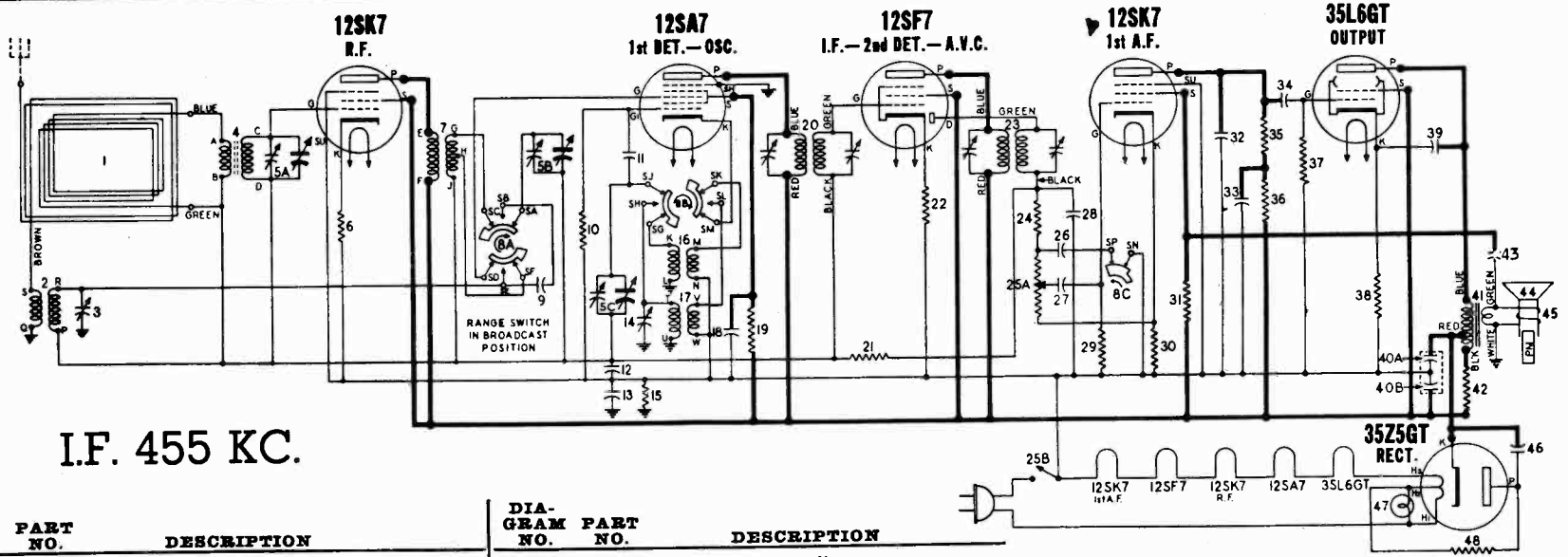
MEASURED WITH VOLTMETER HAVING SENSITIVITY OF 1000 OHMS PER VOLT
TONE CONTROL IN CLOCKWISE POSITION
VOLUME ON FULL WITH NO SIGNAL
RADIO-PHONO SWITCH IN RADIO POSITION
DIAL TUNED TO 540 KC.

BOTTOM VIEW OF CHASSIS

117 VOLT 60 CYCLE A.C. POWER SUPPLY USED FOR THESE MEASUREMENTS.
ALL VOLTAGES MEASURED BETWEEN SOCKET TERMINALS AND CHASSIS.



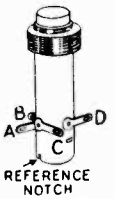
REAR OF CHASSIS



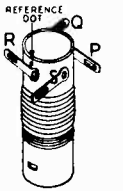
I.F. 455 KC.

DIAGRAM NO.	PART NO.	DESCRIPTION
		CONDENSERS
3	502172	Condenser—trimmer; 25 to 100 Mmfd.
5A-5B-5C	502123	Condenser—variable gang (with drum)
9	502162	Condenser—315 Mmfd. 500 volt
11	502159	Condenser—mica—50 Mmfd. 500 volt
12	502155	Condenser—.1 Mfd. 200 volt
13	502158	Condenser—.2 Mfd. 400 volt
14	502172	Condenser—trimmer; 25 to 100 Mmfd.
18	502262	Condenser—.25 Mfd. 200 volt
26	502470	Condenser—.0008 Mfd. 400 volt
27	502453	Condenser—.002 Mfd. 400 volt
28	502160	Condenser—mica—110 Mmfd. 500 volt
32	502160	Condenser—mica—110 Mmfd. 500 volt
33	502153	Condenser—.05 Mfd. 200 volt
34	502156	Condenser—.004 Mfd. 400 volt
39	502151	Condenser—.01 Mfd. 400 volt
40A-40B	500256	Condenser—electrolytic A-40 Mfd. 150 volt B-20 Mfd. 150 volt
43	502152	Condenser—.02 Mfd. 400 volt
46	502157	Condenser—.05 Mfd. 400 volt
		RESISTORS
6	502140	Resistor—carbon 390 ohms ¼ watt
10	502130	Resistor—carbon 22,000 ohms ¼ watt
15	502133	Resistor—carbon 220,000 ohms ¼ watt
19	502291	Resistor—carbon 4700 ohms ¼ watt
21	502269	Resistor—carbon 3.3 Meg. ¼ watt
22	502264	Resistor—carbon 47 ohms ¼ watt
24	502131	Resistor—carbon 47,000 ohms ¼ watt
25A-25B	502145	Volume control 500,000 ohms (with switch)
29	502136	Resistor—carbon 10 Meg. ¼ watt
30	502128	Resistor—carbon 2200 ohms ¼ watt
31	502135	Resistor—carbon 2.2 Meg. ¼ watt
35-36	502133	Resistor—carbon 220,000 ohms ¼ watt
37	502134	Resistor—carbon 470,000 ohms ¼ watt
38	502138	Resistor—carbon 130 ohms ¼ watt
42	502469	Resistor—carbon 1500 ohms 1 watt
48	502574	Resistor—carbon 33 ohms ½ watt
		COILS & TRANSFORMERS
1	502196	Loop antenna
2	502740	Coil—S. W. antenna
4	502121	Coil—antenna coupling
7	502142	Coil—BC. R.F.
16	502198	Coil—BC. oscillator
17	502197	Coil—S.W. oscillator
20	502102	Transformer—1st I.F.
23	502103	Transformer—2nd I.F.
41	500617 502906	Transformer—output for R-500616 spkr. Transformer—output for A-500616 spkr.
		OTHER ELECTRICAL PARTS
8A-8B-8C	502199	Switch-tone & range
44	500587 502905	Cone and voice coil for R-500616 spkr. Cone and voice coil for A-500616 spkr.
45	500616	Speaker—P.M. dynamic (5 inch)
47	502473	Lamp-dial (Mazda 47) 6-8V. 150 Ma.
		MISCELLANEOUS PARTS
	116467	Base for mtg. electrolytic condenser
	502115	Back for cabinet
	502192	Cabinet
	501732	Clamp—dial scale mtg.
	112745	Clip—coil mtg.
	114955	Clip—retainer on end of dial cord
	116563	Connector—for antenna leads
	117057	Cord—dial drive (57 in. required) per ft.
	500324	Cover—cardboard, for elect. cond.
	502220	Dial scale—glass
	501186	Grounding plate (under I.F. trans. can)
	501778	Knob—volume or tuning
	501779	Knob—tone & band switch
	502367	Pointer
	81145	Retaining ring for tuning shaft
	14771	Screw—No. 6x⅜; holds frame to cab.
	83047	Screw—No. 8x⅞; chassis mtg.
	500734	Screw—No. 4x6/16; holds clamps to cab.
	501777	Screw—No. 4x½; for mtg. loop & back
	502173	Shaft—tuning control
	116690	Socket—octal base
	160392	Socket—octal (rectifier)
	500499	Socket—dial lamp (with leads)
	161384	Spring—dial cord tension
	111456	Washer—spring washer for tuning shaft
	500487	Washer—felt; for knobs

S.W. OSC. COIL 502197

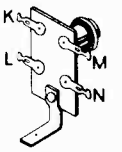


BC. ANTENNA COUPLING COIL 502121

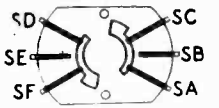


S.W. ANTENNA COIL 502740

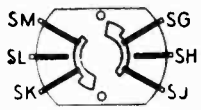
R.F. COIL 502142



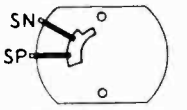
BC. OSC. COIL 502198



REAR DECK FRONT VIEW



FRONT DECK FRONT VIEW



FRONT DECK REAR VIEW

RANGE AND TONE SWITCH 502199

ALIGNMENT PROCEDURE

Remove chassis and loop antenna from cabinet (do not remove loop of wire stapled to cabinet.) After chassis has been removed, replace loop antenna in cabinet. Stand the chassis on one end and space it approximately same distance from loop as when installed in cabinet. Then reconnect all leads to loop antenna and to loop of wire stapled on cabinet.

Note that there are four calibrating lines stamped into the metal dial frame. When gang condenser is fully meshed, dial pointer should be in the position indicated by first line at the left. If it is set incorrectly, release pointer clip on dial cord and reposition pointer.

Connect an output meter across the speaker voice coil or from plate of 35L6GT tube to B— through a .1 Mfd. condenser (see voltage chart for convenient B— connection).

Connect ground lead from signal generator to B— through a .25 Mfd. condenser.

Set volume control at maximum volume position and use a weak signal from the signal generator.

IMPORTANT:—Align this receiver in exactly the order shown below. Broadcast band must be aligned before short wave band.

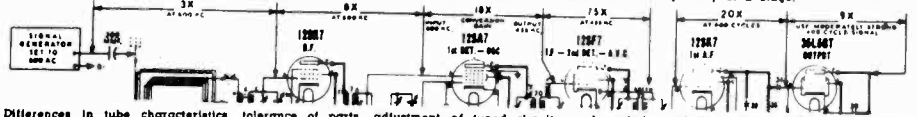
DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	CONNECT HIGH SIDE OF GENERATOR TO	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RECEIVER DIAL SETTING	TRIMMER NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
200 MMFD. Mica Condenser	Control Grid of 12SA7	455 KC	Broadcast	Any point where it does not affect the signal	1-2	2nd I.F.	Adjust for maximum output Then repeat adjustment.
					3-4	1st I.F.	
200 MMFD. Mica Condenser	External Antenna Clip on Loop Frame	1500 KC	Broadcast	Set pointer to 1500 KC reference line stamped into metal dial plate (first line at the right)	5	Broadcast Oscillator (Shunt)	Adjust for maximum output.
200 MMFD. Mica Condenser	External Antenna Clip on Loop Frame	1500 KC	Broadcast	Tune to 1500 KC generator signal	6	Broadcast R.F.	Adjust for maximum output.
200 MMFD. Mica Condenser	External Antenna Clip on Loop Frame	1500 KC	Broadcast	Tune to 1500 KC generator signal	7	Broadcast Antenna	Adjust for maximum output.
400 OHM Resistor	External Antenna Clip on Loop Frame	12 MC	Short Wave	Set pointer to 12 MC. Reference line stamped into metal dial plate (second line from the right)	8	Short Wave Oscillator	Adjust to bring in signal. Check to see if proper peak was obtained by tuning in image at approx. 11.1 MC. If image does not appear, realign at 12 MC. with trimmer screw farther out. Recheck image.
130 OHM Resistor	External Antenna Clip on Loop Frame	12 MC	Short Wave	Tune to 12 MC generator signal	9	Short Wave Antenna	Adjust for maximum output. Try to increase output by detuning trimmer and retuning receiver dial until maximum output is obtained.

APPROXIMATE STAGE GAIN DATA

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. For R.F. and I.F. measurements connect negative terminal of a 3 volt battery (two 1½ volt cells in series) to A.V.C. lead and positive terminal to B—. This provides a definite operating point. IMPORTANT: Disconnect battery when measuring audio stage gains.
3. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
4. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.

The R.F. and I.F. stage gains shown below are less than under normal operating conditions due to the use of 3 volts fixed bias in order to establish a definite operating point. Therefore, these values are not intended to indicate the full capability of a stage.



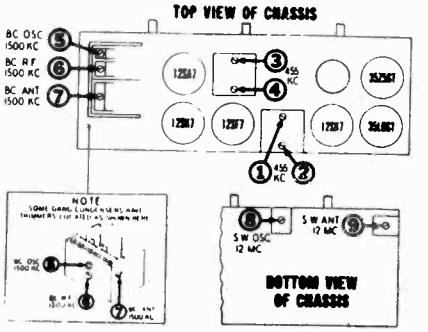
Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

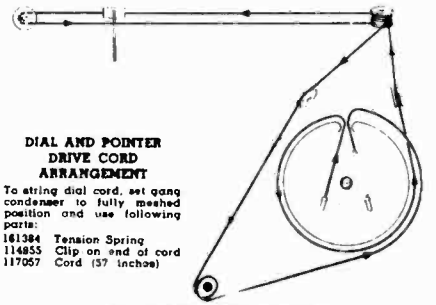
FREQUENCY RANGES:
Standard Broadcast Band } 540-1650 KC.
Short Wave Band } 9-12 MC.

POWER SUPPLY:
117 volts
50-60 cycles A.C. or D.C.
30 watts

POWER OUTPUT:
Undistorted — 1.0 watts
Maximum — 1.6 watts

SPEAKER:
5 inch P-M Dynamic
Voice coil impedance—3.5 ohms





DIAL AND POINTER DRIVE CORD ARRANGEMENT

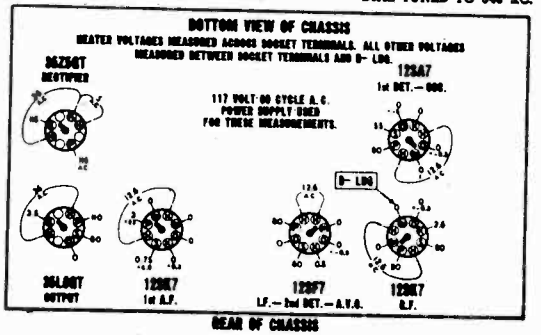
To string dial cord, set gang condenser to fully meshed position and use following parts:

161384 Tension Spring
114855 Clip on end of cord
117057 Cord (57 inches)

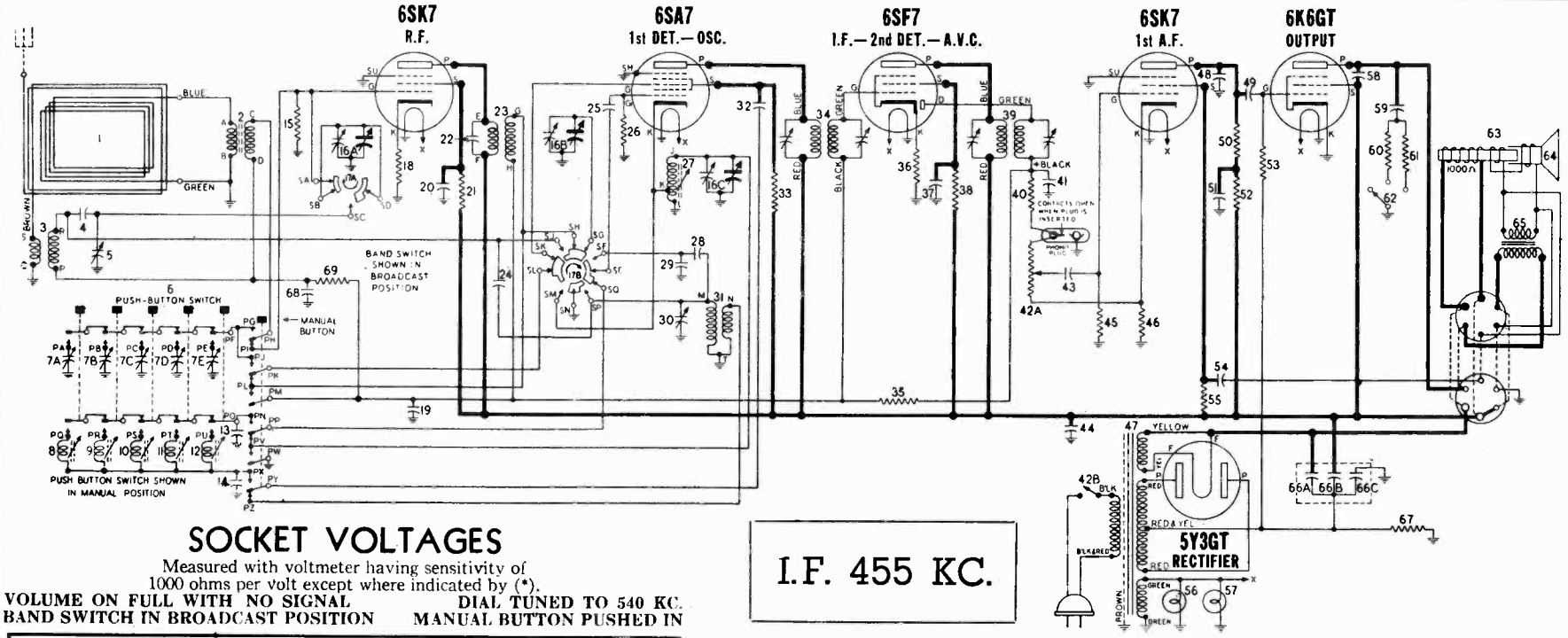
SOCKET VOLTAGES

Measured with voltmeter having sensitivity of 1000 ohms per volt except where indicated by (*).

VOLUME ON FULL WITH NO SIGNAL — DIAL TUNED TO 540 KC.



*—Measured with vacuum tube voltmeter

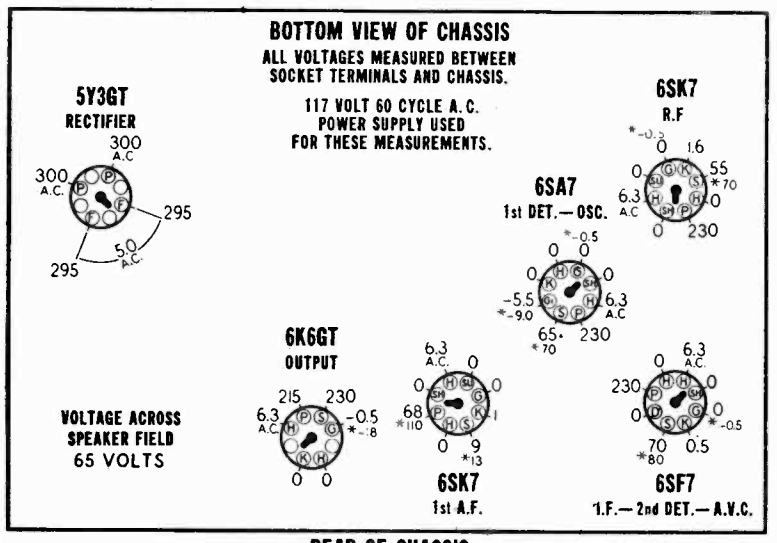


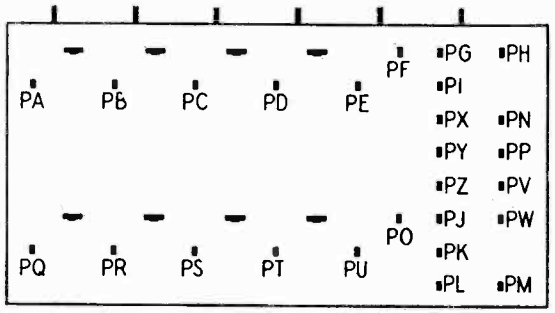
SOCKET VOLTAGES

Measured with voltmeter having sensitivity of 1000 ohms per volt except where indicated by (*).

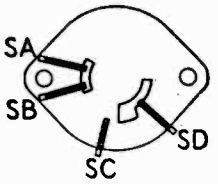
VOLUME ON FULL WITH NO SIGNAL — DIAL TUNED TO 540 KC.
BAND SWITCH IN BROADCAST POSITION — MANUAL BUTTON PUSHED IN

I.F. 455 KC.

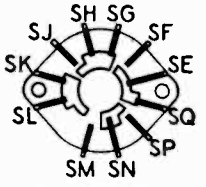




PUSH-BUTTON SWITCH
502177



FRONT SECTION REAR VIEW



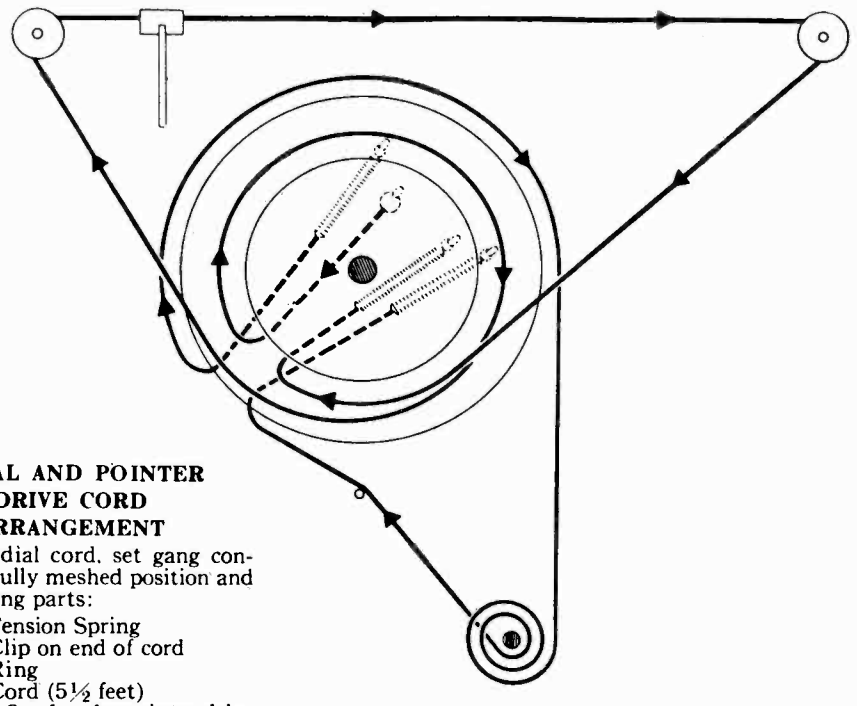
REAR SECTION REAR VIEW

BAND SWITCH
502147

LETTERED TERMINALS IN ILLUSTRATIONS CORRESPOND TO SIMILARLY LETTERED TERMINALS ON THE CIRCUIT DIAGRAM.

NOTE:—The 6K6GT grid bias of — 18 volts can be measured across resistor No. 67.
*—Measured with vacuum tube voltmeter.

Oct. 1, 1946



DIAL AND POINTER DRIVE CORD ARRANGEMENT

To string dial cord, set gang condenser to fully meshed position and use following parts:

113177 Tension Spring
114955 Clip on end of cord
119087 Ring
117057 Cord (5½ feet)
3 feet for pointer drive
2½ feet for tuning drive

POWER SUPPLY:

117 volts
50-60 cycles A.C.
55 watts

POWER OUTPUT:

Undistorted—2.3 watts
Maximum —3.5 watts

SPEAKER:

6 inch Electro-Dynamic
Voice coil impedance—3.5 ohms

BUILT-IN ANTENNA:

Noise reducing
low impedance loop.

FREQUENCY RANGES:

Standard Broadcast Band	540-1725 KC.	Short Wave Band	9-12 MC.

PUSH-BUTTON RANGES:

Button No. 1 —540-1000 KC.
Button No. 2 & 3—650-1300 KC.
Button No. 4 & 5—975-1600 KC.

SETTING-UP THE PUSH-BUTTONS

1. Set band switch to "AM" position and allow set to operate 15 minutes before making adjustments.

2. Note two rows of adjusting screws on back of radio chassis (visible and accessible through opening in cabinet back). Each **vertical pair** of adjusting screws is used to tune in a station for one of the push-buttons. A label under the row of screws specifies the frequency or tuning range that each screw will cover.

3. Select five powerful stations, each of which falls within the frequency range of the adjusting screw to be used to tune in that station.

4. Push in "MANUAL" button and listen to the program of the lowest frequency station you selected.

5. Now push in the first button **on the left,** Return to rear of radio and use vertical pair of adjusting screws **on extreme right** to tune in the same station. Adjust bottom screw first until desired station is heard. If station is not heard, change setting of top screw to a position where the slight static noise or rushing sound is the loudest. Then try adjusting bottom screw again; repeat this procedure until desired station is found. After locating station, carefully set bottom screw for deepest tone and top screw for maximum volume.

6. The set-up of the first push-button is now complete. Use a similar procedure to set-up the remaining buttons.

ALIGNMENT PROCEDURE

1. Remove chassis and loop antenna from cabinet (do not remove loop of wire stapled to cabinet). After chassis has been removed, replace loop antenna in cabinet. Stand the chassis on one end and space it approximately same distance from loop as when installed in cabinet. Then reconnect all leads to loop antenna and to loop of wire stapled on cabinet.

2. With the gang condenser fully meshed, dial pointer should be in the position indicated by the last division below 55 on the dial. If it is set incorrectly, release pointer clip on dial cord and reposition pointer.

3. Connect output meter across speaker voice coil or from plate of 6K6GT tube to chassis through a .1 Mfd. condenser.

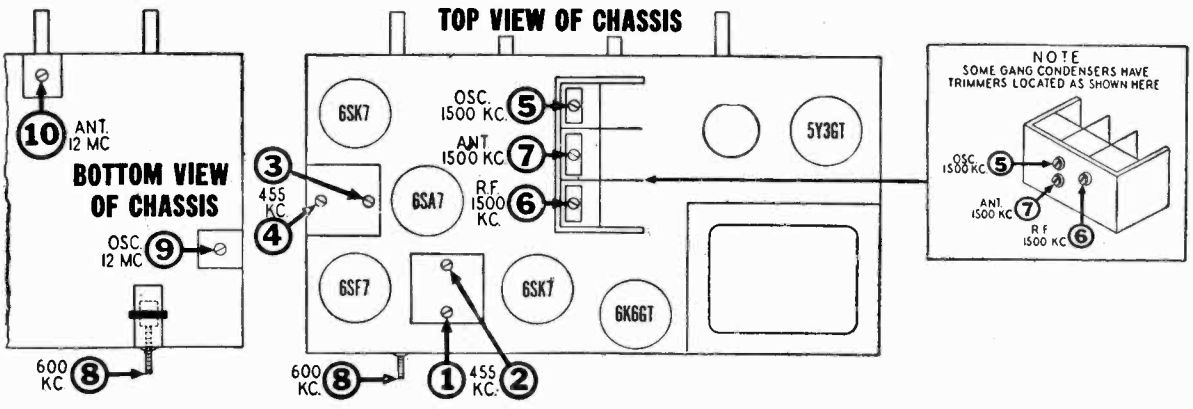
4. Connect the ground lead of the signal generator to the receiver chassis.

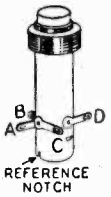
5. Set volume control at maximum volume position and use a weak signal from the signal generator.

6. Push in the manual button and leave it in that position throughout the alignment procedure.

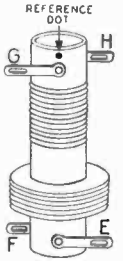
IMPORTANT:—Align this receiver in exactly the order shown below. Broadcast band must be aligned before short wave band.

DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POSITION	RECEIVER DIAL SETTING	TRIMMER NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
.1 MFD. Condenser	Trimmer on rear section of gang	455 KC	Broadcast (Clockwise)	Any point where it does not affect the signal.	1-2 3-4	2nd I.F. 1st I.F.	Adjust for maximum output. Then repeat adjustment.
500 MMFD. Mica Condenser	External Antenna Clip on Loop Frame	1500 KC	Broadcast (Clockwise)	1500 KC	5	Broadcast Oscillator (Shunt)	Adjust for maximum output.
500 MMFD. Mica Condenser	External Antenna Clip on Loop Frame	1500 KC	Broadcast (Clockwise)	Tune to 1500 Kc. generator signal.	6	Broadcast R.F.	Adjust for maximum output.
500 MMFD. Mica Condenser	External Antenna Clip on Loop Frame	1500 KC	Broadcast (Clockwise)	Tune to 1500 Kc. generator signal.	7	Broadcast Antenna	Adjust for maximum output.
500 MMFD. Mica Condenser	External Antenna Clip on Loop Frame	600 KC	Broadcast (Clockwise)	Tune to 600 Kc. generator signal.	8	Adjustable core of Broadcast Oscillator Coil.	Adjust for maximum output. Try to increase output by rotating core in and out and retuning receiver dial until maximum output is obtained.
500 MFD. Mica Condenser	External Antenna Clip on Loop Frame	Repeat adjustment of trimmers 5, 6 and 7 at 1500 Kc. Then re-check adjustment of trimmer 8 at 600 Kc.					
400 OHM Carbon Resistor	External Antenna Clip on Loop Frame	12 MC	Short wave (Counter-Clockwise)	12 MC	9	S.W. Oscillator	Adjust for maximum output. Check to see if proper peak was obtained by tuning in image at approx. 11.1 MC. If image does not appear, realign at 12 MC, with trimmer screw farther out. Recheck image.
400 OHM Carbon Resistor	External Antenna Clip on Loop Frame	12 MC	Short wave (Counter-Clockwise)	Tune to 12 MC. generator signal.	10	S.W. Antenna	Adjust for maximum output. Try to increase output by detuning trimmer and retuning receiver dial until maximum output is obtained.

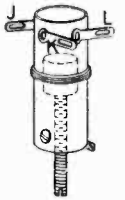




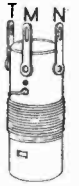
BC. ANTENNA COUPLING COIL 502112



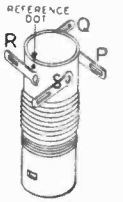
R.F. COIL 502113



BC. OSCILLATOR COIL 502114



S.W. OSCILLATOR COIL 502111



S.W. ANTENNA COIL 502110

Lettered terminals in illustrations correspond to similarly lettered terminals on the circuit diagram.

DIAGRAM NO.	PART NO.	DESCRIPTION
		CONDENSERS
4	502202	Condenser—ceramic 150 Mmfd. 500 volt
5	502172	Condenser—trimmer; 25 to 100 Mmfd
7A to E	502910	Condenser—trimmer assem. for P-B tuner
13	502161	Condenser—mica 270 Mmfd. 500 volt
14	502165	Condenser—mica 1,000 Mmfd. 500 volt
16A, B, C	502122	Condenser—variable gang
19	502155	Condenser—.1 Mfd. 200 volt
20	502157	Condenser—.05 Mfd. 400 volt
22	502295	Condenser—ceramic 10 Mmfd. 500 volt
24	502411	Condenser—2 Mmfd. 500 volt
25	502159	Condenser—mica 50 Mmfd. 500 volt
28	502201	Condenser—ceramic 130 Mmfd. 500 volt
29	502182	Condenser—ceramic 39 Mmfd. 500 volt
30	502171	Condenser—trimmer; 5 to 35 Mmfd.
32	502151	Condenser—.01 Mfd. 400 volt
37	502157	Condenser—.05 Mfd. 400 volt
41	502271	Condenser—mica 260 Mmfd. 500 volt
43	502150	Condenser—.004 Mfd. 600 volt
44	502157	Condenser—.05 Mfd. 400 volt
48	502160	Condenser—mica 110 Mmfd. 500 volt
49	502152	Condenser—.02 Mfd. 400 volt
51	502410	Condenser—.1 Mfd. 400 volt
54	502405	Condenser—.25 Mfd. 400 volt
58	502150	Condenser—.004 Mfd. 600 volt
59	502154	Condenser—.05 Mfd. 600 volt
66A, B, C	502207	Condenser—electrolytic A—20 Mfd. 400 volt B—10 Mfd. 400 volt C—20 Mfd. 25 volt
68	502153	Condenser—.05 Mfd. 200 volt
		RESISTORS
15	502468	Resistor—carbon 4.7 Meg. ¼ watt
18	502125	Resistor—carbon 220 ohms ¼ watt
21	502132	Resistor—carbon 100,000 ohms ¼ watt
26	502130	Resistor—carbon 22,000 ohms ¼ watt
33	502466	Resistor—carbon 33,000 ohms 1 watt
35	502135	Resistor—carbon 2.2 Meg. ¼ watt
36	502264	Resistor—carbon 47 ohms ¼ watt
38	502467	Resistor—carbon 68,000 ohms ½ watt
40	502131	Resistor—carbon 47,000 ohms ¼ watt
42A, B	502148	Volume control 500,000 ohms (with switch)
45	502468	Resistor—carbon 4.7 Meg. ¼ watt
46	502128	Resistor—carbon 2200 ohms ¼ watt
50	502133	Resistor—carbon 220,000 ohms ¼ watt
52	502132	Resistor—carbon 100,000 ohms ¼ watt
53	502134	Resistor—carbon 470,000 ohms ¼ watt
55	502135	Resistor—carbon 2.2 Meg. ¼ watt
60	502291	Resistor—carbon 4700 ohms ¼ watt
61	502127	Resistor—carbon 560 ohms ¼ watt
67	502137	Resistor—wire wound 330 ohms 2 watt
69	503134	Resistor—carbon 470,000 ohms ¼ watt
		COILS & TRANSFORMERS
1	502247	Loop antenna
2	502112	Coil—B.C. antenna
3	502110	Coil—S.W. antenna
	502025	Complete coil and trimmer assembly for push-button tuner
8	502907	Coil less slug (540-1000 Kc.)
9, 10	502908	Coil less slug (650-1000 Kc.)
11, 12	502909	Coil less slug (975-1600 Kc.)
	502911	Tuning slug for coils, 502907, 502908, 502909
	501151	Clip—for mtg. push-button coils
23	502113	Coil—B.C. R.F.
27	502114	Coil—B.C. oscillator
31	502111	Coil—S.W. oscillator
34	502102	Transformer—1st I.F.
39	502103	Transformer—2nd I.F.
47	502174	Transformer—power
	502170	Transformer—output for R-502168 spkr.
65	504061	Transformer—output for M-502168 spkr.
	504122	Transformer—output for D-502168 spkr.
		OTHER ELECTRICAL PARTS
6	502177	Switch—push-button
17A, B	502147	Switch—band
56, 57	110629	Lamp—(Mazda No. 44) 6.3 V. 0.25 Amps.
62	502146	Switch—tone control
63	502168	Speaker—Electro-Dynamic (6 inch)
	502169	Cone & voice coil for R-502168 spkr.
64	504062	Cone & voice coil for M-502168 spkr.
	504123	Cone & voice coil for D-502168 spkr.
		MISCELLANEOUS PARTS
	502249	Back for cabinet
	502229	Background for dial
	116467	Base for mtg. electrolytic condenser
	502194	Cabinet for (Model 4-A-21X)
	502195	Cabinet for (Model 4-A-22X)
	119739	Call letter tabs for push-buttons
	119559	Clamp—for dial glass
	112745	Clip—coil mtg.
	114955	Clip—retainer on end of dial cord
	501151	Clip—for mtg. push-button coils
	116563	Connector—for antenna lead
	117057	Cord—dial drive (5½ ft. required) per ft.
	502218	Dial scale—glass
	117029	Drum—for dial drive
	500283	Escutcheon (Model 4-A-22X)
	501496	Escutcheon (Model 4-A-21X)
	502704	Knob—volume or tuning (Model 4-A-21X)
	502706	Knob—volume or tuning (Model 4-A-22X)
	502705	Knob—tone or band switch (Mode 4-A-21X)
	502707	Knob—tone or band switch (Model 4-A-22X)
	504097	Plug for speaker
	502601	Pointer
	501497	Push-button (Model 4-A-21X)
	501651	Push-button (Model 4-A-22X)
	81145	Retaining ring for tuning shaft
	119087	Ring—for dial cord
	116584	Rubber spacer for mtg. dial scale
	83552	Screw—No. 10x⅞"; for mtg. chassis
	85827	Screw—No. 8-32 for dial drum
	114914	Screw—No. 2x¾"; for mtg. escutcheon
	501777	Screw—No. 4x½"; for mtg. loop & back
	118606	Shaft—tuning control
	112818	Socket—dial lamp with lead
	116690	Socket—octal base
	160392	Socket—octal (rectifier)
	502210	Socket for speaker
	113177	Spring—dial cord tension
	119911	Terminal strip-phono
	111456	Washer—spring washer for tuning shaft
	119886	Washer—felt; for knobs

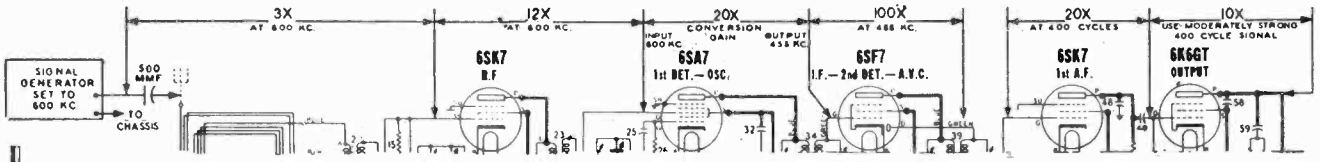
MODELS 4-A-21X, 4-A-22X

APPROXIMATE STAGE GAIN DATA

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

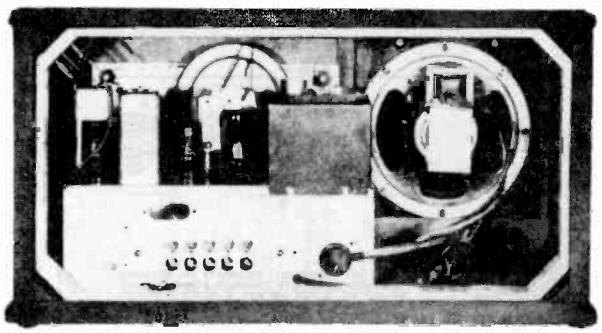
1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. For R.F. and I.F. measurements connect negative terminal of a 3 volt battery (two $1\frac{1}{2}$ volt cells in series) to A.V.C. lead at terminal "P" of short wave antenna coil; then connect positive battery lead to chassis. This provides a definite operating point.
   IMPORTANT: Disconnect battery when measuring audio stage gains.
3. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
4. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.

The R.F. and I.F. stage gains shown below are less than under normal operating conditions due to the use of 3 volts fixed bias in order to establish a definite operating point. Therefore, these values are not intended to indicate the full capability of a stage.



AUDIO OSCILLATION

The audio system of this receiver utilizes a two stage type of inverse feed-back arrangement and, should it ever be necessary to replace the speaker or output transformer, it is important to maintain a definite phase relationship in the feed-back circuit. If the connections to the output transformer are reversed or if the feed-back connection is made to the wrong side of the output transformer secondary, the system will become regenerative instead of degenerative. Under those conditions audio oscillation may result. If that occurs, oscillation may be prevented by reversing the connections to the primary of the output transformer.



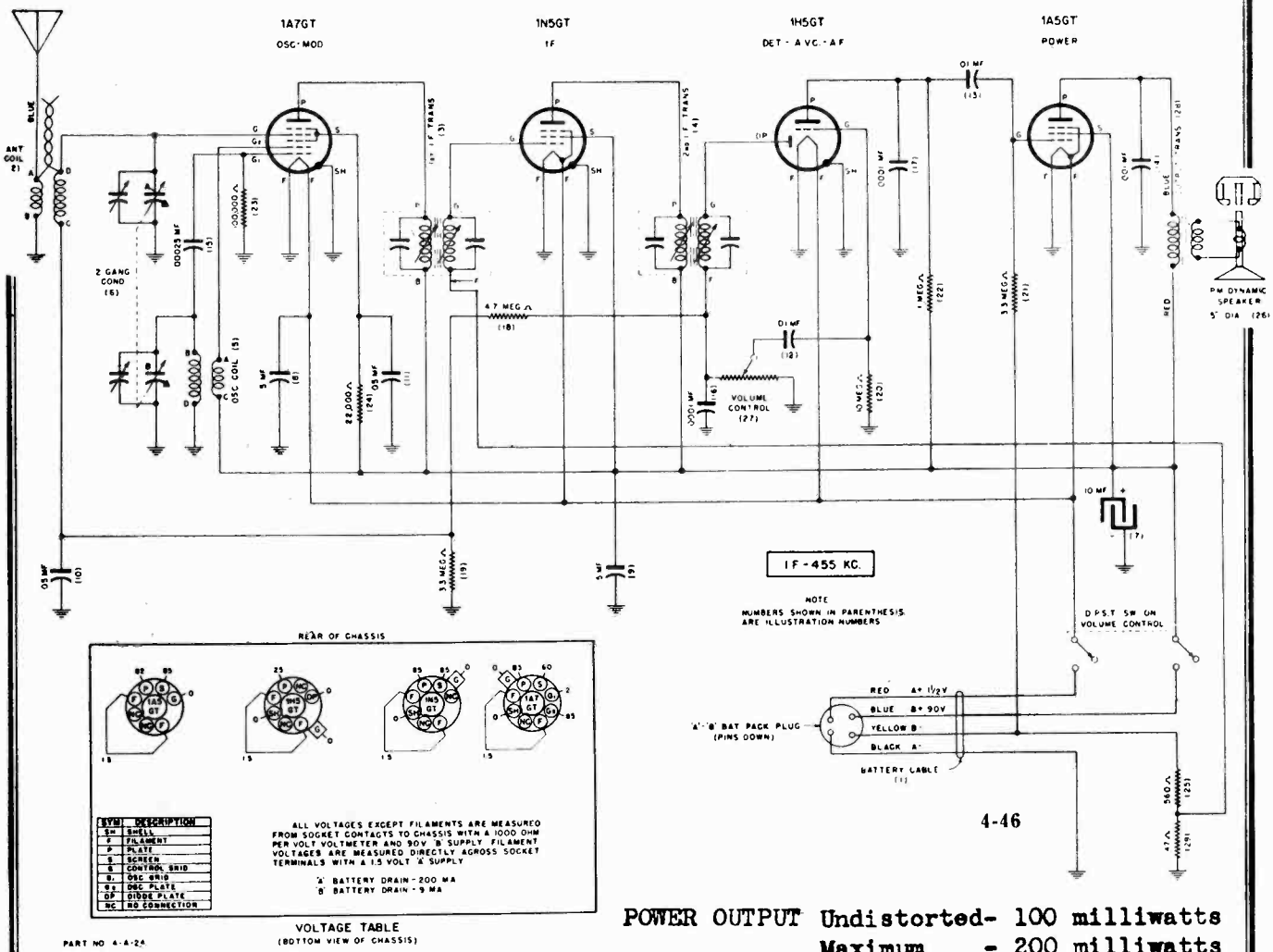
MODEL 4-A-24

Illus. No.	Part No.	Part Name	Description
1	20E58	Cable	Battery, with 4 Prong Plug
2	20E32	Coil	Antenna
3	20E21	Coil	1st I.F. Transformer
4	20E35	Coil	2nd I.F. Transformer
5	20E77	Coil	Oscillator
6	24E4 or	Condenser	Tuning 2 Gang, 3 hole mounting
6	24E19	Condenser	Tuning 2 Gang, 2 hole mounting
7	**25E9**	**Condenser**	**Tubular, Dry Elect. 10 Mfd. 100 V.**
8	23E224	Condenser	Tubular, .5 Mfd. 200 V.
9	23E224	Condenser	Tubular, .5 Mfd. 200 V.
10	23E216	Condenser	Tubular, .05 Mfd. 200 V.
11	23E216	Condenser	Tubular, .05 Mfd. 200 V.
12	23E151	Condenser	Tubular, .01 Mfd. 120 V.
13	23E151	Condenser	Tubular, .01 Mfd. 120 V.
14	23E204	Condenser	Tubular, .001 Mfd. 200 V.
15	23E42	Condenser	Mica, .00025
16	23E11	Condenser	Fixed Ceramic, .0001 Mfd.
17	23E11	Condenser	Fixed Ceramic, .0001 Mfd.
18	27E475	Resistor	Carbon, 4.7 Megohm, 1/3 W.
19	27E335	Resistor	Carbon, 3.3 Megohm, 1/3 W.
20	27E106	Resistor	Carbon 10 Megohm, 1/3 W.
21	27E335	Resistor	Carbon, 3.3 Megohm, 1/3 W.
22	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.
23	27E104	Resistor	Carbon, 100,000 Ohm, 1/3 W.
24	27E223	Resistor	Carbon, 22,000 Ohm, 1/3 W.
25	27E561	Resistor	Carbon, 560 Ohm, 1/3 W.
26	1E15	Speaker	6" P. M.
27	**28E15**	**Volume Control**	**With D.P.S.T. Switch**
28	**22E4**	**Transformer**	**Output**
29	27E470	Resistor	Carbon, 47 Ohm, 1/3 W.

MISCELLANEOUS PARTS

Part No.	Part Name	Description
7E57	Cabinet	Wood Table Model
4E1	Dial Cord	18 Lb. Drive Cord
65E2	Dial Cord Spring	Dial Cord Tension Spring
68E1	Dial Shaft	Drive Shaft
36E21	Dial Scale	Calibrated Scale
35E10	Dial Pointer	Dial Needle
36E20	Dial Indicator	"On-Off" Indicator
9E7	Dial Crystal	Clear Acetate Crystal
19E3	Dial Shaft Bearing	Bearing for Drive Shaft
65E3	Dial Indicator Spring	Tension Spring for "On-Off" Indicator
12E103-F10	Dial Shaft Washer	"C" Retainer Washer for Drive Shaft
37E30-1	Knob	
17E3-4	Plug	4-Prong Battery Plug
46E5	Throw Arm	Operates "On-Off" Indicator

MODEL 4A24 THE FIRESTONE TIRE & RUBBER CO.



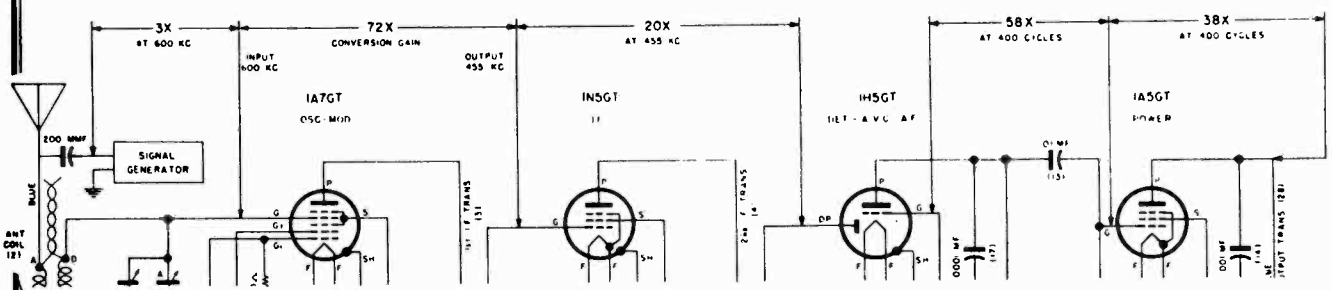
VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

PART NO 4-A-24

POWER OUTPUT Undistorted- 100 milliwatts
Maximum - 200 milliwatts

VOICE COIL IMPEDANCE 3.2 ohm at 400~

TUNING RANGE 528 to 1730 KC



Be sure R. F. and I. F. stages are accurately aligned before measuring gain. R. F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R. F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe the following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.

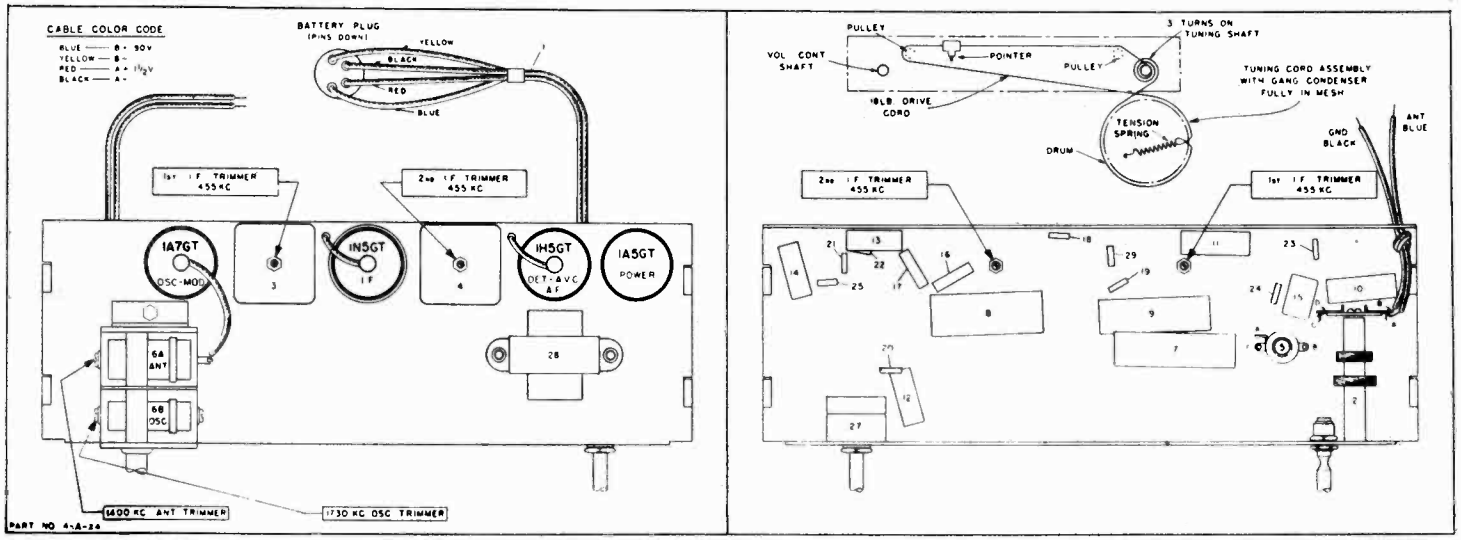
Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. Make the adjustment marked (1) first, (2) next, etc.

Before starting alignment:

(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move to correct position.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

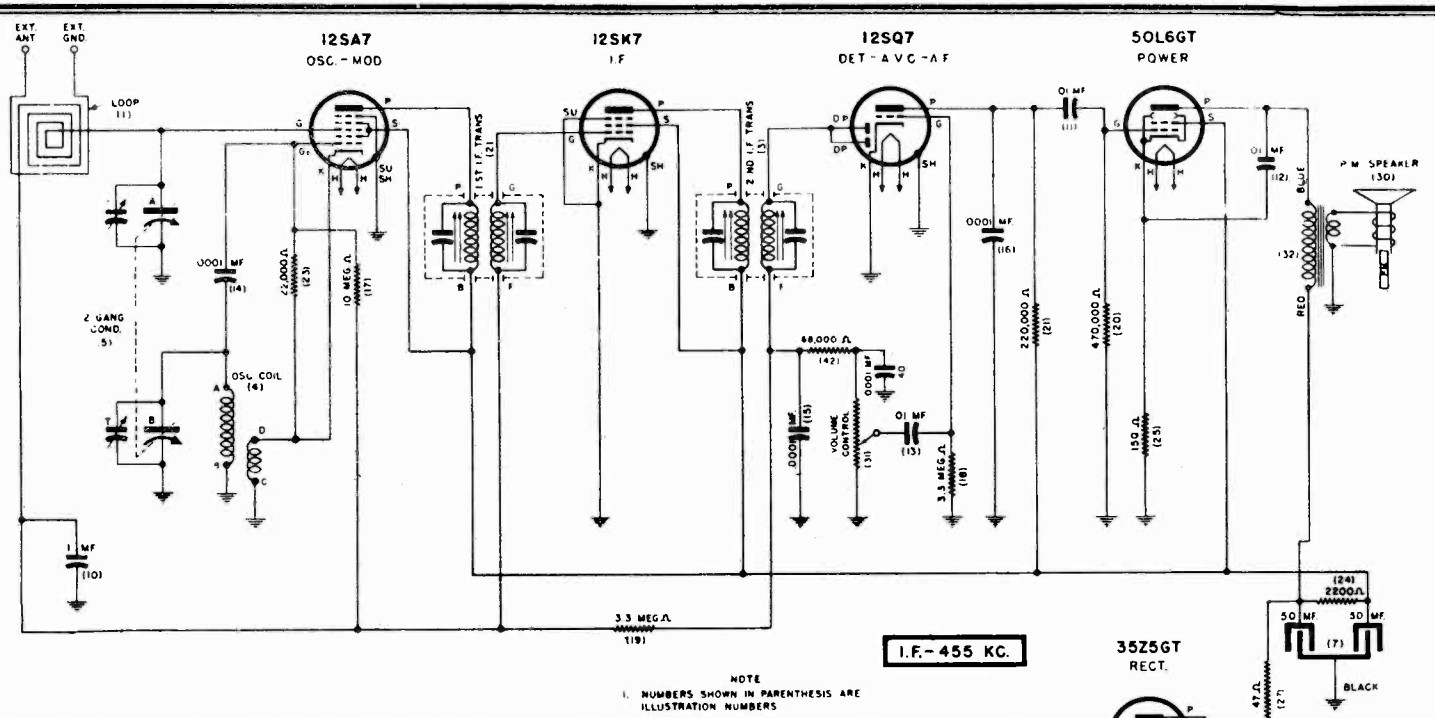
Steps	Set receiver dial to:	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	
1	I.F. Any point where no interference signal is received	455 K. C.	.02 MFD. condenser	High side to grid terminal of 1A7GT tube DO NOT REMOVE CAP. Low side to receiver black ground lead.	Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.
2	Exactly 1730 K. C.	Exactly 1730 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver black ground lead	Adjust 1730 K. C. oscillator trimmer for maximum output.
3	Exactly 1400 K. C.	Exactly 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver black ground lead	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.



LOUD SPEAKER

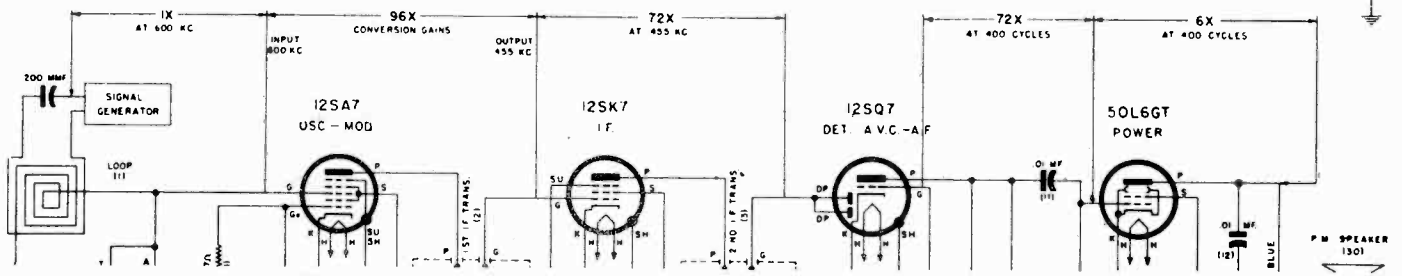
VOICE COIL IMPEDANCE

3.2 OHM at 400 Cycles



Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel type instrument carefully tune it for maximum output at desired frequency before making measurements.

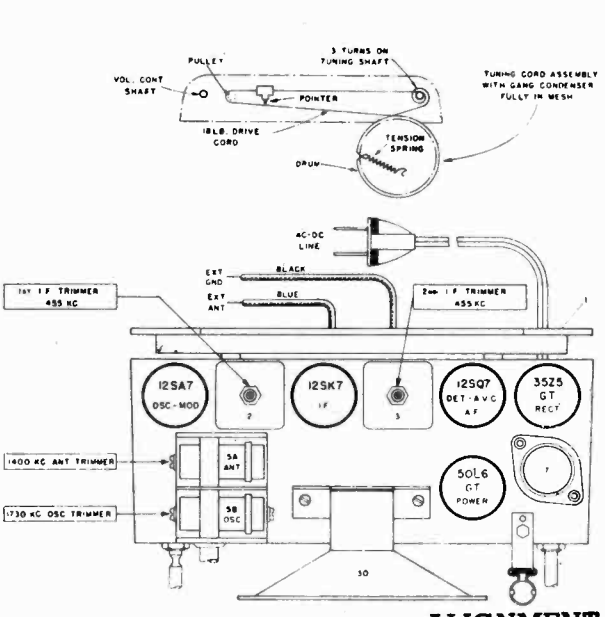


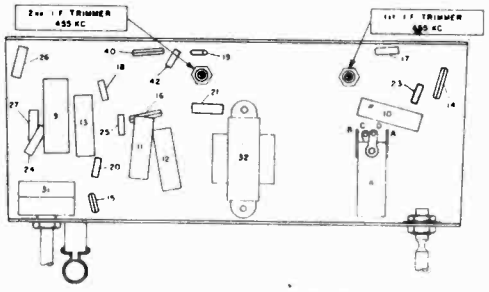
POWER OUTPUT

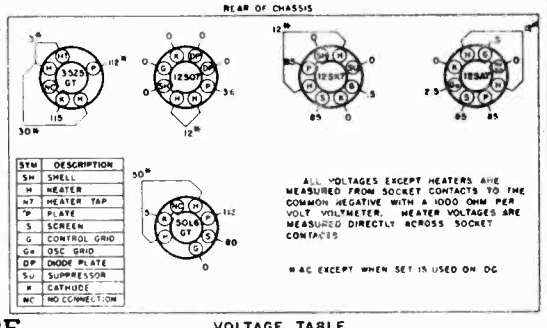
Undistorted - 0.9 Watts
Maximum - - 1.7 Watts

Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

THE FIRESTONE TIRE & RUBBER CO.







VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)

ALIGNMENT PROCEDURE

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move to correct position.

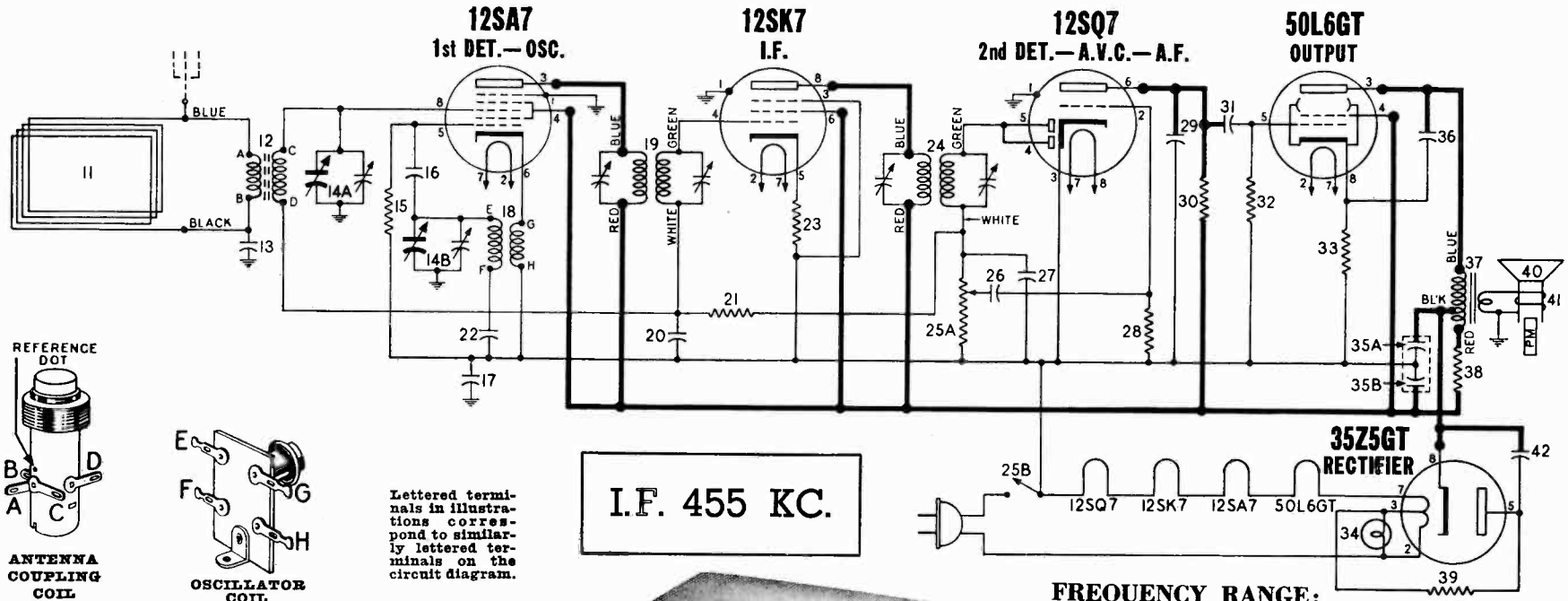
(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

Steps	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to front stator plates of tuning condenser. Low side to frame of condenser through a .02 Mfd. blocking condenser.	Adjust each of the second I. F. transformer trimmers for maximum output—then adjust each of the first I. F. trimmers for maximum output.
2	Exactly 1730 K. C.	Exactly 1730 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver black ground lead	Adjust 1730 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver black ground lead	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.

Ill. No.	Part No.	Part Name	Description
1	20E24	Antenna	Loop
2	20E21	Coil	1st I.F. Transformer
3	20E22	Coil	2nd I.F. Transformer
4	20E13	Coil	Oscillator
5	24E2	Condenser	Tuning, 2 Gang (3 Hole Mtg.)
	or		
5	24E18	Condenser	Tuning, 2 Gang (2 Hole Mtg.)
7	**25E1**	**Condenser**	**Dry Electrolytic, 50-50 Mfd. 150 V.**
9	23E416	Condenser	Tubular, .05 Mfd. 400 Volts
10	23E218	Condenser	Tubular, .1 Mfd. 200 Volts
11	23E211	Condenser	Tubular, .01 Mfd. 200 Volts
12	23E211	Condenser	Tubular, .01 Mfd. 200 Volts
13	23E211	Condenser	Tubular, .01 Mfd. 200 Volts
14	23E39	Condenser	Mica, .0001 Mfd.
15	23E39	Condenser	Mica, .0001 Mfd.
16	23E39	Condenser	Mica, .0001 Mfd.

Ill. No.	Part No.	Part Name	Description
17	27E106	Resistor	Carbon, 10 Megohm 1/3 Watt
18	27E335	Resistor	Carbon, 3.3 Megohm 1/3 watt
19	27E335	Resistor	Carbon, 3.3 Megohm 1/3 Watt
20	27E474	Resistor	Carbon, 470,000 Ohm 1/3 Watt
21	27E224	Resistor	Carbon, 220,000 Ohm 1/3 Watt
23	27E223	Resistor	Carbon, 22,000 Ohm 1/3 Watt
24	27E222-3	Resistor	Carbon, 2,200 Ohm 1 Watt
25	27E151	Resistor	Carbon, 150 Ohm 1/3 Watt
26	27E101	Resistor	Carbon, 100 Ohm 1/3 Watt
27	27E470-2	Resistor	Carbon, 47 Ohm 1/2 Watt
30	1E9	Speaker	5" PM
31	**28E1**	**Volume Control**	**With S.P.S.T. Switch**
32	22E2	Transformer	Output for Speaker
40	23E39	Condenser	Mica, .0001 Mfd.
42	27E683	Resistor	Carbon, 68,000 Ohm, 1/3 W.



ANTENNA COUPLING COIL
504899

OSCILLATOR COIL
502934

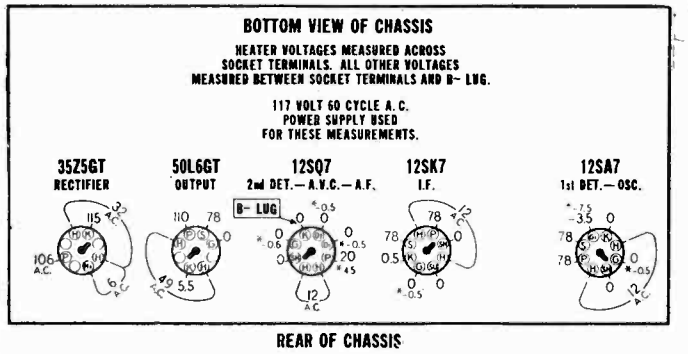
Lettered terminals in illustrations correspond to similarly lettered terminals on the circuit diagram.

I.F. 455 KC.

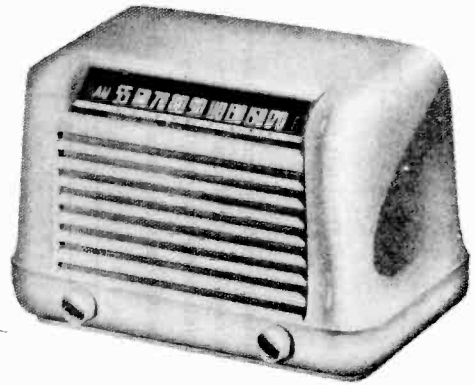
SOCKET VOLTAGES

Measured with voltmeter having sensitivity of 1000 ohms per volt except where indicated by (*). The (*) symbol designates a vacuum tube voltmeter measurement.

VOLUME ON FULL WITH NO SIGNAL — DIAL TUNED TO 540 KC.



REAR OF CHASSIS



POWER SUPPLY:

117 volts
50-60 cycles A.C. or D.C.
30 watts

POWER OUTPUT:

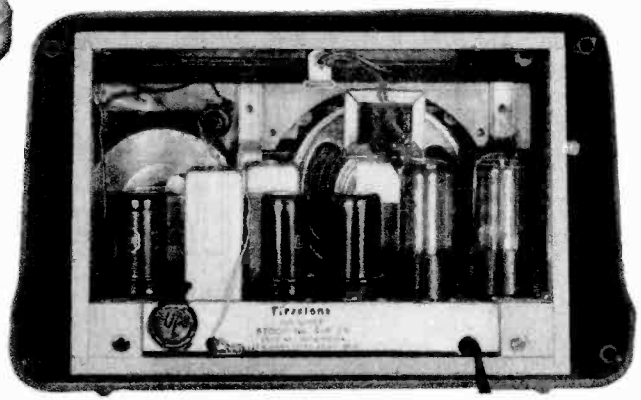
Undistorted — 1.0 watts
Maximum — 1.9 watts

FREQUENCY RANGE:

Standard Broadcast Band } 540-1725 KC.

SPEAKER:

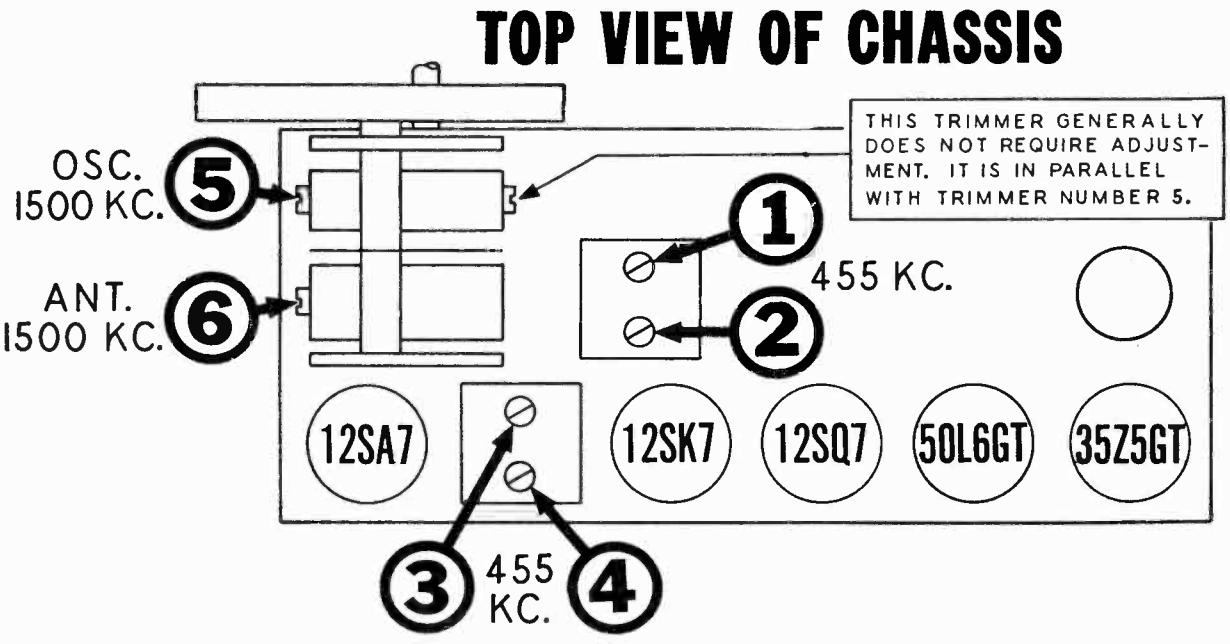
4 inch P-M Dynamic
Voice coil impedance—3.2 ohms



ALIGNMENT PROCEDURE

1. With the gang condenser fully meshed, the dial pointer should be in the position indicated by the last mark below 55 on the dial. If it is set incorrectly, release the pointer clip on dial cord and reposition pointer.
2. Remove chassis from cabinet by taking out two screws which hold chassis to bottom of cabinet. Solder approximately 8" of insulated wire to any B— connection (see voltage chart on Page 6 for convenient B— location).
3. Connect ground lead of signal generator to B— through a 0.25 Mfd. condenser.
4. Connect output meter across speaker voice coil (terminals at back of speaker) or from plate of type 50L6GT tube to B— through a 0.1 Mfd. condenser.
5. Set volume control at maximum volume position and use a weak signal from the signal generator.

DUMMY ANT. IN SERIES WITH SIGNAL GENERATOR	CONNECT HIGH SIDE OF GENERATOR TO	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
200 MMFD. Mica Condenser	Lug on trimmer No. 6 on rear section of gang (see figure below for location of trimmer.)	455 KC	Any point where it does not affect the signal.	1-2	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
				3-4	1st I.F.	
200 MMFD. Mica Condenser	External Antenna Clip on Loop Antenna	1500 KC	1500 KC	5	Broadcast Oscillator	Adjust for maximum output.
200 MMFD. Mica Condenser	External Antenna Clip on Loop Antenna	1500 KC	Tune to 1500 KC generator signal.	6	Broadcast Antenna	Adjust for maximum output.



TRIMMER LOCATIONS

MODEL 4-A-26,
THE NEWSCASTER

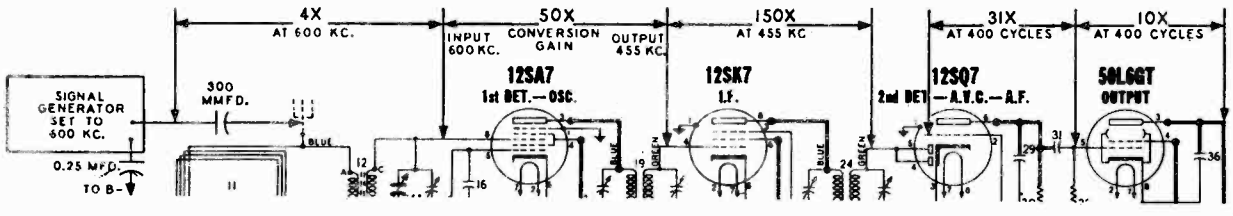
THE FIRESTONE TIRE & RUBBER CO.

STAGE GAIN MEASUREMENT PROCEDURE

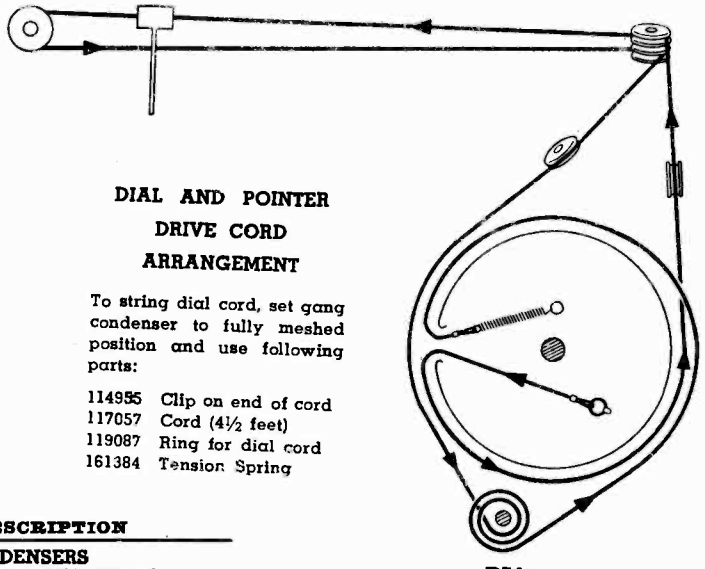
REQUIRED INSTRUMENTS: The amount of amplification or "gain" of each of the stages of this receiver may be measured with an A.C. Vacuum Tube Voltmeter or a "channel" type instrument containing a tuned and calibrated amplifier.

PROCEDURE: It is exceedingly important to adhere to the procedure outlined below since the accuracy of these measurements will be affected to a considerable extent by the failure to establish proper operating conditions.

1. Be sure that R.F. and I.F. stages are carefully and accurately aligned by utilizing the alignment procedure given on page 4.
2. Connect Signal Generator as shown below.
3. The values of stage gain which are given here were measured with a fixed bias of 3 volts on the control grids of all R.F. and I.F. tubes which are connected to the A.V.C. circuit. Therefore, these values are not intended to indicate the full capability of a stage but they will serve as a convenient basis for determining proper operation. In order to duplicate the fixed bias voltage, connect the negative terminal of a 3 volt battery to the A.V.C. lead at terminal "D" of antenna coil and then connect positive battery lead to B— in the receiver chassis.
4. Set Signal Generator for operation at 600 Kc with 400 cycle modulation and carefully tune radio receiver to this signal by using an output meter to indicate peak output. If a local station interferes, set generator to a nearby frequency and re-tune the receiver.
5. R.F. and I.F. circuits are slightly de-tuned when contact is made with an instrument probe and this action, which is indicated by a change in the output meter reading, may seriously affect the gain measurement. Therefore, it is important to adjust the associated circuit trimmer for a maximum output meter reading and to set the input signal level to a convenient reference point on the gain measuring instrument while the probe is making contact. After removing the probe it is again necessary to adjust the trimmer so as to obtain the same output meter reading and thereby assure that the signal voltage at the specified point has not changed as a result of circuit de-tuning.
6. When using a "channel" type instrument, carefully tune it for maximum output at desired frequency before making measurements.



DIFFERENCES in tube characteristics, tolerance of parts, adjustment of tuned circuits and variations in line voltage will influence stage gain. These factors should be given due attention in event the gain of a stage varies extensively from the values shown above.



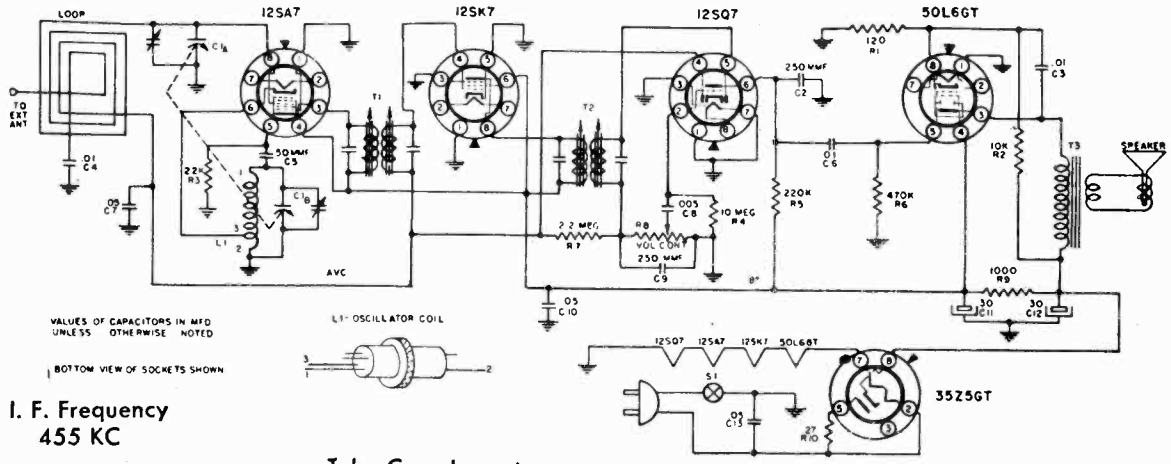
DIAL AND POINTER DRIVE CORD ARRANGEMENT

To string dial cord, set gang condenser to fully meshed position and use following parts:

114955 Clip on end of cord
117057 Cord (4½ feet)
119087 Ring for dial cord
161384 Tension Spring

DIAGRAM NO.	PART NO.	DESCRIPTION
		CONDENSERS
13	502156	Condenser—.004 Mfd. 400 volt
14-A, B	502925	Condenser—variable gang (with drum)
16	502929	Condenser—47 Mmfd. 500 volt
17	502158	Condenser—.2 Mfd. 400 volt
20	502153	Condenser—.05 Mfd. 200 volt
22	502410	Condenser—.1 Mfd. 400 volt
26	502156	Condenser—.004 Mfd. 400 volt
27	502882	Condenser—220 Mmfd. 500 volt
29	502470	Condenser—.0008 Mfd. 400 volt
31	502156	Condenser—.004 Mfd. 400 volt
35-A, B	500256	Condenser—electrolytic A—40 Mfd. 150 volt, B—20 Mfd. 150 volt
36	502152	Condenser—.02 Mfd. 400 volt
42	502157	Condenser—.05 Mfd. 400 volt
		RESISTORS
15	502130	Resistor—carbon 22,000 ohms ¼ watt
21	502135	Resistor—carbon 2.2 Meg. ¼ watt
23	502264	Resistor—carbon 47 ohms ¼ watt
25-A, B	502928	Volume control—with switch; 1 Meg.
28	502136	Resistor—carbon 10 Meg. ¼ watt
30	502134	Resistor—carbon 470,000 ohms ¼ watt
32	502134	Resistor—carbon 470,000 ohms ¼ watt

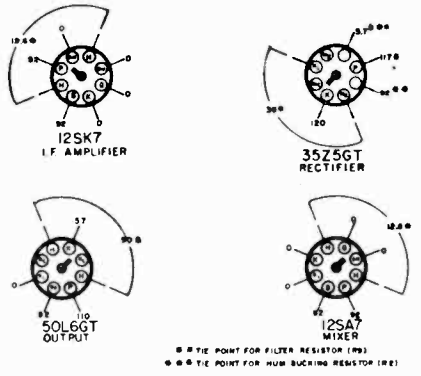
DIAGRAM NO.	PART NO.	DESCRIPTION
33	502932	Resistor—carbon 150 ohms 1 watt
38	502933	Resistor—carbon 1,500 ohms 1 watt
39	502574	Resistor—carbon 33 ohms ½ watt
		COILS AND TRANSFORMERS
11	504348	Loop antenna
12	504899	Coil—antenna
18	502934	Coil—oscillator
19	502926	Transformer—1st I.F.
24	505040	Transformer—2nd I.F.
37	502817	Transformer—output for C-502816 speaker
	504583	Transformer—output for W-502816 speaker
		OTHER ELECTRICAL PARTS
34	118921	Lamp—dial (Mazda 47) 6-8V. 150 Ma.
40	502818	Cone and voice coil for C-502816 speaker
	504584	Cone and voice coil for W-502816 speaker
41	502816	Speaker—P.M. dynamic (4 inch)



VOLTAGE TABLE

(BOTTOM OF CHASSIS)

SYM	DESCRIPTION
SH	SHELL
H	HEATER
HT	HEATER TAP
P	PLATE
S	SCREEN
G	CONTROL GRID
G_1	OSC GRID
DP	DIODE PLATE
SU	SUPPRESSOR
K	CATHODE
NC	NO CONNECTION



I. F. Frequency
455 KC

Loud Speaker
4 inch P. M.

Voice Coil Impedance
3.2 ohms at 400 cycles

Power Output
Maximum 1.65 watts

Tube Complement

12SA7	—	Oscillator Converter
12SK7	—	I. F. Amplifier
12SQ7	—	AVC, Detector, 1st Audio
50L6GT	—	Power Output
35Z5GT	—	Rectifier

Power Supply
105-125 volt AC-DC

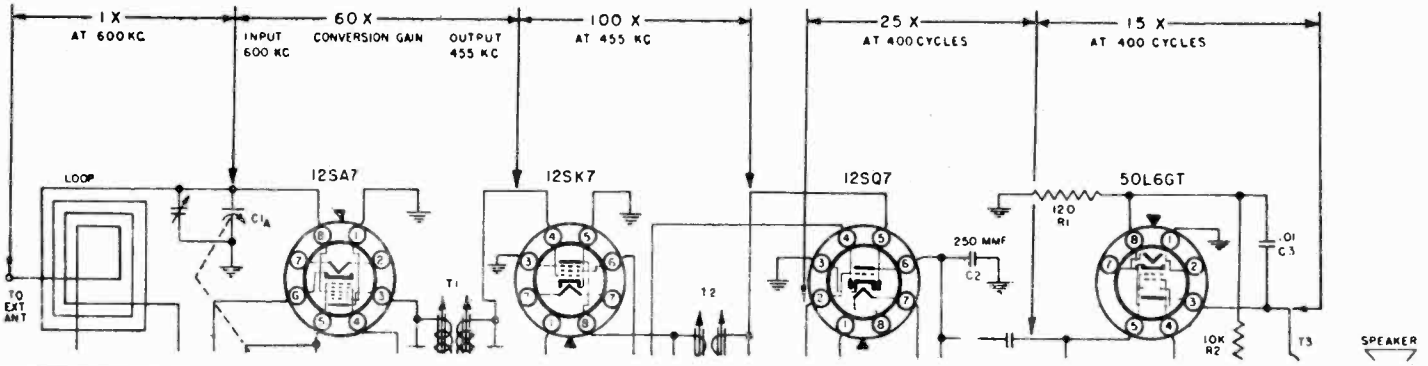
Tuning Range
540 to 1630 KC

All voltages except heaters are measured from socket contacts to ground (chassis). Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.

*AC except when used on DC.

Before proceeding with stage measurements be sure the receiver is properly aligned. R.F. gains can be measured by a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe the following precautions:

1. **For all gain measurements connect the "high" side of a signal generator to the antenna lead through a .00025 mica condenser. The ground side of the signal generator should be connected to the chassis. Use a 600 KC signal with 400 cycle modulation (use nearby frequency if local station interferes.)**
2. **Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)**
3. **When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.**



MODEL 4-A-27, Cameo

THE FIRESTONE TIRE & RUBBER CO.

The alignment should be made with volume contral fully on, and the output from the signal generator as low as possible, to prevent A.V.C. actian from interfering with correct alignment.

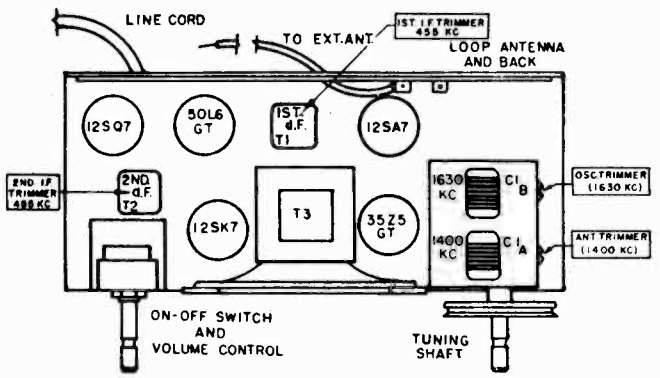
For alignment procedure read tabulations fram left to right, and make the adjustment marked (1) first, (2) next, (3) third. Before starting alignment:

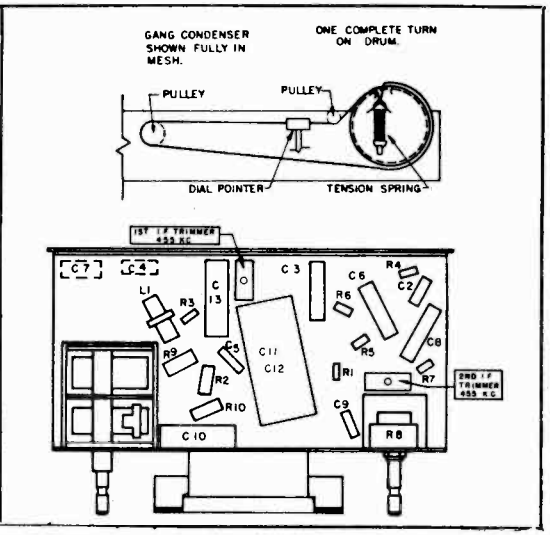
(a) Check tuning dial adjustment by tuning gang candenser until plates touch maximum capacity stop (completely in mesh) at which paint the dial pointer must be exactly even with the last mark at the low frequency end of the dial calibration. If dial pointer is incorrectly set, release pointer clip on dial cord and reposition pointer.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

Steps	Set receiver dial to:	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	
1	Minimum capacity (fully open)	455 K.C.	.1 MFD. condenser	High side to grid of tuning condenser. Low side to chassis. (through .25 MFD. Cond.)	Adjust each trimmer on the second I. F. transformer for maximum output—then adjust each trimmer on the first I. F. transformer for maximum output.
2	Minimum capacity (fully open)	Exactly 1630 K.C.	.00025 MFD. condenser	Receiver antenna lead. Chassis.	Adjust 1630 K.C. oscillator trimmer for maximum output.
3	Approx. 1400 K.C.	Approx. 1400 K.C.	.00025 MFD. condenser	Receiver antenna lead. Chassis.	While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.





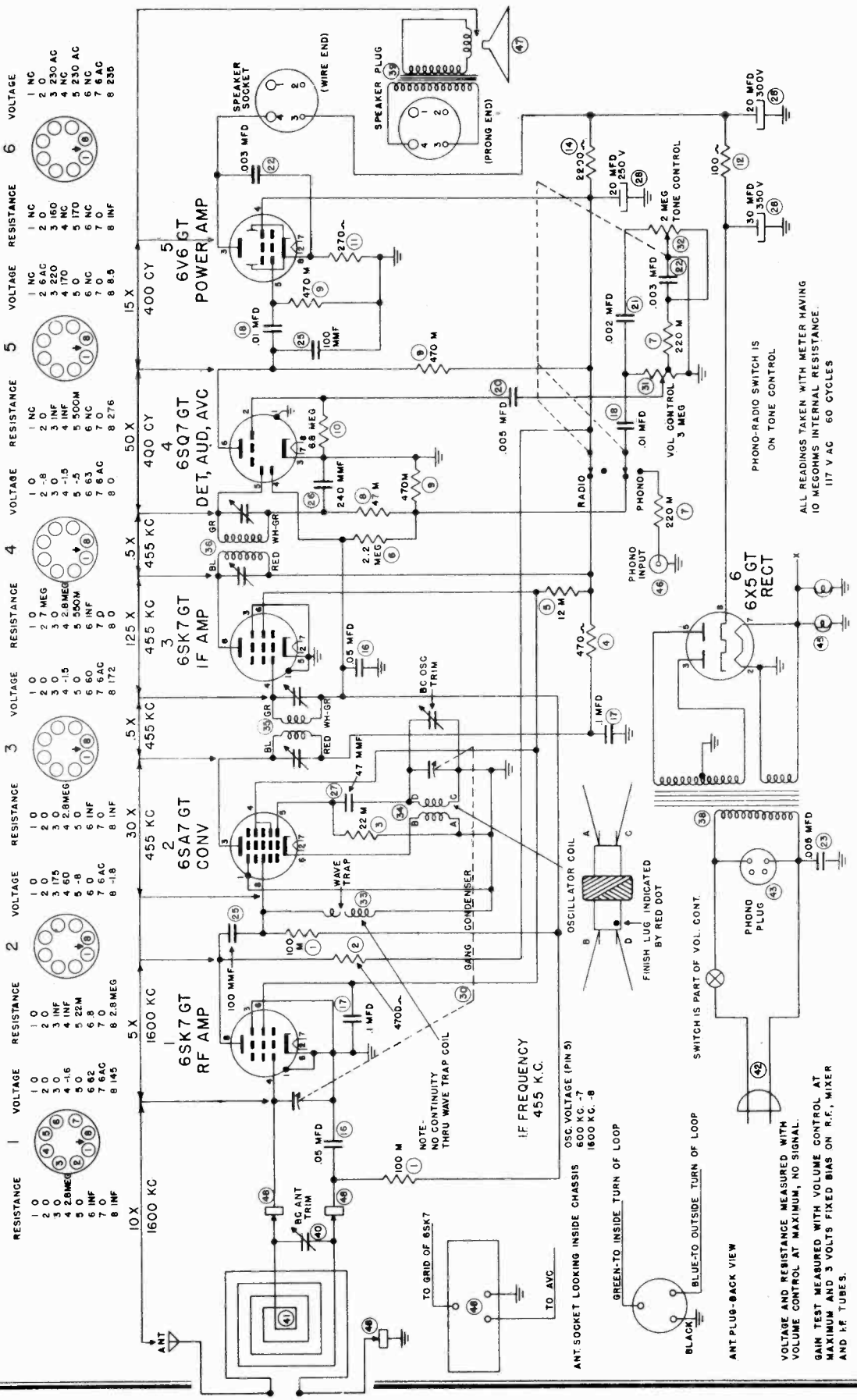
C1A, C1B	19-173	Variable condenser	T1	A10-478	1st I. F. transformer
C2, C9	A15-176	250 MMFD mica condenser	T2	A10-479	2nd I. F. transformer
C3, C4, C6	A16-156	.01 MFD 400 volt condenser	T3	A80-233	Output transformer—part of speaker
C5	A15-175	50 MMFD mica condenser	L1	B10-480	Oscillator coil
C7, C10	A16-152	.05 MFD 200 volt condenser			
C8	A16-153	.005 MFD 600 volt condenser			
C11, C12	B18-283	30 x 30 MFD 150 volt electrolytic cond			
C13	A16-158	.05 MFD 400 volt condenser			
R1	A60-702	120 ohm ½ watt resistar			
R2	A60-698	10K ohm 1 watt resistor			
R3	A60-659	22K ohm ½ watt resistor			
R4	A60-663	10 Megohm ½ wat resistor			
R5	A60-667	220K ohm ½ watt resistor			
R6	A60-662	470K ohm ½ watt resistar			
R7	A60-684	2.2 Megohm ½ watt resistor			
R8	24-157	Volume control, 1 megohm			
R9	A60-732	1000 ohm 1 watt resistor			
R10	A60-690	27 ohm ½ watt resistor			

MISCELLANEOUS PARTS

48-34	Dial crystal
58-37	Dial pointer
B67-506	Dial scale
51-105	Dial cord, 15" long
79-316	Speaker, 4 inch P. M. (includes output transfarmer)
B82-46	Loop antenna
23-07	Line cord
A42-425	Cobinet, molded, white
C83-468	Cabinet back
A52-226	Knob, white

THE FIRESTONE TIRE & RUBBER CO.

MODEL 4-A-31



DATE 4-30-46

Power Output
Radio—5.4 watts
Phono—6.6 watts

Tuning range 540 Kc. to 1620 Kc. 65 watts at 117 volts.

Speaker: 10" P.M. Dynamic
Voice coil inpedance—3.5 ohms

PARTS LIST

STOCK No. 4-A-31. CODE No. 177-5-4A31

Part No.	DESCRIPTION
77214	100 M Ohms
77211	4700 Ohms
77266	22 M Ohms
77261	470 Ohms
77155	12 M Ohms 2 Watt
77270	2.2 Megohms
77216	220 M Ohms
77213	47 M Ohms
77217	470 M Ohms
77273	6.8 Megohms
77174	270 Ohms 1 Watt
77258	100 Ohms
77301	2200 Ohms 2 Watt
25196	.05 Mfd. Tubular 600 V.
25215	.1 Mfd. Tubular 600 V.
25194	.01 Mfd. Tubular 600 V.
25183	.005 Mfd. Tubular 600 V.
25185	.002 Mfd. Tubular 600 V.
25184	.003 Mfd. Tubular 600 V.
25031	.005 Mfd. Line Buffer 600 V.
25188	100 Mmf. Mica
25187	240 Mmf. Mica
25193	47 Mmf. Mica
25180	Electrolytic Cap. 30 Mf. 350 V.—20 Mf. 300 V.—20 Mf. 250 V.
15154	Gang Condenser and Drive Drum
78119	Volume Control
90148	Tone Control and Phono Switch
38484	Wave Trap
38483	Oscillator Coil
38536	1st. I. F. Transformer
38537	2nd. I. F. Transformer
94025	Power Transformer
94199	Output Transformer
26032	Antenna Trimmer
38652	Loop Antenna
27118	Line Cord
11274	Phono A. C. Cable and Plug
42185	Dial Lamp (Mazda 44) 6.3 V. 250 Ma. (Two required)
80030	Phono Input Socket
81124	Speaker
80256	Antenna Socket
80230	Speaker Socket
80252	Antenna Plug
80139	Molded Octal Tube Socket
11259	Dial Pointer Assembly
05090	Drive Cord Assembly
31287	Dial Glass
04038	Dial Background
59284	Knob
71223	Phono Needle
22147	P. U. Cable

EQUIPMENT AND PROCEDURE FOR ALIGNMENT

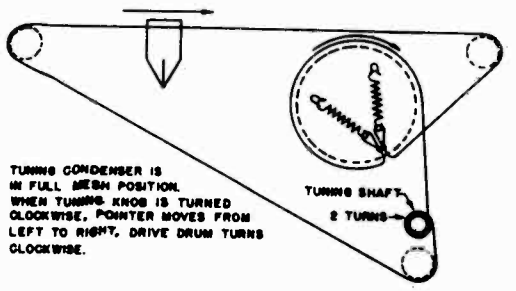
A Signal Generator calibrated at 455 Kc., 600 Kc. and 1500 Kc., and an output indicator are necessary to properly align this set. All adjustments should be made with the volume control set for maximum and the tone control for maximum treble, keeping the signal generator output as low as possible to prevent A.V.C. action and false settings.

The low side of the signal generator is connected to the chassis.

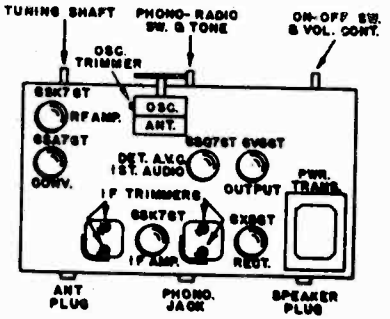
Steps	Connect High Side of Generator to	Set Generator At	Set Gang At	Adjust	Located	To Obtain
1	Set Volume Control at Maximum and Tone Control at Maximum Treble.					
2	Stator of Ant. Section of Gang with .1 Mf. In Series	455 Kc.	Minimum	2nd. I.F. Trimmers	Top of 2nd. I.F. Transformer	Maximum Output
3				1st. I.F. Trimmers	Top of 1st. I.F. Transformer	
4	Ant. Lead With 250 Mmf. In Series*	1500 Kc.	1500 Kc.	Osc. Trimmer	On Gang	
5		1500 Kc.	1500 Kc.	Ant. Trimmer	On Loop	
6	Check Pointer Calibration on 600 Kc.					

*Antenna wire protrudes from loop.

DIAL STRINGING

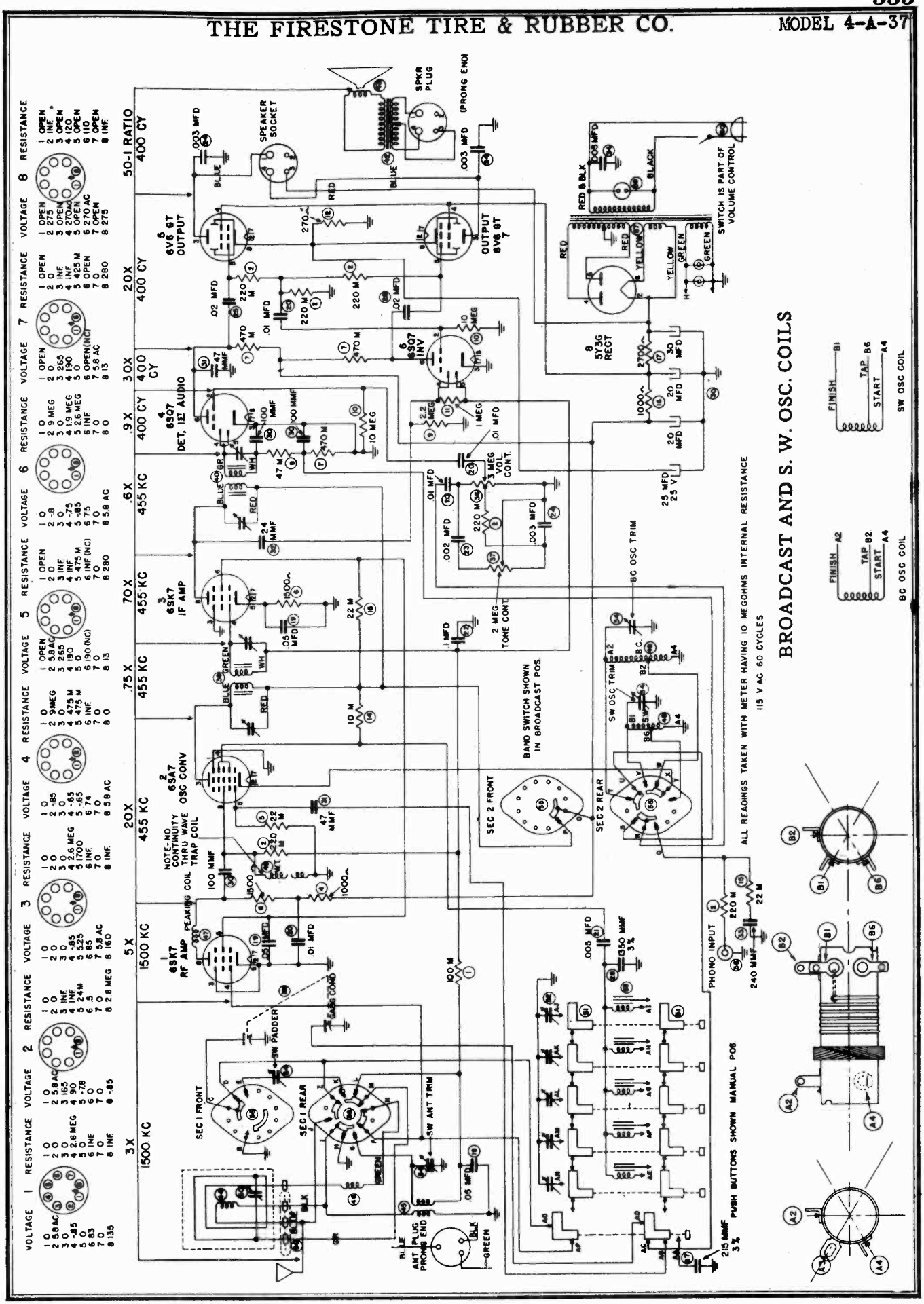


CHASSIS LAYOUT

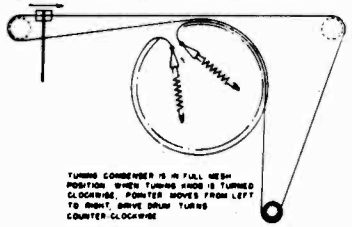


THE FIRESTONE TIRE & RUBBER CO.

MODEL 4-A-37



Refer. No.	Part Number	DESCRIPTION
1	77214	100 M Ohms
2	77216	220 M Ohms
4	77262	1000 Ohm
5	77266	22 M Ohms
6	77263	1500 Ohm
7	77217	470 M Ohms
8	77213	47 M Ohm
9	77270	2.2 Megohm
10	77274	10 Megohm
11	77218	1 Megohm
12	77189	270 Ohm 2 Watt
14	77013	10 M Ohms 2 Watt
15	77069	22 M Ohms 1 Watt
16	77304	1000 Ohm 2 Watt
17	77243	2700 Ohm 4.7 Watt Molded
19	25196	.05 Mfd. Tubular 600 Volts
20	25194	.01 Mfd. Tubular 600 Volts
21	25183	.005 Mfd. Tubular 600 Volts
22	25215	.1 Mfd. Tubular 600 Volts
23	25185	.002 Mfd. Tubular 600 Volts
24	25184	.003 Mfd. Tubular 600 Volts
25	25195	.02 Mfd. Tubular 600 Volts
27	25212	215 Mmf. Silver Mica Capacitor
28	25213	1350 Mmf. Silver Mica Capacitor
30	25188	100 Mmf. Mica
31	25193	47 Mmf. Mica
32	25192	24 Mmf. Mica
33	25187	240 Mmf. Mica
34	25031	.005 Buffer 600 Volts
35	25214	Electrolytic Capacitor -20-30-450 Volts; 25-25 Volts
36	78020	Volume Control
37	78072	Tone Control
38	26194	Gang Capacitor
39	38536	1st. I. F. Transformer
40	38537	2nd. I. F. Transformer
42	94195	Output Transformer
43	81126	Speaker
44	38552	Loop Antenna
45	38542	Short Wave Antenna Coil
46	38794	Antenna Loading Coil
47	38544	Peaking Coil
48	38484	Wave Trap
49	38543	S.W. and B.C. Oscillator Coil Ass'y.
50	26032	Antenna Trimmer
51	90118	Push Button Switch
52	26175	P. B. Trimmer Strip
53	38405	P. B. Coil Strip
54	26195	Trimmer Strip
55	90175	Band Switch
56	80252	Antenna Plug
56	80256	Antenna Socket
57	94104	Power Transformer
58	80030	Phono Imput Socket
59	11274	Phono A.C. Cord and Socket
60	27118	Universal Line Cord
	22174	Phono Pickup Cable
	31274	Dial
	11257	Dial Pointer
	42185	Dial Lamp (Mazda 44) 6 V 250 Ma.
	59206	Volume Knob
	59207	Tuning Knob
	59208	Band Switch Knob
	59209	Tone Control Knob
	41106	Drive Cord Kit
	59278	Push Button
	59259	Push Button Escutcheon
	41105	Station Call Letter Kit
	17019	Drive Drum
	80139	Molded Octal Socket
	71223	Phono Needle



TUNING CONDENSER IS IN FULL MESH POSITION WHEN TUNING KNOB IS TURNED CLOCKWISE. POINTER MOVES FROM LEFT TO RIGHT. DRIVE DRUM TURNS COUNTER CLOCKWISE

EQUIPMENT AND PROCEDURE FOR ALIGNMENT

To properly align this receiver, a signal generator calibrated at 455 Kc., 1000 Kc., 1500 Kc., 1620 Kc., 9.7 Mc., 15 Mc., and 15.4 Mc.; and also an output indicator are required. All adjustments should be made with the volume control set for maximum volume, keeping the generator output as low as possible to prevent A.V.C. action and false readings.

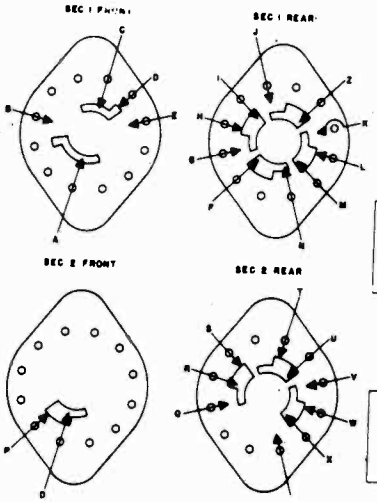
The loop should be placed in the approximate position relative to chassis as when the chassis is installed in the cabinet.

Connect the low side of the generator to the ground (black) wire and the high side of the generator to the antenna (red) wire.

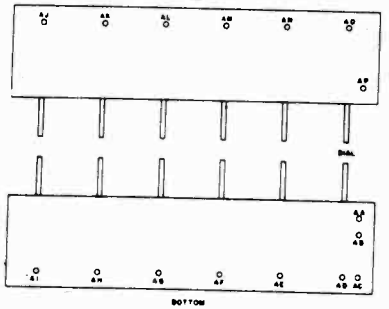
CAUTION—Tighten S.W. oscillator trimmer screw for maximum capacity, then unscrew to second peak. Two peaks are usually found on the S.W. oscillator trimmer—one at 16.3 Mc., and one at 15.4 Mc. The lower frequency (15.4 Mc.) is used.

STEPS	USE IN SERIES WITH ANTENNA		SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1	SET VOLUME CONTROL AT MAXIMUM						
2	250 MMFD.	I. F.	455 Kc.	MINIMUM	2nd. I.F. TRIMMERS	TOP 2nd. I.F. TRANS.	MAXIMUM OUTPUT
3					1st. I.F. TRIMMERS	TOP 1st. I.F. TRANS.	
4		BROAD CAST	1620 Kc.	1620 Kc.	B.C. OSC. TRIMMER	See Chassis Layout*	
5			1500 Kc.	1500 KC Rock Gang	ANT. TRIMMER	ON LOOP	
6	SET POINTER AT 1000 Kc. AND CHECK POINTER CALIBRATION						
7	400 Ohms	SHORT WAVE	15.4 Mc.	MINIMUM	S.W. OSC. TRIMMER**	See Chassis Layout*	
8			15 Mc.	15 Mc Rock Gang	S.W. ANT. TRIMMER		
9			9.7 Mc.	9.7 Mc Rock Gang	S.W. ANT. PADDER		
10	RECHECK 15.4 Mc.						

BAND SWITCH DECKS.



PUSH BUTTON TUNER SWITCH



SETTING UP PUSH BUTTONS

**See Caution above.

A Signal Generator should be used to prevent buttons being set up on wrong stations.

1. Allow the set to warm up for about half an hour before beginning to set up the buttons.

2. Remove the button escutcheon, exposing five pairs of adjusting screws. The small screw adjusts the oscillator and the large screw adjusts the antenna. (See Push Button Layout.)

3. Select the pair of adjustment screws covering the frequency of a wanted stations.

4. Press the "Dial" Button and manually tune in the desired station frequency.

5. Press the button selected for this frequency.

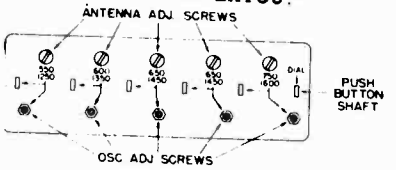
6. Adjust the lower screw of the pair selected for this frequency until the signal is heard most clearly.

7. Adjust the upper screw in same pair until maximum volume is secured.

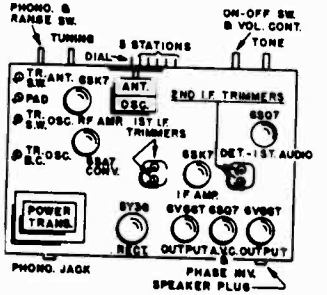
8. Press dial button making certain original frequency is still tuned in; check results on button just set up. If it is the same, proceed with the next button until all are set up.

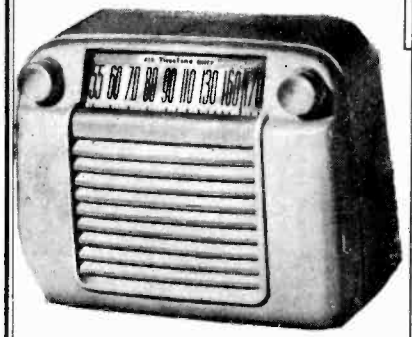
9. Recheck settings and correct any drift due to interaction between adjacent soils.

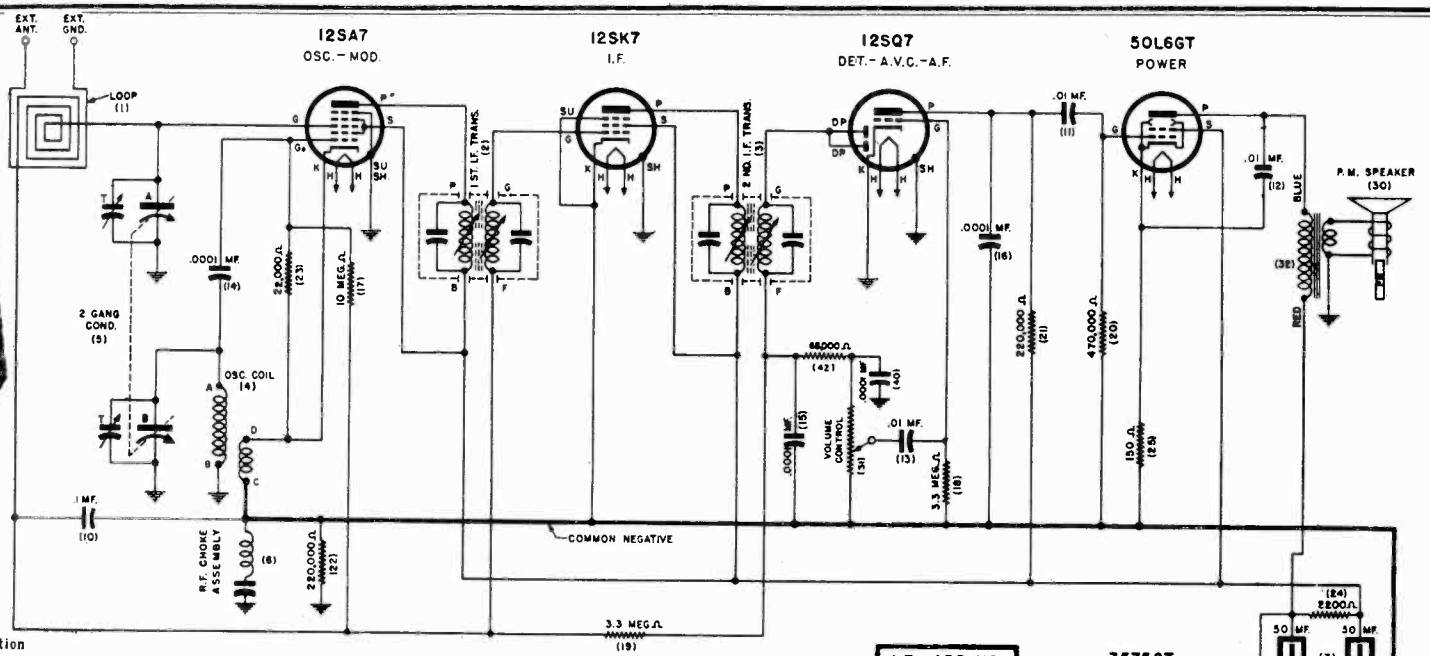
PUSH BUTTON LAYOUT



CHASSIS LAYOUT





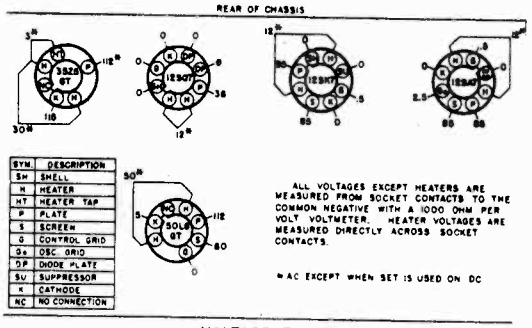


No.	Part No.	Part Name	Description
1	20E24	Antenna	Loop
2	20E21	Coil	1st I.F. Transformer
3	20E22	Coil	2nd I.F. Transformer
4	20E162	Coil	Oscillator
5	24E2	Condenser	Tuning, 2 Gang (3 Hole Mtg.)
5	24E18	Condenser	Tuning, 2 Gang (2 Hole Mtg.)
7	**25E16**	**Condenser**	**Dry Elec. 50-50 Mfd. 150 V.**
8	20E75	Choke	R.F. Choke Assembly
9	23E416	Condenser	Tubular, .05 Mfd. 400 V.
0	23E418	Condenser	Tubular, .1 Mfd. 400 V.
1	23E211	Condenser	Tubular, .01 Mfd. 200 V.
2	23E211	Condenser	Tubular, .01 Mfd. 200 V.
3	23E211	Condenser	Tubular, .01 Mfd. 200 V.
4	23E39	Condenser	Mica, .0001 Mfd.
5	23E39	Condenser	Mica, .0001 Mfd.
6	23E39	Condenser	Mica, .0001 Mfd.
17	27E106	Resistor	Carbon, 10 Megohm 1/3 W.
18	27E335	Resistor	Carbon, 3.3 Megohm 1/3 W.
19	27E335	Resistor	Carbon, 3.3 Megohm 1/3 W.
20	27E474	Resistor	Carbon, 470,000 Ohm 1/3 W.
21	27E224	Resistor	Carbon, 220,000 Ohm 1/3 W.
22	27E224	Resistor	Carbon, 220,000 Ohm 1/3 W.
23	27E223	Resistor	Carbon, 22,000 Ohm 1/3 W.
24	27E222-3	Resistor	Carbon, 2,200 Ohm 1 W.
25	27E151	Resistor	Carbon, 150 Ohm 1/3 W.
26	27E101	Resistor	100 Ohm 1/3 W., Carbon
27	27E470-2	Resistor	Carbon, 47 Ohm 1/2 W.
30	1E9	Speaker	5" P.M.
31	**28E1**	**Vol. Cont.**	**With S.P.S.T. Switch**
32	22E2	Transformer	Output for Speaker
40	23E39	Condenser	Mica, .0001 Mfd.
42	27E683	Resistor	Carbon 68,000 Ohm 1/3 W.

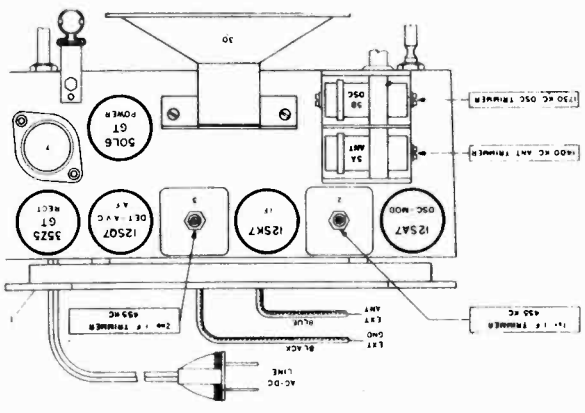
Part No.	Part Name	Description
7E76-2	**Cabinet**	**Ivory Plastic**
7E83	Cabinet Back	For Ivory Plastic Cabinet
41E1	Cord	6 Ft. Rubber Line Cord
20E12	Dial Plate Assem.	Dial Back Plate Assem. Less Scale
4E1	Dial Cord	30" of 18 lb. Dial Drive Cord
36E23	Dial Scale	Calibrated Scale
68E1	Dial Shaft	Drive Shaft
19E3	Dial Shaft Bearing	Bearing for Drive Shaft
35E8	Dial Pointer	Dial Indicator
65E2	Dial Spring	Tension Spring For Drive Cord
37E27-19	Knob	For Ivory Cabinet
20E43	Pilot Lamp Socket	Pilot Lamp Socket Assembly
40E1	**Pilot Lamp**	**6-8 Volt .150 Amp. Type 47 Lamp**

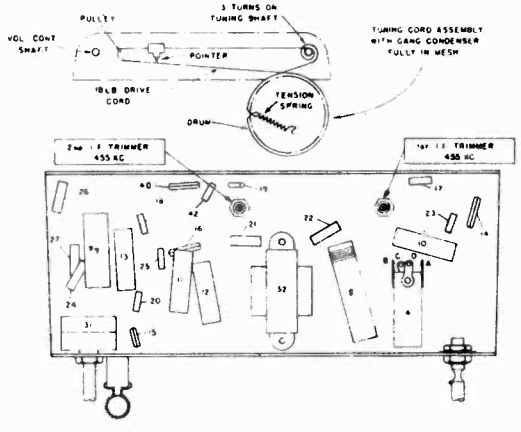
OCTOBER 10, 1946

TUNING RANGE	1730 to 530 KC
INTERMEDIATE FREQ	455 KC
LOUD SPEAKER	5 Inch P.M.
VOICE COIL IMPEDANCE	3.2 OHM at 400 Cycles
POWER OUTPUT	Undistorted - 0.9 Watts Maximum - - 1.7 Watts



VOLTAGE TABLE
(BOTTOM VIEW OF CHASSIS)





For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.

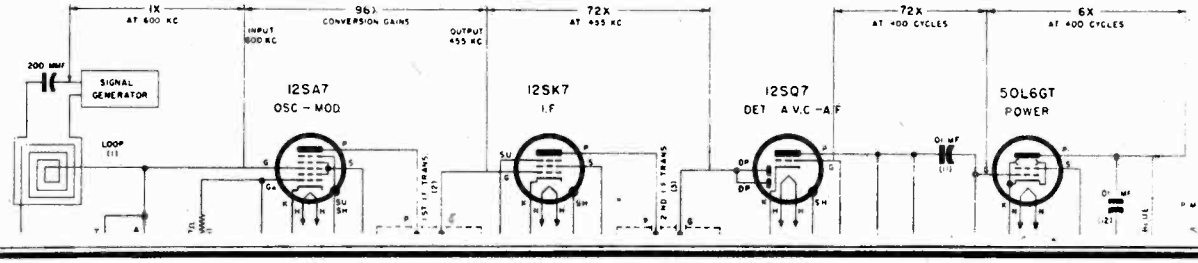
Before starting alignment:

(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move to correct position.

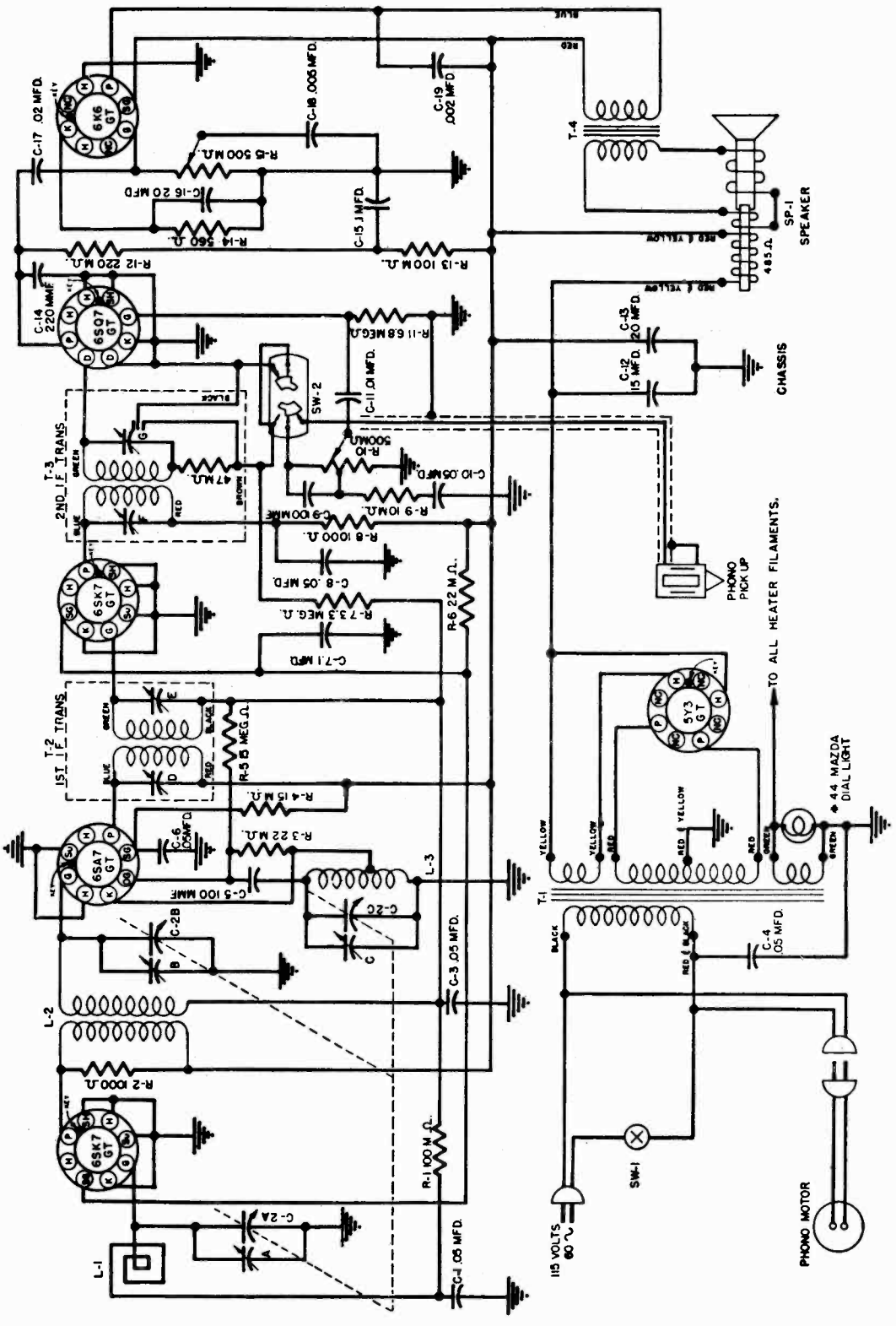
(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

Steps	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to front stator plates of tuning condenser. Low side to frame of condenser through a .02 Mfd. blocking condenser.	Adjust each of the second I. F. transformer trimmers for maximum output—then adjust each of the first I. F. trimmers for maximum output.
2	Exactly 1730 K. C.	Exactly 1730 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver black ground lead	Adjust 1730 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver black ground lead	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.



THE FIRESTONE TIRE & RUBBER CO. MODEL 4-A-43



455 KC IF

ALL TUBE SOCKETS SHOWN FROM PIN END VIEW.

ALL SWITCHES SHOWN IN COUNTERCLOCKWISE POSITION, SHAFT END VIEW.

MODEL 4A43 THE FIRESTONE TIRE & RUBBER CO.

Electrical and Mechanical Specifications

Frequency Range	540-1600 kc.	V.C. Impedance	3.5 ohms at 400 cycles
Intermediate Frequency	455 kc.	Power Output (Undistorted)	1 watt
Power Supply	105-125 volts, 60 cycle A.C.	Power Output (Maximum)	4 watts
Loudspeaker	Electrodynamic	Tuning Drive Ratio	4¾ to 1

TUBE COMPLEMENT

1—6SK7GT	RF Amplifier tube	1—6SQ7GT	Detector—AVC—1st Audio tube
1—6SA7GT	Converter tube	1—6K6GT	Power Output tube
1—6SK7GT	IF Amplifier tube	1—5Y3GT	Rectifier tube

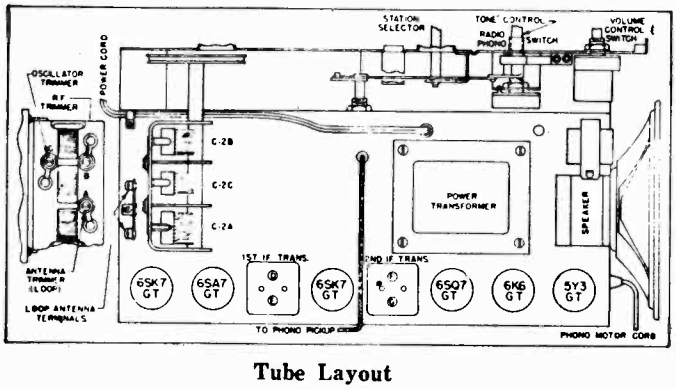
NOTE: The above glass tubes are interchangeable with their metal equivalent.

ALIGNMENT PROCEDURE

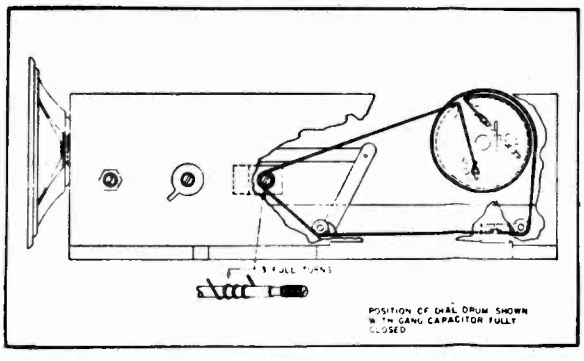
The following equipment is necessary to properly align this chassis:

1. A signal generator which will provide an accurately calibrated signal at the frequencies listed.
2. An output meter.
3. A non-metallic screwdriver.
4. Dummy antenna: — .1 mfd. — RMA loop.

CONNECT GENERATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL AT	TRIMMERS	PURPOSE
6SA7GT grid	.1 mfd	455 kc.	Broadcast	HF end	D E F G	Align IF
6SK7GT RF grid	.1 mfd	1620 kc.	Broadcast	HF end	C	Set limit of band
6SK7GT RF grid	.1 mfd	1400 kc.	Broadcast	1400 kc.	B	Align RF
RMA loop	Through loop	1400 kc.	Broadcast	1400 kc.	A	Align antenna



Tube Layout



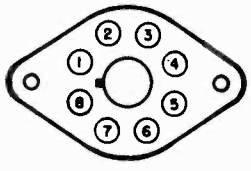
Dial Mechanism.

MODEL 4A43

THE FIRESTONE TIRE & RUBBER CO.

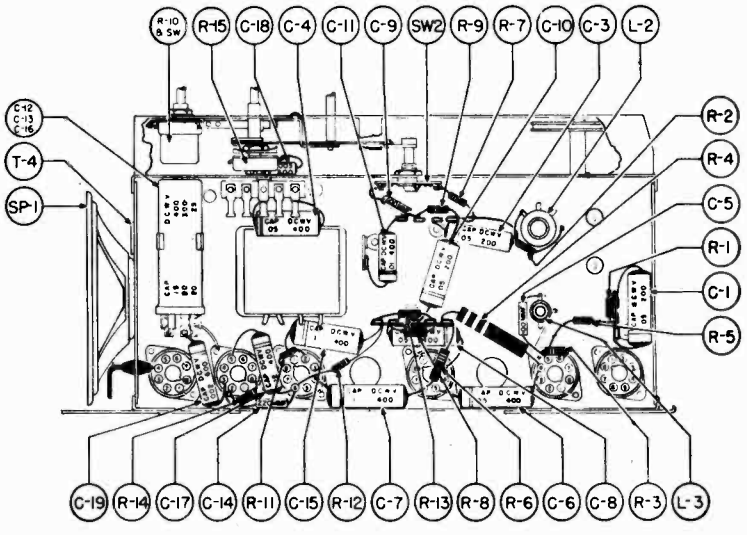
SOCKET VOLTAGES

TUBE	POSITION	1	2	3	4	5	6	7	8
6SK7GT	RF Amplifier	0	0	0	0	0	93	6.3 AC	270
6SA7GT	Converter	0	6.3 AC	270	113	-7.5	0	0	0
6SK7GT	IF Amplifier	0	0	0	0	0	93	6.3 AC	260
6SQ7GT	Detector—AVC—1st Audio	0	0	0	0	0	88	6.3 AC	0
6K6GT	Power Output	0	0	250	270	0	0	6.3 AC	19
5Y3GT	Rectifier	0	310	0	290 AC	0	290 AC	0	310



NOTE: All voltages measured from chassis to socket contact indicated.
DC voltages measured with a 1000 ohm-per-volt meter.
All voltages are positive DC unless otherwise marked.
Volume control full on. No signal.
Tone Control in clockwise position.
Line Voltage 117 volts AC.

Parts Layout



SERVICE PARTS LIST

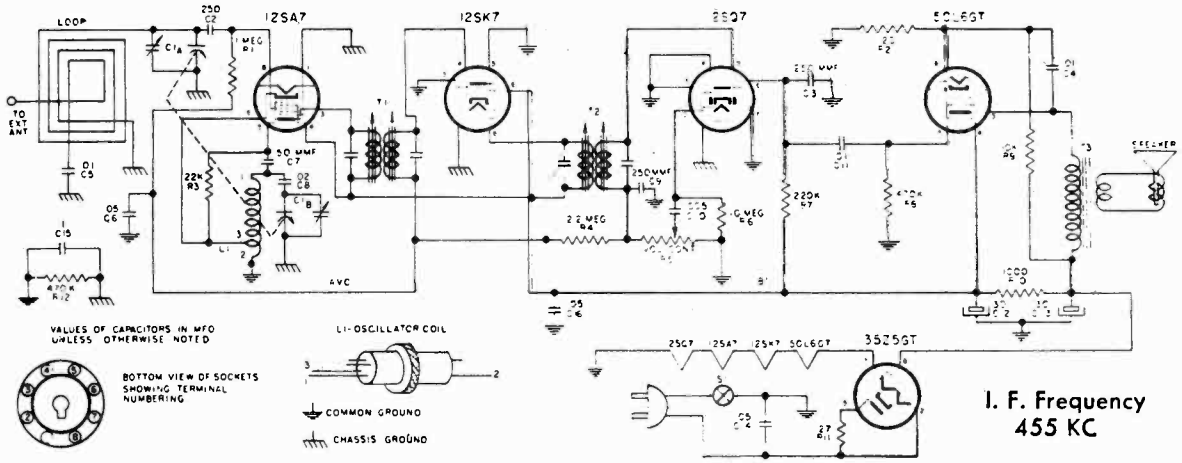
Symbol	Part No.	Description
C-1, 3, 10	BD210503	Cap., Paper, .05 mfd., 200 v.
C-11	BD410103	Cap., Paper, .01 mfd., 400 v.
C-7, 15	BD410104	Cap., Paper, .1 mfd., 400 v.
C-17	BD410203	Cap., Paper, .02 mfd., 400 v.
C-6, 8, 4	BD410503	Cap., Paper, .05 mfd., 400 v.
C-19	BD610202	Cap., Paper, .002 mfd., 600 v.
C-18	BD610502	Cap., Paper, .005 mfd., 600 v.
C-5, 9	BM78A101	Cap., Mica, 100 mmf.
C-14	BM78A221	Cap., Mica, 220 mmf.
R-14	BR16E561	Resistor, 560 ohm, 1 w.
R-2, 8	BR17B102	Resistor, 1000 ohm, ⅓ w.
R-9	BR17B103	Resistor, 10M ohm, ⅓ w.
R-1, 13	BR17B104	Resistor, 100M ohm, ⅓ w.
R-5	BR17B156	Resistor, 15 meg., ⅓ w.
R-3	BR17B223	Resistor, 22M ohm, ⅓ w.
R-12	BR17B224	Resistor, 220M ohm, ⅓ w.
R-7	BR17B335	Resistor, 3.3 meg., ⅓ w.
R-11	BR17B685	Resistor, 6.8 meg., ⅓ w.
R-6	BR17E223	Resistor, 22M ohm, 1 w.
R-4	BR17G153	Resistor, 15M ohm, 2 w.

Symbol	Part No.	Description
	A-2163	Cable, Dial
	A-3123	Clamp, Cable
	A-9285	Lamp, Pilot, Mazda No. 44
	A-51160-3	Cord, Power, 6 ft.
	A-51163	Clip, Spring
C-12, 13	A-51356	Cap., Electro., 15-20-20 mfd.
C-2	C-51501-1	Capacitor, Variable, 3-section
T-1	C-51502	Transformer, Power
L-2	B-51511	Coil, Assembly, RF
SP-1	C-51512	Speaker, 5" Dynamic, 485 ohm
L-3	B-51522	Coil Assembly, Osc.
	A-51531	Shaft, Drive
T-2	B-51416-2	Trans. Assembly, 1st IF
T-3	B-51417-2	Trans. Assembly, 2nd IF
	B-51591	Spring, Dial Bracket
	A-51787	Spring, Cable
	A-51801	Rivet, Pronged, 3/32 x 1/8
	B-55300-1	Channel, Rubber
SW-2	B-55500-1	Switch (Radio-Phono)
R-15	B-55550-1	Potentiometer, 500M ohm
R-10	B-55575-1	Potentiometer & Switch, 500M ohm

Order parts not listed by specifying (1) Part Name, (2) Model Number (include number following dash and (3) Run No.

MODEL 4-A-61,
THE CAMEO

THE FIRESTONE TIRE & RUBBER CO.

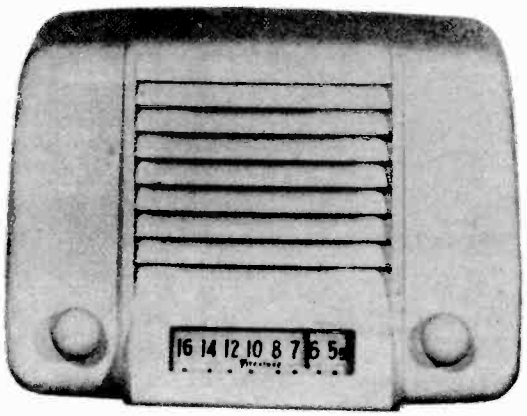


I. F. Frequency
455 KC

Code No.	Part No.	Description
C1A, C1B	19-173	Variable condenser
C2, C3, C9	A15-176	250 MMF mica condenser
C4, C5, C11	A16-156	.01 MFD 400 volt condenser
C6, C16	A16-152	.05 MFD 200 volt condenser
C7	A15-175	50 MMF mica condenser
C8	A16-150	.02 MFD 400 volt condenser
C10	A16-153	.005 MFD 600 volt condenser
C12, C13	B18-283	30 X 30 MFD 150 volt electrolytic condenser
C14	A16-158	.05 MFD 400 volt condenser
C15	A16-160	.1 MFD 400 volt condenser
R1	A60-668	1 megohm ½ watt resistor
R2	A60-702	120 ohm ½ watt resistor
R3	A60-659	22K ohm ½ watt resistor
R4	A60-684	2.2 megohm ½ watt resistor
R5	24-157	Volume control and switch, 1 megohm
R6	A60-663	10 megohm ½ watt resistor
R7	A60-667	220K ohm ½ watt resistor
R8, R12	A60-662	470K ohm ½ watt resistor
R9	A60-698	10K ohm 1 watt resistor
R10	A60-732	1000 ohm 1 watt resistor
R11	A60-690	27 ohm ½ watt resistor
T1	C10-475	1st I. F. Transformer
T2	A10-479	2nd I. F. Transformer
T3		Output transformer (part of speaker)
L1	B10-480	Oscillator coil

Tube Complement

12SA7	— Oscillator Converter
12SK7	— I. F. Amplifier
12SQ7	— AVC, Detector, 1st Audio
50L6GT	— Power Output
35Z5GT	— Rectifier



Power Supply
105-125 volt AC-DC

Tuning Range
540 to 1630 KC

Loud Speaker
4 inch P. M.

Voice Coil Impedance
3.2 ohms at 400 cycles

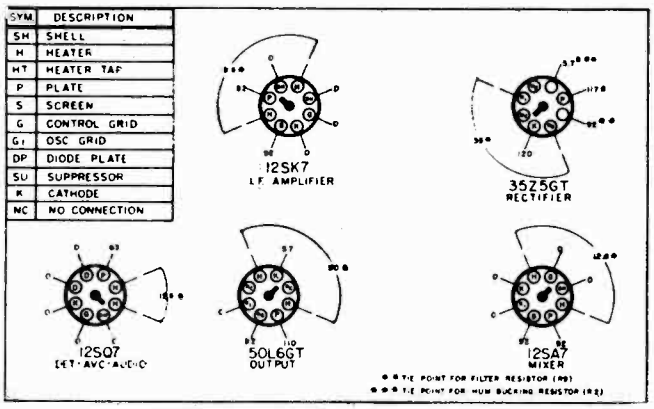
Power Output
Maximum 1.65 watts

REAR OF CHASSIS

VOLTAGE TABLE

(BOTTOM OF CHASSIS)

SYM	DESCRIPTION
SH	SHELL
H	HEATER
HT	HEATER TAP
P	PLATE
S	SCREEN
G	CONTROL GRID
G1	OSC GRID
DP	DIODE PLATE
SU	SUPPRESSOR
K	CATHODE
NC	NO CONNECTION



All voltages except heaters are measured from socket contacts to "common negative." Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.

*AC except when used on DC.

THE FIRESTONE TIRE & RUBBER CO.

MODEL 4-A-61, THE CAMEO

ALIGNMENT PROCEDURE

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

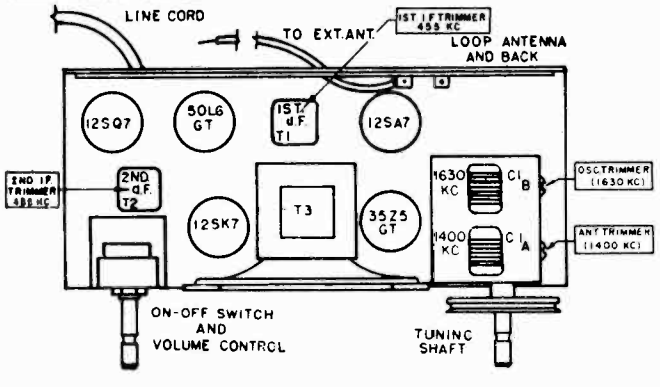
For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third. Before starting alignment:

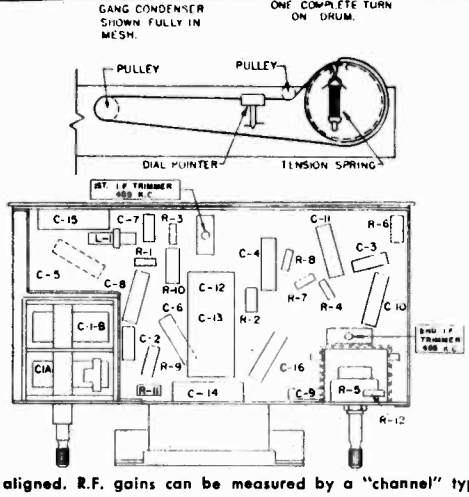
(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial pointer must be exactly even with the last mark at the low frequency end of the dial calibration. If dial pointer is incorrectly set, release pointer clip on dial cord and reposition pointer.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

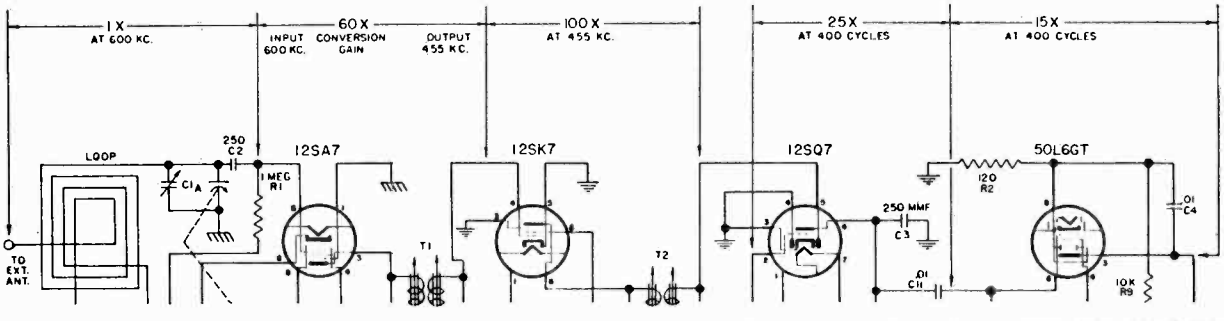
Steps	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	Minimum capacity (fully open)	455 K.C.	.1 MFD. condenser	High side to grid of tuning condenser. Low side to common negative. (through .25 MFD. Cond.)	Adjust each trimmer on the second I. F. transformer for maximum output—then adjust each trimmer on the first I. F. transformer for maximum output.
2	Minimum capacity (fully open)	Exactly 1630 K.C.	.00025 MFD. condenser	Receiver antenna lead. common negative	Adjust 1630 K.C. oscillator trimmer for maximum output.
3	Approx. 1400 K.C.	Approx. 1400 K.C.	.00025 MFD. condenser	Receiver antenna lead. common negative	While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.





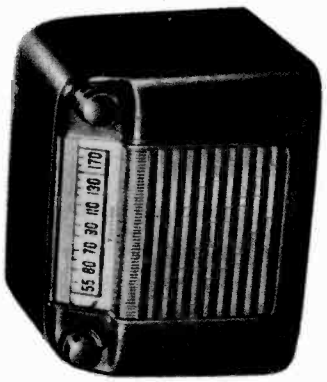
Before proceeding with stage measurements be sure the receiver is properly aligned. R.F. gains can be measured by a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe the following precautions:

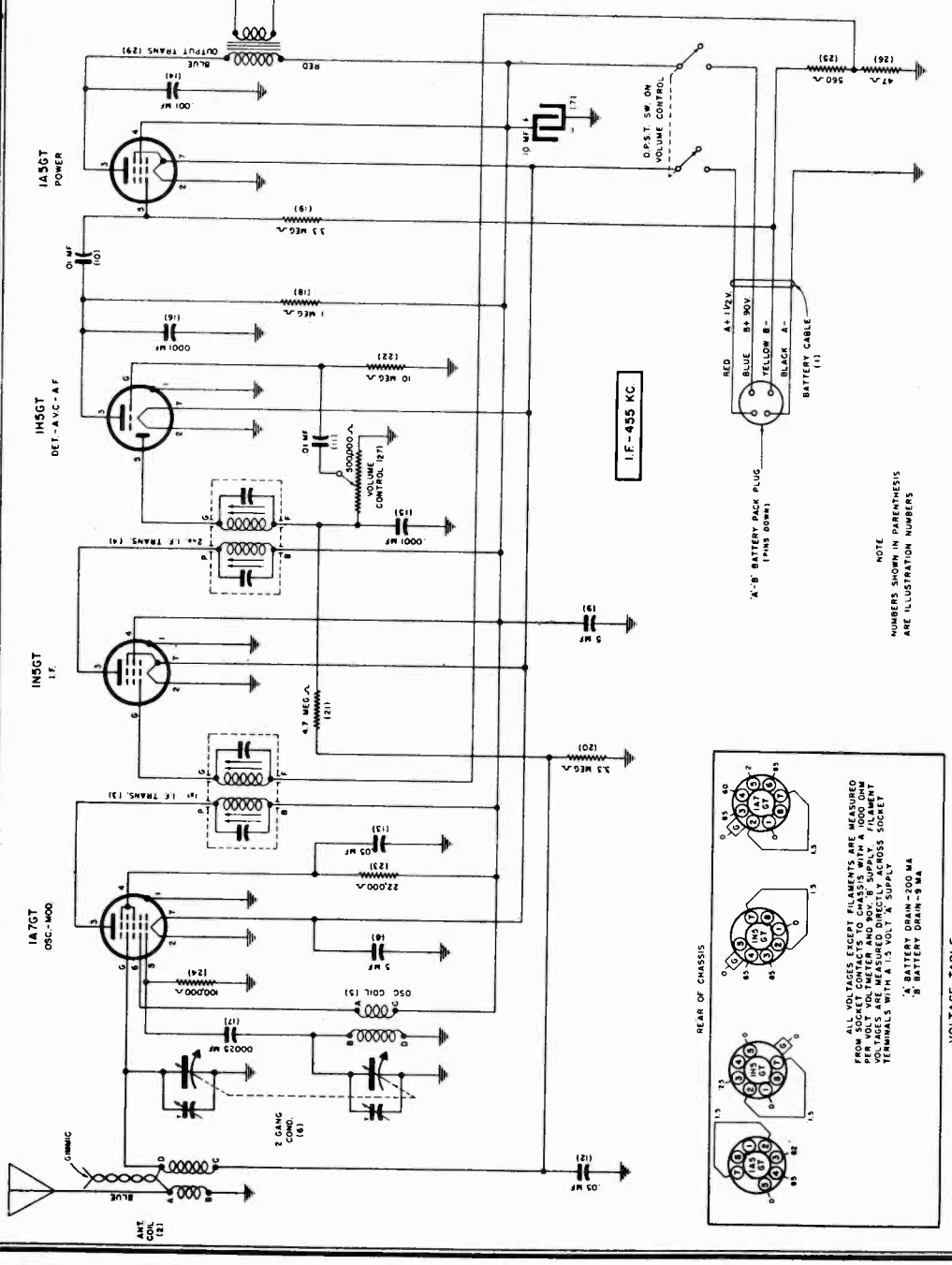
1. For all gain measurements connect the "high" side of a signal generator to the antenna lead through a .00025 mica condenser. The ground side of the signal generator should be connected to common negative. Use a 600 KC signal with 400 cycle modulation (use nearby frequency if local station interferes).
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.



Stage gain measurements can be influenced by the normal manufacturers tolerances allowed in parts, differences in individual tube characteristics, the adjustment of the tuned circuits and variations in line voltage. Careful tuning of the receiver as well as experience in using your test equipment will determine the accuracy of the measurements taken. Due to all of these factors, the stage gains shown in the above diagram are approximate values rather than absolute as it is possible to introduce many variations in these measurements.

MODEL 4-A-67 THE FIRESTONE TIRE & RUBBER CO.





POWER SUPPLY	Battery Operated
BATTERY SPECIFICATIONS	1000 hour Firestone Battery Stock No. 4-D-1
TUNING RANGE	528 to 1730 KC
INTERMEDIATE FREQUENCY	455 KC

LOUD SPEAKER	5 Inch P.M.
VOICE COIL IMPEDANCE	3.2 OHM at 400 Cycles
POWER OUTPUT	Undistorted - 100 Milliwatts Maximum - 200 Milliwatts
TUBE COMPLEMENT	1A7GT Oscillator Modulator, 1N5GT IF, 1H5GT Det. AVC, 1A5GT Power Output.

ALIGNMENT PROCEDURE

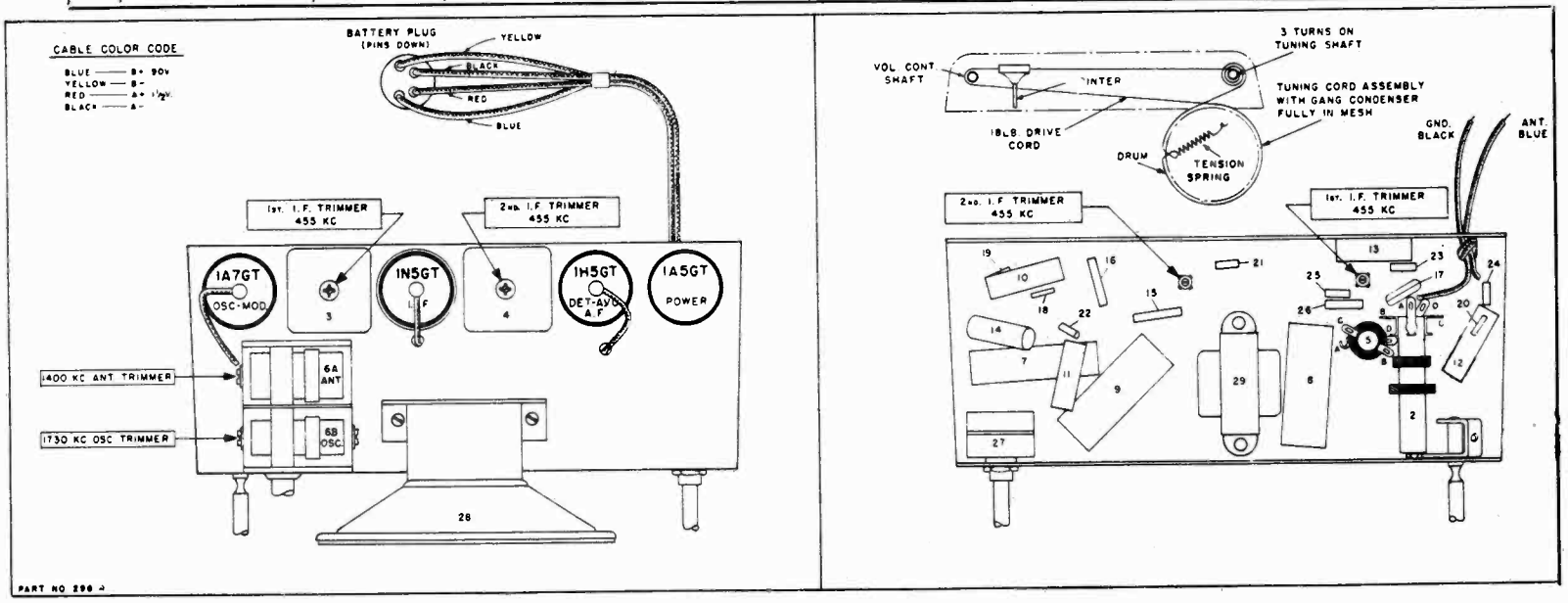
Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. Make the adjustment marked (1) first, (2) next, etc.

Before starting alignment:

(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move to correct position.

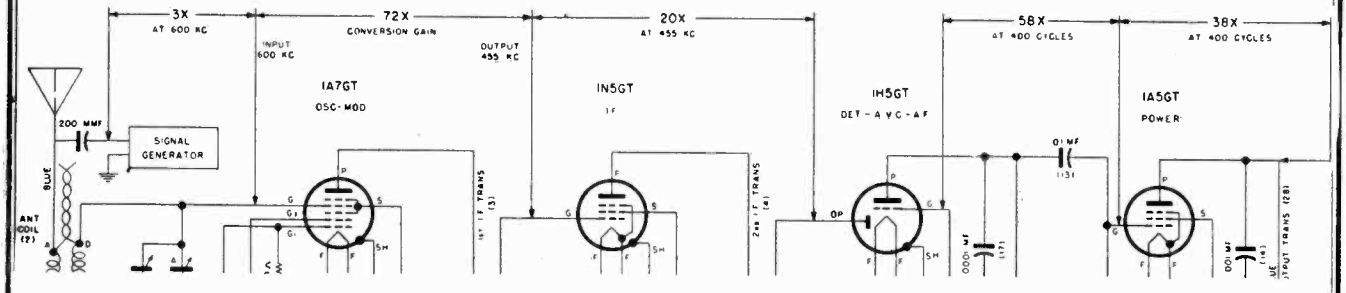
(b) Use an accurately calibrated test oscillator with some type of output measuring device.

Steps	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
1	I.F. Any point where no interference signal is received	455 K. C.	.02 MFD. condenser	High side to grid terminal of 1A7GT tube DO NOT REMOVE CAP. Low side to receiver black ground lead.	Adjust each of the second I.F. transformer trimmers for maximum output—then adjust each of the first I.F. trimmers for maximum output.
2	Exactly 1730 K. C.	Exactly 1730 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver black ground lead	Adjust 1730 K. C. oscillator trimmer for maximum output.
3	Exactly 1400 K. C.	Exactly 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver black ground lead	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.



Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions.

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gains. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

PARTS LIST

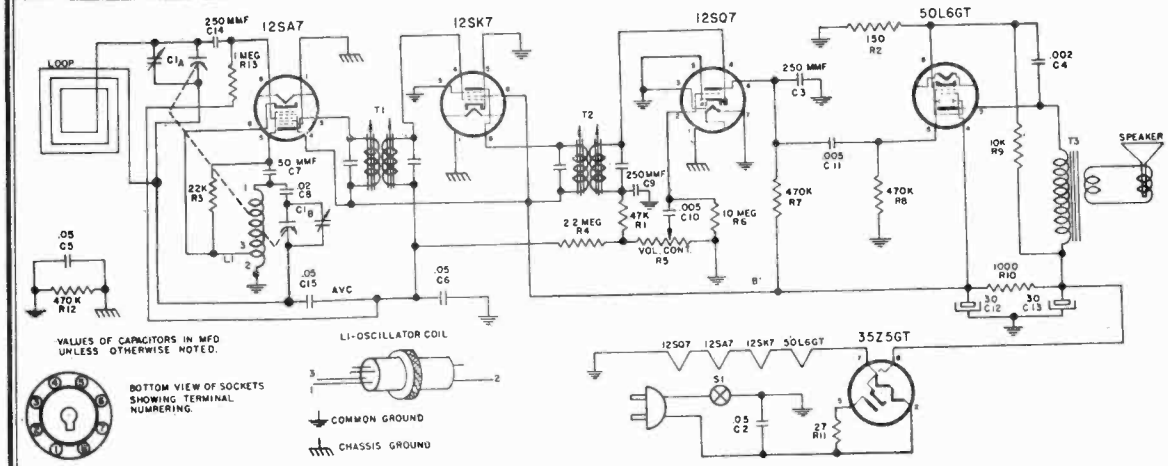
Illus. No.	Part No.	Part Name	Description
1	20E94-2	Cable	Battery with 4 Prong Plug
2	20E32	Coil	Antenna
3	20E261	Coil	1st I.F. Transformer
	or		
	20E307	Coil	1st I.F. Transformer
4	20E261-3	Coil	2nd I.F. Transformer
	or		
	20E307-3	Coil	2nd I.F. Transformer
5	20E77	Coil	Oscillator
6	**24E2**	**Condenser**	**Tuning, 2 Gang**
7	**25E9**	**Condenser**	**Tubular, Dry Elect. 10 Mfd. 100 V.**
8	23E224	Condenser	Tubular, .5 Mfd. 200 V.
9	23E224	Condenser	Tubular, .5 Mfd. 200 V.
10	23E151	Condenser	Tubular, .01 Mfd. 120 V.
11	23E151	Condenser	Tubular, .01 Mfd. 120 V.
12	23E216	Condenser	Tubular, .05 Mfd. 200 V.
13	23E216	Condenser	Tubular, .05 Mfd. 200 V.
14	23E204	Condenser	Tubular, .001 Mfd. 200 V.
15	23E11	Condenser	Fixed Ceramic, .0001 Mfd. 500 V.
16	23E11	Condenser	Fixed Ceramic, .0001 Mfd. 500 V.
17	23E42	Condenser	Mica, .00025 Mfd. 500 V.
18	27E105	Resistor	Carbon, 1 Megohm, 1/3 Watt
19	27E335	Resistor	Carbon, 3.3 Megohm, 1/3 Watt
20	27E335	Resistor	Carbon, 3.3 Megohm, 1/3 Watt
21	27E475	Resistor	Carbon, 4.7 Megohm, 1/3 Watt
22	27E106	Resistor	Carbon, 10 Megohm, 1/3 Watt
23	27E223	Resistor	Carbon, 22,000 Ohm, 1/3 Watt
24	27E104	Resistor	Carbon, 100,000 Ohm, 1/3 Watt
25	27E561	Resistor	Carbon, 560 Ohm, 1/3 Watt
26	27E470	Resistor	Carbon, 47 Ohm, 1/3 Watt
27	**28E11**	**Vol. Control**	**With D.P.S.T. Switch, 500,000 Ohm**
28	1E9	Speaker	5" P.M.
29	22E25	Transformer	Output

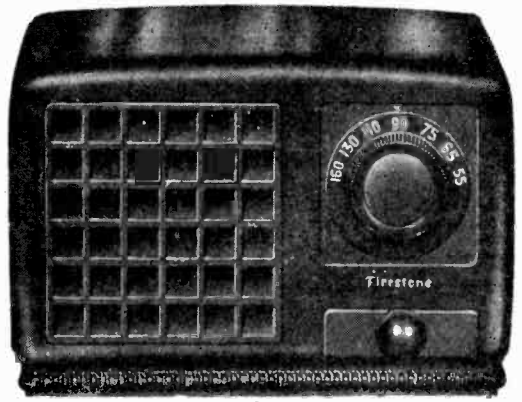
MISCELLANEOUS PARTS

Part No.	Part Name	Description
7E76-4	**Cabinet**	**Walnut Cabinet**
7E83	Cabinet Back	Back for Cabinet
20E253-11	Dial Cord	Drive Cord Assembly
65E2	Dial Cord Spring	Dial Cord Tension Spring
20E270-3	Dial Shaft Assembly	Drive Shaft Assembly
36E40	**Dial Scale**	**Calibrated Scale**
35E8	Dial Pointer	Dial Needle
35E15	Dial Indicator	"ON-OFF" Indicator
37E27-41	Knob	Walnut Knob
17E3-4	Plug	4 Prong Battery Plug
46E14	Throw-Arm	Operates "ON-OFF" Indicator

MOUNTING HARDWARE

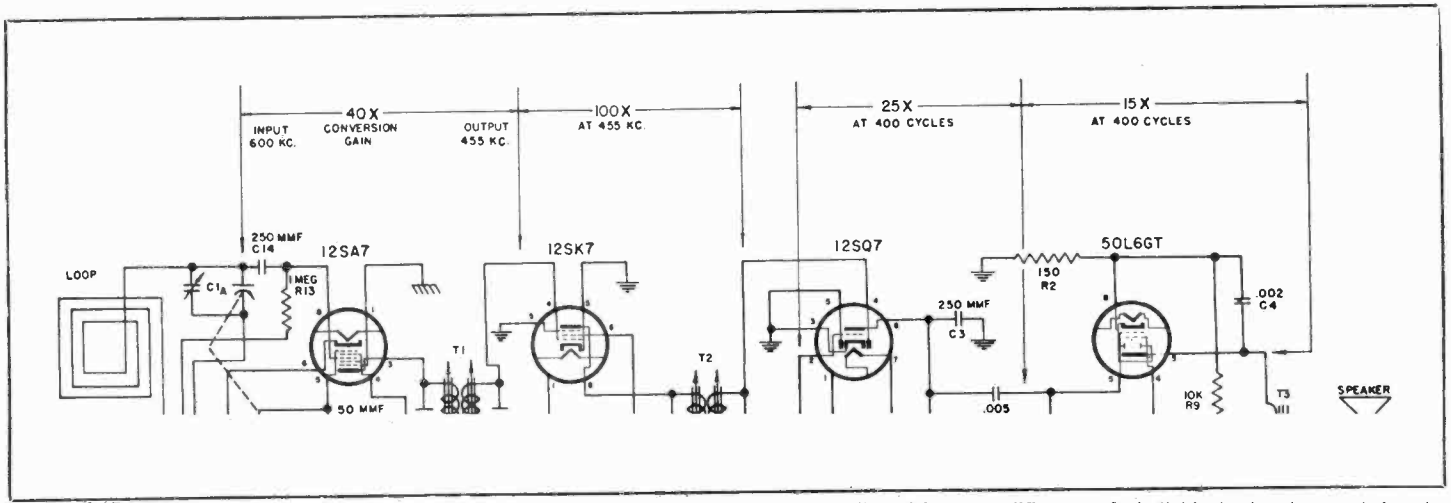
Part No.	Part Name	Description
12E6-F10	Washer	Metal Washer used with 82E36 Screw for Mtg. Back —Lower Right & Left Corners
82E36	Screw	6—20x5/16 Rd. Rec. Hd. Shakeproof Type No. 25 used with 12E6 Washer
82E3	Screw	4—24x1/4 Rd. Rec. Hd. Shakeproof Type No. 25 For Mtg. Dial Scale
10E43	Stud	Trimount Stud to Mount Cabinet Back
12E52	Washer	Fibre Washer for Mounting Dial Scale
12E104	Washer	Spring Washer for Mounting Dial Scale
13E103-2	Washer	Speed Clip Washer for Mtg. Dial Scale
82E55	Screw	8—18x1/2 Rd. Rec. Hd. Shakeproof Type No. 25 Chassis Mounting Screw
12E114	Washer	Special Washer Used with 82E55 Chassis Mounting Screw





Before proceeding with stage measurements be sure the receiver is properly aligned. R.F. gains can be measured by a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe the following precautions:

1. For all gain measurements connect the "high" side of a signal generator to the grid of the tuning condenser, C1A, through a .00025 mica condenser. The ground side of the signal generator should be connected to common negative. Use a 600 KC signal with 400 cycle modulation (use nearby frequency if local station interferes).
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.



Stage gain measurements can be influenced by the normal manufacturers tolerances allowed in parts, differences in individual tube characteristics, the adjustment of the tuned circuits and variations in line voltage. Careful tuning of the receiver as well as experience in using your test equipment will determine the accuracy of the measurements taken. Due to all of these factors, the stage gains shown in the above diagram are approximate values rather than absolute as it is possible to introduce many variations in these measurements.

ALIGNMENT PROCEDURE

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third. When making alignment:

(a) Use an accurately calibrated test oscillator with some type of output measuring device.

(b) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

Steps	Set receiver dial to:	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	
1	Minimum capacity (fully open)	455 K.C.	.1 MFD. condenser	High side to grid of tuning condenser, C1A. Low side to common negative. (through .25 MFD. Cond.)	Adjust each trimmer on the second I. F. transformer for maximum output—then adjust each trimmer on the first I. F. transformer for maximum output.
2	Minimum capacity (fully open)	Exactly 1630 K.C.	.00025 MFD. condenser	High side to grid of tuning condenser, C1A. Low side to common negative.	Adjust 1630 K.C. oscillator trimmer for maximum output.
3	Approx. 1400 K.C.	Approx. 1400 K.C.	.00025 MFD. condenser	Loosely coupled to loop.	While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.

SPECIFICATIONS

I. F. Frequency
455 KC

Loud Speaker
5 inch P. M.

Voice Coil Impedance
3.2 ohms at 400 cycles

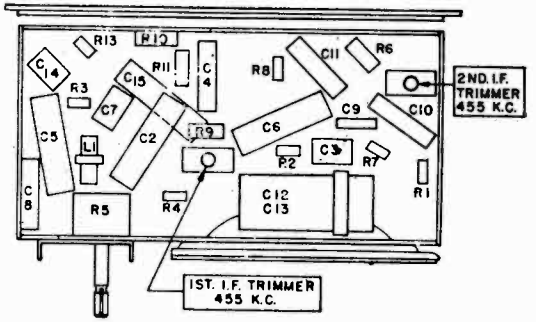
Power Output
Maximum 1.65 watts

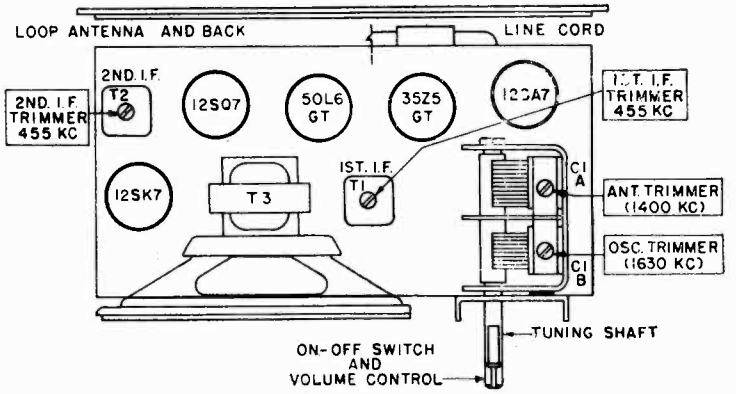
Tube Complement

12SA7 — Oscillator Converter
12SK7 — I. F. Amplifier
12SQ7 — AVC, Detector, 1st Audio
50L6GT — Power Output
35Z5GT — Rectifier

Power Supply
105-125 volts, 50-60 cycles, AC or DC

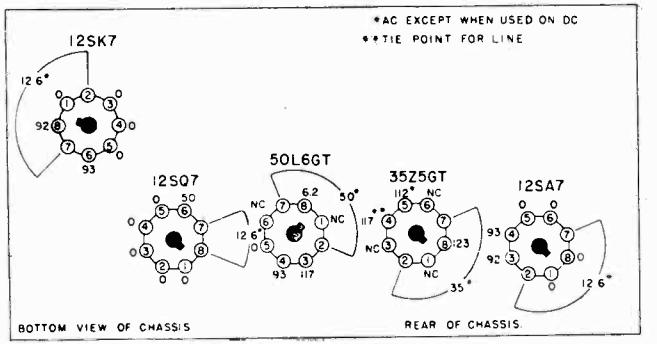
Tuning Range
540 to 1630 KC





VOLTAGE TABLE

(BOTTOM OF CHASSIS)



REAR OF CHASSIS

All voltages except heaters are measured from socket contacts to "common negative." Heater voltages are measured across socket contacts. All voltages measured with a 20,000 ohms per volt meter.

*AC except when used on DC.

Code No.	Part No.	Description
C1A, C1B	B19-199	Variable condenser
C2, C5	A16-158	.05 MFD 400 volt condenser
C3, C9, C14	A15-176	250 MMF mica condenser
C4	A16-155	.002 MFD 600 volt condenser
C6, C15	A16-152	.05 MFD 200 volt condenser
C7	A15-175	50 MMF mica condenser
C8	A16-150	.02 MFD 400 volt condenser
C10, C11	A16-153	.005 MFD 600 volt condenser
C12, C13	B18-283	30 x 30 MFD 150 volt electrolytic condenser
R1	A60-685	47K ohm ½ watt resistor
R2	A60-686	150 ohm ½ watt resistor
R3	A60-659	22K ohm ½ watt resistor
R4	A60-684	2.2 megohm ½ watt resistor
R5	A24-174	Volume control and switch, 1 megohm
R6	A60-663	10 megohm ½ watt resistor
R7, R8, R12	A60-662	470K ohm ½ watt resistor
R9	A60-698	10K ohm 1 watt resistor
R10	A60-732	1000 ohm 1 watt resistor
R11	A60-690	27 ohm ½ watt resistor
R13	A60-668	1 megohm ½ watt resistor
T1, T2	A10-479	1st and 2nd I. F. Transformer
T3		Output transformer (part of speaker)
L1	B10-502	Oscillator coil

MISCELLANEOUS PARTS

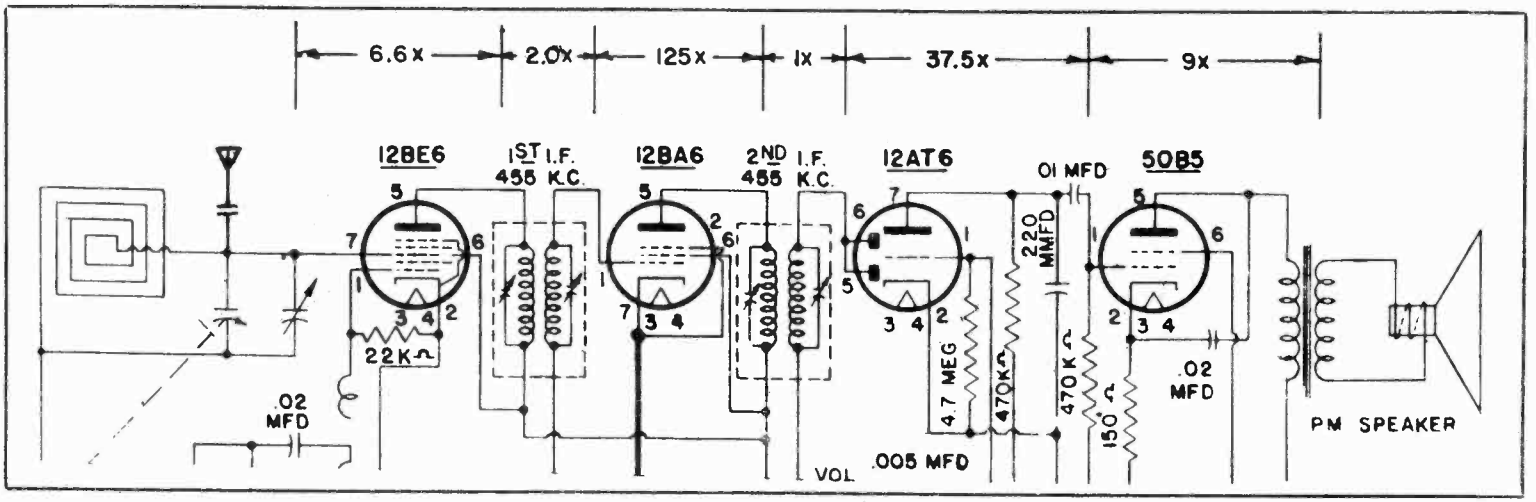
C42-449	Cabinet, molded
C52-274	Knob, tuning, calibrated
A52-275	Knob, volume control
A23-151	Line cord
SB82-56	Loop antenna, with cabinet back
B79-363	Speaker, 5" P.M. (includes output transformer)

Before proceeding with stage measurements be sure the receiver is properly aligned. R.F. gains can be measured by a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe the following precautions:

1. For all gain measurements connect the "high" side of a signal generator to the flexible antenna lead. The ground side of the signal generator is connected through a .25 Mfd. condenser to receiver chassis. Use a 600 K.C. signal with 400 cycle modulation. (Use nearby frequency if local station interferes.)

2. Be sure radio is carefully tuned to generator signal. (Use weak signal for sharp tuning.)

3. When using a "channel" type instrument, carefully tune it for maximum output at desired frequency before making measurements.



Stage gain measurements can be influenced by the normal manufacturers tolerances allowed in parts, differences in individual tube characteristics, the adjustment of the tuned circuits and variations in line voltage. Careful tuning of the receiver as well as experience in using your test equipment will determine the accuracy of the measurements taken. Due to all of these factors, the stage gains shown in the above diagram are approximate values rather than absolute as it is possible to introduce many variations in these measurements.

I. F. Frequency
455 KC

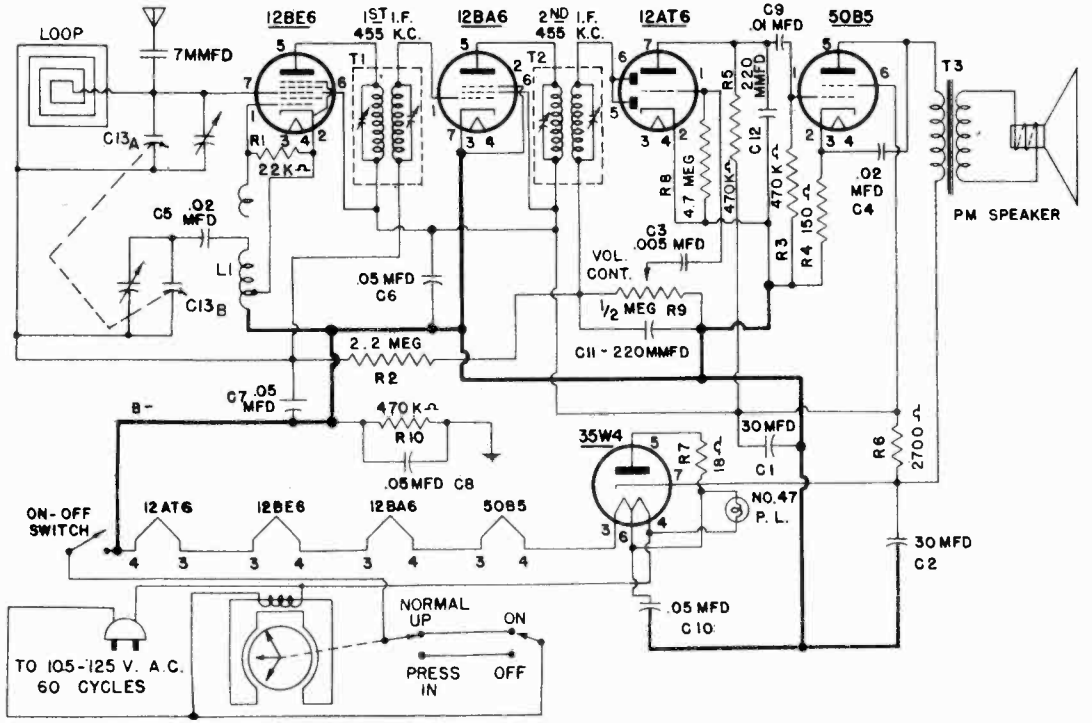
Loud Speaker
4 inch P. M.

Voice Coil Impedance
3.2 ohms at 400 cycles

Power Output
Maximum 1.25 watts

Power Supply
105-125 Volt, 60 Cycle. A.C. only

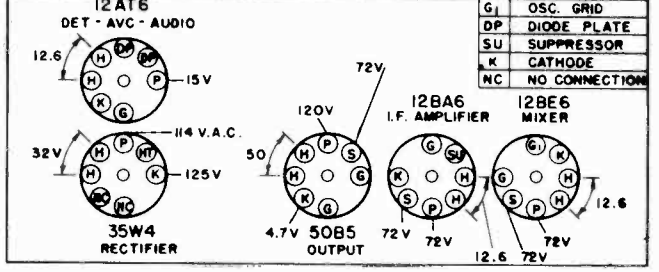
Tuning Range
535 to 1700 KC



VOLTAGE TABLE
(BOTTOM OF CHASSIS)

ALL VOLTAGES EXCEPT HEATERS ARE MEASURED FROM SOCKET CONTACTS TO B MINUS. HEATER VOLTAGES ARE MEASURED ACROSS SOCKET CONTACTS. ALL VOLTAGES MEASURED WITH A 1000 OHMS PER VOLT METER.

SYM	DESCRIPTION
SH	SHELL
H	HEATER
HT	HEATER TAP
P	PLATE
S	SCREEN
G	CONTROL GRID
G_1	OSC. GRID
DP	DIODE PLATE
SU	SUPPRESSOR
K	CATHODE
NC	NO CONNECTION



Tube Complement

12BE6	— Oscillator Converter
12BA6	— I. F. Amplifier
12AT6	— AVC, Detector, 1st Audio
50B5	— Power Output
35W4	— Rectifier

Code No.	Part No.	Description
C1, C2	2033-2	30 x 30 MFD 150 volt electrolytic condenser
C3	2000-5	.005 MFD 400 volt condenser
C4, C5	2000-2	.02 MFD 400 volt condenser
C6, C7, C10	2000-4	.05 MFD 400 volt condenser
C8	2000-25	.05 MFD 600 volt condenser
C9	2000-1	.01 MFD 400 volt condenser
C11, C12	2012-1	220 MMFD ceramicon condenser
C13A, C13B	2003 C	Variable condenser
R1	3003-16	22K ohm ½ watt resistor
R2	3003-14	2.2 Megohm ½ watt resistor
R3, R5, R10	3003-13	470K ohm ½ watt resistor
R4	3003-11	150 ohm ½ watt resistor
R6	3004-3	2700 ohm 2 watt resistor
R7	3003-12	18 ohm ½ watt resistor
R8	3003-15	4.7 Megohm ½ watt resistor
R9	3013-3	½ Megohm volume control and switch
		Dial Cord, 40" long

Code No.	Part No.	Description
T1	1046-3	1st I.F. transformer
T2	1046-4	2nd I.F. transformer
T3	1048	Output transformer
L1	1049	Oscillator coil
	1073	Loop antenna
	7009	Speaker, 4 inch P.M.
	5008	Line Cord
	8026-2	Clock
	6017 B	Clock face
	6013C	Clock Crystal
	9113	Dial pointer
	6016	Dial scale (glass)
	8001	Pilot lamp socket
		#47 Pilot lamp
	4077A	Cabinet, molded, mahogany
	4079	Cabinet back
	4080-3	Knob, mahogany
	4066-2	Clock knob, mahogany

ALIGNMENT PROCEDURE

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

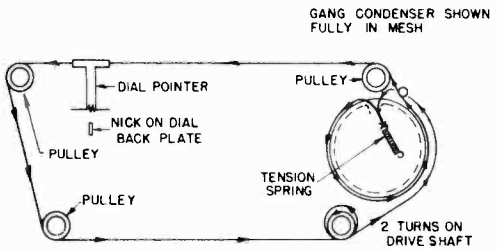
For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third. Before starting alignment:

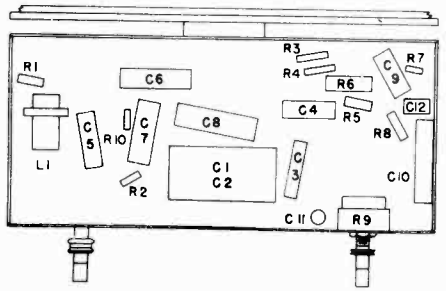
(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial pointer must be exactly even with the last mark at the low frequency end of the dial calibration. If dial pointer is incorrectly set, release pointer clip on dial cord and reposition pointer.

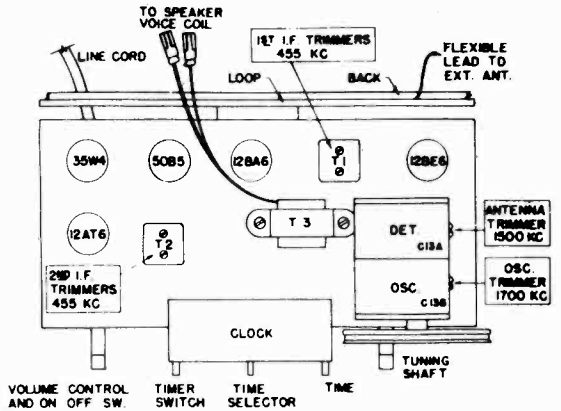
(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

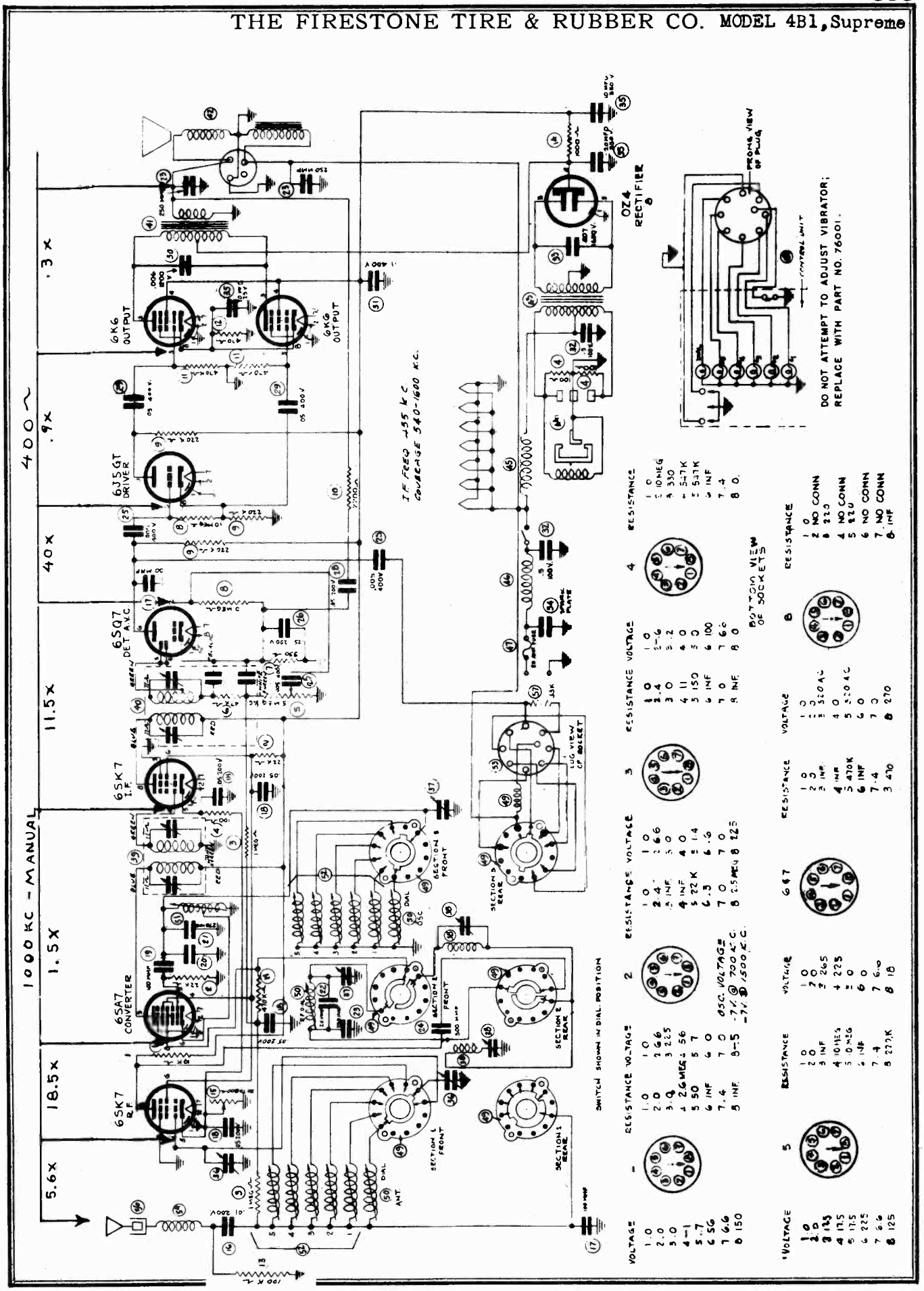
Steps	Set receiver dial to:	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	
1	Minimum capacity (fully open)	455 K.C.	.1 MFD. condenser	High side to grid of tuning condenser. Low side to B– buss (through .25 MFD. Cond.)	Adjust each trimmer on the second I. F. transformer for maximum output—then adjust each trimmer on the first I. F. transformer for maximum output.
2	Minimum capacity (fully open)	Exactly 1700 K.C.	NONE	High side to receiver antenna lead. Low side to chassis. (Through .25 Mfd. Cond.)	Adjust 1700 K.C. oscillator trimmer for maximum output.
3	Approx. 1500 K.C.	Approx. 1500 K.C.	NONE	High side to receiver antenna lead. Low side to chassis. (Through .25 Mfd. Cond.)	While rocking gang condenser adjust 1500 K.C. antenna trimmer for maximum output.







THE FIRESTONE TIRE & RUBBER CO. MODEL 4B1, Supreme



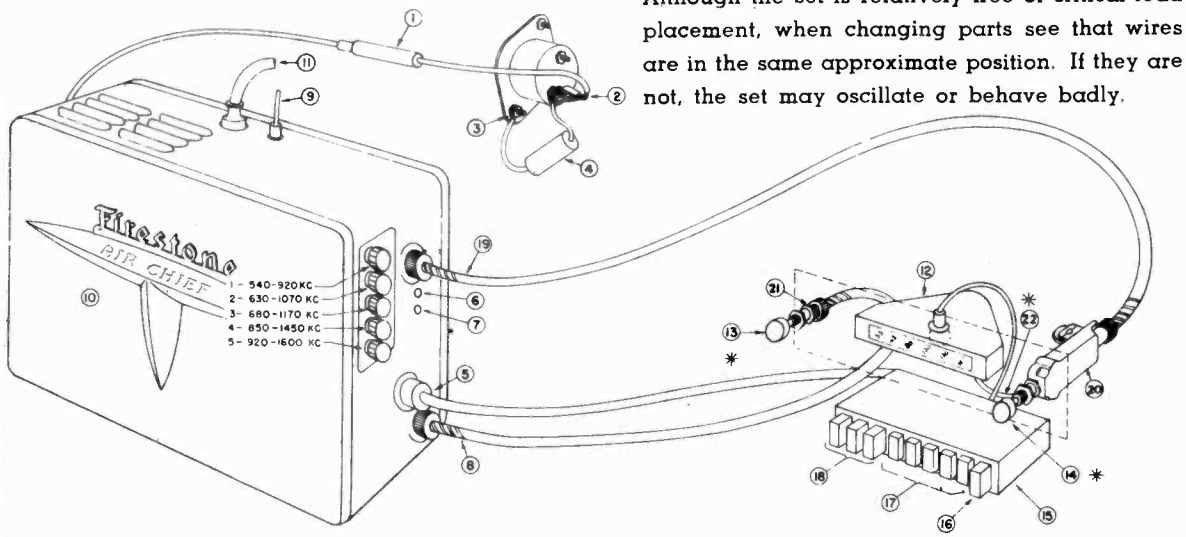


Fig. 3

1. Fuse Holder } Part No. 11160
2. "A" Power Lead }
3. Ground Connection
4. Ignition Interference Capacitor, Part No. 25120
5. Plug for Monomatic Tuner, Part of Part No. 15536
6. Antenna Trimmer, Manual Tuning
7. Antenna Trimmer, Automatic Tuning
8. Volume Control Flexible Cable, Part No. 15057
9. Antenna Lead (Part of Antenna)
10. Receiver PM-15
11. Speaker Cable, Part No. 27178
12. Slide Rule Dial, Part No. 13428
13. Volume Control Knob } Part No. 59314
14. Manual Control Knob }
15. Monomatic Tuner, Part No. 15536
16. Push Button Station Selector, Part of Part No. 15536
17. Station Indicators, Part of Part No. 15536
18. Tone Control Push Buttons, Part of Part No. 15536
19. Manual Tuning Control Cable, Part No. 15057
20. Tuning Control "Worm Reduction", Part No. 13538
21. Volume Control Shaft Bushing, Part No. 13537
22. Dial Drive Flexible Cable, Part No. 27298

All items except 13, 14, and 22 are packed with the receiver, other items are packed with the control kit.

PUSH BUTTON ADJUSTMENT

It is advisable to adjust the push buttons while set is still on the bench. With set operating and connected to the antenna, make a list of the five stations for which you desire Monomatic tuning. The stations chosen must be such that each will come within a different frequency range, as indicated by the following list. For example, it would not be possible to choose both a 550 kc station and a 600 kc station, since 600 kc does not come within the range of position #2. Arrange the stations in order of their frequency: that is, the station of lowest frequency will be #1; of next higher frequency, #2, next.

STATION	FREQUENCY RANGE
#1	540 to 920 kc
#2	680 to 1170 kc
#3	850 to 1450 kc
#4	850 to 1450 kc
#5	920 to 1570 kc

Operate the Monomatic button (marked Push) until the dial becomes illuminated, indicating that the receiver is adjusted for Dial Tuning. Then tune your #5 station, using the Station Selector knob. Operate the Monomatic button until the #5 station indicator (furthest right of the station indicators) becomes illuminated.

Turn the knob, located on the side of the set, which has the range 920-1570 kc indicated below it, until the desired station is heard at maximum volume.

After setting button #5, the antenna should be matched by adjusting the screw marked P. B. Antenna Trimmer in Figure 3, as #7. This screw is covered by a snap button. Slowly turn this screw until maximum volume is secured.

Return to Manual then tune in until your #1 indicator becomes illuminated. Then proceed to adjust the knob for this station until maximum signal is heard.

Assuming the lid is removed, place a 5/16 open end wrench on adjusting nut immediately ahead of heavy compression spring and adjust for further increase in signal, then readjust red knob for maximum signal. This is actually a tracking operation and will give optimum performance. This operating should be repeated for each button position.

After the car installation is made, it is recommended that all the red buttons be rechecked for maximum response.

After this re-check is completed, it is necessary to adjust the manual antenna trimmer, see #6. The adjusting screw for this is accessible after removing the snap button.

Return the set to dial tuning, turn the manual tuning control until a station near 1400 kc is heard, then adjust this screw for maximum volume. Now with set in car, depress monomatic button until #5 station is again illuminated. Check #7 trimmer for maximum signal.

MODEL 4-B-1 CODE 7-C-PM15

	Part No.	Name of Part		Part No.	Name of Part
1.	77180	10 K. Ohms	37.	26114	Trimmer Ass'y
2.	77169	22 K. Ohms	38.	38276	R. F. Coil Ass'y
3.	77181	1 Meg. Ohms	39.	38274	1st I. F. Ass'y
4.	77176	100 Ohms	40.	38275	2nd I. F. Ass'y
5.	78042	.5 Meg. Vol. Control	41.	94111	Output Transformer
6.	77172	47 K. Ohms	42.	11163	Speaker & Cable Ass'y
7.	77179	330 Ohms	43.	94078	Power Transformer
8.	77182	10 Meg. Ohms	44.	76001	Vibrator
9.	77178	220 K. Ohms	45.	38277	Vibrator Choke
10.	77194	2200 Ohms	46.	38278	A. Choke
11.	77173	470 K. Ohms	47.	48007	Fuse, 20 Amp.
12.	77125	470 Ohms, 1 Watt	48.	41100	Control Unit
13.	77167	100 K. Ohms	49.	90070	Switch & Stepper Ass'y
14.	77123	1000 Ohms, W. W., 1 W.	50.	38273	Permeability Tuner
15.	78031	Sensitivity Control	51.	38280	Shunt Tracking Coil
16.	25112	.01-200 V.	52.	38311	P. B. Coil Ass'y
17.	25188	100 MMF.	53.	80136	Control Socket
18.	25111	.05-200	54.	38279	Ant. Spark Choke
19.	25106	100 MMF., XM-262	56.	561367	Ant. Cable Recp.
20.	25117	Compensating Cap		41084	Monomatic Tuner with Extra Length Cable
21.	25190	270 MMF., Sil. Mica Cap		41083	Extra Length Control Cable Kit
22.	25121	20 MMF.		15100	Extra Length Control Cable
23.	25187	250 MMF.	57.	77183	33 K. Ohms
24.	25189	500 MMF.	58.	11160	Fuse Holder
25.	25105	.005-400 V.	59.	11160	"A" Power Lead
26.	25114	.25-200 V.	60.	25120	Ignition Interference Capacitor
27.	25116	.005-400 V.	61.	15057	Volume Control Flexible Cable
28.	25102	.05-200	62.	27178	Speaker Cable
29.	25105	.05-400	63.	13428	Slide Rule Dial
30.	25110	.006-1200 V.	64.	59314	Volume Control Knob
31.	25103	.1-400 V.	65.	59314	Manual Control Knob
32.	25118	.5-100 V.	66.	15536	Monomatic Tuner
33.	25109	.007-1600 V.	67.	15057	Manual Tuning Control Cable
34.	25100	Spark Plate	68.	13538	Tuning Control "Worm Reduction"
35.	25099	Electrolytic	69.	13537	Volume Control Shaft Bushing
36.	26113	Trimmer	70.	27298	Dial Drive Flexible Cable

Volume control full on, tone control on speech position. Keep generator input low except as noted (*) below.

Connect output meter across voice coil of speaker.

Connect signal generator ground lead to receiver chassis.

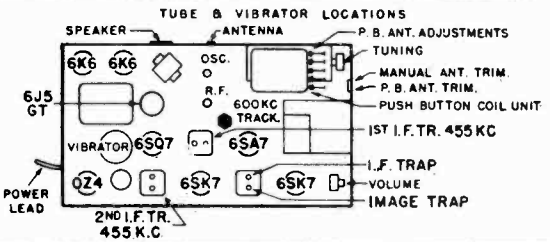
Connect signal generator output lead to antenna.

To adjust image rejector, return set to button #5. Set generator to 1500 kc. Adjust button for maximum signal at 1500 kc. Then set generator to image frequency 24100 and adjust image rejector for minimum signal. Use high generator output.

Dial	Generator Frequency	Dummy Antenna	Adjustments
540 kc	455 kc	.1 Mfd	1st & 2nd IF
*540 kc	455 kc	.1 Mfd	IF Trap
Highest Frequency	1600 kc	.0001 Mfd	Osc., RF, Antenna
600 kc	600 kc	.0001 Mfd	600 kc Track

MODEL 4-B-2 CODE 7-6-PM14

	Part No.	Name of Part		Part No.	Name of Part
1.	77180	10 M Ohm	29.	25112	.01-200 V.
2.	78031	Sensitivity C	30.	25189	500 MMF.
3.	77181	1 Meg.	31.	561367	Antenna Cable Recp.
4.	77069	22 M Ohm, ½ W.	32.	38279	Antenna Spark Choke
5.	77172	47 M Ohm	33.	38281	Permeability Tuner
6.	78042	.5 Meg. Vol. Control	34.	38280	Shunt Tracking Coil
7.	77182	10 Meg.	35.	26116	Trimmer Assembly
8.	77178	220 M Ohm	36.	26115	Antenna Trimmer
9.	77173	470 M Ohm	37.	38274	1st I. F. Assembly
10.	77179	330 Ohm	38.	38275	2nd I. F. Assembly
11.	77123	1000 Ohm	39.	94080	Output Transformer
12.	77176	100 Ohm	40.	11164	Speaker & Cable
13.	77183	33 M Ohm	41.	94078	Power Transformer
14.	77069	22 M Ohm, 1 W.	42.	76001	Vibrator
15.	25111	.05-200 V.	43.	38277	Vibrator Choke
16.	25102	.05-200 V.	44.	38278	A. Choke
17.	25188	100 MMF.	45.	48007	Fuse, 20 Amp.
18.	25104	.005-400 V.	46.	25124	Silver Mica Cond., 420 MMF.
19.	25116	.005-400 V.	47.	41083	Extra Length Control Cable
20.	25113	.01-400 V.	48.	11160	Fuse Holder
21.	25119	.002-200 V.	49.	11160	"A" Lead Assembly
22.	25103	.1-400 V.	50.	25120	Capacitor
23.	25099	Electrolytic	51.	15057	Flexible Shaft Tuning
24.	25110	.006-1200 V.	52.	15057	Flexible Shaft Volume Control
25.	25109	.007-1600 V.	53.	11172	Pilot Light and Cable Assembly
26.	25118	.5-100 V.	54.	13428	Slide Rule Dial
27.	25100	Spark Plate	55.	13538	Tuning Control Worm Reduction
28.	25121	20 MMF.	56.	13537	Volume Control Shaft Bushing

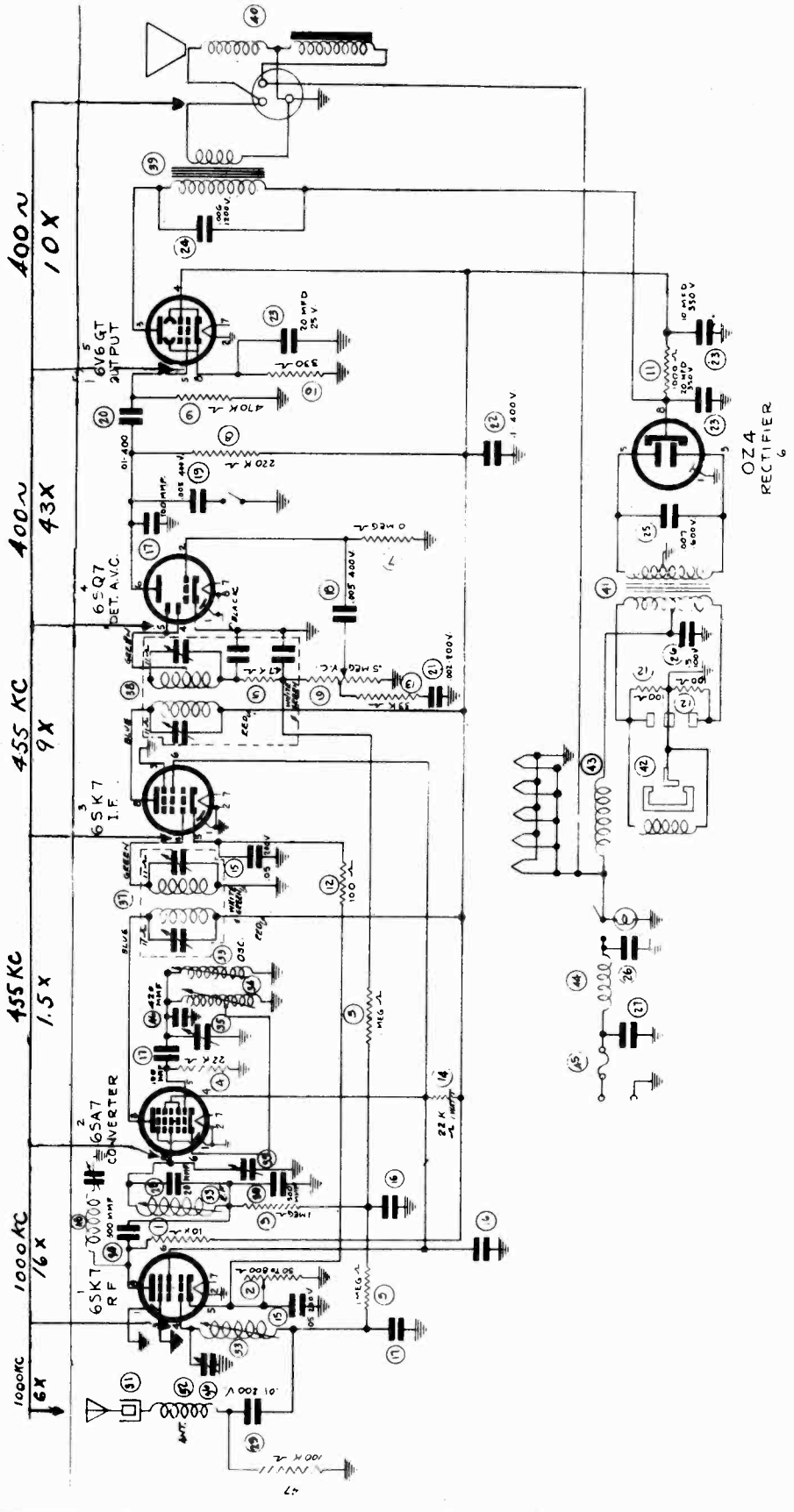


THE FIRESTONE TIRE & RUBBER CO.

MODEL 4B1, Supreme
MODEL 4B2, DeLuxe

MODEL 4B2, DeLuxe

THE FIRESTONE TIRE & RUBBER CO.



ALIGNMENT PROCEDURE

	Dial	Generator Frequency	Dummy Antenna	Adjustments
1. Volume control full on, tone control on speech position. Keep generator input low except as noted by (*) below.	540 kc	455 kc	.1 Mfd.	1st & 2nd IF
2. Connect output meter across voice coil of speaker.	*540 kc	455 kc	.1 Mfd.	IF Trap
	Highest Frequency	1600 kc	.0001 Mfd.	Osc., RF, Antenna
3. Connect signal generator ground lead to receiver chassis.	600 kc	600 kc	.0001 Mfd.	600 kc Track

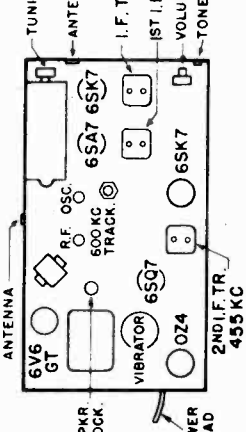
Repeat Alignment procedure to insure accuracy.

4. Connect signal generator output lead to antenna.

*Keep generator input low except as noted by (*).

DO NOT ATTEMPT TO ADJUST VIBRATOR; REPLACE WITH PART NO. 76001.

TUBE & VIBRATOR LOCATIONS



MODEL 4B2, DeLuxe

THE FIRESTONE TIRE & RUBBER CO.

CONNECTING THE RECEIVER

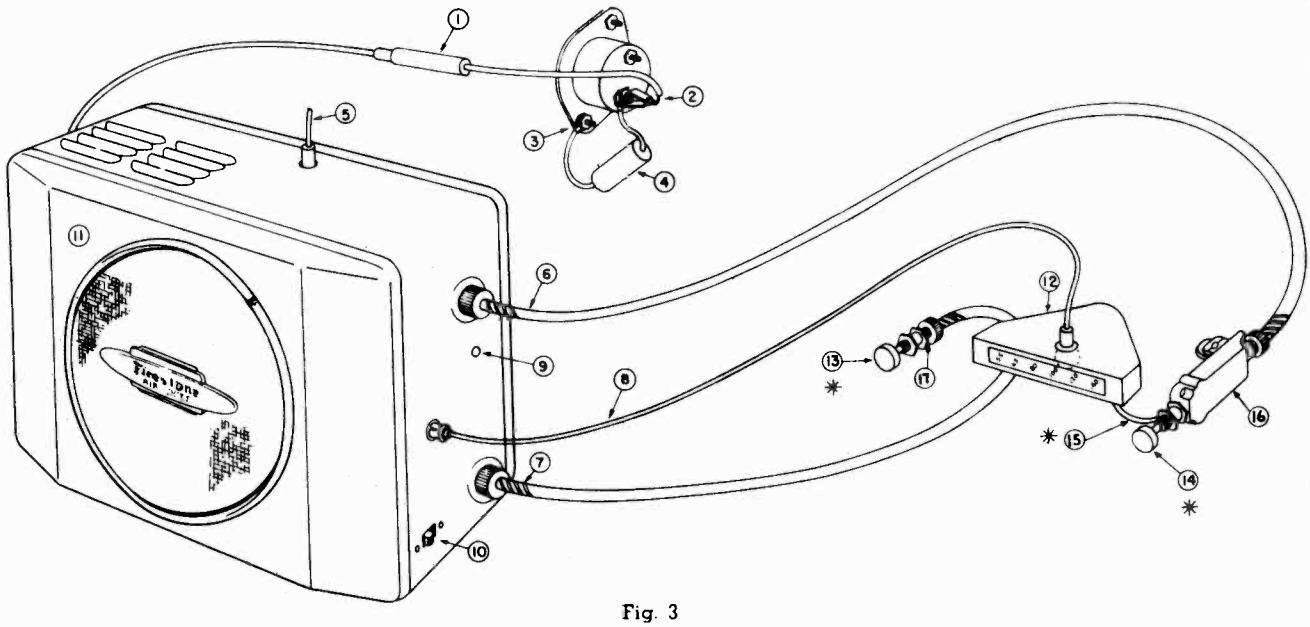


Fig. 3

	Name	Part No.
1.	Fuseholder	11160
2.	Ammeter Connector	36621
3.	Ground Connection	64270
4.	Capacitor	25120
5.	Antenna Lead	——
6.	Flexible Tuning Shaft	15057
7.	Flexible Volume Control Shaft	15057
8.	Pilot Light Lead	11172
9.	Antenna Trimmer Adjustment Hole	——
10.	Tone Control	90071
11.	Receiver	PM-14
12.	Slide Dial Assembly	13428

The following items are supplied by Crowe Nameplate:

13.	Volume Control Knob	Included in Crowe
14.	Tuning Control Knob	Assy. #A-11540-C
15.	Flexible Dial Coupling Shaft	
16.	Dial Drive Tuning Assembly	Assy. #A-11827

SOCKET VOLTAGES

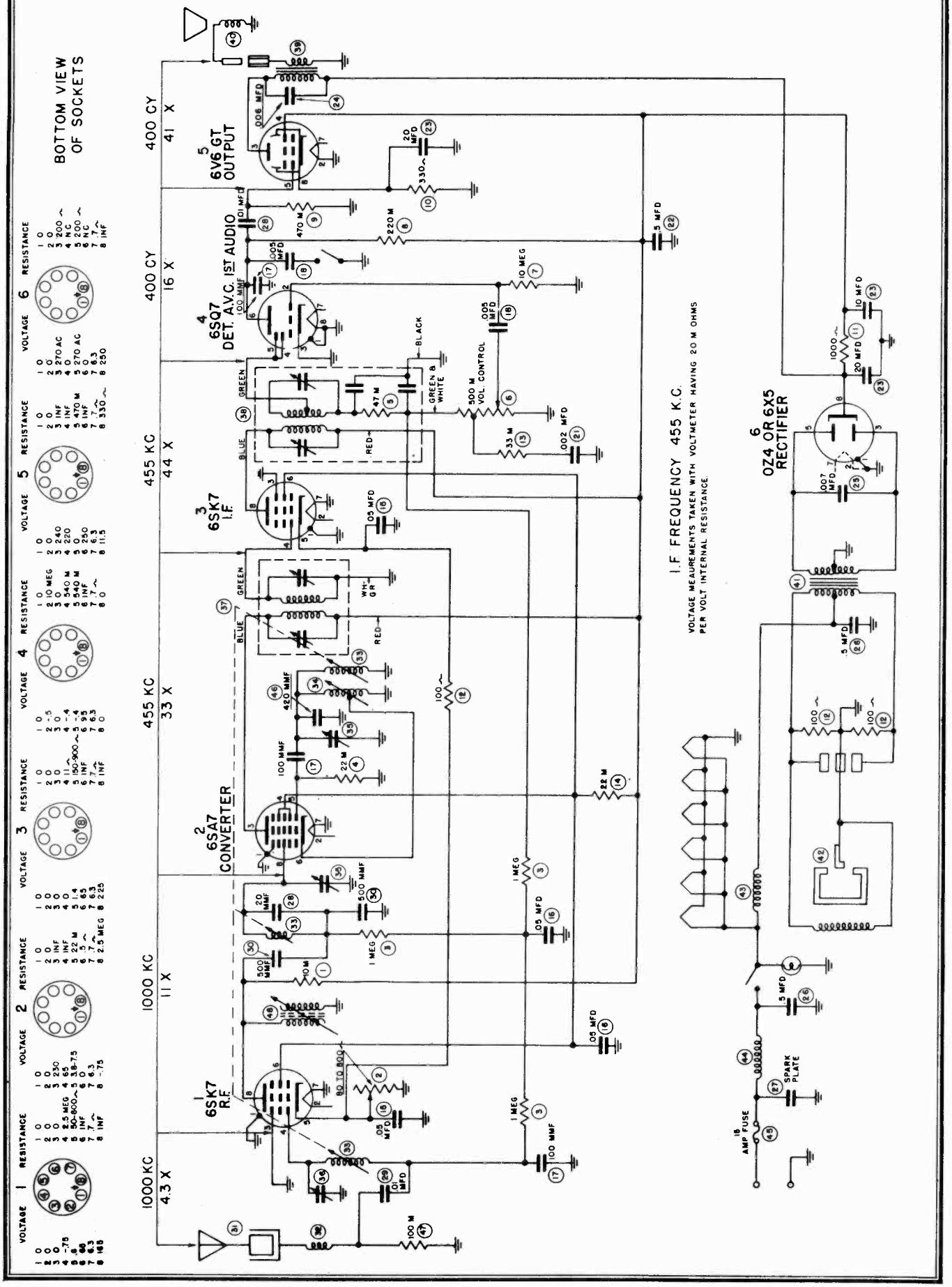
VOLTAGE	1	RESISTANCE	VOLTAGE	2	RESISTANCE	VOLTAGE	3	RESISTANCE
1. 0		1. 0	1. 0		1. 0	1. 0		1. 0
2. 0		2. 0	2. 0		2. 0	2. 0		2. 0
3. 0		3. 0	3. 224		3. INF.	3. 0		3. 0
4. -1		4. 2.6 MEG.	4. 58		4. INF.	4. 0		4. 11 Ω
5. .7		5. 50 Ω	5. 0		5. 22 K Ω	5. 1.4		5. 150 Ω
6. 58		6. INF.	6. 0		6. .2	6. .6		6. INF.
7. 6.6		7. .4 Ω	7. 6.6		7. .4	7. 6.6		7. .4
8. 150		8. INF.	8. -.5		8. 2.5 MEG.	8. 224		8. INF.

VOLTAGE	4	RESISTANCE	VOLTAGE	5	RESISTANCE	VOLTAGE	6	RESISTANCE
1. 0		1. 0	1. 0		1. 0	1. 0		1. 0
2. -6		2. 10 MEG.	2. 0		2. 0	2. 0		2. NO CONN.
3. 0		3. 0	3. 265		3. INF.	3. 320 A.C.		3. 220 Ω
4. 0		4. 550 K Ω	4. 225		4. INF.	4. 0		4. NO CONN.
5. 0		5. 550 K Ω	5. 0		5. 470 K Ω	5. 320 A.C.		5. 220 Ω
6. 100		6. INF.	6. 0		6. INF.	6. 0		6. NO CONN.
7. 6.6		7. .4	7. 6.6		7. .4	7. 0		7. NO CONN.
8. 0		8. 0	8. 12		8. 330 Ω	8. 270		8. INF.

BOTTOM VIEW OF SOCKETS

MODEL 4-B-6

THE FIRESTONE TIRE & RUBBER CO.



Manual Tuning Alignment Procedure

A signal generator calibrated at 455 Kc, 540 Kc, 600 Kc and 1600 Kc and an output meter are required to properly align this receiver. Except for Wave Trap adjustment, the signal generator output should be kept as low as possible and still obtain output meter reading. Connect output meter across voice coil of speaker. Connect signal generator ground lead to receiver chassis. Connect signal generator output lead to antenna connector in series with dummy antenna specified below.

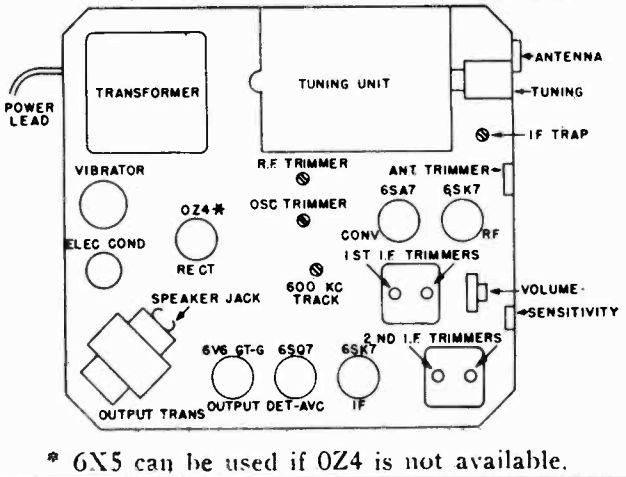
STEPS	IN SERIES WITH GEN.	SET SIGNAL GEN. AT	SET DIAL AT	ADJUST	LOCATED	TO OBTAIN
1	Set Volume Control at Maximum Volume. Tone control on treble position.					
2	.1 Mfd.	455 Kc	54 Or tuning mechanism fully counter-clock-wise.	2nd. I.F. Trimmers	Top 2nd. I.F. Transformer	MAXIMUM
3				1st. I.F. Trimmers	Top 1st. I.F. Transformer	
4				Wave Trap Adjusting Screw		MINIMUM
5	.0001 Mfd.	1600 Kc	160 Or tuning mechanism fully clock-wise.	Osc. Trimmer	Top of Chassis **	MAXIMUM
6				RF Trimmer		
7				Ant. Trimmer	End of Chassis **	
8		540 Kc	54	600 Kc Tracking	On Chassis **	
9		Recheck step 5.				
10		600 Kc	Rock 60	600 Kc Tracking	On Chassis **	

**See Tube and Trimmer layout.

STATION SELECTOR:

Stations may be tuned in with the station selector (right hand knob) as soon as the tubes become heated which requires less than a minute's wait after the receiver is turned on. Slowly turn this knob to bring the pointer over that portion of the dial where the wanted station is found. If the station frequency is known the desired station may be tuned in very close to its dial markings. The dial is calibrated in kilocycles with the last zero omitted. When the station is heard finish tuning so that the pointer is in the center of the area where the station is received. The station selector should

TUBE AND TRIMMER LOCATIONS



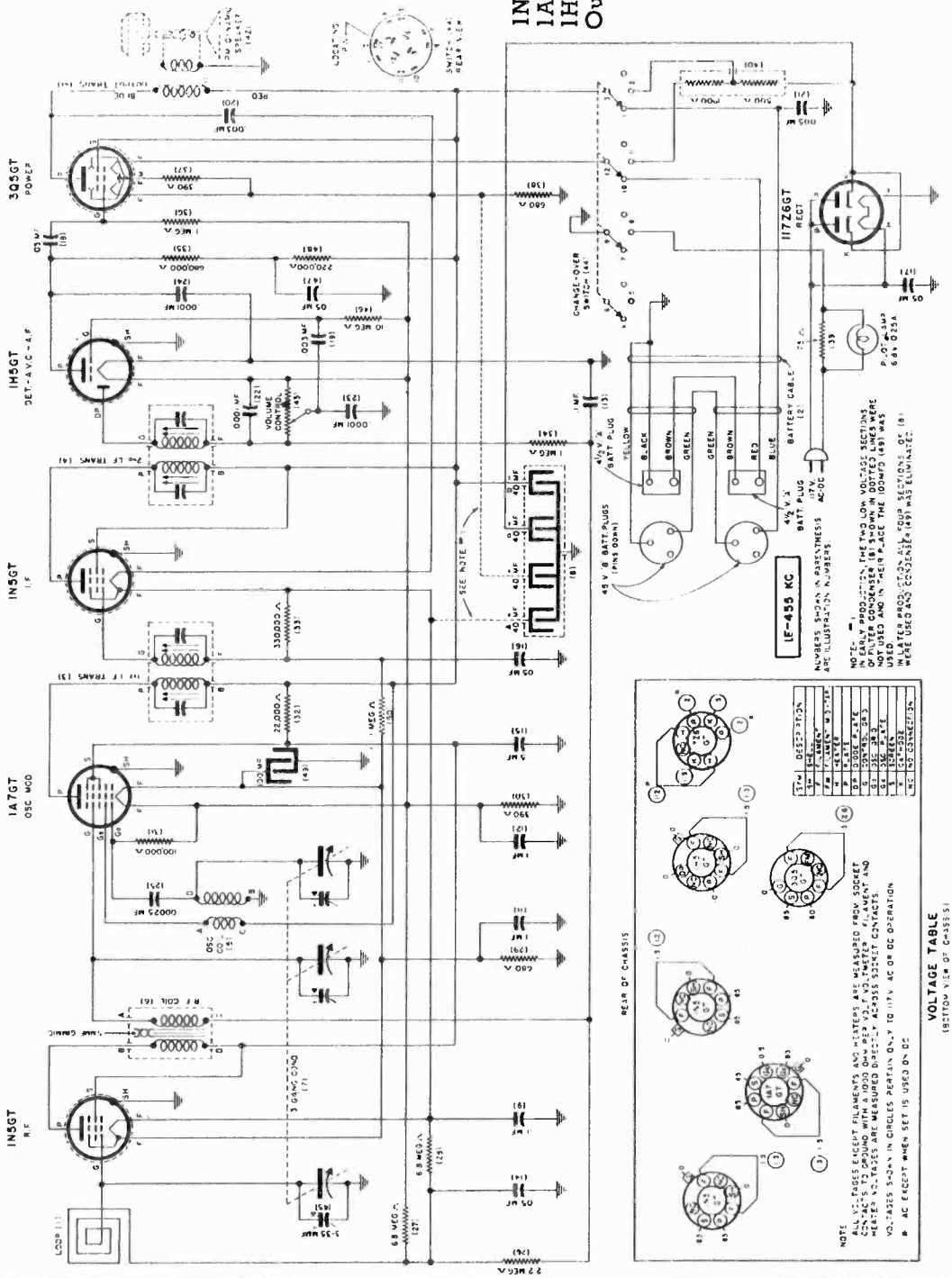
* 6X5 can be used if 0Z4 is not available.

MODEL 4-C-3

THE FIRESTONE TIRE & RUBBER CO.

TUBE COMPLEMENT

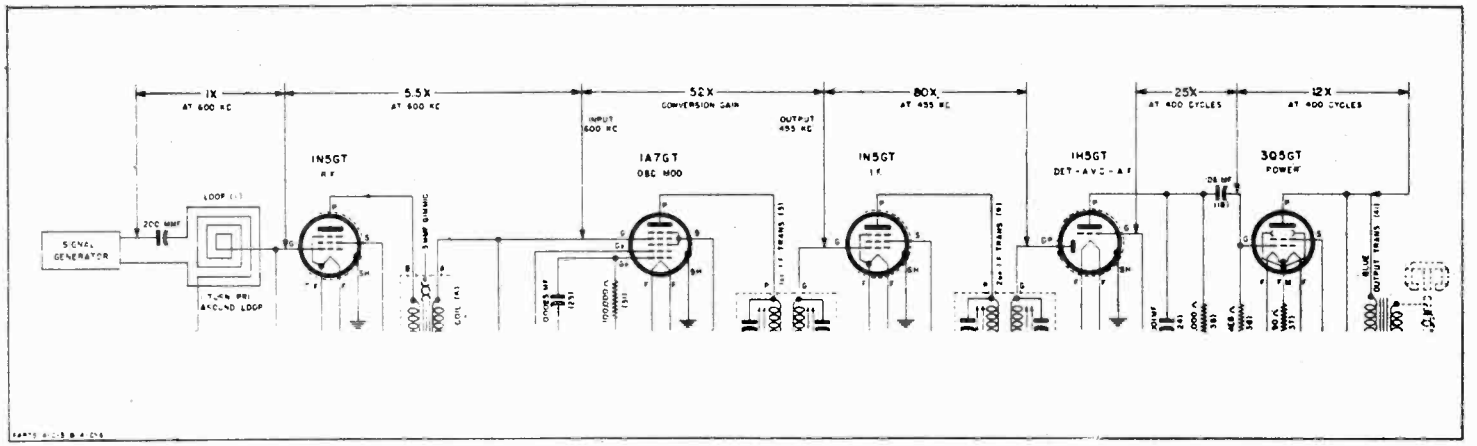
1N5GT R.F., 1N5GT I.F.,
1A7GT Oscillator Modulator,
1H5GT Det., AVC, 3Q5GT Power
Output, 117Z6GT Rectifier.



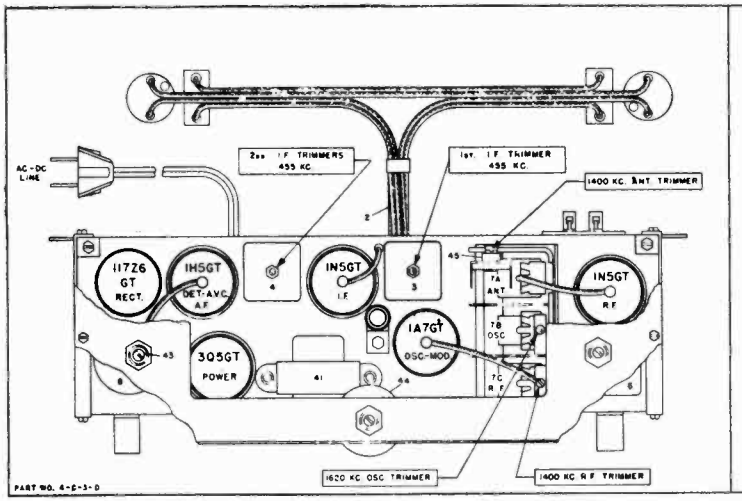
POWER SUPPLY	110-120 Volt AC-DC & Battery
BATTERIES	Two 4½ Volt "A" Firestone Type 4-D-86 Two 45 Volt "B" Firestone Type 4-D-85
TUNING RANGE	1620 to 530 K. C.
INTERMEDIATE FREQ	455 K. C.
LOUD SPEAKER	5 Inch P. M.
VOICE COIL IMPEDANCE	3.2 Ohms at 400 Cycles
POWER OUTPUT	Undistorted — .25 Watts Maximum — .4 Watts

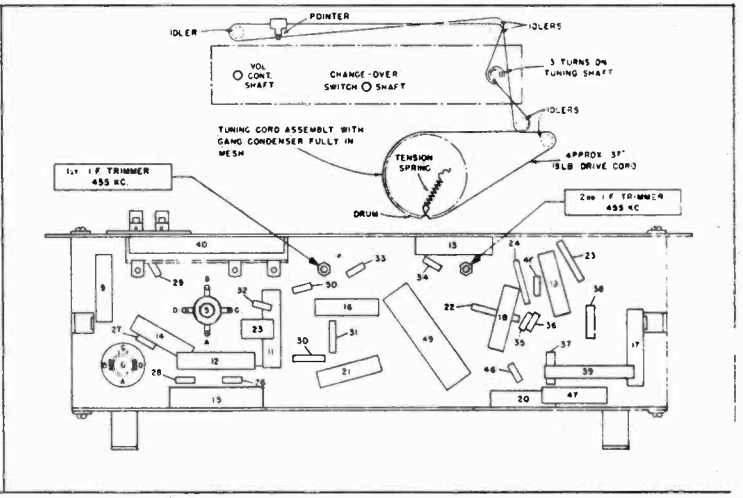
Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.





ALIGNMENT PROCEDURE

Be sure to follow procedure carefully and in the order given—otherwise the receiver will be insensitive and the dial calibration incorrect. For alignment procedure read tabulations from left to right. Make the adjustment marked (1) first, (2) next, (3) third, etc.

Before starting alignment:

(a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line, move to correct position.

(b) Use an accurately calibrated test oscillator with some type of output measuring device.

(c) WHEN ADJUSTING 1620 KC OSCILLATOR TRIMMER AND 1400 KC R. F. TRIMMER, remove chassis from cabinet and disconnect the white-green and white-black loop connection wires from the two Fahenstock clips mounted on rear of chassis. Attach a 1 megohm resistor across these Fahenstock clips and feed output of test oscillator across the 1 megohm resistor.

(d) THE 1400 KC LOOP ANTENNA TRIMMER is accessible from the rear of the chassis when the inner back is removed. It should be adjusted only after all other adjustments have been made and with the set mounted in the cabinet, and the loop in an upright position. When aligning the 1400 KC Antenna Trimmer, couple test oscillator to receiver loop by: (1) make loop consisting of five to ten turns of No. 20 to No. 30 size wire, wound on a 2" or 3" form; (2) connect this loop across output of test oscillator; (3) place test oscillator loop near radio loop. BE SURE THAT NEITHER LOOP MOVES WHILE ALIGNING.

Steps	Set receiver dial to:	TEST OSCILLATOR: Adjust test oscillator frequency to:	TEST OSCILLATOR: Use dummy antenna in series with output of test oscillator consisting of:	TEST OSCILLATOR: Attach output of test oscillator to	Refer to parts layout diagram for location of trimmers mentioned below:
1	Any point where no interfering signal is received	Exactly 455 K. C.	0.2 Mfd. Condenser	High side to grid of 1A7GT tube. Low side to chassis (if non-Underwriter Approved) or Common Negative (if Underwriter Approved).	Adjust each of the 2nd I.F. transformer trimmer adjustment screws for maximum output, then adjust each of the 1st I.F. transformer trimmer adjustment screws for maximum output.
2	Rotate gang condenser to minimum capacity	Exactly 1620 K. C.	See paragraph (C) above	See paragraph (C) above	Adjust 1620 Osc. Trimmer for maximum 1620 K. C. signal.
3	Rotate gang condenser to 1400 K.C.	Exactly 1400 K. C.			Adjust 1400 K.C. R.F. Trimmer for maximum output.
4	Approximately 1400 K. C.	Approx. 1400 K. C.	See paragraph (D) above	See paragraph (D) above	Adjust 1400 K.C. antenna trimmer for maximum output.

PARTS LIST

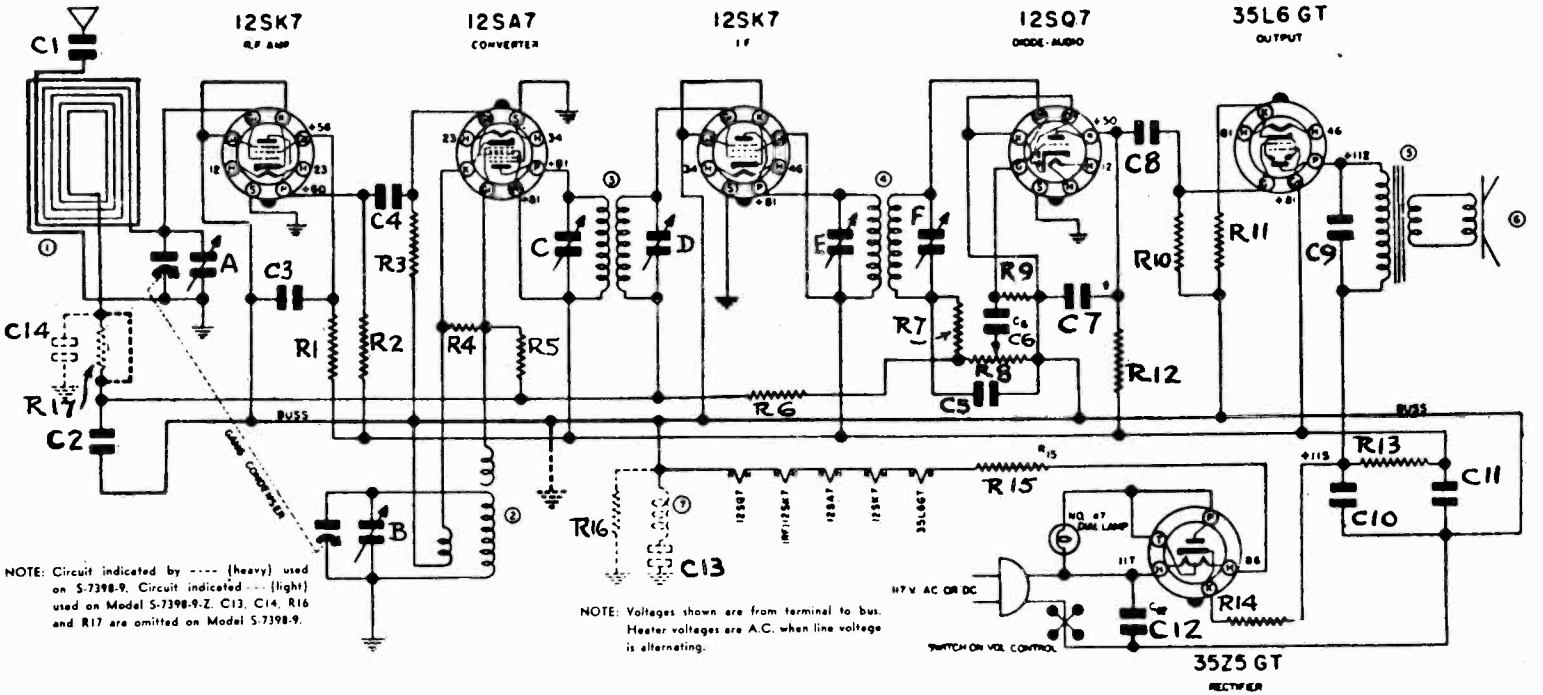
Ill. No.	Part No.	Part Name	Description
1	20E120-1	Antenna	Cabinet Door Assembly Complete with Hinges & Door Stop
2	20E118	Cable	Battery Cable with "A" & "B" Plugs
3	20E53	Coil	1st I.F. Transformer
4	20E54	Coil	2nd I.F. Transformer
*5	20E237	Coil	Oscillator (use with 24E7A Cond.)
	OR		
*5	20E248	Coil	Oscillator (use with 24E7B Cond.)
6	20E48	Coil	R. F.
*7	24E7A	Condenser	Tuning, 3 Gang (use with 20E237 Osc. Coil)
	OR		
*7	24E7B	Condenser	Tuning, 3 Gang (use with 20E248 Osc. Coil)
8	25E11	**Condenser**	Tubular, Dry Elect. {40-40 Mfd. 150 V. / 40-40 Mfd. 25 V.}
9	23E218	Condenser	Tubular, .1 Mfd. 200 V.
10	23E218	Condenser	Tubular, .1 Mfd. 200 V.
11	23E218	Condenser	Tubular, .1 Mfd. 200 V.
12	23E218	Condenser	Tubular, .1 Mfd. 200 V.
13	23E218	Condenser	Tubular, .1 Mfd. 200 V.
14	23E216	Condenser	Tubular, .05 Mfd. 200 V.
15	23E224	Condenser	Tubular, .5 Mfd. 200 V.
16	23E216	Condenser	Tubular, .05 Mfd. 200 V.
17	23E416	Condenser	Tubular, .05 Mfd. 400 V.
18	23E216	Condenser	Tubular, .05 Mfd. 200 V.
19	23E406	Condenser	Tubular, .003 Mfd. 400 V.
20	23E406	Condenser	Tubular, .003 Mfd. 400 V.
21	23E408	Condenser	Tubular, .005 Mfd. 400 V.
22	23E39	Condenser	Mica, .0001 Mfd.
23	23E39	Condenser	Mica, .0001 Mfd.
24	23E39	Condenser	Mica, .0001 Mfd.
25	23E42	Condenser	Mica, .00025 Mfd.
26	27E225	Resistor	Carbon, 2.2 Megohm, 1/3 W.
27	27E685	Resistor	Carbon, 6.8 Megohm, 1/3 W.
28	27E685	Resistor	Carbon, 6.8 Megohm, 1/3 W.
29	27E681	Resistor	Carbon, 680 Ohm, 1/3 W.
30	27E391	Resistor	Carbon, 390 Ohm, 1/3 W.
31	27E104	Resistor	Carbon, 100,000 Ohm, 1/3 W.
32	27E223	Resistor	Carbon, 22,000 Ohm, 1/3 W.
33	27E334	Resistor	Carbon, 330,000 Ohm, 1/3 W.
34	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.
35	27E684	Resistor	Carbon, 680,000 Ohm, 1/3 W.
36	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.
37	27E391	Resistor	Carbon, 390 Ohm, 1/3 W.
38	27E681	Resistor	Carbon, 680 Ohm, 1/3 W.
39	27E1001	Resistor	Flexible Wire Wound, 75 Ohm, 2 W.
40	27E1000	Resistor	Wire Wound 500 & 1900 Ohms
41	22E15	**Transformer**	**Output**
42	1E18	Speaker	5" P.M. Dynamic
43	28E13	**Volume Control**	**500,000 Ohms**
44	29E10	Switch	4 Pole 3 Pos.
45	24E21	Condenser	Trimmer 3-35 Mmf.
46	27E106	Resistor	Carbon, 10 Megohm, 1/3 W.
47	23E216	Condenser	Tubular, .05 Mfd. 200 V.
48	27E224	Resistor	Carbon, 220,000 Ohm, 1/3 W.
**49	25E19	Condenser	Tubular, Dry Elect. 100 Mfd. 25 V.
50	27E105	Resistor	Carbon, 1 Megohm, 1/3 W.

MISCELLANEOUS PARTS

Part No.	Part Name	Description
17E3-2	"A" Battery Plug	2 Prong "A" Battery Plug
17E3-5	"B" Battery Plug	3 Prong "B" Battery Plug
7E63	Cabinet	Cabinet less Loop Door & Inner Barrier
41E1	Cord	6 Ft. Rubber Line Cord
20E121	Door Stop Assembly	Stop for Door & Loop Assembly
5E17	Dial Plate Assembly	Dial Back Plate Assembly less Dial Scale
5E16	Dial Front Plate	Metal Control Plate for Cabinet, less Crystal
9E6	Dial Crystal	Crystal for Front Plate
36E22	Dial Scale	Calibrated Scale
4E1	Dial Cord	18 lb. Dial Drive Cord
68E10	Dial Shaft	Complete Shaft Assem.
10E43	Dial Scale Fastener	Trimount Stud for fastening Scale
35E20-1	Dial Pointer	Dial Indicator
65E2	Dial Spring	Tension Spring for Drive Cord
37E1-1	Knob	1-1/8" Dia. for Tuning & Volume Control
37E2-1	Knob	5/8" Dia. for Changeover Switch
55E18	Hinge	Hinge for Cabinet Door & Loop Assembly
17E17	Pilot Lamp Socket Assembly	Pilot Lamp Socket Assembly less Lamp
40E2	**Pilot Lamp**	**6-8 volt .250 amp. Type No. 44 Lamp**
69E72F47	Rivet	For Hinge
69E92F47	Rivet	For Door Stop

**NOTE No. 1: In early production, the two low voltage sections of filter condenser, Illus. No. 8, Part 25E11, shown in dotted lines on circuit diagram, were not used and in their place the 100 Mfd., Illus. No. 49, Part 25E19 was used.
In later production all four sections of Illus. No. 8, Part 25E11, were used and condenser, Illus. No. 49, Part 25E19, was eliminated.

*NOTE No. 2: CHASSIS MARKED WITH LETTER "A" adjacent to serial number use Part 24E7A Gang Condenser and Part 20E237 Oscillator Coil.
CHASSIS MARKED WITH LETTER "B" adjacent to serial number use Part 24E7B Gang Condenser and Part 20E248 Oscillator Coil.
THESE GANG CONDENSERS AND OSCILLATOR COILS ARE NOT INTERCHANGEABLE.
DO NOT use Part 24E7A Gang Condenser with Part 20E248 Osc. Coil, or Part 24E7B Gang Condenser with Part 20E237 Osc. Coil.



I.F.—456 K.C.

Diag. No.	Part No.	Description	
C-1	N-1344	.01 mfd. 400 V.	20%
C-2	N-1345	.05 mfd. 200 V.	20%
C-3	N-1345	.05 mfd. 200 V.	20%
C-4	N-2383	150 mmfd. Mica	20%
C-5	N-1374	100 mmfd. Mica	20%
C-6	N-1344	.01 mfd. 400 V.	20%
C-7	N-1447	.0005 mfd. 400 V.	20%
C-8	N-1344	.01 mfd. 400 V.	20%
C-9	N-1376	.02 mfd. 400 V.	20%
C-10 } C-11 }	N-3658	{ 40 mfd. 150 W.V. } { 40 mfd. 150 W.V. }	Electrolytic
C-12	N-1346	.05 mfd. 400 V.	20%
C-13	N-3080	.22 mfd. 200 V.	10%
C-14	N-1345	.05 mfd. 200 V.	20%

R-1	N-3814	15,000 Ohm .5 W.	20%
R-2	N-3964	2,000 Ohm .5 W.	10%
R-3	N-1260	50,000 Ohm .5 W.	20%
R-4	N-1627	20,000 Ohm .5 W.	20%
R-5	N-1263	10 Megohm .5 W.	20%
R-6	N-1682	3 Megohm .5 W.	20%
R-7	N-1460	30,000 Ohm .5 W.	20%
R-8	N-4076	0.5 Megohm Volume Control	
R-9	N-2189	4 Megohm .5 W.	20%
R-10	N-1264	500,000 Ohm .5 W.	20%
R-11	N-3663	150 Ohm .5 W.	10%
R-12	N-1377	200,000 Ohm .5 W.	20%
R-13	N-3819	1,200 Ohm .1 W.	10%
R-14	N-1742	25 Ohm .5 W.	20%
R-15	N-3869	30 Ohm 1 W.	10%
R-16	N-1377	200,000 Ohm .5 W.	20%
R-17	N-1262	1 Megohm .5 W.	20%
1	N-3784	Antenna Loop Coil	
2	N-3298	Oscillator Coil	
3	N-3816	1st I.F. Transformer	
4	N-3804	2nd I.F. Transformer	
5	N-3782	Output Transformer	
6	N-3781	5" P. M. Speaker	
	N-4052	2 Gang Condenser	

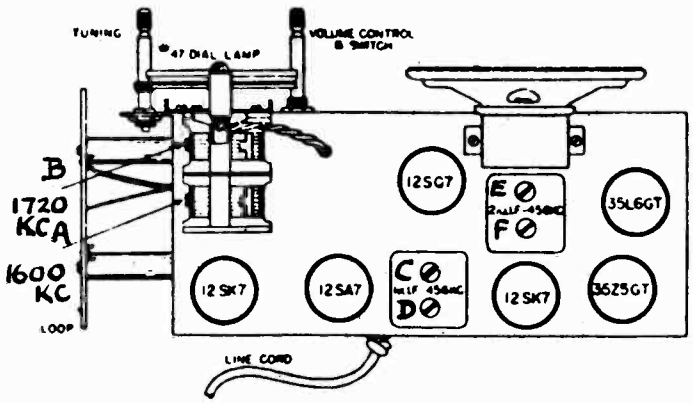
MISCELLANEOUS PARTS

Part No.	Description
N-4054	Dial scale (glass)
N-4055	Dial background plate
N-4053	Dial pointer
N-3787	Dial drive shaft
N-3238	Dial drive shaft bushing
N-3243	"C" Washer—dial drive shaft retainer
N-2655	Dial drive string
N-3925	Dial drive spring
N-4075	Dial lamp socket
N-1958	Rubber line cord
N-3812	Wood dowel spacers—loop mounting
N-3795	Screw—6-32x2¼" round head
N-3642	Washer—fibre—chassis mounting
N-4687	Cabinet back
N-4688	Knobs
N-4386	Clips—dial scale fastening
N-4696	Speaker baffle
N-4697	Grille cloth

DECEMBER 8, 1941

MODELS 7398-9, 7398-9Z, 7403-1

THE FIRESTONE TIRE & RUBBER CO.



TUBE AND TRIMMER LOCATIONS

ALIGNMENT DATA AND SERVICING

Lack of sensitivity and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, open or grounded bias resistor, bypass condenser, etc. Never attempt to realign set until all other possible sources of trouble have been first thoroughly investigated and definitely proved not to be the cause.

NOTE: IT IS ABSOLUTELY NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR WITH SOME TYPE OF OUTPUT MEASURING DEVICE BE USED WHEN ALIGNING THE RECEIVER AND THAT THE PROCEDURE BE CAREFULLY FOLLOWED, OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMERS WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE PARTS DIAGRAM.

ALIGNMENT PROCEDURE

GENERAL DATA

The alignment of this receiver requires the use of a test oscillator that will cover the frequencies of 456, 600, 1400 and 1720 KC and an output meter to be connected across the primary and secondary of the output transformer. If possible, all alignments should be made with the volume control on maximum and the test oscillator output as low as possible to prevent the AVC from operating and giving false readings.

CORRECT ALIGNMENT PROCEDURE

The intermediate frequency (I. F.) stages should be aligned properly as the first step. After the I. F. transformers have been properly adjusted and peaked, the broadcast band should be adjusted.

I. F. ALIGNMENT

With the gang condenser set at minimum, adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (12SA7) through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to the ground bus, indicated in circuit diagram. Align all four I. F. trimmers to peak or maximum reading on the output meter.

BROADCAST BAND ALIGNMENT

Remove the chassis from the cabinet and set on a bench, taking care that no metal is near the loop. Do not make this setup on a metal bench. Connect the test oscillator to the antenna of the set through a 200 mmfd. (.0002) condenser. With the gang condenser set at minimum capacity, set the test oscillator at 1720 KC, and adjust the oscillator (or 1720 KC trimmer) on gang condenser. Next—set the test oscillator at 1400 KC, and tune in the signal on the gang condenser. Adjust the antenna trimmer (or 1400 KC trimmer) for maximum signal. Next set the test oscillator at 600 KC, and tune in signal on condenser to check alignment of coils.