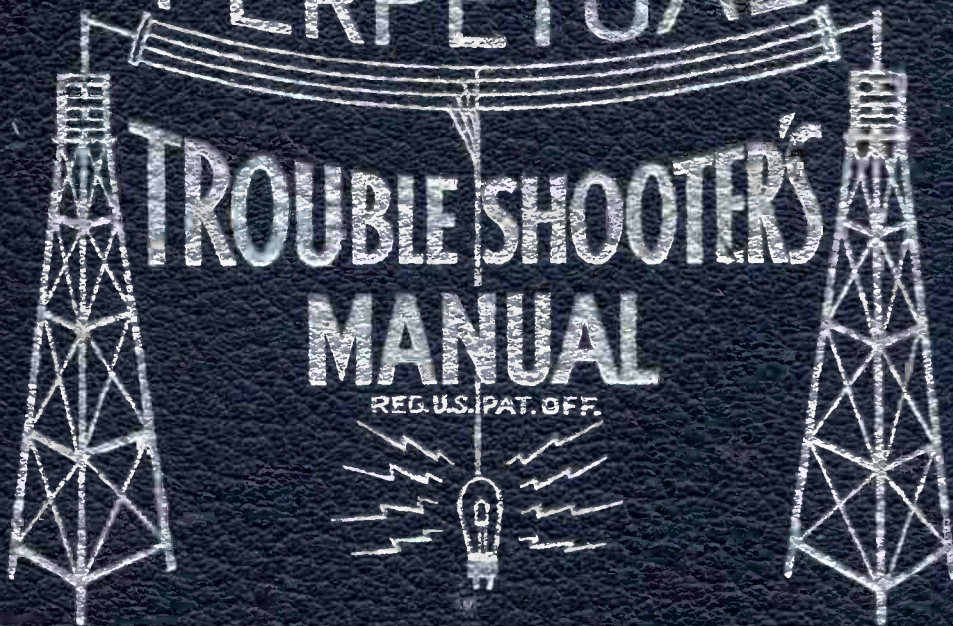


VOLUME XIII

PERPETUAL

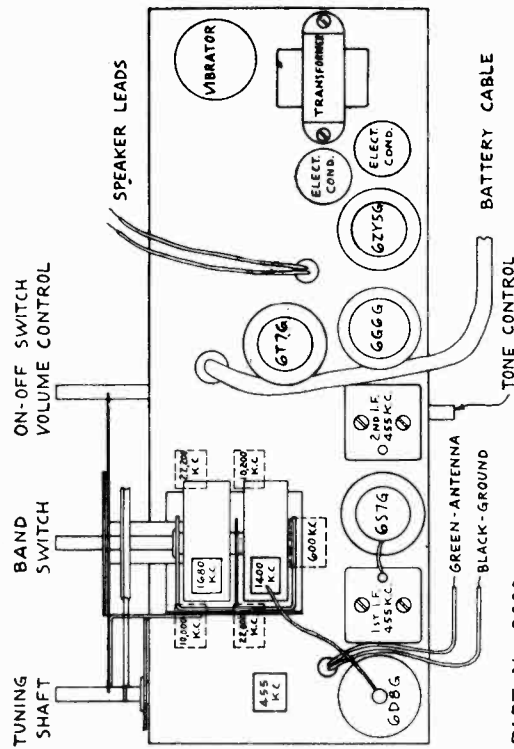


REG. U.S. PAT. OFF.

JOHN F. RIDER

DETROLA CORP.

TUBE LAYOUT and CONNECTION DIAGRAM



PART No 8600

ALIGNMENT OF SHORT WAVE BANDS

S. W. Band No. 1

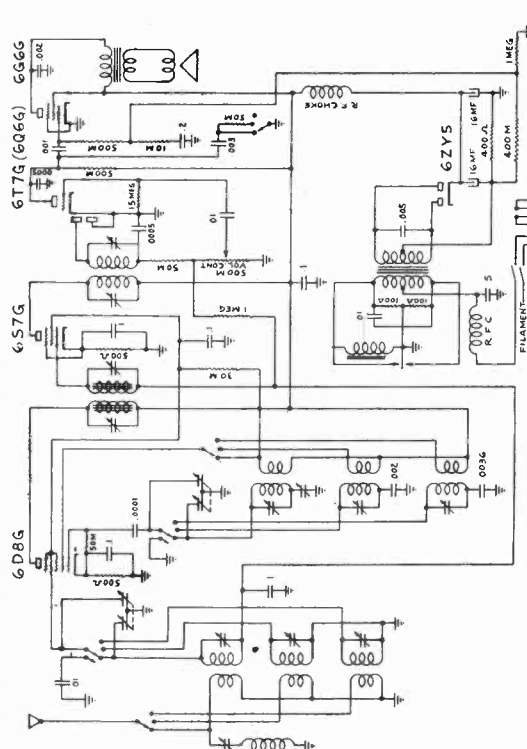
Rotate the band selector switch to the center position (No. 1 on band selector knob). Disconnect the 200 mmf. condenser from the output of the signal generator and in its place substitute a 400 ohm resistor which serves as a dummy antenna for aligning both short wave bands. The other end of the 400 ohm resistor is connected to the antenna lead of the receiver. Set the tuning condenser of the receiver at minimum capacity (plates all the way out). Produce a weak signal of 10,200 KC in the signal generator. Screw the S. W. No. 1 OSCILLATOR TRIMMER all the way down and then unscrew it to the second peak at which the signal is heard. If the trimmer is not unscrewed to the second peak, the circuits will not be in proper relation and the calibration will be incorrect and there may also be a dead spot on some position on the dial. Next produce a signal of 10,000 KC in the signal generator and tune this signal carefully in the receiver. If the signal can be heard at two places, the proper signal to tune is the one which is closest to the 10.2 mark on the dial chart of the receiver. Adjust the S. W. No. 1 ANTENNA TRIMMER until a definite peak is noted in the output meter. During this adjustment, rock the tuning condenser back and forth through the signal, while adjusting this trimmer in order to assure perfect alignment.

S. W. Band No. 2

Using exactly the same procedure and taking the same precautions as for S. W. Band No. 1, turn the band selector switch to the No. 2 position. Align the S. W. No. 2 OSCILLATOR TRIMMER at 22,200 KC. with the signal generator producing a signal of 22,200 KC. and with the tuning condenser set at minimum capacity (plates all the way out). Align the S. W. No. 2 ANTENNA TRIMMER at 22,000 KC with the signal generator producing a 22,000 KC signal and be sure to tune the receiver to the signal nearest the 22 mark on the dial chart. The same procedure of screwing the oscillator trimmer all the way down and then unscrewing to the second peak and the same precautions of rocking the tuning condenser back and forth through the signal are followed to secure a proper alignment of this band.

TUBES

- Tubes required are:
- 1—6D8G Oscillator Translator
  - 1—6S7G I.F. Amplifier
  - 1—6T7G Detector AVC Audic
  - 1—6G6G Power Output
  - 1—6Z5Y5 Rectifier



PART No. 8584

ALIGNMENT PROCEDURE

Intermediate Frequency Alignment

Turn the band selector switch to the broadcast position ("B" on the band selector knob). Connect a .1 mfd. condenser to the output terminal of the signal generator and connect the other end of this condenser to the control grid of the 6S7G tube. Do not disconnect the grid clip on the tube. Generate a weak 455 KC signal in the signal generator, and adjust the trimmer of the second I.F. transformer for maximum response in the output meter. If the signal measures above 1/2 volt during the adjustment, reduce its strength. Now transfer the connection of the signal generator through the .1 mfd. condenser to the grid of the 6D8G tube and align the trimmers of the first I.F. transformer.

R. F. ALIGNMENT

Broadcast Band

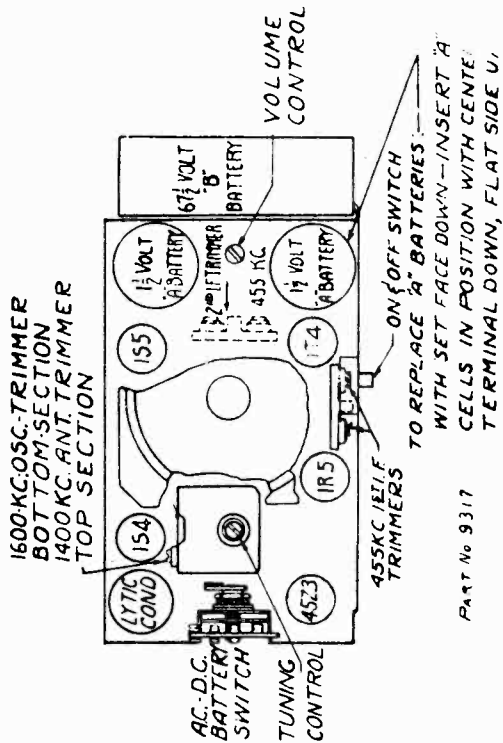
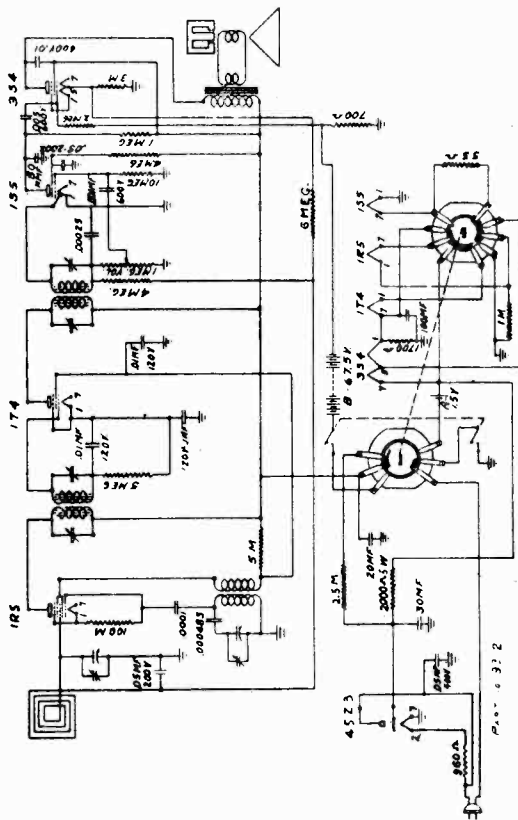
Disconnect the .1 mfd. condenser from the output of the signal generator and in its place substitute a 200 or 250 mmf. condenser, connecting the other end of this condenser to the ANTENNA LEAD of the receiver. Turn the tuning condenser to about 600 KC. With the generator producing a fairly powerful signal of 455 KC, adjust the WAVE TRAP trimmer for MINIMUM RESPONSE. Set the tuning condenser of the receiver at minimum capacity (plates all the way out). Generate a weak signal of 1680 KC in the signal generator. Adjust the BROADCAST OSCILLATOR TRIMMER until the signal is tuned in. Next produce a weak signal of 1400 KC in the signal generator. Tune the receiver very carefully to the signal and adjust the BROADCAST ANTENNA TRIMMER for maximum response in the output meter. Produce a 600 KC signal in the signal generator and tune the receiver carefully to this signal, adjust the BROADCAST OSCILLATOR PADDLE for maximum response. The tuning condenser of the receiver should be rocked back and forth through the signal while varying the paddle in order to assure perfect alignment. The last three adjustments should be repeated two or three times for perfect alignment.

Tune in a broadcast station of known frequency between 1200 and 800 KC. and set the pointer to the proper calibration on the dial chart. Be sure to use a station whose frequency is reliable as the accuracy of calibration depends on this setting. Note that the square dots in the upper half of the black band are accurately calibrated for the frequencies of the broadcast band.

MODEL 378  
MODEL 3781

DETROLA CORP.

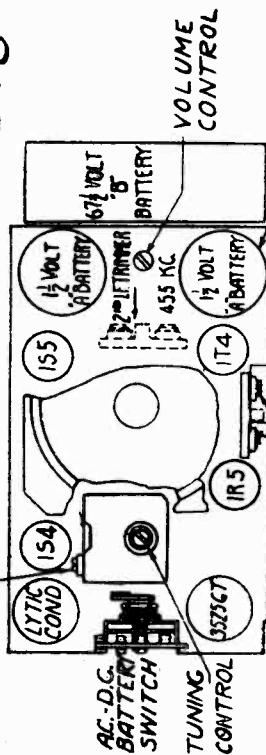
MODEL 3781 AC-DC



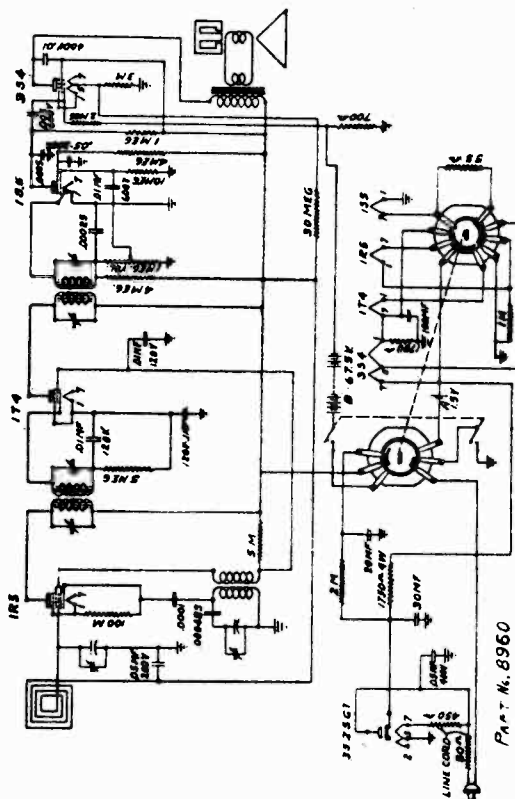
PART No 9317

MODEL 378

1600-KC. OSC. TRIMMER  
BOT TOM-SECTION  
1400 KC. ANT. TRIMMER  
TOP SECTION



PART No. 8974



PART No. 8960

DETROLA CORP.

MODELS 386, 3861 MODEL 379  
 MODELS 389, 389-1, MODEL 383  
 389-2

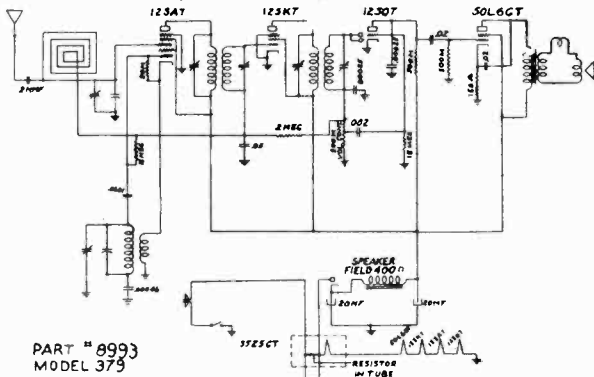
ALIGNMENT PROCEDURE

I.F. Frequency 455 KC. Set Range 510-1580 KC.

Connect the test oscillator, or signal generator, to the set as follows: Connect the "hot" side of the signal generator to the grid of the 1A7GT tube, and the ground side to the chassis. If the set is aligned on AC or DC be sure that the test oscillator or signal generator is isolated from the receiver and line by either a transformer or .2MFD condensers in both test leads. An output meter should be connected across the voice coil leads of the speaker to indicate resonance. Align the I.F. trimmers at 455 KC. for maximum meter reading.

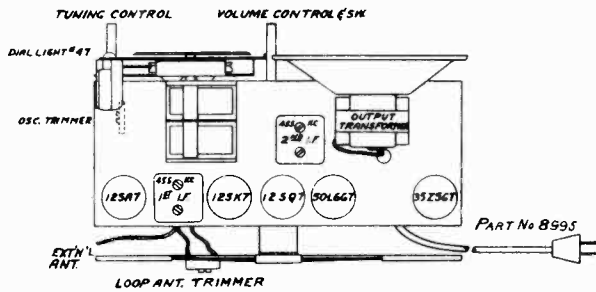
Turn the condenser plates all the way out. Set the test oscillator to 1580 KC and adjust the oscillator trimmer for maximum signal. Disconnect the test oscillator and tune in a weak station near 1400 KC. at full volume. Adjust the trimmer on the front of the variable condenser for maximum signal. When aligning the set do not set the receiver on or near a metal work bench or other large metal object, as it will affect the tracking of the receiver.

12SA7 Translater  
 12SK7 IF amplifier  
 35Z5GT Rectifier  
 12SQ7 Detector AVC  
 50L6GT Output

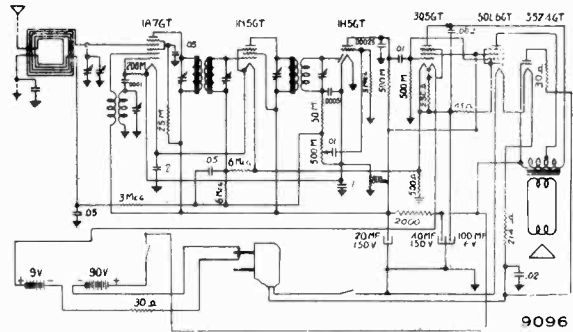


PART # 8993  
 MODEL 379

MODEL 379 SERIES

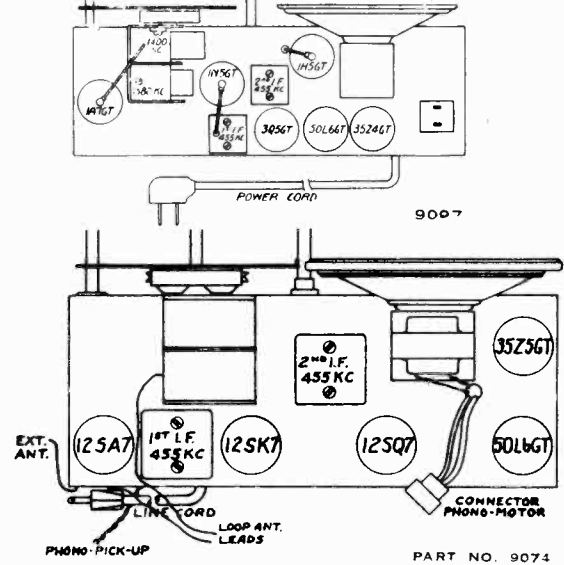


PART No 8995

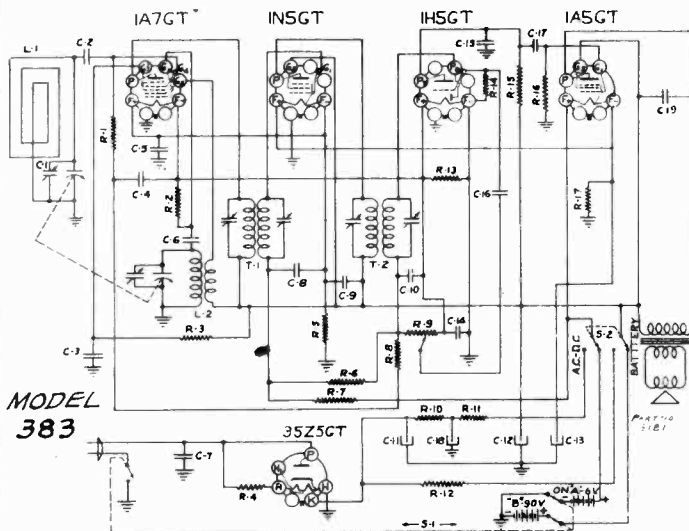


9096

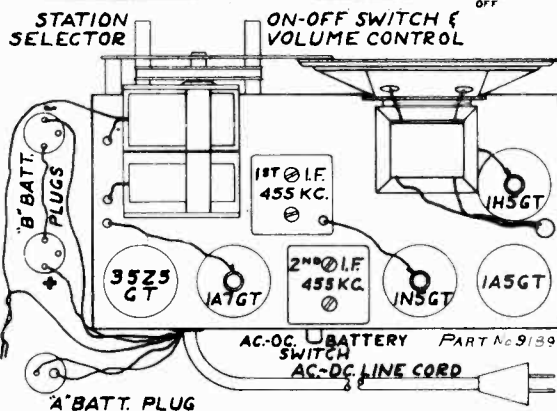
MODELS 389



PART NO. 9074

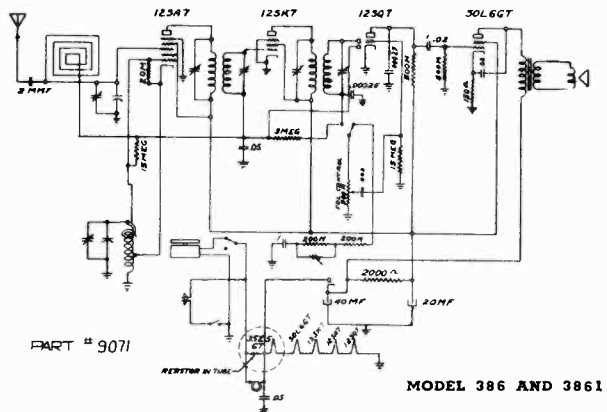


MODEL 383



PART No 9139

The following tubes are used in this receiver.  
 12SA7 Translater  
 12SK7 IF amplifier  
 35Z5GT Rectifier  
 12SQ7 Detector AVC  
 50L6GT Output

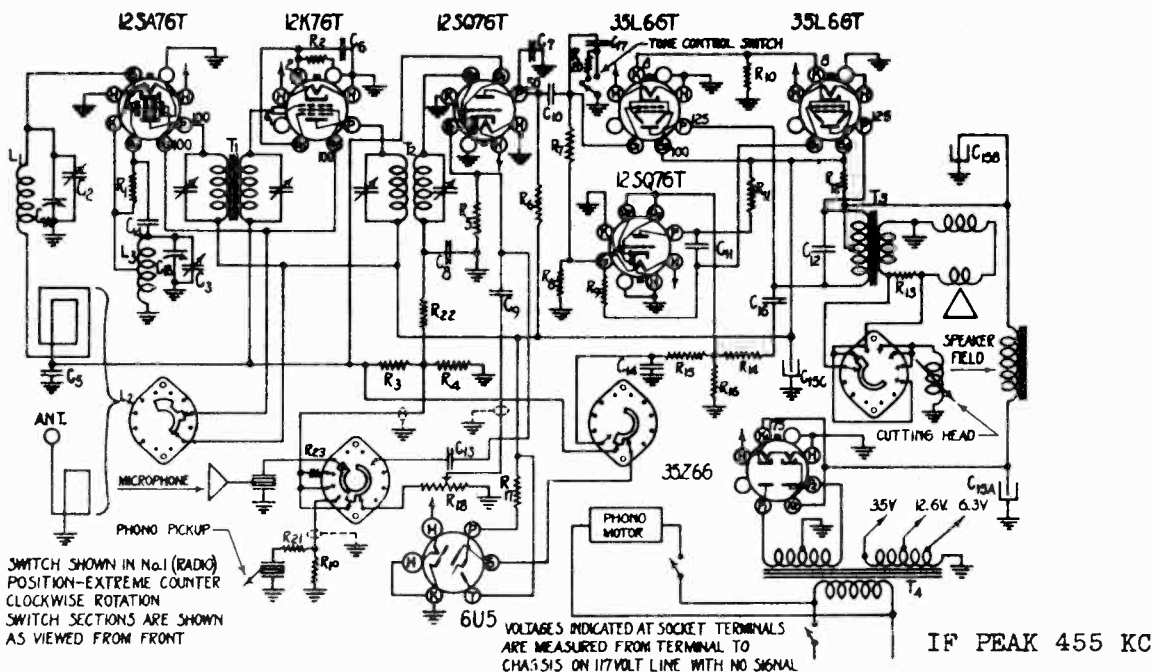


PART # 9071

MODEL 386 AND 3861

MODEL 390

DETROLA CORP.



SWITCH SHOWN IN No.1 (RADIO) POSITION-EXTREME COUNTER CLOCKWISE ROTATION SWITCH SECTIONS ARE SHOWN AS VIEWED FROM FRONT

VOLTAGES INDICATED AT SOCKET TERMINALS ARE MEASURED FROM TERMINAL TO CHASSIS ON 117VOLT LINE WITH NO SIGNAL

IF PEAK 455 KC

Schematic Location	Part Number	Description	Schematic Location	Part Number	Description
	<b>CHASSIS PARTS</b>			8932	Switch, Master Control
	4417	Button, Snap (Dial Mounting)		8919	Speaker, 6½" Dynamic
	8931	Cable, Tuning Tube		8918	Transformer, Power, 60 cycle
	2163	Cable, drive		8933	Transformer, Power, 50 cycle
	3227	Cap, Grid		89191	Transformer, Output
R18	8910	Control, Volume and Switch	T4	8434	Transformer, 1st IF
	1732	Cord, Line	T3	8435	Transformer, 2nd IF
	6424	Clamp, Linecord		<b>CABINET ASSEMBLY PARTS</b>	
	4314	Clamp, Tapped—For Tuning Tube		Back for Cabinet	
	4315	Clamp, Plain—For Tuning Tube		Book, Instruction	
L3	8422	Coil, Oscillator		8462	Bushing, Rubber (Recorder Unit Mtg.)
L1	8423	Coil, Tracking		9208	Plate, Instruction
C1a,b	8911	Condenser, Variable (with Pulley)		8477	Plate, Motor-on-off
C2,3	8504	Condenser, Dual Trimmer		8287	Plug, 1 Prong (for Cutter Leads)
C15a,b,c	8425	Condenser, Electrolytic (20-250)—(20-150)—(20-150)		3288	Plug, 1 Prong (for Phono Pickup Leads)
C4		Condenser, 100 Mmf. Mica		8493	Plug, 2 Prong (for Motor Leads)
C5,14		Condenser, 1 Mfd. 200 v.		8454	Switch, Motor
C6		Condenser, .05 Mfd. 200 v.		2997	Washer, Rubber (for Recorder Mtg.)
C7		Condenser, 250 Mmf. Mica		<b>RECORDER UNIT PARTS</b>	
C8		Condenser, 100 Mmf. Mica		6943	Hex Nut for Pivot Post
C9		Condenser, .002 Mfd. 600 v.		6947	Motor Mounting Screw
C10,16		Condenser, .01 Mfd. 400 v.		6948	Adjusting Screw (Follower Arm)
C11		Condenser, .05 Mfd. 400 v.		9413	Turntable Shaft Locking Screw
C12,13		Condenser, .001 Mfd. 600 v.		9417	Recorder Arm Rest
C17		Condenser, .005 Mfd. 600 v.		9418	Follower Arm Complete
	7209	Grommet, Tuner Assembly Mtg.		9424	Pickup Cartridge
	9121	Dial Chart		9426	Pickup Arm Complete
	8941	Microphone Socket Assembly		9428	Cutter Head Tension Spring
	6244	Pulley, Idler		9484	Magnetic Cutter Head with Leads
	5026	Pointer		9434	Recorder Arm Complete
	6158	Pilot Lite		9438	Pivot Post Return Spring
	1207	Retainer, "C" Washer (Holds Tuning Shaft)		9450	10" One-piece Turntable
R1		Resistor, 20M, 1/3 Watt		9456	Turntable Drive Disc Stud Clip
R2		Resistor, 200 Ohm, 1/3 Watt		9458	Lead Screw and Pinion Assembly
R3,4,14,16		Resistor, 1 Meg. 1/3 Watt		9463	Turntable Drive Disc Tension Spring
R5		Resistor, 10 Meg. 1/3 Watt		9464	Turntable Shaft
R6,7,8,9,11		Resistor, 200M. 1/3 Watt		9466	Turntable Drive Disc
R10		Resistor, 120 Ohm, 1/2 Watt		9467	Turntable Drive Disc Mounting Bracket Assembly
R12		Resistor, 1000 Ohm, 1 Watt		The following parts are for models with ONE-PIECE.	
R13		Resistor, 35 Ohm, 1/2 Watt		<b>TURNTABLE ONLY</b>	
R15		Resistor, 2 Meg. 1/3 Watt		9469	Retractable Pin Spring
R17		Resistor, 1 Meg (in Tuning Tube Socket)		9470	Retractable Pin
R19,20,21,22		Resistor, 50M, 1/3 Watt		9472	Rotor Shaft Pulley
R23		Resistor, 4 Meg. 1/3 Watt		9474	Rotor Shaft Pulley Set-Screw
	8440	Socket, Dual Dial Lamp		9481	Motor 60 Cycle
	8648	Spring, Drive Cable		9482	Motor 50 Cycle
	8427	Shaft, Drive			
	8428	Switch, Tone Control			

DETROLA CORP.

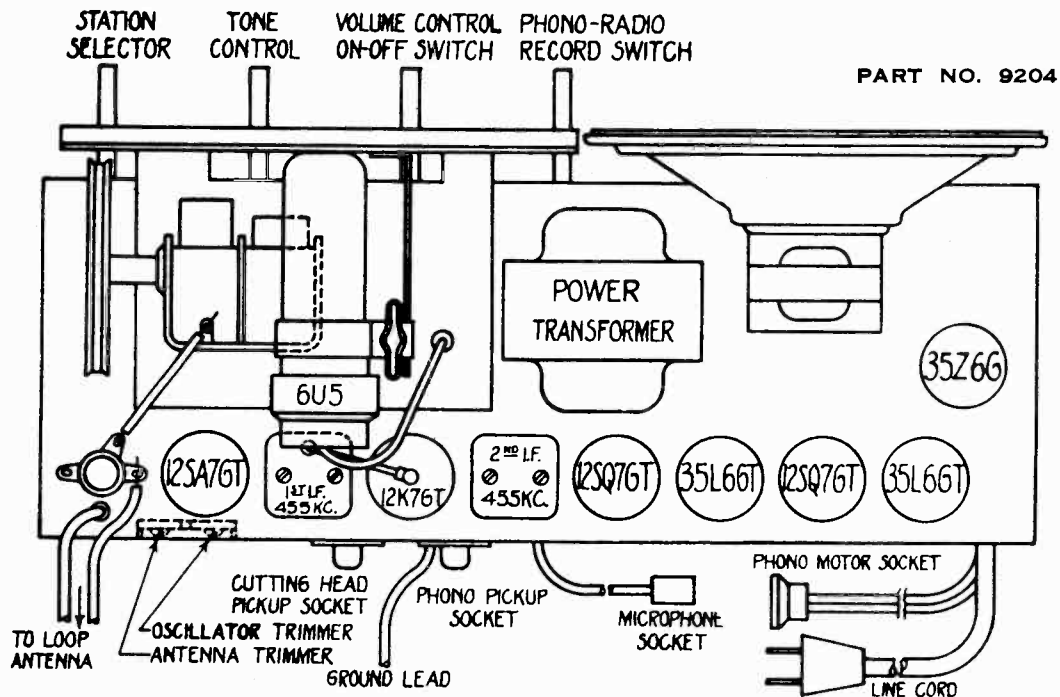
Voltages indicated at socket terminals are measured with 1000 ohm per volt meter, on 117 volt line, no signal.

ALIGNMENT PROCEDURE

Output meter connection . . . . . Across speaker voice coil  
 Connection of generator ground lead . . . . . To Chassis  
 Connection of generator output lead . . . . . See chart below  
 Dummy antenna value to be used in series with generator . . . . . See chart  
 Position of volume control . . . . . Full on (Clockwise)

POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMERS ADJUSTED (IN ORDER SHOWN)
Open (Min. capacity)	455 kc.	.1 mfd.	Ant. section of variable	T2, T1.
Min. capacity	1720 kc.	50 mmf.	Ant. Terminal	Oscillator Trimmer
Tune in signal from generator	1400 kc.	50 mmf.	Ant. Terminal	Antenna Trimmer

ALL ALIGNMENT OPERATIONS MUST BE DONE WITH THE MASTER CONTROL SWITCH IN THE NO. 1 (RADIO) POSITION.



LOOP ANTENNA

This receiver is equipped with a loop antenna. This antenna is somewhat directional in its reception characteristics, therefore turning the receiver to a particular position will often improve reception or reduce interference.

ANTENNA AND GROUND CONNECTIONS

When this receiver is used inside a building which has metal lath or a large amount of steel in it, or in a location where reception conditions are poor, an outdoor antenna and a ground may be necessary.

Two terminals are provided on the back of the cabinet for connection of antenna and ground.

MODEL 390

## DETROLA CORP.

Adjust the Volume Control so that the eye just closes (See paragraph titled "THE TUNING EYE").

Turn the phono motor ON.

Raise the Recorder Arm and move it so that the needle is just inside the edge of the record. Lower the arm carefully on the record.

When the recording arm is lowered on the record an arm on the under side of the recorder unit engages the lead screw which moves the arm across the record. The arm must be raised about three inches to disengage the lead screw so that the arm can be moved.

As the recording is being made, a small shaving is cut out of the record by the recording needle. This piles up in the center of the record.

After the record has been cut, raise the recorder arm, swing it outwardly and place it on the rest. Stop the turntable and remove the shaving which has been cut out of the record.

The record may now be played in the normal manner.

#### TO RECORD WITH THE MICROPHONE

Plug the Microphone into the socket provided on the rear of the cabinet.

Turn the Master Control Switch to the No. 5 position.

Speak into the microphone and adjust the volume control until the eye just closes as described in the preceding paragraph. Whatever sound is picked up by the microphone will be recorded on the record. Keep the microphone some distance away from the receiver, preferably to one side so that it does not pick up the sound from the speaker. Keep the microphone at least six inches from your mouth and try to keep the same voice level as used initially in setting the volume.

Place the recording arm on the record as described above.

#### TO RECORD WITH MICROPHONE AND RADIO AT THE SAME TIME

Position No. 4 of the Master Control Switch arranges the circuits so that it is possible to make a recording from a radio program and with the microphone at the same time.

Tune in the program you desire to record exactly as described under "Recording Radio Programs".

Turn the Master Control Switch to the No. 4 position. Adjust eye so that it does not completely close at maximum radio signal.

Speak into the microphone with sufficient volume so that the eye just closes at the maximum combined radio and voice signal. To make the voice predominate, retard the volume setting which reduces the radio volume, and speak a little closer to the microphone.

Place the recorder arm on the record and proceed with the recording.

#### PUBLIC ADDRESS

The No. 6 position of the Master Control Switch connects the circuits so that the microphone, and the audio amplifier and speaker of the receiver may be used as a small public address system. Keep the microphone as far as possible from the speaker so that the sound from the speaker will not reach the microphone, causing a "Howl" or whistle.

#### GENERAL INFORMATION

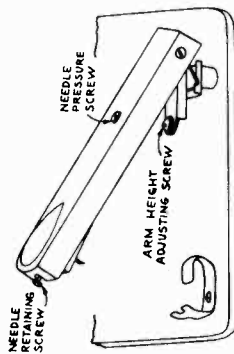
In the recording positions (Positions 3, 4 and 5 of the Master Control Switch) the volume from the speaker is reduced. This is done automatically by the switch for three reasons, some of the power from the output tube is needed for operating the recording head, the volume level necessary for recording is too high for the average size room, and to prevent the sound from the speaker from reaching the microphone.

If the recording needle is not very sharp, the quality of the recording will be poor. A needle which has become dull through use or which has been otherwise damaged should be replaced.

The Master Control Switch should always be turned to the No. 1 (Radio) position when listening to radio programs.

The pickup and the recording arms should always be placed on the rests provided for them when they are not in use, to protect them from damage.

#### RECORDING ARM ADJUSTMENTS



The recorder arm and recording head are adjusted at the factory for best operation. The following paragraph tells how to correct these adjustments should they, for any reason, become changed from their factory setting.

The bottom of the recording arm should be exactly 1/4 inch from the surface of the record. This should be measured beside the needle retaining screw on the end of the arm. The screw for making this adjustment can be found when the arm is raised, on a small platform near the hinge. Turning the adjusting screw to the left raises the arm, turning to the right lowers it. In making an adjustment turn the screw only a small fraction of a turn at a time.

Make a cut of at least ten or fifteen turns to see whether or not the needle is exerting the correct pressure on the record. This is correct when the groove cut by the needle is of approximately the same width as the space between grooves. On top of the cutting arm is a flat head screw. Turning this screw to the right increases the depth of cut, to the left decreases it. This adjustment is quite critical and the screw should be turned not more than 1/4 turn at a time.

#### PHONO OPERATION

Turning the Master Control Switch to the No. 2 or Phono position connects the phono pickup to the audio amplifier of the receiver and disconnects the radio. The Volume control acts for phono the same as for radio.

Always place the pickup arm on the rest provided when not in use.

#### RECORDING

The recording mechanism will cut records up to 10 inches in diameter. Recordings of excellent quality can be made if the instructions in the following paragraphs are very carefully followed.

#### INSERTING THE RECORDING NEEDLE IN THE HEAD OF THE RECORDER ARM

Notice that the shank of the recording needle is ground flat on one side. Loosen the screw in the end of the Recorder Arm. Insert the needle into the hole in the under side so that the flat side is towards the front of the cabinet. Tighten the retaining screw so that the needle is held firmly. Check to make sure that the recording needle is tight each time a recording is made.

#### TO RECORD A RADIO PROGRAM

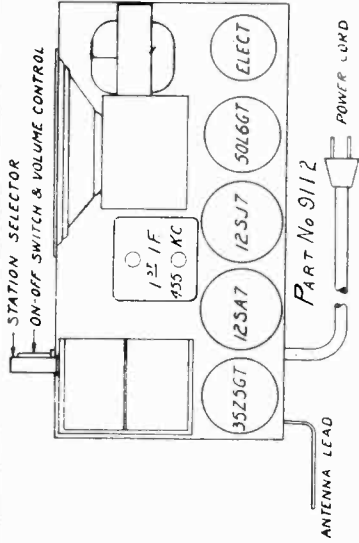
Place a blank record on the turntable making sure that the small pin on the turntable projects through the hole provided for it in the record. This is necessary to prevent the record from slipping and ruining the recording.

Turn the Master Control Switch to the No. 1 (Radio) position. Tune in the program you desire to record. Observe the tuning eye carefully and be sure that the station is tuned in perfectly.

Turn the Master Control Switch to the "Record Radio" (No. 3) position. Notice that the shadow on the tuning eye screen now varies in width with the volume of sound.

# DETROLA CORP.

MODEL 392  
MODELS 3862, 3863

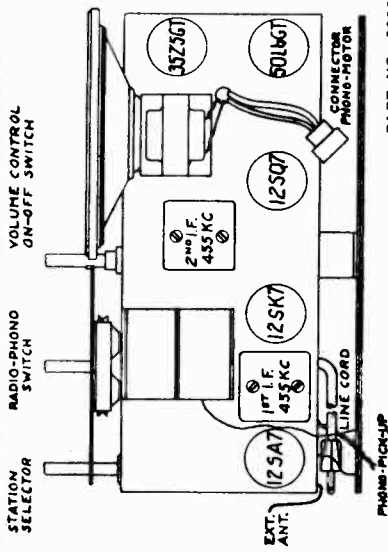
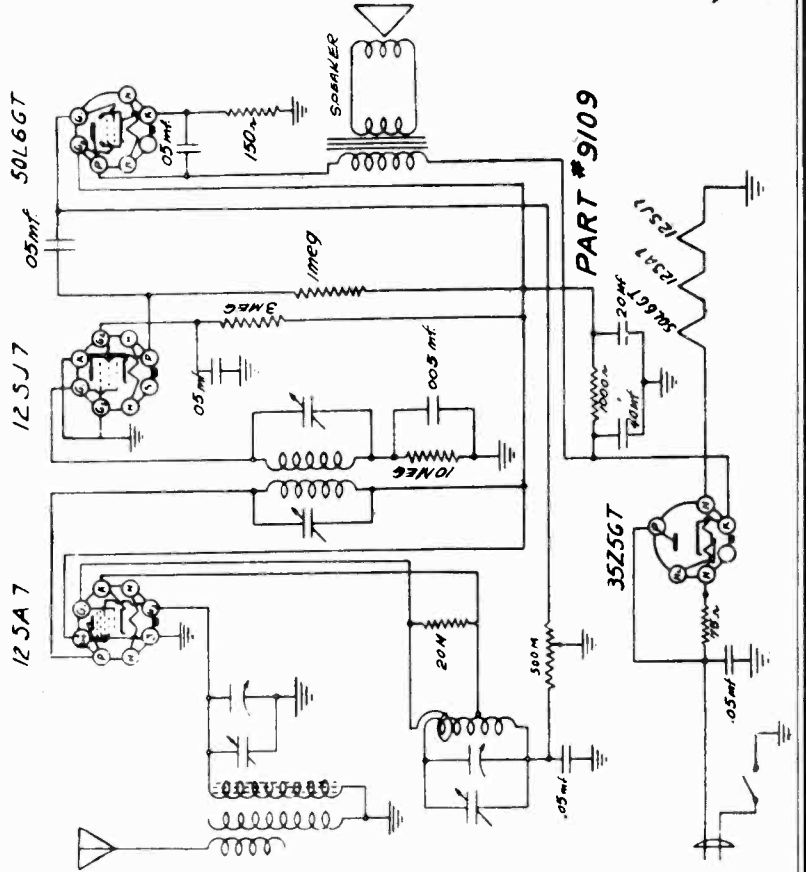


The following tubes are used in this receiver:

- 12SA7 Translator      50L6GT Output
- 12SJ7 Detector      35Z5GT Rectifier

If this receiver should fail to operate when connected to direct current reverse the attachment plug in the light socket.

## MODEL 392 SERIES

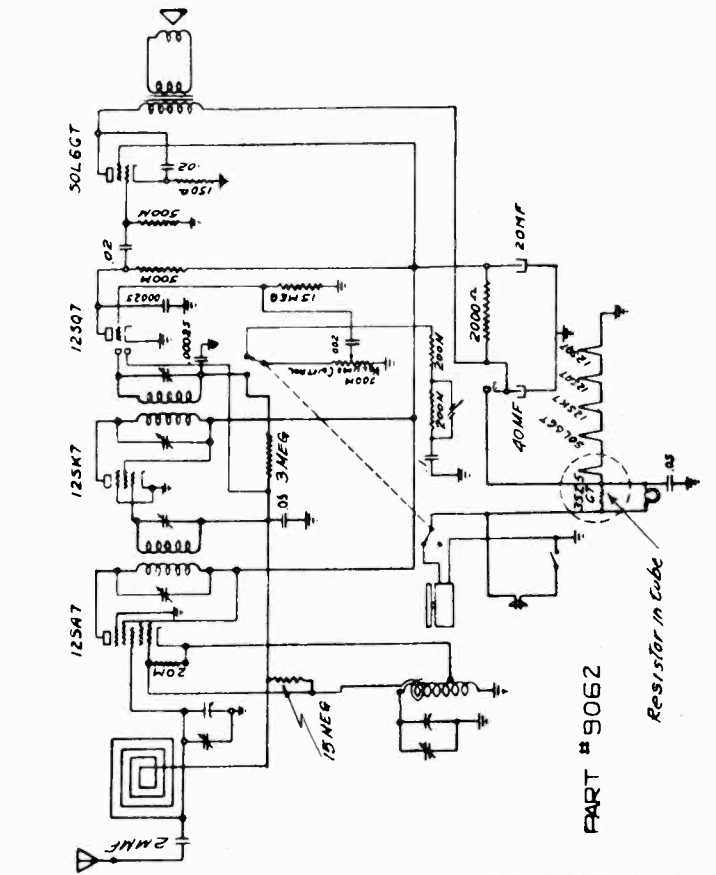


## MODEL 3863 AC PHONO COMBINATION

The following tubes are used in this receiver:

- 12SA7 Translator      12SQ7 Detector AVC
- 12SK7 IF amplifier      50L6GT Output
- 35Z5GT Rectifier

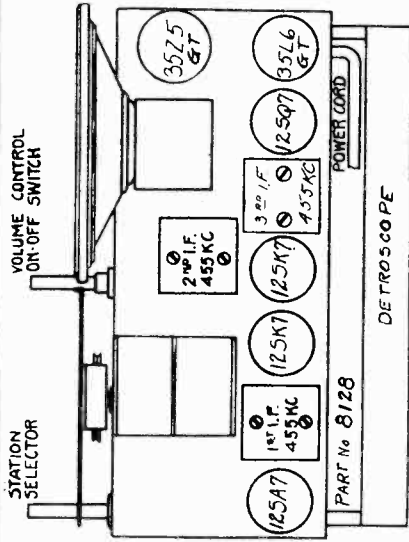
## MODEL 3862 AC-DC PHONO COMBINATION





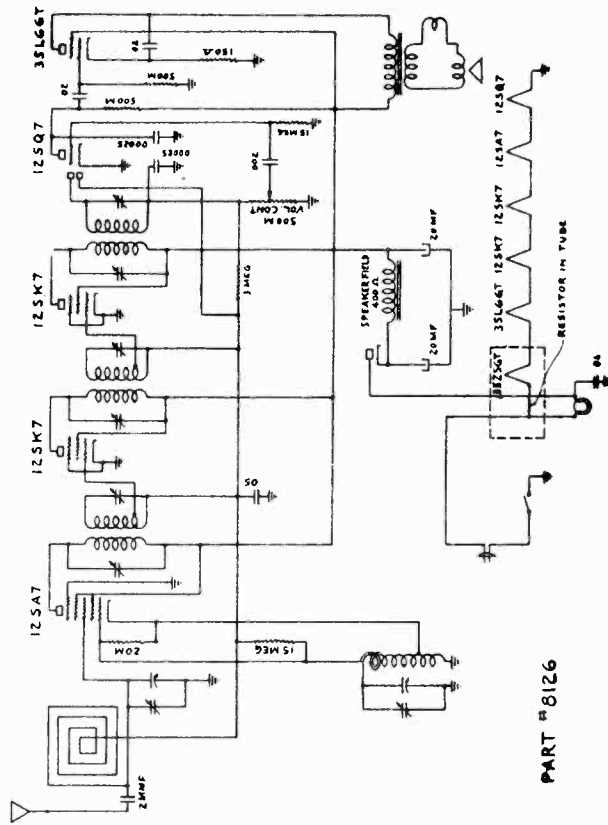
MODEL 393  
MODEL 394

DETROLA CORP.



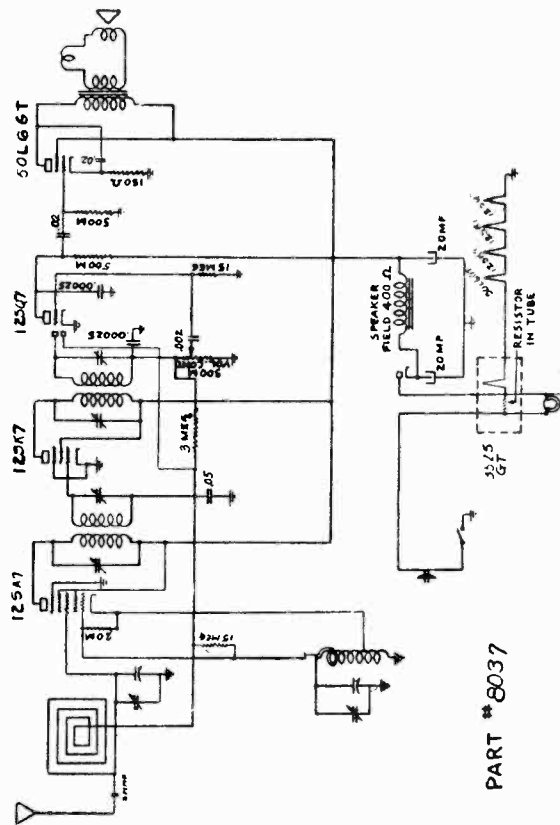
The following tubes are used in this receiver.  
 12SA7 Translator 12SQ7 Detector AVC  
 12SK7 1st IF Amplifier 35L6GT Output  
 12SK7 2nd IF Amplifier 35Z5GT Rectifier

MODEL 394 SERIES



The following tubes are used in this receiver.  
 12SA7 Translator 12SQ7 Detector AVC  
 12SK7 IF amplifier 50L6GT Output  
 35Z5GT Rectifier

MODEL 393 SERIES

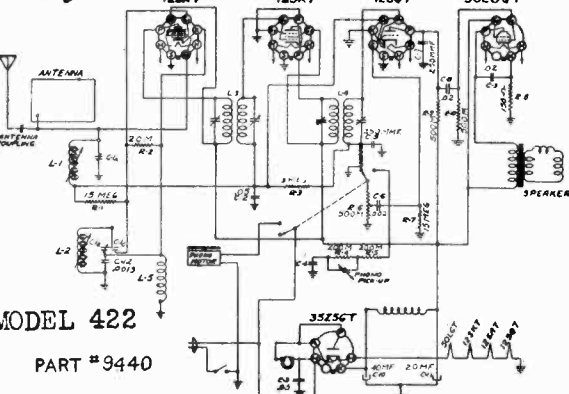
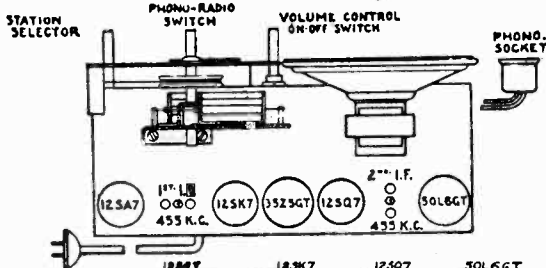
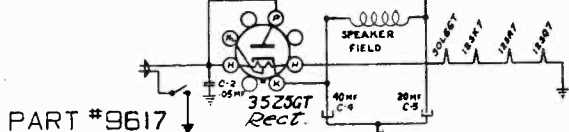
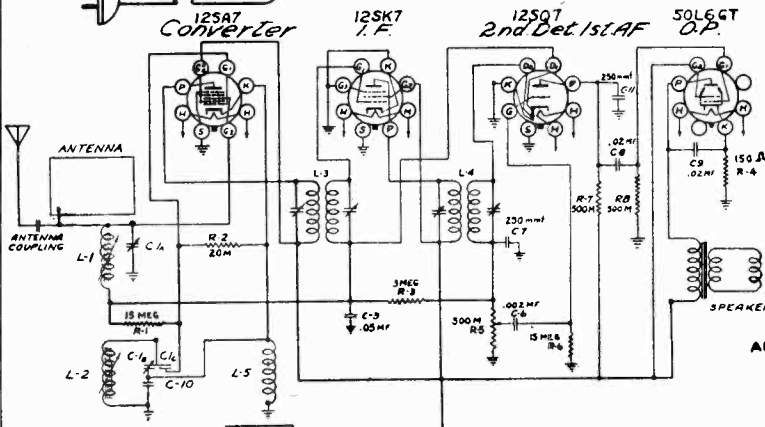
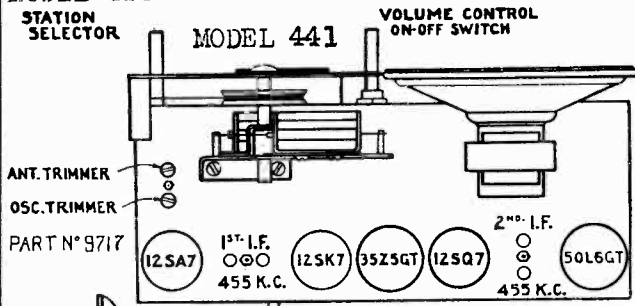


PART # 8037

MODEL 441 MODEL 445  
MODEL 423

DETROLA CORP.

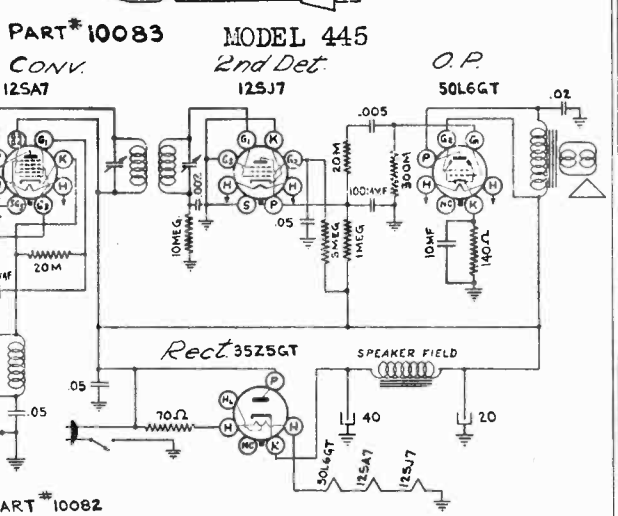
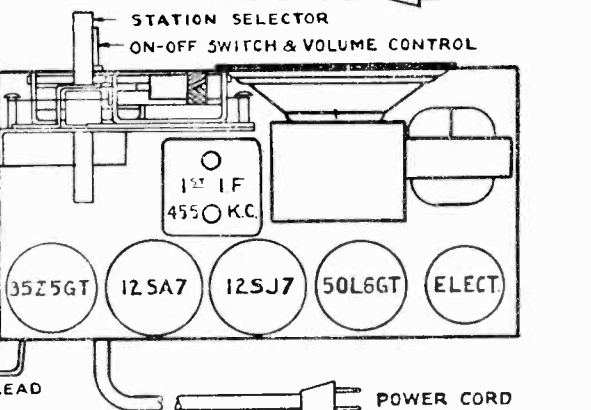
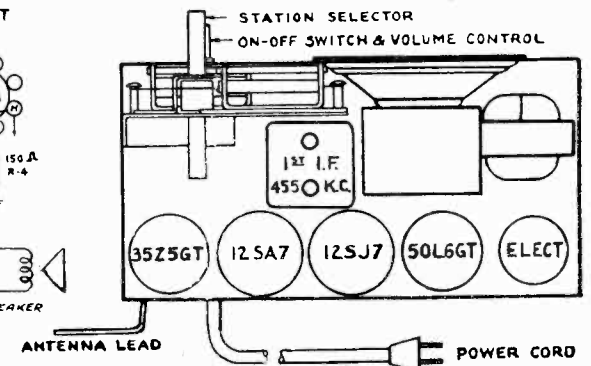
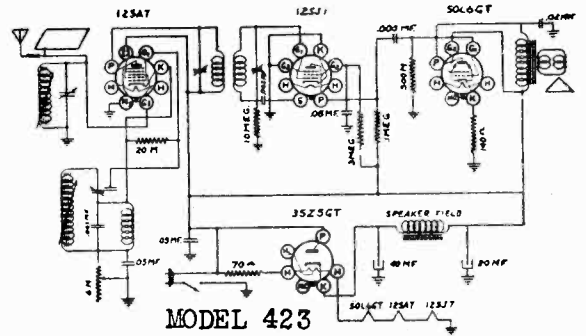
MODEL 422



MODEL 422  
PART #9440

ALIGNMENT FOR MODELS 441 and 445

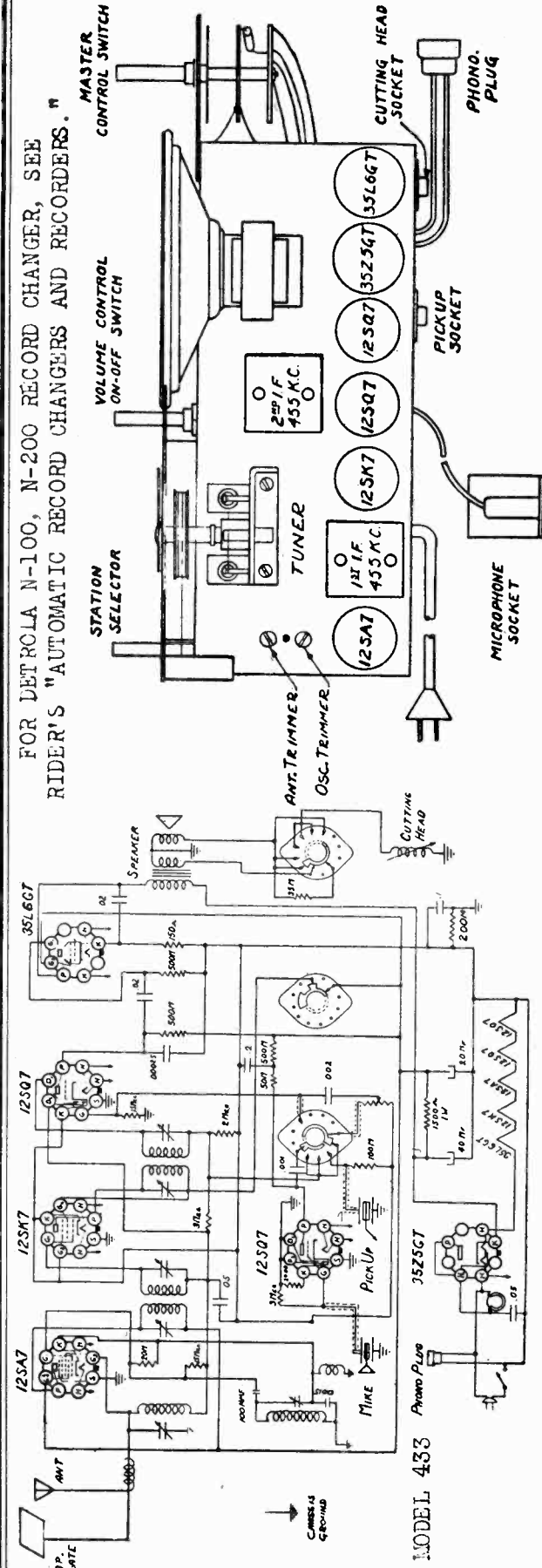
GENERATOR	CONNECTION AT RADIO	DUMMY ANTENNA	DIAL	TRIMMER TO TUNE	REMARKS
I.F. 455 kc.	12SA7 Grid	.1 mfd.	H. F. end	I.F. Transformers	Tune to Max.
1720 kc	Ext. Ant. Wire	200 mmf.	H. F. end	Oscillator Trimmer	Set Limit of band
1400 kc	Ext. Ant. Wire	Dummy antennae—1 mfd., 200 mmf.	1400	Antenna Trimmer	Tune to Max.



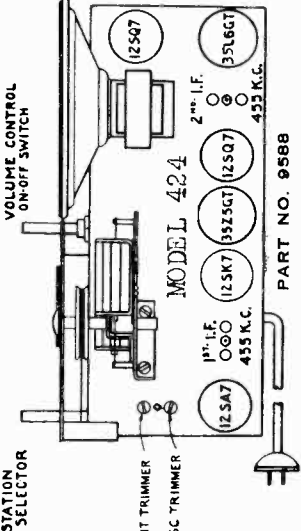
MODEL 433 MODEL 424

DETROLA CORP.

FOR DETROLA N-100, N-200 RECORD CHANGER, SEE RIDER'S "AUTOMATIC RECORD CHANGERS AND RECORDERS."



MODEL 433



MODEL 424

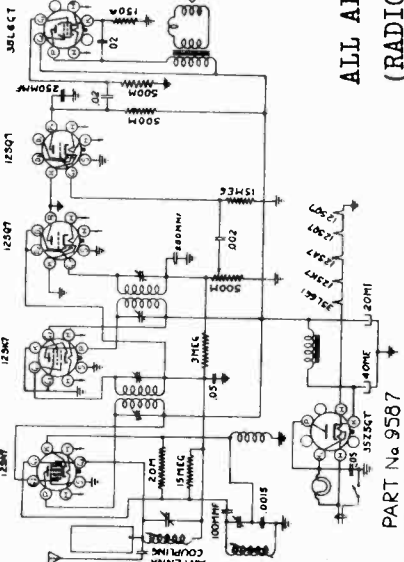
ALIGNMENT PROCEDURE  
MODEL 433

- Output meter connection . . . . . Across speaker voice coil
- Connection of generator ground lead . . . . . To Chassis
- Connection of generator output lead . . . . . See chart below
- Dummy antenna value to be used in series with generator . . . . . See chart
- Position of volume control . . . . . Full on (Clockwise)

GENERATOR	CONNECTION AT RADIO	DUMMY ANTENNA	DIAL	TRIMMERS TO TUNE	REMARKS
IF 455 KC	12SA7 Ghd	.1 mfd.	H. F. End	IF Transformers	Tune to Max.
1720 KC	Antenna	200 mmi.	H. F. End (1720)	4 Trimmers	Set Limit Of Band
1400 KC	"	"	1400	Oscillator Trimmer	Tune to Max.
				Antenna Trimmer	

Repeat Above Alignment Procedure at least once more.

ALL ALIGNMENT OPERATIONS MUST BE DONE WITH THE MASTER CONTROL SWITCH IN THE NO. 1 (RADIO) POSITION.



PART No 9587

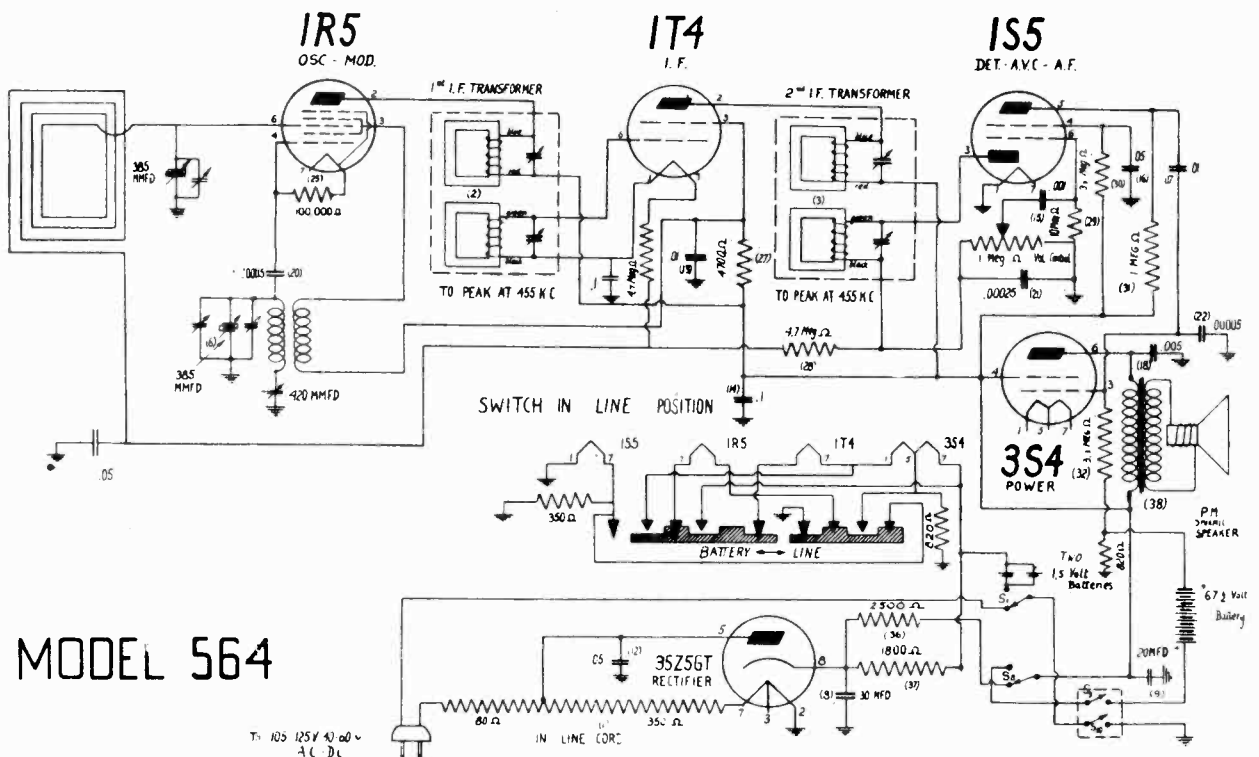
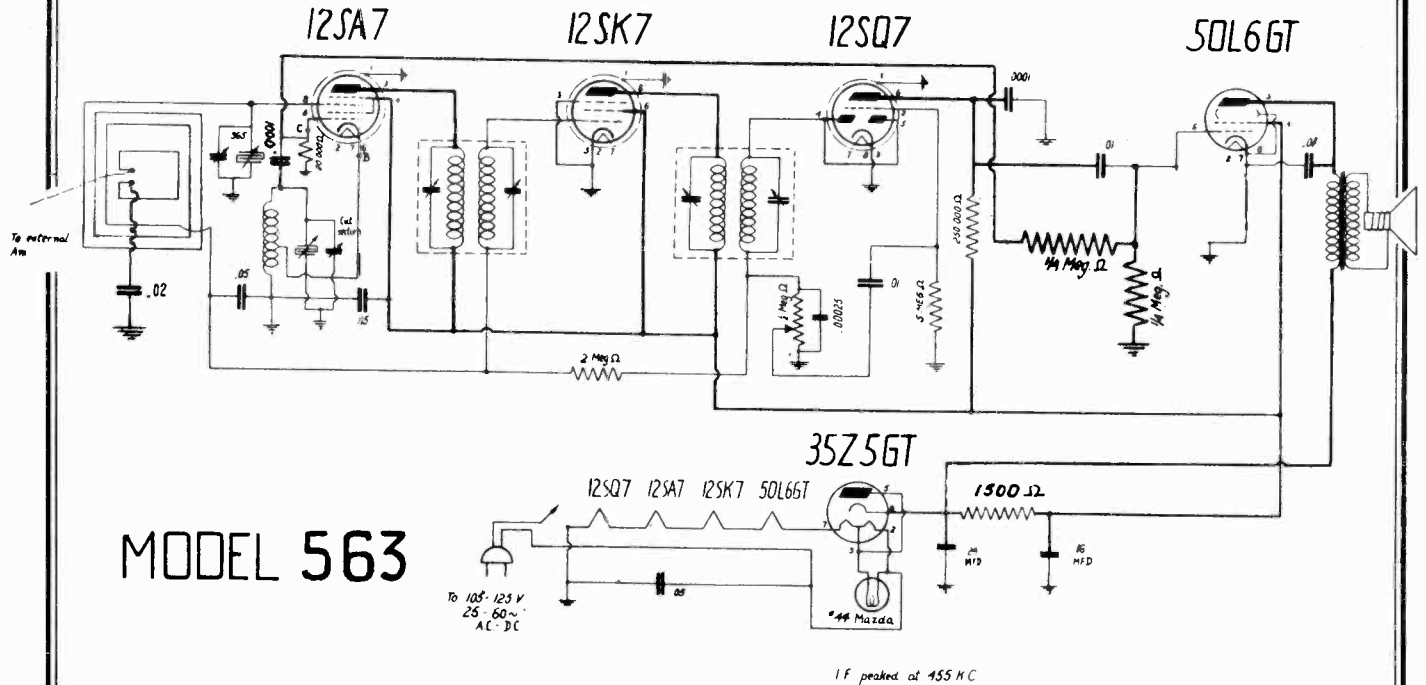
DeWALD RADIO MFG. CORP.

MODEL 563

MODEL 564

TO CALIBRATE RECEIVER

Attach the hot side of signal generator to one of the flexible antenna loop leads. Connect the ground side to the other flexible lead. Adjust the signal generator to 455 KC and peak the I.F. trimmers for maximum signal. Adjust the receiver dial and generator to 1500 KC peak the variable condenser trimmer screws for maximum gain.



DeWALD RADIO MFG. CORP.

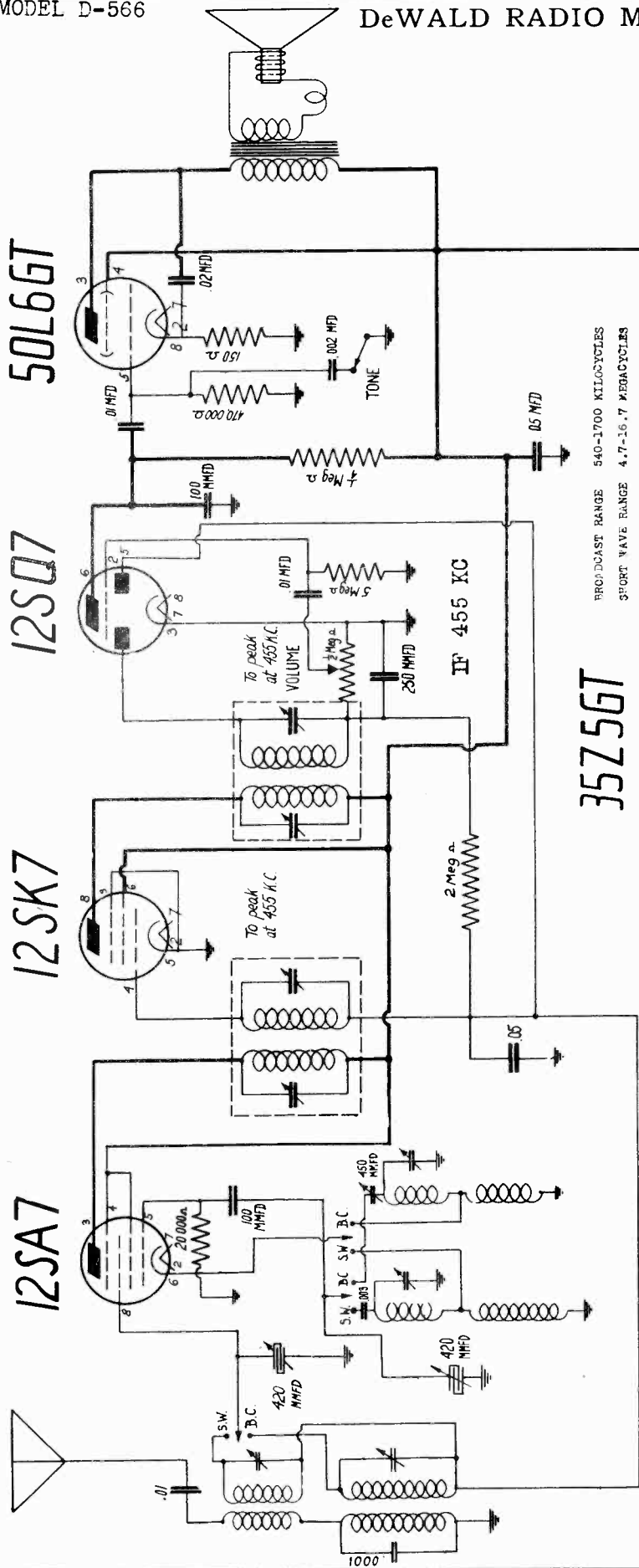
MODEL D-566

50L6GT

12SQ7

12SK7

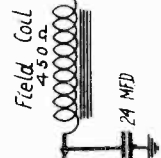
12SA7



35Z5GT

12SQ7 12SA7 12SK7 50L6GT

BROADCAST RANGE 540-1700 KILOCYCLES  
SHORT WAVE RANGE 4.7-16.7 MEGACYCLES



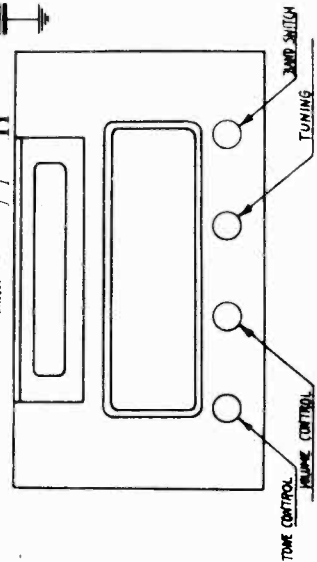
Remove short from variable condenser. Have the wave band switch on broadcast position. Adjust the generator and receiver to 1500 K.C. Peak trimmers for maximum signal. Adjust generator and receiver to 600 K. C. and peak the broadcast padder for maximum signal. The variable condenser should be "rocked" during this operation.

Mazda #44  
BROADCAST ALIGNMENT

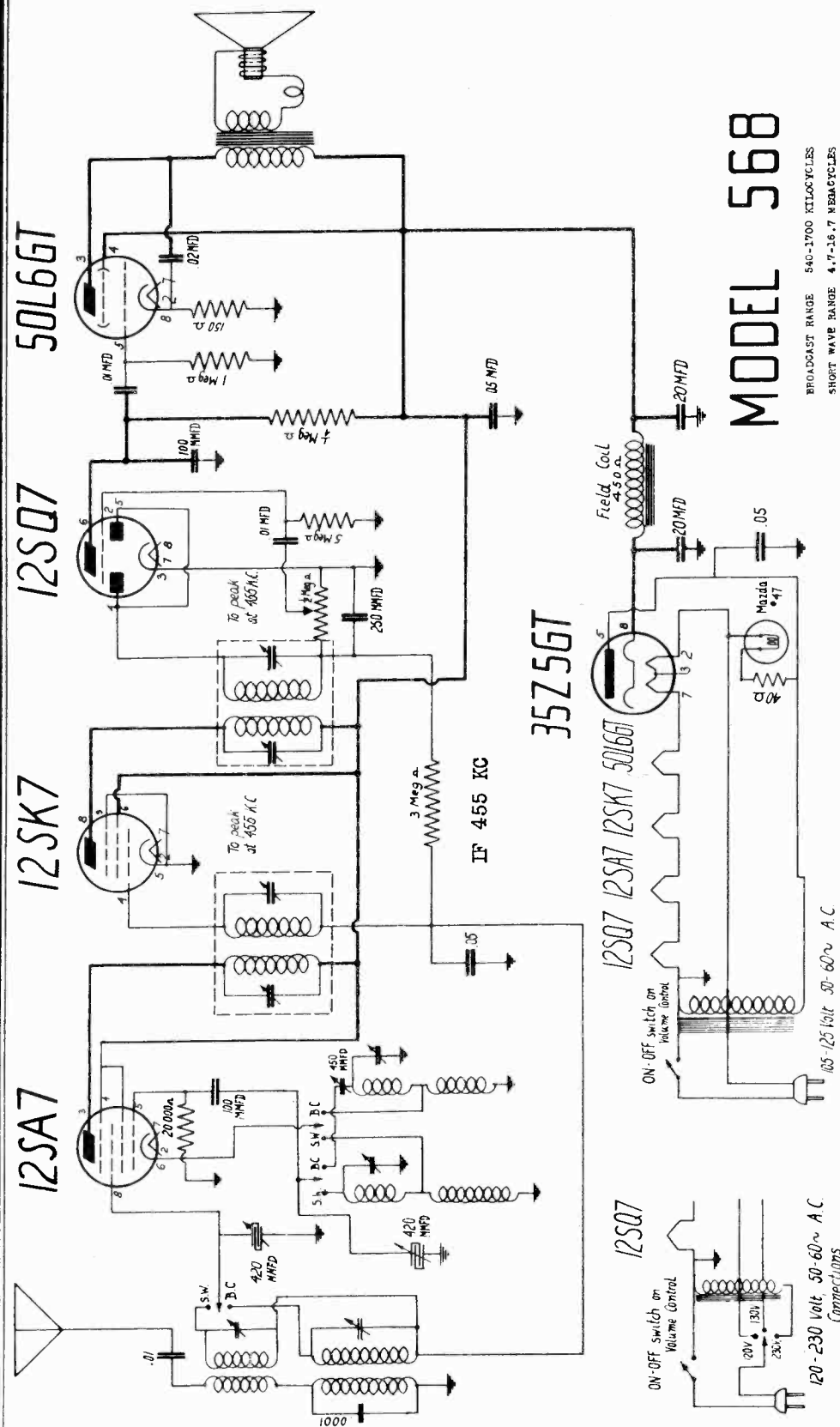
For 4.7-10 M.C. Turn wave band switch knob to this band. Adjust the generator and receiver to 10 M.C. and peak the trimmers for maximum signal. The low frequency is automatically adjusted by a fixed calibrated padder. For 11.5-24 M.C. Turn wave band switch knob to this band. Adjust the generator and receiver to 22 M.C. peak trimmers for maximum signal. Adjust the generator and receiver to 12 M.C. Peak the short wave padders (located underneath chassis) for maximum signal.

SHORT WAVE ALIGNMENT

105-125V. 40-60W  
A.C. or D.C.  
unless otherwise specified



DeWALD RADIO MFG. CORP.



# MODEL 568

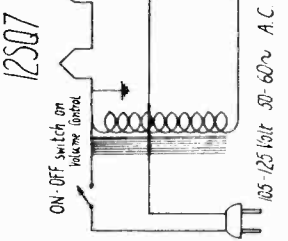
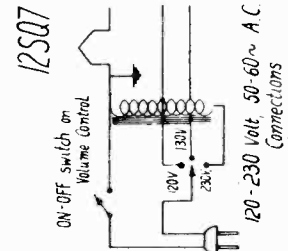
BROADCAST RANGE 540-1700 KILOCYCLES  
 SHORT WAVE RANGE 4.7-16.7 MEGACYCLES

### BROADCAST ALIGNMENT

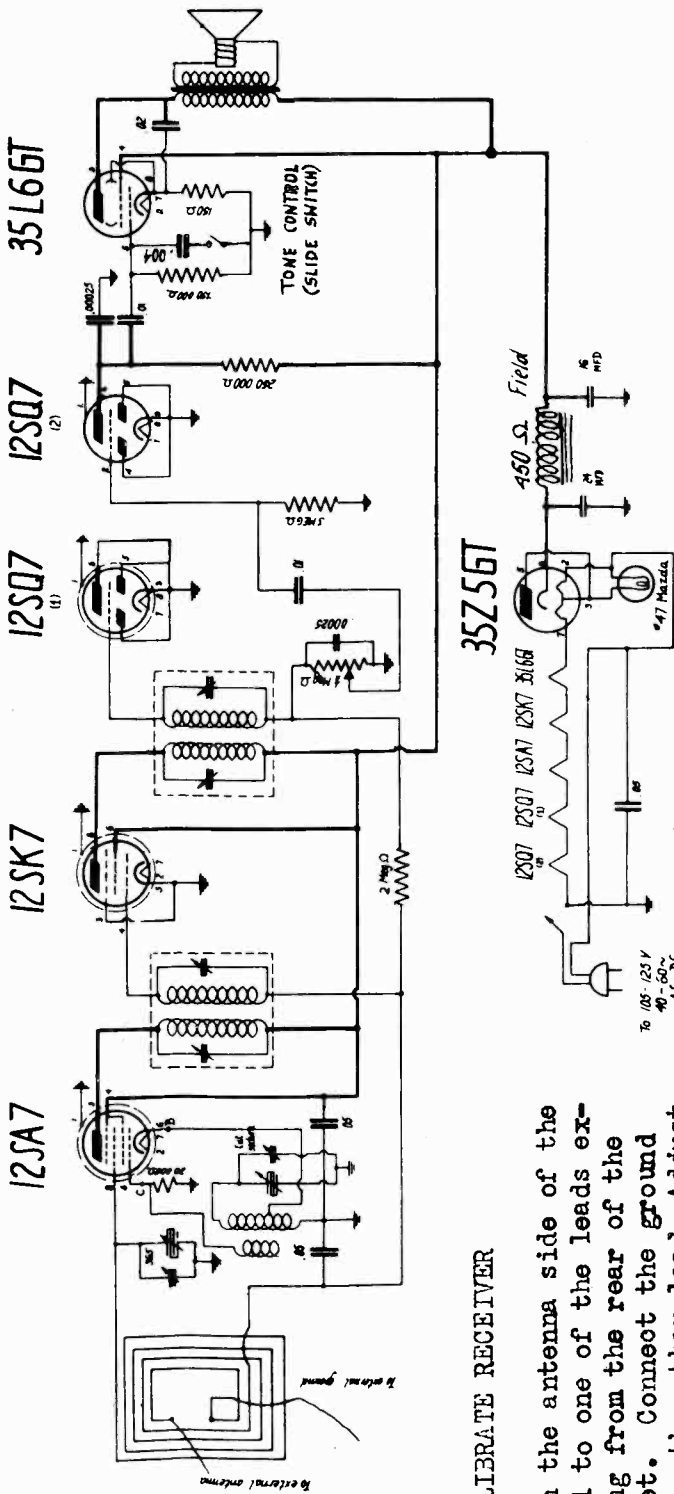
Set the signal generator and receiver dial to 1500 kilocycles. Adjust the broadcast oscillator trimmer screw until the signal from the generator is heard. Peak the antenna trimmer screw for maximum output. Now, set the signal generator and receiver dial to 600 kilocycles. Peak the broadcast paddler for maximum output. The variable condenser should be "rocked" during this operation.

### SHORT WAVE OPERATION

Slide the wave band switch button to the short wave position. Set the signal generator and receiver to 16 megacycles. Adjust the short wave oscillator coil trimmer until the generator signal is heard. Peak the short wave antenna coil trimmer for maximum output. The low frequency end of the dial is automatically adjusted.



DeWALD RADIO MFG. CORP.



MODEL 666-T

**IMPORTANT**

Since the loop used has a directional effect, it may be found that it is necessary at times to turn the receiver for best reception on weaker stations.

**TO CALIBRATE RECEIVER**

Attach the antenna side of the signal to one of the leads extending from the rear of the cabinet. Connect the ground side to the other lead. Adjust the signal generator to 455 KC and peak the I.F. trimmers for maximum signal. Set the signal generator and the receiver to 1500 KC and peak the variable condenser trimmers for maximum signal. The low frequency end of the dial is automatically calibrate by a cut section variable condenser.

**MODEL 666T**

This model is a six tube superheterodyne receiver with full automatic volume control. A self-contained loop is incorporated which makes the use of an antenna unnecessary. The range coverage is 540-1700 kilocycles. The receiver has been designed to operate on 105-125 volts, 40-60 cycles A.C.-D.C. unless otherwise specified.

DeWALD RADIO MFG. CORP.

Power AF  
35L6GT

2<sup>nd</sup> Det. & AF  
12SQ7

I.F.  
12SK7

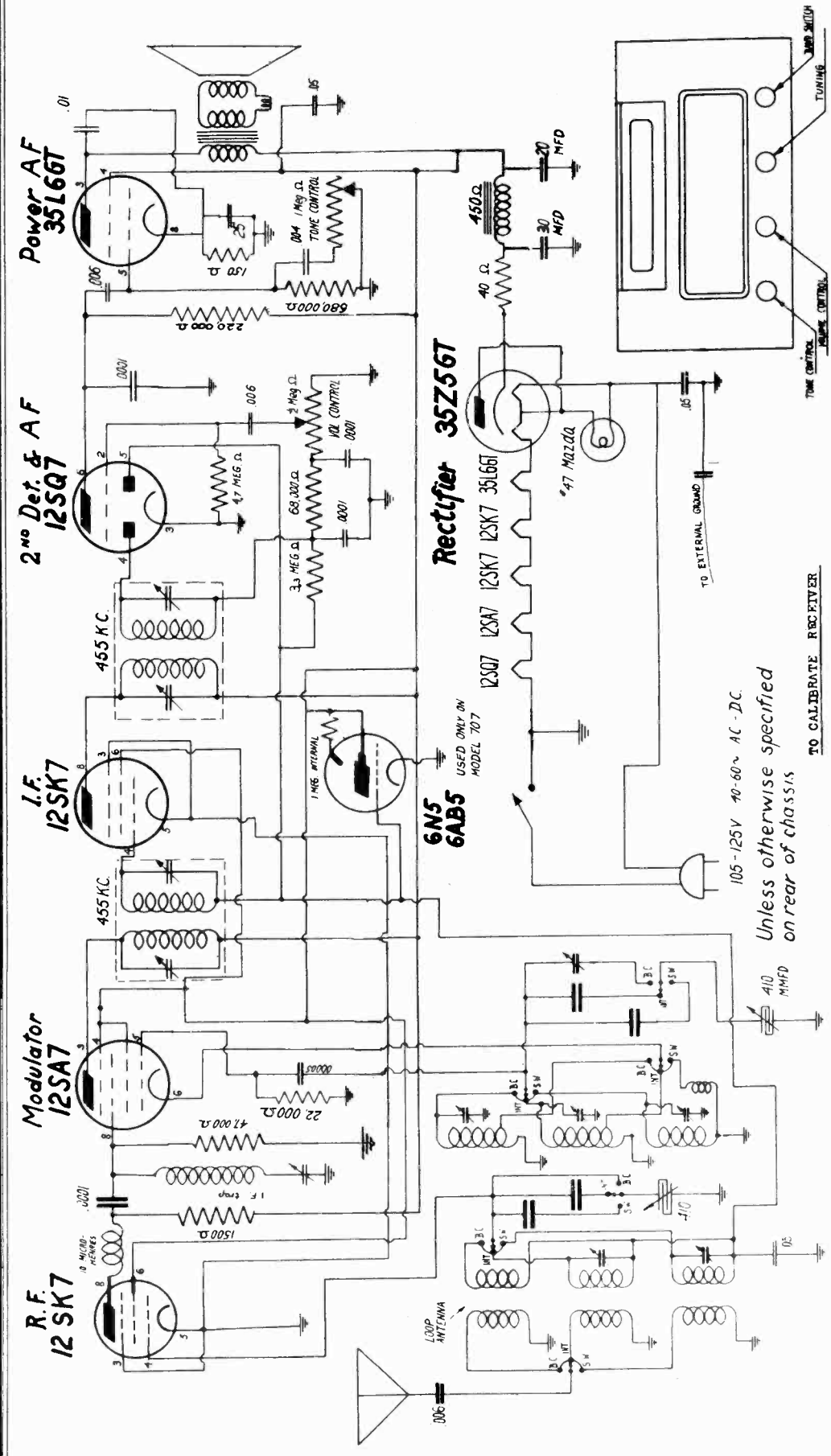
Modulator  
12SA7

R.F.  
12SK7

Rectifier  
35Z56T

6N5  
6AB5

USED ONLY ON  
MODEL 707



105-125V 40-60~ A.C. - D.C.

Unless otherwise specified  
on rear of chassis

**I. F. ALIGNMENT** Connect antenna lead of the signal generator to antenna lead of receiver and ground lead of generator to receiver chassis. Short circuit front section of variable condenser. Adjust generator to 455 K.C. and peak I.P.F. trimmers for maximum signal.

ALIGNMENT FOR MODELS 670, 707, 672-A

**SHORT WAVE ALIGNMENT**

For 4-7-10 K.C. Turn wave band switch knob to this band. Adjust the generator and receiver to 10 M.C. and peak the trimmers for maximum signal. The low frequency is automatically adjusted by a fixed calibrated padder. For 11.5-24 M.C. Turn wave band switch knob to this band. Adjust the generator and receiver to 22 M.C. Peak trimmers for maximum signal. The low frequency is automatically adjusted by a fixed calibrated padder.

**BROADCAST ALIGNMENT**

Remove short from variable condenser. Have the wave band switch on broadcast position. Adjust the generator and receiver to 1500 K.C. Peak trimmers for maximum signal. Adjust generator and receiver to 600 K.C. and peak the broadcast padder for maximum signal. The variable condenser should be "rooked" during this operation.



MODEL 672-A

DeWALD RADIO MFG. CORP.

MODEL 672-A

Power AF  
6K66T

2<sup>nd</sup> Det. & AF  
7C6

I.F.  
7B7

Modulator  
6SA7

R.F.  
7B7

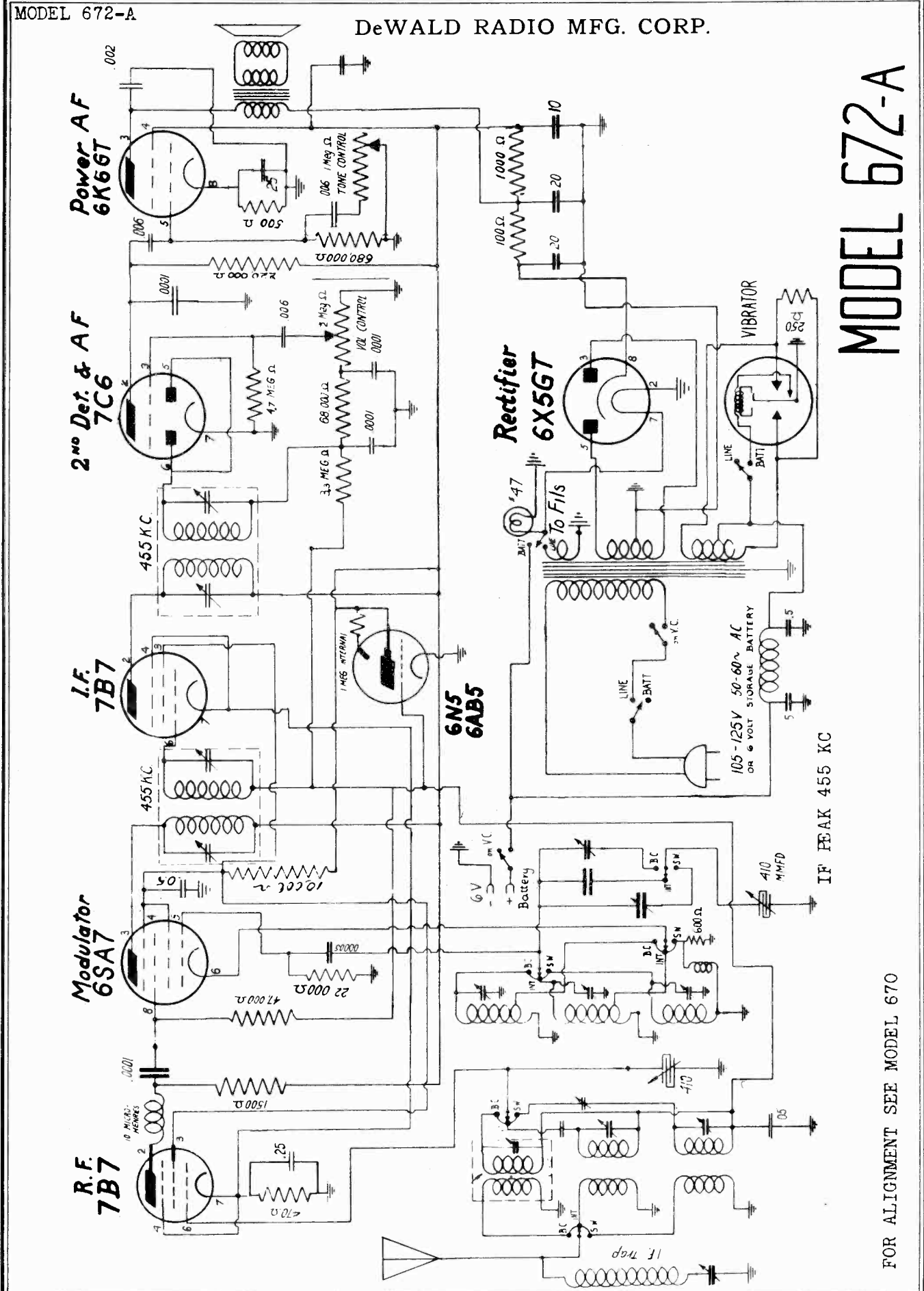
6N5  
6AB5

Rectifier  
6X5GT

105-125V 50-60~ AC  
OR 6 VOLT STORAGE BATTERY

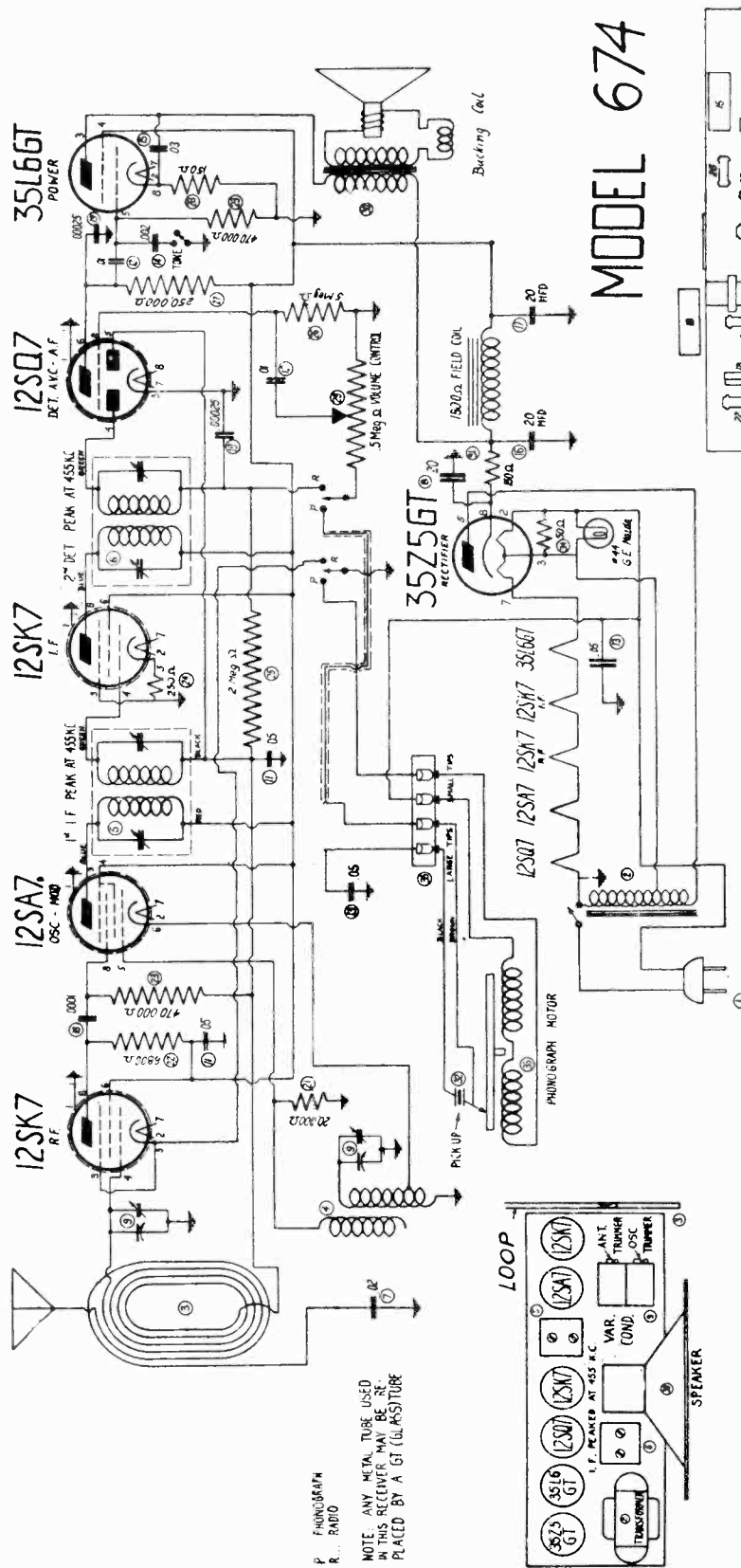
IF PEAK 455 KC

FOR ALIGNMENT SEE MODEL 670



DeWALD RADIO MFG. CORP.

MODEL 674



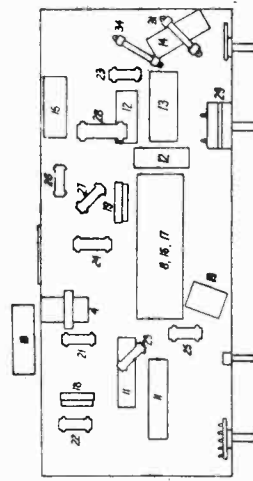
P. PHONOGRAM  
R. RADIO  
NOTE: ANY METAL TUBE USED  
IN THIS RECEIVER MAY BE REPLACED  
BY A GUL AIR TUBE

MODEL 674 INSTRUCTION SHEET

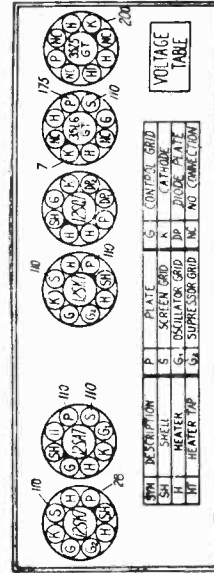
The model 674 is a RADIO-PHONO combination that provides reproduction of recordings with good fidelity as well as regular radio broadcast reception. All types of records up to 12 inches may be played with the lid closed. A self-starting motor together with a crystal pick-up are used for phonograph reproduction. The radio receiver employs a superheterodyne circuit using the latest low drain tubes for low power consumption. A self-contained loop-tenna is incorporated which makes the use of an outside antenna unnecessary in most localities. It will function on 105-125 volts, 60 cycles A.C. only, unless otherwise specified. A range of 540-1700 kilocycles is covered by the receiver.

RADIO-PHONOGRAM SWITCH

The control on the extreme right is used to operate either the radio or play phonograph disc recordings. When the knob is in the counterclockwise direction, the radio receiver will function. To play records, turn the knob clockwise. This will adjust the instrument for phonograph operation. If a rise in hum level is noticed when handling the phonograph pick-up, reverse the line cord plug in the electric outlet.



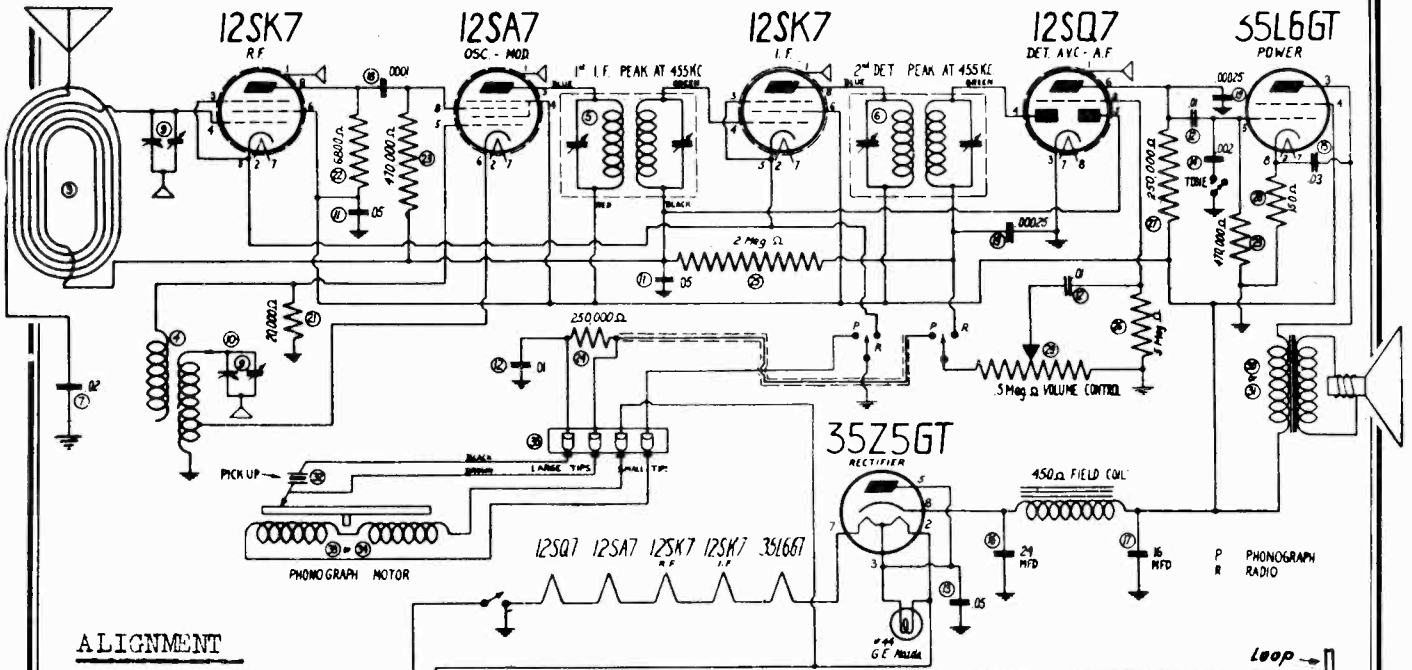
BOTTOM VIEW OF CHASSIS



BOTTOM VIEW OF CHASSIS  
ALL ABOVE VOLTAGES MEASURED FROM SOCKET TERMINAL TO CHASSIS WITH A 1000 Ω PER VOLT VOLTMETER

MODEL 675

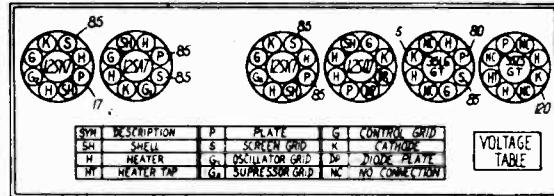
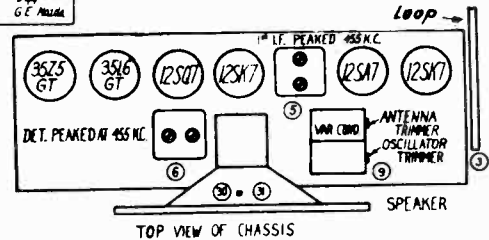
DeWALD RADIO MFG. CORP.



**ALIGNMENT**

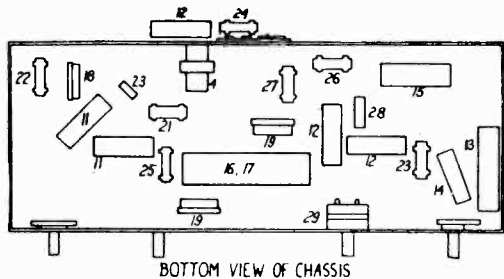
I.F.-----455 K.C.  
R.F.-----1700 to  
1400 K.C.

FOR CONVENTIONAL  
ALIGNMENT SEE  
SPECIAL SECTION  
VOL. EIGHT



BOTTOM VIEW OF CHASSIS

ALL ABOVE VOLTAGES MEASURED FROM SOCKET TERMINAL TO CHASSIS WITH A 1000 Ω PER VOLT VOLTMETER



BOTTOM VIEW OF CHASSIS

**SERVICE NOTES**

Tuning Control Drive Ratio \_\_\_\_\_ 12:1  
Power Consumption (with phono) \_\_\_\_\_ 40 watts  
Intermediate Frequency \_\_\_\_\_ 455 K.C.  
Tuning Frequency Range \_\_\_\_\_ 540-1700 K.C.  
Maximum Power Output \_\_\_\_\_ 0.9 watts  
Loud Speaker \_\_\_\_\_ Cone Diameter---5 inches  
Voice Coil Impedance \_\_\_\_\_ (at 400 cycles) 3 ohms

Plate (8) of 12SK7 R. F. tube to common ground \_\_\_\_\_ 17 volts  
Screen (6) of 12SK7 R.F. tube to common ground \_\_\_\_\_ 85 volts  
Plate (3) of 12SA7 tube to common ground \_\_\_\_\_ 85 volts  
Screen (4) of 12SA7 tube to common ground \_\_\_\_\_ 85 volts  
Plate (8) of 12SK7 I.F. tube to common ground \_\_\_\_\_ 85 volts  
Screen (6) of 12SK7 I.F. tube to common ground \_\_\_\_\_ 85 volts  
Plate (3) of 35L6GT tube to common ground \_\_\_\_\_ 80 volts  
Screen (4) 35L6GT tube to common ground \_\_\_\_\_ 85 volts  
Cathode (8) 35L6GT tube to common ground \_\_\_\_\_ 5.0 volts  
Cathode (8) 35Z5GT tube to common ground \_\_\_\_\_ 120 volts  
heater (2) and (7) of 12SA7 tube \_\_\_\_\_ 12.4 volts AC  
Heater (2) and (7) of 12SK7 R.F. tube \_\_\_\_\_ 12.4 volts AC  
Heater (2) and (7) of 12SK7 I.F. tube \_\_\_\_\_ 12.4 volts AC  
Heater (2) and (7) of 12SQ7 tube \_\_\_\_\_ 12.4 volts AC  
Heater (2) and (7) of 35L6GT tube \_\_\_\_\_ 35.0 volts AC  
Heater (2) and (7) of 35Z5GT tube \_\_\_\_\_ 35.0 volts AC

**SERVICE INFORMATION**

Voltages--Line 117 Volts AC--Power Consumption 40 Watts including Phono-graph Motor. Volume Control maximum. Meter 1000 ohms per volt, 250 volt

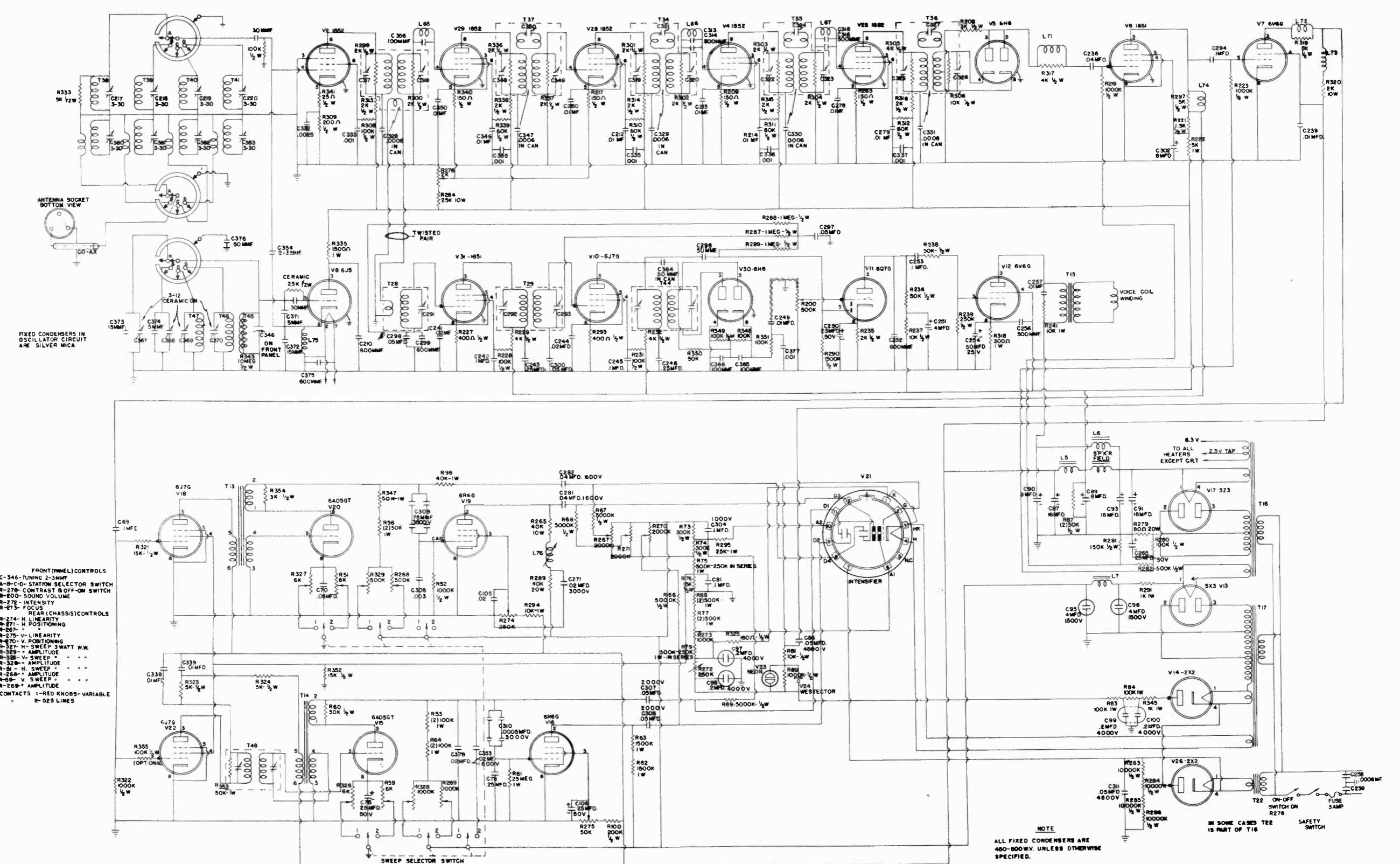
**I.F. Alignment**

Connect an output meter across the voice coil. Rotate the volume control to maximum. Set test oscillator to 455 kilocycles and apply signal to control grid of 12SK7 R.F. through a .05 mfd. capacitor. Align the second I.F. transformer trimmers, next adjust the first I.F. transformer trimmers. Keep the test oscillator output to a level that will give a good meter reading.

**R.F. Alignment**

Attach high side of test oscillator to flexible lead extending from rear of chassis through a .00025 mfd. condenser. Connect the low side to the receiver chassis. Adjust the test oscillator and receiver to 1700 kilocycles. Peak 1700 kilocycles oscillator trimmer for maximum output. Change test oscillator signal and receiver dial to approximately 1400 kilocycles. Then trim 1400 kilocycles antenna trimmer for maximum output.

ALLEN B. DUMONT LABS., INC.



FIXED CONDENSERS IN OSCILLATOR CIRCUIT ARE SILVER MICA

- FRONT (PANEL) CONTROLS**  
 C-346-TUNING 2-3MMF  
 A-B-C-D-STATION SELECTOR SWITCH  
 R-276-CONTRAST B OFF-ON SWITCH  
 R-200-SOUND VOLUME  
 R-278-INTENSITY  
 R-273-FOCUS  
**REAR (CHASSIS) CONTROLS**  
 R-274-H. LINEARITY  
 R-271-H. POSITIONING  
 R-267-V. LINEARITY  
 R-270-V. POSITIONING  
 R-325-H. SWEEP SWATT W.K.  
 R-329-AMPLITUDE  
 R-328-V. SWEEP  
 R-31- H. SWEEP  
 R-258-AMPLITUDE  
 R-269-V. SWEEP  
 R-268-AMPLITUDE  
 CONTACTS 1-RED KNOBS-VARIABLE  
 R-525 LINES

**NOTE**  
 ALL FIXED CONDENSERS ARE 450-500V. UNLESS OTHERWISE SPECIFIED.  
 IN SOME CASES T22 IS PART OF T16  
 SAFETY SWITCH

### ALIGNMENT AND PRODUCTION TESTING OF TELEVISION RECEIVERS.

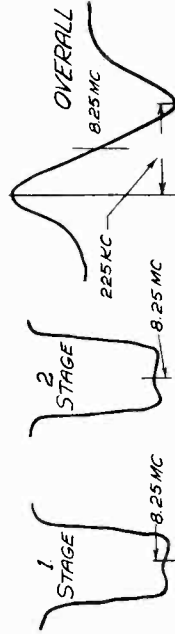
#### 1. AUDIO CIRCUITS

Operation of the audio frequency amplifier may be checked by touching the grid of the 6Q7 and noting hum pickup in the speaker. The first video IFT should be adjusted roughly as it affects the sound I.F. characteristic.

Next, the I.F. amplifier should be aligned, using an oscillograph connected to the screen of the 2nd I.F. tube (screen by pass removed) and a wobulator connected to the proper points to indicate the desired characteristic. The 2nd I.F.T. should be adjusted first with the wobulator connected to the grid of the first I.F. tube (1851), and then the first I.F.T. adjusted with the wobulator connected to the converter grid. Next the 6U7 screen by pass should be put back, the oscillograph shifted to the diode output at the first audio coupling condenser, the .001 de-emphasis condenser opened, and the discriminator transformer adjusted.

The output of the wobulator should be of the order of 5000 microvolts which may be obtained from the RCA wobulator using the low tap with a 10 ohm resistor shunting it to ground. A Ferris signal generator may be used as a marker connecting it to the wobulator output (low tap) through a 100 ohm resistor.

The appearance of the characteristics are indicated by the sketches below. The exact shape of these curves will vary somewhat with individual receivers.



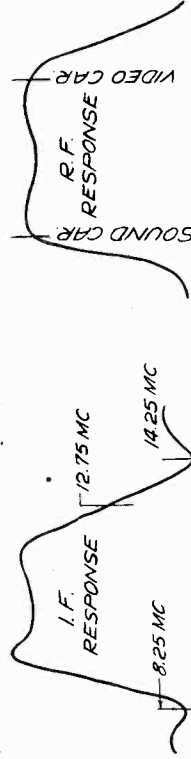
A check on alignment should be made using a Ferris signal generator with about 5000 microvolts output. Tuning the signal generator through the band two equal peaks ( $\pm 10\%$ ) and a null point should be observed. The null point should be at 8.25 mc ( $\pm 15$  Kc).

Sensitivity should then be checked using the Ferris signal generator connected to the converter grid, and the oscillograph connected to the plate of the 6V6G audio output tube. The input for an average output for the two peaks of 50 v. p. to p. (1" direct on 168) should be from 30 to 100 microvolts. (At this low input the two peaks may not be exactly equal due to the fact that signal level affects the I.F. tuning to some extent.)

#### 2. VIDEO I.F. CIRCUITS

An oscillograph is attached to the 6H6 video detector load. An I.F. wobulator is connected successively to the last I.F. stage, next to the last, and so on, back to the mixer grid with adjustment of the corresponding I.F. transformer at each step. In this alignment the overall curve is approximately that shown below. This sketch is illustrative of several receivers but the exact amount of dip is somewhat variable and the final adjustment generally involves use of an actual test pattern received by R.F. It

is desirable that the video I.F. alignment shall have the 6db attenuation at the carrier to provide successful reception of the single side band transmission. 4 of the 5 picture I.F. transformers are triple tuned while the first I.F. transformer is a double tuned unit. When tuning the video I.F. transformer in the plate of the mixer tube, the R.F. circuits should be disconnected from the grid of the mixer before attaching the I.F. signal wobulator to this grid so as to insure flat input.



The trap to reject the adjacent channel picture carrier and the traps to reject the associated sound carrier are all pre-tuned and need no further adjustment. These traps are tuned in manufacture using a Q-meter.

#### 3. R.F. CIRCUITS

The R.F. circuits are aligned by using an input wobulator having relatively high voltage of the order of 1 volt covering the channels as follows:

1	50-56 Mc
2	60-66 Mc
4	78-84 Mc
6	96-102 Mc

To determine the characteristic of these R.F. circuits independent of I.F. response, an oscillograph is connected with its grounded terminal to the B plus supply (using care not to touch the oscillograph) and with its vertical input amplifier connected to the mixer screen. In this way the mixer screen response represents quite adequately the band pass characteristics of the R.F. circuits. This high level wobulator is applied to the antenna terminals, following which the R.F. antenna coil and the mixer grid coil are tuned with the corresponding condensers for each band. The response curve for each band is represented by the sketch above, showing the response for one of the bands which is typical of all of them. The higher channels are somewhat broader than this. During this alignment the oscillator tube has been removed.

Alignment of the oscillator itself is made by using a signal generator tuned to the carrier frequency for the sound channel. Then the oscillator trimmers are adjusted for each of the 4 channels mentioned above so that the sound carrier is received as indicated by the loud speaker. To insure that the oscillator is tuned above the desired carrier the signal generator is then tuned to the picture carrier and a check of received signal is made through the video channel. Another check is to see that the minimum capacity of the oscillator trimmer is used where it is possible to get 2 oscillator frequencies which pass a sound signal. This adjustment of the oscillator is made with the front knob trimmer set at  $\frac{1}{2}$  capacitance. A final sensitivity measurement is now made using the signal generator on the carrier frequencies for sight and sound for all 4 channels.

with the two linearity controls on the sweep deck. In case these adjustments do not cover a sufficient range additional small capacitances are placed in parallel with the bottom condenser of the potential divider which feeds the grid of the sweep amplifier tube. This added condenser is actually placed from grid to ground of the sweep amplifier tube. In this way the ratio of signal from the oscillator to the signal from the amplifier will be controlled, thus correcting the linearity so that an overall linear sawtooth is produced by combination of a sweep oscillator output which is exponential and a sweep amplifier output which by its grid characteristic produces a reverse curvature.

After linearity has been adjusted the horizontal amplitude control should have at least one inch additional amplitude available. The vertical amplitude control should have several inches of additional amplitude available.

The black sweep control knobs, which are connected by turning the sweep selector switch on the front panel counter-clockwise (to position 2), should be checked to insure that the vertical frequency range includes 30 and 60 fields per second with adequate overlap, and that the horizontal frequency range includes 8000 and 15,750 lines per second with adequate overlap.

The black knobs should be set up at the standard 525 lines 30 frames.

The red sweep control knobs, which are connected by turning the sweep selector switch clockwise (to position 1) should be capable of being adjusted to the following color combinations:

(a) CBS color pictures use 375 lines per frame at 60 frames per second which requires a horizontal scanning rate of 22,500 lines per second, and a vertical scanning rate of 120 field scans per second.

(b) NBC has transmitted color with 441 lines per frame and 60 frames per second, requiring 26,460 scanning lines per second, and 120 vertical fields per second.

The Du Mont sync transformer should be adjusted as follows:

A Du Mont picture signal should be applied to the 1851 first video grid in accordance with the previous instructions, or received over the air. A diode rectifier with its output connected to an oscillograph should be very loosely coupled to the grid of the horizontal oscillator (green lead on Du Mont sync transformer). This may be done by clipping a battery clip around an insulated portion of the green lead. The oscillograph sweep should be synchronized to the 60 cycle power line, the beam of the CRT should be cut off, and the sweep oscillator tubes of the television receiver removed. The Du Mont sync transformer should then be adjusted for maximum amplitude of the envelope of the H.F. burst pulse as indicated on the oscillograph.

The test pattern should be clean and crisp with no signs of any breakdown visible. Breakdown will cause intermittent black lines which jump back and forth vertically or horizontally tear out similar to that produced by noise, which is particularly noticeable at the black circle of the test pattern.

Very often faulty coupling condensers in the deflection circuits will cause this trouble and tapping them with an insulated red will help locate the faulty part.

The picture sensitivity should be approximately 200 microvolts input signal on all channels to yield 15 volts peak to peak at the final video 6V6 amplifier plate, using an oscillograph for measurement and using a signal generator with 30% modulation. 4

#### Sound Rejection

While an attenuation ratio of 100 at the sound carrier was sufficient with A.M. sound, it is not adequate with F.M. sound. The signal generator should be tuned through the sound band which is 150 Kc ( $\pm 75$  Kc) and the attenuation ratio should be at least 100 throughout this band at R.F.

#### Adjacent Channel Sound Rejection

Previously rejection ratios of 1000 to 1 at R.F. was attained, measurements should be made by tuning through the band as above and the ratio should be over 500 throughout the band.

The sound sensitivity at R.F. should be approximately the same as at I.F.

#### 4. VIDEO AND SWEEP CIRCUITS

This alignment of the video amplifier and the sweep circuits can be made either with an over-the-air test pattern or with a test pattern from a coaxial line. When an over-the-air transmission is used the signal is applied to the antenna terminals.

However, when a coaxial line signal is used, it is necessary to observe the precaution of a suitable input network for applying the signal to the grid of the 1851 first video amplifier tube. This tube has a fixed bias within the set to which its grid lead is returned and its cathode is grounded. It is therefore desirable to insert a coupling condenser of at least 0.1 ufd from the coaxial line and supply a grid leak from the 1851 grid lead of at least  $\frac{1}{2}$  megohm between the 1851 grid cap and the lead wire from beneath the chassis which would otherwise normally be connected to the 1851. In this way the proper fixed bias is still applied to this tube.

After alignment has been made as outlined above there are certain tests and precautions that should be followed closely in order to eliminate the possibility of shipping either defective receivers or those that are not up to standard in efficiency and quality. A co-ax line carrying a composite video signal to be used for checking video amplifier and sync circuits should be monitored to make sure that Horizontal Blanking is no more than 16% and front porch comprises 2% of total. Vertical Blanking should be from 7 to 8%.

The 1851 tube and 6V6 tube of the 2 stage video frequency amplifier have their frequency constants such that the overall response to the cathode-ray tube grid is essentially flat from 30 cps to 3 1/2 megacycles with a gradual drop to approximately 4 1/2 megacycles at which time the response is down to about 30%. This original design was checked with the video frequency wobulator and it has been found unnecessary to check each receiver individually except for general observation of a test pattern which is adequate to show up any actual mistake in the circuit wiring of the peaking coils, etc.

The sweep circuits are tested to determine the adequacy of amplitude and frequency range. Linearity adjustment is made

ALLEN B. DUMONT LABS., INC.

MODELS 180X  
to 183X

THE LENGTH of the reflector rod should be slightly over the overall length of the dipole (see table).

WHEN two antennas of varying lengths are used, remember that the distance between the dipole and the reflector rod of each antenna should approximate 1/4 wave length of the transmitted signal, or 1/2 the length of the dipole.

REFLECTIONS

METAL structures, large buildings in the path of the signal, will reflect the transmitted waves and cause multiple "ghost" images on the screen of the receiver. These "ghosts" are very annoying and should be eliminated by rotating the antenna or changing the location. The use of reflector rods may at times serve the purpose.

SOMETIMES, however, the reflected waves are a blessing in disguise, especially in large cities where low buildings are sandwiched in between high buildings. Very often it is possible to pick up a reflected signal below the line-of-sight, or turn the dipole completely away from the line-of-sight to eliminate "ghosts" and pick up a reflected signal with better results than on a direct pick-up.

IN CERTAIN locations, in large cities, signals radiated by the various stations are reflected from many angles and it will be impossible to eliminate "ghosts" on all stations. In such cases, a second antenna will have to be erected. But, bear in mind that a satisfactory signal either direct or reflected, can always be picked up within the transmission radius with the proper equipment.

TRANSMISSION LINE

THE TWISTED pair transmission line or lead in wire used should have an impedance of 72 ohms per 100 feet. This type of transmission line can be used in most installations, but it must be remembered that there is an appreciable loss of signal strength in ordinary twisted wires - approximating 20% for lengths from 100 feet to 200 feet.

IN CASES where the signal strength is low to begin with, or where an exceptionally long lead-in is required, co-axial cable is recommended. There is very little loss in comparatively long lengths of co axial cable.

WHEN the signal level is weak the contrast or sensitivity control of the set has to be turned on "full" and all kinds of noises will be picked up, interfering with the picture. This kind of interference will cause small white spots and flashes similar to a snow storm on the screen, and is known as "snow in the picture".

IF CO AXIAL cable is used in such cases, the signal level will be raised and the noise level lowered proportionately, giving a clear picture at all times.

----- SERVICE NOTES -----

HERE are some of the most common service problems encountered in the field:

1. Receiver dead
2. Sound but no picture
3. Picture but no sound
4. Poor sound
5. Poor synchronizing picture tears out
6. Bright spot on screen of CRT Sound OK

S E R V I C E N O T E S

----- DUMONT TELEVISION RECEIVERS -----

THE FOLLOWING information was compiled by the Service Department and is based on actual experience acquired in the field over the last three years.

ANTENNA INSTALLATION

ERECT the antenna in the clear whenever possible, as high and as far back from the street as possible.

ANTENNAS over 15 feet high should be guyed securely. Mount antenna securely on a chimney or wall, using the hardware and mounting brackets supplied by the antenna manufacturer.

INSTALLATION crew should consist of two men. One man on the roof to rotate the antenna and locate the position. Another man at the set to watch the results. These two men should be in constant communication. Philco phones will serve the purpose. Connect the speaker of the Philco phones to 25 feet of transmission wire with a pair of insulation-piercing clips - this enables you to clip on the lead-in wire without breaking the insulation. Connect the master station in series with the antenna lead-in wire and antenna plug at the set, thereby giving constant communication with the operator on the roof without using extra lead-in wire for the phones.

DIPOLE

THE DIPOLE (both rods) should be equal to one-half wave-length of the radiation to be received, for maximum result, and connected to the receiver by means of a transmission line - twin conductor.

FREQUENCIES assigned to each of the New York stations and dipole needed to match the wave length are listed below:

Station	Frequency -M.C.-	Length of -Dipole--	Length of Reflector
WNBT	50-56	100"	112"
WCBW	60-66	90"	96"
WABD	78-84	72"	76"

THIS does not necessarily mean that a separate antenna is required for each station. It has been found that in most parts of the Metropolitan area, a satisfactory signal can be picked up from all three stations on an antenna tuned to WCBW's frequency, 90 inch dipole (45 inches each rod) with reflector.

HOWEVER, in some of the outlying points in Long Island, Westchester, and New Jersey it may be necessary to erect a second antenna tuned to WABD's frequency, 72 inches (36" each rod) to pick up their signal, until such time as WABD's power is raised to normal strength.

REFLECTOR

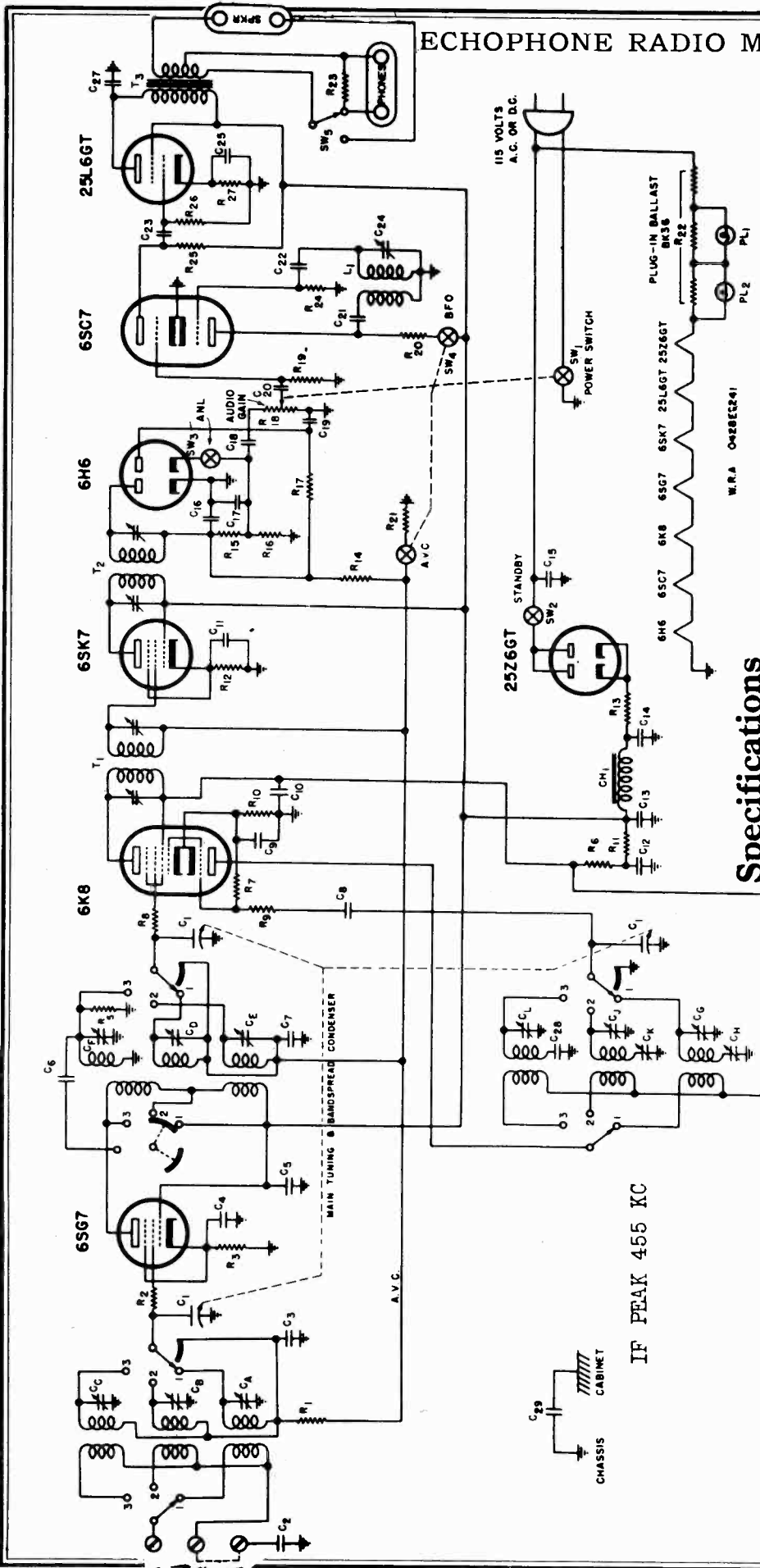
WHEN the receiver is located at a considerable distance from the transmitter, better pick-up and directional properties are required, and a second rod connected parallel to, and 1/4 wave length behind the dipole will reflect the signal back and aid signal strength considerably. The reflector will also help reduce reflections.

MODELS 180X  
to 183X

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7. No control of focus or intensity
  - (a) Fibre tongue is usually broken on controls. The fibre tongue insulates the intensity and focus control pots from ground as they are 4000 volts above ground. If no fibre tongues are available, turn controls with an insulated screwdriver to the proper intensity and focus.
  - (b) The 750K and 2 meg. bleeder resistors mounted on the front panel between the focus and intensity pots may be open.
8. Breakdown in raster or test pattern
9. Microphonics
  - (a) Check for leakage at CRT socket and base.
  - (b) If breakdown is due to leakage at CRT socket, you will hear a sizzling noise at base of CRT socket. If socket hasn't arced across causing complete breakdown, you can put a 25 watt lamp in tube socket to dry out moisture. If that doesn't do it, replace CRT socket and if CRT base is badly burned from arcing send CRT to plant to be rebased.
  - (c) Breakdown is noticed on the raster by the separation of the line structure.
10. Sound in picture
  - (a) Check the 6J5 oscillator, 1852 mixer and the 1851 first audio tubes for microphonic conditions.
  - (a) Check 1851 first video amplifier tube.
  - (b) Check 6V6G video amplifier tube.
  - (c) R.F. and detector circuits being off, frequency due to drift or misalignment. Realignment will be necessary.
11. Vertical or horizontal lines on screen
  - (a) Caused by no plate voltage on 6AD5 horizontal or vertical sweep oscillator, due to open plate supply resistors. On the vertical side there are four 100K 1 watt resistors. Always turn down the intensity control if there is a bright horizontal or vertical line on screen or it will become burned.
12. Intermittent sound or picture
  - (a) Due to shorted antenna line.
13. Poor linearity
  - (a) Due to defective 6R6G horizontal or vertical amplifier tube. On the right side of the sweep deck, you will find the horizontal linearity control. On the left side you will find the vertical linearity control. By adjusting controls, poor linearity can be corrected.
1. Receiver dead
  - (a) If receiver is dead check a.c. plug and check back of cabinet 8. Breakdown in raster or test pattern
  - (b) To make sure safety switch is closed.
  - (c) If 3 amp. fuse is blown, look for a shorted or arcing 2Xa, 4000 volt, high voltage rectifier tube.
  - (d) Check for shorted or arcing 5X3. 1500 volt, high voltage rectifier tube.
  - (e) Check for shorted or arcing 2X2. 4500 volt intensifier-rectifier tube mounted in a horizontal position.
  - (f) Check for a shorted high voltage filter condenser in the 1500 or 4000 volt supply.
  - (g) Check for a shorted .05 4500 volt coupling condenser mounted in a horizontal position under sweep deck.
2. Sound but no picture
  - (a) Check video amplifier by touching grid of 1851 first video amplifier tube. You should see broad white bars on CRT indicating that that circuit is OK. If no response is noted, check that portion of the circuit the 1851, or 6V6G video amplifier tubes may be defective.
  - (b) Drift in oscillator realign oscillator trimmer.
  - (c) Check 1852 video I.F. amplifier tubes for open filament or shorts.
3. Picture but no sound
  - (a) Check oscillator for drift realign oscillator trimmer.
  - (b) Check 6V6G audio amplifier tube. Check 6Q7G, 6J7G, also 1851 first audio I.F. amplifier tube. These tubes will also cause the sound to be distorted, weak and intermittent.
4. Poor sound
  - (a) Defective 6V6G audio amplifier tube.
  - (b) Shorted or gassy 1st audio 1851 tube.
  - (c) 6Q7G audio amplifier tubes not all the way in sockets - press tubes all the way in socket.
5. Poor synchronism
  - (a) A weak signal due to a broken or shorted antenna lead-in or a defective synchronism separator tube, will cause the picture to lose synchronism. Also check frequency controls for correct adjustment.
6. Bright spot on screen of CRT
  - (a) Sound OK
  - (a) If this condition exists, turn intensity off at once as this will burn a spot on the screen of the CRT. Look for a defective 5X3, 1500 volt rectifier tube. If tube is OK look for a shorted 4 mfd. 1500 volt filter condenser.

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PASSAIC, NEW JERSEY



### Specifications

#### TUBES -

- 1 - 6SG7 R.F. Amplifier
- 1 - 6K8 Mixer - H.F. Oscillator
- 1 - 6SK7 I.F. Amplifier
- 1 - 6H6 2nd Detector-AVC-ANL
- 1 - 6SC7 BFO - 1st Audio
- 1 - 25L6GT Audio Output

- 1 - 25Z6GT Rectifier
- 1 - BK36 Ballast Tube

- Power Consumption - 40 Watts
- Power Source - 115 volts AC or DC
- Power Output - One watt undistorted
- Intermediate Frequency - 455 KC
- Frequency Range - 550 KC to 30 mc.

FOR PARTS LIST SEE NEXT PAGE



MODEL EC-2

ECHOPHONE RADIO MFG. CO.

RESISTORS

SYMBOL	OHMS	WATTAGE	SYMBOL	OHMS	WATTAGE
R <sub>1</sub>	250,000	1/3	16	250,000	1/3
2	30	1/3	17	1 meg	1/3
3	200	1/3	18	500,000	Audio Gain #25-048
5	10,000	1/3	19	5 meg	1/3
6	300	1/3	20	10,000	1/3
7	50,000	1/3	21	150	1/3
8	30	1/3	22	Ballast Resistor	BK 36
9	100	1/3	23	300	1/2
10	300	1/3	24	50,000	1/3
11	1,000	1/3	25	250,000	1/3
12	200	1/3	26	500,000	1/3
13	15	1/2	27	150	1/3
14	3 meg	1/3			
15	100,000	1/3			

CONDENSERS

SYMBOL	CAPACITY	VOLTAGE	TYPE	SYMBOL	CAPACITY	VOLTAGE	TYPE
C <sub>1</sub>	Main tuning and bandsread			15	.02 mfd	400	Paper
2	.01 mfd	400	Paper	16	100 mmf		Mica
3	.05 mfd	200	Paper	17	100 mmf		Mica
4	.05 mfd	200	Paper	18	.01 mfd	400	Paper
5	.1 mfd	200	Paper	19	.05 mfd	200	Paper
6	5-6 1/2 mmf		Ceramicon	20	.005 mfd	400	Paper
7	.05 mfd	200	Paper	21	.01 mfd	200	Paper
8	25 mmf		Mica	22	100 mfd	#44-055	
9	.05 mfd	200	Paper	23	.01 mfd	400	Paper
10	.02 mfd	200	Paper	24	450 mmf	#44-055	
11	0.1 mfd	200	Paper	25	10 mfd	25	Electrolytic
12	30 mfd	150	Electrolytic	27	.02 mfd	600	Paper
13	30 mfd	150	Electrolytic	28	.0054 mfd		Mica
14	40 mfd	150	Electrolytic	29	0.1 mfd	200	Paper

Alignment Procedure

EQUIPMENT NEEDED FOR ALIGNING AND PRE-LIMINARY ADJUSTMENTS:

An all wave signal generator which will provide an accurately calibrated signal at the test frequencies listed.

Output indicating meter

Non-metallic screw driver

Dummy antenna 400 ohm, 200 mmf. and 0.1 mfd.

Connect signal generator ground to ground terminal (G) of receiver.

Set bandsread at 100.

Connect output meter across primary of output transformer.

Gain controls - Maximum all adjustments.

I.F. ALIGNMENT

Connect 0.1 mfd. dummy antenna between high side of generator and 6K8 grid.

Set signal generator to 455 kc.

Adjust all trimmers on T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> for maximum output.

Adjust the BFO control to give the desired beat note with the 455 kc I.F. signal. This adjustment, C24, is located under chassis.

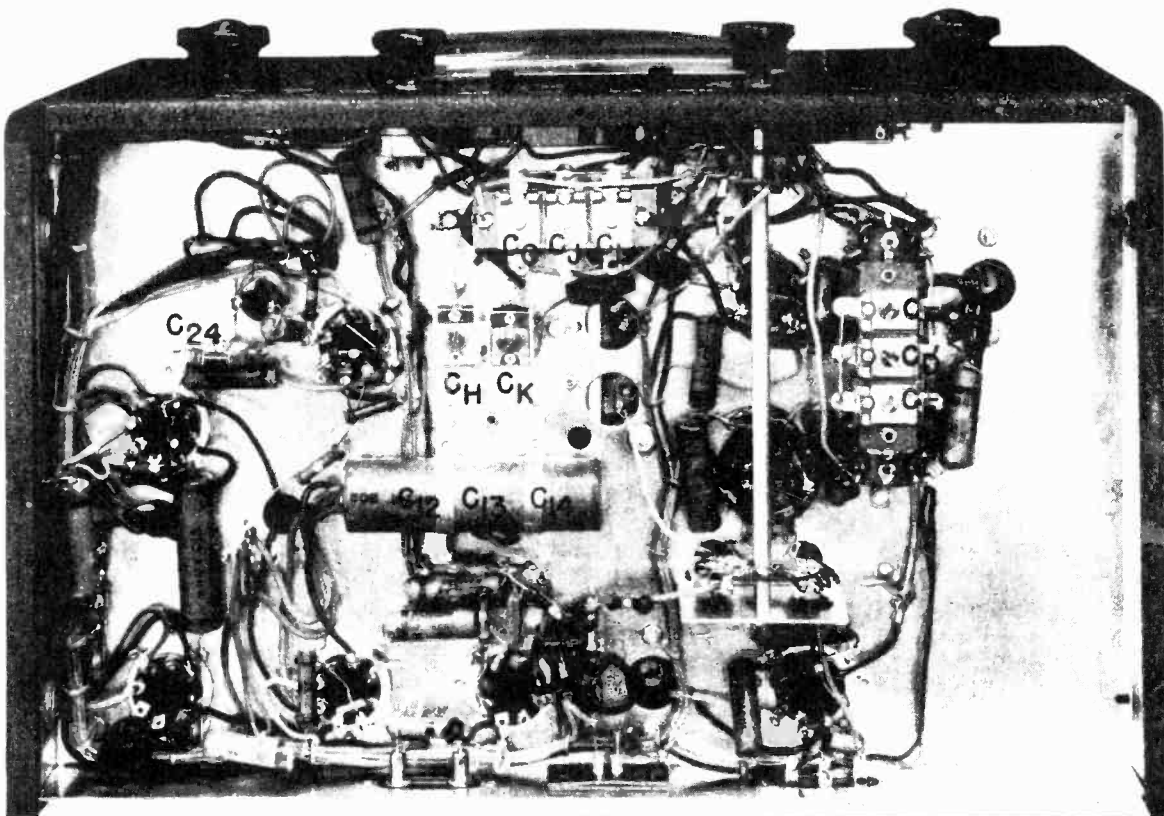
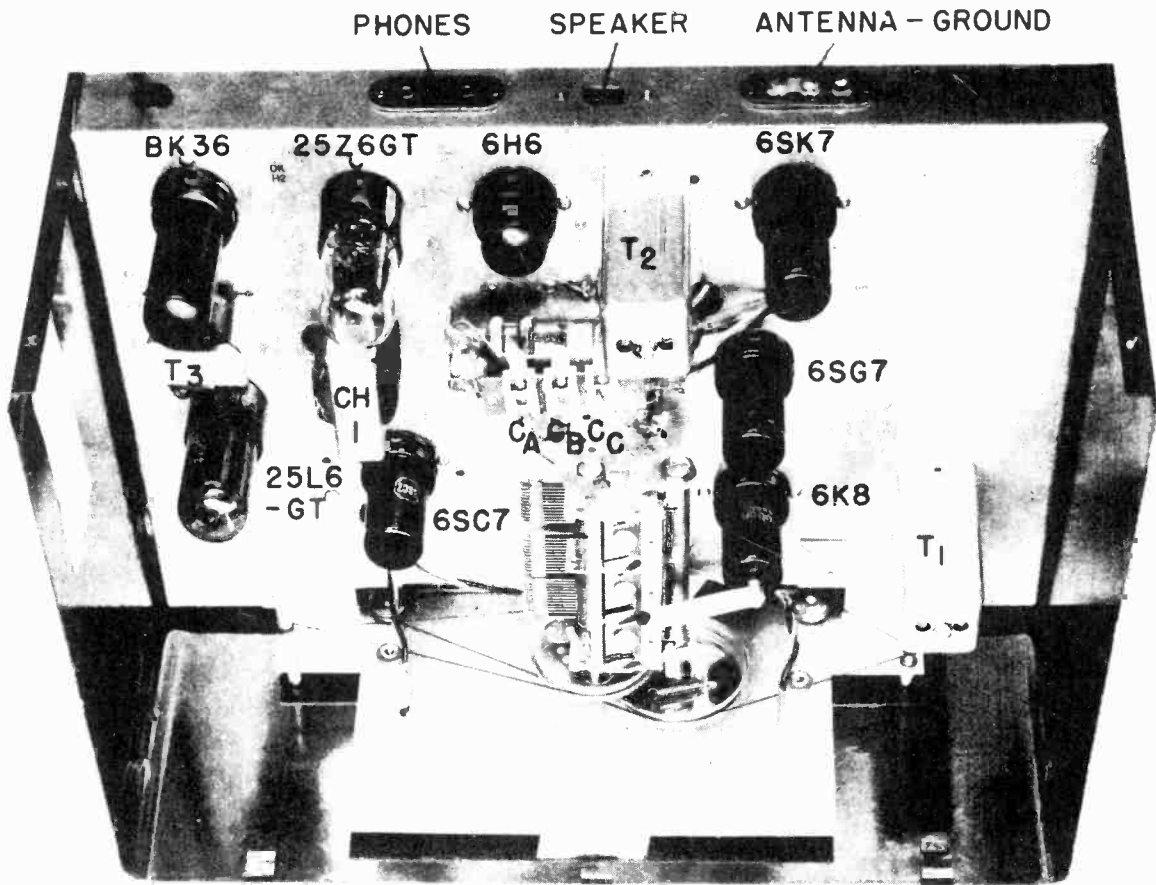
R. F. ALIGNMENT

The following table indicates R. F. alignment procedure.

Band	Signal Generator		Pad	Trimmers	Adjustment
	Frequency Setting	Dummy Antenna			
1	600 kc	200 mmf	C <sub>H</sub>	none	maximum output
	1800 kc	200 mmf	none	C <sub>A</sub> C <sub>E</sub> C <sub>G</sub>	
2	2.5 mc	400 ohm	C <sub>K</sub>	none	maximum output
	7.0 mc	400 ohm	none	C <sub>B</sub> C <sub>D</sub> C <sub>J</sub>	
3	no padding	condenser	on this band		maximum output
	28 mc	400 ohm	C <sub>C</sub> C <sub>F</sub> C <sub>L</sub>		

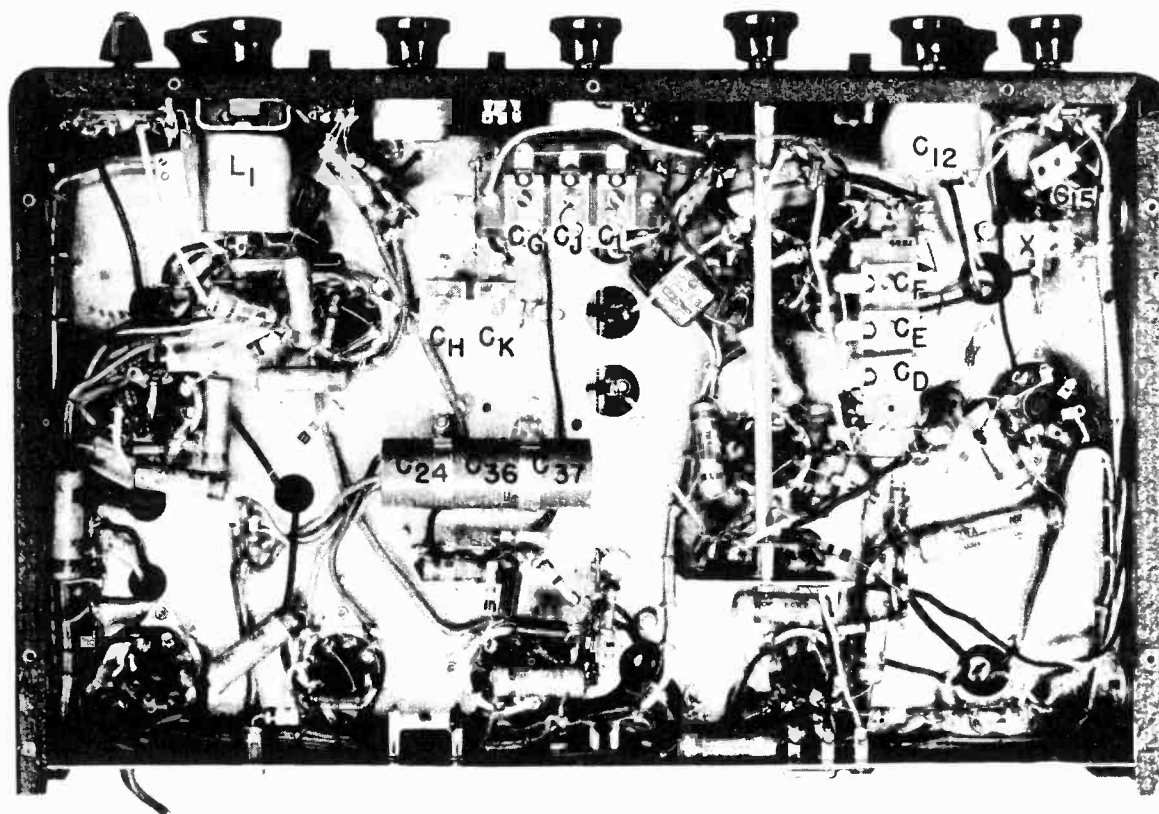
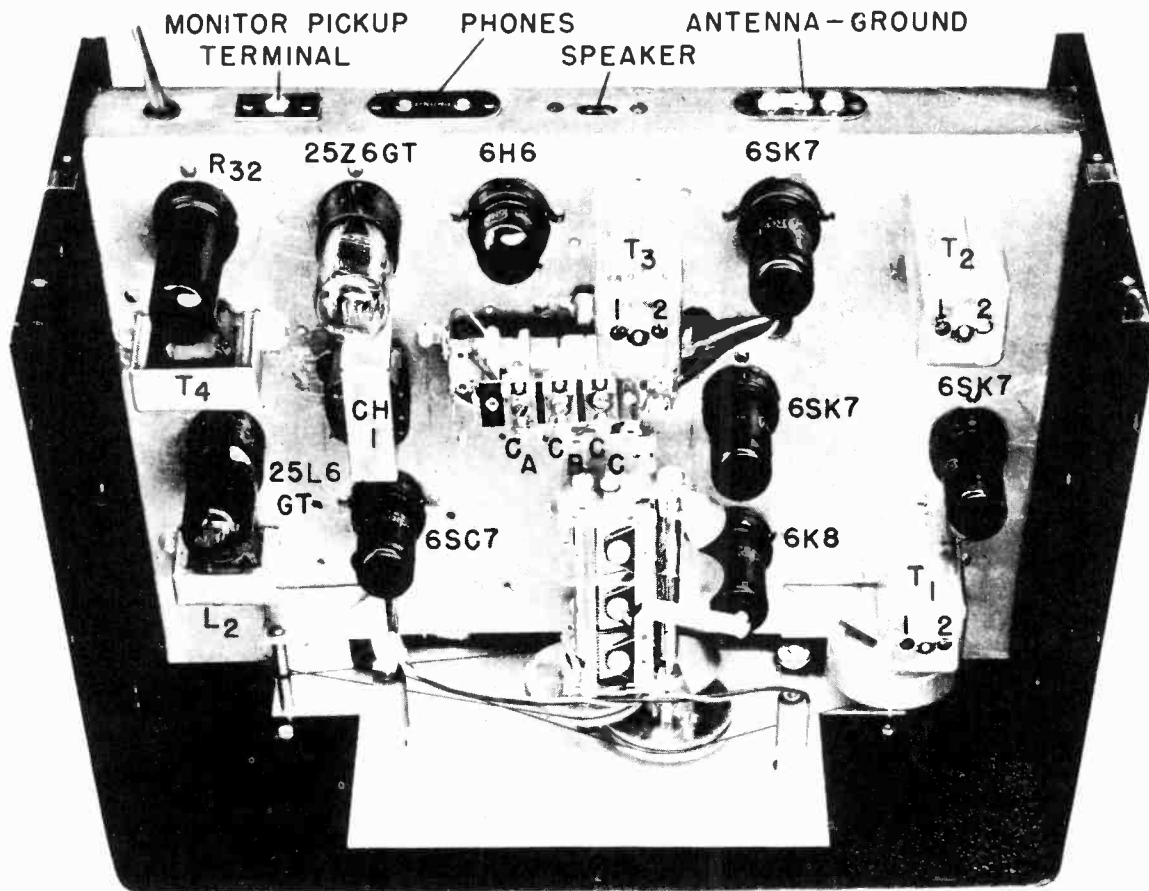
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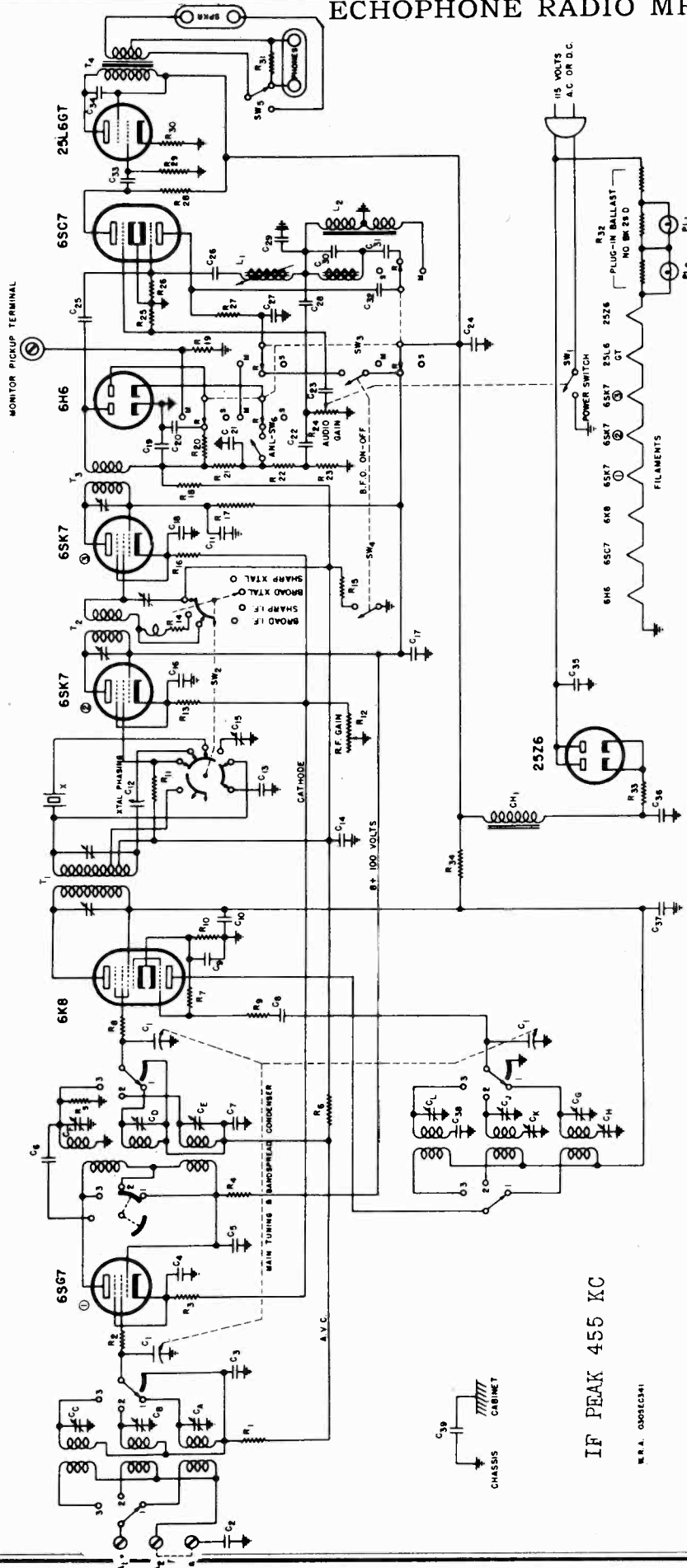
MODEL EC-2



MODEL EC-3

ECHOPHONE RADIO MFG. CO.





IF PEAK 455 KC

M.S.A. 00012341

FOR PARTS LIST SEE NEXT PAGE

### Specifications

TUBES -

- 1 - 6SK7 R.F. Amplifier
- 1 - 6K8 Mixer - H.F. Oscillator
- 1 - 6SK7 Xtal 1st I.F. Amplifier
- 1 - 6SK7 2nd I.F. Amplifier
- 1 - 6H6 2nd Detector-AVC-ANL
- 1 - 6SK7 BFO - Monitor - 1st Audio
- 1 - 25L6GT Audio Output
- 1 - 25Z6 Rectifier

1 - BK29D Ballast Tube

- Power Consumption - 46 watts
- Power Source - 115 volts AC or DC
- Power Output - One watt undistorted
- Selectivity - Single signal crystal to broad I.F. in four steps
- Intermediate Frequency - 455 KC
- Frequency Range - 550 KC to 30 mc.

CONDENSERS

SYMBOL	CAPACITY	VOLTAGE	TYPE	SYMBOL	CAPACITY	VOLTAGE	TYPE
C1	Main Tuning & Bandspreed			C21	50 mmf		Mica
2	.01 mfd	400	Paper	22	.01 mfd	400	Paper
3	.05 mfd	200	Paper	23	.005 mfd	400	Paper
4	.05 mfd	200	Paper	24	40 mfd	150	Electrolytic
5	.02 mfd	200	Paper	25	Twisted Leads		
6	5-6 1/2 mmf	200	Ceramicon	26	.02 mfd	200	Paper
7	.05 mfd	200	Paper	27	.001 mfd	200	Paper
8	25 mmf	200	Mica	28	.0054 mfd		Mica
9	.05 mfd	200	Paper	29	.0005 mfd		Mica
10	.02 mfd	200	Paper	30	25 mmf		Mica
11	.02 mfd	200	Paper	31	.05 mfd	200	Paper
12	25 mmf	Variable		32	.02 mfd	400	Paper
13	4-5 mmf	200	Mica	33	.02 mfd	600	Paper
14	.02 mfd	200	Paper	34	.02 mfd	400	Paper
15	1-9 mmf	Variable		35	.05 mfd	150	Electrolytic
16	.05 mfd	200	Paper	36	30 mfd	150	Electrolytic
17	.25 mfd	200	Paper	37	30 mfd	150	Electrolytic
18	.05 mfd	200	Paper	38	.0054 mfd		Mica
19	50 mmf	200	Mica	39	.25 mfd	200	Paper
20	.05 mfd	200	Paper				

Alignment Procedure

EQUIPMENT NEEDED FOR ALIGNING AND PRE-LIMINARY ADJUSTMENTS:

An all wave signal generator which will provide an accurately calibrated signal at the test frequencies listed.  
 Output indicating meter  
 Non-metallic screw driver  
 Dummy antenna 400 ohm, 200 mmf. and 0.1 mfd.  
 Connect signal generator ground to ground terminal (G) of receiver.  
 Set bandspread at 100.  
 Connect output meter across primary of output transformer.  
 Gain controls - Maximum all adjustments.

I. F. ALIGNMENT

Connect 0.1 mfd. dummy antenna between high side of generator and 6X3 grid.  
 Set signal generator to 455 kc.  
 Set receiver selectivity in "I. F. SHARP" position.  
 Adjust all trimmers on T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> for maximum output.

R. F. ALIGNMENT

The following table indicates R. F. Alignment procedure.

Band	Signal Generator Frequency Setting	Dummy Antenna	Pad	Trimmers	Adjustment
1	600 kc 1800 kc	200 mmf 200 mmf	C <sub>4</sub> none	none A, C, C <sub>6</sub>	maximum output maximum output
2	2.5 mc 7.0 mc	400 ohm 400 ohm	C <sub>4</sub> none	none B, C, C <sub>7</sub>	maximum output
3	no padding	400 ohm	condenser on this band	C <sub>6</sub> C <sub>7</sub> C <sub>8</sub>	maximum output

Detune the signal generator so that a high pitched note is heard (BFO "ON").  
 Adjust the crystal phasing control for maximum rejection or until minimum volume is obtained.  
 Adjust #2 trimmer on T<sub>1</sub> noting that the output reaches a maximum, goes through a dip and then back to maximum. Wobulate the signal generator tuning adjustment and align to the dip between the two peaks. A distinct change in the crystal note to a swishy sound will be noted when the correct adjustment has been reached.  
 Now readjust the other trimmers for maximum gain without changing any other adjustments.

Set the selectivity switch to the I. F. Sharp position and adjust the trimmer (C<sub>15</sub>) under T<sub>1</sub> for maximum output.

MISCELLANEOUS

SYMBOL	OHMS	WATTAGE	SYMBOL	OHMS	WATTAGE	SYMBOL	DESCRIPTION
R1	50,000	1/3	R18	2 meg	1/3	T1	1st I. F. Transformer
2	30	1/3	19	4,000	1/3	T2	2nd I. F. Transformer
3	200	1/3	20	1 meg	1/3	T3	3rd I. F. Transformer
4	1,000	1/3	21	100,000	1/3	T4	Audio output transformer
5	10,000	1/3	22	250,000	1/3	CH <sub>1</sub>	Filter Choke
6	50,000	1/3	23	250,000	1/3	L <sub>1</sub>	B. F. O. Coil
7	50,000	1/3	24	500,000	1/3	L <sub>2</sub>	Monitor Oscillator coil
8	30	1/3	25	5 meg	#25-048	SW <sub>1</sub>	Power switch on audio gain control
9	100	1/3	26	50,000	1/3	SW <sub>2</sub>	Selectivity switch
10	300	1/3	27	10,000	1/3	SW <sub>3</sub>	Send-Receive-Monitor switch
11	1 meg	1/3	28	250,000	1/3	SW <sub>4</sub>	BFO-AVC switch
12	10,000	R. F. Gain	29	500,000	1/3	SW <sub>5</sub>	Speaker-Phones switch
13	400	#25-066	30	150	1/3	SW <sub>6</sub>	ANL switch
14	200	1/3	31	300	1/2		
15	100	1/3	32	Ballast Resistor	BK 29D		
16	300	1/3	33	15	1/2		
17	1,000	1/3	34	1,000	1/3		

RESISTORS

## ECHOPHONE RADIO MFG. CO.

MODEL EC-2  
MODEL EC-3

**BFO-ON-OFF:**- This switch removes the AVC and places the BEAT FREQUENCY OSCILLATOR in operation for the reception of CW signals, and for locating weak DX signals. Code signal intensity should be adjusted by the R. F. GAIN CONTROL.

**PITCH CONTROL:**- Allows adjustment of the beat note obtained from the BEAT OSCILLATOR to a pitch most pleasing to the listener.

**ARL-ON-OFF:**- The AUTOMATIC NOISE LIMITER switch will effectively minimize ignition and similar types of interference which would be objectionable to short wave reception. Best results are obtained with the R. F. Gain full on and the A. F. Gain set near minimum. Amateurs who operate on C. W. will find the MONITOR circuit in the EC-3 an aid to easier and more efficient operating

A-Short wire must be connected to the single MONITOR PICKUP TERMINAL at the rear of the receiver to allow a small amount of R. F. energy to be picked up from the transmitter by the monitor circuit. The length of this wire and its proximity to the transmitter can only be determined experimentally, because it depends entirely on the power of your transmitter. Too much coupling is indicated by a raspy note when the monitor circuit is in operation:

The value of the "CRYSTAL SHARP" SELECTIVITY position will be apparent when it is desired to receive CW signals on any of the amateur bands. The tremendous sideband interference encountered will be reduced to a minimum when the SELECTIVITY knob is in the "CRYSTAL SHARP" position and the CRYSTAL PHASING control is adjusted for maximum reduction of unwanted signals. Since tuning becomes easier with decreasing selectivity the receiver should not be set at a SELECTIVITY greater than is necessary. Thus, for best fidelity on the Broadcast band the SELECTIVITY should be "IF BROAD". For amateur phone work the SELECTIVITY may be "IF SHARP" or "SELECTIVITY". This switch allows four step selectivity to meet all receiving requirements.

**CRYSTAL PHASING:**- This control is in the circuit only when the SELECTIVITY switch is in the "CRYSTAL SHARP" or "CRYSTAL BROAD" positions. The function of the PHASING control is to eliminate the unwanted interfering sideband signal.

## CONTROLS &amp; THEIR FUNCTIONS:

**A. F. GAIN:**- The ON-OFF switch is part of the A. F. Gain Control. Turning this knob to the right turns the receiver ON and increases the volume. Turning it all the way to the left decreases the volume until the switch clicks and the receiver goes off. The pilot lights indirectly illuminate the dial scale when the power is on.

**MAIN TUNING:**- The main tuning control, when rotated, will tune the receiver to any frequency throughout its range.

**R. F. GAIN:**- This control adjusts the sensitivity of the receiver by varying the cathode bias on the R. F. and I. F. amplifier. Maximum sensitivity will be obtained when this control is rotated as far as it will go to the right.

**BAND SWITCH:**- Turning this knob connects the proper coils in the circuit to tune the desired frequency range.

Band 1 - 550 to 2000 K. C.  
Band 2 - 2.1 to 8.1 M. C.  
Band 3 - 8 to 30 M. C.

**BAND SPREAD TUNING:**- The band spread control acts as an electrical vernier on the main tuning condenser. The 80, 40, 20 and 10 meter amateur bands are calibrated on the band spread scale together with a logging scale. To use these amateur band calibrations it is necessary that careful adjustments of the main tuning pointer be made; the most convenient way being to set the BAND SPREAD TUNING pointer to your transmitter frequency or some known receiver frequency, then adjust the MAIN TUNING pointer until the signal is heard. If this is not possible it will be necessary to locate the bands by setting the main tuning pointer at the high frequency end of the desired amateur band; then adjust the band spread pointer until amateur signals are heard. The band may then be scanned by the BAND SPREAD TUNING to check the calibration. Slight readjustment of the main tuning may be necessary for best accuracy of the BAND SPREAD scale.

**"STDBY-RECEIVE":**- This switch must be in the RECEIVE position for normal operation of the receiver. The STANDBY position renders the EC-2 inoperative for standby purposes.

**BFO-ON-OFF:**- This switch removes the AVC and places the BEAT FREQUENCY OSCILLATOR in operation for the reception of CW signals, and for locating weak DX signals.

**ARL-ON-OFF:**- The AUTOMATIC NOISE LIMITER switch will effectively minimize ignition and similar types of interference which would be objectionable to short wave reception.

**PHONES - SPKR:**- On the rear apron of the chassis will be found two phone tip jacks. Headphones may remain permanently connected to the receiver. The PHONES-SPKR switch makes it possible to select either.

**IMPORTANT:**- This receiver, unless otherwise marked, must be operated from 115-125 volts - Alternating OR Direct Current power. If the set does not operate in one minute when connected to Direct Current, reverse the power plug in the receptacle.

**MAIN TUNING:**- The main tuning control, when rotated, will tune the receiver to any frequency throughout its range.

**BAND SWITCH:**- Turning this knob connects the proper coils in the circuit to tune the desired frequency range.

Band 1 - 550 to 2000 K. C.  
Band 2 - 2.1 to 8.1 M. C.  
Band 3 - 8 to 30 M. C.

**BAND SPREAD TUNING:**- The band spread control acts as an electrical vernier on the main tuning condenser. The 80, 40, 20 and 10 meter amateur bands are calibrated on the band spread scale together with a logging scale. To use these amateur band calibrations it is necessary that careful adjustments of the main tuning pointer be made; the most convenient way being to set the BAND SPREAD TUNING pointer to your transmitter frequency or some known receiver frequency, then adjust the MAIN TUNING pointer until the signal is heard. If this is not possible it will be necessary to locate the bands by setting the main tuning pointer at the high frequency end of the desired amateur band; then adjust the band spread pointer until amateur signals are heard. The band may then be scanned by the BAND SPREAD TUNING to check the calibration. Slight readjustment of the main tuning may be necessary for best accuracy of the BAND SPREAD scale.

**"STDBY-RECEIVE":**- This switch must be in the RECEIVE position for normal operation of the receiver. The STANDBY position renders the EC-2 inoperative for standby purposes.

**BFO-ON-OFF:**- This switch removes the AVC and places the BEAT FREQUENCY OSCILLATOR in operation for the reception of CW signals, and for locating weak DX signals.

**ARL-ON-OFF:**- The AUTOMATIC NOISE LIMITER switch will effectively minimize ignition and similar types of interference which would be objectionable to short wave reception.

**PHONES - SPKR:**- On the rear apron of the chassis will be found two phone tip jacks. Headphones may remain permanently connected to the receiver. The PHONES-SPKR switch makes it possible to select either.

**IMPORTANT:**- This receiver, unless otherwise marked, must be operated from 115-125 volts - Alternating OR Direct Current power. If the set does not operate in one minute when connected to Direct Current, reverse the power plug in the receptacle.

Make sure the antenna is not grounded at some point, and is securely connected to the antenna terminal.

The speaker wires may not be plugged into the speaker terminal strip. Be sure the PHONES-SPKR switch is in the SPKR position and the STANDBY switch is in the RECEIVE position.

**ANTENNA:**- A wire approximately 50 to 75 feet long, including the lead-in, will provide very satisfactory reception throughout the tuning range of the receiver. It should be connected to the A<sub>1</sub> terminal of the antenna terminal strip located on the rear apron of the chassis; the jumper between A<sub>2</sub> and G should remain in place. A good antenna of this type should be erected as high as possible, insulated from ground, and at right angles to interference producing power lines. A ground connected to the G terminal may be used if it is found to materially improve the operation of the receiver. DO NOT GROUND CHASSIS DIRECT.

A doublet antenna should be connected to terminals A<sub>1</sub> and A<sub>2</sub>. The jumper may remain connected between A<sub>2</sub> and G or removed depending upon its favorable effect on reception.

**NOTE:**- If a ground is used it should always be connected to the G terminal, NEVER to the chassis itself.

## CONTROLS &amp; THEIR FUNCTIONS:

**A. F. GAIN:**- The ON-OFF switch is part of the A. F. Gain Control. Turning this knob to the right turns the receiver ON and increases the volume. Turning it all the way to the left decreases the volume until the switch clicks and the receiver goes off. The pilot lights indirectly illuminate the dial scale when the power is on.

**MAIN TUNING:**- The main tuning control, when rotated, will tune the receiver to any frequency throughout its range.

**R. F. GAIN:**- This control adjusts the sensitivity of the receiver by varying the cathode bias on the R. F. and I. F. amplifier. Maximum sensitivity will be obtained when this control is rotated as far as it will go to the right.

**BAND SWITCH:**- Turning this knob connects the proper coils in the circuit to tune the desired frequency range.

**BAND SPREAD TUNING:**- The band spread control acts as an electrical vernier on the main tuning condenser. The 80, 40, 20 and 10 meter amateur bands are calibrated on the band spread scale together with a logging scale. To use these amateur band calibrations it is necessary that careful adjustments of the main tuning pointer be made; the most convenient way being to set the BAND SPREAD TUNING pointer to your transmitter frequency or some known receiver frequency, then adjust the MAIN TUNING pointer until the signal is heard. If this is not possible it will be necessary to locate the bands by setting the main tuning pointer at the high frequency end of the desired amateur band; then adjust the band spread pointer until amateur signals are heard. The band may then be scanned by the BAND SPREAD TUNING to check the calibration. Slight readjustment of the main tuning may be necessary for best accuracy of the BAND SPREAD scale.

**"STDBY-RECEIVE-MONITOR":**- This switch must be in the RECEIVE position for normal operation of the receiver. The STANDBY position renders the EC-3 inoperative for standby purposes. The MONITOR position places the CW MONITOR in operation to allow the C. W. operator to listen to his keying.

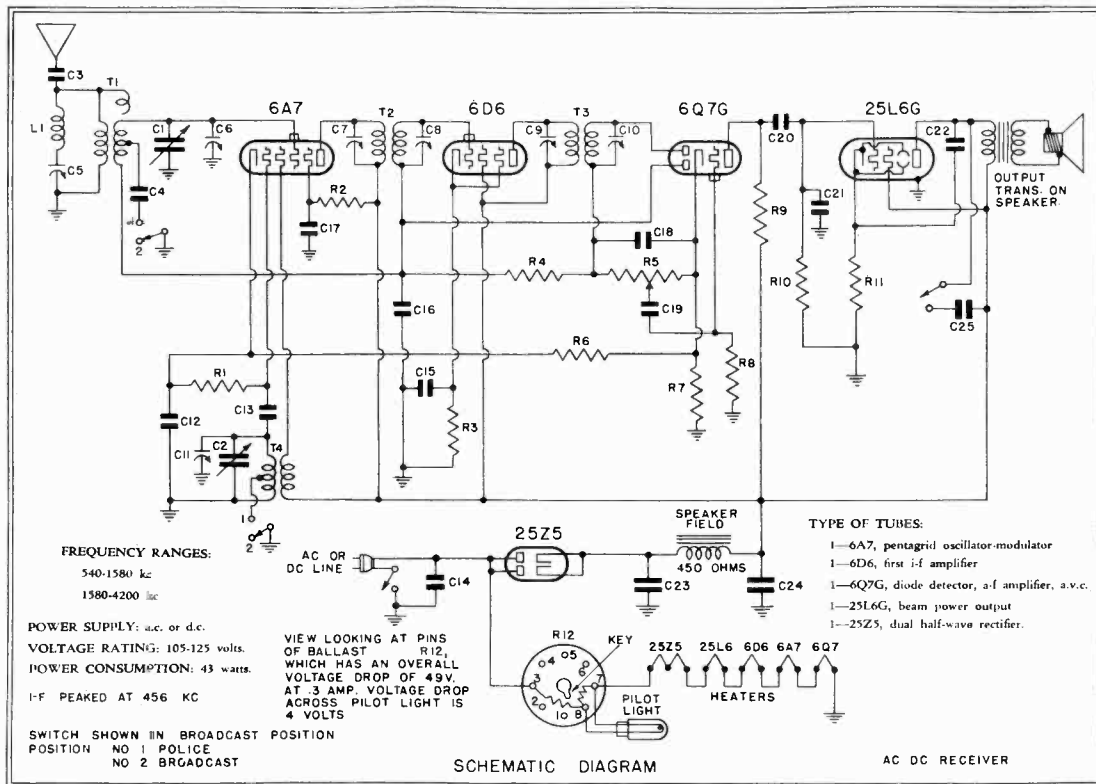
1

2

3

4

EMERSON RADIO & PHONOGRAPH CORP MODEL BH-203 Chassis BH



**FREQUENCY RANGES:**  
 540-1580 kc  
 1580-4200 mc

**POWER SUPPLY:** a.c. or d.c.  
**VOLTAGE RATING:** 105-125 volts.  
**POWER CONSUMPTION:** 43 watts.  
**I-F PEAKED AT 456 KC**

**SWITCH SHOWN IN BROADCAST POSITION**  
 POSITION NO 1 POLICE  
 NO 2 BRADCAST

**VIEW LOOKING AT PINS OF BALLAST R12 WHICH HAS AN OVERALL VOLTAGE DROP OF 49V. AT 3 AMP. VOLTAGE DROP ACROSS PILOT LIGHT IS 4 VOLTS**

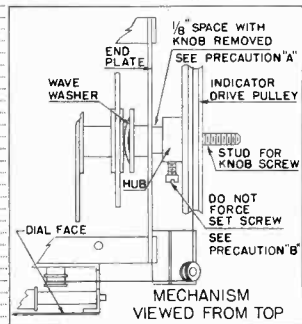
SCHMATIC DIAGRAM

**TYPE OF TUBES:**  
 1-6A7, pentagrid oscillator-modulator  
 1-6D6, first i-f amplifier  
 1-6Q7G, diode detector, a-f amplifier, a.v.c.  
 1-25L6G, beam power output  
 1-25Z5, dual half-wave rectifier.

AC DC RECEIVER

REPLACEMENT PARTS LIST

Item	Part No.	DESCRIPTION
T1	3RT-384A	Two-band antenna coil.
T2	3RT-320B	456 kc first i-f transformer.
T3	3RT-321B	456 kc second i-f transformer.
T4	3RT-319A	Two-band oscillator coil.
L1	4DT-343	456 kc adjustable wave-trap.
R1	KR-53	50,000 ohm 1/2 watt carbon resistor.
R2	ZZR-196	30,000 ohm 1/2 watt carbon resistor.
R3	3CR-293	410 ohm 1/2 watt wire wound resistor.
R4, R8	HR-42	2 megohm 1/4 watt carbon resistor.
R5	3FR-256	Volume control with line switch—500,000 ohms.
R6, R7	3CR-294	240 ohm 1/2 watt wire-wound resistor.
R9	KR-55	250,000 ohm 1/2 watt carbon resistor.
R10	KR-56	500,000 ohm 1/2 watt carbon resistor.
R11	3FR-293	140 ohm 1/2 watt wire-wound resistor.
R12	ZUR-224	Plug-in type ballast resistor.
C1, C2	5HC-387	Two-gang variable condenser.
C3	3HC-274	0.002 mf, 600 volt tubular condenser.
C4	4DC-367	0.0012 mf mica condenser.
C5		Trimmer, part of wave-trap assembly.
C6, C11		Trimmer, part of variable condenser.
C7, C8		Trimmer, part of first i-f transformer assembly.
C9, C10		Trimmer, part of second i-f transformer assembly.
C12, C17	AC-6	0.1 mf, 200 volt tubular condenser.
C13	AAC-106A	0.00005 mf mica condenser.
C14	2VC-242A	0.1 mf, 400 volt molded condenser.
C15	FC-29	0.02 mf, 200 volt tubular condenser.
C16, C25	HC-12	0.05 mf, 200 volt tubular condenser.
C18, C21	5AC-384	0.0002 mf, 600 volt tubular condenser.
C19	KC-58	0.01 mf, 400 volt tubular condenser.
C20	LC-65	0.02 mf, 400 volt tubular condenser.
C22	7FC-336	0.025 mf, 400 volt tubular condenser.
C23, C24	3CC-261	20 mf, 150 volt wet electrolytic condenser.
	3RS-231A	Wave-band switch.
	3FS-251	5 1/2" dynamic speaker.
	4BL-94	Pilot light, 6.3 volt, 25 amp., Mazda No. 44.
	3ES-256A	Tone control switch.
	5HD-49	Six-button mechanical tuning unit.
	5HZ-801	Station name tabs (complete set).
	5HZ-802	Celluloid station name tab caps (set of 6).
	5EB-58	Pilot light socket.



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

\*Item number locates the article on the schematic diagram.  
 †These trimmers are part of coil assemblies and cannot be supplied separately.  
 ‡These trimmers are part of variable condenser and cannot be supplied separately.

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to ground (chassis) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except cathodes and heaters were taken on 250 volt scale.

Tube	Plate	Screen	Cathode	Osc. Plate	Fil.
6A7	100	50	2.3	100	6.3
6D6	100	100	3.5	—	6.3
6Q7G	43	—	1.2	—	6.3
25L6G	92	100	6.5	—	25.0

Voltage at 25Z5 cathode—E30 volts. Voltage across speaker field—30 volts. Voltage drop across ballast resistor (pins Nos. 3, 7)—49 volts. Voltage drop across pilot light section (pins Nos. 8 and 7)—4 volts.

ADJUSTMENTS

An oscillator with frequencies of 456 and 1400 kc is required.  
 An output meter should be used across the voice coil or output transformer for observing maximum response.  
 The set's oscillator is higher in frequency than the signal, so images should be observed on the low frequency side of the signals.  
 The last motion in adjusting trimmers should always be a tightening one, not a loosening one.  
 Never leave a trimmer with the outside plate so loose that there is no tension on the screw. Either bend the plate up or remove the screw entirely.  
 Always use as weak a test signal as possible during alignment.  
 Use a .0001 mf mica condenser as a dummy antenna during alignment.

Location of Coils and Trimmer Adjustments

The two i-f transformers are in oblong coil cans located on top of the chassis deck. The first i-f transformer is the one behind the variable condenser. The trimmers for these transformers are accessible through holes in the tops of the cans.  
 The 456 kc wave-trap is mounted on the top of the chassis to left of variable condenser. Its trimmer is mounted on the trap.  
 The antenna coils for the broadcast and police bands are wound on one form and are mounted underneath the chassis deck below the variable condenser.  
 The oscillator coils for the broadcast and police bands are wound on one form and are mounted on the rear wall of the chassis deck near the variable condenser.  
 The trimmers for the broadcast antenna and oscillator coils are located on the variable condenser. The trimmer on the section closest to dial is for the antenna coil.

I-f Transformer and Wave-Trap Alignment

Turn the switch clockwise to the broadcast position and rotate the variable condenser to the minimum capacity position. Feed 456 kc to the grid cap of the 6A7 tube through a .02 mf condenser and adjust the four i-f trimmers for maximum response. Feed 456 kc to the antenna through a .0001 mf condenser and adjust the wave-trap trimmer for minimum response. (See General Notes, No. 7.)

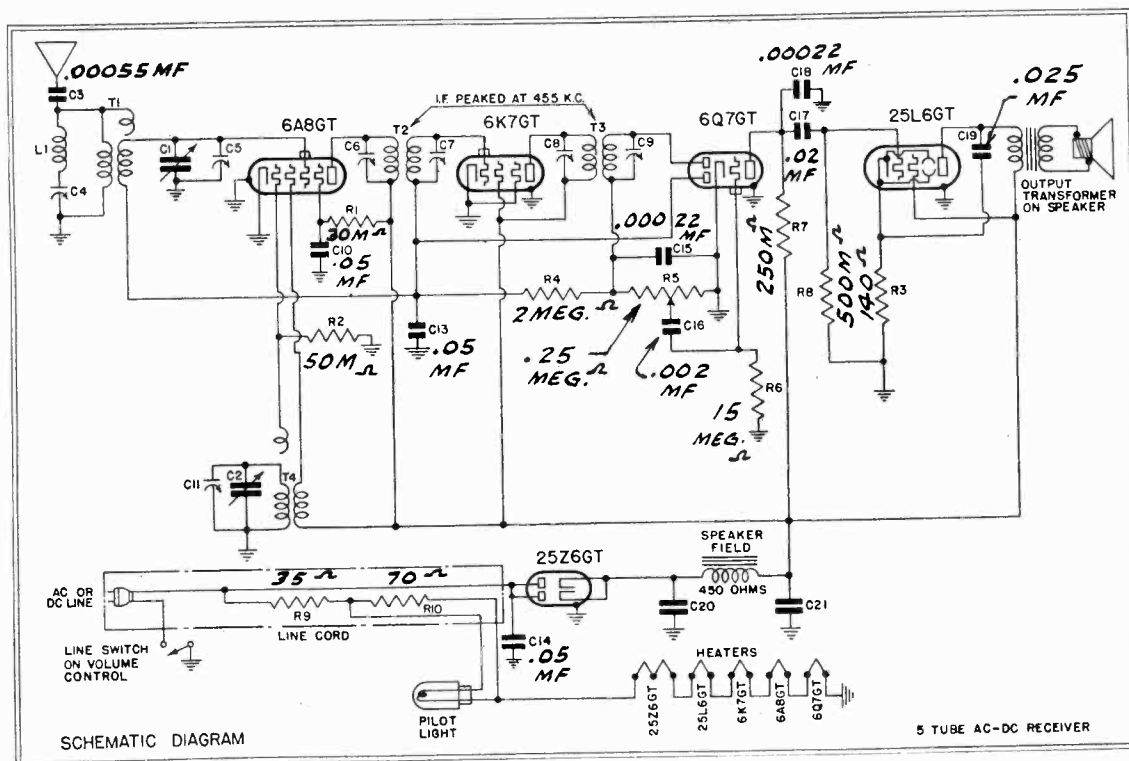
R-f Alignment

With the wave-band switch (rear of chassis) in the broadcast position, clockwise, loosen indicator drive pulley set screw and set the dial indicator at 140. Feed 1400 kc through a .0001 mf condenser to the antenna lead and adjust first the oscillator trimmer (on left section of variable condenser) then the antenna trimmer (on right section of variable condenser) for maximum response. The police band is self-tracking and does not require any adjustment.



MODELS CH246, CH253, CH256,  
Chassis CH  
MODELS CL246, CL253, CL256,  
Chassis CL

EMERSON RADIO & PHONOGRAPH CORP.



SCHMATIC DIAGRAM FOR CH CHASSIS BEARING SERIAL NUMBERS BELOW 2,395,000

PRODUCTION CHANGES

1. Chassis bearing serial numbers below 2,395,000 differ from the above as follows:
- |          |          |  |
|----------|----------|--|
| T4       | 4XT-458  | Oscillator coil. (See production change no. 2)                           |
| T2       | 4XT-434  | Double-tuned 455 kc first i-f transformer                                |
| T3       | 4XT-435  | Double-tuned 455 kc second i-f transformer                               |
| R4       | KR-57    | 1 megohm 1/4 watt carbon resistor  |
| R9, R10  | 4XW-112  | Resistance line cord with pilot light section (R9—150 ohms; R10—40 ohms) |
| C13      | AC-6     | 0.1 mf, 200 volt tubular condenser                                       |
| C20, C21 | 4HC-348B | Dual 20 mf, 150 volt dry electrolytic condenser                          |
|          | 4BL-94   | Pilot light, 6.3 volt, .25 amp., Mazda No. 44                            |
|          | 4XS-324  | 4" dynamic speaker   |
|          | 4XZ-811C | Dial drive shaft   |
2. Chassis which use oscillator coil 4XT-458 may use 6JT-467 or 6JT-467A as replacement. For correct lug connections for either of the three coils see illustration on next page.
3. Condenser C12 is not used in CH chassis which have the negative connected to the chassis.
4. Not used in CL above 2.656.950.

FOR ALL OTHER DATA SEE EMERSON PAGE 10-22, RIDER'S VOL. X  
VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given below.

FOR CH SERIAL NUMBERS BELOW 2,395,000:

Tube	Plate	Screen	Cathode	Osc. Plate	Fil.
6A8	100	55	0	100	6.3
6K7	100	100	0	—	6.3
6Q7	43	—	0	—	6.3
25L6	92	100	5.5	—	25.0

- Voltage at 25Z6 cathode—125 volts.
- Voltage across speaker field—28 volts.
- Voltage across pilot light—4 volts.

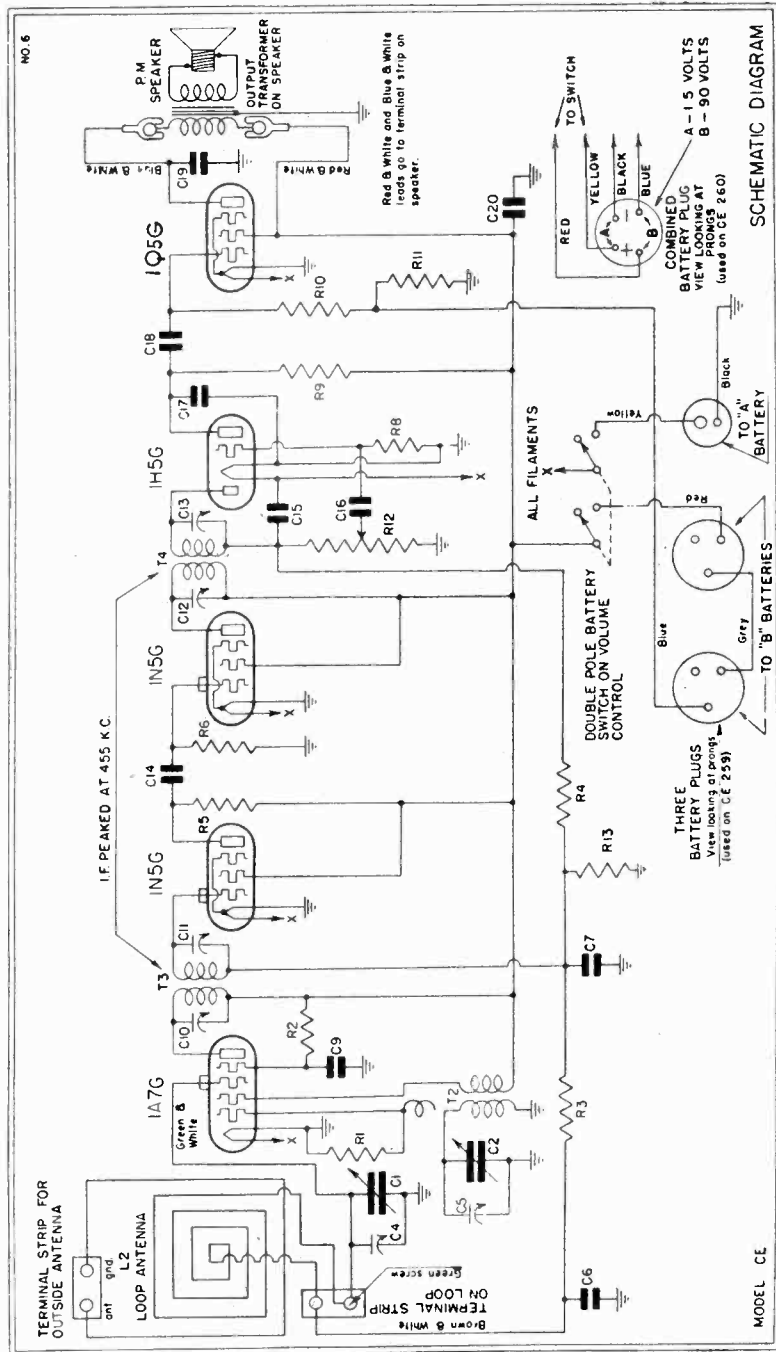
FOR CH SERIAL NUMBERS ABOVE 2,395,000 AND CL SERIAL NUMBERS BELOW 2.656,950:

Tube	Plate	Screen	Cathode	Osc. Plate	Fil.
12A8	94	50	0	94	12
12K7	94	94	0	—	12
12Q7	40	—	0	—	12
†35L6	87	94	5.2	—	35

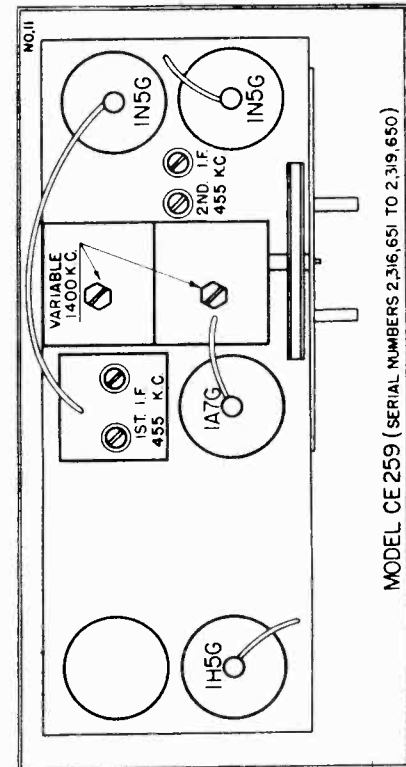
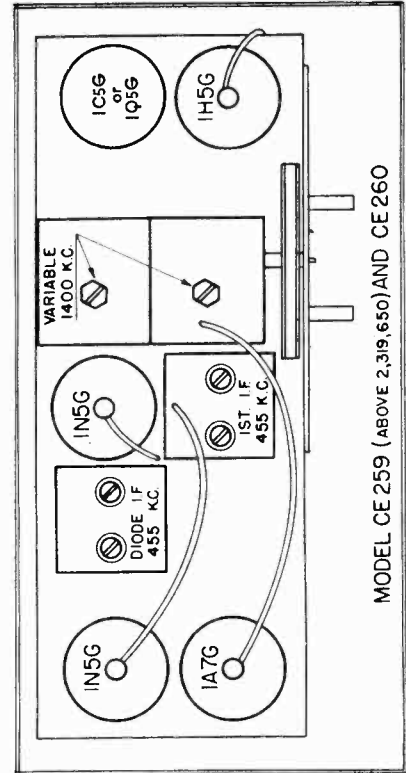
- ‡Voltage at 35Z4 cathode—121 volts.
- Voltage across speaker field—27 volts.
- Voltage across pilot light section of ballast resistor (R9)—3.5.
- Voltage drop across entire ballast resistor (R9 and R10)—13.5.
- †Plate and screen voltages for 50L6 are 5% lower.
- Heater voltage—50 volts.
- ‡Voltage at 35Z5 cathode—115 volts.

EMERSON RADIO & PHONOGRAPH CORP.

MODELS CE259,  
CE260, CE263,  
Chassis CE, Late



Schematic Diagram for Models CE-259, CE-260 and CE-263 (See Production Change No. 7)



MODELS CE259,  
CE260, CE263,  
Chassis CE, Late

EMERSON RADIO & PHONOGRAPH CORP.

REPLACEMENT PARTS LIST

When ordering replacement parts specify part numbers.

*Item	Part No.	DESCRIPTION
L2	6EW-146	Loop antenna assembly (for CE-259 only).....
L2	6EW-152	Loop antenna assembly (for CE-260 only).....
L2	6EW-157	Loop antenna assembly (for CE-263 only).....
T2	6JT-467A	Oscillator coil (see production change no. 1c).....
T3	6JT-466B	Double-tuned 455 kc first i-f transformer (see production change no. 1a).....
T4	6MT-472A	Double-tuned 455 kc diode i-f transformer (see production change no. 1b).....
R1	KR-53	50,000 ohm ¼ watt carbon resistor (see production change no. 5).....
R2	ZZR-196	30,000 ohm ¼ watt carbon resistor (see production change no. 1f).....
R3, R6	KR-54	100,000 ohm ¼ watt carbon resistor.....
R4, R8, R13	HR-42	2 megohm ¼ watt carbon resistor.....
R5	OR-73	25,000 ohm ¼ watt carbon resistor (see production change no. 7b).....
R9, R10	KR-56	.5 megohm ¼ watt carbon resistor.....
R11	6ER-358	680 ohm ½ watt wire-wound resistor (see production change no. 7a).....
R12	3HR-240B	Volume control 500,000 ohms with double pole line switch (for CE-259 and CE-263).....
R12	3HR-240C	Volume control 500,000 ohms with double pole line switch (for CE-260).....
C1, C2	4XC-391B	Two-gang variable condenser.....
†C4, C5		Trimmers, part of variable condenser (see production change no. 3).....
C6, C7	BC-12	0.05 mf, 200 volt tubular condenser.....
C9, C18	LC-65	0.02 mf, 400 volt tubular condenser.....
†C10, C11, C12, C13		Trimmers, part of i-f transformer.....
C14	5AC-384	0.0002 mf, 600 volt tubular or mica condenser.....
C15, C17	4XC-394A	0.00022 mf mica condenser (see production change no. 4).....
C16	KC-58	0.01 mf, 400 volt tubular condenser.....
C19	NNC-199	0.001 mf, 600 volt tubular condenser.....
C20	6EC-432	8 mf, 100 volt dry electrolytic condenser.....
	6ES-367A	5" permanent magnet dynamic speaker.....
	4XD-51A	Dial face (see production change no. 2).....
	6ED-69	Indicator dial.....
	4MZ-588B	Dial pointer.....
	4XE-3	Dial crystal (for CE-259 and CE-260).....
	4XE-3B	Dial crystal (for CE-263).....
	5JZ-824	Drive cord spring.....
	4YZ-772	Dial drive cord.....
	6EW-135A	Battery cable (for CE-259).....
	6EW-148	Battery cable (for CE-260).....

\*Item number locates the article on the schematic diagram.

†Not supplied separately.

PRODUCTION CHANGES

Chassis bearing serial numbers below 2,319,650 use:

- (a) Double-tuned 455 kc first i-f transformer, part no. 4XT-434A.....
- (b) Double-tuned 455 kc diode i-f transformer, part no. 4XT-435B.....
- (c) Oscillator coil, part no. 4XT-433.....
- (d) The low side of the volume control (R12) is connected to A plus instead of A minus (chassis) as shown in the schematic.
- (e) Condenser C19 is connected from plate to B plus instead of from plate to ground as shown in the schematic.
- (f) Resistor R2 is 50,000 ohms, part no. KR-53, instead of 30,000 ohms.
- (g) Chassis using oscillator coil 4XT-433 have a 60 mmf condenser connected from oscillator grid to the grid terminal of the coil. Coil 6JT-467A has an extra capacity winding on the form which replaces this condenser.

Chassis bearing serial numbers below 2,408,049 use dial face, part no. 4XD-51.....

On Model CE-260 the antenna trimming condenser (C4) is mounted on the loop antenna frame instead of on the variable condenser.

In chassis bearing serial numbers above 2,319,650 condenser C15 is connected from the high side of the volume control to ground instead of to A plus as shown in the schematic.

Chassis bearing serial numbers below 2,439,541 use R1, 200,000 ohm ¼ watt carbon resistor.....

Chassis bearing serial numbers below 2,440,834 use R5, 10,000 ohm ¼ watt carbon resistor.....

Chassis bearing serial numbers below 2,593,855 use 1C5G output tube in same position on chassis as 1Q5G output tube and also have following changes:

- (a) Resistor R11 was 740 ohm ½ watt wire-wound resistor.....
- (b) Resistor R5 was 10,000 ohm ¼ watt carbon resistor.....

Chassis bearing serial numbers above 2,593,855 use a resistor 50,000 ohms in series with the high side of the volume control. This resistor is not shown on the schematic diagram.

EMERSON RADIO & PHONOGRAPH CORP.

MODELS CE259,  
CE260, CE263  
Chassis CE, Late

DESCRIPTION

GENERAL NOTES

TYPE: Single-band superheterodyne.

FREQUENCY RANGE:

540-1730 on early CE-259  
530-1600 on all Models CE-260, CE-263 and later CE-259.

NUMBER OF TUBES: Five.

TYPE OF TUBES:

- 1—1A7G, oscillator-modulator
- 1—1N5G, 1st i-f amplifier
- 1—1N5G, 2nd i-f amplifier
- 1—1H5G, 2nd detector, a.v.c., a-f amplifier
- †1—1C5G, pentode output, or, 1Q5G, beam power output (see production change no. 7).

POWER SUPPLY: A and B batteries.

VOLTAGE RATING:

- 1.5 volts A
- 90 volts B

CURRENT DRAIN:

- .3 amps A at 1.5 volts
- .01 amps B at 90 volts.

1. Batteries. The Models CE-259, CE-260 and CE-263 are designed to house the complete set of batteries within the cabinet.
2. The color coding of the i-f transformer leads is as follows:  
Grid—green                      Plate—blue  
Grid return—black              B plus—red
3. The color coding of the battery cable is as follows:  
Red—B plus, 90 volts              Yellow—A plus, 1.5 volts  
Blue—B minus                      Black—A minus.
4. If replacements are made in the r-f section of the circuit, the receiver should be carefully re-aligned.
5. Models CE-259, CE-260 and CE-263 have self-contained antennas and do not require additional antenna or ground connections. For permanent home installations of either model, however, if it is desired to improve reception of weak stations, an additional outdoor antenna should be used. For this purpose a terminal strip is provided in the cabinet for antenna and ground connections. (See diagram on last page.)
6. 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.

BATTERY COMPLEMENT

		FOR MODEL CE-259 (Portable)		Burgess Part No.
Type Battery	No. Req.	Eveready Part No.	Ray-o-vac Part No.	
1½ volt "A"	1	742 (plug-in type)	P-94A (plug-in type)	4FA-PI (plug-in type)
45 volt "B"	2	762 (plug-in type)	P-5303 (plug-in type)	B30-PI (plug-in type)
		FOR MODEL CE-260		
Combined "A" and "B" Pack	1	748 (plug-in type)	AB82 (plug-in type)	
		FOR MODEL CE-263 (Portable)		
1½ volt "A"	1	741 (plug-in type)	P-96A (plug-in type)	8F (plug-in type)
45 volt "B"	2	762 (plug-in type)	P-5303 (plug-in type)	B30-PI (plug-in type)

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed are from point indicated to chassis with volume control turned on full and no signal. The battery voltages for these readings were: "A" 1.5 volts, "B" 90 volts.

Tube	Plate	Screen	Osc. Plate	Fil.
1A7G	82	52	82	1.5
1N5G, 1st i-f.	70	82	—	1.5
1N5G, 2nd i-f.	82	82	—	1.5
1H5G	25	—	—	1.5
†1C5G or 1Q5G	77	82	—	1.5

Bias for the 1C5G or 1Q5G tube is obtained across the resistor R11. The voltage drop across this resistor should be 7.8 volts with 1C5G or 7volts with 1Q5G (see production change no. 7.)

MODELS CE259,  
CE260, CE263

## EMERSON RADIO & PHONOGRAPH CORP.

Chassis CE, Late

### ADJUSTMENTS

An oscillator with frequencies of 455 and 1400 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.

#### Location of Coils and Trimmer Adjustments

The oscillator coil is located beneath the chassis. The trimmer for the oscillator coil is on the rear section of the variable condenser.

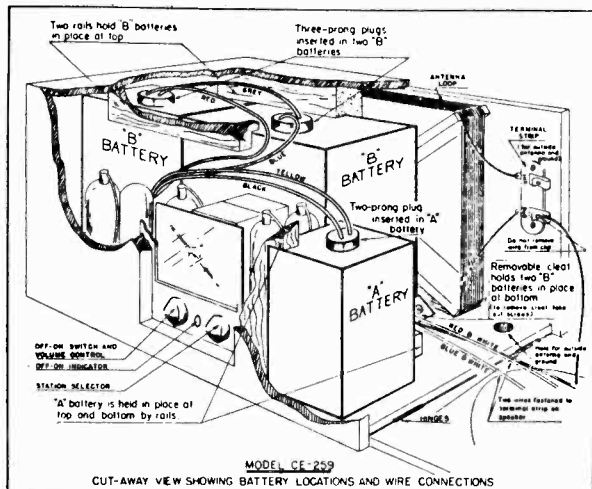
The loop antenna acts as the antenna coil. The trimmer for the loop, when provided, is on the front section of the variable condenser or on the loop frame. (See Production Change No. 3.)

#### I-f Alignment

Model CE-259 (below serial number 2,319,650). Swing variable condenser to maximum capacity position.

Model CE-259 (above serial number 2,319,650), CE-260 and CE-263. Swing the variable condenser to minimum capacity position.

Feed 455 kc to the grid of the 1A7G tube through a 0.01 mf condenser. Adjust the four i-f trimmers for maximum response.



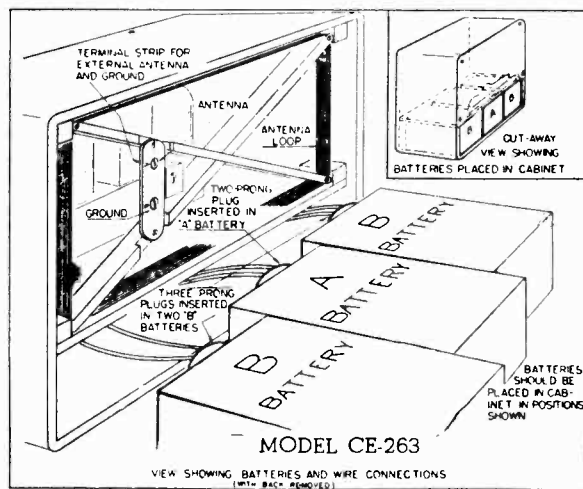
#### R-f Alignment

Set the dial pointer at 140. Set the signal generator at 1400 kc and feed its output into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from and parallel to the receiver loop antenna. Advance the output of the signal generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (on front section of variable condenser or on loop frame) then the antenna trimmer (on rear section of variable condenser) for maximum response.

If the loop antenna has been replaced it may be necessary to adjust the loop inductance as follows. Align at 140. Set the pointer at 60 and feed 600 kc to the antenna lead. A portion of the outside turn of the loop may be swung to either side of the center to give maximum response. Realign at 140.

#### Battery Installation for Model CE-260

The cabinet for this model is designed to house completely the combined "A" and "B" pack. Place the battery pack in the cabinet at the rear of the receiver and insert the four-prong plug of the battery cable into the socket on the top of the battery.



#### Battery Installation for Model CE-259

The diagram above illustrates the proper position of the batteries in the portable cabinet. To install and connect the batteries in this cabinet observe the following procedure:

1. Open the end side of the cabinet (side with speaker grille) by removing the two wood screws in the top corners of the panel. The panel is hinged at the bottom. Open the panel by pulling the small leather tab at the top edge.
2. A small wood cleat is fastened to the bottom of the cabinet directly below the two large wood rails. Remove this cleat by taking out the small wood screws.
3. The three-prong plugs on the battery cable from the receiver should be plugged into the two "B" batteries.
4. Slide the "B" batteries, one at a time, in an upright position between the two wood rails in the cabinet, as indicated in the diagram.
5. Replace the small wood cleat in front of the second battery and fasten it securely with the wood screws.
6. The small two-prong plug in the battery cable should be plugged into the "A" battery. Place the "A" battery in the front corner of the cabinet as shown in the diagram.
7. Be sure that all of the cable wires are free and clear of the chassis. Care should be taken also to keep the wires from jamming between the wood rails and the batteries.

8. Close the end panel and replace the wood screws, fastening them securely.

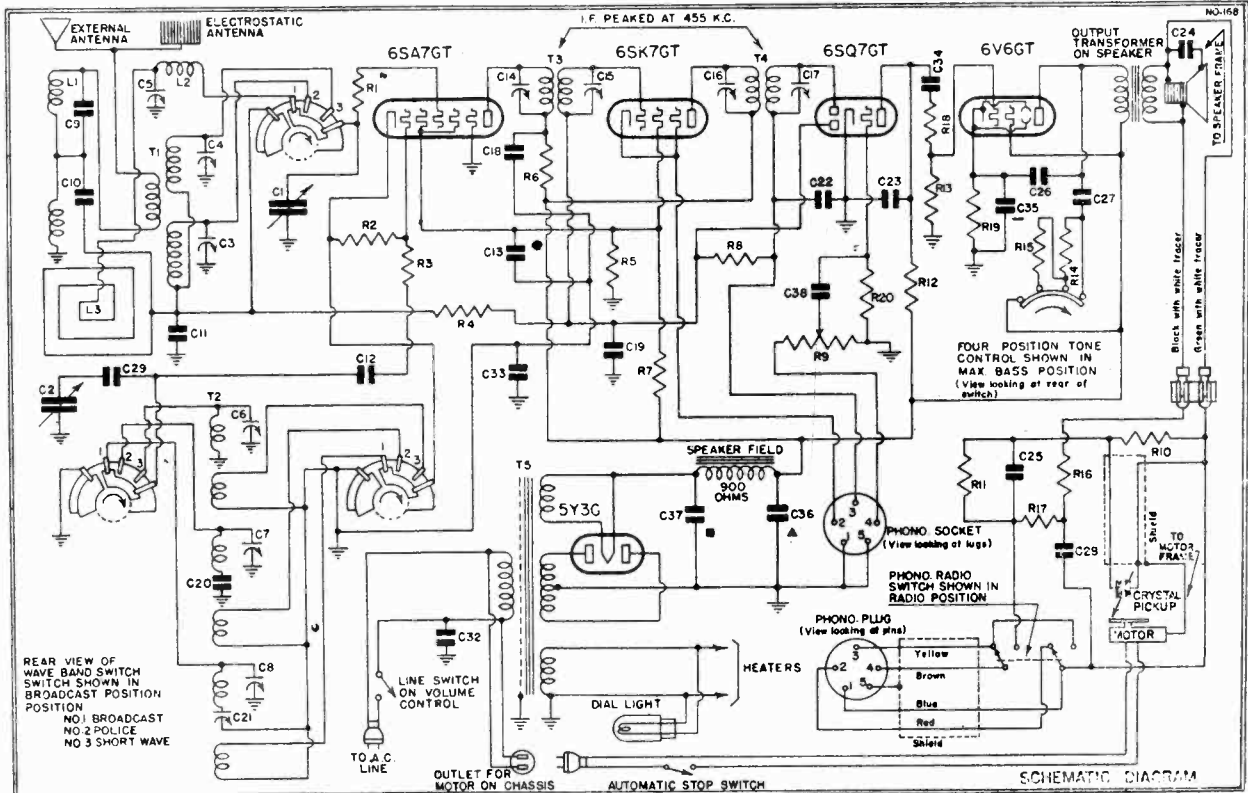
#### Battery Installation for Model CE-263

The cabinet for this model contains a shelf under the receiver for housing the batteries. The illustration above indicates the position of the batteries. To install and connect the batteries observe the following procedure:

1. Remove the back panel of the cabinet by taking out the wood screws.
2. Locate the battery cable on the bottom shelf of the cabinet.
3. With the batteries out of the cabinet insert the three-prong plugs on the battery cable into the two "B" batteries and the small two-prong plug into the "A" battery.
4. Place the batteries in the cabinet as indicated in the illustration. Note that the "A" battery is placed between the two "B" batteries. Also note that the plug end of the battery is up against the front panel of the cabinet.
5. Replace the back panel of the cabinet and fasten it in place with the wood screws.

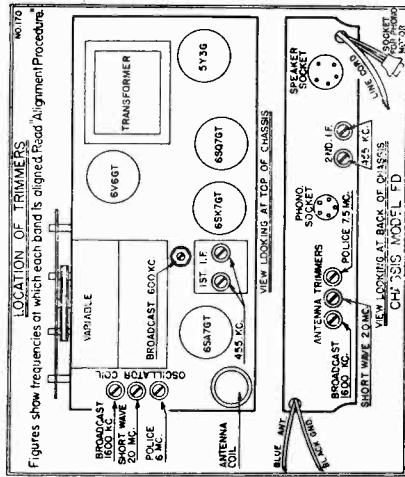
EMERSON RADIO & PHONOGRAPH CORP.

MODEL FD396,  
Chassis FD



When ordering, specify part numbers. List price each, effective as of January 15, 1941. Subject to change without notice.

*Item No.	Part No.	DESCRIPTION	Price
L1, C9	8FT-573A	Antenna choke and 455 kc fixed wave-trap.....	.75
L2	7XT-564	Broadcast antenna loading coil.....	.25
L3	7XW-283	Broadcast antenna loop assembly.....	.70
T1	7XT-562	Police and short-wave antenna coil.....	.55
T2	7XT-563A	Three-band oscillator coil.....	1.45
T3	7QT-548D	Double-tuned 455 kc first i-f transformer.....	.90
T4	8ST-588B	Double-tuned 455 kc second i-f transformer.....	.95
T5	8DT-554	Power transformer.....	4.85
R1, R3	7XR-406	100 ohm 1/4 watt carbon resistor.....	.16
R2	LR-60	20,000 ohm 1/4 watt carbon resistor.....	.16
R4	KR-54	100,000 ohm 1/4 watt carbon resistor.....	.16
R5	3LR-265	43,000 ohm 1/2 watt carbon resistor.....	.16
R6	PR-79	1,000 ohm 1/4 watt carbon resistor.....	.16
R7	8DR-397	15,000 ohm 3 watt carbon resistor.....	.30
R8, R11	HR-42	2 megohm 1/4 watt carbon resistor.....	.16
R9	6GR-352	Volume control .25 meg. with line switch.....	.90
R10, R13, R17	KR-56	500,000 ohm 1/4 watt carbon resistor.....	.16
R12	KR-55	250,000 ohm 1/4 watt carbon resistor.....	.16
R14	4XR-334	2,500 ohm 1 watt carbon resistor.....	.16
R15	LR-64	5,000 ohm 1/4 watt carbon resistor.....	.16
R16	3BR-247	40,000 ohm 1/4 watt carbon resistor.....	.16
R18	KR-53	50,000 ohm 1/4 watt carbon resistor.....	.16
R19	8QR-421	240 ohm 1 watt wire-wound resistor.....	.16
R20	3RR-275	10 megohm 1/4 watt carbon resistor.....	.16
C1, C2	7AC-442	Two-gang variable condenser.....	2.90
C3, C4, C5	7XC-485	Triple trimmer strip for antenna circuits.....	.45
†C6, C7, C8		Trimmers, part of oscillator coil	
C9		0.001 mf condenser, part of 455 kc wave-trap	
C10, C33	KC-58	0.01 mf, 400 volt tubular condenser.....	.20
C11	2ZC-253	0.0025 mf mica condenser.....	.30
C12	5LC-410A	0.00011 mf mica condenser.....	.20
C13	EEC-132	.1 mf, 400 volt tubular condenser.....	.20
†C14, C15, C16, C17		Trimmers, part of i-f transformers	
C18, C27	LC-64	0.05 mf, 400 volt tubular condenser.....	.20
C21	2NC-231D	Single adjustable padding condenser. Range: 150-300 mmf.....	.30
C24	FC-29	0.02 mf, 200 volt tubular condenser.....	.20
C28	ZZC-211	0.03 mf, 200 volt tubular condenser.....	.20
C29	AAC-110	0.002 mf mica condenser.....	.20
C32	3LC-297A	0.01 mf, 400 volt tubular condenser.....	.20
C34	LC-65	0.02 mf, 400 volt tubular condenser.....	.20
C35, C36, C37	8DC-522	Multiple dry electrolytic condenser.....	1.05
C38	3HC-274	C35—20 mf, 25 volt; C36—15 mf, 350 volt; C37—15 mf, 400 volt 0.002 mf, 600 volt tubular condenser.....	.20



Figures show frequencies at which each band is aligned. Read Alignment Procedure.

GENERAL NOTES

- The receiver should never be turned on with either the speaker plug or the 6V6GT tube out of their respective sockets, since the rapid rise in rectifier voltage will damage the electrolytic condenser.
- When replacing the chassis in the cabinet take precautions to keep any part of the dial and condenser assembly from touching the cabinet, otherwise microphonism will result.
- The color coding of the i-f transformers is as follows:  
Grid—green  
B plus—red  
Plate—blue  
Grid return—black
- The color coding of the power transformer is as follows:  
Primary—black leads  
High-voltage secondary—two red leads  
High-voltage secondary center tap—red and yellow lead  
5 volt secondary—two yellow leads.
- The adjustable padding condenser for the broadcast band is mounted on the top of the chassis, with the screw adjustment accessible in the top of the chassis. The police and short-wave bands have fixed paddlers, C20 and C29 on the side. When adjusting these fixed paddlers be careful to use a condenser with a capacity within 2% of the specified value, otherwise the short-wave coils may not track.
- The phonograph motor is equipped with an automatic stop switch. To set this stop, with receiver switched off, push the motor start lever arm toward the rear (arm crosses under pickup near rear of cabinet). Then, with record in place on turntable, swing the vertical arm (which is at the left rear of the pickup) about its pivot so that the pickup bears against the arm when the needle reaches the spiral groove at the center of the record. This adjustment may have to be changed with different records.

DESCRIPTION

TYPE: Three-band superheterodyne.

FREQUENCY RANGES:  
540-1750 kc. (555-170 meters)  
2300-7500 kc. (130-40 meters)  
6.9-22 mc. (43.5-13.6 meters)

NUMBER OF TUBES: Five.

TYPE OF TUBES:  
1—6SA7GT, pentagrid converter  
1—6SK7GT, i-f amplifier  
1—6SQ7GT, diode detector, audio amplifier and a.v.c.  
1—6V6GT, power output  
1—5Y3G, full-wave rectifier.

POWER SUPPLY: A.C. only.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION:  
55 watts for the receiver.  
75 watts for the combination.

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to ground (chassis) with the volume control turned on full and no signal. Line voltage for these readings was 117 volts, 60 cycles, a.c. All readings except B plus at rectifier, heaters, and cathode voltages were taken on 250 volt scale.

Tube	Plate	Screen	Cathode	Fil.
6SA7GT	250	85	0	6.3 ac.
6K7GT	250	85	0	6.3 ac.
6SQ7GT	125	—	0	6.3 ac.
6V6GT	235	250	0	6.3 ac.

ADJUSTMENTS

- An oscillator with frequencies of 455, 600, 1600, 7500 and 20,000 kc should be used.
- An output meter should be used across the voice coil or speaker output transformer for observing maximum response.
- Use a dummy antenna for aligning the police and short-wave bands. A .0001 mf condenser in series with a 400 ohm carbon resistor may be used for the police band dummy antenna. For the short-wave band a 400 ohm carbon resistor may be used.
- Always use as weak a test signal as possible during alignment.
- The set's oscillator is higher in frequency than the signal on all three bands, so images should be observed on the low frequency side of the signals.

i-f Alignment

Rotate the wave-band switch to the broadcast (clockwise) position. Set the variable condenser at the minimum capacity position and feed 455 kc through a 0.02 mf paper condenser, to the grid of the 6SA7 tube. The input may be fed to the stator lug of the front condenser section. Adjust the four i-f trimmers for maximum response.

Broadcast Alignment

Rotate the wave-band switch to the broadcast (clockwise) 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 and parallel to the receiver loop antenna and advance the output of the generator until a deflection is obtained on the output meter. Adjust first the oscillator coil trimmer then the antenna trimmer for maximum response. Reset the pointer at 60, feed 1600 kc and rock the variable condenser while adjusting the series paddler for maximum response. Return to 1600 kc and check alignment. If readjustment is necessary return to 600 and repeat entire procedure.

Police Alignment

Set the wave-band switch at the police band (central) position and the pointer at 7.5. Feed 7500 kc to the antenna and adjust the oscillator trimmer for maximum response. Then adjust the antenna trimmer for maximum response. The police band paddler is fixed and therefore requires no adjustment.

Short-Wave Alignment

Set the wave-band switch at the short-wave (counter-clockwise) position. Move the pointer to 20 and feed 20,000 kc to the antenna (using a 400 ohm dummy antenna) and adjust the short-wave oscillator trimmer for maximum response. If two peaks are obtained choose the minimum capacity peak. Then adjust the antenna coil trimmer for maximum response. If two peaks are obtained choose the maximum capacity peak.

EMERSON RADIO & PHONOGRAPH CORP. MODEL E0388 Chassis E0 Phono.

Receivers using 55, 75, 85, 6Q7, 12Q7, 6E5 and similar type tubes used as first audio amplifiers (see Fig. A).

1. Remove the adapter plug from the phonograph connecting cable.
2. Remove the control grid lead from the tube; connect the red wire emerging from the connecting cable to the grid cap of the tube; connect the black wire emerging from the connecting cable to the grid lead which originally connected to the grid cap.
3. The connecting cable shield must be connected to B— on the receiver chassis.

**MODEL: E0-388**  
**Phonograph Adapter**  
CHASSIS MODEL: E0

MOTOR: Alternating current type  
Run-drive

PICKUP: Crystal

POWER CONSUMPTION: 20 watts.

VOLTAGE RATING: 105-125 volts.

NO.137 Rim drive motor, 117 volt a.c.

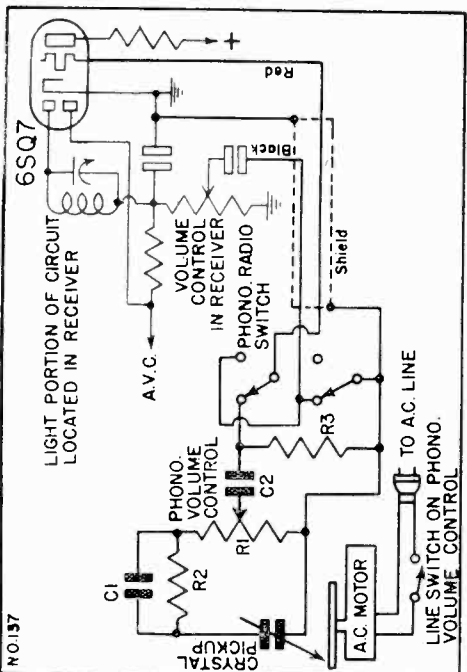
8CPM-64 Crystal pick-up

8CC-486A Phono-radio switch

6VG-24 Rubber needle cup

7MW-305 Phonograph connecting cable and adapter plug.

EO-388-S1 EO-388-S2

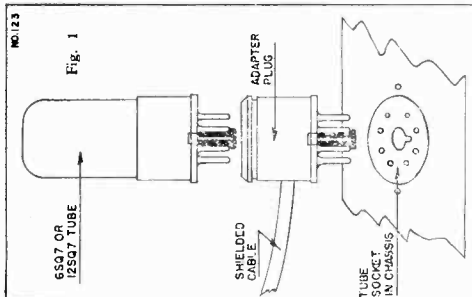


FOR OTHER DATA SEE THAT PERTAINING TO MODEL EQ410, EMERSON PAGE 12-22.

- R1 Volume control, .5 megohms, with line switch.
- R2 2 megohm 1/4 watt carbon resistor.
- R3 15 megohm 1/4 watt carbon resistor.
- C1 0.00011 mf mica condenser.
- C2 0.002 mf, 600 volt tubular condenser.

**GENERAL NOTES**

1. This adapter may be used with any receiver which employs a 6SQ7, 6SQ7GT, 12SQ7 or 12SQ7GT tube for its first audio amplifier.
2. The motor used in the adapter is of the A.C. ONLY type and will be damaged if used on direct current.
3. The regular receiver volume control operates when the adapter switch is in the "radio" position.
4. The phonograph volume control and motor on-off switch are operated by the same knob.
5. The motor on-off switch does not switch the receiver on or off.
6. THIS RECORD PLAYER HAS BEEN DESIGNED TO OPERATE WITHOUT A GROUND. UNDER NO CIRCUMSTANCES SHOULD ANY GROUND (OR GROUND WIRE) BE PERMITTED TO COME IN CONTACT WITH ANY METAL PART OF THE COMBINATION.



**OPERATION**

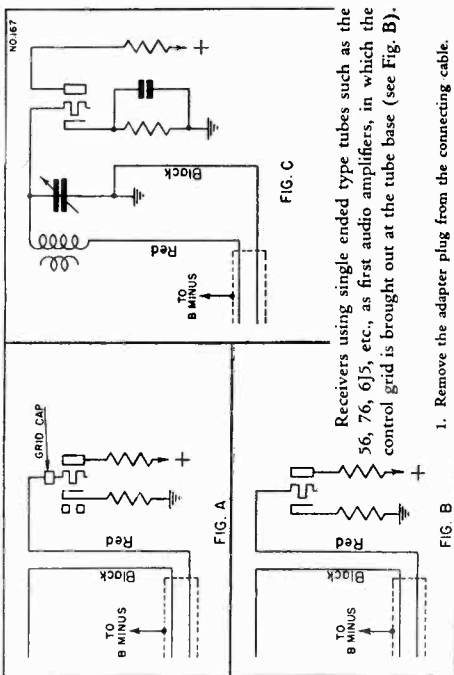
To connect the record player to the Models DM-331, DP-332 or any other radio receiver equipped with a 6SQ7 or 12SQ7 second detector and first audio amplifier proceed as follows:

1. Remove the back from the cabinet (if cabinet is equipped with a back).
2. Locate and remove the 6SQ7 or 12SQ7 tube from its socket, inserting the prong end of the adapter (which comes attached to the 388 cabinet by a length of cable) into the socket from which the 6SQ7 or 12SQ7 tube has been removed. See Figure 1.
3. Insert the 6SQ7 or 12SQ7 tube into the top of the adapter, plug. See Figure 1.
4. The back may then be replaced on the cabinet.

With the phonograph switch in the adapter turned to the position marked "Radio," the receiver may be used in the ordinary manner. The receiver on-off switch and volume control must be operated to control the receiver.

With the phonograph switch in the adapter turned to the position marked "Phono," the phonograph may be operated. The phonograph volume is controlled by the same knob which switches the motor on and off. The radio receiver volume control will have no effect in "phono" position.

To turn the receiver off be sure to turn off both motor switch and receiver switch.



Receivers using single ended type tubes such as the 56, 76, 6J5, etc., as first audio amplifiers, in which the control grid is brought out at the tube base (see Fig. B).

1. Remove the adapter plug from the connecting cable.
2. Remove the grid lead from the control grid socket lug; connect the red wire emerging from the connecting cable to the grid socket lug; connect the black wire emerging from the connecting cable to the wire which originally connected to the control grid socket lug.
3. The connecting cable shield is connected to B— on the receiver chassis.

Receivers using a plate bend detector tube and having no first audio tube (see Fig. C).

1. Remove the adapter plug from the connecting cable.
2. Remove lead to the low end of the secondary on the detector coil; connect the red wire emerging from the connecting cable to the low end of the detector secondary; connect the black wire emerging from the connecting cable to the lead which originally connected to the secondary of the coil.
3. The connecting cable shield is connected to B— on the receiver chassis.

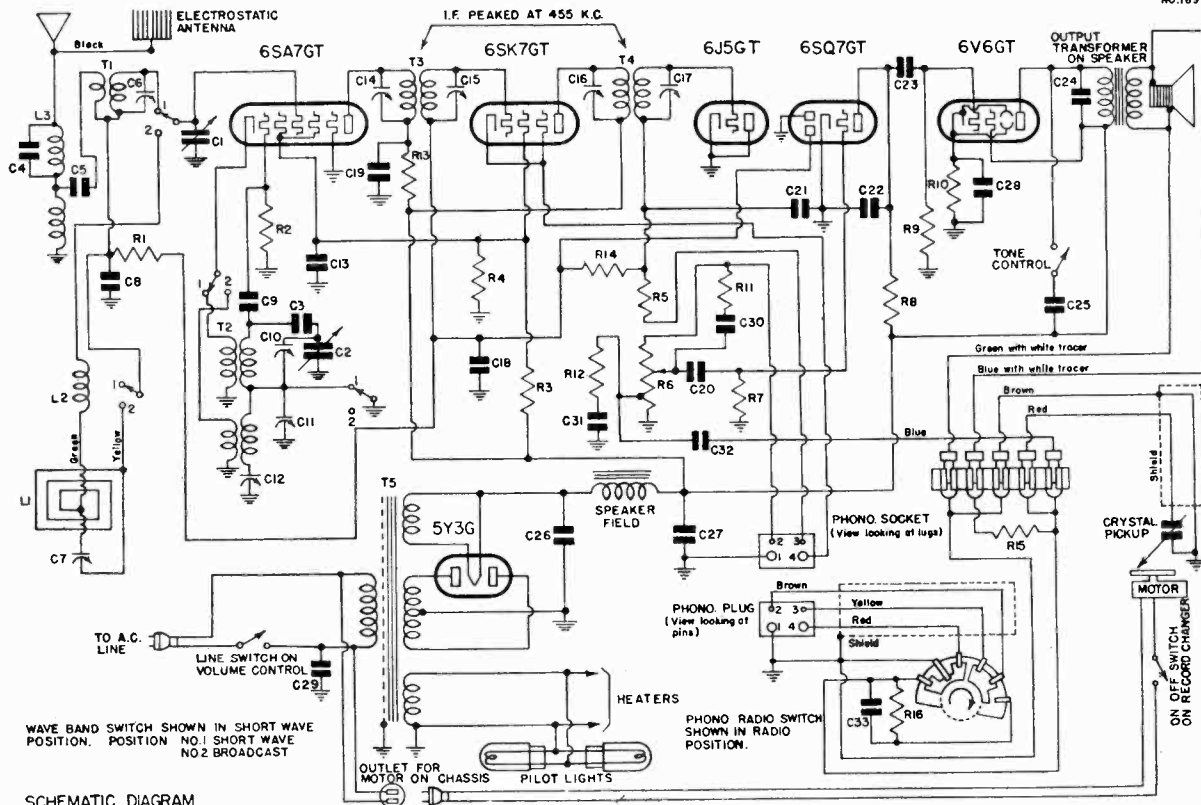
Note: This record player is not recommended for use with receivers using a grid leak detector and having only one audio stage.



EMERSON RADIO & PHONOGRAPH CORP.

MODEL FE-409, Chassis FE

NO.169



WAVE BAND SWITCH SHOWN IN SHORT WAVE POSITION. POSITION NO.1 SHORT WAVE NO.2 BROADCAST

SCHEMATIC DIAGRAM

List price each as of February 15 1941. Subject to change without notice.

*Item No.	Part No.	REPLACEMENT PARTS LIST	Price
T1	8QT-576	Short-wave antenna coil	\$.45
T2	8QT-577	Two-band oscillator coil	.55
T3	7QT-548E	Double-tuned 455 kc first i-f transformer	.90
T4	7BT-550	Double-tuned 455 kc second i-f transformer	.80
T5	8QT-584	Power transformer	4.70
L1	8QW-286	Broadcast loop antenna	1.85
L2	8QT-578	Broadcast antenna loading coil	.25
L3	7RT-531A	Antenna choke and 455 kc wave-trap	.85
R1	KR-54	100,000 ohm 1/4 watt carbon resistor	.16
R2	LR-60	20,000 ohm 1/4 watt carbon resistor	.16
R3	8DR-397	15,000 ohm 3 watt carbon resistor	.30
R4	3BR-247	40,000 ohm 1/4 watt carbon resistor	.16
R5	OR-73	25,000 ohm 1/4 watt carbon resistor	.16
R6	8QR-420	Volume control .5 megohm with line switch	.90
R7	3RR-275	10 megohm 1/4 watt carbon resistor	.16
R8	KR-55	250,000 ohm 1/4 watt carbon resistor	.16
R9, R11	KR-56	500,000 ohm 1/4 watt carbon resistor	.16
R10	8QR-421	240 ohm 1 watt wire-wound resistor	.16
R12	LR-65	10,000 ohm 1/4 watt carbon resistor	.16
R13	PR-79	1,000 ohm 1/4 watt carbon resistor	.16
R14, R15	HR-42	2 megohm 1/4 watt carbon resistor	.16
R16	NNR-220	3 megohm 1/4 watt carbon resistor	.16
C1, C2	8QM-634	Six-button tuning unit with two-gang variable condenser	5.45
C4		0.0001 mf mica condenser—Part of L3	
C5	KC-58	0.01 mf, 400 volt tubular condenser	.20
C6		Trimmer, part of T1	
C7		Trimmer, part of L1	
C8	AAC-111	.003 mf mica condenser	.20
C9, C33	5LC-410A	.00011 mf mica condenser	.20
C10, C11	8QC-505	Dual oscillator trimming condenser	.30
C12	2NC-231A	Single adjustable padding condenser	.30
C13, C19	EEC-132	0.1 mf, 400 volt tubular condenser	.20
C14, C15		Trimblers, part of i-f transformers	
C16, C17			
C18	BC-12	0.05 mf, 200 volt tubular condenser	.20
C20	3HC-274	0.002 mf, 600 volt tubular condenser	.20
C21, C22	5AC-384	0.0002 mf, 600 volt tubular condenser	.20
C23, C25	LC-65	0.02 mf, 400 volt tubular condenser	.20
C26, C27		Multiple dry electrolytic condenser	1.05
C28	8QC-509	C26, 15 mf—400 volt; C27, 15 mf—350 volt; C28, 20 mf—25 volt.	
C29	3LC-297	0.01 mf, 400 volt tubular condenser	.20
C30	AAC-106A	0.00005 mf mica condenser	.20
C31	3PC-306	0.005 mf mica condenser	.20
C32	4VC-370A	0.00015 mf mica condenser	.20

EMERSON RADIO & PHONOGRAPH CORP. MODEL FF411, Chassis FF

REPLACEMENT PARTS LIST

When ordering state part number. List price each as of February 15, 1941. (Subject to change without notice.)

*Item No.	Part No.	DESCRIPTION	PRICE
L2	7UW-296	Loop antenna	.85
T1	7UT-539A	Oscillator coil	.45
T2	7UT-540	Iron core double-tuned 455 kc first i-f transformer	1.90
T3	7UT-541	Iron core single-tuned 455 kc second i-f transformer	1.30
R1	KR-54	100,000 ohm 1/4 watt carbon resistor	.16
R2	LR-64	5,000 ohm 1/4 watt carbon resistor	.16
R3	LR-65	10,000 ohm 1/4 watt carbon resistor	.16
R4	3RR-274	5 megohm 1/4 watt carbon resistor	.16
R5	7UR-380	Volume control 1.5 megohm with double pole battery switch	.90
R6	3RR-275	10 megohm 1/4 watt carbon resistor	.16
R7, R9	NNR-220	3 megohm 1/4 watt carbon resistor	.16
R8	KR-57	1 megohm 1/4 watt carbon resistor	.16
R10	7UR-394	2200 ohm 1/4 watt carbon resistor	.16
R11	7UR-392	1800 ohm 1/4 watt carbon resistor	.16
C1, C2	7UC-469	Two-gang variable condenser	2.20
C3, C4	FC-29	Trimmers, part of variable condenser	.20
C5, C9, C15	FC-29	0.02 mf, 200 volt tubular condenser	.20
C6, C12, C14	3LC-410A	0.00011 mf mica condenser	.20
C7, C8, C11	7UC-476	Fixed trimming condensers, contained inside i-f cans	.50
C10	3HC-476	10 mf, 100 volt dry electrolytic condenser	.20
C13	3HC-274	0.002 mf, 600 volt tubular condenser	.20
C16, C17	NNC-199	0.001 mf, 600 volt tubular condenser	.20

GENERAL NOTES

TYPE: Single-band (battery operated) superheterodyne.

FREQUENCY RANGE: 540-1700 kc.

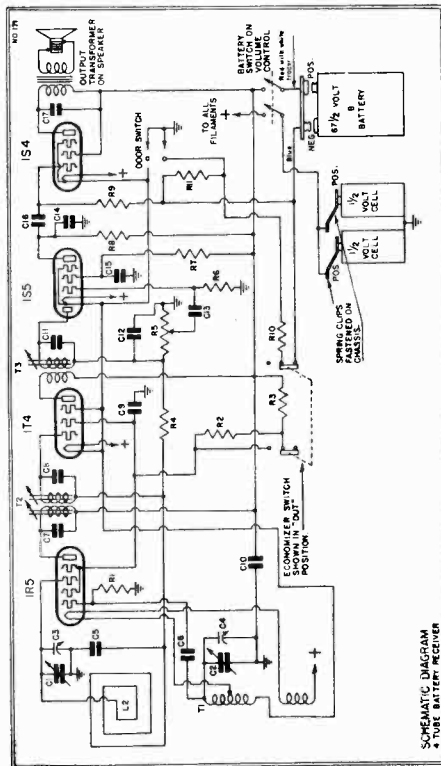
NUMBER OF TUBES: Four. Grid—green Plate—blue Grid return—black B plus—red

TYPE OF TUBES: 1—1R5, oscillator-modulator 1—1T4, i-f amplifier 1—1S5, 2nd detector, a.v.c., a-f amplifier 1—1S4, 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 with Battery Saver "OUT" 0.0055 amp with Battery Saver "IN"



VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohm-per-volt meter. Voltages listed are from point indicated to chassis with volume control set for maximum response. "A" 1.5 volts, "B" 67.5 volts. All readings except filament were taken on the 250 volt scale, with battery saver "out."

Tube	Plate	Screen	Fil.
1R5	57	60	1.5
1T4	57	60	1.5
1S5	95	53	1.5
1S4	55	60	1.5

Note: The 1S4 tube is obtained across the resistor R11. The voltage drop across this resistor should be 7.5 volts with battery saver "out" or 9.4 volts with battery saver "in."

\*The operating voltage of this tube cannot be measured because of the high resistor in the circuit.

ADJUSTMENTS

I-f Alignment

Swing variable condenser to minimum capacity position.

Feed 455 kc to the grid of the 1R5 tube through a 0.01 mf condenser. Adjust the three i-f trimmer core screws for maximum response. (Clip the i-f input to the stator lug of the upper variable condenser section.)

R-f Alignment

Set the dial pointer at 150. Set the signal generator at 1500 kc and feed its output into a loop of wire about one foot in diameter. Hold this radiating loop about one foot away from and parallel to the receiver loop antenna.

Advance the output of the generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (on lower section of variable condenser) then the antenna trimmer (on upper section of variable condenser) for maximum response.

BATTERY COMPLEMENT

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

Type Battery	Number Required
1 1/2 volt "A"	2
67 1/2 volt "B"	1

Standard "D" size (1 1/4" diameter) flashlight cell  
Eveready "Mini-max" No. 467

Location of Coils and Trimmer Adjustments

The first i-f transformer is located in the bottom outer edge of the chassis behind the lower flashlight cell. The brass screws which protrude from either end of the can are the core adjustment for trimming the transformer. 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.

The oscillator coil is located inside the chassis, beside the variable condenser. Trimmer for the oscillator is located on the lower section of the variable condenser.

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

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

Type Battery	Number Required
1 1/2 volt "A"	2
67 1/2 volt "B"	1

Standard "D" size (1 1/4" diameter) flashlight cell  
Eveready "Mini-max" No. 467

MODEL FJ412, Chassis FJ

EMERSON RADIO & PHONOGRAPH CORP.

**ADJUSTMENTS**

An oscillator with frequencies of 455 and 1400 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.

**Location of Coils and Trimmer Adjustments**

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

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

The trimmer for the oscillator coil is mounted on the front section of the variable condenser. The loop antenna trimmer is located on the loop assembly.

**i-f Alignment**

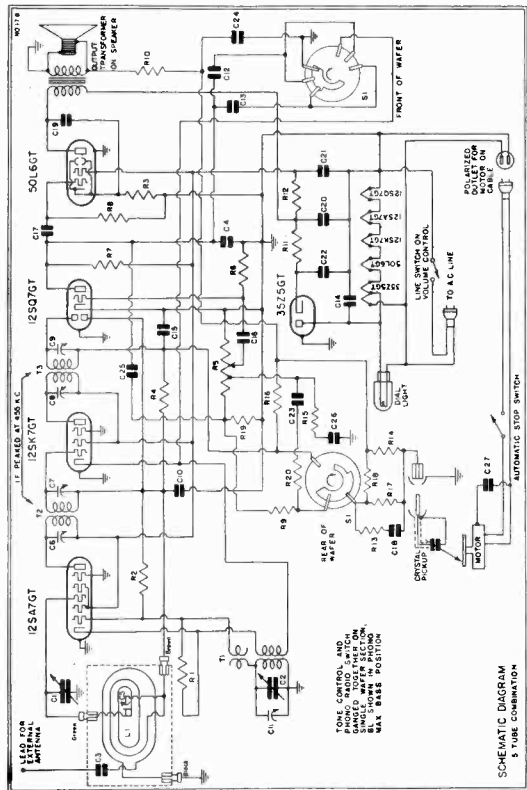
Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7GT i-f through a .01 microfarad condenser. Adjust the four i-f trimmers for maximum response. The grid of the 12SA7GT may be reached by clipping the input lead to the stator lug of the antenna section.

**R-f Alignment**

Set the dial pointer at 140. Feed 1400 kc from the signal generator into a loop of wire about one foot in diameter. Hold this radiating loop about 12 inches away from and parallel to the receiver loop antenna. Advance the input to the loop until a satisfactory deflection is obtained on the output meter. Adjust first the oscillator trimmer then the antenna trimmer for maximum response. If the loop antenna has been replaced, it may be necessary to retrace the loop inductance. With the dial set at 60 feed 600 kc to the antenna lead. A portion of the outside may be swung to either side of the center to give maximum response. Repeat the trimmer alignment at 140.

**REPLACEMENT PARTS LIST**

Part No.	Description
91W-243	Antenna loop assembly
91T-617	Oscillator coil
8PT-586A	Double-tuned 455 kc first i-f transformer
8PT-587	Double-tuned 455 kc second i-f transformer
LR-60	20,000 ohm 1/2 watt carbon resistor
LR-61	20,000 ohm 1/2 watt carbon resistor
LR-62	140 ohm 3/4 watt wire-wound resistor
3R-293	3 megohm 1/4 watt carbon resistor
NNR-220	3 megohm 1/4 watt carbon resistor
9JR-445	Volume control 2.5 meg, tapped at .5 meg
4XR-327	15 megohm 3/4 watt carbon resistor
50K-000	500,000 ohm 1/4 watt carbon resistor
KR-56	50,000 ohm 3/4 watt carbon resistor
KR-53	178 ohm 1 watt carbon resistor
9JR-430	100,000 ohm 1/2 watt carbon resistor
9JR-431	100,000 ohm 1/2 watt carbon resistor
9JR-432	100,000 ohm 1/2 watt carbon resistor
9JR-434	100,000 ohm 1/2 watt carbon resistor
9JR-435	100,000 ohm 1/2 watt carbon resistor
KR-57	1 megohm 3/4 watt carbon resistor
CR-55	250,000 ohm 1/2 watt carbon resistor
CR-56	Two-gang variable condenser
3HC-574	0.002 mf, 600 volt tubular condenser
3RC-373	0.0004 mf, 600 volt tubular condenser
Trimmers, part of i-f transformers	
AC-6	.01 mf, 200 volt tubular condenser
9JC-541	0.0015 mf, 600 volt tubular condenser
9JC-542	0.0015 mf, 600 volt tubular condenser
LC-384	0.0002 mf, 600 volt tubular condenser
LC-385	0.0002 mf, 600 volt tubular condenser
3HC-274	0.002 mf, 400 volt tubular condenser
LC-65	0.005 mf, 400 volt tubular condenser
8WC-524	Multiple dry electrolytic condenser, 150 volt, 0.00025 mf, 200 mf, C21, C22—20 mf.
AC-7A	.05 mf, 200 volt tubular condenser
RC-12	0.000026 mf mica condenser
4HC-395A	0.001 mf, 600 volt tubular condenser
NNC-199	0.05 mf, 600 volt tubular condenser
9JC-534	0.05 mf, 600 volt tubular condenser



SCHMATIC DIAGRAM FOR MODEL FJ

**VOLTAGE ANALYSIS**

Readings should be taken with a 1000 ohm-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale.

Tube	Plate	Screen	Cathode	Fil.
12SA7GT	88	88	0	12
12SK7GT	88	88	0	12
12SQ7GT	30	—	0	12
50L6GT	100	88	5.3	50

**GENERAL NOTES**

Voltage at 3/5Z5 cathode—120 volts.  
Voltage across pilot light—4.5 volts.

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 plus—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.
4. 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.

**TYPE:** Single-band superheterodyne and phonograph.

**FREQUENCY RANGE:** 540-1000 kc.

**NUMBER OF TUBES:** Five.

**TYPE OF TUBES:**

- 1—12SA7GT, pentagrid oscillator-modulator
- 1—12SK7GT, first i-f amplifier
- 1—12SQ7GT, diode detector, a-f amplifier, a.v.c.
- 1—50L6GT, beam power output
- 1—35Z5GT, half-wave rectifier.

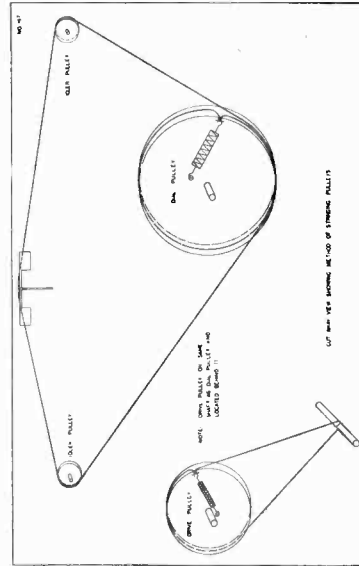
**POWER SUPPLY:** A.C. only.

**VOLTAGE RATING:** 105-125 volts.

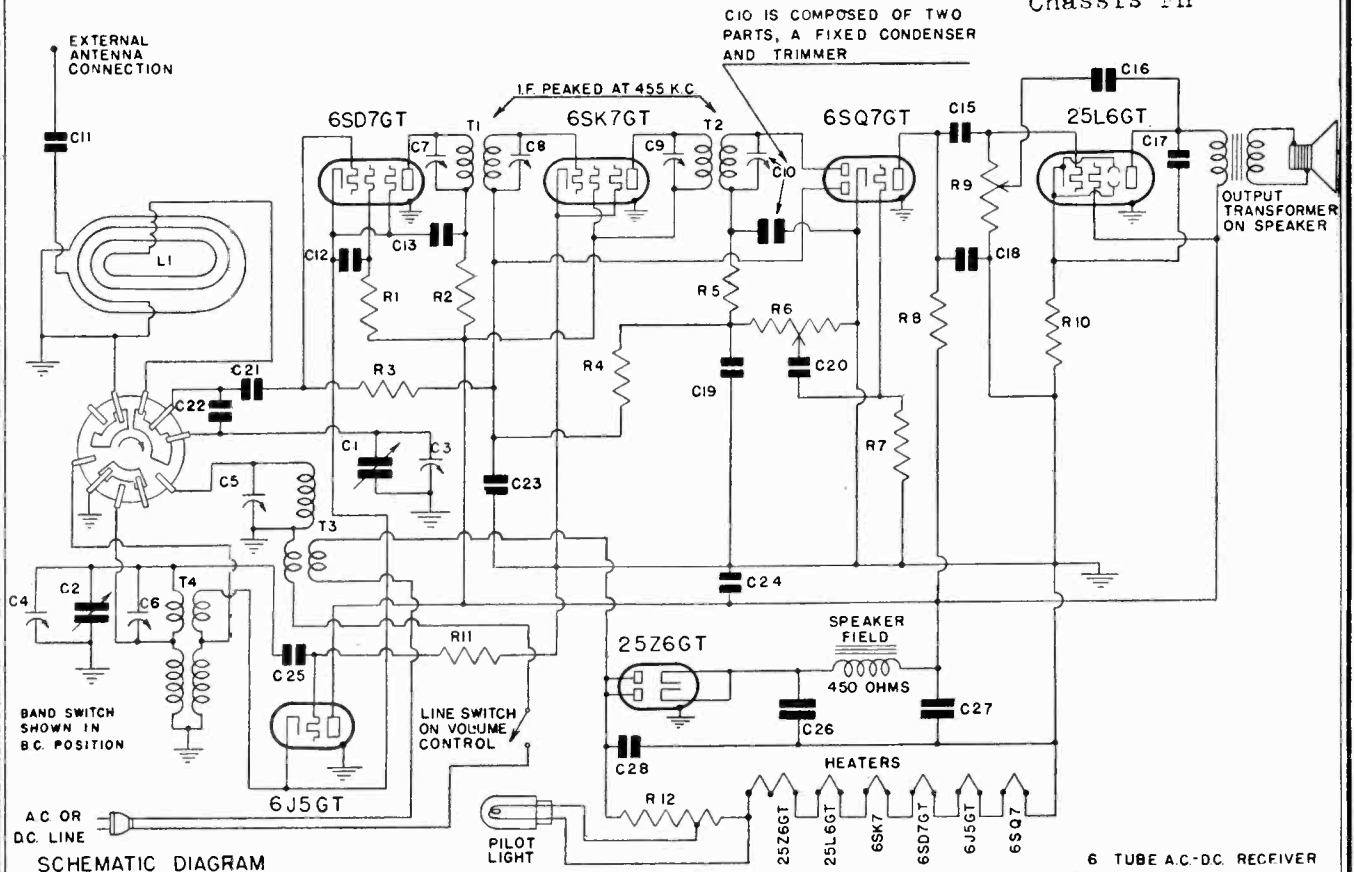
**POWER CONSUMPTION:**

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

**MODEL: FJ-412**  
**CHASSIS MODEL: FJ**



EMERSON RADIO & PHONOGRAPH CORP. MODELS FH413, FH440, Chassis FH



SCHEMATIC DIAGRAM

6 TUBE A.C.-D.C. RECEIVER

TYPE: Two-band superheterodyne.

FREQUENCY RANGES:

540-1620 kc. (555-185 meters)

8.8-12.2 (16.3-24.5 meters)

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

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

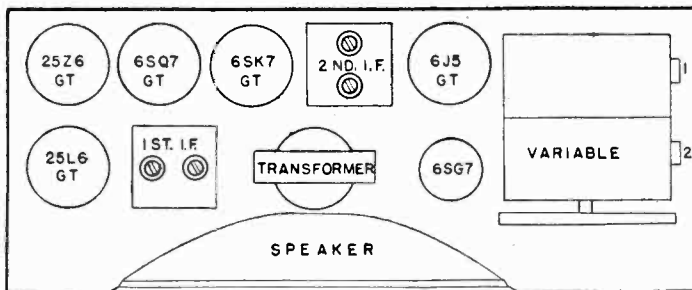
TYPE OF TUBES:

- 1-6SG7 or 6SD7
- 1-6J5, oscillator
- 1-6SK7, i-f amplifier
- 1-6SQ7, diode detector, a-f amplifier, a.v.c.
- 1-25L6, beam power output
- 1-25Z6, half-wave rectifier

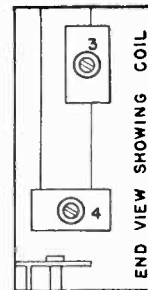
LOCATION OF TRIMMERS

NO. 191

FIGURES SHOW FREQUENCIES AT WHICH EACH BAND IS ALIGNED. READ "ALIGNMENT PROCEDURE"



- 1. BROADCAST OSCILLATOR TRIMMER 1600 K.C.
- 2. BROADCAST LOOP ANTENNA TRIMMER 1600 K.C.
- 3. SHORT WAVE OSCILLATOR TRIMMER 12 M.C.
- 4. SHORT WAVE ANTENNA TRIMMER 12 M.C.



VOLTAGE ANALYSIS

- Voltage at 25Z6 cathode—150 volts.
- Voltage across speaker field—32 volts.
- Voltage across pilot light—4.5 volts.

Tube	Plate	Screen	Cathode	Fil.
6SG7 or 6SD7	92	63	0	6.3
6J5	102	—	0	6.3
6SK7	102	102	0	6.3
6SQ7	30	—	—	6.3
25L6	92	102	6.5	25

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given below.

MODELS FH413, FH440  
Chassis FH

EMERSON RADIO & PHONOGRAPH CORP.

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 6SD7 tube through a .01 mf condenser and adjust the four i-f trimmers for maximum response.

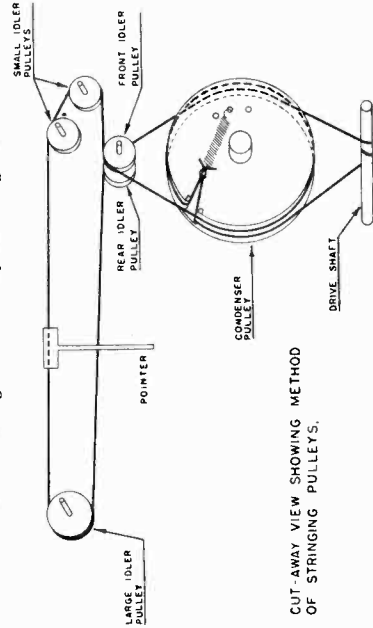
Note: The grid of the 6SD7 tube is the No. 4 pin.

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 300 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 antenna and advance the signal generator until the maximum response is obtained on the output meter. Adjust first the oscillator trimmer (rear meter 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. Realign at 1600.



CUT-AWAY VIEW SHOWING METHOD OF STRINGING PULLEYS.

REPLACEMENT PARTS LIST

When ordering, specify part numbers. List price each effective as of December 15, 1941. Subject to change without notice.

*Item	Part No.	DESCRIPTION	PRICE
L1	9HW-338	Loop antenna assembly (see production change no. 1a)	\$.65
T1	8CT-566B	Double-tuned 455 kc first i-f transformer	.85
T2	9HT-615	Double-tuned 455 kc second i-f transformer (see production change no. 1b)	1.15
T3	9HT-616	Short-wave antenna coil	.30
T4	9HT-614	Two-band oscillator coil	1.05
R1, R11	KR-53	50,000 ohm 1/4 watt carbon resistor	.16
R2	LR-64	5,000 ohm 1/4 watt carbon resistor	.16
R3, R4	NNR-220	3 megohm 1/4 watt carbon resistor	.16
R5		50,000 ohm 1/4 watt carbon resistor, part of T2	.80
R6	9HR-441	Volume control, .5 megohm	.16
R7	3RR-275	10 megohm 1/4 watt carbon resistor	.16
R8	KR-56	500,000 ohm 1/4 watt carbon resistor	.60
R9	9HR-442	Tone control, 400,000 ohm	.16
R10	3FR-293	140 ohm 1/2 watt wire-wound resistor	.50
R12	9HR-443	Ballast resistor, 155 ohm	2.35
C1, C2	9HC-530	Two-gang variable condenser	.20
†C3, C4		Trimmers, part of variable condenser	.20
†C5		Trimmer, part of T3	.20
†C6		Trimmer, part of T4	.20
†C7, C8, C9		Trimmers, part of i-f transformers	.20
†C10		Trimmer and 0.0001 mf, mica condenser, part of T2	.20
C11, C20	3HC-274	0.002 mf, 600 volt tubular condenser	.20
C12	FC-29	0.02 mf, 200 volt tubular condenser	.20
C13	BC-12	0.05 mf, 200 volt tubular condenser	.20
C15, C17	LC-65	0.02 mf, 400 volt tubular condenser	.20
C16, C18, C21	4XC-394A	0.00022 mf, mica condenser	.20
C28	LC-64	0.05 mf, 400 volt tubular condenser	.20
C19, C25	5LC-410A	0.00011 mf, mica condenser	.20
C22	9HC-531	0.00046 mf, mica condenser	.20
C23	AC-6	0.1 mf, 200 volt tubular condenser	.20
C24	KC-58	0.01 mf, 400 volt tubular condenser	.20
C26, C27	6JC-426R	Dual 20 mf, 150 volt dry electrolytic condenser	4.35
	9HS-549	Dynamic speaker	3.50
	9HS-541	Dynamic speaker for Model 440	.80
	9HS-542	Band switch	.65

\*Item number locates the article on the schematic diagram.

†Not supplied separately.

PRODUCTION CHANGES

1. Chassis bearing serial numbers above 4,671,200 use:  
 a-9HW-376 loop antenna..... .65  
 b-9HT-638 second i-f transformer..... 1.25

EMERSON RADIO & PHONOGRAPH CORP. MODELS FL14 to FL19  
inc. Chassis FL

When ordering, specify part numbers. List price each effective as of March 1, 1941. Subject to change without notice.

*Item	Part No.	DESCRIPTION	PRICE
L1	9LW-344	Loop antenna assembly.	.80
L2	9LT-619	.455 kc wave trap.	.40
T1	7QT-540G	Double-tuned 455 kc first i-f transformer.	.90
T2	9LT-618	Double-tuned 455 kc second i-f transformer.	1.15
T3	9LT-379A	Oscillator coil.	.40
R1	LR-60	20,000 ohm 1/4 watt carbon resistor.	.16
R2	3RR-275	10 megohm 1/4 watt carbon resistor.	.16
R3	3FR-293	140 ohm 1/2 watt wire-wound resistor.	.16
R4	NNR-220	3 megohm 1/4 watt carbon resistor.	.16
R5	9LR-446	Volume control .5 megohm with line switch (see production change No. 1a).	.80
R6	4XR-327	15 megohm 1/4 watt carbon resistor.	.16
R7, R8	KR-56	500,000 ohm 1/4 watt carbon resistor.	.16
R9	KR-53	50,000 ohm 1/4 watt carbon resistor, part of T2.	.16
R10	LR-65	10,000 ohm 1/4 watt carbon resistor.	.16
R11	OR-73	25,000 ohm 1/4 watt carbon resistor.	.16
R12	KR-37	1 megohm 1/4 watt carbon resistor.	.16
C1, C2	7BC-443E	Two-gang variable condenser.	1.95
C3, C16	3HC-274	0.002 mf, 600 volt tubular condenser.	.20
C4	5AC-384	0.0002 mf, 600 volt tubular condenser.	.20
C5, C13	B12	0.05 mf, 200 volt tubular condenser.	.20
C6, C7, C8		Trimmers, part of i-f transformers.	
C10, C11		Trimmer and fixed condensers, part of T2.	
C12		Trimmers, part of variable condenser.	
C14	4XC-394A	0.00022 mica condenser.	.20
C15, C19	LC-64	0.05 mf, 400 volt tubular condenser.	.20
C17	5LC-410A	0.0011 mica condenser.	.20
C18	LC-65	0.02 mf, 400 volt tubular condenser.	.20
C20, C21	EC-23	0.03 mf, 400 volt tubular condenser.	.20
	6IC-426P	Dual 20 mf, 150 volt dry electrolytic condenser.	.90
	7YS-476B	7" dynamic speaker.	3.65

PRODUCTION CHANGES

1. Chassis bearing serial numbers below 4,540,900 use:
  - (a) Volume control 7BR-363C..... .85
  - (b) Drive shaft 7BH-40D..... .10

VOLTAGE ANALYSIS

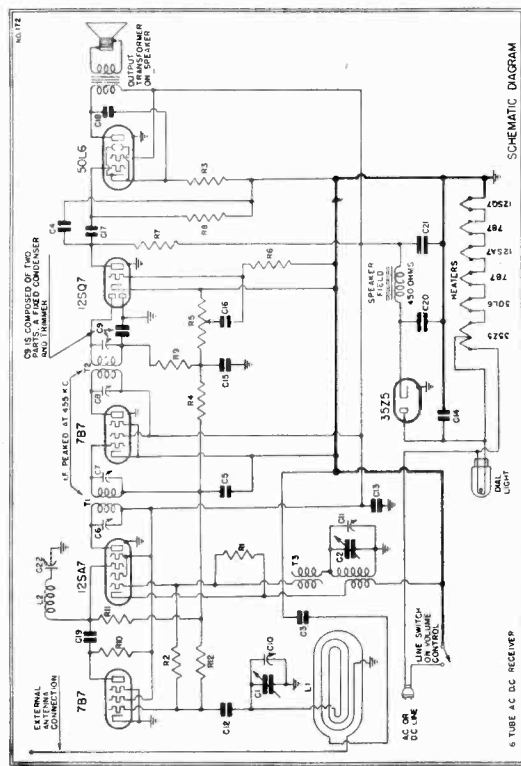
Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given below.

Tube	Plate	Screen	Cathode	FIL
7B7 (r-f)	18	88	0	5.5
12SA7	88	88	0	12.0
7B7	88	85	0	5.5
12SQ7	30	—	0	12.0
50L6	82	88	5.6	90.0

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

DIAL CORD REPLACEMENT

Draw the cord snugly around the condenser pulley and knot it, with no slack, near the notch in the pulley, after which the spring may be hooked to the cord and pulley. The dial face should bear against the fibre washer when finally assembled.



SCHEMATIC DIAGRAM FOR MODEL FL

- TYPE: Single-band Superheterodyne.
- TYPE OF TUBES:
- 1—7B7, r-f amplifier
  - 1—12SA7, pentagrid oscillator-modulator
  - 1—7B7, fixed i-f amplifier
  - 1—12SQ7, diode detector, a-f amplifier, a.v.c.
  - 1—50L6, beam power output
  - 1—35Z5, half-wave rectifier.
- FREQUENCY RANGE: 540-1630 kc.
- NUMBER OF TUBES: Six.
- POWER SUPPLY: A.C. or D.C.
- VOLTAGE RATING: 105-125 volts.
- POWER CONSUMPTION: 30 watts.

ADJUSTMENTS

- An oscillator with frequencies of 455 and 1400 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 and Wave-trap Alignment
- Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7 tube through a 10 mf condenser and adjust the four i-f trimmers for maximum response.
- Feed 455 kc to the external antenna lead and adjust the wave-trap for minimum response.
- Note: The grid of the 12SA7 tube is the No. 8 pin.

Location of Coils and Trimmer Adjustments

- The first i-f transformer is mounted on top of the chassis deck to the left 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 7B7 tube and the speaker. The trimmers are accessible through holes in the top of the can.
- The 455 kc wave-trap is located below the chassis deck.
- The trimmers for the antenna and oscillator coils 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 act as the antenna coil.

EMERSON RADIO & PHONOGRAPH CORP. MODEL F0420, Chassis F0

ADJUSTMENTS  
I-f Alignment

As oscillator with frequencies of 455, 600 and 1500 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.

Swing the variable condenser to its minimum capacity position and 455 kc oscillator of the 12SA7 tube with a .01 mf condenser and adjust the four i-f trimmers for maximum response.

Note: The grid of the 12SA7 tube is connected to the lower antenna lead. The antenna lead which is not connected may be made with a test clip to the upper stator lug. This lug is easily identified by the connection of the green lead to the loop.

Location of Coils and Trimmer Adjustments

The first i-f transformer is located on top of the chassis deck. The trimmers are available through holes in top of the can.

The second i-f transformer is located on the rear wall underneath the chassis. The trimmers are available through holes in the rear chassis wall.

The loop antenna trimmer is mounted on the loop assembly. The oscillator trimmer is mounted on the front section of the variable condenser.

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

R-f Alignment

Set the dial pointer at 150. Set the signal generator at 1500 kc and feed its output into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from and parallel to the receiver loop antenna. Advance the output of the signal generator until the signal is maximum. Adjust the output of the oscillator trimmer (on front section of variable condenser) then the antenna trimmer (on the loop assembly) for maximum response.

If the loop antenna has been replaced it may be necessary to adjust the antenna lead. The antenna lead is connected to the dial pointer at 60 and feed 600 kc to the antenna lead. A portion of the outside turn of the loop may be swung to either side of the center to give maximum response. Realign at 150.

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale.

Tube	Plate	Screen	Cathode	File
12SA7GT	90	90	0	12
12SK7GT	90	90	0	12
12SQ7GT	30	—	0	12
50L6GT	100	87	5.5	50

Voltage at 35Z5 cathode—115 volts.  
Voltage across pilot light—1.5 volts.

DESCRIPTION

TYPE: Single-band superheterodyne and phonograph.

FREQUENCY RANGE: 540-1630 kc.

NUMBER OF TUBES: Five.

TYPE OF TUBES:

- 1—12SA7GT, pentagrid oscillator-modulator
- 1—12SK7GT, first i-f amplifier
- 1—12SQ7GT, diode detector, a-f amplifier, a.v.c.
- 1—50L6GT, beam power output
- 1—35Z5GT, half-wave rectifier.

POWER SUPPLY: A.C. only.

VOLUME RATING: 105-125 volts.

POWER CONSUMPTION:

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

DIAL CORD REPLACEMENT

Use a turn and a half of cord, part number 79Z-867A. Draw the cord snugly around the condenser pulley and knot it to the dial cord. The dial cord should be drawn so that the spring may be hooked to the cord and pulley. The dial face should bear against the fibre washer when finally assembled.

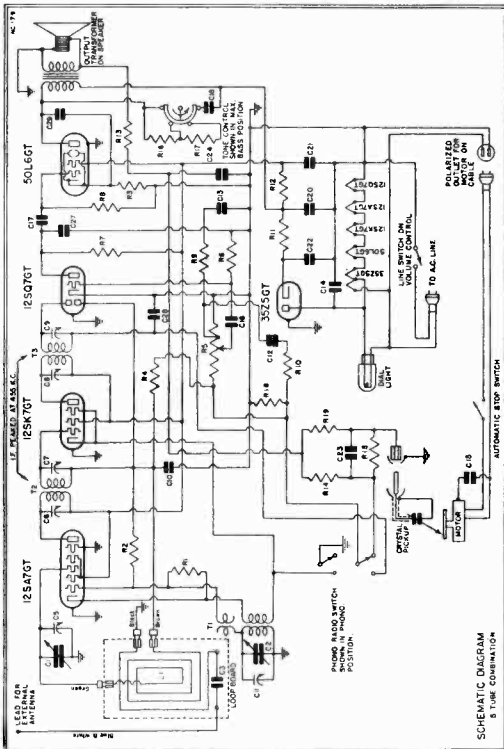
The color coding of the i-f transformer leads is as follows:

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

The receiver has a self-contained antenna and does not require additional antenna connections. For permanent home use, an additional antenna should be connected to the terminals 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.

The self-contained loop antenna has directional properties. It is recommended, therefore, once the station is tuned in, that the "Interceptor" knob (rear) be rotated back and forth, and left at the position where the desired station is received with maximum volume.

When replacing the chassis in the cabinet take precautions to keep any part of the dial and condenser assembly from touching the cabinet, otherwise interference will result.



REPLACEMENT PARTS LIST

When ordering, specify part numbers. List prices each, effective as of March 15, 1941. Subject to change without notice.

*Item No.	Part No.	DESCRIPTION	Price
L1	8SW-323A	Antenna loop assembly	\$1.95
T1	8DT-572	Oscillator coil	.45
T2	7QT-548	Double-tuned 455 kc first i-f transformer	1.00
T3	8ST-588C	Double-tuned 455 kc second i-f transformer	.85
R1	LR-60	20,000 ohm 1/2 watt carbon resistor	.16
R2	4XR-327	15 megohm 1/2 watt carbon resistor	.16
R3	3FR-293	1.40 ohm 1/2 watt wire-wound resistor	.16
R4	NNR-220	3 megohm 1/2 watt carbon resistor	.16
R5	90K-448	Volume control 2.5 megohm tapped at .5 megohm	.85
R7, R8, R10, R19	KR-56	100,000 ohm 1/2 watt carbon resistor	.16
R9	KR-54	1 megohm 1/2 watt carbon resistor	.16
R11	9IR-150	175 ohm 1 watt carbon resistor	.16
R12	8IR-424	750 ohm 1 watt wire-wound resistor	.16
R13	KR-53	50,000 ohm 1/2 watt carbon resistor	.16
R15	HR-42	2 megohm 1/2 watt carbon resistor	.16
R16	IR-43	1000 ohm 1/2 watt carbon resistor	.16
R17	7UR-394	2200 ohm 1/2 watt carbon resistor	.16
C1, C2	8SC-307A	Two-gang variable condenser	2.30
C3, C16	3HC-274	0.002 mf, 600 volt tubular condenser	.20
C4, C11		Trimmers, part of variable condenser	
C6, C7, C8, C9		Trimmers, part of i-f transformers	
C10	AC-6	0.1 mf, 200 volt tubular condenser	.20
C12	4KC-394A	0.0022 mf, mica condenser	.20
C13	NNC-199	0.001 mf, 600 volt tubular condenser	.20
C14	LC-64	0.05 mf, 400 volt tubular condenser	.20
C15	9IC-534	0.02 mf, 400 volt tubular condenser	.20
C17	3CC-102	0.15 mf, 200 volt tubular condenser	.20
C18	3CC-102	0.15 mf, 200 volt tubular condenser	.20
C20, C21, C22	8IC-513A	Multiple dry electrolytic condenser 150 volt, C20—40 mf, C21, C22—20 mf.	1.50
C23	JIC-133A	0.000025 mf, mica condenser (See Production Change No. 1)	.20
C24	BC-12	0.05 mf, 200 volt tubular condenser	.20
C27, C28	5LC-100A	0.00011 mf, mica condenser	.20
C29	3PC-106	0.005 mf, 600 volt tubular condenser	.20

EMERSON RADIO & PHONOGRAPH CORP. MODELS FP421, FP422  
Chassis FP

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohm-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given below.

Tube	Plate	Screen	Cathode	Fil.
12SA7GT	88	88	0	12
12SK7GT	88	88	0	12
12SQ7GT	30	—	0	12
50L6GT	82	88	5.6	50

ADJUSTMENTS

Voltage at 35Z5 cathode—120 volts.  
Voltage across speaker field—32 volts.  
Voltage across pilot light—4.5 volts.

An oscillator with frequencies of 455 and 1400 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.

Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7GT tube through a .01 mf condenser and adjust the four i-f trimmers for maximum response. The grid of the 12SA7GT tube may be reached by clipping the input lead to the stator lug of the antenna section.

R-f Alignment

Set the dial pointer at 140. Feed 1400 kc from the signal generator into a loop of wire about one foot in diameter. Hold this radiating loop about 12 inches away from and parallel to the receiver loop antenna. Advance the input to the loop until a satisfactory deflection is obtained on the output meter. Adjust first the oscillator trimmer then the antenna trimmer for maximum response. If the loop antenna has been replaced it may be necessary to retrace the loop inductance. With the dial set at 60 feed 600 kc to the antenna lead. A portion of the outside may be swung to either side of the center to give maximum response. Repeat the trimmer alignment at 140.

Location of Coils and Trimmer Adjustments

The first i-f transformer is mounted on top of the chassis deck next to the loop antenna. The trimmers are accessible through holes in the top of the can.

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

The trimmers for the antenna loop and the oscillator coil are located on the variable condenser. The front section is for the oscillator. The rear section is for the antenna loop. The oscillator coil is located beneath the chassis deck.

TYPE: Single-band superheterodyne.

FREQUENCY RANGE: 540-1630 kc.

NUMBER OF TUBES: Five.

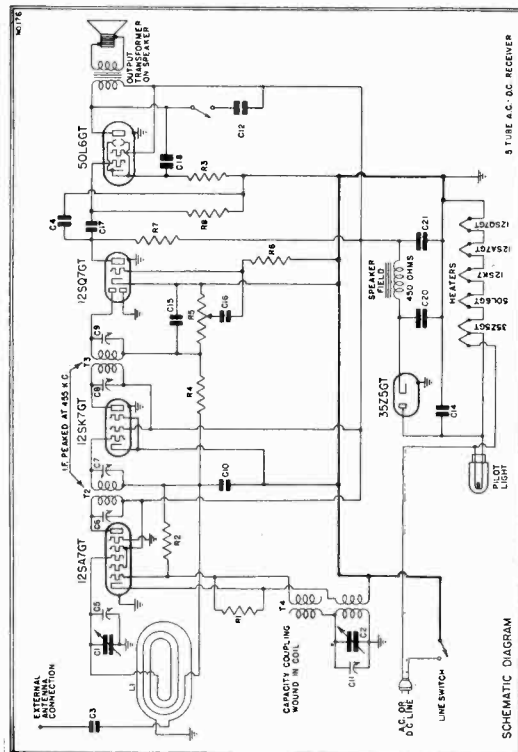
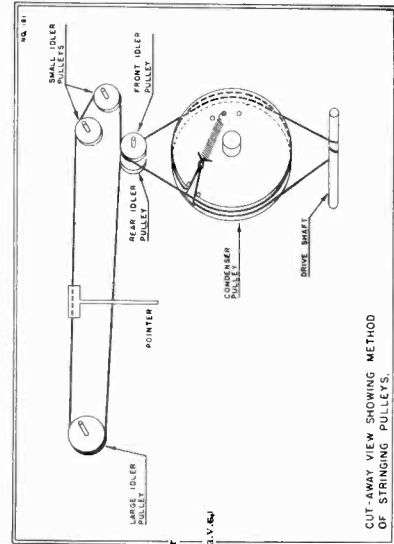
TYPE OF TUBES:

- 1—12SA7, pentagrid oscillator-modulator
- 1—12SK7, first 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.



SCHEMATIC DIAGRAM FOR MODEL FP

MODELS: FP-421 and FP-422  
CHASSIS MODEL: FP

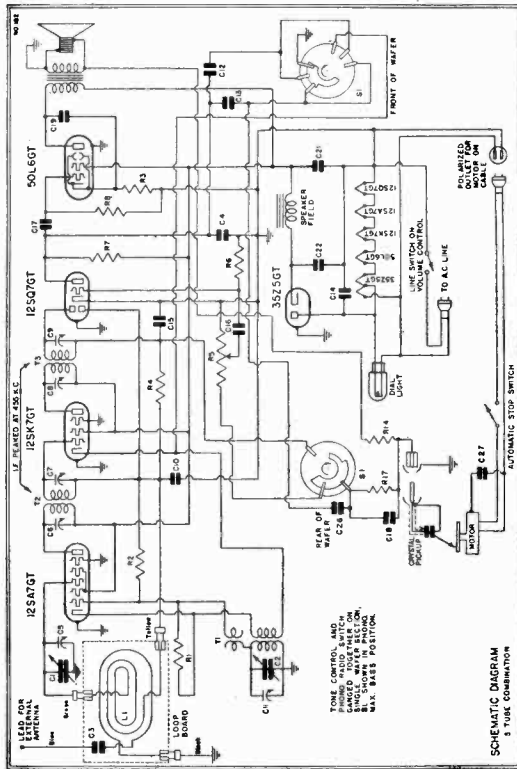
GENERAL NOTES

- If replacements are made or the wiring disturbed in the i-f section of the circuit, the receiver should be carefully realigned.
- In operating the receiver on d.c. it may be necessary to reverse the line plug for correct polarity.
- The color coding of the i-f transformer leads is as follows:  
Grid—green  
Plate—blue  
B plus—red  
Grid return—black
- 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.
- 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.

REPLACEMENT PARTS LIST

Item	Part No.	DESCRIPTION
L1	7BW-179	Loop antenna assembly
T4	9PT-620	Oscillator coil
T2	8CT-566B	Double-tuned 455 kc first i-f transformer
T3	9PT-621	Double-tuned 455 kc second i-f transformer
R1	LR-60	20,000 ohm 1/4 watt carbon resistor
R2, R6	4XR-327	15 megohm 1/4 watt carbon resistor
R3	3FR-293	140 ohm 1/2 watt wire-wound resistor
R4	NNR-220	3 megohm 1/4 watt carbon resistor
R5	9PR-447	Volume control, 5 megohm
R7, R8	KR-56	500,000 ohm 1/4 watt carbon resistor
C1, C2	9PC-533	Two-gang variable condenser
C3, C16	3HC-274	0.002 mf, 600 volt tubular condenser
C4	5AC-384	0.0002 mf, 600 volt tubular condenser
C5, C11		Trimmers, part of variable condenser
C6, C7, C8, C9		Trimmers, part of i-f transformers
C10	AC-6	0.1 mf, 200 volt tubular condenser
C12	9PC-544	0.04 mf, 200 volt tubular condenser





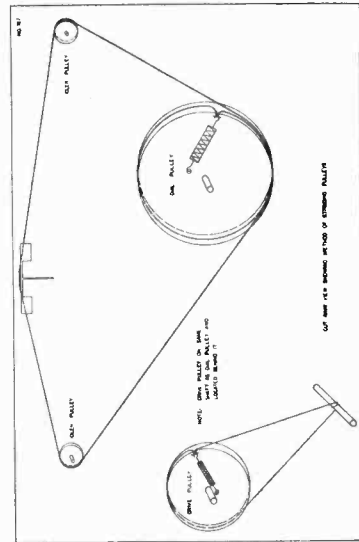
SCHEMATIC FOR MODEL FW  
5 TUBE COMBINATION

**REPLACEMENT PARTS LIST**

Item	Part No.	DESCRIPTION
L1	9WV-362	Antenna loop assembly
T1	9T-617	Oscillator coil
T2	8PT-586A	Double-tuned 455 kc first i-f transformer
T3	8PT-587	Double-tuned 455 kc second i-f transformer
R1	LR-60	20,000 ohm 1/4 watt carbon resistor
R2, R6	4XR-327	15 megohm 1/4 watt carbon resistor
R3	3FR-293	140 ohm 1/4 watt carbon resistor
R4, R17	NNR-220	3 megohm 1/4 watt carbon resistor
R5	9SR-432	Volume control, .5 megohm
R7, R8, R14	KR-56	500,000 ohm 1/4 watt carbon resistor
C1, C2	9SC-544	Two-gang variable condenser
C3, C16	3HC-274	0.002 mfd, 600 volt tubular condenser
C4	3RC-373	0.0004 mfd, 600 volt tubular condenser
C5, C11	C6, C7, C8, C9	Trimmers, part of i-f transformer
C10	AC-6	0.1 mfd, 200 volt tubular condenser
C12	9JC-541	0.0006 mfd, 600 volt tubular condenser
C13	9JC-542	0.0015 mfd, 600 volt tubular condenser
C14	LC-64	0.05 mfd, 400 volt tubular condenser
C15	5AC-384	0.0002 mfd, 600 volt tubular condenser
C17	LC-65	0.02 mfd, 400 volt tubular condenser
C18	IC-47	0.0005 mfd, mica condenser
C19	KC-38	0.01 mfd, 400 volt tubular condenser
C21, C22	6JC-426S	Dual 20 mfd, .50 volt dry electrolytic condenser
C26	4AC-395A	0.000026 mfd mica condenser
C27	9JC-534	0.05 mfd, 200 volt tubular condenser

**Location of Coils and Trimmer Adjustments**

- The first i-f transformer is mounted on top of the chassis deck next to the 12SA7 tube. The trimmers are accessible through holes in the top of the can.
- The second i-f transformer is mounted on top of the chassis next to the 12SK7 tube. The trimmers are accessible through holes in the top of the can.
- The trimmers for the antenna and oscillator coils are located on the speaker field. The trimmer on the front section is for the oscillator coil.
- The oscillator coil is located underneath the chassis. The loop antenna coil is located underneath the chassis.



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 plus—red

4. The receiver has a self-contained antenna and does not require additional antenna leads. For permanent connections, however, if it is desired to connect to the antenna 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.

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. Before turning the phono motor on check the a.c.-d.c. switch underneath the turntable on the motor board, making sure that it is in a position corresponding to the power supply.

**VOLTAGE ANALYSIS**

Readings should be taken with a 1,000 ohm-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and a signal generator at the indicated frequency. Measurements made with 117.5 volts a.c. will be lower than those given below.

Tube	Plate	Screen	Cathode	Fill
12SA7	88	88	0	12
12SK7	88	88	0	12
12SQ7	30	—	0	12
50L6	82	88	5.6	30

An oscillator with frequencies of 655 and 1400 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.

**ADJUSTMENTS**

**I-f Alignment**

Setting the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7 tube through a .01 mfd condenser and adjust the four i-f trimmers for maximum response.

Note: The grid of the 12SA7 tube is connected to the lower stator lug of the variable condenser. The control section may be made with a wax clip to the upper stator lug.

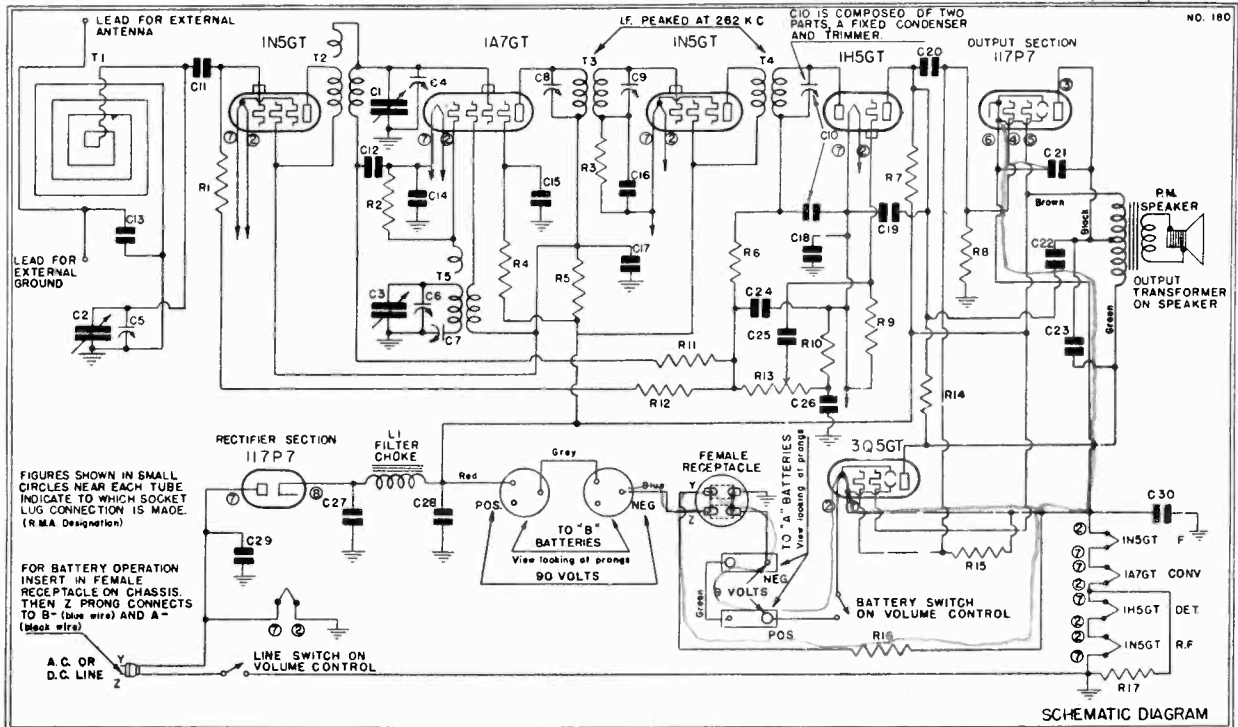
**R-f Alignment**

Set the dial pointer at 140. Set the signal generator at 1400 kc. Feed the signal generator through a .01 mfd condenser to the antenna lead of the antenna coil. Hold this radiating loop about 12 inches from and parallel to the receiver loop antenna. Advance the output of the signal generator until deflection is obtained on the output meter. Adjust first the trimmer on the antenna coil (on rear section of variable condenser) for maximum response.

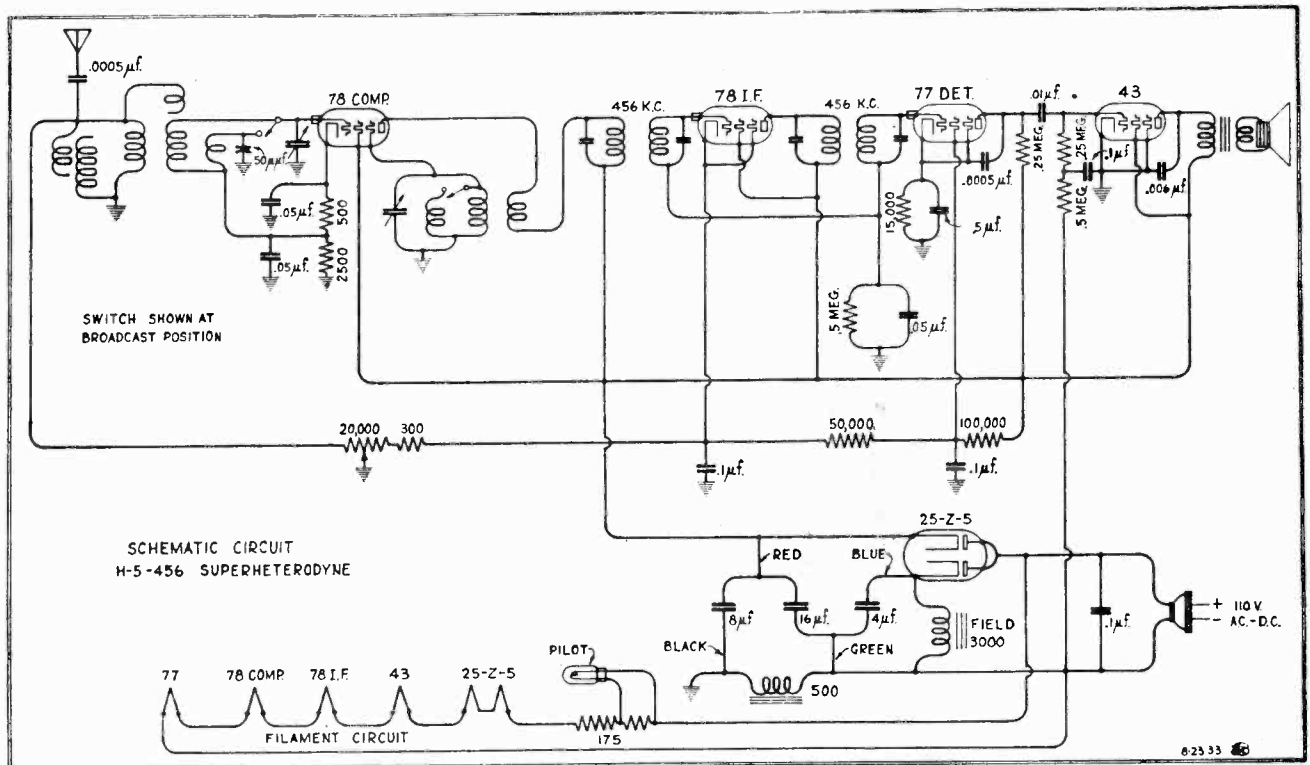
If the loop antenna has been replaced it may be necessary to adjust the loop inductance as follows: Align at 140. Set the pointer at 60 and feed 600 kc to the antenna lead. Advance the trimmer on the antenna coil for maximum response. Realign at 140.

EMERSON RADIO & PHONOGRAPH CORP.

MODELS FU424,  
FU427, FU428  
Chassis FU  
MODEL H-5 Universal  
Compact



SCHEMATIC DIAGRAM FOR MODEL FU



Universal Compact

Five Tube Superheterodyne - - Short-and-Long Wave - - 75 to 550 Meters  
Either A. C. or D. C. - - 110-120 Volts - - Adaptable for 220 Volts - - 25 to 60 Cycles

MODELS FU424, FU427, FU428  
Chassis FU

EMERSON RADIO & PHONOGRAPH CORP.

MODELS: FU-424, FU-427 and FU-428  
CHASSIS MODEL: FU

DESCRIPTION

TYPE: Universal (battery, a.c.-d.c.) superheterodyne.  
FREQUENCY RANGE: 340-1630 kc.  
NUMBER OF TUBES: Six.  
TYPE OF TUBES:  
1—1A7GT, oscillator-modulator  
1—1N5GT, r-f amplifier  
1—1N5GT, i-f amplifier  
1—6X4, a.c.-d.c. a-f amplifier  
1—30SGT, beam power output (battery operation)  
1—117P7, beam power output and half-wave rectifier (line operation).  
POWER SUPPLY: Battery, a.c. or d.c.  
VOLTAGE RATING: (Line operation) 105-125 volts, a.c.-d.c.  
POWER CONSUMPTION: (Line operation) 20 watts.  
CURRENT DRAIN: "A" battery 0.05 amp.  
(Battery operation) "B" battery 0.01 amp.

GENERAL NOTES

- The color coding of the i-f transformer leads is as follows:  
Grid return—black  
Plate—blue  
B plus—red
- The color coding of the battery cable is as follows:  
Red—B plus, 90 volts  
Yellow—A plus, 9 volts  
Blue—B minus  
Black—A minus
- If replacements are made in the r-f section of the circuit, the receiver should be carefully realigned.

BATTERY COMPLEMENT

The cabinet is designed to house the complete set of batteries.

Type	Number Required	Part No.	Remarks
4 1/2 volt "A"	2	746 (plug-in type)	Eveready
45 volt "B"	2	482 Minimax (plug-in type)	P83A or EM-83 (plug-in type)

ADJUSTMENTS

An oscillator with frequencies of 262, 1400 and 600 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.

Location of Coils and Trimmer Adjustments

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

The i-f transformer is mounted on top of the chassis. The first i-f transformer is on the loop, the second i-f transformer is mounted next to the dial.

The series paddler is located between the variable condenser and the shielded 1N5 tube.

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

The interstage coil is the shielded coil located beneath the chassis. Its trimmer is on the front section of the variable condenser.

If the loop antenna has been replaced, it may be necessary to adjust the loop inductance. Align at 140, S. A portion of the outside turn of the loop may then be swung to either side of the center to give maximum response. Realign at 140.

4. A.C.D.C. Operation: In portable models open the small door at the back of the cabinet. It is important that this small door be left open while operating the receiver on either a.c. or d.c. power. Take out the line cord, removing the plug from the receptacle at the rear of the chassis. Insert the plug in the wall outlet. If the power supply is d.c. and the receiver does not operate at first, remove the plug from the wall outlet, turn it half way around and re-insert it in the outlet, thus obtaining the proper polarity.

5. Battery Operation: Important: Remove the line plug from the electrical outlet. Insert the plug into the receptacle at the rear of the receiver. This is important since the receiver will draw current from batteries with the plug out of the receptacle. The loose portion of the cord can then be coiled and placed in the cabinet.

6. The receiver has a self-contained antenna and normally does not require additional antennas or ground connection. For permanent home installations, however, a location for removing from broadcasting stations an additional outside antenna should be used. The outside antenna and ground connections should be made to the two leads at the rear of the cabinet. See the illustration on last page.

7. 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.

The battery complement should be as follows:

Rayovac Part No.	Burgess Part No.	Remarks
P83A or EM-83 (plug-in type)	3G (plug-in type)	

I-f Alignment

Note: This receiver has an i-f frequency of 262 kc.

Swing variable condenser to minimum capacity position.

Feed 262 kc to the grid of the 1A7 tube through a 0.01 mf condenser. Adjust the three i-f trimmers for maximum response.

R-f Alignment

Set the dial pointer at 140. Feed 1400 kc from the signal generator into a loop of wire about one foot in diameter. Hold this radiating loop approximately one foot away from and parallel to the receiver loop, and advance the output of the signal generator until the output meter indicates maximum response. Adjust first the oscillator trimmer (middle section) the interstage and loop trimmers for maximum response. Move the dial pointer to 60 and feed 600 kc into the radiating loop and adjust the padding condenser (while rocking the variable condenser back and forth) for maximum response. Realign at 1400 kc.

If the loop antenna has been replaced, it may be necessary to adjust the loop inductance. Align at 140, S. A portion of the outside turn of the loop may then be swung to either side of the center to give maximum response. Realign at 140.

REPLACEMENT PARTS LIST

Item	Part No.	DESCRIPTION	PRICE
L1	7J7-324A	Filter choke	.85
T1	9UW-363	Antenna loop assembly	.80
T2	9UW-363A	Antenna loop assembly (Model 428)	.80
T3	9UT-627	Interstage coil	1.10
T4	9UT-628	Double-tuned 262 kc first i-f transformer	.90
T5	9UT-629	Single-tuned 262 kc second i-f transformer	.80
T6	9UT-626	Oscillator coil	.16
R1	HR-42	2 megohm 1/4 watt carbon resistor	.16
R2	1R-61	200,000 ohm 1/4 watt carbon resistor	.16
R3	3R8-274	5 megohm 1/4 watt carbon resistor	.16
R4	ZFR-196	30,000 ohm 1/4 watt carbon resistor	.16
R5	PR-79	1,000 ohm 1/4 watt carbon resistor	.16
R6	KR-36	47,000 ohm 1/4 watt carbon resistor (part of T4)	.16
R9	3R8-275	500,000 ohm 1/4 watt carbon resistor	.16
R10	BBR-113	10 megohm 1/4 watt carbon resistor	.16
R14, R15	BBR-113	4,000 ohm 1/4 watt carbon resistor	.16
R16	NNR-220	3 megohm 1/4 watt carbon resistor	.16
R17	9UR-451	Volume control .5 megohm with double-pole switch	.90
C1	8AR-395	1,200 ohm 1/2 watt carbon resistor	.16
C2	3UR-282	860 ohm 1/2 watt carbon resistor	.16
C3, C4, C5, C6	9UC-516	Three-stage variable condenser	3.55
C7	2NC-231E	Part of variable condenser	.30
C8, C9, C10		Trimmers, part of i-f transformer	.20
C11, C12	BC-12	0.05 mf, 200 volt tubular condenser	.20
C13, C14, C15	3FC-274	0.002 mf, 600 volt condenser	.20
C16, C17	5AC-388	0.25 mf, 100 volt tubular condenser	.20
C18, C19	FC-29	0.05 mf, 200 volt tubular condenser	.20
C20	BC-12	0.05 mf, 200 volt tubular condenser	.20
C21	3RC-373	0.0004 mf, 600 volt tubular condenser	.20
C22	LC-65	0.02 mf, 400 volt tubular condenser	.20
C23	KC-38	0.01 mf, 400 volt tubular condenser	.20
C24	4NC-393A	0.00006 mf, mica condenser	.20
C25	5LC-410A	0.00011 mf, mica condenser	.20
C26	5AC-388	0.25 mf, 100 volt tubular condenser	.20
C27, C28	6JC-26T	Dial 20 mf, 150 volt dry electrolytic condenser	.90
C29	LC-64	0.05 mf, 400 volt tubular condenser	.20
C30	7FC-451	40 mf, 25 volt dry electrolytic condenser	.80
	9US-568	5" permanent magnet dynamic speaker (Model 424)	4.75
	7JS-443	6 1/2" permanent magnet dynamic speaker (Model 428)	5.75
	9LH-87A	Drive shaft and pulley	.10
	7BZ-467A	Drive coil	.02
	9CE-45	Dial crystal	.20
	9CD-127B	Dial pointer (Models 424, 427)	.15
	9CD-127N	Dial pointer (Model 428)	.15
	9UD-137-T	Dial face	.35

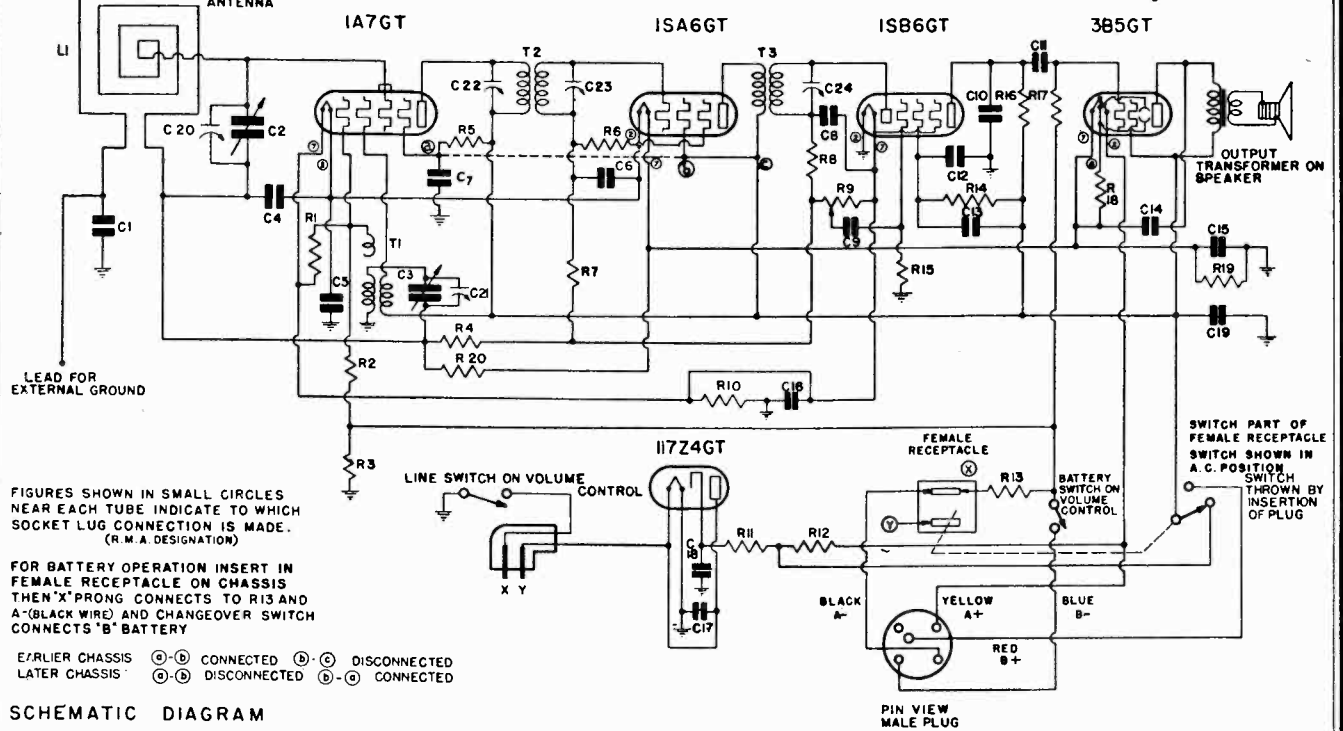
VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed are from point indicated to chassis with volume control turned on full and no signal. The battery voltages for these readings were: "A" 9.0 volts, "B" 90 volts.

Tube	Plate	Screen	Osc. Plate	Fil.
1A7GT	88	50	84	1.5
1N5GT, r-f	88	88	84	1.5
1N5GT, i-f	88	88	88	1.5
30SGT	88	88	88	1.5
30SGT	85	85	85	1.5
117P7 (line operation only)	86	95	95	1.0
117P7 rectifier cathode (Pin No. 8)	86	95	95	1.0
117P7 may be substituted for the 117P7				1.17

DIAL PARTS

EMERSON RADIO & PHONOGRAPH CORP. MODELS FV426, FV433, Chassis FV



VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given below.

Tube	Plate	Screen	Osc. Plate	Fil.
1A7GT	69	46	69	1.4
1SA6GT	69	70	—	1.4
1SB6GT	9	5	—	1.4
3B5GT	67	69	—	2.5

Voltage at 117Z4GT cathode—125 volts.  
Voltage drop across R11, R12—117 volts.

DESCRIPTION

TYPE: Universal (battery, a.c.-d.c.) superheterodyne.

FREQUENCY RANGE: 540-1600 kc.

NUMBER OF TUBES: Five.

TYPE OF TUBES:

- 1—1A7GT, oscillator-modulator
- 1—1SA6GT, i-f amplifier
- 1—1SB6GT, 2nd detector, a.v.c., a-f amplifier
- 1—3B5GT, beam power output (battery operation)
- 1—117Z4, half-wave rectifier (line operation).

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

VOLTAGE RATING: (Line operation) 105-125 volts, a.c.-d.c.

POWER CONSUMPTION: (Line operation) 13 watts.

CURRENT DRAIN:

- (Battery operation) "A" battery .02 amp.
- "B" battery 0.007 amp.

GENERAL NOTES

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

2. The color coding of the battery cable is as follows:  
Red—B plus, 67.5 volts      Yellow—A plus, 7.5 volts  
Blue—B minus                      Black—A minus
3. If replacements are made in the r-f section of the circuit, the receiver should be carefully re-aligned.
4. Battery Operation: Important: Remove the line plug from the electrical outlet. Insert the plug into the receptacle at the bottom of the receiver. This is important since the receiver will not operate from batteries with the plug out of the receptacle. The loose portion of the cord can then be coiled and placed in the cabinet.
5. 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 should be used. The outside antenna and ground connections should be made to the two leads at the rear of the cabinet.
6. 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.

MODELS FV426, FV433  
Chassis FV

EMERSON RADIO & PHONOGRAPH CORP.

REPLACEMENT PARTS LIST

Specify part numbers when ordering. List price each, effective as of December 15, 1941. (Subject to change without notice.)

*Item	Part No.	DESCRIPTION	PRICE
L1	9VW-355	Loop antenna .....	\$ .90
T1	9VT-360	Oscillator coil .....	.50
T2	9VT-668	Double-tuned 455 kc first i-f transformer.....	1.45
T3	9VT-632	Single-tuned 455 kc second i-f transformer.....	1.25
R1	10TR-485	220,000 ohm 1/4 watt carbon resistor.....	.16
R2, R16	KR-57	1 megohm 1/4 watt carbon resistor.....	.16
R3	9ZR-478	470,000 ohm 1/4 watt carbon resistor.....	.16
R4, R6, R17	9ZR-480	3.3 megohm 1/4 watt carbon resistor.....	.16
R5	9ZR-477	22,000 ohm 1/4 watt carbon resistor.....	.16
R7, R20	3RR-275	10 megohm 1/4 watt carbon resistor.....	.16
R8	10TR-486	47,000 ohm 1/4 watt carbon resistor.....	.16
R9	9VR-453	Volume control with line switch 1.5 megohm.....	.90
R10	4CR-321	290 ohm 1/2 watt wire-wound molded resistor.....	.16
R11, R12	9VR-462	Candohm ballast resistor: R11—960 ohms, 3.5 watts; R12—1375 ohms, 3.6 watts.....	.40
R13	7VR-488	290 ohm 1/2 watt metallized filament, ceramic coated resistor.....	.16
R14, R15	10TR-487	4.7 megohm 1/4 watt carbon resistor.....	.16
R18	3VR-271	510 ohm 1 watt wire-wound molded resistor.....	.16
R19	9VR-463	800 ohm 1 watt wire-wound molded resistor.....	.16
C1, C9, C11, C14	3HC-274	0.002 mf, 600 volt tubular condenser.....	.20
C2, C3		Two-gang variable condenser.....	2.90
C4, C16	AC-6	0.1 mf, 200 volt tubular condenser.....	.20
C5	5AC-388A	0.25 mf, 100 volt tubular condenser.....	.20
C6	KC-58	0.01 mf, 400 volt tubular condenser.....	.20
C7	9VC-566	5. mf, 100 volt dry electrolytic condenser.....	.50
C8	4XC-394A	0.0002 mf mica condenser.....	.20
C10	4XC-393A	0.00006 mf mica condenser.....	.20
C12	ZZC-211	0.03 mf, 200 volt tubular condenser.....	.20
C13	3VC-324	0.003 mf, 600 volt tubular condenser.....	.20
C15	9VC-560	40 mf, 40 volt dry electrolytic condenser.....	.55
C17	LC-64	0.05 mf, 400 volt tubular condenser.....	.20
C18, C19	8TC-529C	Dual 40 mf, 150 volt dry electrolytic condenser.....	1.00
+C20, C21		Trimmer condenser, part of variable condenser.	
+C22, C23, C24		Trimmer condenser, part of i-f transformers.	
	9VS-562	4" P.M. dynamic speaker.....	6.00

\*Item number locates the article on the schematic diagram.

†Not supplied separately.

Location of Coils and Trimmer Adjustments

The first i-f transformer is mounted on top of the chassis deck next to 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 volume control and the speaker. The trimmer is accessible through a hole in the top of the can.

The trimmers for the antenna and oscillator coils are located on the variable condenser. The trimmer on the lower 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

Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 1A7GT tube through a .01 mf condenser and adjust the three i-f trimmers for maximum response.

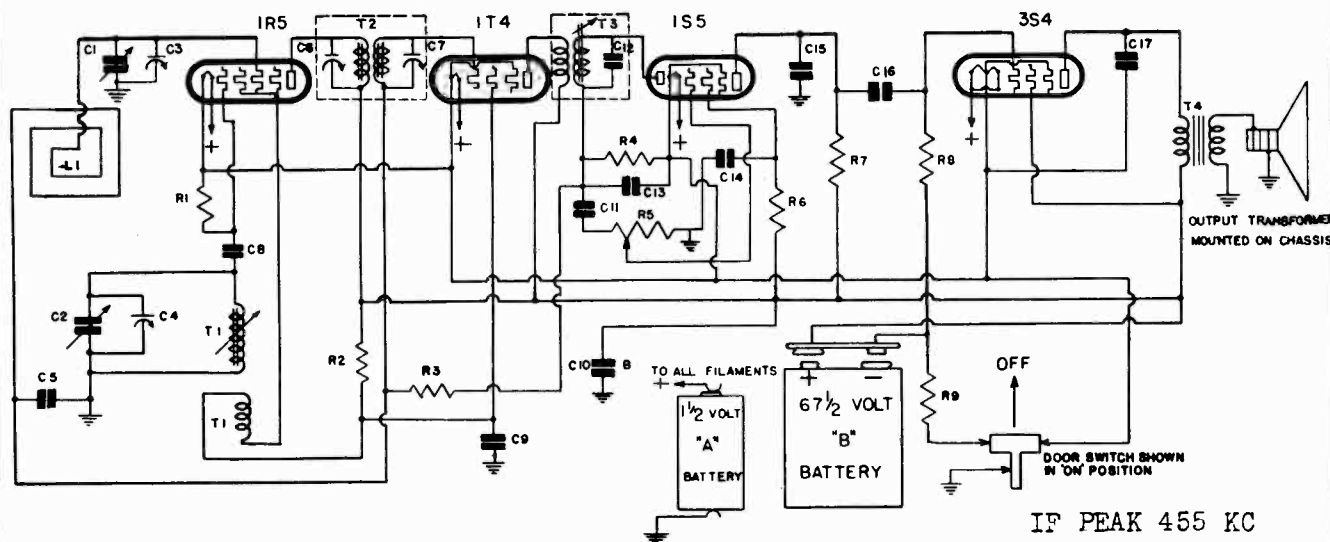
R-f Alignment

Set the dial pointer at 140. Set the signal generator at 1400 kc and feed its output into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from and parallel to the receiver loop antenna. Advance the output of the signal generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (on front section of variable condenser) then the antenna trimmer (on rear section of variable condenser) for maximum response.

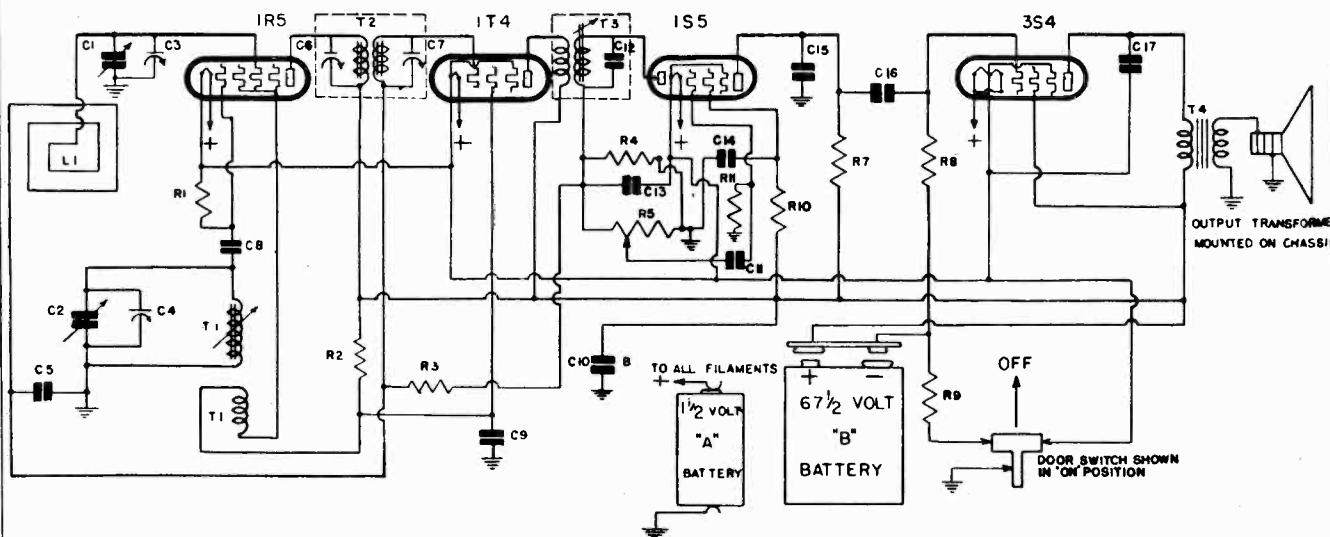
If the loop antenna has been replaced it may be necessary to adjust the loop inductance as follows: Align at 140. Set the pointer at 60 and feed 600 kc to the antenna lead. A portion of the outside turn of the loop may be swung to either side of the center to give maximum response. Realign at 140.

EMERSON RADIO & PHONOGRAPH CORP.

MODEL FR432  
Chassis FR  
Early, Late



FR SCHEMATIC DIAGRAM FOR CHASSIS BEARING SERIAL NUMBERS BELOW 4,818,700



FR SCHEMATIC DIAGRAM FOR CHASSIS BEARING SERIAL NUMBERS ABOVE 4,818,700

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed are from point indicated to chassis with volume control turned on full and no signal. The battery voltages for these readings were: "A" 1.5 volts, "B" 67.5 volts. All readings except filaments were taken on the 250 volt scale.

Tube	Plate	Screen	Fil.
1R5	57	35	1.5
1T4	57	35	1.5
1S5	*12	*3	1.5
3S4	55	60	1.5

Bias for the 3S4 tube is obtained across the resistor R9. The voltage drop across this resistor should be 7.5 volts.

\*The operating voltage of this tube cannot be measured because of the high resistor in the circuit.

MODEL FR432, Chassis FR  
Early, Late

EMERSON RADIO &amp; PHONOGRAPH CORP.

## REPLACEMENT PARTS LIST

When ordering state part number. List price each as of June 15, 1941. (Subject to change without notice.)

*Item	Part No.	DESCRIPTION	PRICE
L1	9RW-350A	Loop antenna .....	\$ .60
T1	9RT-622	Oscillator coil .....	.75
T2	9RT-623	Double-tuned 455 kc first i-f transformer.....	1.70
T3	9RT-624	Single-tuned 455 kc second i-f transformer.....	1.40
T4	9RT-625	Output transformer .....	.90
R1	KR-54	100,000 ohm $\frac{1}{4}$ watt carbon resistor.....	.16
R2	KR-63	15,000 ohm $\frac{1}{4}$ watt carbon resistor.....	.16
R3, R6, R8	NNR-220	3 megohm $\frac{1}{4}$ watt carbon resistor.....	.16
R4, R7	KR-57	1 megohm $\frac{1}{4}$ watt carbon resistor.....	.16
R5	9RR-449	Volume control, 3 megohm.....	.65
R9	9RR-458	980 ohm $\frac{1}{2}$ watt wire-wound resistor.....	.16
R10		5 megohm $\frac{1}{4}$ watt carbon resistor.....	.16
C1, C2	9RC-535G	Two-gang variable condenser.....	2.50
†C3, C4		Trimmers, part of variable condenser.	
C5, C9, C14	9RC-537	0.02 mf, 100 volt tubular condenser.....	.12
†C6, C7		Trimmers, part of first i-f transformer.	
C8	9RC-539	0.00005 mf, ceramic condenser.....	.20
C10	9RC-536	8 mfd, 100 volt dry electrolytic condenser.....	.50
C11, C17	9RC-552	0.003 mf, 150 volt tubular condenser.....	.12
†C12		Part of second i-f transformer.	
C13, C15	9RC-540	0.0001 mf, ceramic condenser.....	.20
C16	9RC-538	0.001 mf, 100 volt flat tubular condenser.....	.12
	9RS-553	Permanent magnet dynamic speaker.....	3.75

\*Item number locates the article on the schematic diagram.

†Not supplied separately.

## ADJUSTMENTS

An oscillator with frequencies of 455 and 1600 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.

## Location of Coils and Trimmer Adjustments

The first i-f transformer is located next to the output transformer.

The trimmers are accessible through holes in 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.

The oscillator coil is located next to the first i-f transformer. 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. Trimmer for the loop is located on the larger section of the variable condenser.

## I-f Alignment

Swing variable condenser to minimum capacity position.

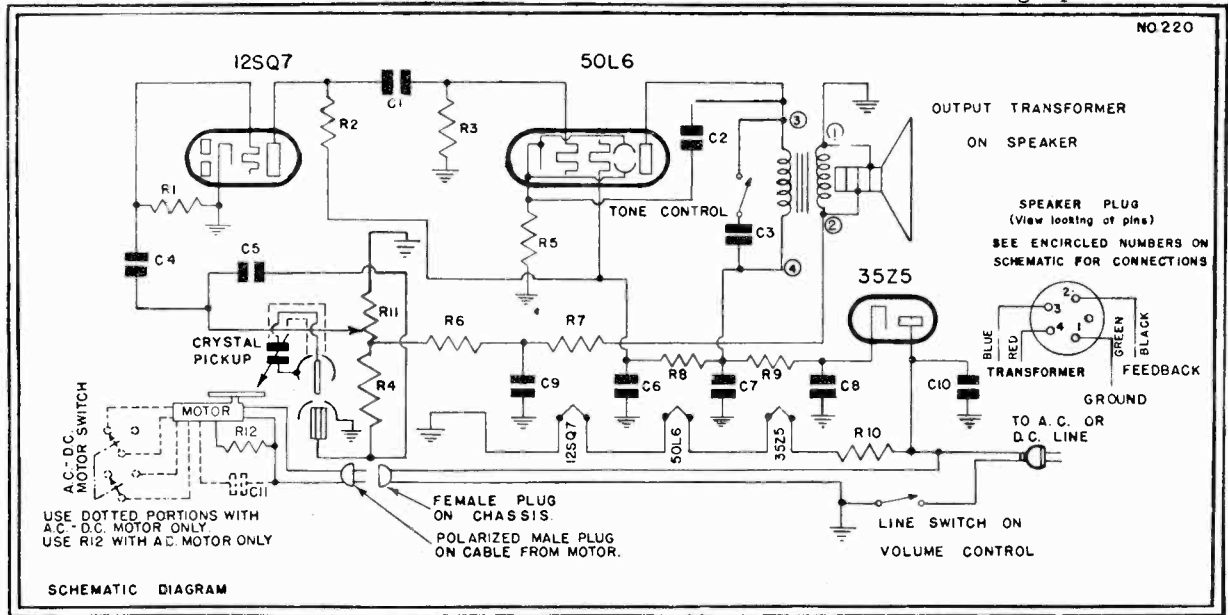
Feed 455 kc to the grid of the 1R5 tube through a 0.01 mf condenser. Adjust the three i-f trimmer screws for maximum response. (Clip the i-f input to the stator lug of the larger variable condenser section.)

## R-f Alignment

Set the dial pointer at 160. Set the signal generator at 1600 kc and feed its output into a loop of wire about one foot in diameter. Hold this radiating loop about one foot away from and parallel to the receiver loop antenna. Advance the output of the generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (smaller section of variable condenser) then the antenna trimmer (larger section of variable condenser) for maximum response. Set the dial pointer at 60. Feed 600 kc and rock the variable condenser while adjusting the oscillator core adjustment for maximum response. Return to 1600 and check alignment. If re-adjustment is necessary return to 600 and repeat entire procedure.

EMERSON RADIO & PHONOGRAPH CORP.

MODELS FY434, Chas. FY  
FY2-434, Chassis FY2  
Phonograph



REPLACEMENT PARTS LIST

When ordering, specify part numbers. List price each effective as of Dec. 1, 1941. Subject to change without notice.

*Item	Part No.	DESCRIPTION	PRICE
R1	4XR-327	15 megohm 1/4 watt carbon resistor.....	\$.16
R2, R3	KR-56	500,000 ohm 1/4 watt carbon resistor.....	.16
R4, R6	KR-57	1 megohm 1/4 watt carbon resistor.....	.16
R7	KR-53	50,000 ohm 1/4 watt carbon resistor.....	.16
R8	KR-51	2,500 ohm 1/4 watt carbon resistor.....	.16
R9	9JR-450	175 ohm 1 watt carbon resistor.....	.16
R10	9YR-460	133 ohm 3 watt wire-wound resistor.....	.25
R11	9YR-459	Volume control 2.5 megohm.....	.80
R12	KR-55	250,000 ohm 1/4 watt carbon resistor (FY).....	.16
C1, C2	LC-65	0.02 mf, 400 volt tubular condenser.....	.20
C3	BC-12	0.05 mf, 200 volt tubular condenser.....	.20
C4	3HC-274	0.002 mf, 600 volt tubular condenser.....	.20
C5	IC-51A	0.00001 mf, mica condenser.....	.20
C6, C7, C8	8JC-513B	Multiple dry electrolytic condenser, 150 volt; C6, C8—20 mf, C7—40 mf.....	.95
C9	FC-29	0.02 mf, 200 volt tubular condenser.....	.20
C10	LC-64	0.05 mf, 200 volt tubular condenser (FY2).....	.20
C11	9JC-534	0.05 mf, 200 volt tubular condenser.....	.20

\*Item number locates the article on the schematic diagram.

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage: for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given below.

Tube	Plate	Screen	Cathode	Fil.
12SQ7GT	35	—	0	12
50L6GT	120	115	6.0	50

Voltage at 35Z5 cathode—135 volts.

TYPE OF TUBES:

- 1—12SQ7, first audio
- 1—50L6, beam power output
- 1—35Z5, half-wave rectifier.

POWER CONSUMPTION:

- 45 watts (FY)
- 65 watts (FY2)

POWER SUPPLY:

- a.c. (FY)
- a.c.-d.c. (FY2)

VOLTAGE RATING: 105-125 volts.

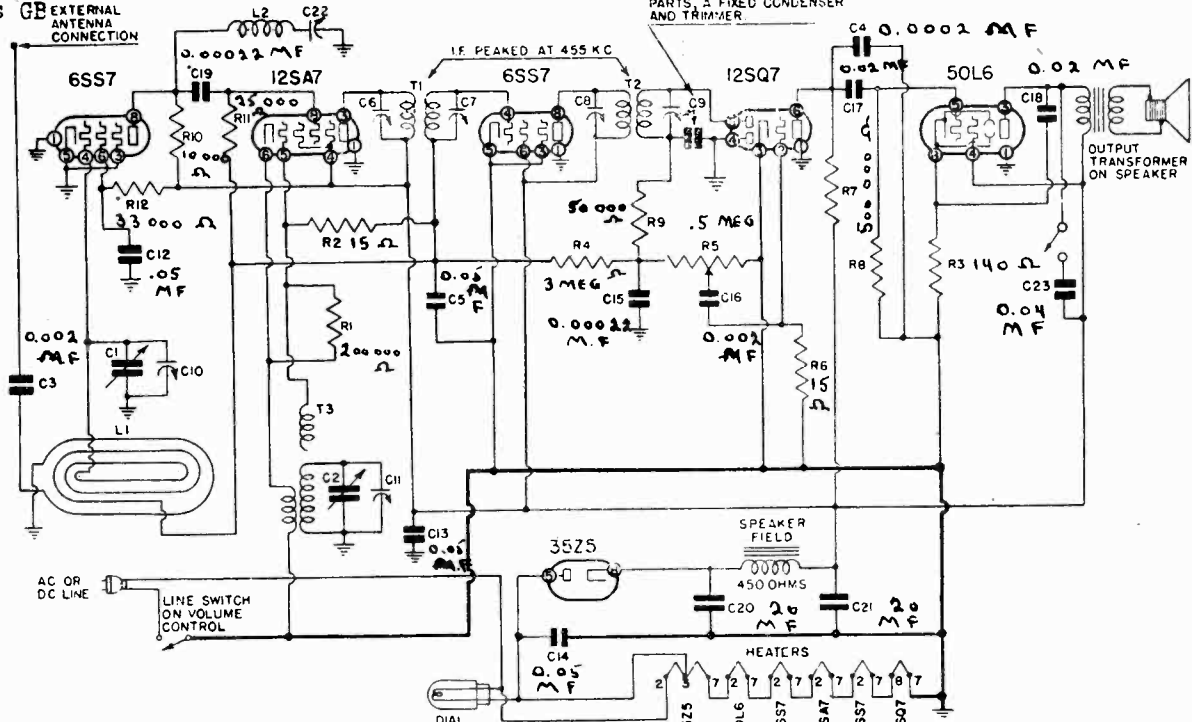


MODELS GB439, GB441

EMERSON RADIO & PHONOGRAPH CORP.

Chassis GB EXTERNAL ANTENNA CONNECTION

C9 IS COMPOSED OF TWO PARTS, A FIXED CONDENSER AND TRIMMER



VOLTAGE ANALYSIS

Voltage at 35Z5GT cathode—115 volts.

Tube	Plate	Screen	Cathode	Fil.
6SS7 (r-f)	50	57	0	6.0
12SA7	87	89	0	12.0
6SS7	88	89	0	6.0
12SQ7	30	—	0	12.0
50L6GT	82	89	5.3	50.0

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given below.

Location of Coils and Trimmer Adjustments

The first i-f transformer is mounted on top of the chassis deck next to the loop antenna. 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 50L6 tube and the speaker. The trimmers are accessible through holes in the top of the can.

The trimmers for the antenna and oscillator coils 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 and Wave-trap Alignment

Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7 tube through a .01 mf condenser and adjust the four i-f trimmers for maximum response.

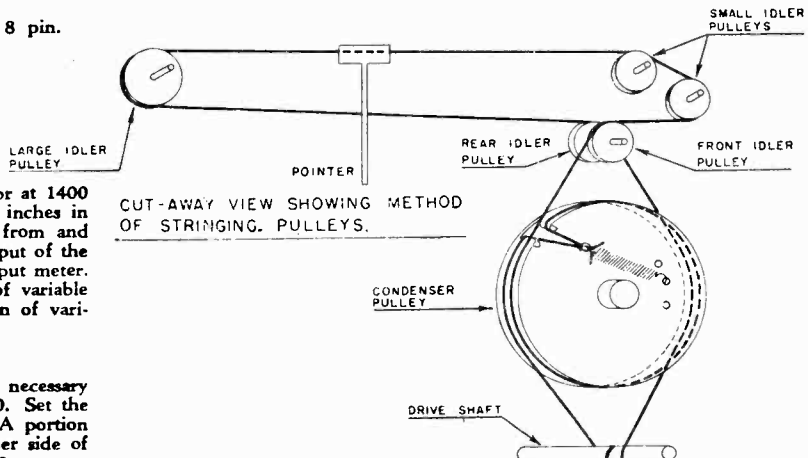
Feed 455 kc to the external antenna lead and adjust the wave-trap for minimum response.

Note: The grid of the 12SA7 tube is the No. 8 pin.

R-f Alignment

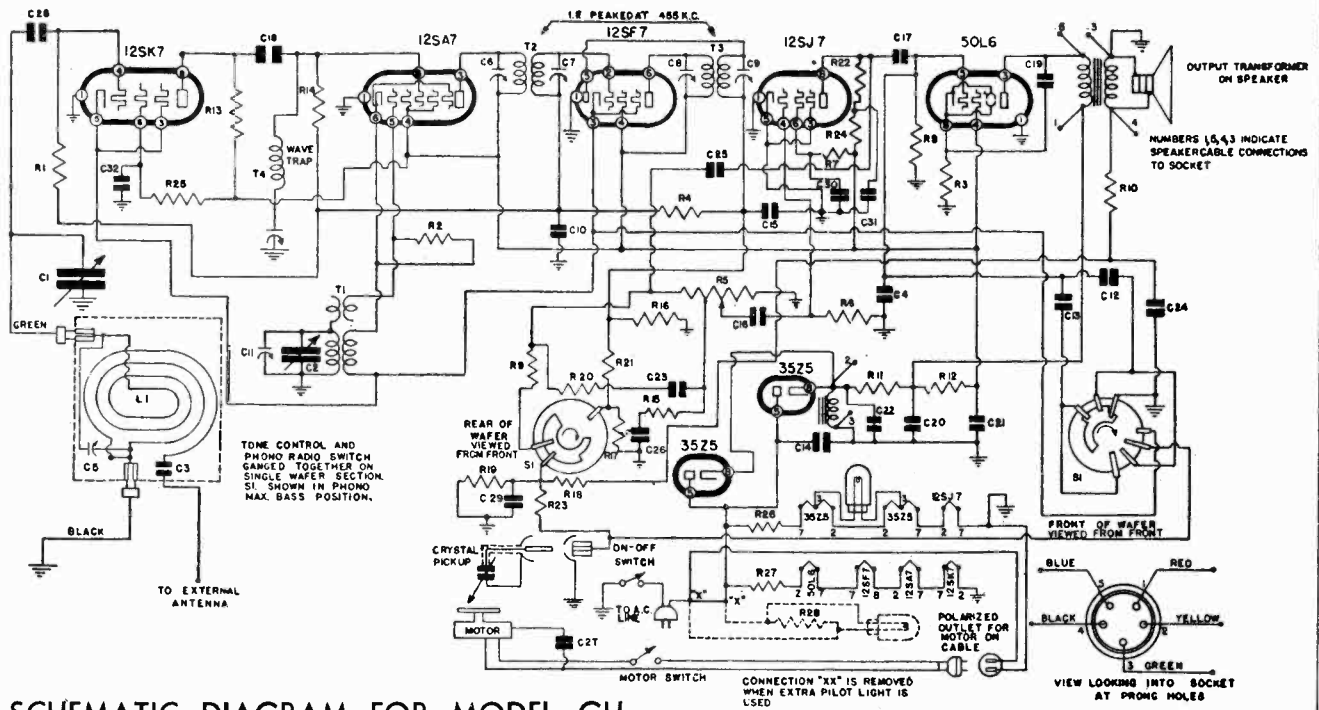
Set the dial pointer at 140. Set the signal generator at 1400 kc and feed its output into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from and parallel to the receiver loop antenna. Advance the output of the signal generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (on front section of variable condenser) then the antenna trimmer (on rear section of variable condenser) for maximum response.

If the loop antenna has been replaced it may be necessary to adjust the loop inductance as follows. Align at 140. Set the pointer at 60 and feed 600 kc to the antenna lead. A portion of the outside turn of the loop may be swung to either side of the center to give maximum response. Realign at 140.



EMERSON RADIO & PHONOGRAPH CORP.

MODELS GH437, GH447,  
Chassis GH; GH2-447  
Chassis GH2



**SCHEMATIC DIAGRAM FOR MODEL GH**

**POWER SUPPLY:** a.c. only, 60 cycle (GH)  
a.c.-d.c. (GH2)

**TYPE OF TUBES:**

- 1-12SA7, pentagrid oscillator-modulator
- 1-12SK7, r-f amplifier
- 1-12SF7, diode detector, i-f amplifier, a.v.c.
- 1-12SJ7, a-f amplifier
- 1-50L6GT, beam power output
- 2-35Z5GT, half-wave rectifier.

**VOLTAGE RATING:** 105-125 volts.

**POWER CONSUMPTION:**

- 30 watts for the receiver.
- 20 watts for a.c. phono motor.
- 30 watts for a.c.-d.c. phono motor.

**ADJUSTMENTS**

An oscillator with frequencies of 455 and 1400 kc is required. **I-f and Wave-trap Alignment**

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.

Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7 tube through a .01 mf condenser and adjust the four i-f trimmers for maximum response.

Feed 455 kc to the external antenna lead and adjust the wave-trap for minimum response.

**Location of Coils and Trimmer Adjustments**

Note: The grid of the 12SA7 tube is the No. 8 pin.

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

**R-f Alignment**

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

The trimmer for the oscillator coil is located on the variable condenser.

Set the dial pointer at 140. Set the signal generator at 1400 kc and feed its output into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from and parallel to the receiver loop antenna. Advance the output of the signal generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (on front section of variable condenser) then the antenna trimmer (on rear section of variable condenser) for maximum response.

The antenna trimmer is mounted on the loop.

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

If the loop antenna has been replaced it may be necessary to adjust the loop inductance as follows: Align at 140. Set the pointer at 60 and feed 600 kc to the antenna lead. A portion of the outside turn of the loop may be swung to either side of the center to give maximum response. Realign at 140.

MODELS GH437, GH447,  
Chassis GH; GR2-447  
Chassis GH2

# EMERSON RADIO & PHONOGRAPH CORP.

## REPLACEMENT PARTS LIST

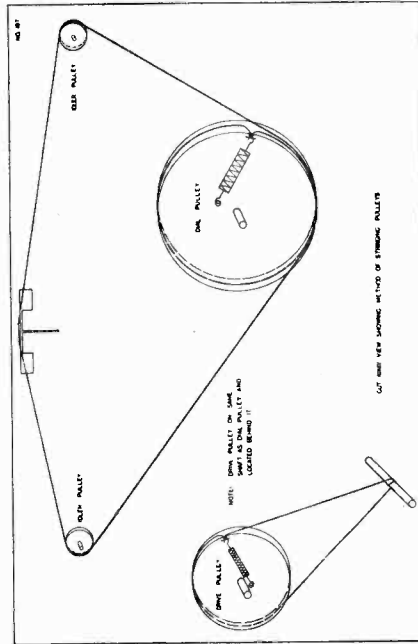
When ordering, specify part numbers. List price each, effective as of December 1, 1941. Subject to change without notice.

*Item	Part No.	DESCRIPTION	PRICE
L1	10HW-385	Loop antenna assembly.....	\$1.45
T1	10HT-642	Oscillator coil.....	.60
T2	8LT-371	455 kc first i-f transformer.....	1.20
T3	10HT-655	455 kc second i-f transformer.....	1.20
T4	9LT-619	455 kc wave-trap.....	.65
R1, R7, R18, R19	KR-57	1 megohm 3/4 watt carbon resistor.....	.16
R2	LR-60	20,000 ohm 1/2 watt carbon resistor.....	.16
R3	3FR-293	140 ohm 1/2 watt wire-wound resistor.....	.16
R4	NNR-220	3 megohm 1/2 watt carbon resistor.....	.16
R5	9JR-445	Volume control 2.5 meg.....	.90
R6	3RR-275	10 megohm 1/2 watt carbon resistor.....	.16
R8, R16, R17, R20	KR-56	500,000 ohm 1/4 watt carbon resistor.....	.16
R9, R10, R24	KR-53	50,000 ohm 1/4 watt carbon resistor.....	.16
R11	9JR-450	175 ohm 1 watt carbon resistor.....	.16
R12	8JR-424	750 ohm 1 watt wire-wound resistor.....	.16
R13	LR-65	10,000 ohm 1/2 watt carbon resistor.....	.16
R14	OR-73	25,000 ohm 1/2 watt carbon resistor.....	.16
R15, R23	KR-54	100,000 ohm 1/4 watt carbon resistor.....	.16
R21, R22	KR-55	100,000 ohm 1/4 watt carbon resistor.....	.16
R25	ZZR-196	30,000 ohm 1/2 watt carbon resistor.....	.16
R26, R27, R28	10HR-468	Badstar resistor: R26—233 ohm; 6 watt; R27—190 ohm, 5 watt; R28—250 ohm, 3 watt.....	.55
C1, C2	10HC-568	Two-gang variable condenser.....	3.35
C3, C16	3FC-274	0.002 mf, 600 volt tubular condenser.....	.20
C4	3RC-373	0.0004 mf, 600 volt tubular condenser.....	.20
†C5		Trimmer, part of loop assembly.....	.20
†C6, C7, C8, C9		Trimmer, part of variable condenser.....	.20
C10	AC-6	0.1 mf, 200 volt tubular condenser.....	.20
C12	9JC-341	0.0006 mf, 600 volt tubular condenser.....	.20
C13	9JC-342	0.0015 mf, 600 volt tubular condenser.....	.20
C14	LC-64	0.05 mf, 400 volt tubular condenser.....	.20
C15	5AC-384	0.0002 mf, 600 volt tubular condenser.....	.20
C17	LC-65	0.02 mf, 400 volt tubular condenser.....	.20
C18	5LC-410A	0.0011 mf, mica condenser.....	.20
C19	8WC-524	0.05 mf, 400 volt tubular condenser.....	.20
C20, C21, C22	10HC-569	Multiple dry electrolytic condenser: 150 volt; C20—20 mf; C21—80 mf; C22—40 mf.....	1.25
C23	AC-7A	0.00025 mf, mica condenser.....	.20
BC-12		0.05 mf, 200 volt tubular condenser.....	.20
4HC-395A		0.00026 mf, mica condenser.....	.20
4NC-199		0.001 mf, 600 volt tubular condenser.....	.20
4XC-394A		0.00022 mf, mica condenser.....	.20
4VC-371A		0.0003 mf, mica condenser.....	.20
10HS-592		6 1/2" dynamic speaker (speaker field 3000 ohms).....	7.10
10HS-586		Phonoradio and tone control switch.....	.90
9JPM-98		Phono motor (Model 437).....	12.00
10HPM-105		Phono motor (Model 447, single post).....	11.25
10HPM-101		Phono motor (Model 447).....	7.50
10HPM-100		Phono motor (Model GH2-447).....	39.00
10HPM-10V		Crystal pickup (Model 437).....	7.75
9JC-555		Crystal pickup (Model 447).....	7.75
10HC-592		Crystal pickup (Model 447).....	6.00
10HC-593		Crystal pickup (Model GH2-447).....	6.00
10HC-594		Crystal pickup (Model GH2-447).....	6.00

\*Item number locates the article on the schematic diagram.  
†Not supplied separately.

Readings should be taken with a 1000 ohms-per-volt meter

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, A.C. All readings except heaters and cathodes were taken on 280 volt scale. Measurements made with 117.5 D.C. will be given lower than those given below.



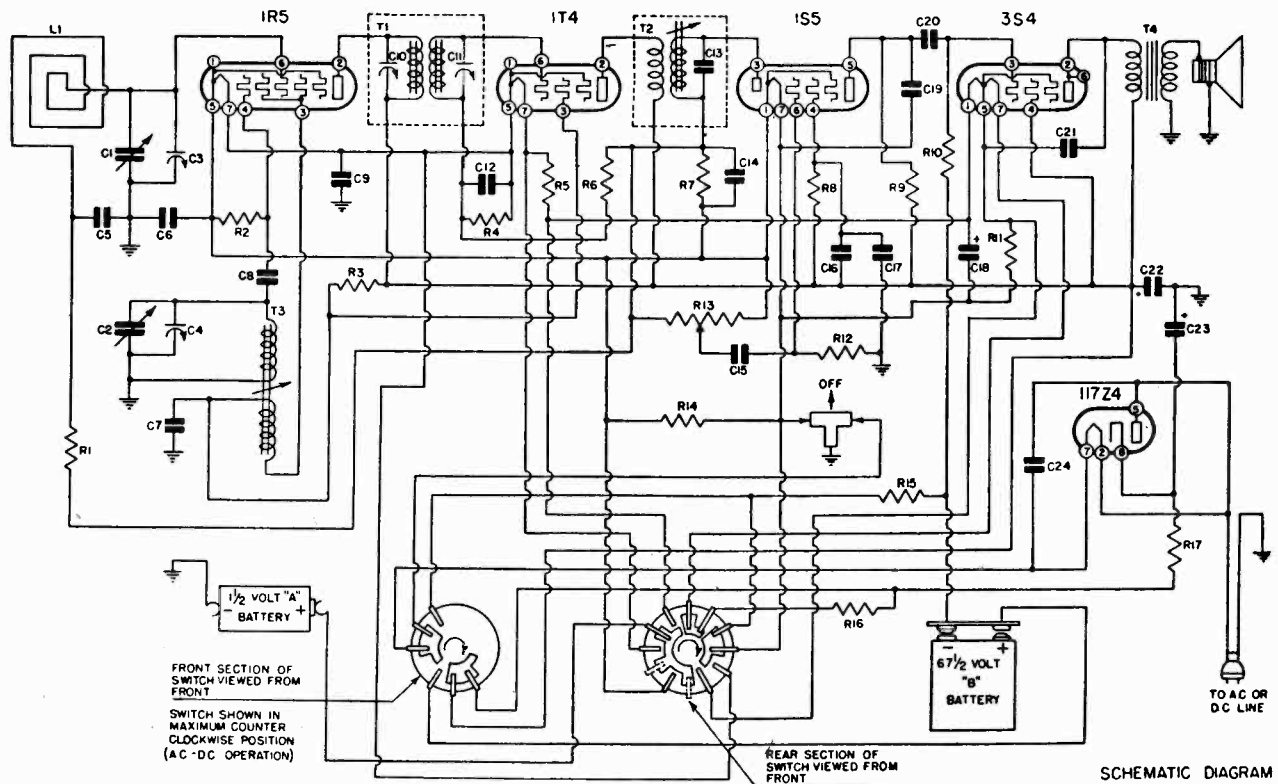
### VOLTAGE ANALYSIS

Tube	Plate	Screen	Cathode	Fil.
12SA7	88	88	0	12 a.c.
12SK7	48	46	0	12 a.c.
12SF7	89	89	0	12 a.c.
12SJ7	8	14	—	12 a.c.
50L6GT	108	89	5.1	50 a.c.

Voltage at 35Z5GT cathode—127 volts.

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given below.

## EMERSON RADIO &amp; PHONOGRAPH CORP.

MODEL GC44B  
Chassis GC

## ADJUSTMENTS

## R-f Alignment

An oscillator with frequencies of 455 and 1600 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.

## Location of Coils and Trimmer Adjustments

The first i-f transformer is located next to the output transformer.

The trimmers are accessible through holes in 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.

The oscillator coil is located next to the first i-f transformer. 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.

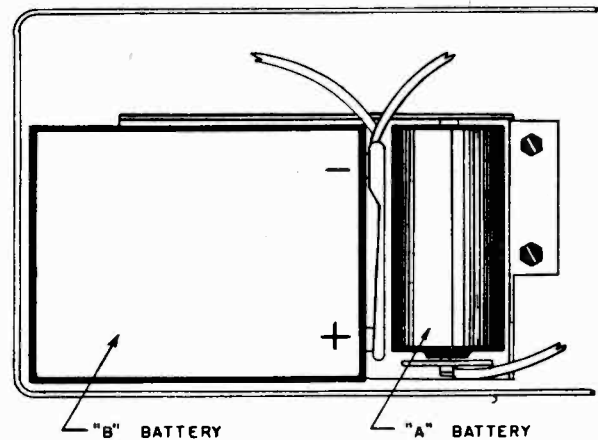
The loop antenna acts as the antenna coil. Trimmer for the loop is located on the larger section of the variable condenser.

## I-f Alignment

Rotate variable condenser to minimum capacity position.

Feed 455 kc to the grid of the 1R5 tube through a 0.01 mf condenser. Adjust the three i-f trimmer screws for maximum response. (Clip the i-f input to the stator lug of the larger variable condenser section.)

Set the dial pointer at 160. Set the signal generator at 1600 kc and feed its output into a loop of wire about one foot in diameter. Hold this radiating loop about one foot away from and parallel to the receiver loop antenna. Advance the output of the generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (smaller section of variable condenser) then the antenna trimmer (larger section of variable condenser) for maximum response. Set the dial pointer at 60. Feed 600 kc and rock the variable condenser while adjusting the oscillator core adjustment for maximum response. Return to 1600 and check alignment. If re-adjustment is necessary return to 600 and repeat entire procedure.



Place Batteries on Shelf, as Illustrated

MODEL GC448  
Chassis GC

EMERSON RADIO & PHONOGRAPH CORP.

REPLACEMENT PARTS LIST

Specify part numbers when ordering. List price each, effective as of December 15, 1941. (Subject to change without notice.)

Part No.	*Item	DESCRIPTION	PRICE
9RW-390A	L1	Loop antenna	.65
9RT-623A	T1	Double-tuned 455 kc first i-f transformer	1.65
9RT-624	T2	Single-tuned 475 kc second i-f transformer	1.40
9RT-622	T3	Oscillator coil	.80
9RT-625A	T4	Output transformer	.75
NNR-220	R1, R10	3 megohm 1/4 watt carbon resistor	.16
KR-54	R2	100,000 ohm 1/4 watt carbon resistor	.16
KR-63	R3	15,000 ohm 1/4 watt carbon resistor	.16
4XR-327	R4, R6	15 megohm 1/4 watt carbon resistor	.16
3GR-300	R5	75 ohm 1/4 watt carbon resistor	.16
KR-57	R7, R9	1 megohm 1/4 watt carbon resistor	.16
3RR-274	R8	5 megohm 1/4 watt carbon resistor	.16
4XR-334	R11	2500 ohm 1 watt carbon resistor	.16
3RR-275	R12	10 megohm 1/4 watt carbon resistor	.16
9RR-449A	R13	Volume control 3. megohm	.65
10CR-466	R14	500 ohm 1 watt carbon resistor	.16
9RR-458	R15	980 ohm 1/4 watt wire-wound, moulded resistor	.16
10CR-464	R16	1500 ohm 5 watt wire-wound, ceramic insulated resistor	.25
10CR-465	R17	950 ohm 5 watt wire-wound, ceramic insulated resistor	.25
9RC-535G	C1, C2	Two-gang variable condenser	3.05
9RC-535A		Trimmer condenser on variable condenser	.20
C3, C4		0.02 mf, 100 volt tubular condenser	.20
C5, C17		0.25 mf, 100 volt tubular condenser	.20
C6, C7, C9		0.00005 mf, ceramic condenser	.20
C8		Trimmer, part of i-f transformer	.20
C10, C11		0.01 mf, 100 volt tubular condenser	.20
C12		Fixed condenser, part of i-f transformer	.20
HCl3		0.0001 mf, ceramic condenser	.20
C14, C19		0.001 mf, 100 volt tubular condenser	.20
C15		0.002 mf, 150 volt tubular condenser	.20
C16, C21		40. mf, 40 volt dry electrolytic condenser	.45
C18		0.001 mf, 100 volt flat wound condenser	.12
C20		Dual dry electrolytic condenser: C22—40 mf, 150 volts; C23—20 mf, 150 volts	.75
C22, C23		0.05 mf, 400 volt tubular condenser	.20
C24		3 1/2" P.M. dynamic speaker	3.50
10CS-577		Power change-over switch	1.05
10CS-578		Lid operated on-off switch	.35
9RS-559A		Line connector plug and cable assembly	.25
10CW-381		Line cord and socket assembly	.60
10CW-380		"B" battery cable	2.00
9RW-367		Tuning wheel	.15
9RK-18		Volume wheel	.15

\*Item number locates the article on the schematic diagram.  
†Not supplied separately.

GC-448

SERVICE NOTES

MODEL: GC-448  
CHASSIS MODEL: GC

DESCRIPTION

TYPE: Universal (battery, a.c.-d.c.) superheterodyne.  
FREQUENCY RANGE: 540-1600 kc.  
NUMBER OF TUBES: Five.

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
- 1—117Z4GT, half-wave rectifier.

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

VOLTAGE RATING:  
Line operation—105-125 volts, a.c.-d.c.  
"A" Battery—1.5 volts.  
"B" Battery—67.5 volts.

CURRENT DRAIN:

- "A" Battery—0.25 amp.
- "B" Battery—0.0075 amp.

GENERAL NOTES

- The color coding of the i-f transformer leads is as follows:  
Grid—green  
Grid return—black  
Plate—blue  
B plus—red  
B minus—red
- The color coding of the battery cable is as follows:  
Red—B plus, 67 1/2 volts  
White—B minus.
- If replacements are made in the i-f section of the circuit, the receiver should be carefully re-aligned.
- The receiver has a self-contained antenna and does not require additional antenna or ground connection.
- 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, 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.

BATTERY COMPLEMENT

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

- Type Battery
- Number Required
- Standard "D" size (1 1/2" diameter) flashlight cell
- Eveready "Mini-max" No. 467

VOLTAGE ANALYSIS (Battery Operation)

Readings should be taken with a 1000 ohm-per-volt meter. Voltages listed are from point indicated to chassis with volume control turned full and no signal. The battery voltages for these readings were: "A": 1.5 volts; "B": 67.5 volts. All readings except filament voltages were taken on the 250 volt scale.

Tube	Plate	Screen	Fil.
1R5	54	29	1.4
1T4	54	29	1.4
1S5	84	—	1.4
3S4	51	54	1.4

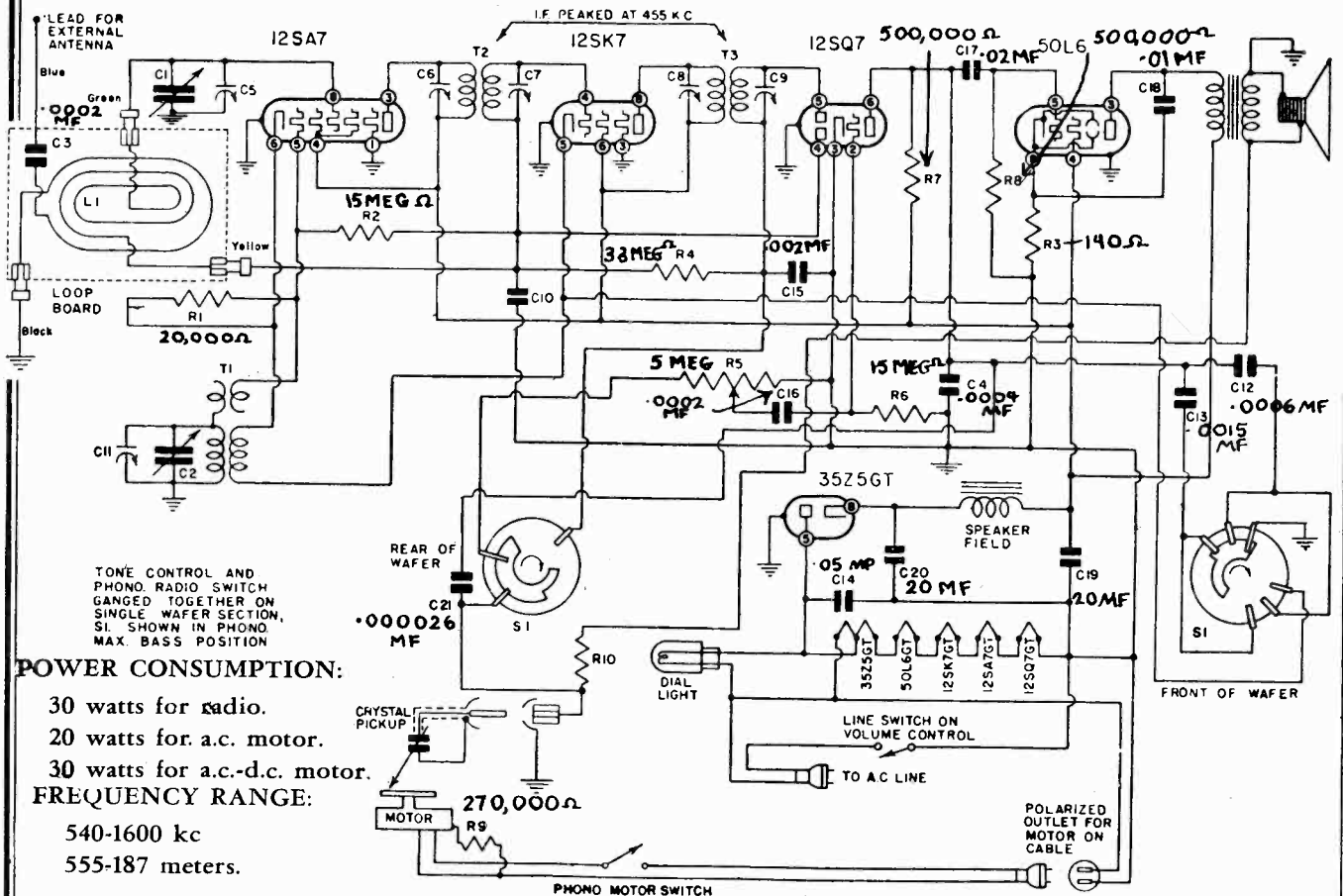
VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohm-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given below.

Tube	Plate	Screen	Fil.
1R5	72	39	1.4
1T4	72	39	1.4
1S5	86	—	1.4
3S4	69	72	2.8

\*The operating voltage of this tube cannot be measured because of the high resistor in the circuit.  
Voltage at 117Z4 cathode—125.

EMERSON RADIO & PHONOGRAPH CORP. MODELS GK450, Ch. GK; GK2-450, Chassis GK2



**POWER CONSUMPTION:**

- 30 watts for radio.
- 20 watts for a.c. motor.
- 30 watts for a.c.-d.c. motor.

**FREQUENCY RANGE:**

- 540-1600 kc
- 555-187 meters.

**R-f Alignment**

Set the dial pointer at 140. Set the signal generator at 1400 kc and feed its output into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from and parallel to the receiver loop antenna. Advance the output of the signal generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (on front section of variable condenser) then the antenna trimmer (on rear section of variable condenser) for maximum response.

If the loop antenna has been replaced it may be necessary to adjust the loop inductance as follows: Align at 140. Set the pointer at 60 and feed 600 kc to the antenna lead. A portion of the outside turn of the loop may be swung to either side of the center to give maximum response. Realign at 140.

**ADJUSTMENTS**

- 1-12SA7, oscillator-modulator TYPE OF TUBES:
- 1-12SK7, i-f amplifier
- 1-12SQ7, diode detector, a-f amplifier and a.v.c.
- 1-50L6GT, beam power output
- 1-35Z5GT, half-wave rectifier

**I-f Alignment**

Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7 tube through a .01 mf condenser and adjust the four i-f trimmers for maximum response.

Note: The grid of the 12SA7 tube is connected to the lower stator lug of the rear variable condenser section. Connection may be made with a test clip to the upper stator lug.

**POWER SUPPLY:** a.c. only. 60 cycle. (GK)  
a.c.-d.c. (GK2)

**VOLTAGE RATING:** 105-125 volts.

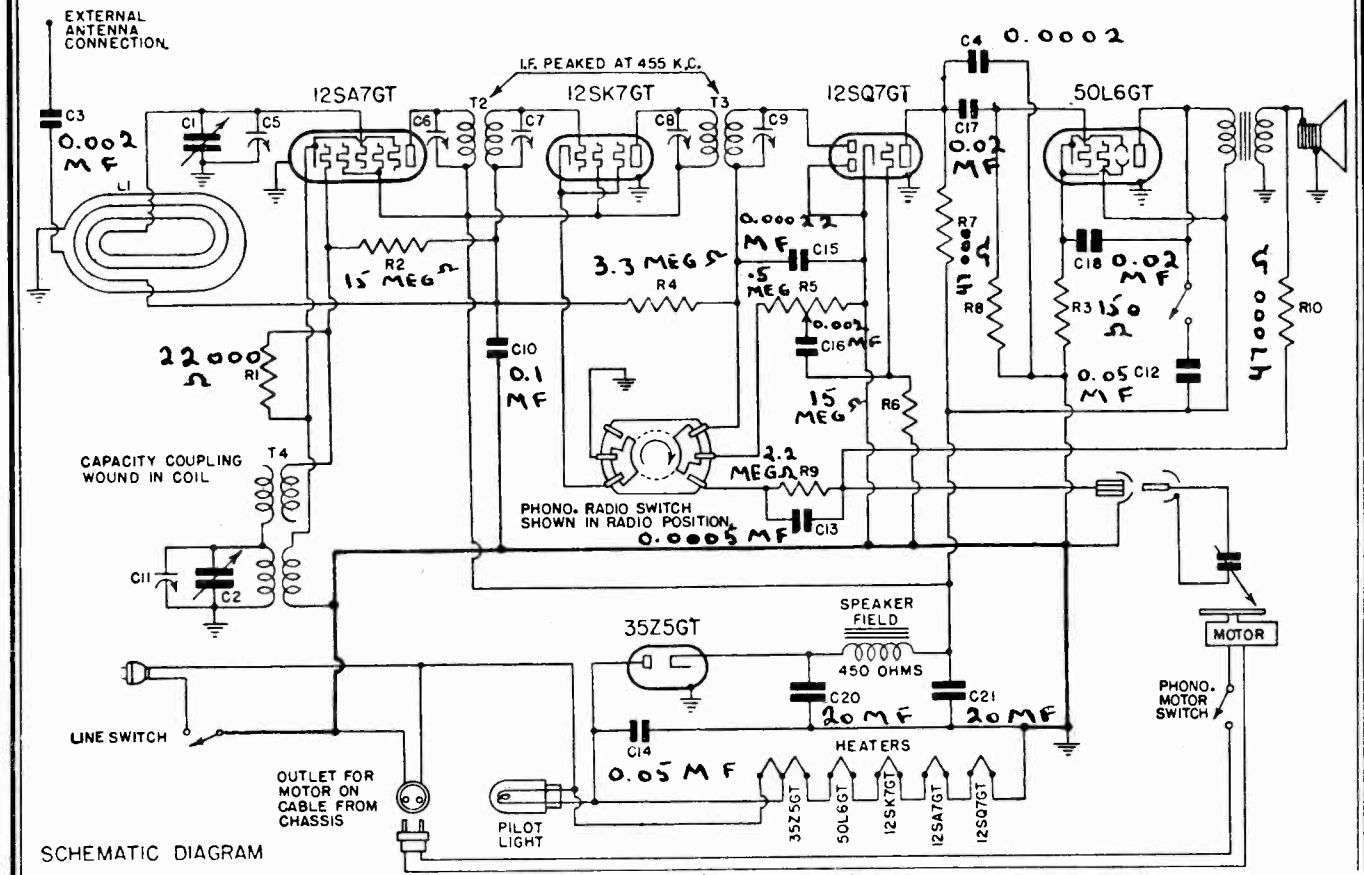
**VOLTAGE ANALYSIS**

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale. Measurements made with 117.5 volts d.c. will be lower than those given below.

Voltage at 35Z5GT cathode-118 volts.

Tube	Plate	Screen	Cathode	Fil.
12SA7	75	85	0	12 a.c.
12SK7	85	85	0	12 a.c.
12SQ7	25	-	0	12 a.c.
50L6GT	75	85	6.6	50 a.c.

MODEL FZ452, Chassis EMERSON RADIO & PHONOGRAPH CORP.



**VOLTAGE ANALYSIS**

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale.

Voltage at 35Z5 cathode—120 volts.  
 Voltage across speaker field—32 volts.  
 Voltage across pilot light—4.5 volts.

Tube	Plate	Screen	Cathode	Fil.
12SA7	88	88	0	12
12SK7	88	88	0	12
12SQ7	30	—	0	12
50L6	82	88	5.6	50

**I-f Alignment**

Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7 tube through a .01 mf condenser and adjust the four i-f trimmers for maximum response.

Note: The grid of the 12SA7 tube is connected to the stator lug of the rear variable condenser section. Connection may be made with a test clip.

**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 trimmers for the antenna and oscillator coils 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.

**R-f Alignment**

Set the dial pointer at 140. Set the signal generator at 1400 kc and feed its output into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from and parallel to the receiver loop antenna. Advance the output of the signal generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (on front section of variable condenser) then the antenna trimmer (on rear section of variable condenser) for maximum response.

If the loop antenna has been replaced it may be necessary to adjust the loop inductance as follows. Align at 140. Set the pointer at 60 and feed 600 kc to the radiating loop. A portion of the outside turn of the loop may be swung to either side of the center to give maximum response. Realign at 140.

**TYPE OF TUBES:**

- 1—12SA7, pentagrid oscillator-modulator
- 1—12SK7, first i-f amplifier
- 1—12SQ7, diode detector, a-f amplifier, a.v.c.
- 1—50L6, beam power output
- 1—35Z5, half-wave rectifier.

**POWER SUPPLY:** A.C. only.

**VOLTAGE RATING:** 105-125 volts.

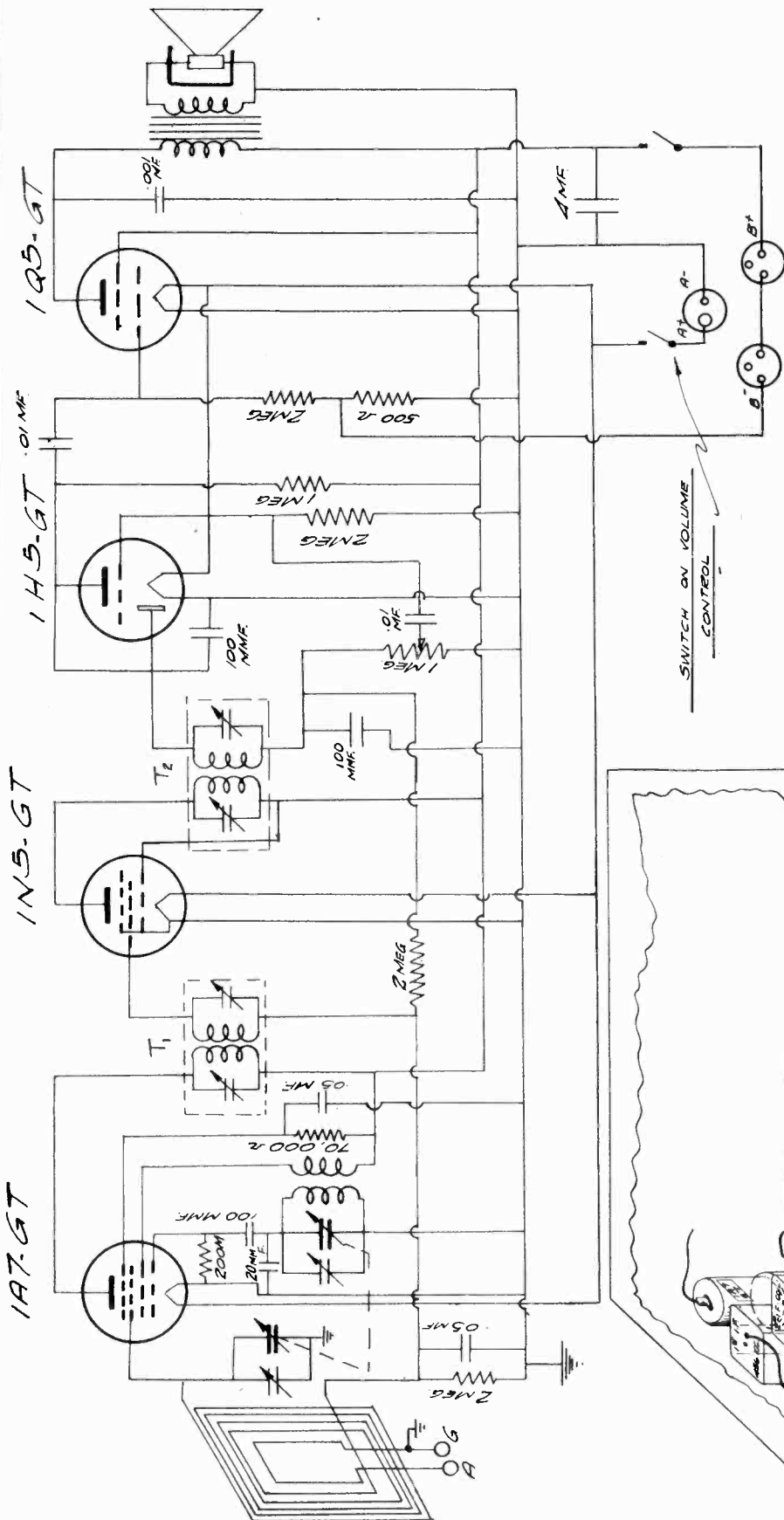
**POWER CONSUMPTION:**

30 watts for receiver

15 watts for phono motor.

ESPEY MFG. CO., INC.

MODEL 040

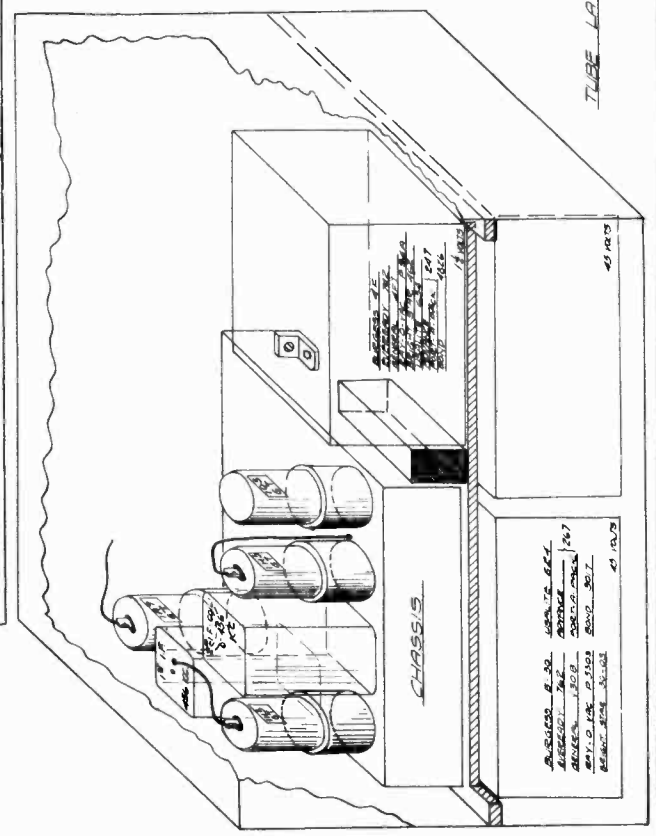


ESPEY MFG CO. INC.  
 NEW YORK N.Y.

CIRCUIT DIAGRAM  
 MODEL - 040

DATE 3-28-39  
 CHECKED J.M.

I.F. 455 KC



TUBE LAYOUT AND BATTERY LAYOUT  
MODEL NO. 040



MODEL 052

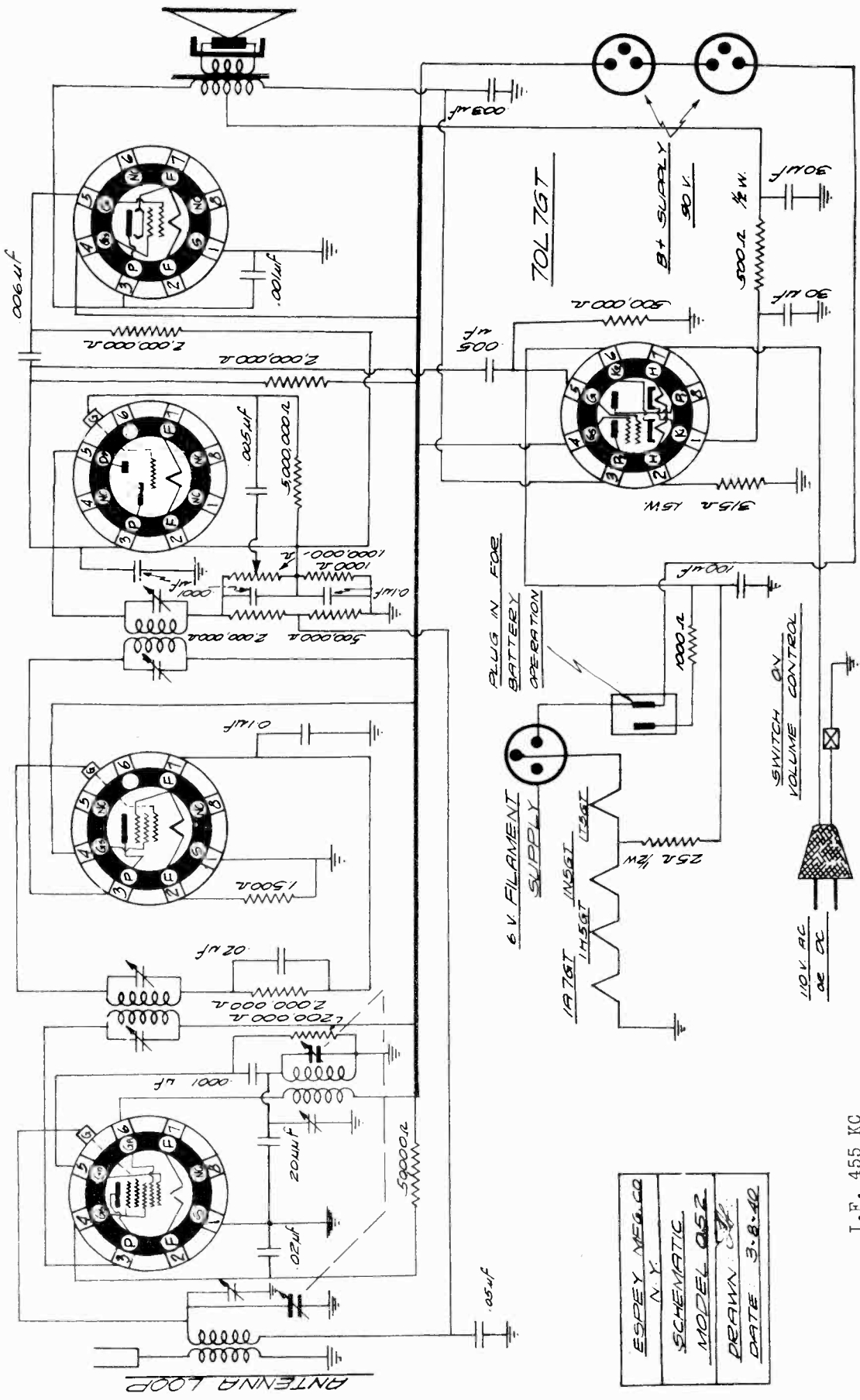
ESPEY MFG. CO., INC.

1T5GT

1H5GT

1N5GT

1A7GT



ESPEY MFG. CO  
 N.Y.  
 SCHEMATIC  
 MODEL 052  
 DRAWN  
 DATE 3-8-40

I.F. 455 KC

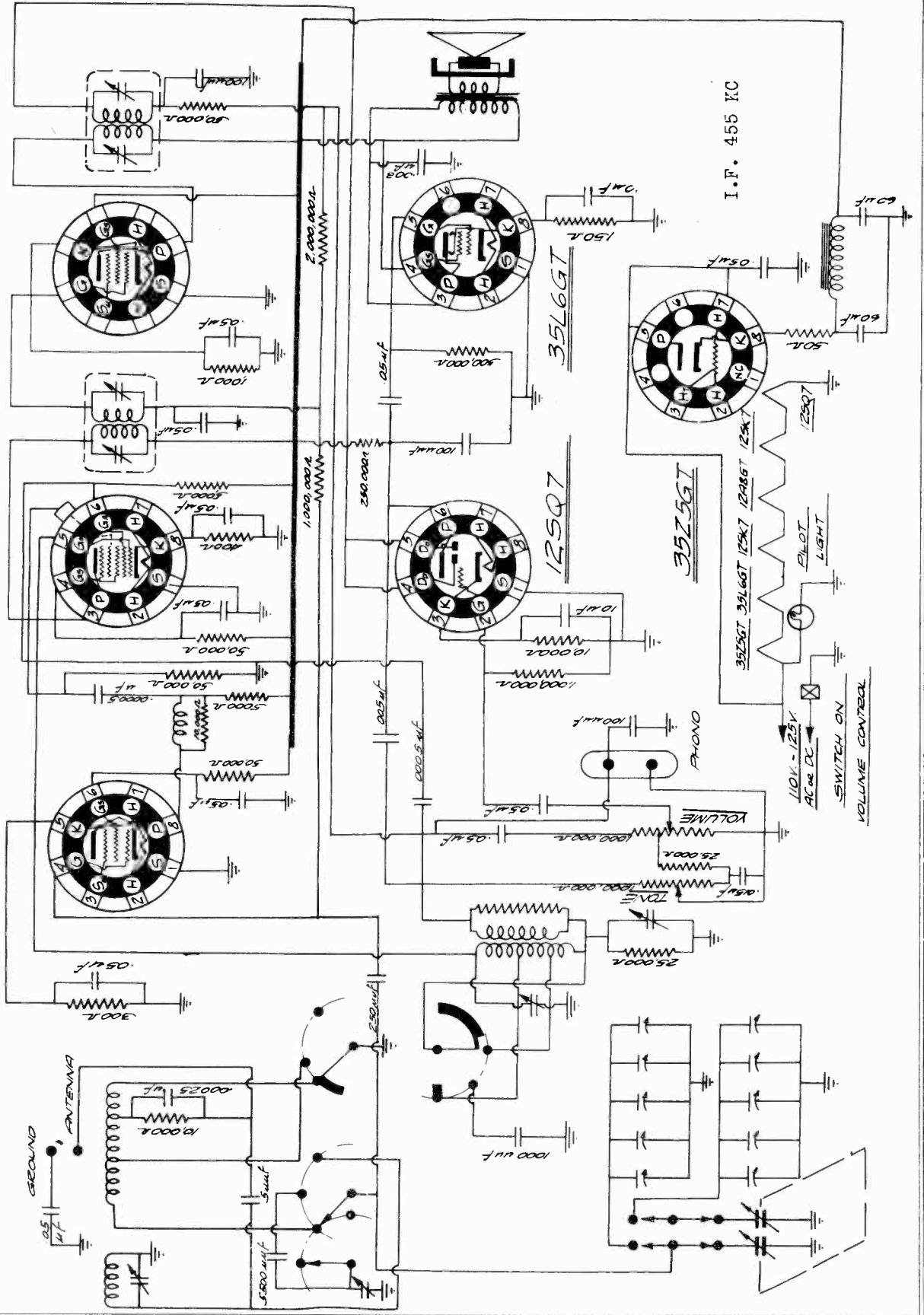
ESPEY MFG. CO., INC.

ESPEY MFG. CO. INC.  
SCHEMATIC DIAGRAM  
M.C. REL. NO. O60  
1-16-40

12SK7

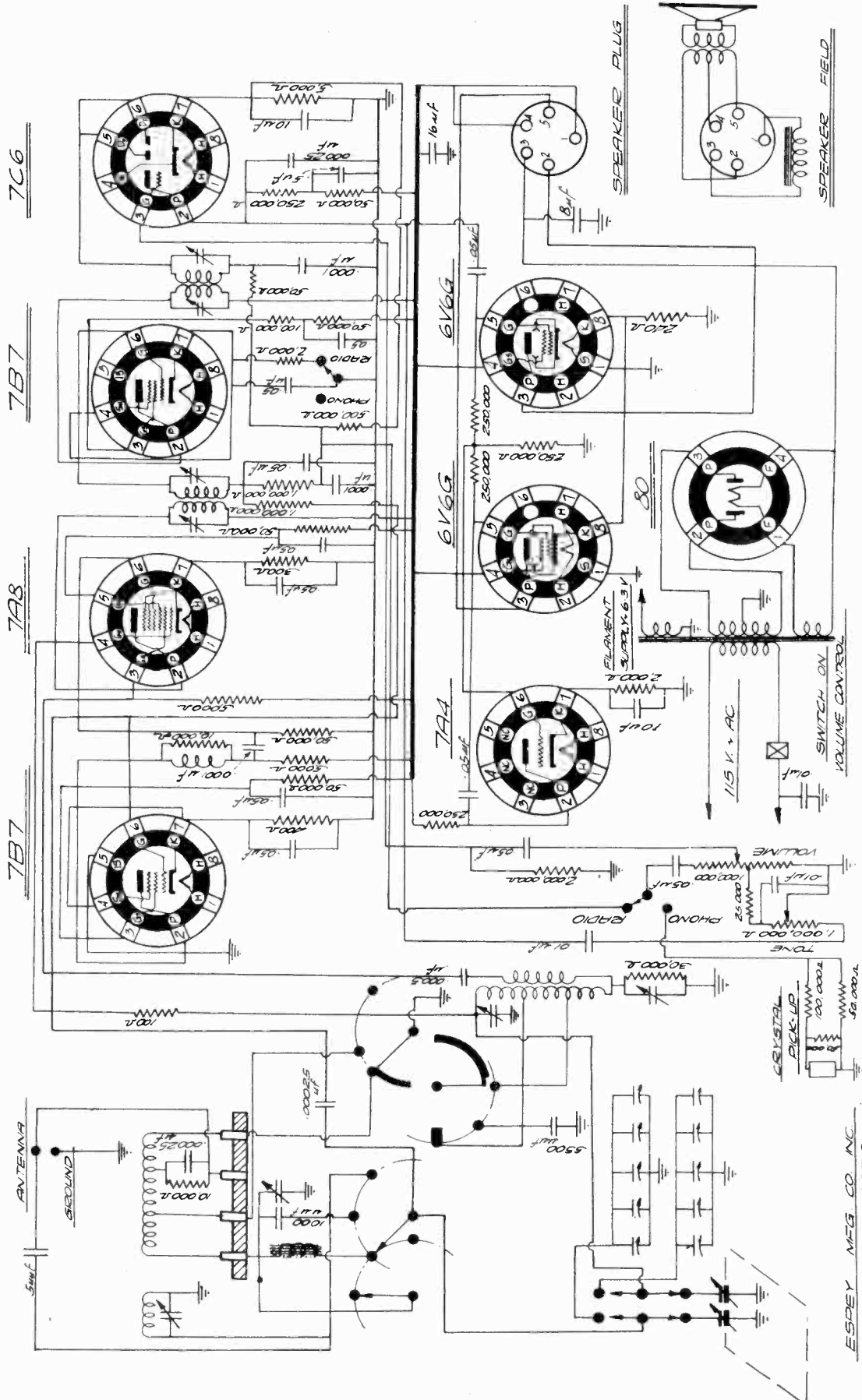
12A8GT

12SK7



MODEL 080

ESPEY MFG. CO., INC.

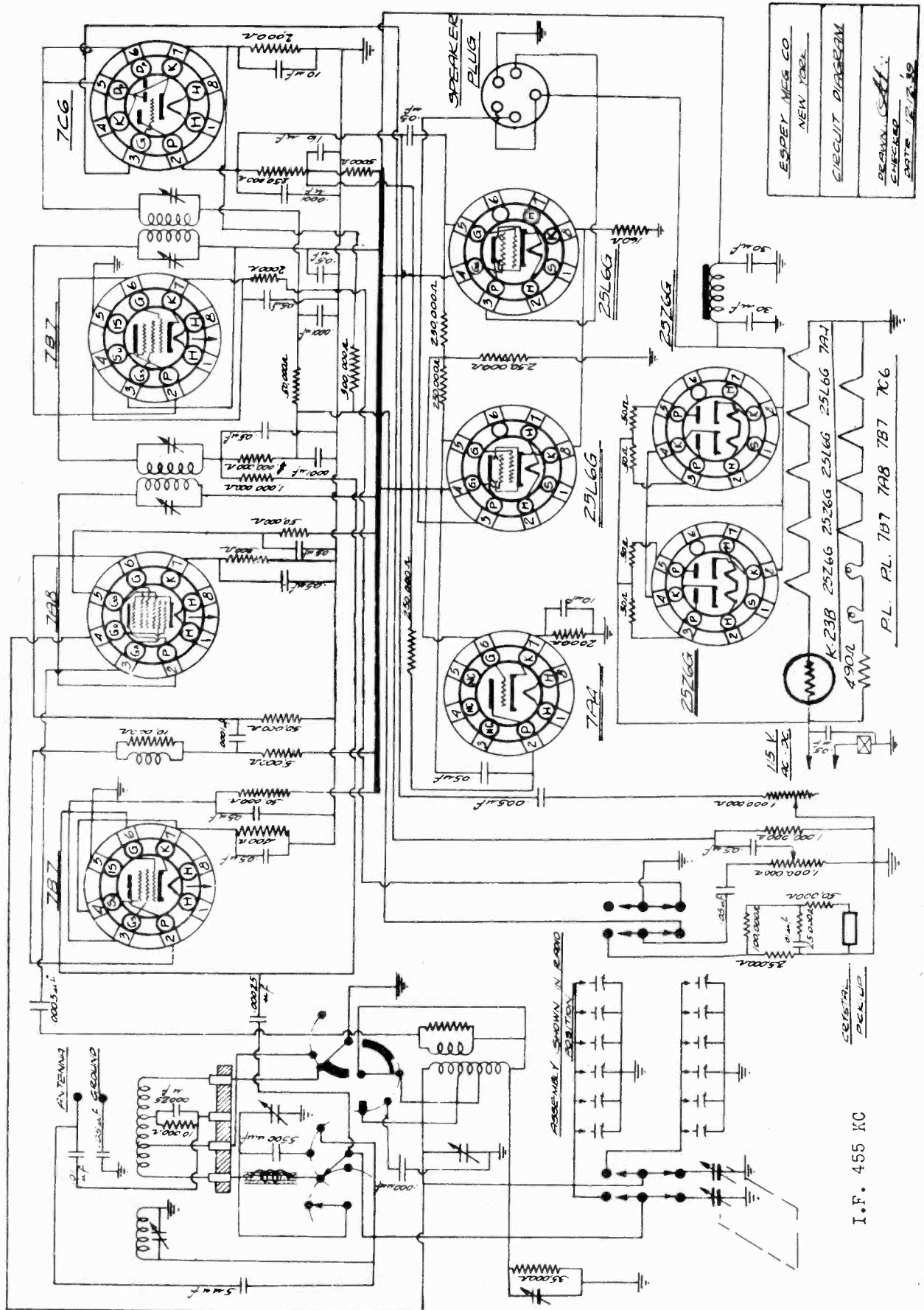


I.F. 455 KC

ESPEY MFG. CO. INC.  
 SCHEMATIC DIAGRAM  
 MODEL NO. 080  
 EN 140 CR

ESPEY MFG. CO., INC.

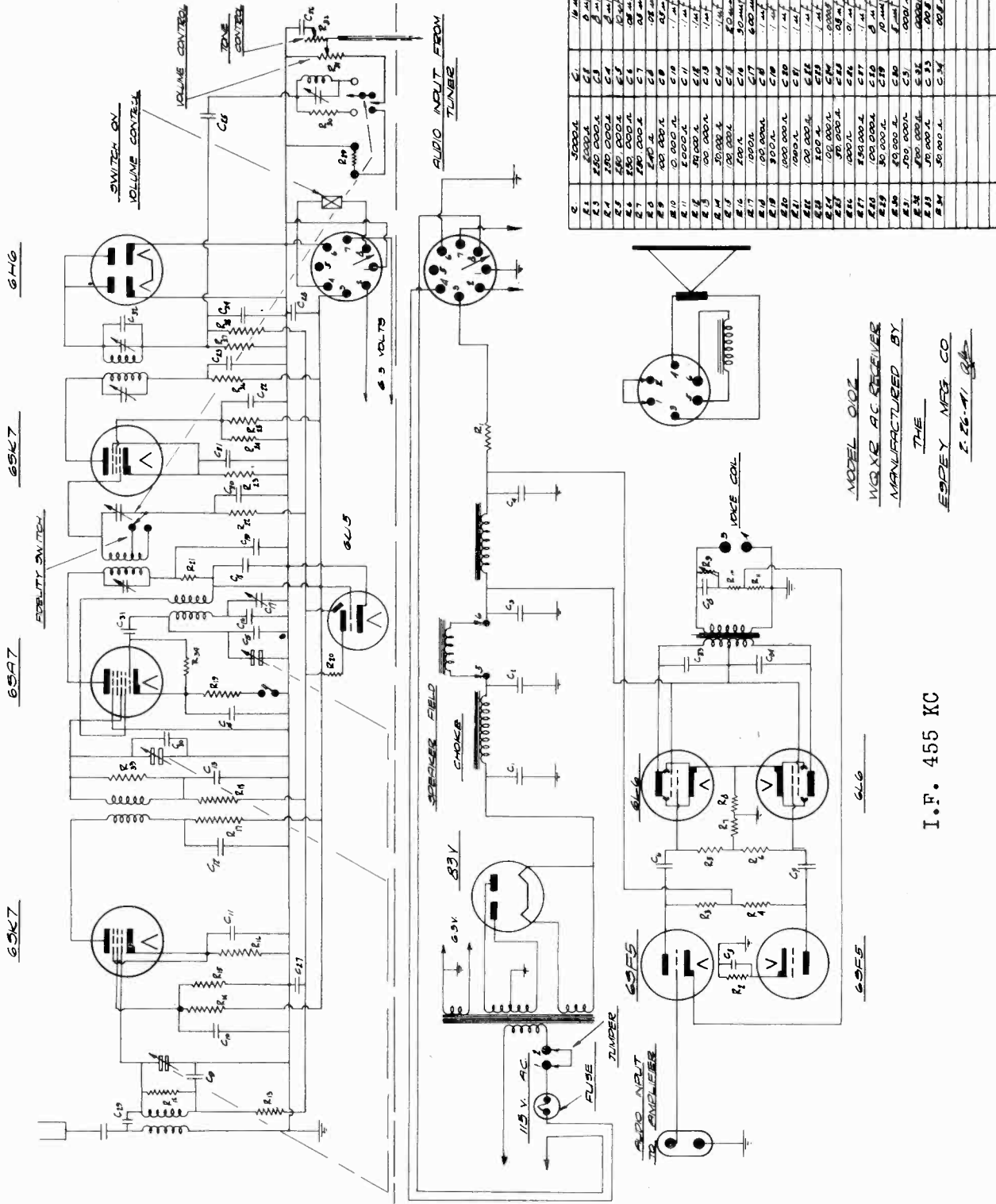
MODEL ~ 0101



ESPEY MFG CO
NEW YORK
CIRCUIT DIAGRAM
DESIGNED BY <i>[Signature]</i>
CHECKED BY <i>[Signature]</i>
DATE 12-2-39

I.F. 455 KC

PER L.P.



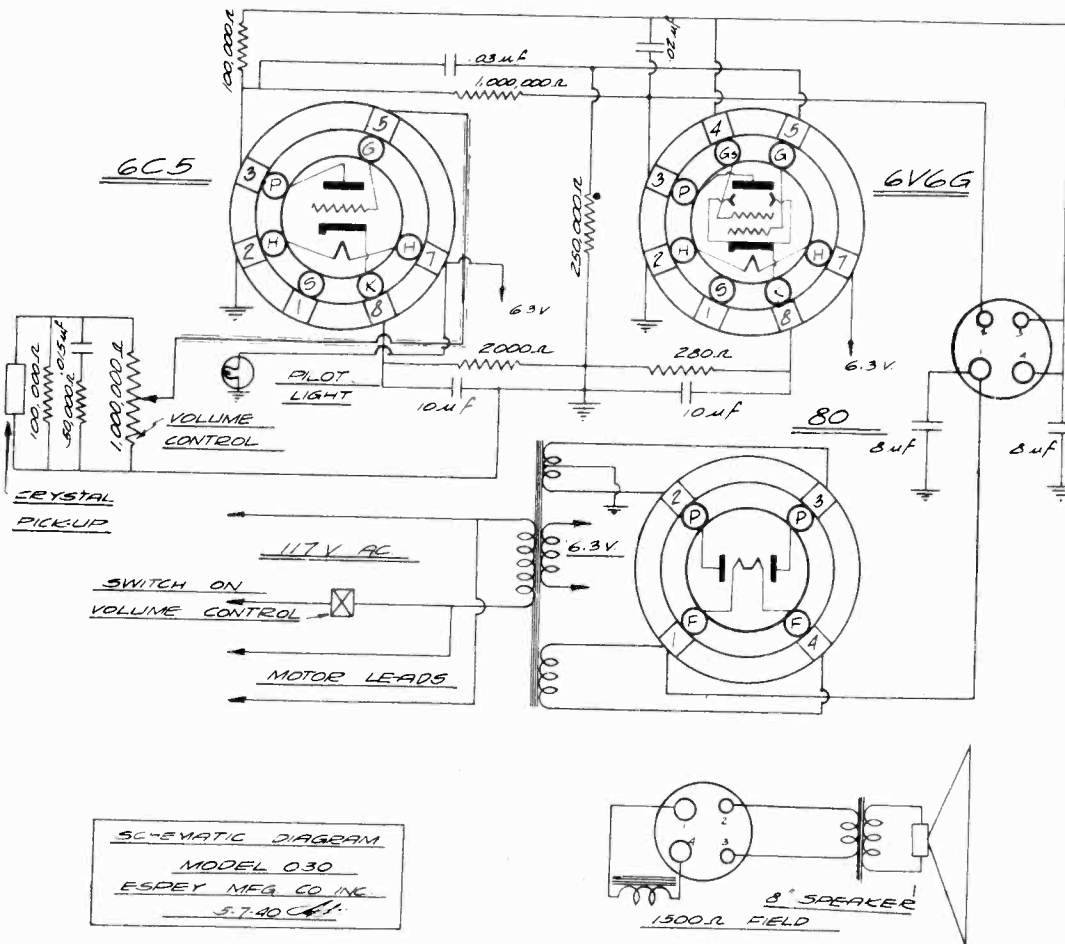
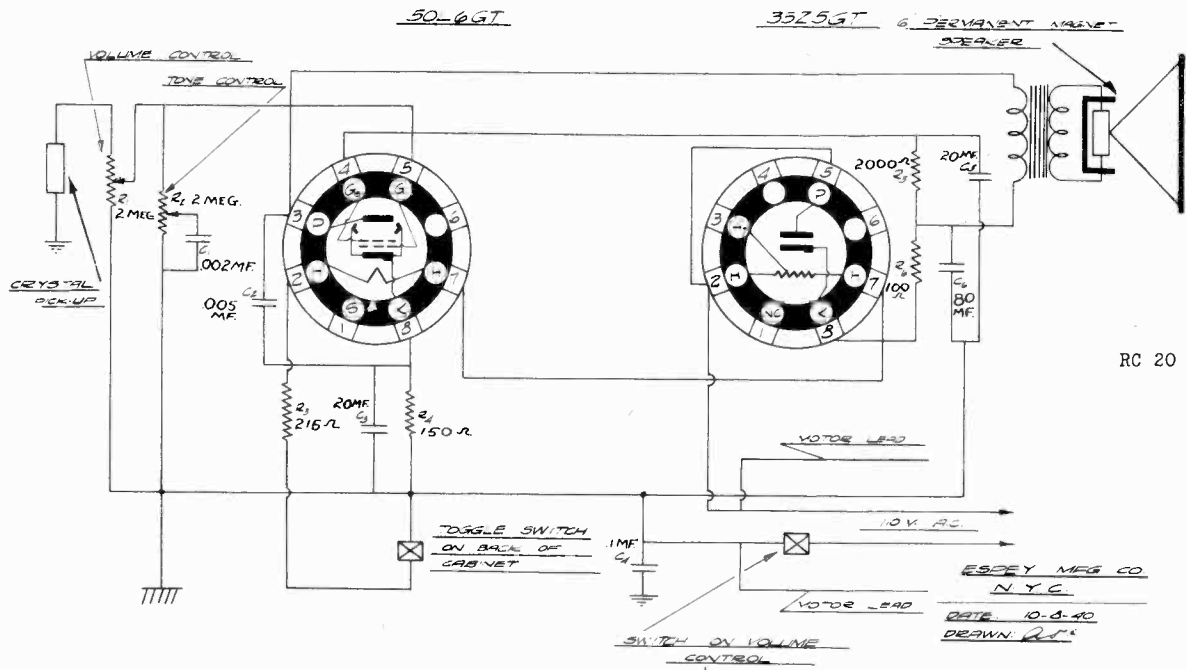
C1	5000 μ	C11	1 μ
C2	5000 μ	C12	1 μ
C3	5000 μ	C13	1 μ
C4	5000 μ	C14	1 μ
C5	5000 μ	C15	1 μ
C6	5000 μ	C16	1 μ
C7	5000 μ	C17	1 μ
C8	5000 μ	C18	1 μ
C9	5000 μ	C19	1 μ
C10	5000 μ	C20	1 μ
C21	5000 μ	C22	1 μ
C23	5000 μ	C24	1 μ
C25	5000 μ	C26	1 μ
C27	5000 μ	C27	1 μ
C28	5000 μ	C28	1 μ
C29	5000 μ	C29	1 μ
C30	5000 μ	C30	1 μ
C31	5000 μ	C31	1 μ
C32	5000 μ	C32	1 μ
C33	5000 μ	C33	1 μ
C34	5000 μ	C34	1 μ
C35	5000 μ	C35	1 μ
C36	5000 μ	C36	1 μ
C37	5000 μ	C37	1 μ
C38	5000 μ	C38	1 μ
C39	5000 μ	C39	1 μ
C40	5000 μ	C40	1 μ
C41	5000 μ	C41	1 μ
C42	5000 μ	C42	1 μ
C43	5000 μ	C43	1 μ
C44	5000 μ	C44	1 μ
C45	5000 μ	C45	1 μ
C46	5000 μ	C46	1 μ
C47	5000 μ	C47	1 μ
C48	5000 μ	C48	1 μ
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C50	5000 μ	C50	1 μ
C51	5000 μ	C51	1 μ
C52	5000 μ	C52	1 μ
C53	5000 μ	C53	1 μ
C54	5000 μ	C54	1 μ
C55	5000 μ	C55	1 μ
C56	5000 μ	C56	1 μ
C57	5000 μ	C57	1 μ
C58	5000 μ	C58	1 μ
C59	5000 μ	C59	1 μ
C60	5000 μ	C60	1 μ
C61	5000 μ	C61	1 μ
C62	5000 μ	C62	1 μ
C63	5000 μ	C63	1 μ
C64	5000 μ	C64	1 μ
C65	5000 μ	C65	1 μ
C66	5000 μ	C66	1 μ
C67	5000 μ	C67	1 μ
C68	5000 μ	C68	1 μ
C69	5000 μ	C69	1 μ
C70	5000 μ	C70	1 μ
C71	5000 μ	C71	1 μ
C72	5000 μ	C72	1 μ
C73	5000 μ	C73	1 μ
C74	5000 μ	C74	1 μ
C75	5000 μ	C75	1 μ
C76	5000 μ	C76	1 μ
C77	5000 μ	C77	1 μ
C78	5000 μ	C78	1 μ
C79	5000 μ	C79	1 μ
C80	5000 μ	C80	1 μ
C81	5000 μ	C81	1 μ
C82	5000 μ	C82	1 μ
C83	5000 μ	C83	1 μ
C84	5000 μ	C84	1 μ
C85	5000 μ	C85	1 μ
C86	5000 μ	C86	1 μ
C87	5000 μ	C87	1 μ
C88	5000 μ	C88	1 μ
C89	5000 μ	C89	1 μ
C90	5000 μ	C90	1 μ
C91	5000 μ	C91	1 μ
C92	5000 μ	C92	1 μ
C93	5000 μ	C93	1 μ
C94	5000 μ	C94	1 μ
C95	5000 μ	C95	1 μ
C96	5000 μ	C96	1 μ
C97	5000 μ	C97	1 μ
C98	5000 μ	C98	1 μ
C99	5000 μ	C99	1 μ
C100	5000 μ	C100	1 μ

MODEL 0102  
 WGX AC RECEIVER  
 MANUFACTURED BY  
 THE  
 ESPEY MFG CO  
 P. 26-11 65

I. F. 455 KC

ESPEY MFG. CO., INC.

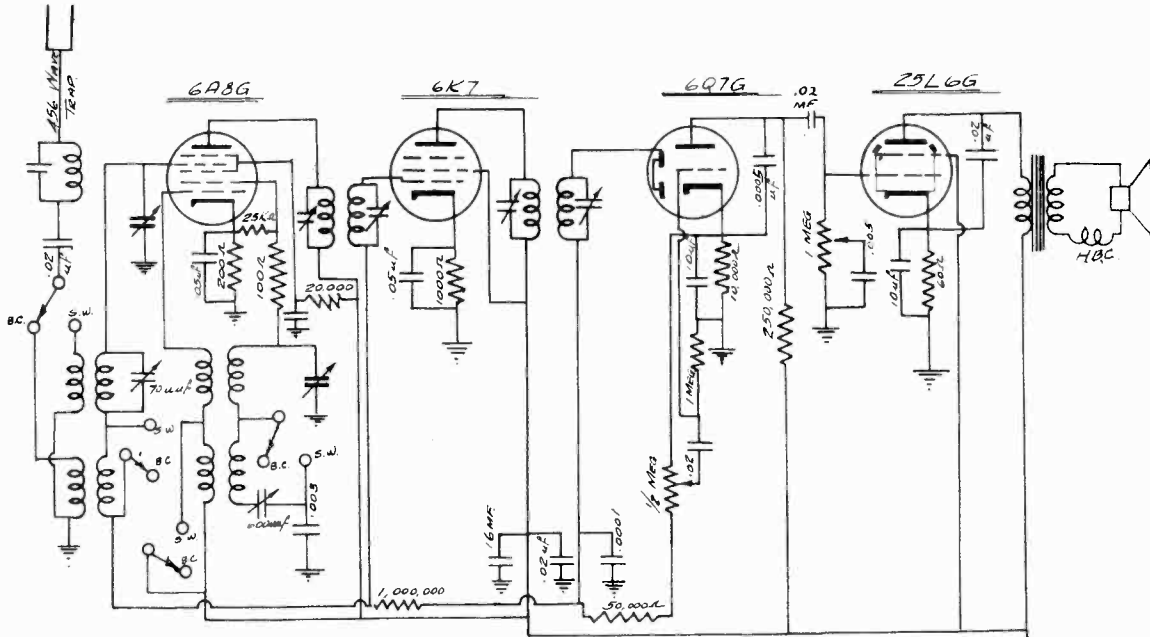
MODEL RC20  
MODEL 030



MODEL 861

MODELS 942, 943

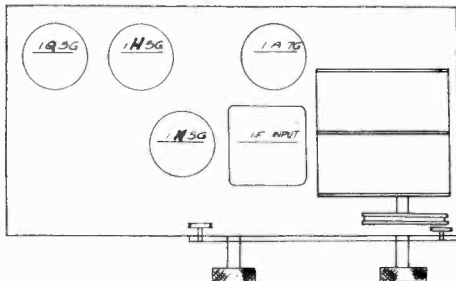
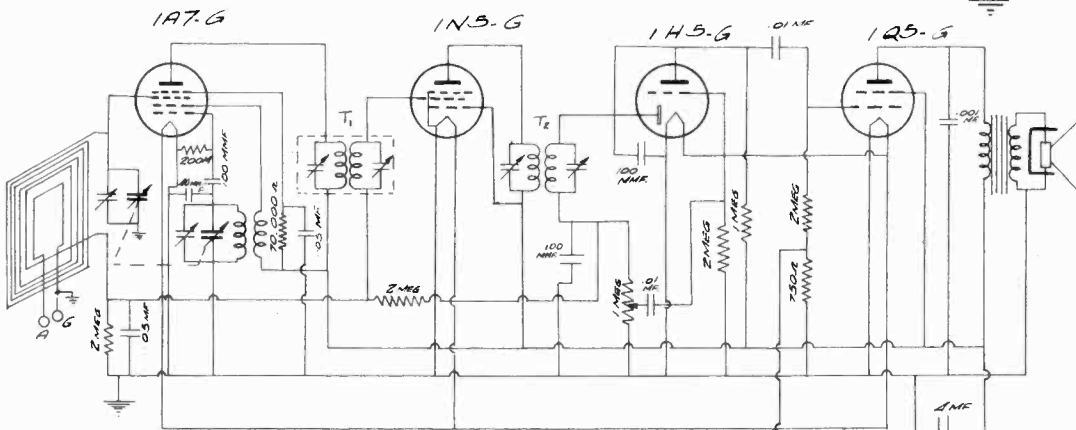
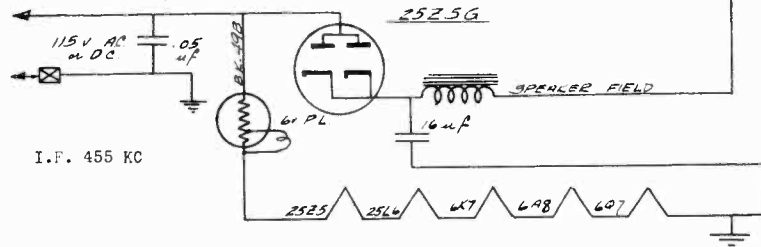
ESPEY MFG. CO., INC.



ESPEY MFG. CO. INC.  
NEW YORK CITY

CIRCUIT OF MODEL  
861

DATE: 6/7/39  
DRAWN BY: J.P.  
CHECKED BY:



ESPEY MFG CO INC  
NEW YORK NY

CIRCUIT DIAGRAM  
MODEL 942-943

DATE: 3-28-39  
CHECKED: J.P.

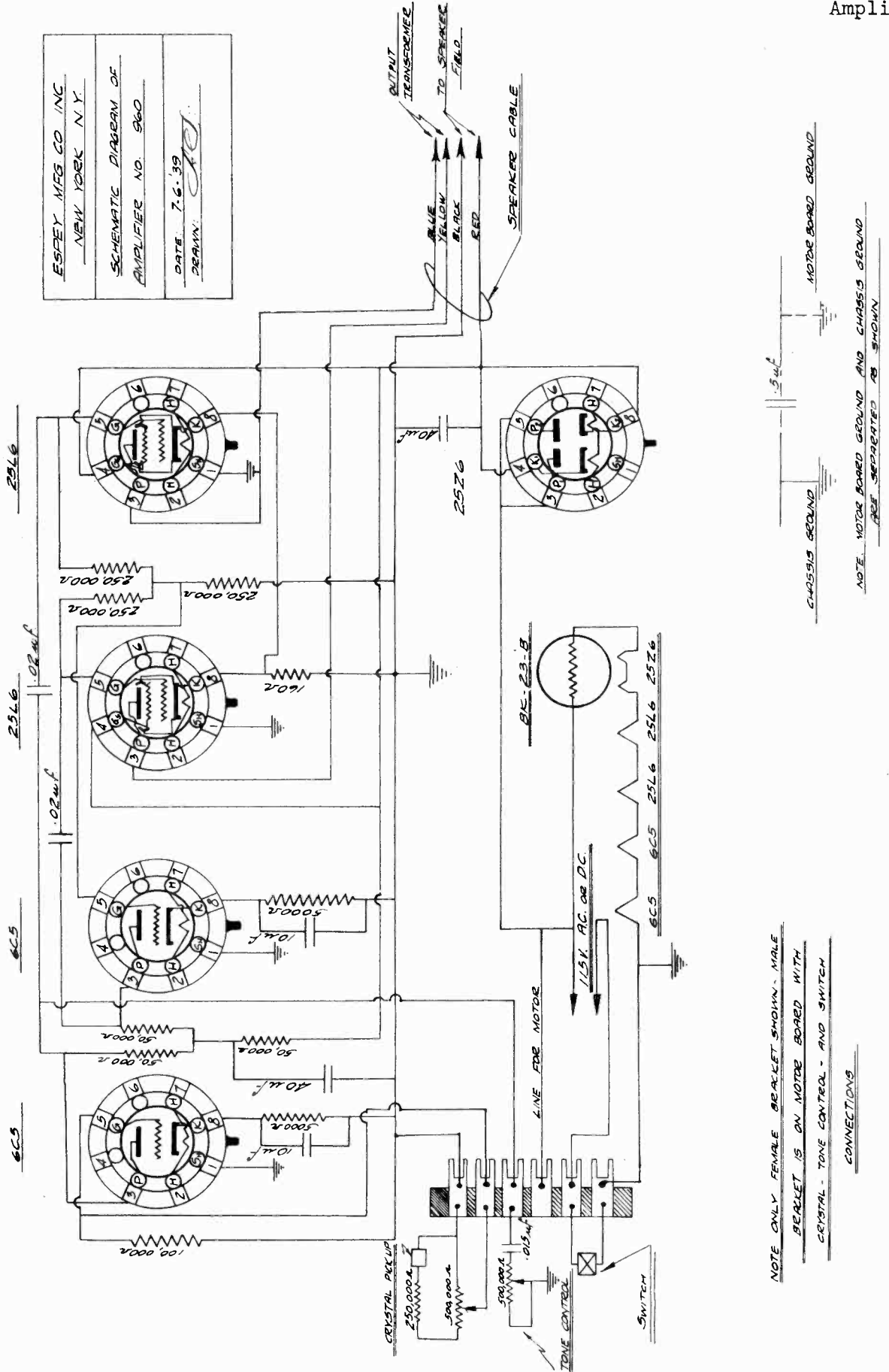
TOP VIEW OF PLUG

I.F. 455 KC

ESPEY MFG. CO., INC.

MODEL 960  
Amplifier

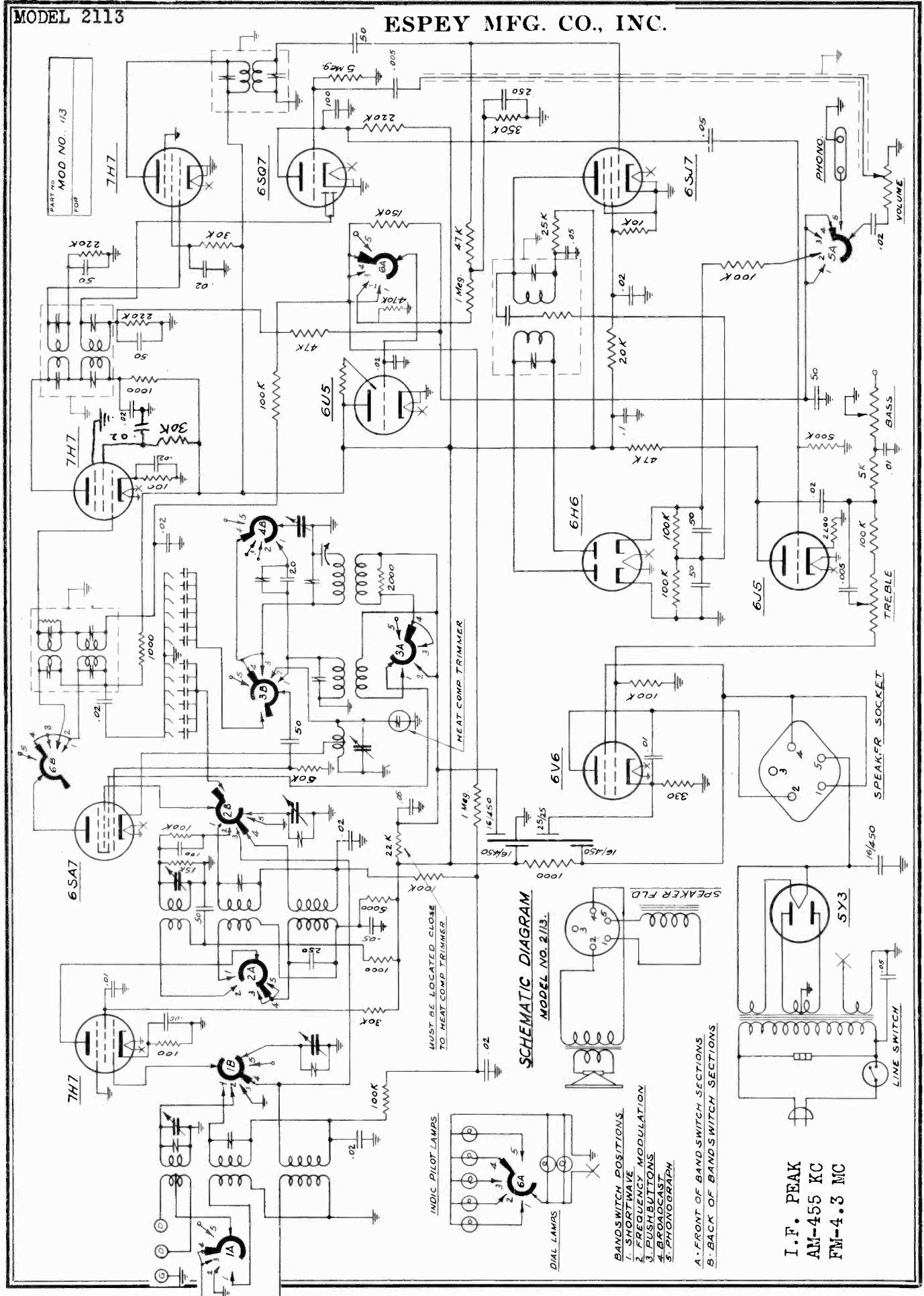
ESPEY MFG CO INC NEW YORK N.Y.
SCHEMATIC DIAGRAM OF AMPLIFIER NO. 960
DATE 7-6-'39 DRAWN: <i>[Signature]</i>



NOTE ONLY FEMALE BRACKET SHOWN. MALE BRACKET IS ON MOTOR BOARD WITH CRYSTAL. TONE CONTROL - AND SWITCH CONNECTIONS

CHASSIS GROUND  
MOTOR BOARD GROUND  
NOTE MOTOR BOARD GROUND AND CHASSIS GROUND ARE SEPARATE AS SHOWN





SCHEMATIC DIAGRAM MODEL NO. 2113.

INDIC. PILOT LAMPS

DIAL LAMPS

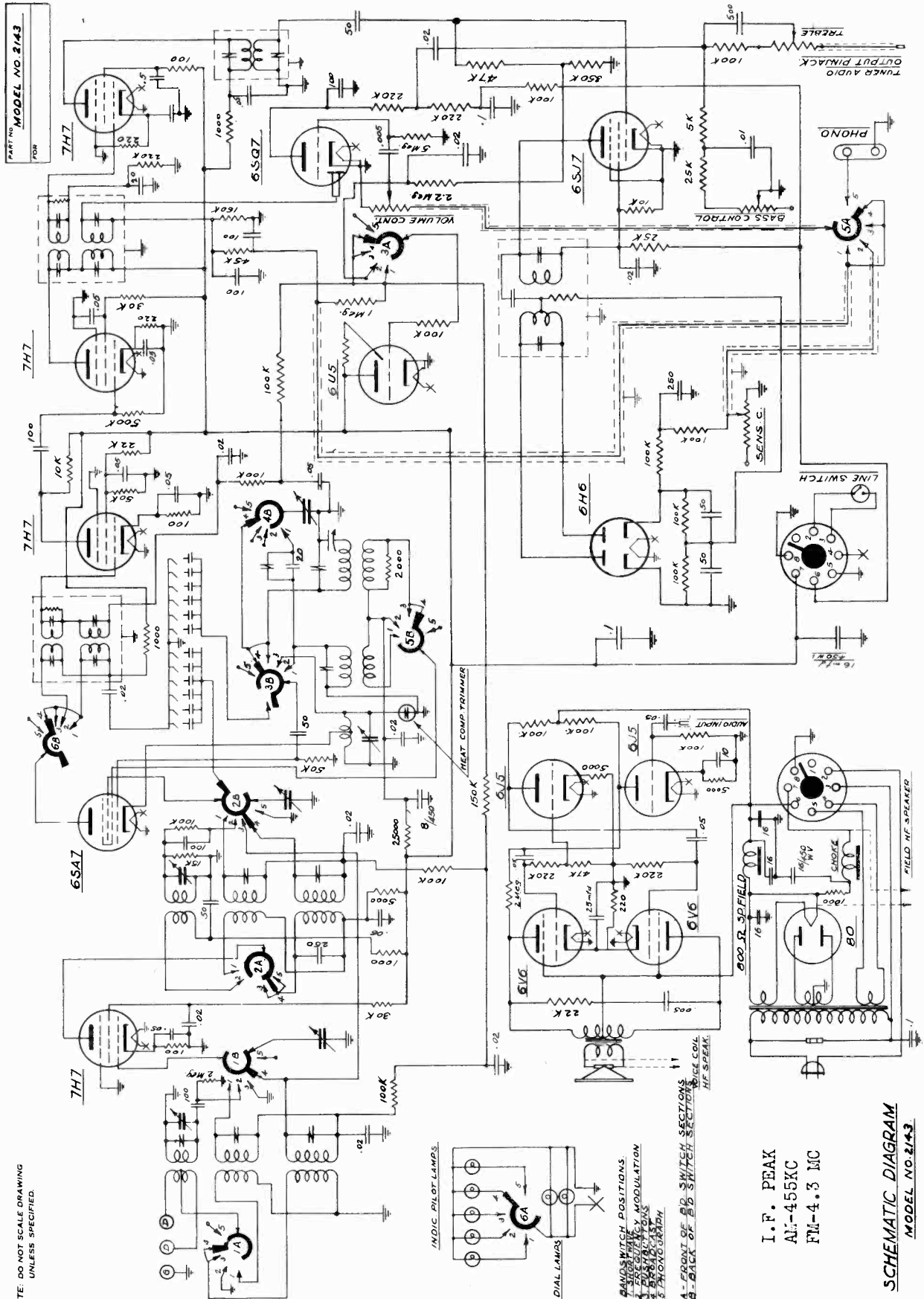
BAND SWITCH POSITIONS.

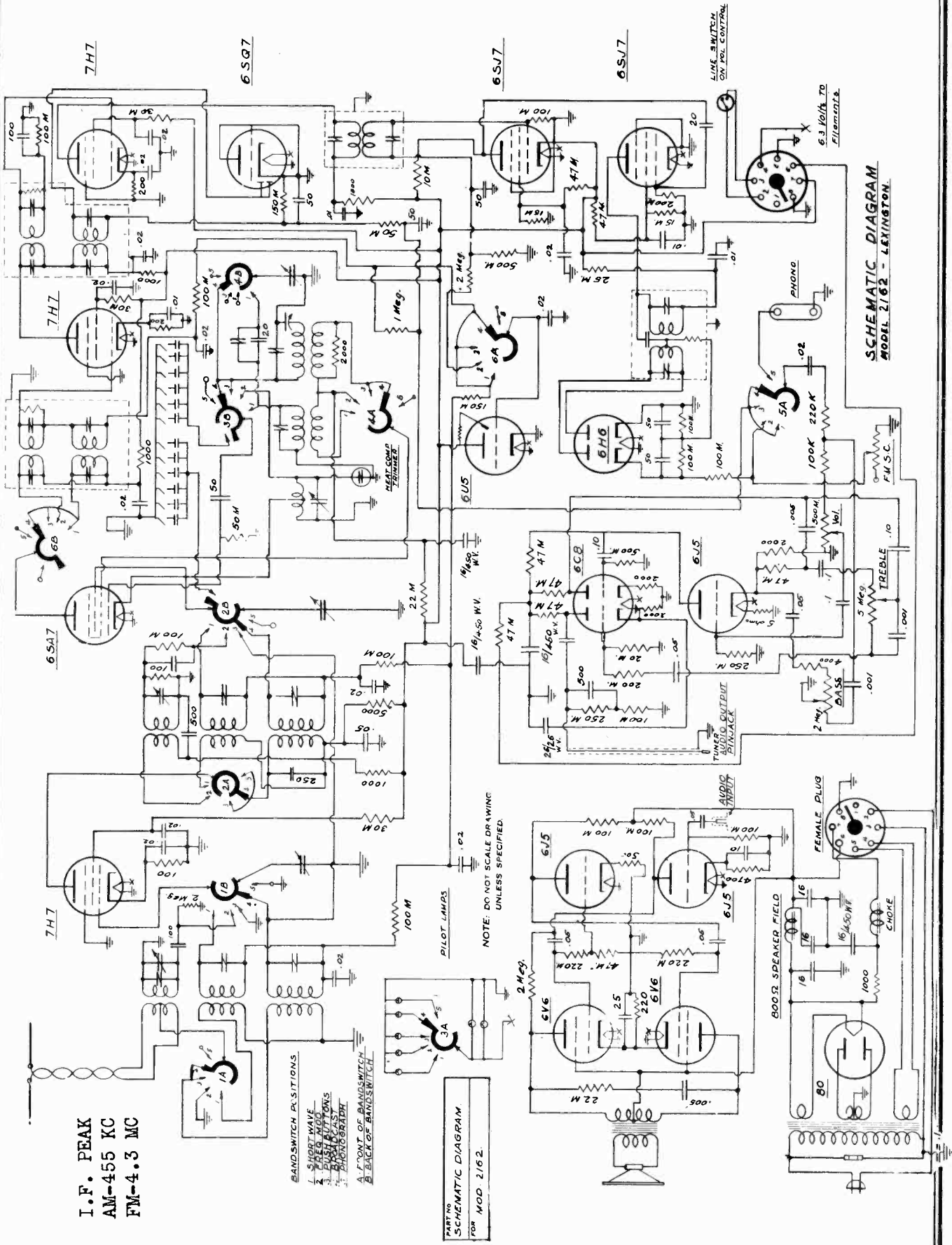
- 1. SHORTWAVE
- 2. FREQUENCY MODULATION
- 3. PUSHBUTTONS
- 4. BROADCAST
- 5. PHONOGRAPH

A. FRONT OF BAND SWITCH SECTIONS  
B. BACK OF BAND SWITCH SECTIONS

I.F. PEAK  
AM-455 KC  
FM-4.3 MC

ESPEY MFG. CO., INC.





I. F. PEAK  
 AM-455 KC  
 FM-4.3 MC

- BANDSWITCH POSITIONS
1. SHORT WAVE
  2. WAVE MOD.
  3. PUSH BUTTONS
  4. PHOTOGRAPH
  5. A. FRONT OF BANDSWITCH
  6. B. BACK OF BANDSWITCH

PART NO.  
 SCHEMATIC DIAGRAM  
 FOR MOD. 2162.

NOTE: DO NOT SCALE DRAWING  
 UNLESS SPECIFIED.

SCHEMATIC DIAGRAM  
 MODEL 2162 - LEXINGTON.

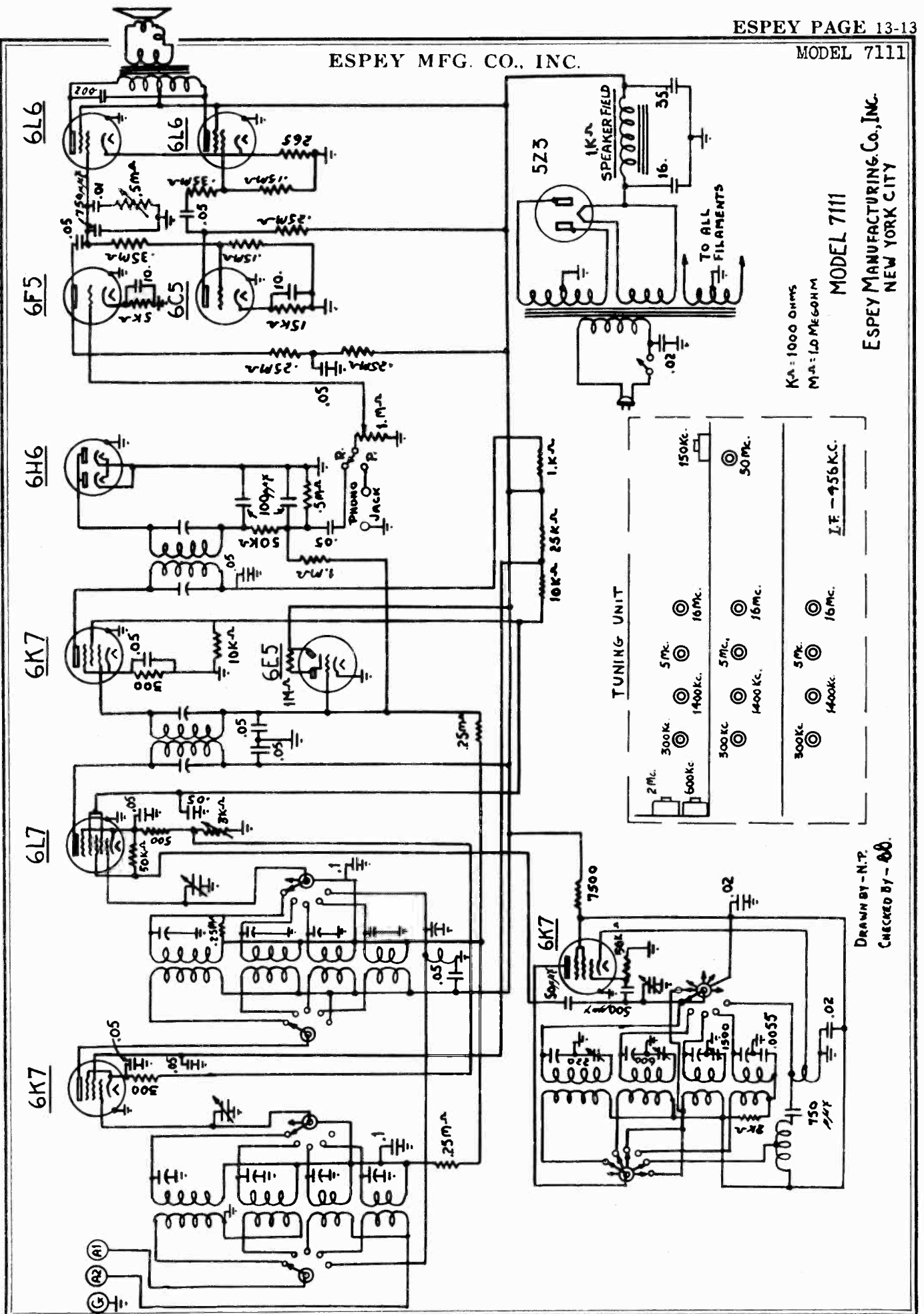
ESPEY MFG. CO., INC.

MODEL 7111

ESPEY MANUFACTURING Co., Inc.  
NEW YORK CITY

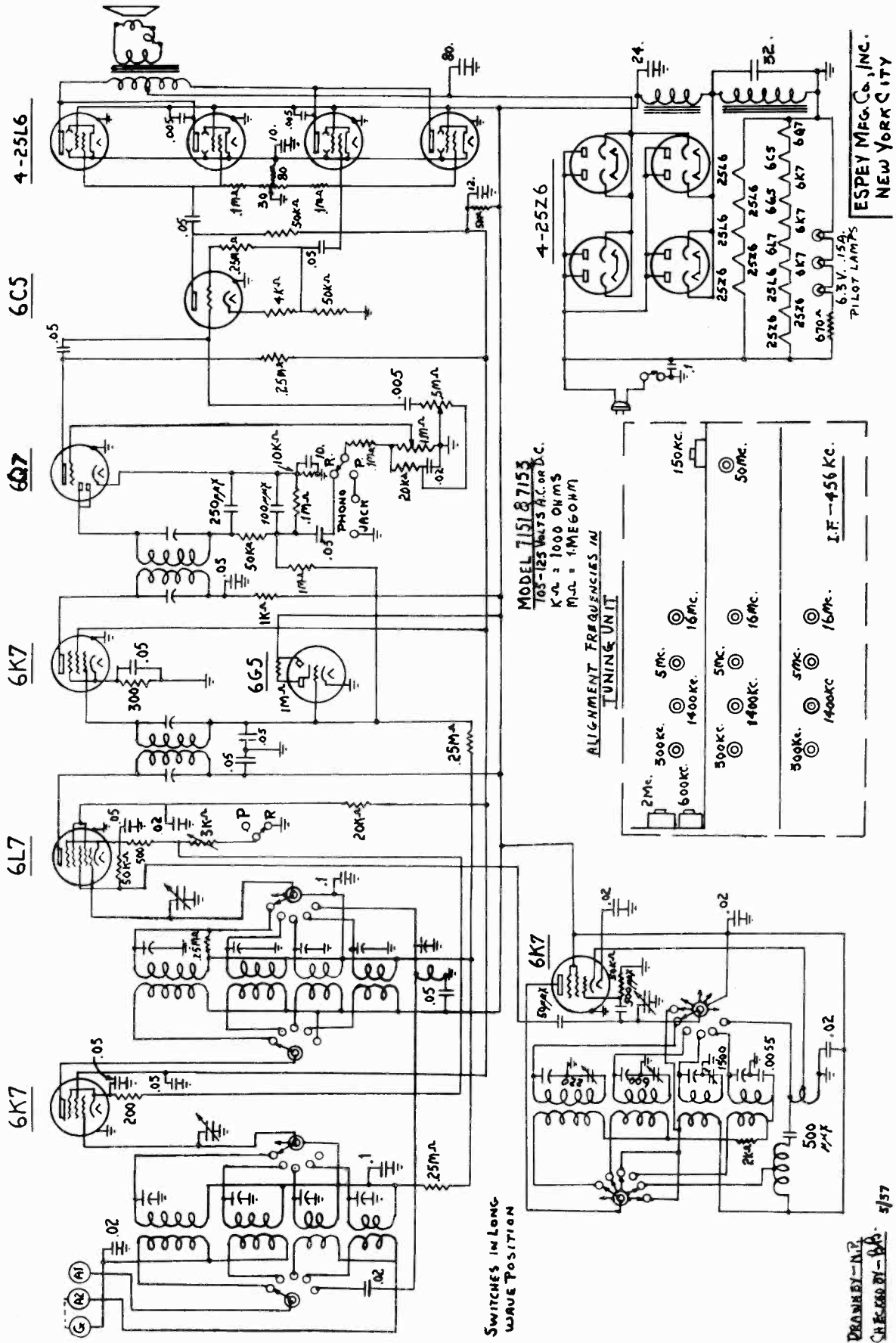
MODEL 7111

K<sub>A</sub> = 1000 OHMS  
M.A. = 10 MEGOHM

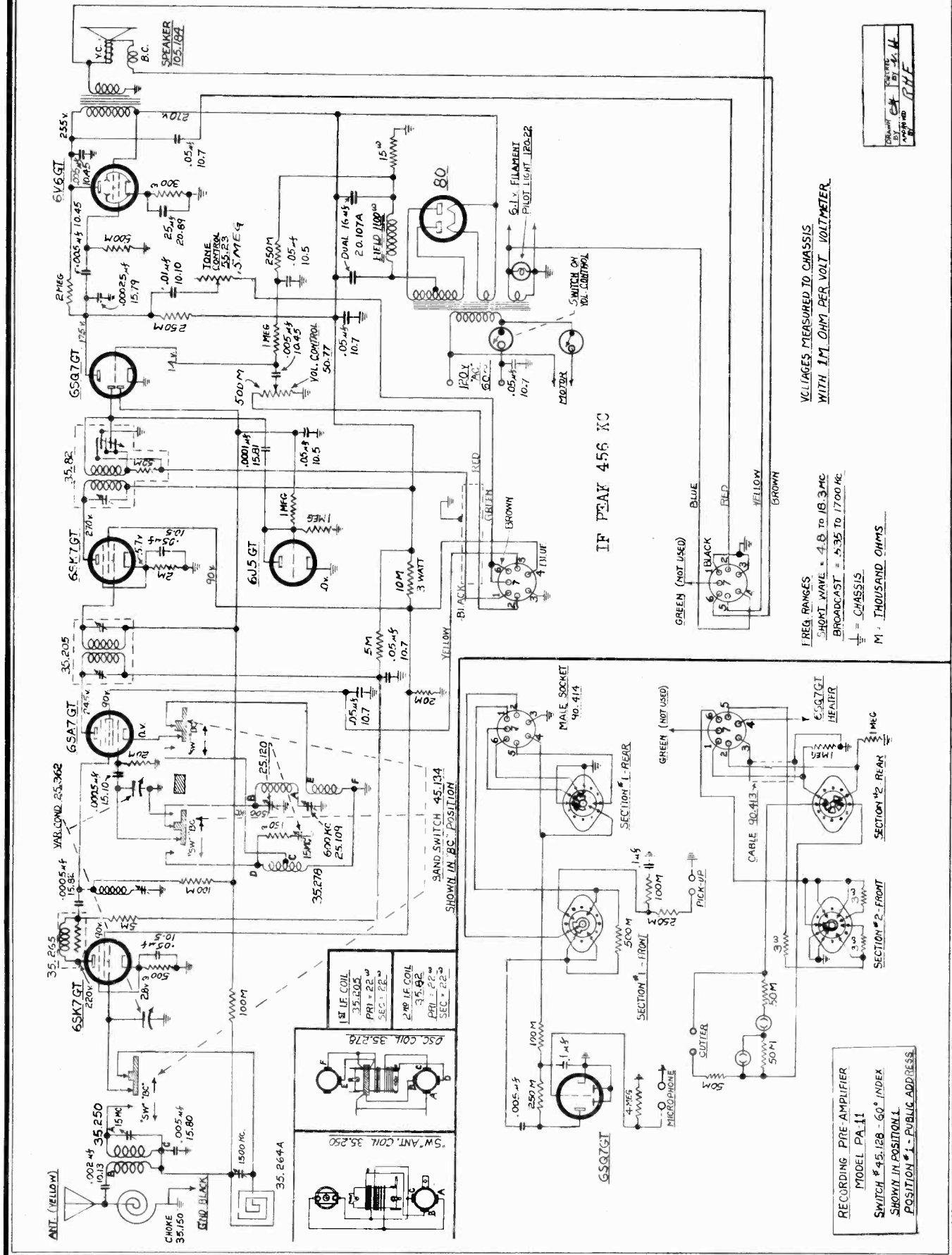


DRAWN BY - N.T.  
CHECKED BY - 88.

ESPEY MFG. CO., INC.



FADA RADIO & ELECTRIC CO.



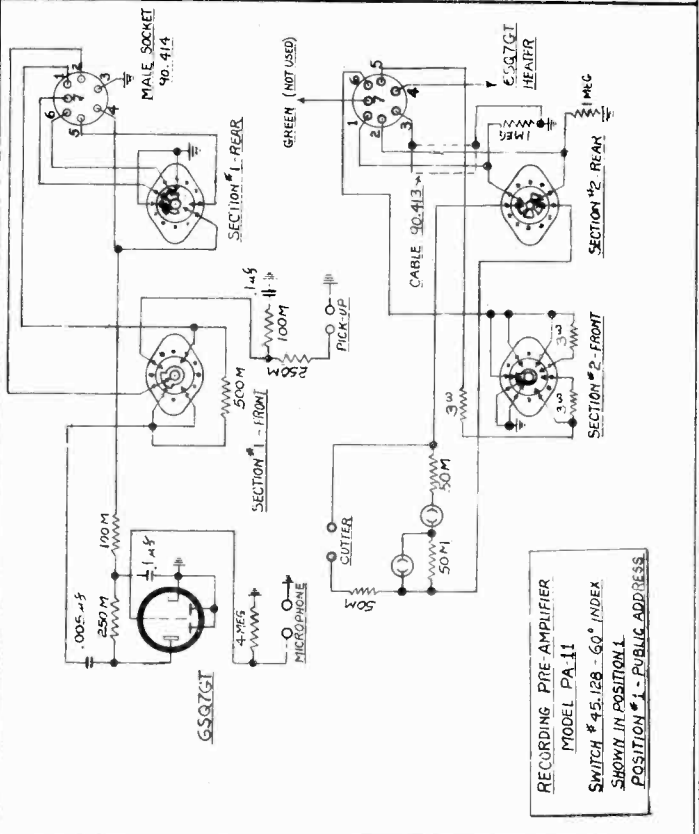
DRAWN BY *[Signature]*  
CHECKED BY *[Signature]*  
DATE *[Signature]*

VOLTAGES MEASURED TO CHASSIS  
WITH 1 M OHM PER VOLT VOLTMETER.

I REG. RANGES  
SHORT WAVE = 4.8 TO 16.3 MC  
BROADCAST = 5.36 TO 17.00 MC  
M = THOUSAND OHMS

IF PEAK 456 KC

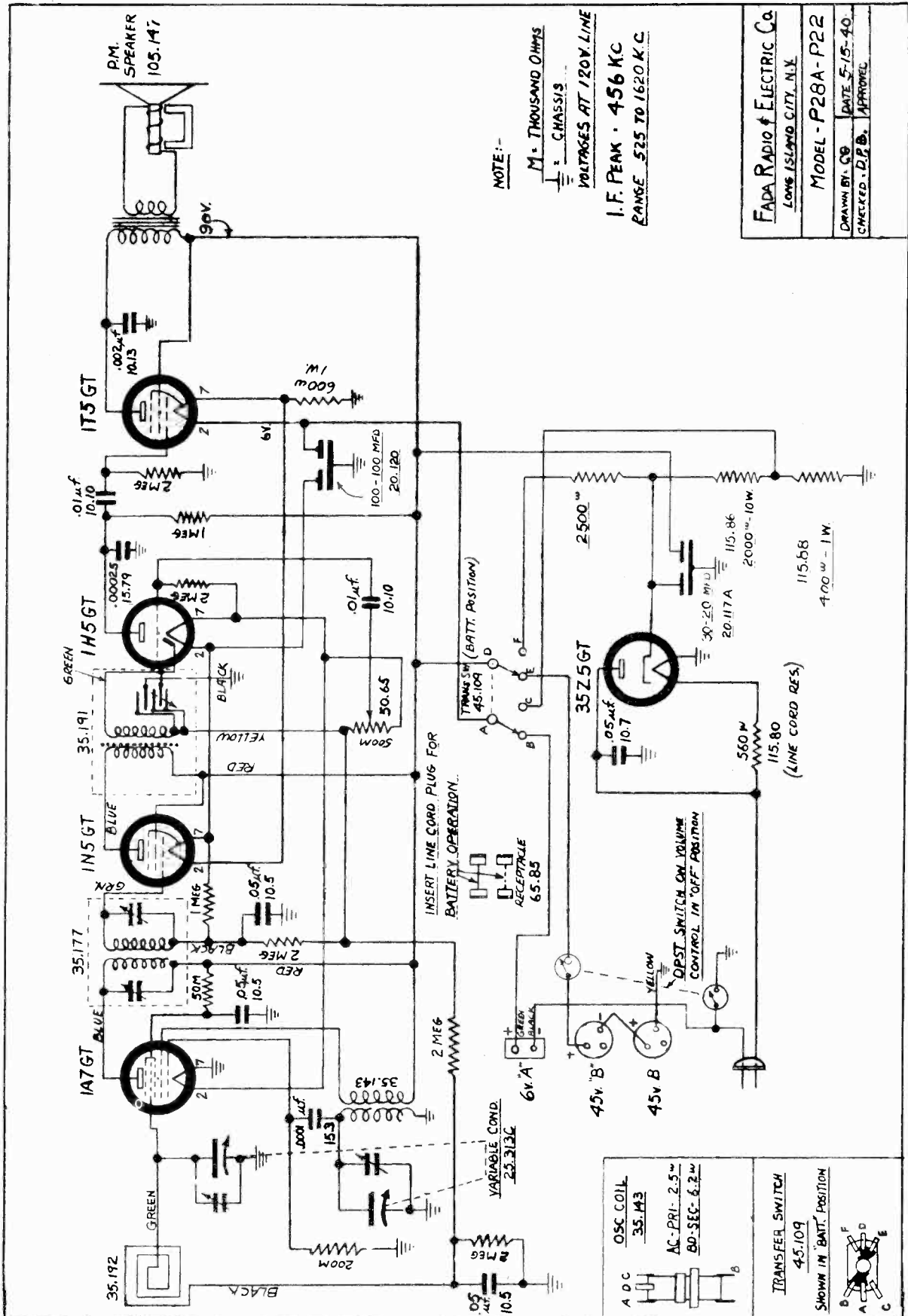
GREEN (NOT USED)  
BLACK  
BLUE  
RED  
YELLOW  
BROWN



RECORDING PRE-AMPLIFIER  
MODEL PA-11  
SWITCH #45.128 - 60° INDEX  
SHOWN IN POSITION 1  
POSITION #1 - PUBLIC ADDRESS



FADA RADIO & ELECTRIC CO.



NOTE:-  
 M = THOUSAND OHMS  
 CHASSIS  
 VOLTAGES AT 120V LINE  
 I.F. PEAK - 456 KC  
 RANGE 525 TO 1620 KC

FADA RADIO & ELECTRIC CO.	
LONG ISLAND CITY, N.Y.	
MODEL - P28A - P22	
DRAWN BY: G.B.	DATE 5-15-40
CHECKED: D.P.B.	APPROVED

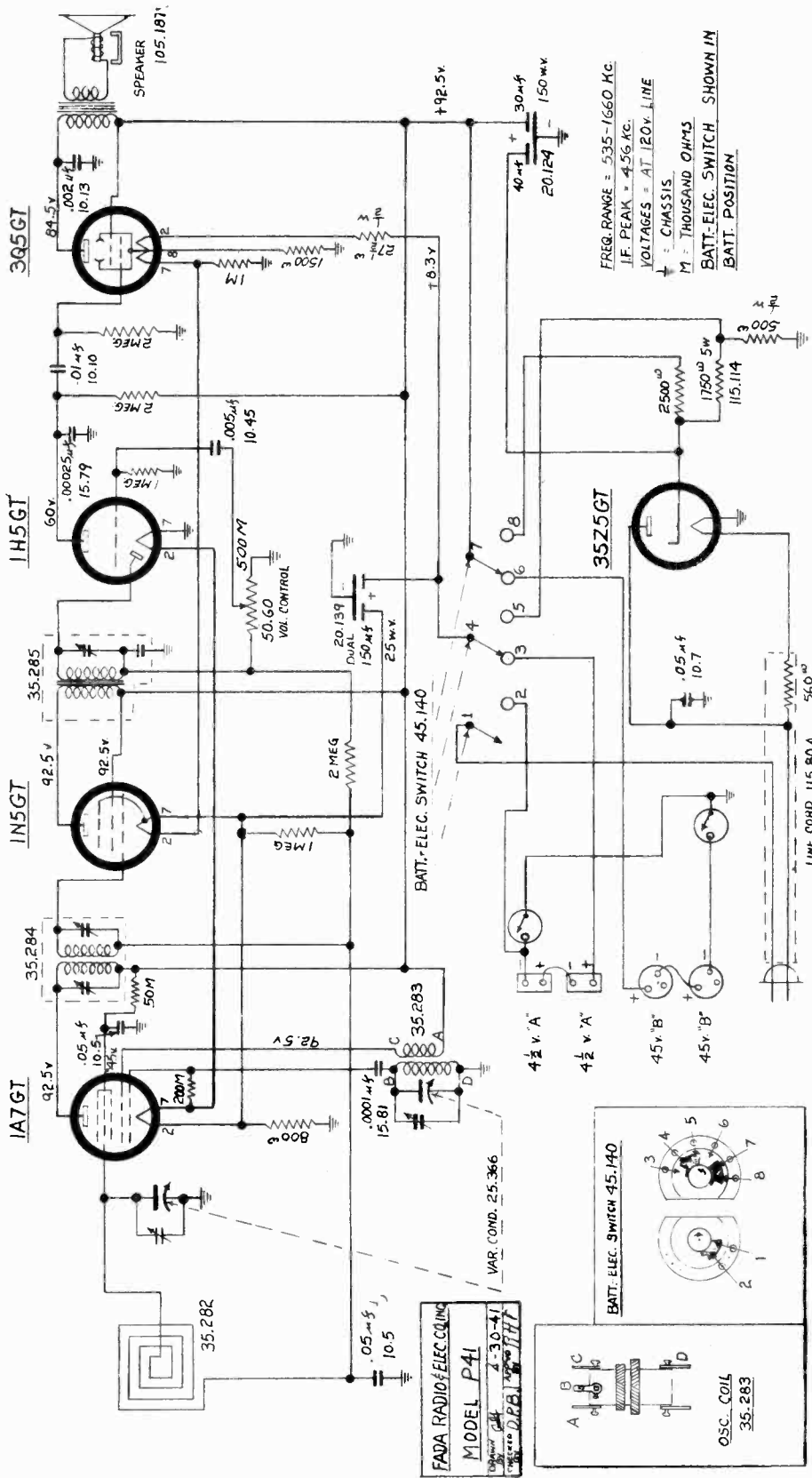
A DC	OSC COIL	35.143
	AC - PRI -	2.5 w
	50 - SEC -	6.2 w

TRANSFER SWITCH	
45.109	
SHOWN IN 'BATT.' POSITION	



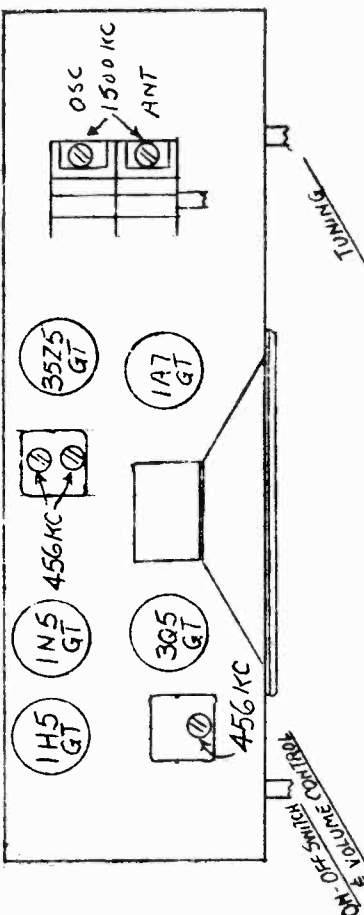
MODEL P41

FADA RADIO & ELECTRIC CO.



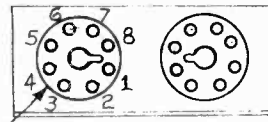
FREQ. RANGE = 535-1660 KC.  
 IF. PEAK = 456 KC.  
 VOLTAGES = AT 120V. LINE  
 + = CHASSIS  
 M = THOUSAND OHMS  
 BATT. ELEC. SWITCH SHOWN IN  
 BATT. POSITION

**ALIGNMENT:** Vol. con. pos.: It is important that loop and batteries occupy same relative positions as in carrying case. IF- Var. cond. fully open. Feed 456 kc sig. into con. grid of 1A7GT tube. Adj. 3 IF trims. for max. o.p. RF- Couple gen. lead loosely to loop, set gen. to 1700 kc. Adj. osc. trim. to pick up this sig. with variable cond. fully open. Change to 1500 kc and adj. 1500 kc ant. trim. for greatest o.p. On 600 kc it may be necessary to bend plates to insure proper tracking.

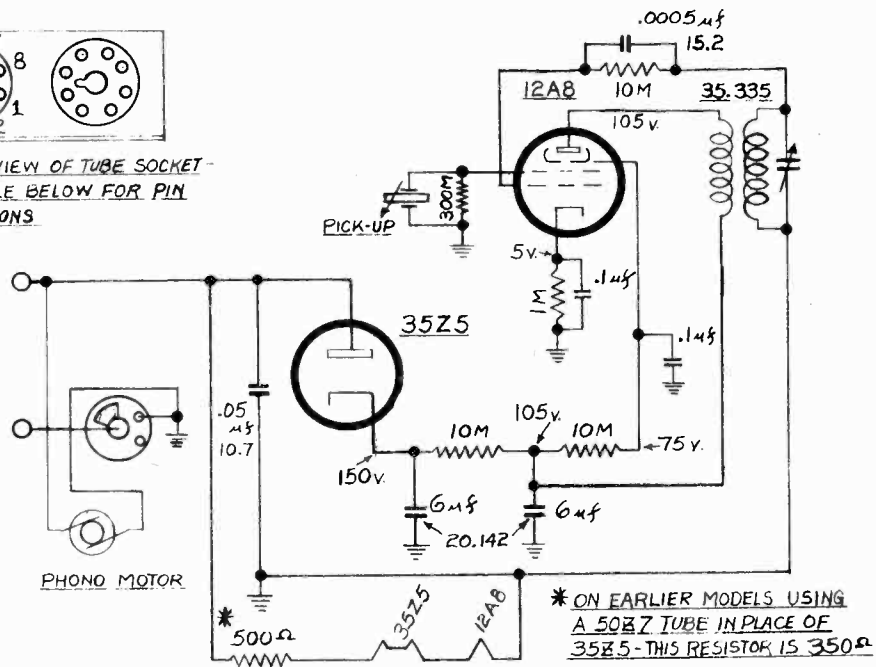


FADA RADIO & ELECTRIC CO.

MODELS WP-101, WP-102  
MODELS AP-104, AP-105



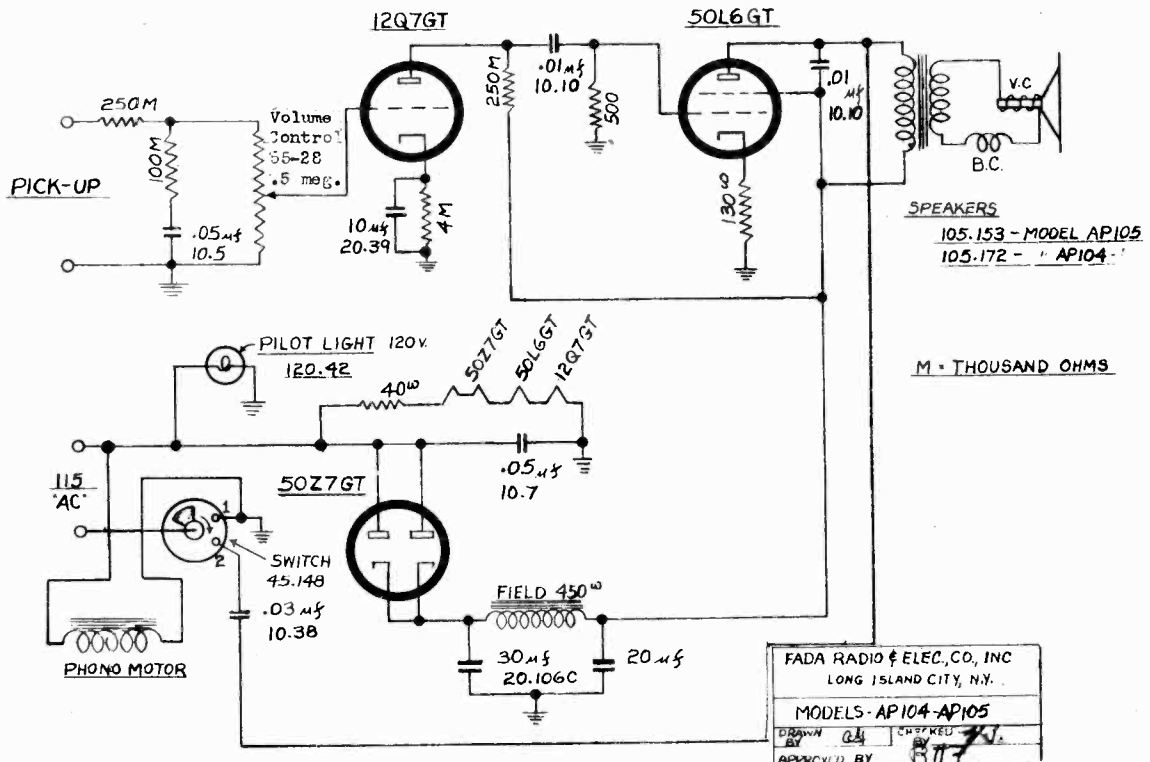
BOTTOM VIEW OF TUBE SOCKET -  
SEE TABLE BELOW FOR PIN  
CONNECTIONS



\* ON EARLIER MODELS USING  
A 50Z7 TUBE IN PLACE OF  
35Z5 - THIS RESISTOR IS 350Ω

PIN CONNECTIONS								
TUBE	1	2	3	4	5	6	7	8
35Z5	NO CONNECT.	HEATER	HEATER TAP	NO CONNECT.	PLATE	NO CONNECT.	HEATER	CATHODE
50Z7	NO CONNECT.	HEATER	PLATE	CATHODE	PLATE	HEATER TAP	HEATER	CATHODE

FADA RADIO & ELEC. CO. INC.  
LONG ISLAND CITY, N.Y.  
MODELS - WP101 - WP102  
DRAWN BY *GH* DATE 9-17-41  
CHECKED BY *GH* APPROVED BY *RTT*



SPEAKERS  
105.153 - MODEL AP105  
105.172 - " AP104 "

M = THOUSAND OHMS

FADA RADIO & ELEC. CO. INC.  
LONG ISLAND CITY, N.Y.  
MODELS - AP104 - AP105  
DRAWN BY *GH* CHECKED BY *GH*  
APPROVED BY *RTT*

SWITCH 45-148 SHOWN IN "OFF" POSITION  
CONTACT 1 - MOTOR & UNIT "ON" - TREBLE TONE  
" 1 & 2 - " " " " - BASS "

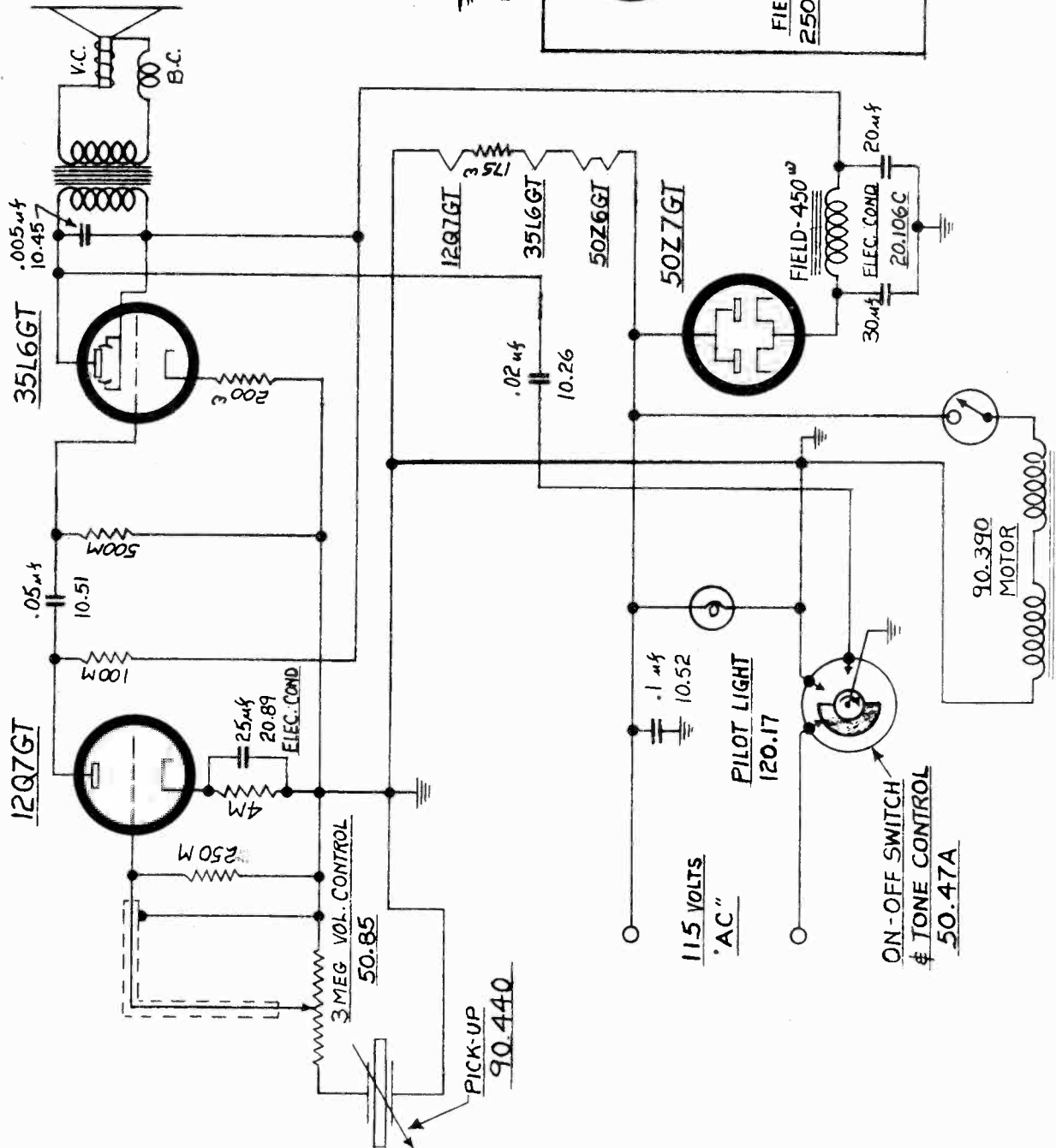
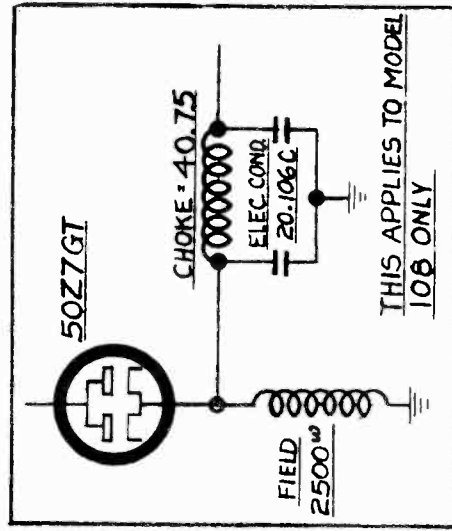
MODELS 107, 108  
Phono.

FADA RADIO & ELECTRIC CO.

MODEL 107 - SPEAKER 105.172  
MODEL 108 - SPEAKER 105.145

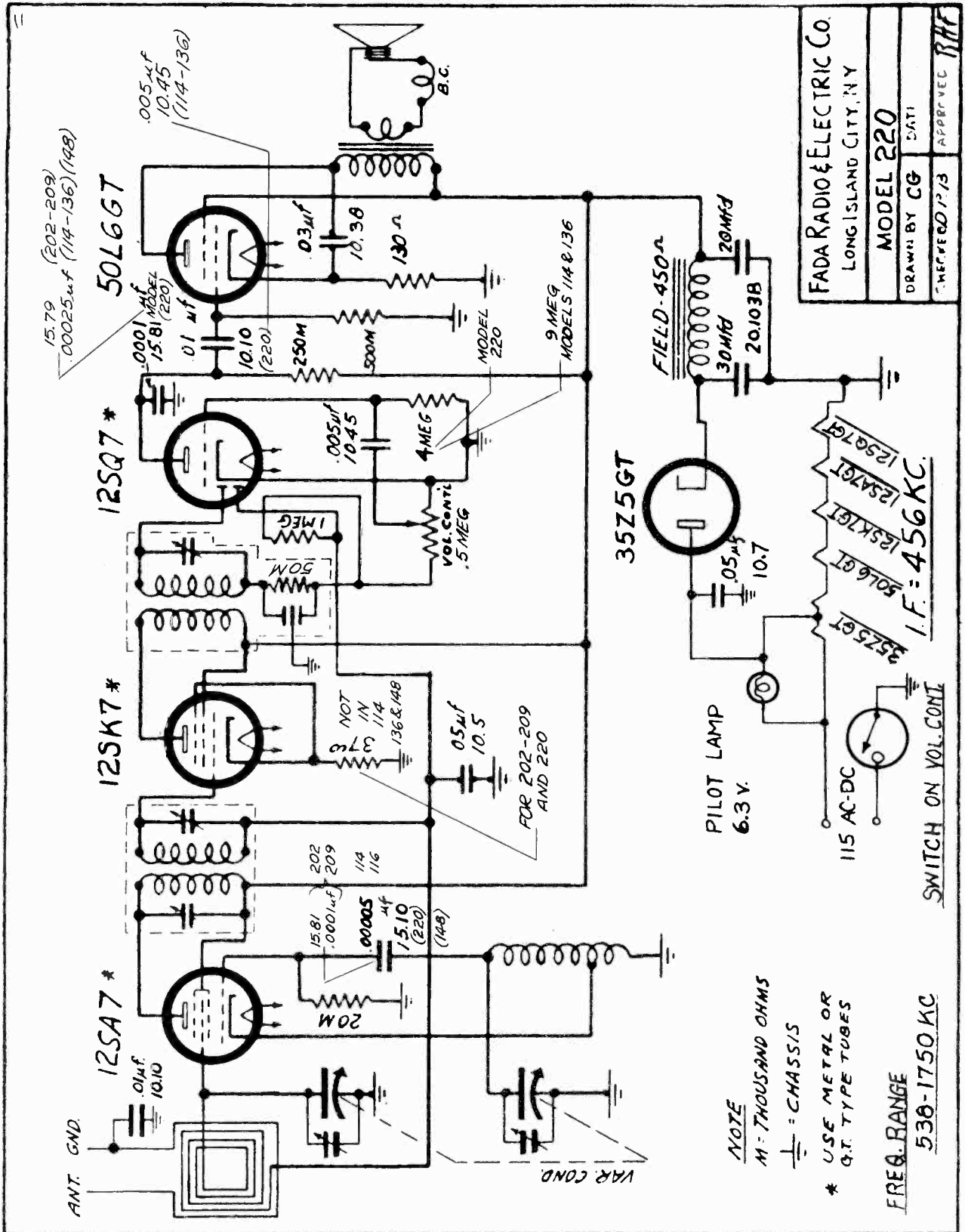
FADA RADIO & ELEC. CO., INC. LONG ISLAND CITY, N.Y.	
RECORD PLAYER - 107-108	
DRAWN BY C.M.	DATE 9-23-41
CHECKED BY R.H.	APPROVED BY R.H.

CHASSIS  
M = THOUSAND OHMS



FADA RADIO & ELECTRIC CO,

MODELS 114, 136, 148, 202, 209, 220



FADA RADIO & ELECTRIC CO.	
LONG ISLAND CITY, N.Y.	
MODEL 220	DATE
DRAWN BY CG	APPROVED
CHECKED P/3	DATE
	APPROVED

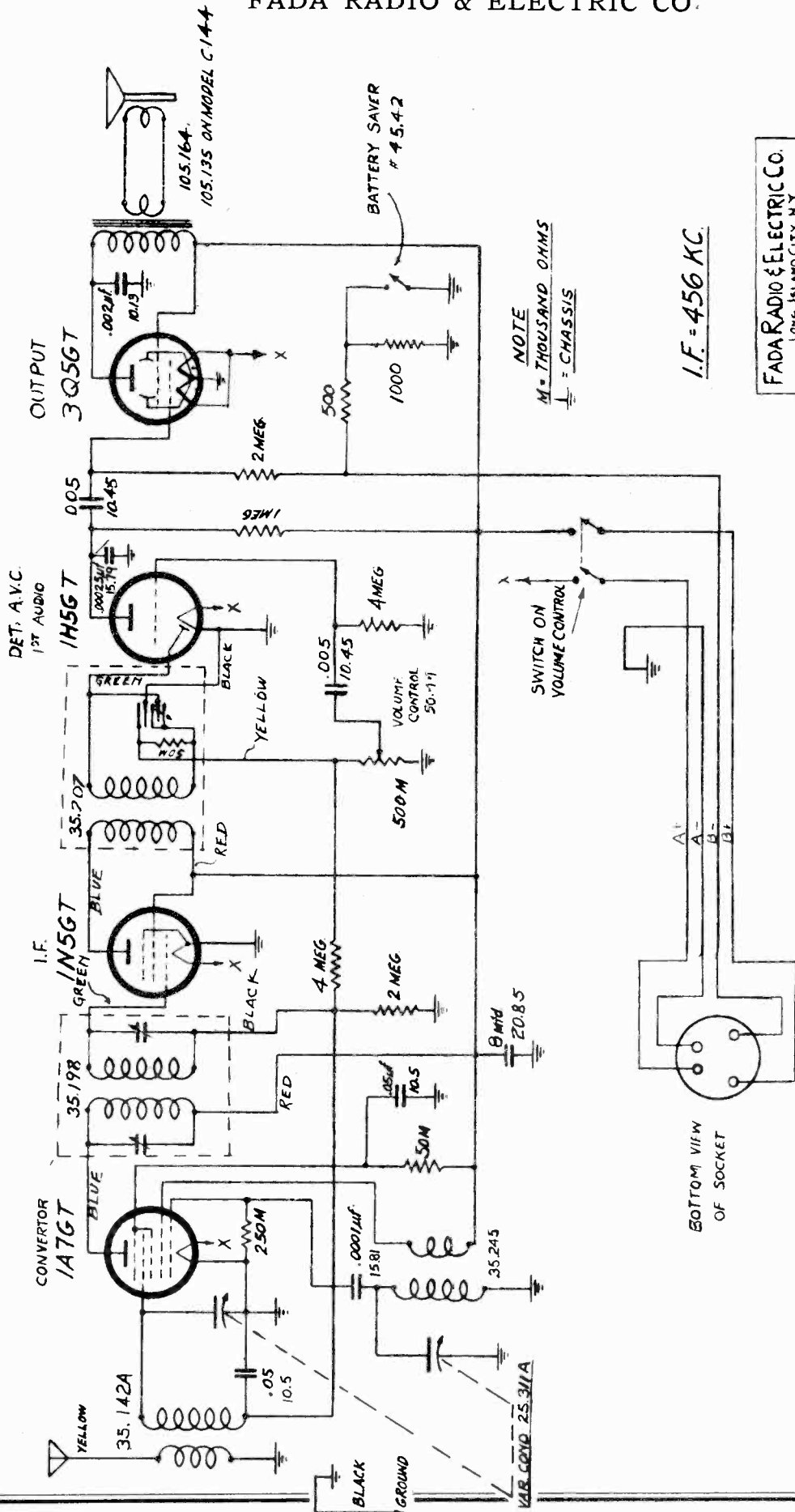
NOTE  
 M = THOUSAND OHMS  
 = CHASSIS  
 \* USE METAL OR  
 Q.T. TYPE TUBES  
 FREQ. RANGE  
 530-1750 KC

SWITCH ON VOL. CONT.

I.F. = 456 KC.

MODEL 144

FADA RADIO & ELECTRIC CO.

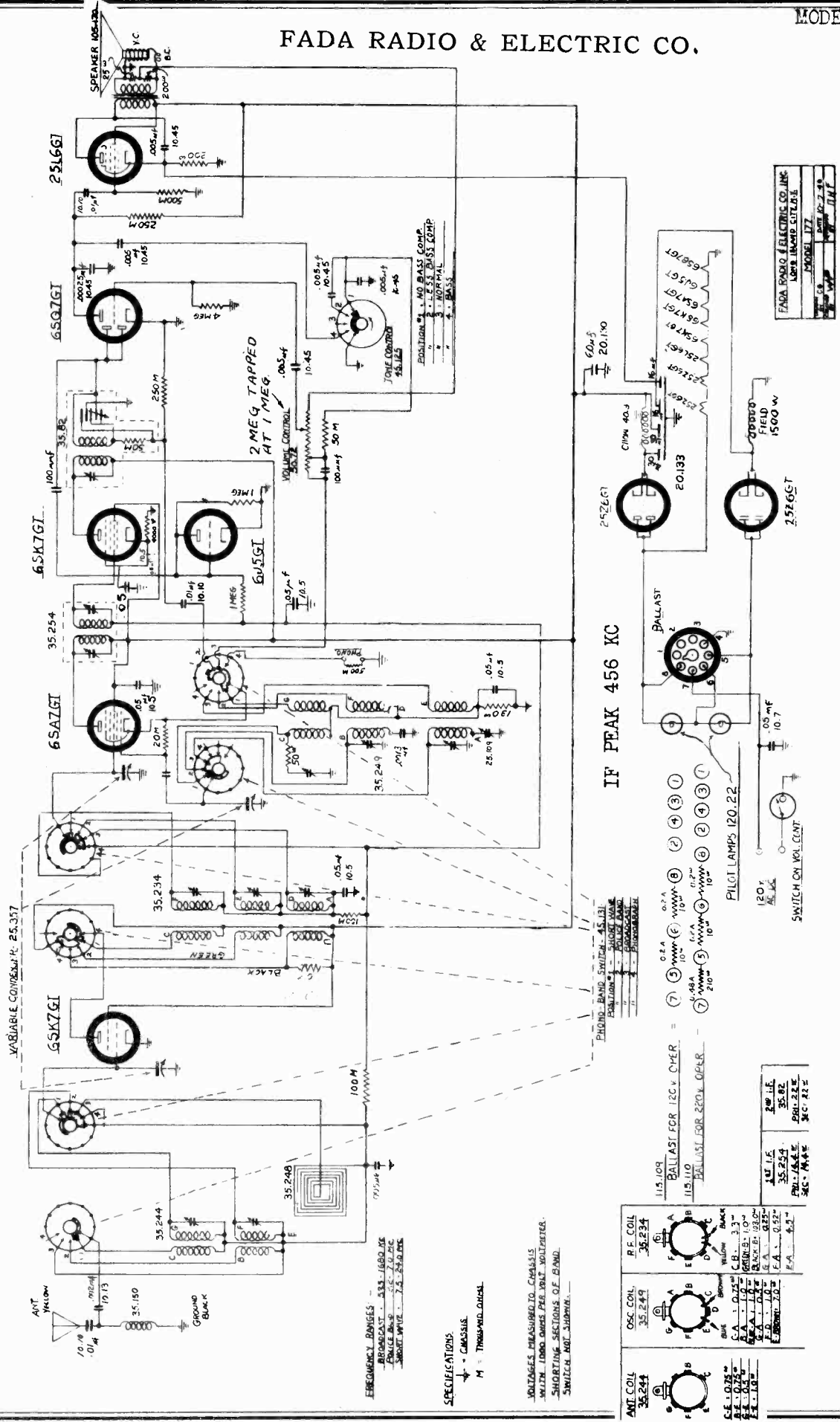


NOTE  
 M = THOUSAND OHMS  
 μ = CHASSIS

I.F. = 456 KC.

FADA RADIO & ELECTRIC CO. LONG ISLAND CITY, N.Y.	
MODEL 144	DATE 2-28-40
DRAWN BY G.M.	CHECKED BY A.P.P.

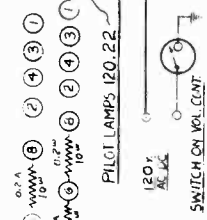
FADA RADIO & ELECTRIC CO.



Part No.	100-2-48
Part Name	INT.
Model	177
Company	FADA RADIO & ELECTRIC CO. INC.
Location	LONG BEACH, CALIF.

IF PEAK 456 KC

PHONO BAND SWITCH - 45.131  
 POSITION 1 - PHONO BAND  
 POSITION 2 - PHONO BAND  
 POSITION 3 - PHONO BAND



- 1 0.1A
- 2 0.1A
- 3 0.1A
- 4 0.1A
- 5 0.1A
- 6 0.1A
- 7 0.1A
- 8 0.1A
- 9 0.1A
- 10 0.1A
- 11 0.1A
- 12 0.1A

Part No.	35.254
Part Name	OSC. COIL
Frequency	456 KC
Material	PERMALLOY

Part No.	35.244
Part Name	ANT. COIL
Frequency	456 KC
Material	PERMALLOY

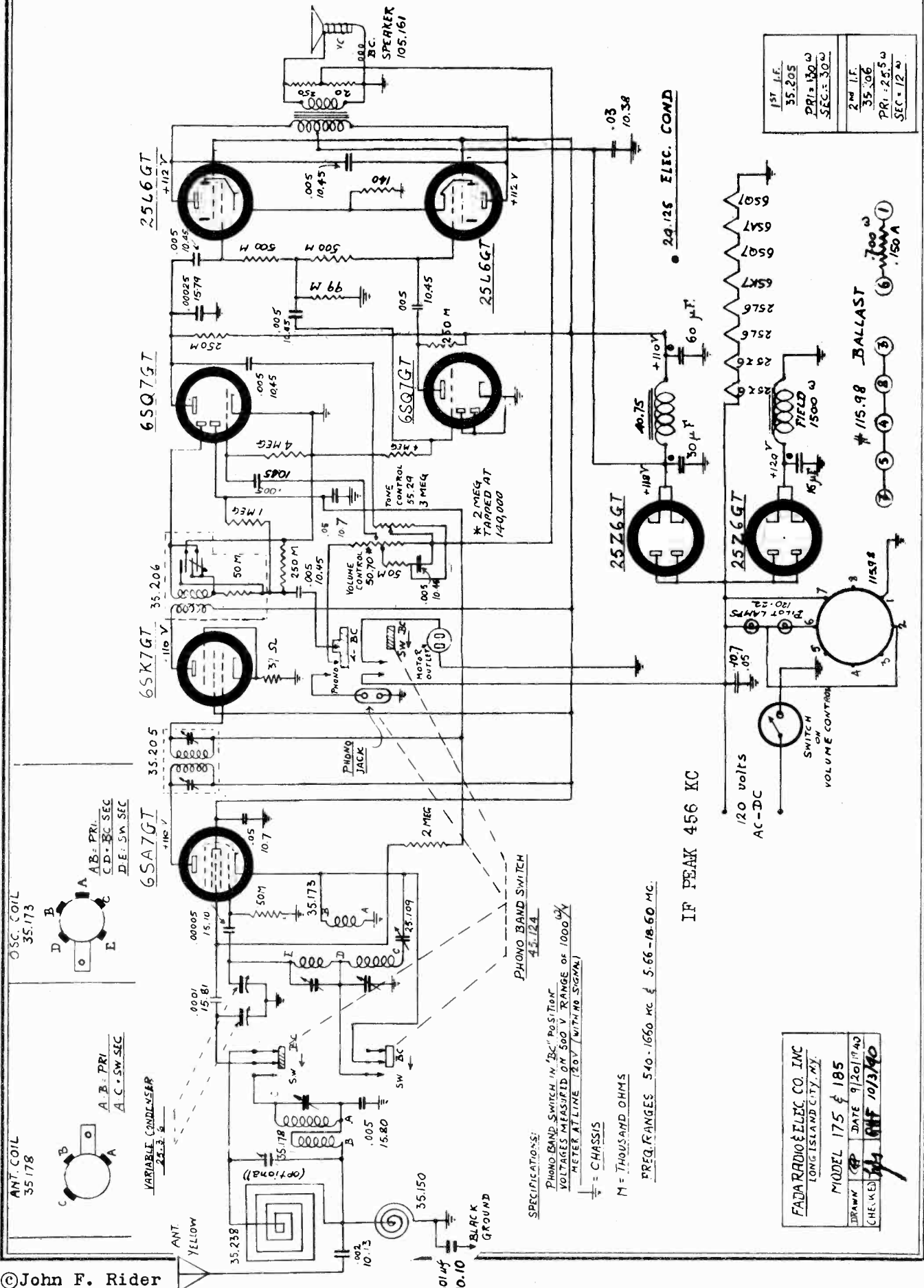
EMERGENCY RANGES -  
 BROADCAST - 535-1680 KC  
 PHONO BAND - 50-7500 KC  
 SHORT WAVE - 7.5-2500 KC

SPECIFICATIONS  
 \* CAMASSIS  
 M = THROUGH-DRILL

VOLTAGES MEASURED TO CHASSIS  
 WITH 1000 OHMS PER VOLT VOLTMETER.  
 SHORTING SECTIONS OF BAND  
 SWITCH NOT SHOWN.

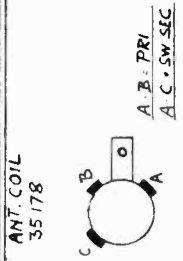
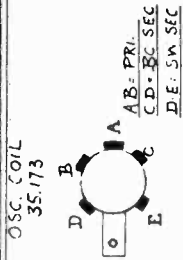
MODELS 175, 185

FADA RADIO & ELECTRIC CO.



1ST I.F.	35.205
2ND I.F.	35.06
PR. 150Ω	
SEC. 30Ω	
2ND I.F.	35.06
PR. 25Ω	
SEC. 12Ω	

1	2	3	4	5	6	7
115.98	1500	1500	1500	1500	1500	1500
ohms	ohms	ohms	ohms	ohms	ohms	ohms



PHONO BAND SWITCH  
4-5-124

SPECIFICATIONS:  
PHONO BAND SWITCH IN "BC" POSITION  
VOLTAGES MEASURED ON 500 V RANGE OF 1000 X  
METER AT LINE (20 V WITH NO SIGNAL)

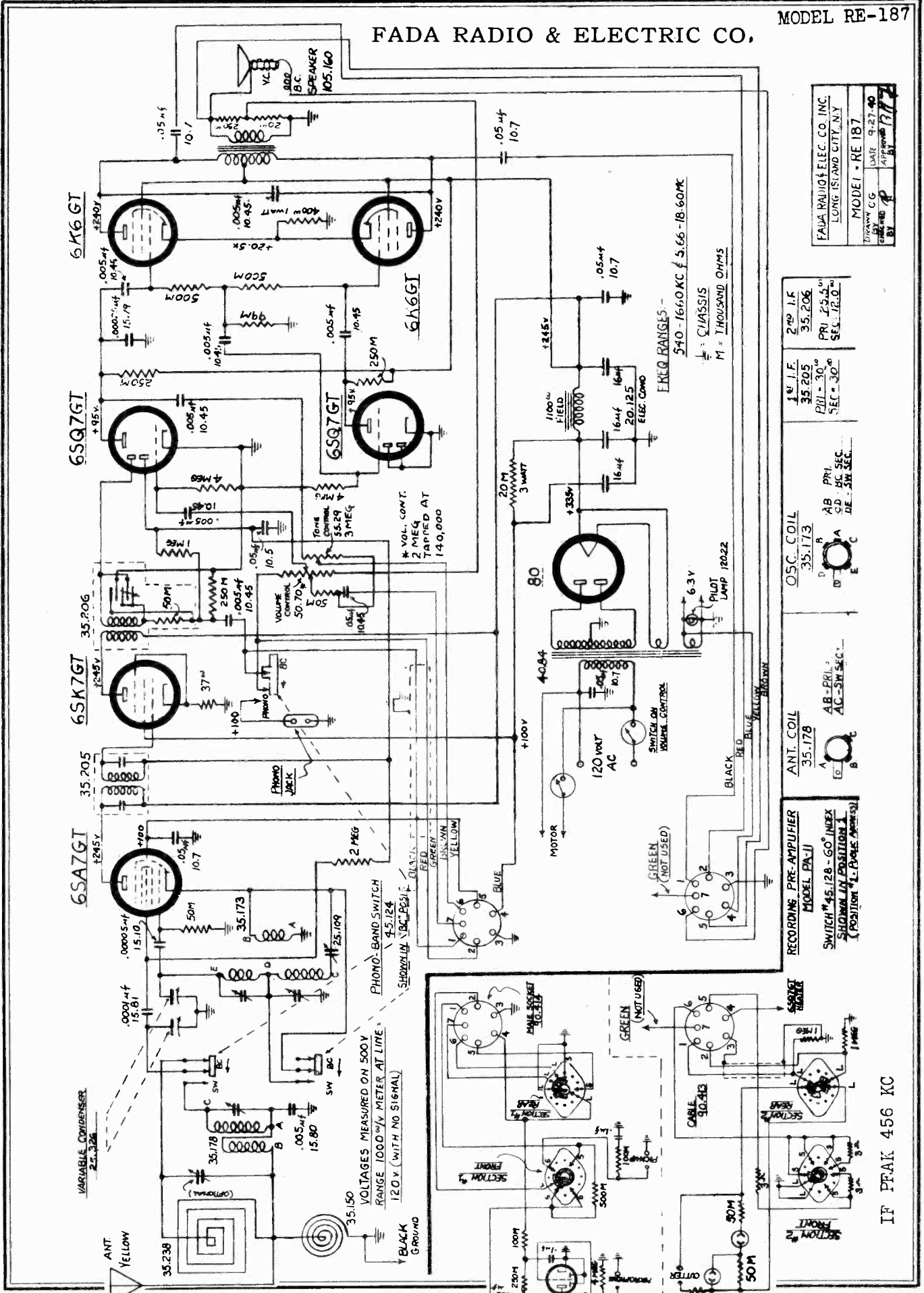
M = THOUSAND OHMS  
FREQ. RANGES 540 - 1660 KC & 5.66 - 18.60 MC.

IF PEAK 456 KC

FADA RADIO & ELECTRIC CO. INC.  
LONG ISLAND CITY, N.Y.  
MODEL 175 & 185  
DRAWN DATE 9/20/1940  
CHECKED 10/13/40

FADA RADIO & ELECTRIC CO.

MODEL RE-187



FADA RADIO & ELECTRIC CO. INC.  
 LONG ISLAND CITY, N.Y.

MODEL - RE 187

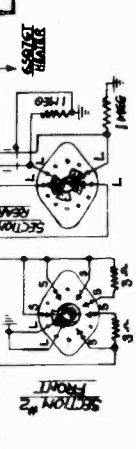
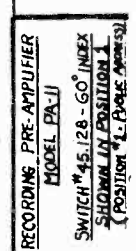
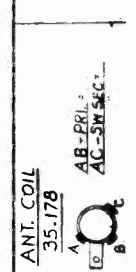
DESIGNED BY [Signature]

DATE 9-27-40

APPROVED BY [Signature]

1st I.F.	35.205
2nd I.F.	35.206
PRI. SEC.	30. 12.0
AB BC DE	5W 5W 5W 5W 5W

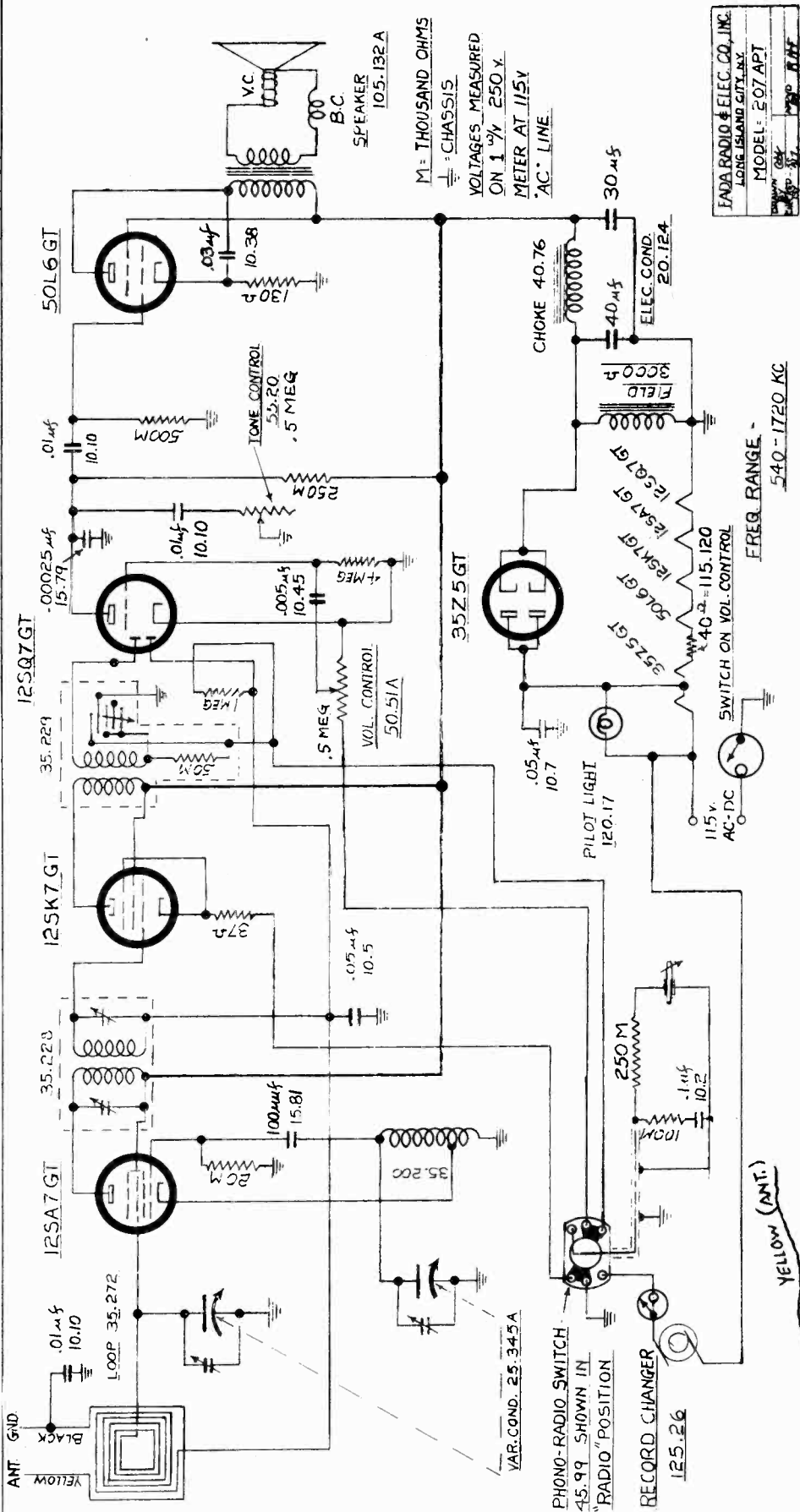
OSC. COIL	35.173
ANT. COIL	35.178
RECORDING PRE-AMPLIFIER	MODEL PA-11
SWITCH #45.128 - 60 INDEX	SHOWN IN POSITION 1 (POSITION #45.128 - 60 INDEX)



IF PFAK 456 KC



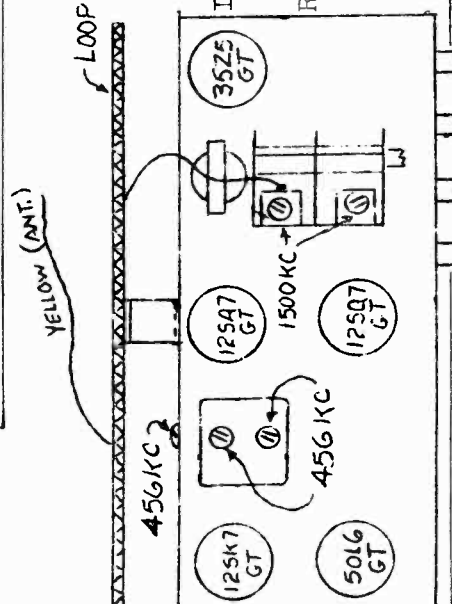
FADA RADIO & ELECTRIC CO.



ALIGNMENT PROCEDURE

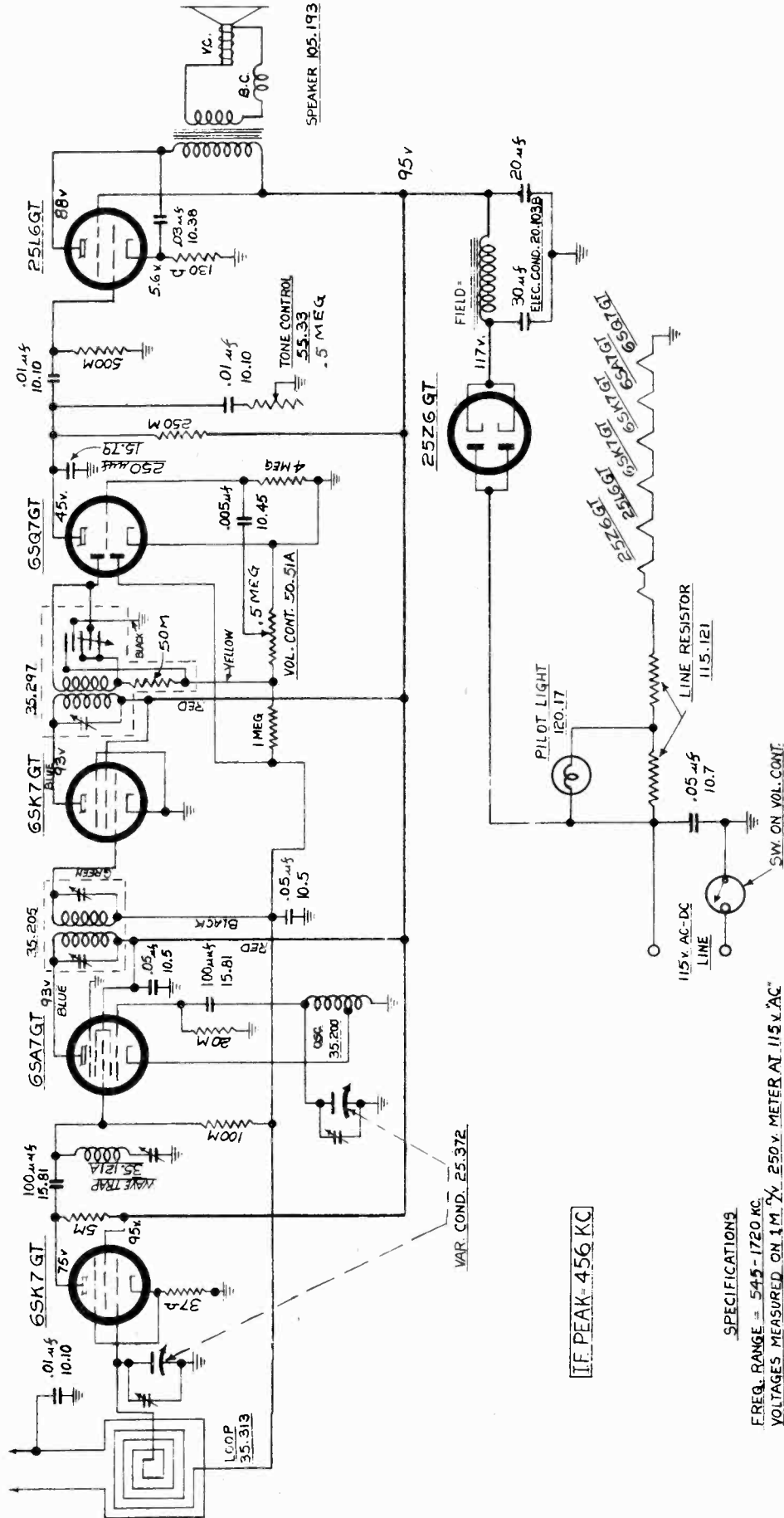
Feed 456 K.C. signal to 12SA7 control grid (top rear section of variable condenser). Adjust T-1-2-3 for maximum output. Feed 1500 K.C. signal to yellow (ant.) lead in series with 200 mmf. condenser. Adjust T-4 for calibration (1500 KC) and T5 for maximum output. Check sensitivity on 600 KC. It may be necessary to bend plates to insure proper tracking.

I.F. PEAK 456 KC



FADA RADIO & ELECTRIC CO.

MODEL 214



IF. PEAK = 4.56 KC

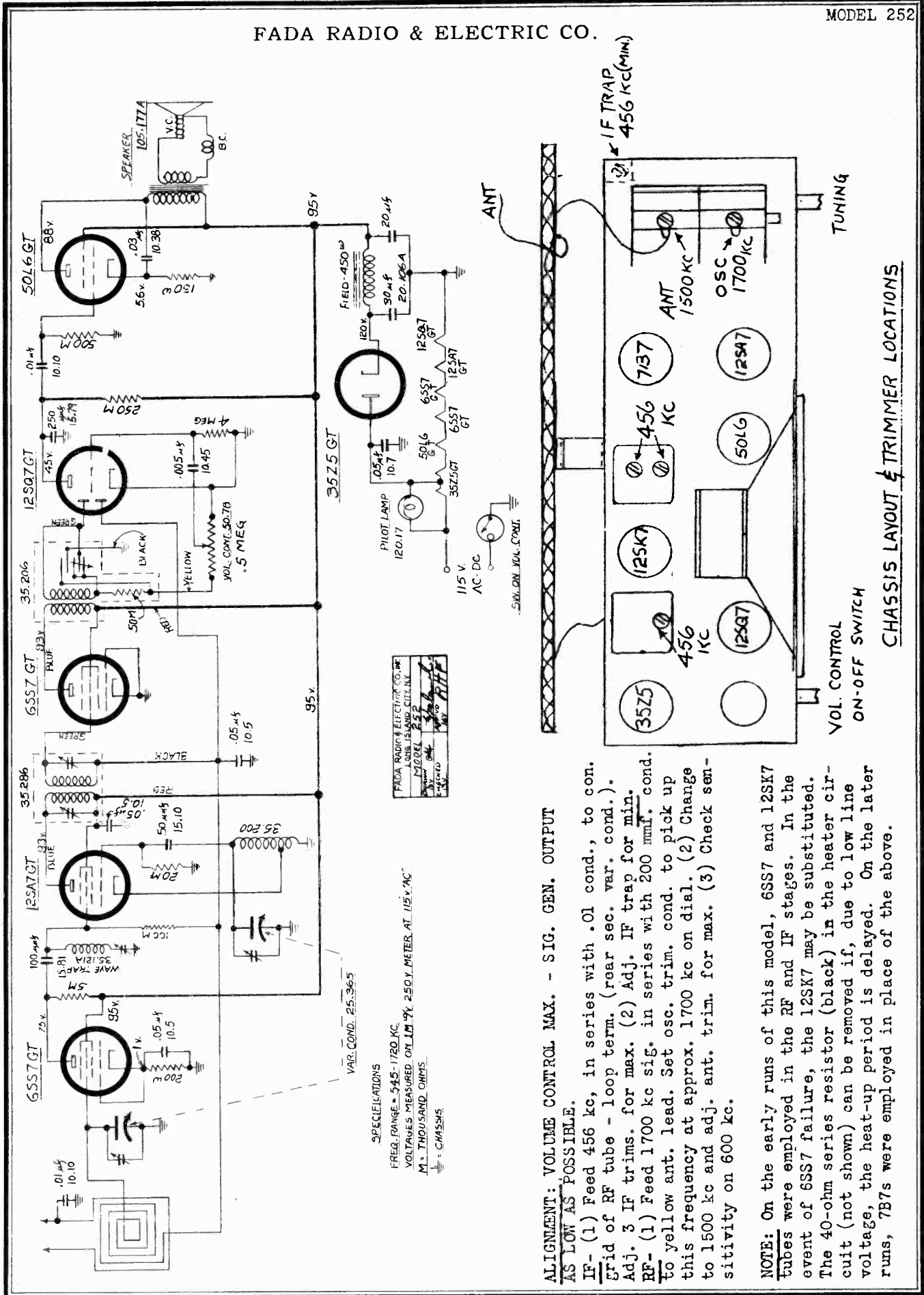
SPECIFICATIONS

FREQ. RANGE = 545 - 1720 KC.  
 VOLTAGES MEASURED ON 1 M Ω 250 V. METER AT 115 V. AC.  
 M = THOUSAND OHMS.  
 ⊥ = CHASSIS  
 — = CONNECTED WIRES

FADA RADIO & ELEC. CO. INC.	
LONG ISLAND CITY, N.Y.	
MODEL 214	
Company C44	Part 8-29-41
By J.P.B.	Checked G.H.

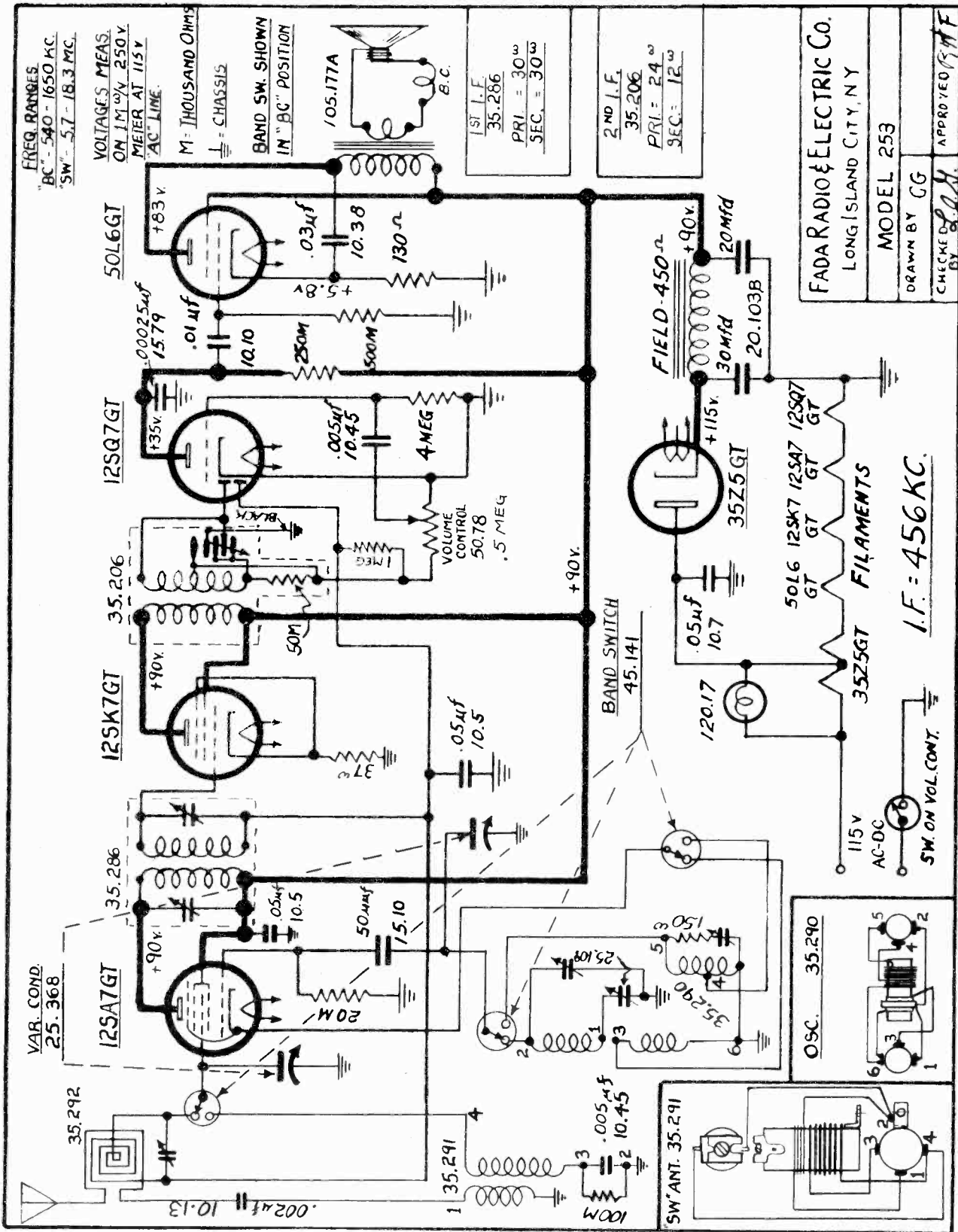


FADA RADIO & ELECTRIC CO.



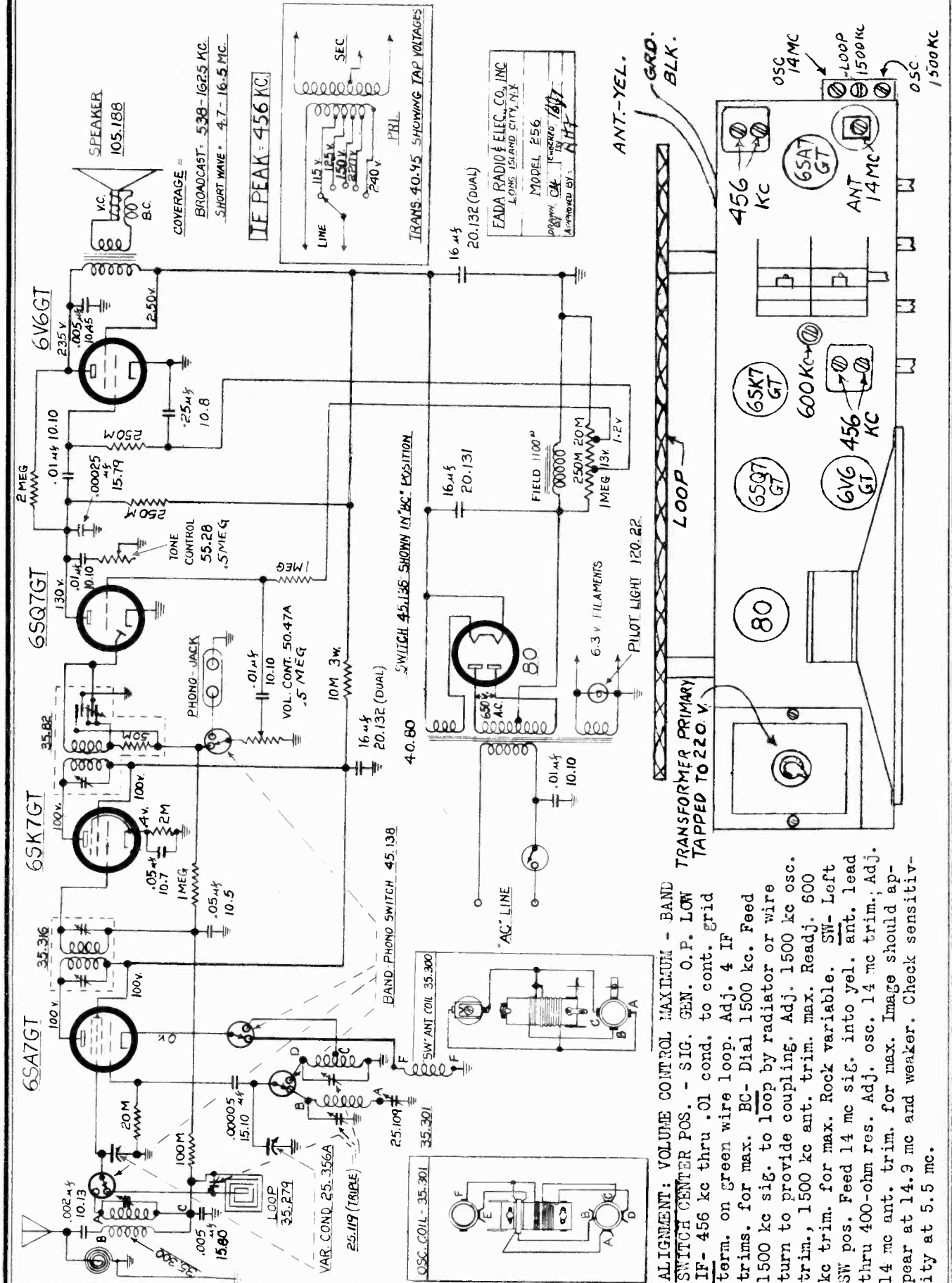
© John F. Rider

FADA RADIO & ELECTRIC CO.

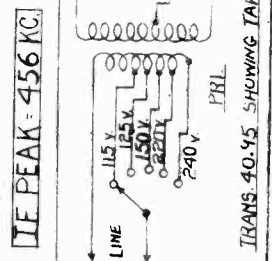


FADA RADIO & ELECTRIC CO.

MODEL 256



FADA RADIO & ELECTRIC CO., INC.  
 LONG ISLAND CITY, N.Y.  
 MODEL 256  
 Patented in U.S. & Canada  
 Approved by: N.Y.C.



COVERAGE =  
 BROADCAST - 538 - 1625 KC.  
 SHORT WAVE - 4.7 - 16.5 MC.

SPEAKER  
 105.188

ANT. - YEL.  
 GRD. BLK.

OSC. 14MC  
 LOOP 1500KC  
 OSC. 1500KC

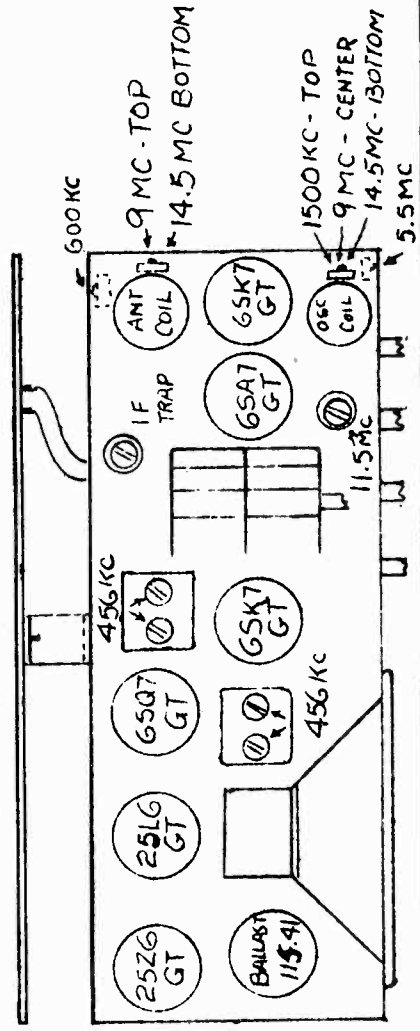
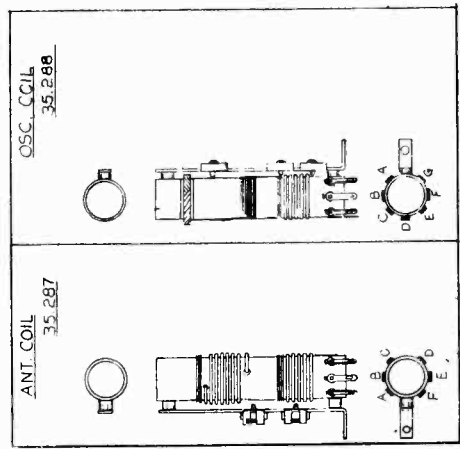
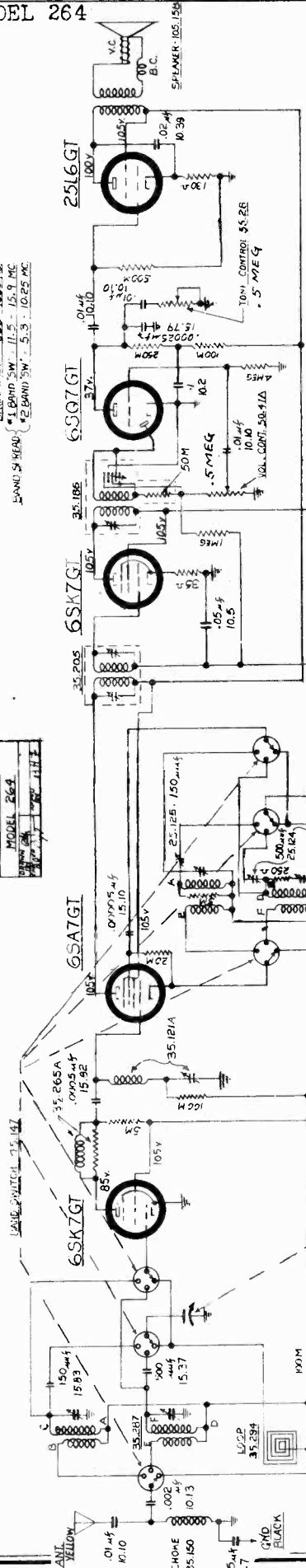
ALIGNMENT: VOLUME CONTROL MAXIMUM - BAND SWITCH CENTER POS. - SIG. GEN. O.P. LOW  
 IF - 456 kc thru .01 cond. to cont. grid term. on green wire loop. Adj. 4 IF trims. for max. BC - Dial 1500 kc. Feed 1500 kc sig. to loop by radiator or wire trim, 1500 kc ant. trim. max. Readj. 600 kc trim. for max. Rock variable. SW - Left SW pos. Feed 14 mc sig. into yel. ant. lead thru 400-ohm res. Adj. osc. 14 mc trim.; Adj. 14 mc ant. trim. for max. Image should appear at 14.9 mc and weaker. Check sensitivity at 5.5 mc.

MODEL 264

FADA RADIO & ELECTRIC CO.

FREQ. RANGE:  
USCAIRCAST... 530-1625 KC.  
BAND 5 MEAS. 1 BAND SW. 11.5-15.9 MC  
2 BAND SW. 5.3-10.25 MC

FADA RADIO & ELECTRIC CO.
MODEL 264
1937
1117



ALIGNMENT: VOL.

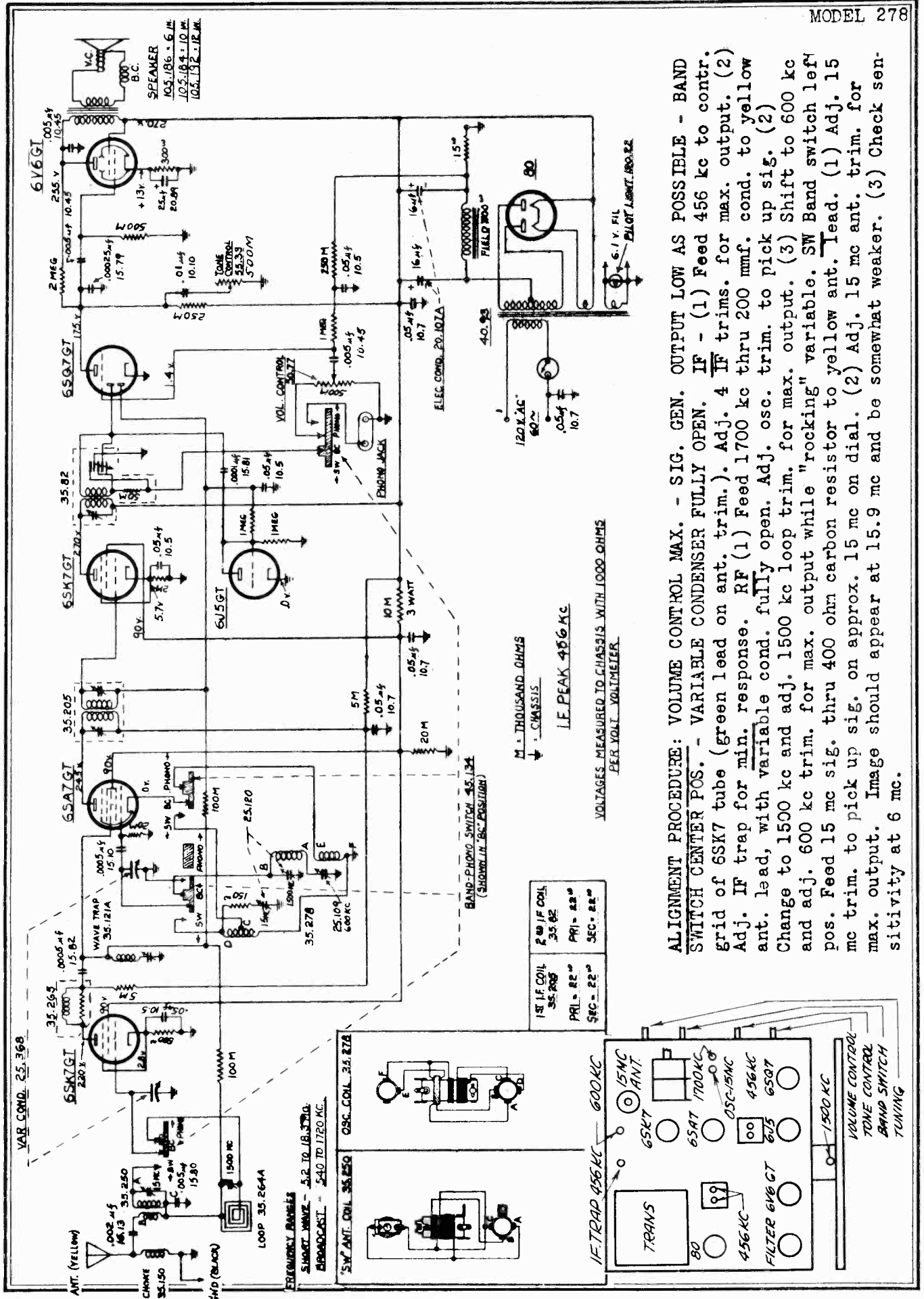
CONTROL - MAX. POS. - GEN. O.P. LOW-BAND SW. (BC) RIGHT POS. - VARIABLE COND. FULLY OPEN. IF-456 kc loop term. green wire. (1) Adj. 4 IF trims for max. (2) Adj. IF trap for min.

BC-1500 kc sig. thru 200 mmf. cond. to yellow ant. lead.

(1) Adj. 1500 kc osc. trim. for max. Rock variable. (2) Readj. 600 kc trim. for max. Rock var.

SW 1- Band switch left pos. 14.5 mc sig. to yellow ant. lead in series with 400 ohm carbon res. (1) Adj. 14.5 mc osc. and ant. trims. for max. Image should appear on 15.4 mc and weaker. (2) Readj. at 11.5 mc trim. for max. Rock variable.

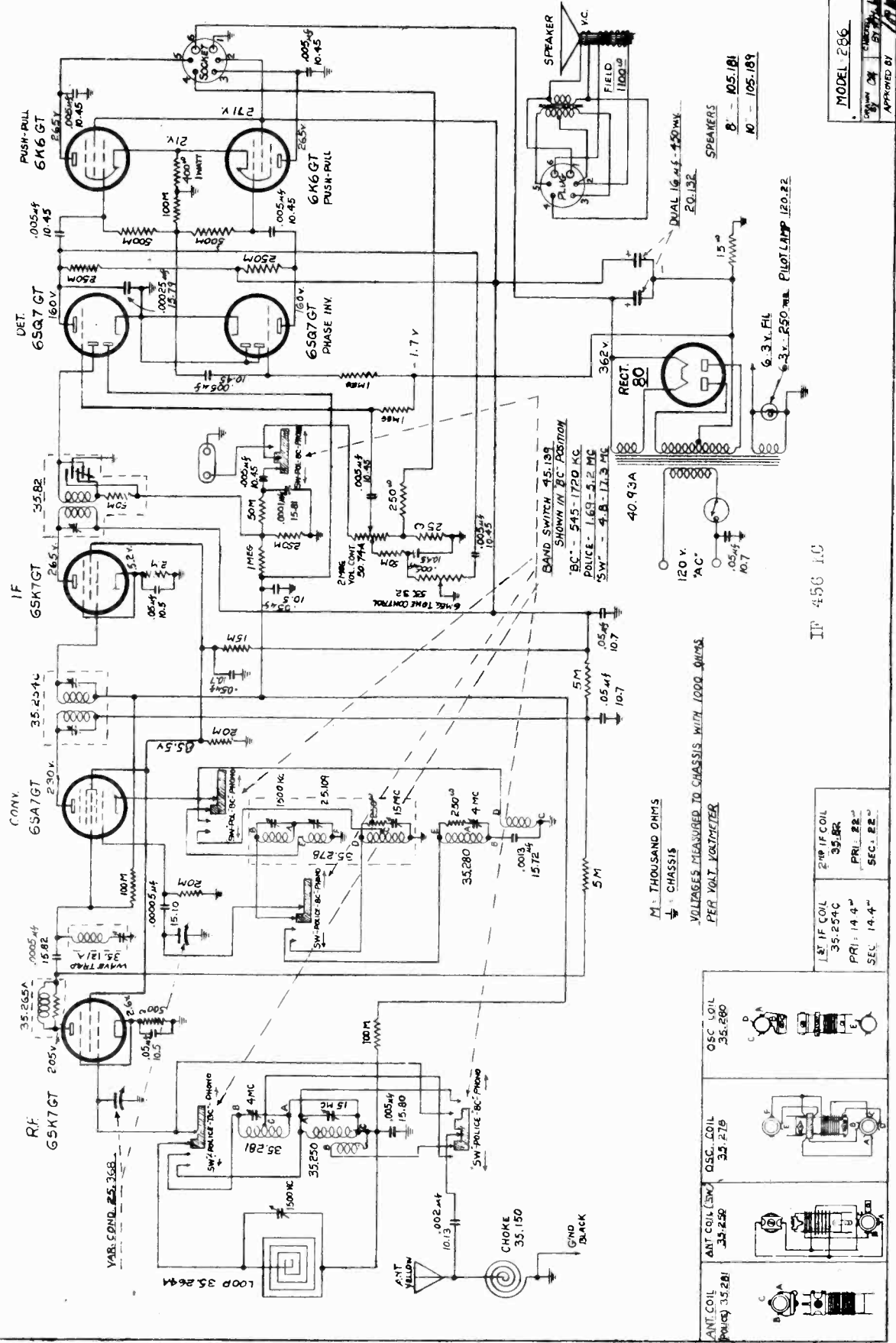
SW 2- Band switch center pos. (1) Set to 9 mc. Adj. 9 mc osc. and ant. trim. for max. (2) Change to 5.5 mc and adj. 5.5 mc trim. for max. Rock variable.



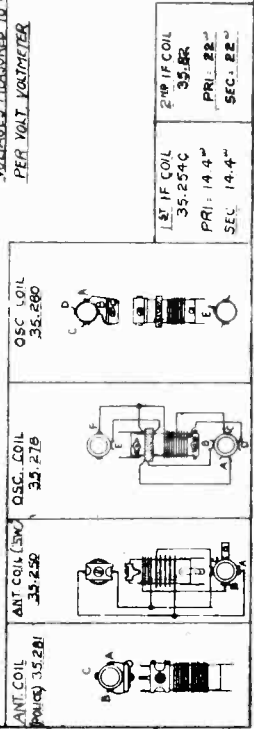
**ALIGNMENT PROCEDURE: VOLUME CONTROL MAX. - SIG. GEN. OUTPUT LOW AS POSSIBLE - BAND SWITCH CENTER POS. - VARIABLE CONDENSER FULLY OPEN. IF - (1) Feed 456 kc to contr. grid of 6SK7 tube (green lead on ant. trim.). Adj. 4 IF trims. for max. output. (2) Adj. IF trap for min. response. RF (1) Feed 1700 kc thru 200 mmf. cond. to yellow ant. lead, with variable cond. fully open. Adj. osc. trim. to pick up sig. (2) Change to 1500 kc and adj. 1500 kc loop trim. for max. output. (3) Shift to 600 kc and adj. 600 kc trim. for max. output while "rocking" variable. SW Band switch left pos. Feed 15 mc sig. thru 400 ohm carbon resistor to yellow ant. lead. (1) Adj. 15 mc trim. to pick up sig. on approx. 15.9 mc and be somewhat weaker. (2) Adj. 15 mc ant. trim. for max. output. Image should appear at 15.9 mc and be somewhat weaker. (3) Check sensitivity at 6 mc.**



FADA RADIO & ELECTRIC CO.



M = THOUSAND OHMS  
 V = CHASSIS  
 VOLTAGES MEASURED TO CHASSIS WITH 1000 OHMS PER VOLT VOLTMETER

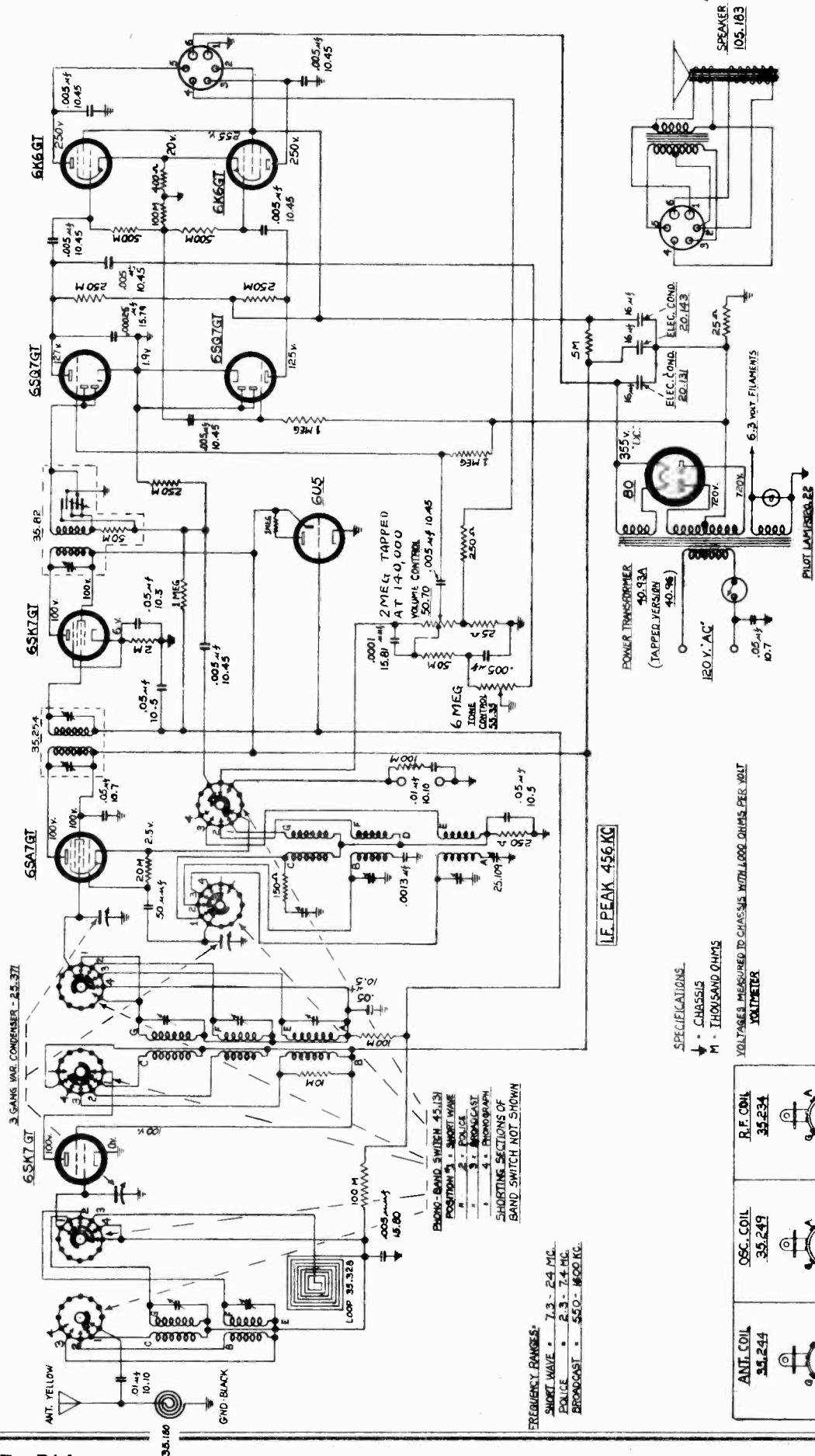


IP 456 IC

MODEL 286  
 APPROVED BY

FADA RADIO & ELECTRIC CO.

MODELS 288, 295



LF. PEAK 456 KC

SPECIFICATIONS.  
 \* - CHASSIS  
 M - THOUSAND OHMS  
 VOLTAGES MEASURED TO CHASSIS WITH 1,000 OHMS PER VOLT  
 10121212

FREQUENCY RANGES:  
 SHORT WAVE \* 7.3 - 24 MC.  
 POLICE \* 2.3 - 7.4 MC.  
 BROADCAST \* 550 - 1600 KC.

PHONO-BAND SWITCH 45.131  
 POSITION 1 - SHORT WAVE  
 " 2 - POLICE  
 " 3 - BROADCAST  
 " 4 - PHOTOGRAPH  
 SHORTING SECTIONS OF  
 BAND SWITCH NOT SHOWN

ANT. COIL 34.244	OSC. COIL 35.249	R.F. COIL 35.234

295-288

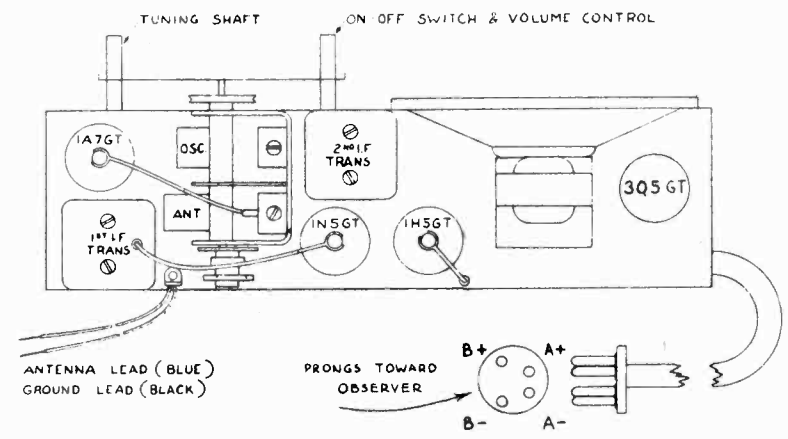
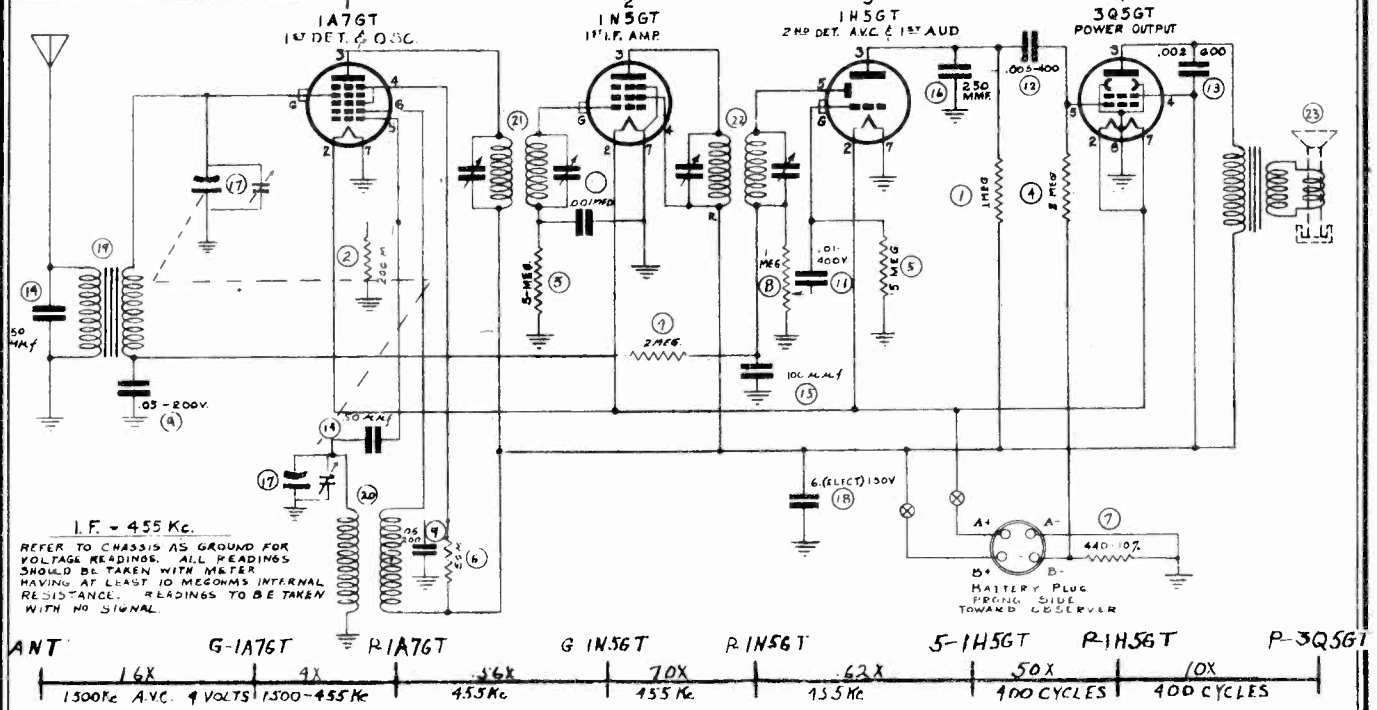


FARNSWORTH TELEV. & RADIO CORP.

MODEL CT-41



BOTTOM VIEW OF SOCKETS



This receiver is a 4-tube battery operated receiver. An outside ant. may be connected to blue wire, and a ground to black wire.

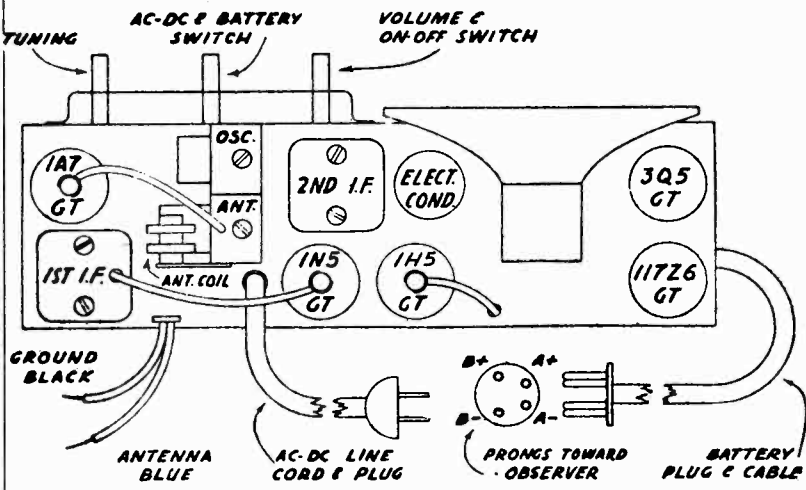
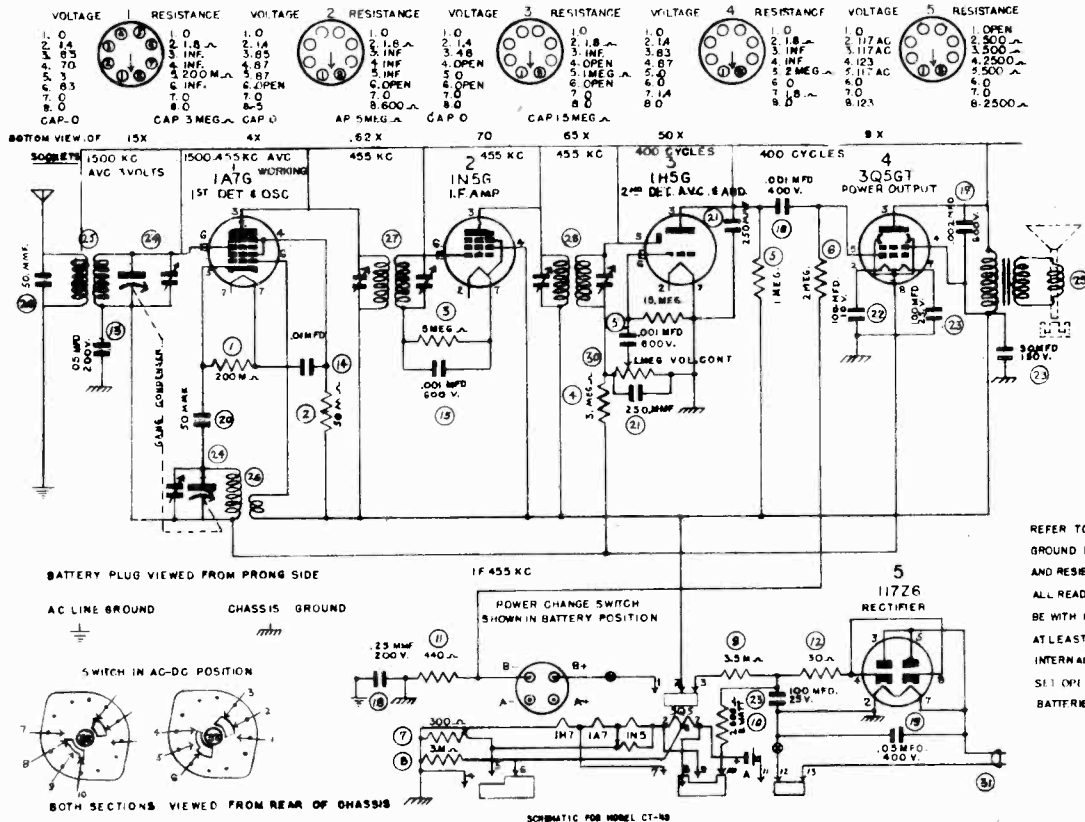
**POWER SUPPLY:** Either General 60B-6L or Burgess 6TA-60 can be used and will fit inside cabinet. Large unit as Burgess 17G-D60, Eveready 748, Ray-O-Vac AB-82, Bond 0528 or General 60DL-11L may be used, but will not fit inside cabinet. Battery drain—.2 amp., at 1½ v. and 9 ma., at 90 v.

TABULATION FOR ALIGNMENT

STEPS	USE IN SERIES WITH GENERATOR	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1.	CONNECT HIGH SIDE OF GENERATOR TO ANTENNA	455 Kc.	QUIET POINT	2ND I.F. TRIMMERS 1st I.F. TRIMMERS	TOP OF I.F. TRANS	MAXIMUM OUTPUT
2.	250 M.M.F.	1730 Kc.	1730 Kc.	OSCILLATOR TRIMMER	SEE FIG	
3.	250 M.M.F.	1500 Kc.	1400 Kc. & ROCK GANG	ANTENNA TRIMMER		

MODEL CT-43

FARNSWORTH TELEV. & RADIO CORP.



**ELEC. SPEC.:** 5-tube AC-DC or 4-tube battery receiver. Outside ant. may be connected to blue wire, and ground to black wire. **POWER SUPPLY:** General 60B6L or Burgess 61A-60 can be used and will fit inside cabinet. Large units as Burgess 17G-D60, Eveready 748, Ray-0-Vac AB-82, Bond 0528 or General 60DL-11L may be used, but will not fit inside cabinet. Battery drain is .2 amp., at 1½ volts and 9 ma., at 90 volts.

**TABULATION FOR ALIGNMENT**

STEPS	USE IN SERIES WITH GENERATOR	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1.	CONNECT HIGH SIDE OF GENERATOR TO ANTENNA	455 Kc.	QUIET POINT	2ND I.F. TRIMMERS 1st I.F. TRIMMERS	TOP OF I.F. TRANS	MAXIMUM OUTPUT
2.	250 M.M.F.	1730 Kc.	1730 Kc.	OSCILLATOR TRIMMER	SEE FIG.	
3.	250 M.M.F.	1500 Kc.	1400 Kc. & ROCK GANG	ANTENNA TRIMMER		

CT-54, CK-58,  
Chassis C108-2

FARNSWORTH TELEV. & RADIO CORP

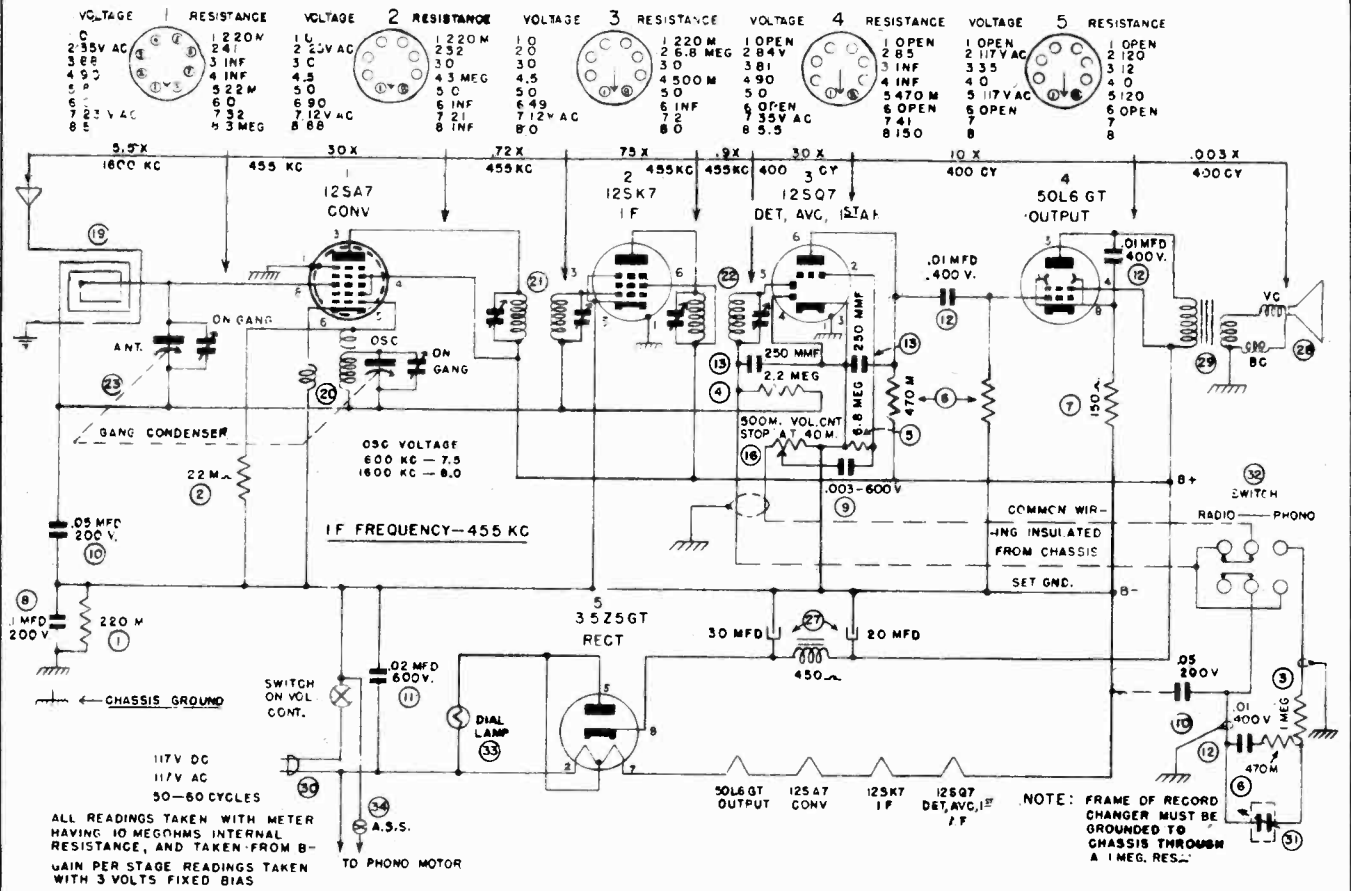
MODELS CT-50, CT-51,

Chassis C108-1;

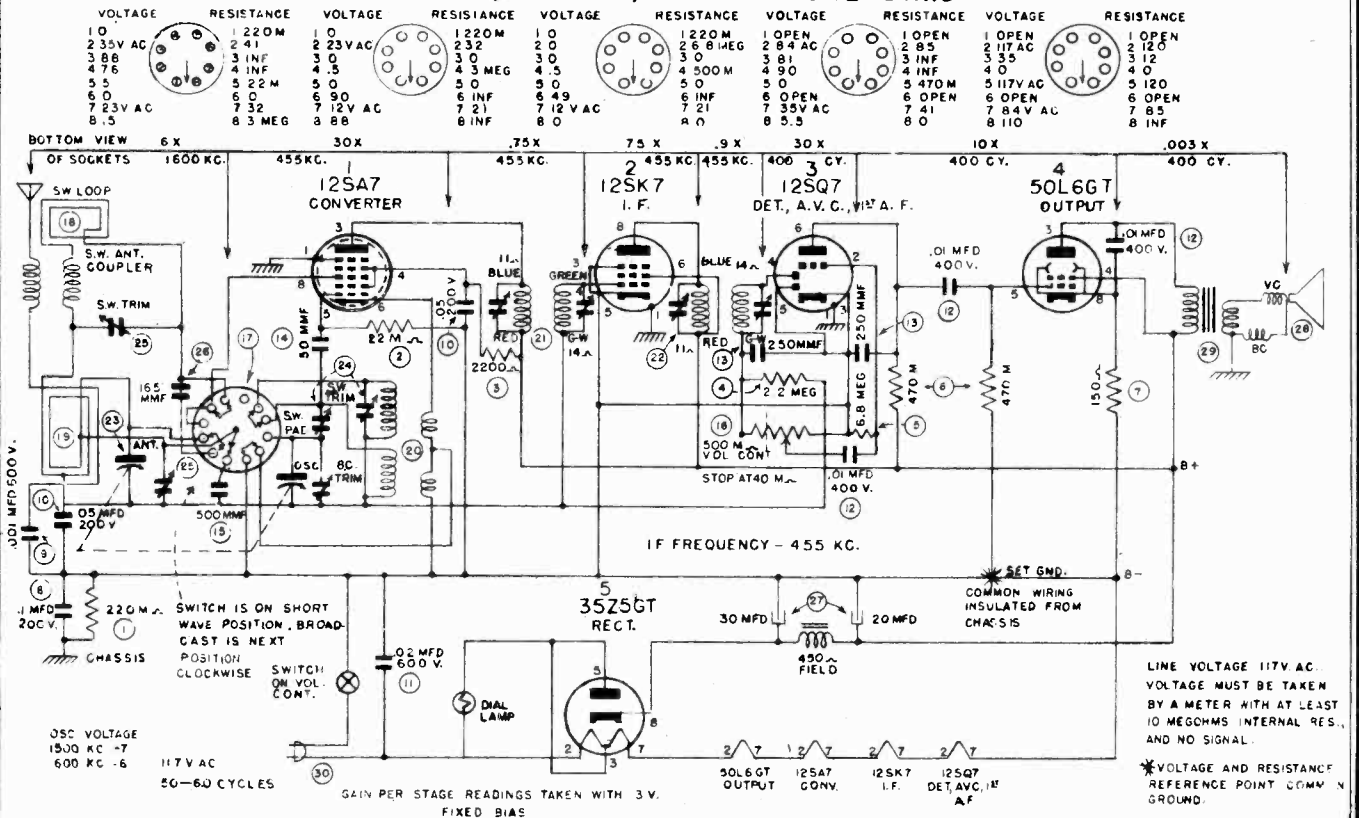
CT-50, CT-51, CK-58 SINGLE BAND

CT-52, CT-53,

Chassis C109-1;



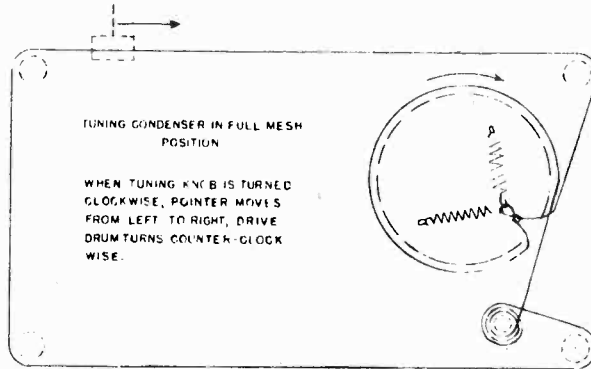
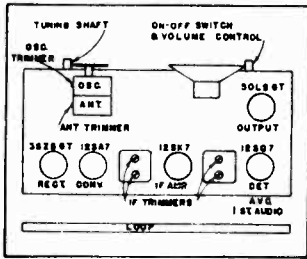
CT-52, CT-53, CT-54 DUAL BAND



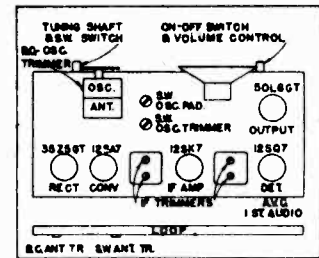
CHASSIS C108-1,  
C108-2, 109-1

FARNSWORTH TELEV. & RADIO CORP.

**SINGLE BAND  
TUBE LAYOUT**



**DUAL BAND  
TUBE LAYOUT**



**DIAL STRINGING**

WHEN ALIGNING THE SHORT WAVE OSCILLATOR TIGHTEN THE ADJUSTING SCREW FOR MAXIMUM CAPACITY AND THEN LOOSEN IT UNTIL THE FIRST PEAK IS REACHED. DO NOT USE THE SIGNAL HEARD AT THE LOWER CAPACITY SETTING AS IN THIS RECEIVER THE OSCILLATOR WORKS AT A FREQUENCY LOWER THAN THE ONE THE R.F. IS TUNED TO. IF THE LOOP IS TUNED TO 9.0 Mc THE OSCILLATOR IS TUNED TO 8,545 Kc THAT IS SIGNAL FREQUENCY MINUS I.F. FREQUENCY, INSTEAD OF SIGNAL FREQUENCY PLUS I.F. FREQUENCY, OR 9,455 Kc AS IS CUSTOMARY.

**TABULATION FOR ALIGNMENT OF SIGNAL AND DUAL BAND RECEIVERS**

STEPS	DUMMY ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN	
1		SET VOLUME CONTROL FOR MAXIMUM OUTPUT				MAXIMUM OUTPUT	
2	100 MMF	445 Kc	MINIMUM CAPACITY	2ND I.F. TRIMMERS	TOP OF I.F. TRANSFORMERS		
3				1ST I.F. TRIMMERS			
4				1720 Kc	B.C. Osc. TRIMMERS		ON TUNING CONDENSER
5				1500 Kc	B.C. R.F. TRIMMER		*ON LOOP ANTENNA
6	CHECK	1500 Kc, 1000 Kc AND 600 Kc	STRONGEST SIGNAL AND ROCK GANG				

**SHORT WAVE BAND ALIGNMENT FOR CT-52, CT-53 AND CT-54 DUAL BAND RECEIVERS**

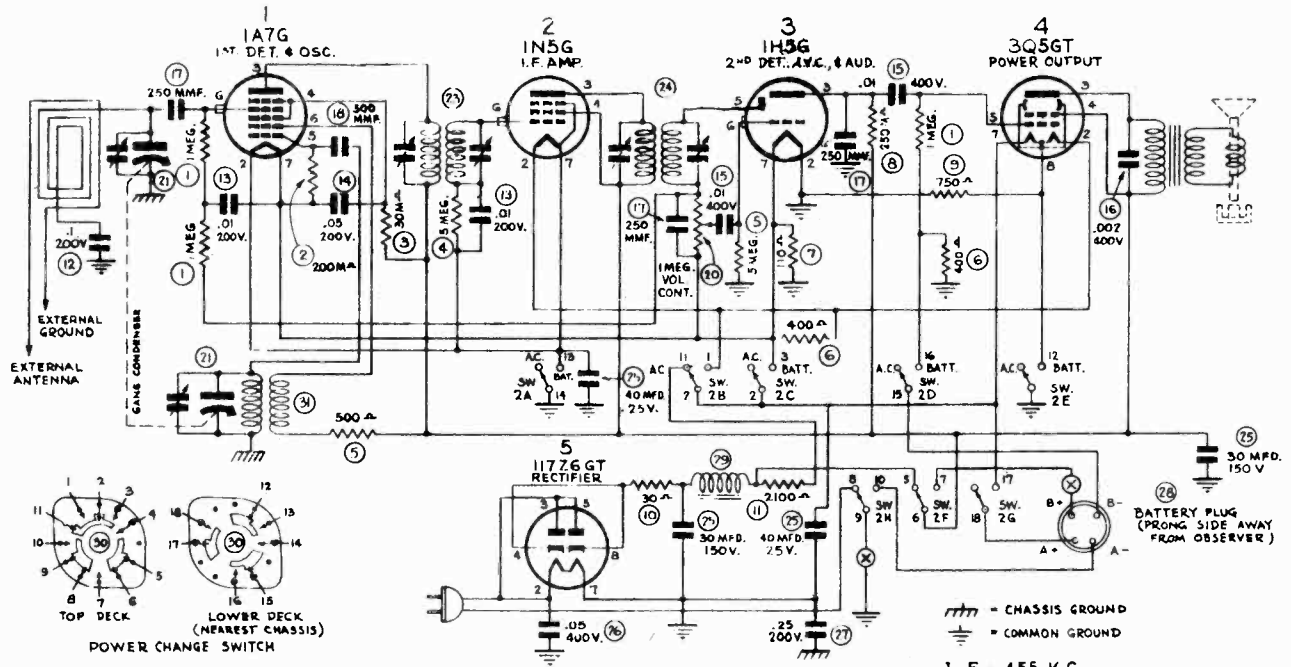
7	400 OHMS	12.1 Mc	MINIMUM CAPACITY	S.W. Osc. TRIMMER	REAR OF CHASSIS	MAXIMUM OUTPUT
8		12.0 Mc	12.0	S.W. R.F. TRIMMER	ON LOOP ANTENNA	
9		9.4 Mc	9.4 Mc ROCK GANG FOR MAXIMUM SIGNAL	S.W. Osc. PADDER	FRONT OF CHASSIS	

\*

FARNSWORTH TELEV. & RADIO CORP.

VOLTAGE		RESISTANCE		VOLTAGE		RESISTANCE		VOLTAGE		RESISTANCE		VOLTAGE		RESISTANCE	
1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN
2. 1.5	2. 40 Ω	2. 1.0	2. 55 Ω	2. 0	2. 0	2. 6.4	2. 85 Ω	2. 117 A.C.	2. 117 A.C.	2. 300 Ω	2. 300 Ω	2. 300 Ω	2. 300 Ω	2. 300 Ω	2. 300 Ω
3. 100	3. 2000 Ω	3. 100	3. 2000 Ω	3. 1	3. 1	3. 99	3. 99	3. 117 A.C.	3. 117 A.C.	3. 500 Ω	3. 500 Ω	3. 500 Ω	3. 500 Ω	3. 500 Ω	3. 500 Ω
4. 64	4. 35000 Ω	4. 100	4. 2000 Ω	4. 2	4. 2	4. 100	4. 100	4. 125	4. 125	4. 2500 Ω	4. 2500 Ω	4. 2500 Ω	4. 2500 Ω	4. 2500 Ω	4. 2500 Ω
5. -7.6	5. 100M Ω	5. OPEN	5. OPEN	5. 3	5. 3	5. 0	5. 0	5. 117 A.C.	5. 117 A.C.	5. 500 Ω	5. 500 Ω	5. 500 Ω	5. 500 Ω	5. 500 Ω	5. 500 Ω
6. 100	6. 2500 Ω	6. .3	6. 5.5 MEG.	6. 4	6. 4	6. 1MEG.	6. 1MEG.	6. 0	6. 0	6. 0	6. 0	6. 0	6. 0	6. 0	6. 0
7. 1.8	7. 21 Ω	7. 1.3	7. 40	7. 5	7. 5	7. 22 Ω	7. 22 Ω	7. 0	7. 0	7. 0	7. 0	7. 0	7. 0	7. 0	7. 0
8. 100	8. 2000 Ω	8. OPEN	8. OPEN	8. 6	8. 6	8. 5	8. 5	8. 125	8. 125	8. 2500 Ω	8. 2500 Ω	8. 2500 Ω	8. 2500 Ω	8. 2500 Ω	8. 2500 Ω

BOTTOM VIEW OF SOCKETS



NOTES: ON D.C. VOLTAGE READINGS METER SHOULD HAVE AT LEAST 10 MEGOHMS INTERNAL RESISTANCE.  
D.C. VOLTAGE READINGS TAKEN WITH NO SIGNAL. REFER TO COMMON GROUND FOR D.C. VOLTAGES.  
LINE VOLTAGE - 117 A.C.

SCHEMATIC FOR MODEL BT-58

THIS SIX TUBE AC - DC OR FIVE TUBE BATTERY OPERATED PORTABLE RECEIVER HAS A BUILT IN LOOP ANTENNA. AN OUTSIDE ANTENNA MAY BE CONNECTED BY LOOSENING THE SCREW IN THE LOWER RIGHT HAND CORNER OF THE BACK COVER. A GROUND SHOULD BE CONNECTED TO THE SCREW IN THE LOWER LEFT HAND CORNER WHEN AN OUTSIDE ANTENNA IS USED.

ALIGNMENT

A SIGNAL GENERATOR CALIBRATED AT 455 Kc., 1400 Kc., AND 1730 Kc., IS NECESSARY TO PROPERLY ALIGN THIS RECEIVER. AFTER ALIGNING THE I.F. STAGES, REPLACE RECEIVER IN CABINET AND FASTEN LOOP IN NORMAL POSITION BEFORE ALIGNING THE R.F. END THROUGH THE OPENINGS IN THE END OF THE CABINET. THESE OPENINGS ARE CLOSED BY SNAP FASTENERS. THE OSCILLATOR TRIMMER IS NEAREST THE FRONT PANEL AND THE LOOP TRIMMER IS DIRECTLY BEHIND IT.

STEPS	USE IN SERIES WITH GENERATOR	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1.	.02MFD IN EACH LEAD CONNECT HIGH SIDE OF GENERATOR TO GRID CAP OF 1A7G TUBE	455 Kc.	QUIET POINT	2ND I.F. TRIMMERS 1ST I.F. TRIMMERS	TOP OF I.F. TRANS.	MAXIMUM OUTPUT
2.	LOOP**	1730 Kc.	MINIMUM	OSCILLATOR TRIMMER*	SEE NOTE BELOW	
3.	LOOP**	1400 Kc.	1400 Kc. & ROCK GANG	LOOP TRIMMER*		

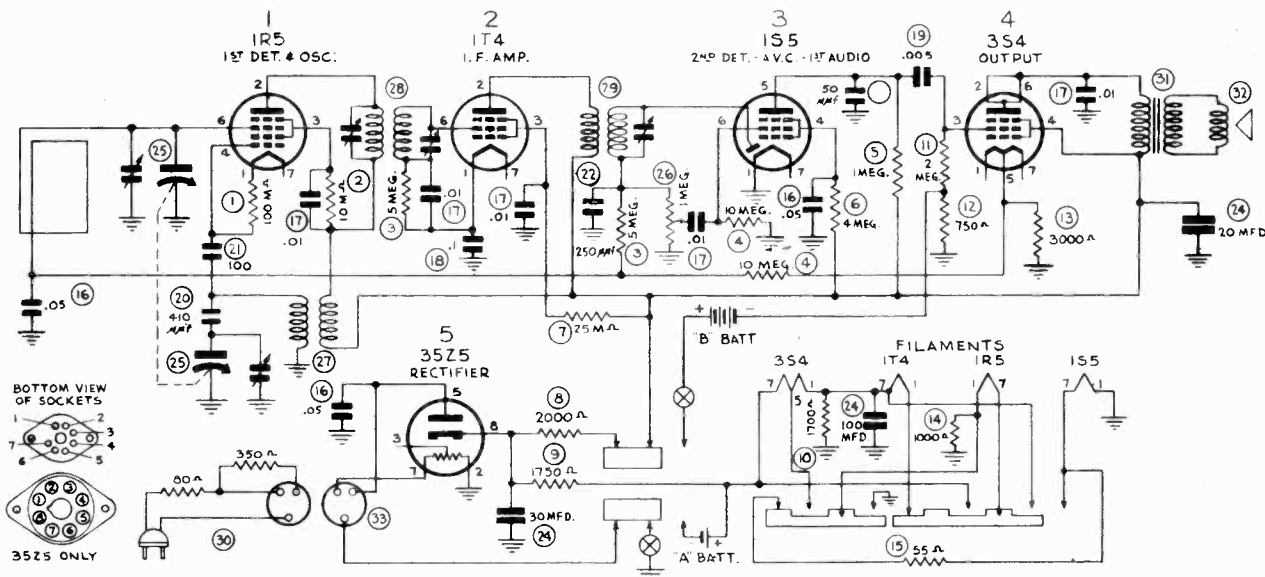
\*SEE PRECEDING PARAGRAPH FOR LOCATION OF TRIMMERS.

\*\*LOOP TO CONSIST OF FIVE TO TEN TURNS OF INSULATED WIRE WOUND ON A THREE OR FOUR INCH FORM TO BE CLOSELY COUPLED TO THE LOOP ANTENNA IN THE RECEIVER.

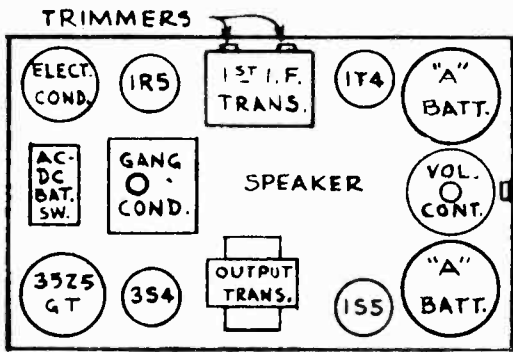


MODEL CT-59

FARNSWORTH TELEV. & RADIO CORP.



SCHEMATIC FOR MODEL CT-59



TOP VIEW OF CHASSIS

BATTERY

"A" BATTERIES  
 EVEREADY 950 BURGESS No. 2  
 FLASHLIGHT BATTERY OR SIZE D  
 TWO REQUIRED  
 REPLACE AFTER 25 HRS OF SERVICE

"B" BATTERY  
 EVEREADY 467 BURGESS XX45  
 REPLACE AFTER 50 HRS OF SERVICE

WATTS  
 VOLTAGE

AT 117 VOLTS A.C.  
 A.C.

25  
 105-125

This five tube AC-DC or four tube battery operated portable receiver has a built in loop antenna.

ALIGNMENT

A signal generator calibrated at 455 Kc., 1400 Kc., and 1600 Kc., is necessary to properly align this receiver. After aligning the I.F. stages, replace receiver in cabinet and fasten loop in normal position before aligning the R.F. The oscillator trimmer is nearest the front panel on the gang and the loop trimmer is directly behind it on the gang. When aligning this receiver it should be operated on the self contained batteries.

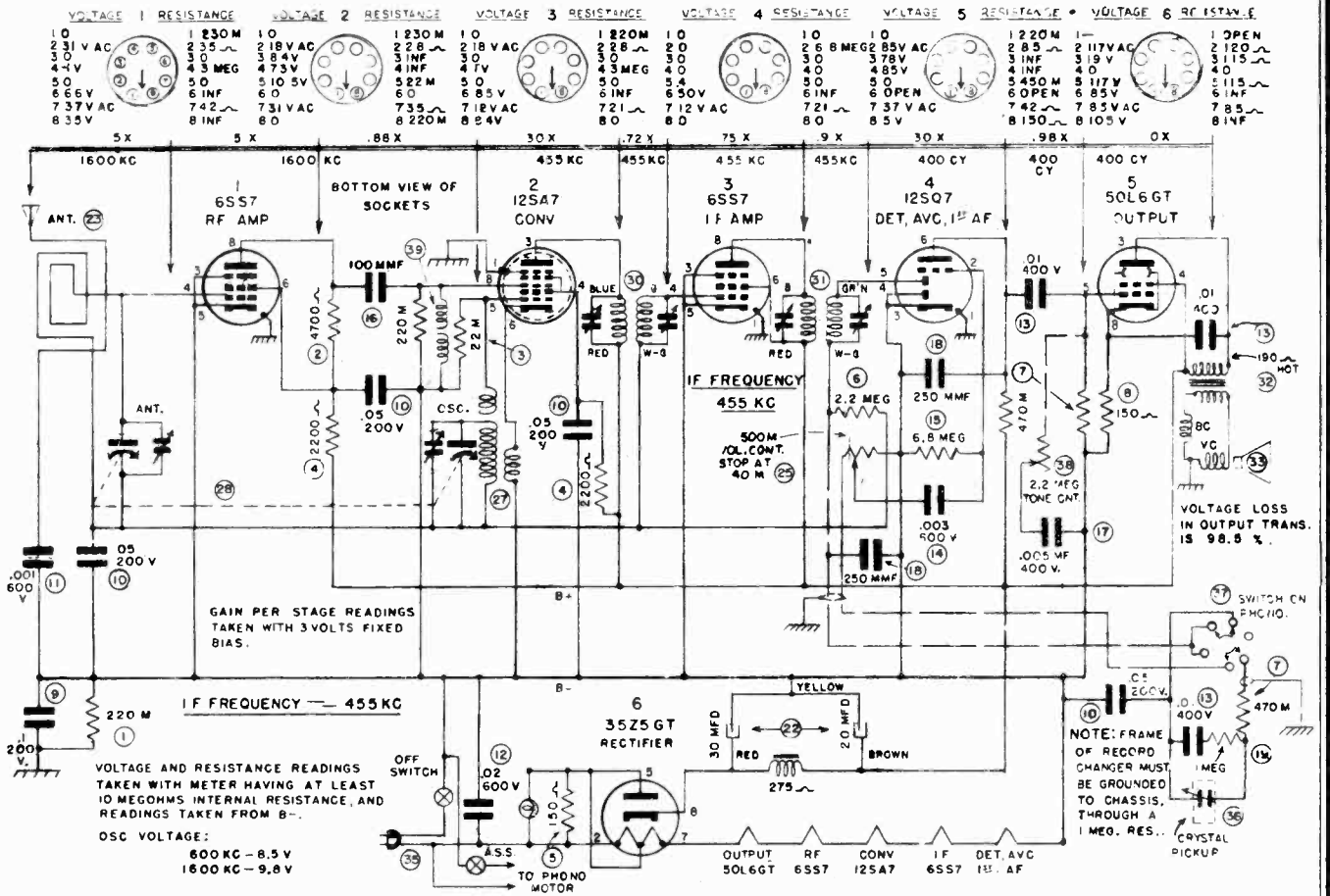
TABULATION FOR ALIGNMENT

STEPS	USE IN SERIES WITH GENERATOR	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1.	.02 MFD. IN EACH LEAD CONNECT HIGH SIDE OF GENERATOR TO GRID OF 1R5 TUBE	455 Kc.	QUIET POINT	2ND I. F. TRIMMERS 1ST I. F. TRIMMERS	SEE FIG.	MAXIMUM OUTPUT
2.	LOOP**	1600 Kc.	MINIMUM	OSCILLATOR TRIMMER*	ON GANG COND.	
3.	LOOP**	1600 Kc.	1600 Kc. & ROCK GANG	LOOP TRIMMER*	ON GANG COND.	

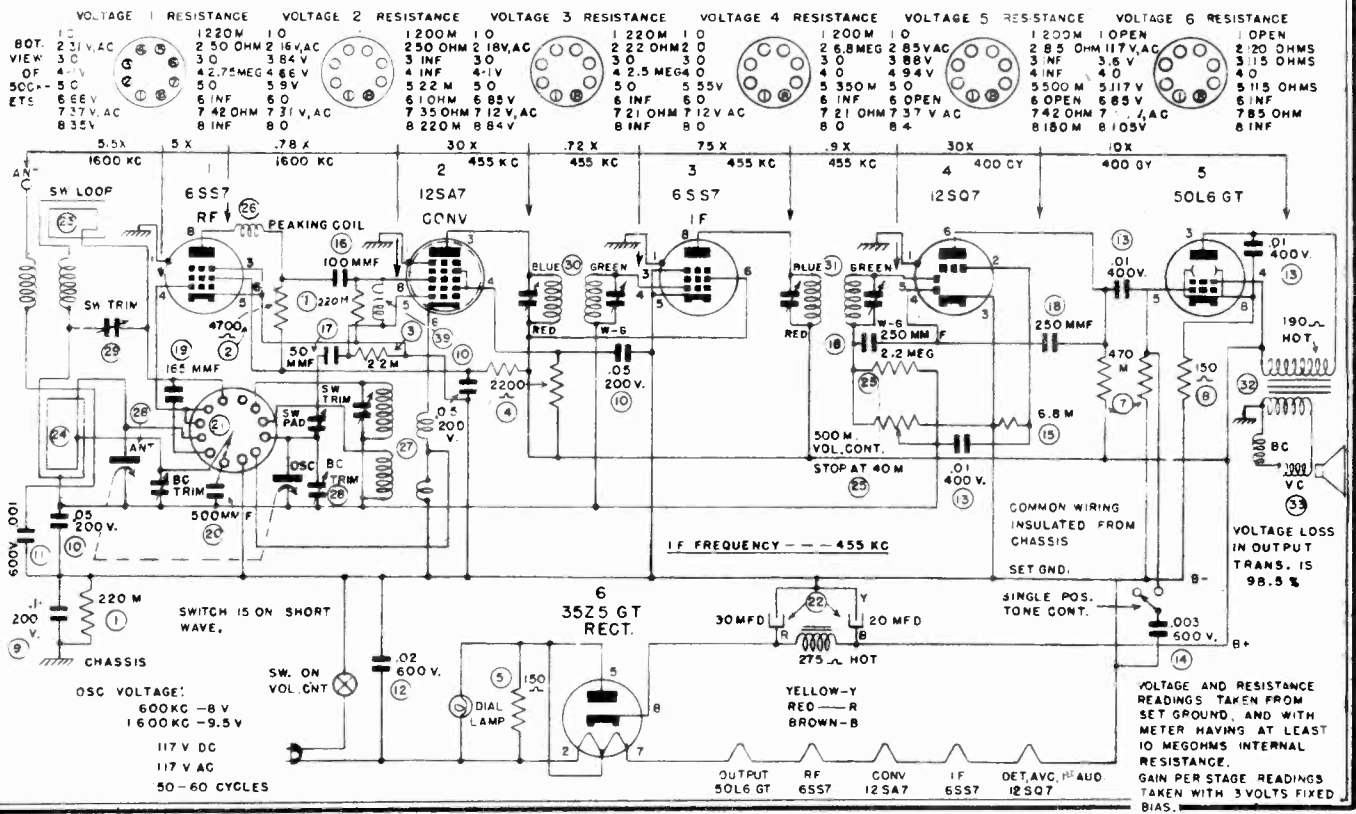
\*\*LOOP TO CONSIST OF FIVE TO TEN TURNS OF INSULATED WIRE WOUND ON A THREE OR FOUR INCH FORM TO BE CLOSELY COUPLED TO THE LOOP ANTENNA IN THE RECEIVER.

CT-64, Chas. C110-2;  
CK-66, Chas. C106-2

FARNSWORTH TELEV. & RADIO CORP. MODELS CT-61, CT-62,  
Chassis C106-1;  
CT-61 - CT-62 - CK-66 SINGLE BAND CT-63, Chas. C110-1;



CT-63 - CT-64 - DUAL BAND



CHASSIS C106-1, C106-2,  
C110-1, C110-2

**FARNSWORTH TELEV. & RADIO CORP.**

6SS7 - R.F. AMPLIFIER

12SQ7 - DET., A.V.C. AND AUDIO

12SA7 - CONVERTER AND OSCILLATOR

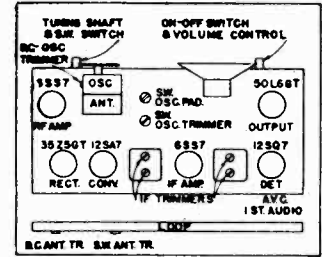
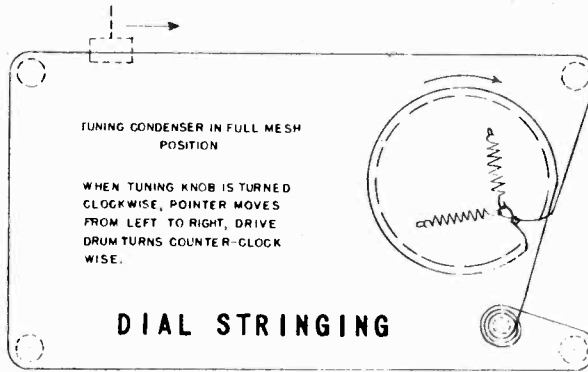
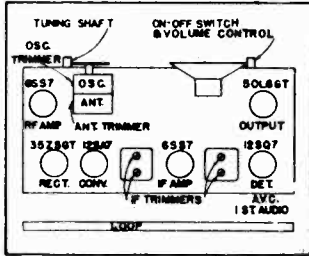
50L6GT - OUTPUT

6SS7 - I.F. AMPLIFIER

35Z5GT - RECTIFIER

**SINGLE BAND  
TUBE LAYOUT**

**DUAL BAND  
TUBE LAYOUT**



When aligning the Short Wave Oscillator tighten the adjusting screw for maximum capacity and then loosen it until the first peak is reached. Do not use the signal heard at the lower capacity setting as in this receiver the oscillator works at a frequency lower than the one the R.F. is tuned to. If the loop is tuned to 9.0 Mc the oscillator is tuned to 8,545 Kc that is signal frequency minus I.F. frequency, instead of signal frequency plus I.F. frequency, or 9,455 Kc as is customary.

**TABULATION FOR ALIGNMENT OF SINGLE AND DUAL BAND RECEIVERS**

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. TRANSFORMERS	MAXIMUM OUTPUT	
3				1ST I.F. TRIMMERS			
4				1720 Kc	B.C. Osc. TRIMMERS		ON TUNING CONDENSER
5		1500 Kc	STRONGEST SIGNAL AND ROCK GANG	B.C. R.F. TRIMMERS	*ON LOOP ANTENNA		
6		CHECK		1500 Kc, 1000 Kc AND 600 Kc			

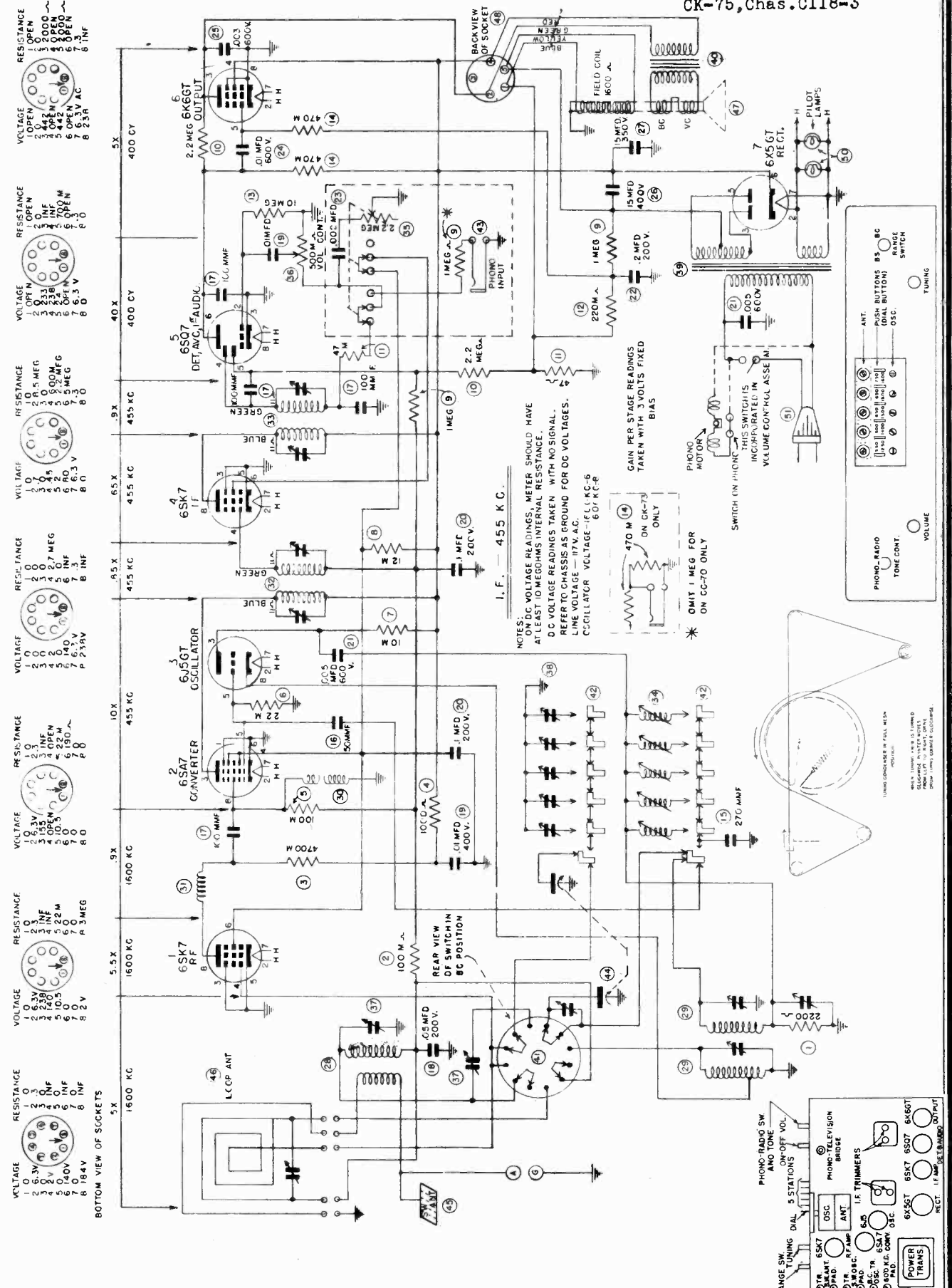
**SHORT WAVE BAND ALIGNMENT FOR CT-63 AND CT-64 DUAL BAND RECEIVERS**

7	400 OHMS	12.1 Mc	MINIMUM CAPACITY	S.W. Osc. TRIMMER	REAR OF CHASSIS	MAXIMUM OUTPUT
8		12 Mc	12 Mc	S.W. R.F. TRIMMER	ON LOOP ANTENNA	
9		9.4 Mc	9.4 Mc ROCK GANG FOR MAXIMUM SIGNAL	S.W. Osc. PADDER	FRONT OF CHASSIS	

\* SEE CHASSIS LAYOUT ON FRONT PAGE.

FARNSWORTH TELEV. & RADIO CORP.

MODELS CC-70, Chas. C118-1;  
CK-73, CK-74, Chas. C118-2;  
CK-75, Chas. C118-3



CHASSIS C118-1, C118-2,  
C118-3

FARNSWORTH TELEV. & RADIO CORP.

WATTS  
VOLTAGE

AT 117 VOLTS A.C.  
A.C.

CC MODEL 60, CK MODELS 80  
105-125

PUSH BUTTON SET UP

TO PREVENT THE BUTTONS FROM BEING SET UP ON THE WRONG STATION A SIGNAL GENERATOR SHOULD BE USED.

ADJUST THE LOWER SCREW FIRST AS THIS IS THE OSCILLATOR, UNTIL THE SIGNAL IS HEARD MOST CLEARLY (SEE FIG.). THEN ADJUST THE TRIMMER SCREW DIRECTLY ABOVE THE OSCILLATOR FOR MAXIMUM VOLUME.

EQUIPMENT AND PROCEDURE FOR ALIGNMENT

WHEN ALIGNING THIS RECEIVER A SIGNAL GENERATOR CALLIBRATED AT 455 Kc, 600 Kc, 1500 Kc, 1720 Kc, 9.5 Mc, 12 Mc, AND 12.1 Mc, 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. BEFORE RE-ALIGNING THE SET BE SURE ALL ADJUSTING SCREWS FOR THE IRON CORE OSCILLATOR COILS ARE FLUSH WITH OR INSIDE THE CHASSIS BASE.

CONNECT THE LOW SIDE OF THE SIGNAL GENERATOR TO THE TERMINAL MARKED G. (GROUND), AND THE HIGH SIDE OF THE GENERATOR TO THE TERMINAL MARKED A. (ANTENNA). (SEE FIG.A).

CAUTION--OFTEN TWO PEAKS ARE FOUND AT 12.1 Mc. USE THE ONE FOUND AT THE MAXIMUM SETTING OF THE OSCILLATOR TRIMMER.

CAUTION--BE SURE AND REMOVE THE DIAL POINTER BEFORE REMOVING THE SET FROM THE CABINET.

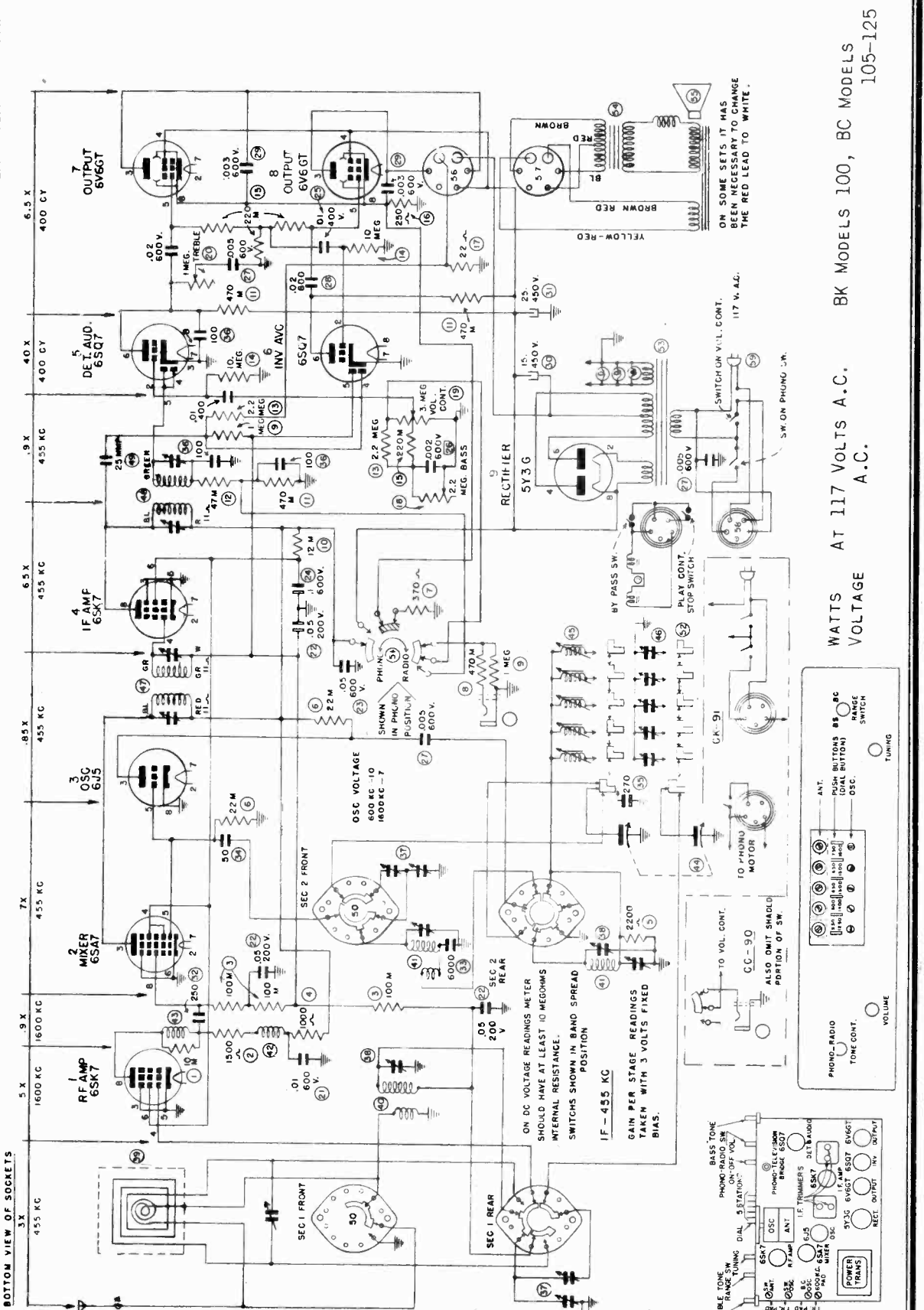
STEPS	USE IN SERIES WITH ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN	
1.	SET VOLUME CONTROL AT MAXIMUM						
2.	250 MMFD.	455 Kc.	NOTE A	2ND I.F. TRIMMERS	TOP 2ND I.F. TRAN.	MAXIMUM OUTPUT	
3.				1ST I.F. TRIMMERS	TOP 1ST I.F. TRAN.		
4.		1720 Mc.	1720	B.C. R.F. TRIMMER	SEE FIG.		
5.		1500 Kc.	1500	B.C. R.F. TRIMMER	ON THE LOOP		
6.		600 Kc.	600 Kc. ROCK GANG	B.C. PADDER	SEE FIG.		
7.		RECHECK 1600 Kc.					
8.	400 OHMS	12.1 Mc.	12.1 Mc.	S.W. Osc. TRIMMER			
9.		12.1 Mc.	12.1 Mc.	S.W. R.F. TRIMMER			
10.		9.5	9.5 Mc. ROCK GANG	S.W. PADDER			

FARNSWORTH TELEV. & RADIO CORP.

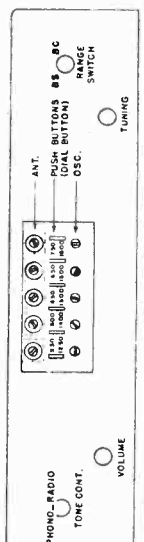
MODELS CC-90, Ch. C128-1;  
 CK-91, Chas. C128-2;  
 CK-92, Chas. C128-3;  
 CK-93, Chas. C128-4

WATTS AT 117 VOLTS A.C.  
 BK MODELS 100, BC MODELS 105-125  
 A.C.

1	2	3	4	5	6	7	8	9
VOLTAGE 0 2.0 4.16 5.8 7.83 AC 8.210	VOLTAGE 0 2.235 4.93 5.0 7.83 AC 8.17	VOLTAGE 0 3.128 4.128 5.0 7.83 AC 8.0	VOLTAGE 0 2.7 3.6 5.8 7.83 AC 8.235	VOLTAGE 0 2.0 MEG 3.0 5.40 M 6.1 8.2	VOLTAGE 0 2.10 MEG 3.228 5.0 7.83 AC 8.2	VOLTAGE 0 2.0 MEG 3.228 5.0 7.83 AC 8.2	VOLTAGE 0 2.0 3.228 5.0 7.83 AC 8.250	VOLTAGE 0 2.0 3.228 5.0 7.83 AC 8.250
RESISTANCE 0 2.0 4.3 MEG 5.0 7.2 8.4 MEG	RESISTANCE 0 2.0 4.3 MEG 5.0 7.2 8.4 MEG	RESISTANCE 0 2.0 4.3 MEG 5.0 7.2 8.4 MEG	RESISTANCE 0 2.0 4.3 MEG 5.0 7.2 8.4 MEG	RESISTANCE 0 2.0 MEG 3.0 5.40 M 6.1 8.2	RESISTANCE 0 2.0 MEG 3.228 5.0 7.83 AC 8.2	RESISTANCE 0 2.0 MEG 3.228 5.0 7.83 AC 8.2	RESISTANCE 0 2.0 3.228 5.0 7.83 AC 8.250	RESISTANCE 0 2.0 3.228 5.0 7.83 AC 8.250



ON SOME SETS IT HAS BEEN NECESSARY TO CHANGE THE RED LEAD TO WHITE.



CHASSIS C128-1, C128-2,  
C128-3, C128-4

FARNSWORTH TELEV. & RADIO CORP.

PUSH BUTTON SET UP

TO PREVENT THE BUTTONS FROM BEING SET UP ON THE WRONG STATIONS A SIGNAL GENERATOR SHOULD BE USED.

THE BUTTON TO THE EXTREME RIGHT IS THE MANUAL TUNING BUTTON.

ADJUST THE LOWER SCREW (SEE FIG.) FIRST AS THIS IS THE OSCILLATOR; THEN ADJUST THE UPPER SCREW FOR MAXIMUM OUTPUT.

TABULATION FOR ALIGNMENT

STEPS	IN SERIES WITH ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN		
1	250 M.M.F.	455 Kc.	NOTE A	2ND I.F. TRIMMERS	TOP OF I.F. TRANS.	MAX. OUTPUT		
2				1ST I.F. TRIMMERS				
3				PUSH STATION BUTTON	WAVE TRAP TRIMMER	SEE FIG.	MIN. OUTPUT	
4				1720 Kc.	1720 Kc.	B.C. OSC. TRIMMER	SEE FIG.	MAXIMUM OUTPUT
5				1500 Kc.	1500 Kc.	B.C. ANT. TRIMMER		
6				600 Kc.	NOTE B	600 Kc. PAD		
7			RECHECK	1500 Kc.				
8	400 OHMS	18 Mc.	18 Mc.	S.W. OSC. TRIMMER *				
9		16 Mc.	16 Mc.	S.W. ANT. TRIMMER **				
10	CHECK	6 Mc.						
11	400 OHMS	12 Mc.	12 Mc.	S.B. OSC. TRIMMER *				
12				S.B. ANT. TRIMMER **				
13		9.5 Mc.	9.5 Mc.	S.B. OSC. PADDER				
14				S.B. ANT. PADDER				
15	RECHECK	12 Mc.						

After pointer has been set on BC and calibrations checked, with range switch on Band Spread (Full CCW) set condenser so pointer is on 12 MC on "Foreign Spread Band." Set "Spread Band" Osc. trimmer for maximum output. Check for image on 11.1 Mc. (A weakened signal should be heard). Align antenna Band Spread trimmer for maximum signal. Turn condenser so pointer is on 9.5 Mc. adjust Spread Band Osc. padder for maximum signal. Check for image. (NO signal should be heard on 10.4 Mc). Align Antenna Band Spread padder for maximum signal. Go back to 12 Mc and repeat above. If much readjustment has to be made on trimmers, the padders must be checked again. Great care must be taken in adjusting Band Spread trimmers. Image must be checked. A fibre screwdriver must be used to adjust band spread.

\*Tighten oscillator trimmer screw for maximum capacity, then unscrew until second peak is secured.

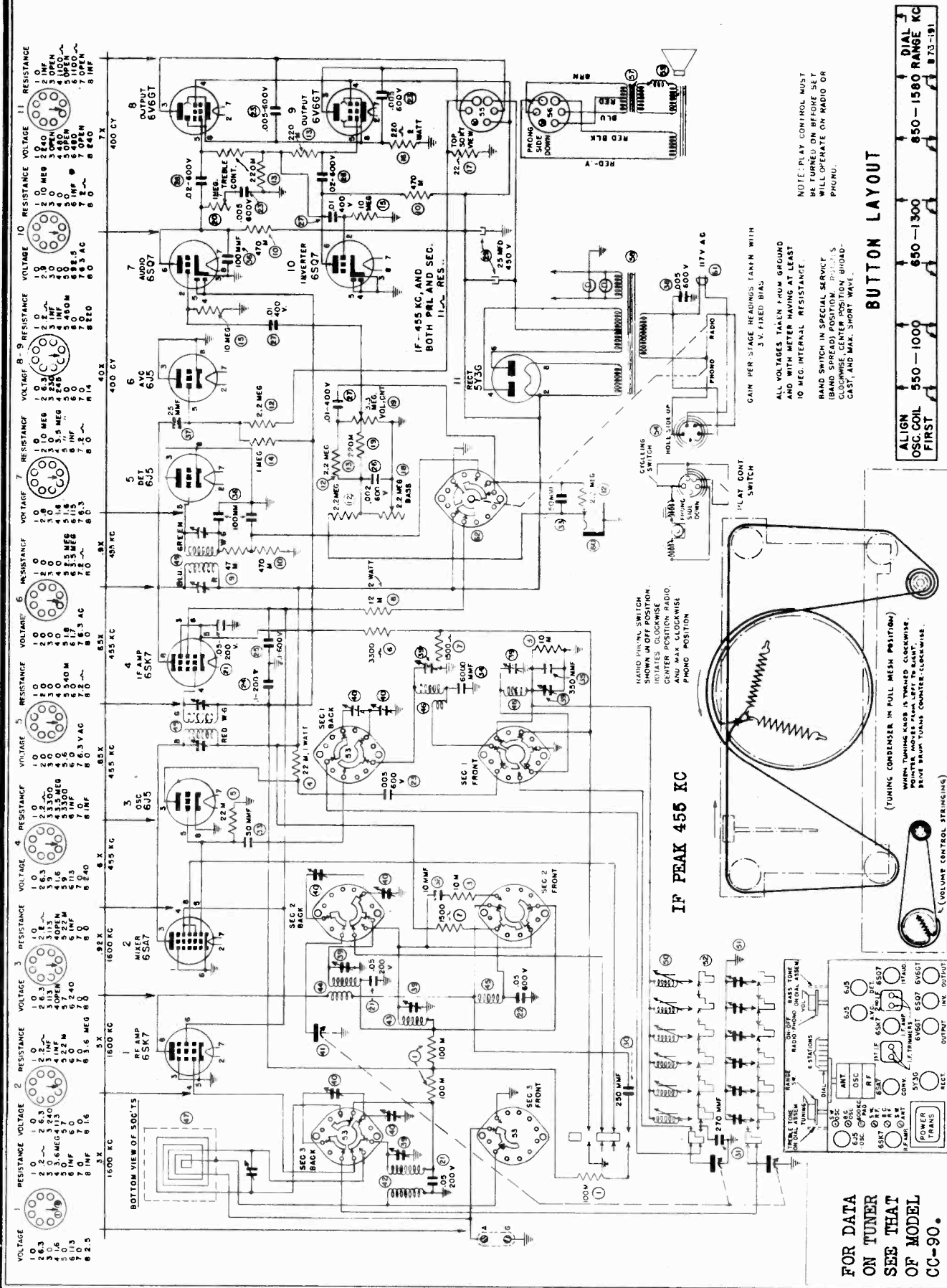
\*\*Tighten R.F. trimmer screw for maximum capacity, then unscrew until first peak is secured.

NOTE A. Set gang at minimum.

NOTE B. Strongest signal and rock gang.

FARNSWORTH TELEV. & RADIO CORP.

MODEL CK-111,  
Chassis C116-1



RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0
1000.0	1000.0	1000.0	1000.0	1000.0	1000.0	1000.0	1000.0	1000.0	1000.0	1000.0	1000.0	1000.0	1000.0
5000.0	5000.0	5000.0	5000.0	5000.0	5000.0	5000.0	5000.0	5000.0	5000.0	5000.0	5000.0	5000.0	5000.0
10000.0	10000.0	10000.0	10000.0	10000.0	10000.0	10000.0	10000.0	10000.0	10000.0	10000.0	10000.0	10000.0	10000.0
50000.0	50000.0	50000.0	50000.0	50000.0	50000.0	50000.0	50000.0	50000.0	50000.0	50000.0	50000.0	50000.0	50000.0
100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0	100000.0
500000.0	500000.0	500000.0	500000.0	500000.0	500000.0	500000.0	500000.0	500000.0	500000.0	500000.0	500000.0	500000.0	500000.0
1000000.0	1000000.0	1000000.0	1000000.0	1000000.0	1000000.0	1000000.0	1000000.0	1000000.0	1000000.0	1000000.0	1000000.0	1000000.0	1000000.0

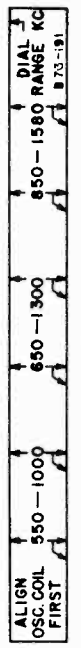
NOTE: PLAY CONTROL MUST BE TURNED ON BEFORE SET WILL OPERATE ON RADIO OR PHONO.

GAIN PER STAGE READINGS TAKEN WITH 3 V. FIXED BIAS

ALL VOLTAGES TAKEN FROM GROUND AND WITH METER HAVING AT LEAST 10 MEG. INTERNAL RESISTANCE.

BAND SWITCH IN SPECIAL SERVICE (BAND SPREAD) POSITION. REVERSES CLOCKWISE. CENTER POSITION BROAD-CAST, AND MAX. SHORT WAVE.

BUTTON LAYOUT



IF PEAK 455 KC

FOR DATA ON TUNER SEE THAT OF MODEL CC-90.



MODEL CK-111,  
Chassis C116-1

FARNSWORTH TELEV. & RADIO CORP.

ALIGNMENT INSTRUCTIONS

AN OUTPUT METER AND A SIGNAL GENERATOR ARE REQUIRED FOR PROPER ALIGNMENT OF THESE SETS. THE OSCILLATOR SHOULD BE CALIBRATED AT THE FOLLOWING POINTS, 455 Kc, 600 Kc, 900 Kc, 1500 Kc, 1720 Kc, 9.5 Mc, 12 Mc, 16 Mc AND 18.1 Mc. ALWAYS KEEP THE OUTPUT OF THE SIGNAL GENERATOR AS LOW AS POSSIBLE TO PREVENT A.V.C. ACTION AND FALSE SETTINGS. CONNECT THE HIGH SIDE OF THE GENERATOR TO THE ANTENNA TERMINAL AND THE LOW SIDE OF IT TO THE GROUND TERMINAL MAKING CERTAIN JUMBER ON TERMINAL STRIP IS DISCONNECTED. BEFORE ALIGNING TIGHTEN WAVE TRAP TRIMMER SCREW.

TABULATION FOR ALIGNMENT

STEPS	IN SERIES WITH ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN	
1	250 M.M.F.	455 Kc.	Note A	2nd I.F. Trimmers	Top of I.F. Trans.	Max. Output	
2				1st I.F. Trimmers			
3				Push Station Button	Wave Trap Trimmer	See Fig.	Min. Output
4		400 Ohms	1720 Kc.	1720 Kc.	B.C. Osc. Trimmer	SEE FIG.	MAXIMUM OUTPUT
5			1500 Kc.	1500 Kc.	B.C. Mixer Trimmer		
6					B.C. Ant. Trimmer		
7			600 Kc.	Note B	600 Kc. Pad		
8	RECHECK	1400 Kc.					
9	400 Ohms	18 Mc.	18 Mc.	S.W. Osc. Trimmer *			
10		16 Mc.	16 Mc.	S.W. Mixer Trimmer **			
11				S.W. Ant. Trimmer **			
12	CHECK	6 Mc.					
13	400 Ohms	12 Mc.	12 Mc.	B.S. Osc. Trimmer			
14				B.S. Mixer Trimmer **			
15				B.S. Ant. Trimmer *			
16		9.5 Mc.	9.5 Mc.	B.S. Osc. Padder			
17				B.S. Mixer Padder			
18				B.S. Ant. Padder			
19	RECHECK	12 Mc.					

AFTER POINTER HAS BEEN SET ON BC AND CALIBRATION CHECKED: WITH RANGE SWITCH ON BAND SPREAD (FULL CCW) SET CONDENSER SO POINTER IS ON 12 MC ON "FOREIGN SPREAD BAND." SET "SPREAD BAND" OSC. TRIMMER FOR MAXIMUM OUTPUT. CHECK FOR IMAGE ON 11.1 MC (A WEAK SIGNAL SHOULD BE HEARD). ALIGN RF AND ANTENNA BAND SPREAD TRIMMERS FOR MAXIMUM SIGNAL. TURN CONDENSER SO POINTER IS ON 9.5 MC, ADJUST SPREAD BAND OSC. PADDER FOR MAXIMUM SIGNAL. CHECK FOR IMAGE. (NO SIGNAL SHOULD BE HEARD ON 10.4 MC). ALIGN RF AND ANTENNA BAND SPREAD PADDER FOR MAXIMUM SIGNAL. GO BACK TO 12 MC AND REPEAT ABOVE. IF SUCH READJUSTMENT HAS TO BE MADE ON TRIMMERS, THE PADDERS MUST BE CHECKED AGAIN. GREAT CARE MUST BE TAKEN IN ADJUSTING BAND SPREAD TRIMMERS. IMAGES MUST BE CHECKED. A FIBRE SCREWDRIVER MUST BE USED TO ADJUST BAND SPREAD.

\*TIGHTEN OSCILLATOR TRIMMER SCREW FOR MAXIMUM CAPACITY, THEN UNSCREW UNTIL SECOND PEAK IS SECURED.

\*\*TIGHTEN RF TRIMMER SCREW FOR MAXIMUM CAPACITY, THEN UNSCREW UNTIL FIRST PEAK IS SECURED.

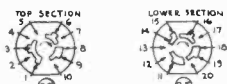
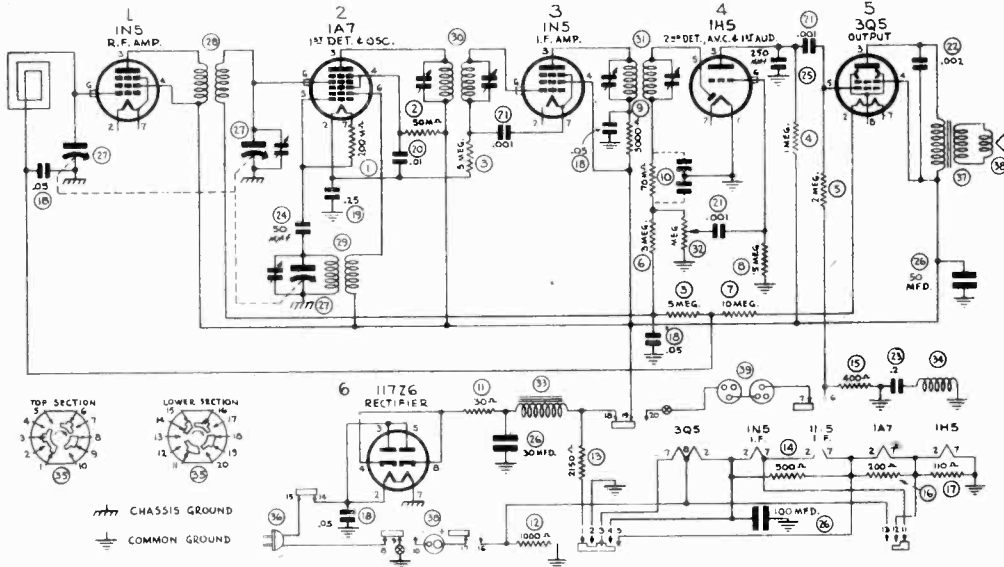
NOTE A. SET GANG AT MINIMUM.

NOTE B. STRONGEST SIGNAL AND ROCK GANG.

FARNSWORTH TELEV. & RADIO CORP.

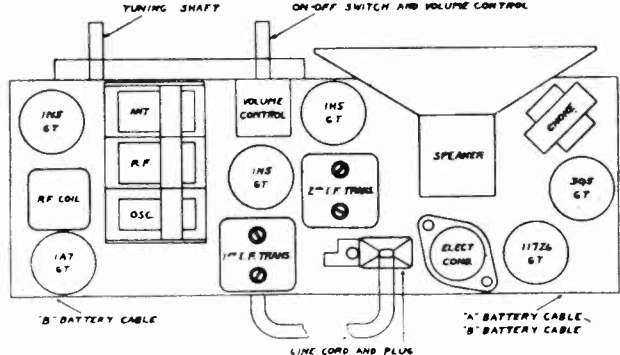
VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE
1. OPEN	1. OPEN	1. OPEN	1. 0	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN	1. OPEN
2. 4.5	2. 2.2M	2. 2.5	2. 2.5A	2. 80	2. 2.5	2. 2.5	2. 2.5	2. 2.5	2. 2.5	2. 2.5	2. 2.5
3. 1.7	3. 2500A	3. 100	3. 100	3. 1500A	3. 8.47	3. 2.0	3. 1MEG	3. 7.95	3. 1500A	3. 1500A	3. 1500A
4. 100	4. 100	4. 14	4. 1500A	4. 1500A	4. 0	4. 0	4. 0	4. 0	4. 1000A	4. 1000A	4. 1500A
5. 0	5. 4MEG	5. 2.3	5. 4MEG	5. 0	5. 0	5. 0	5. 0	5. 0	5. 1MEG	5. 0	5. 0
6. 16	6. 100	6. 100	6. 100	6. 100	6. 100	6. 100	6. 100	6. 100	6. 100	6. 100	6. 100
7. 2.8	7. 40M	7. 1.4	7. 1.4	7. 1.4	7. 1.4	7. 1.4	7. 1.4	7. 1.4	7. 1.4	7. 1.4	7. 1.4
8. OPEN	8. OPEN	8. OPEN	8. OPEN	8. OPEN	8. OPEN	8. OPEN	8. OPEN	8. OPEN	8. OPEN	8. OPEN	8. OPEN
CAP. 2.2	CAP. 2MEG	CAP. 2.2	CAP. 2.2	CAP. 2MEG	CAP. 0	CAP. 2MEG	CAP. 2MEG	CAP. 2MEG	CAP. 2MEG	CAP. 2MEG	CAP. 2MEG

BOTTOM VIEW OF SOCKETS



CHASSIS GROUND  
COMMON GROUND

SCHEMATIC FOR MODEL CT-60



- "A" BATTERIES
- 1 BURGESS No. 6F
  - 1 EVEREADY No. 745
  - 1 RAY-O-VAC No. P96A
  - 1 BOND 4824
  - 1 GENERAL 6F1
- "B" BATTERIES
- 2 BURGESS No. B30
  - 2 EVEREADY No. 482
  - 2 RAY-O-VAC No. 5303
  - 2 BOND 3017
  - 2 GENERAL V30B

WATTS AT 117 VOLTS A.C. 25  
VOLTAGE A.C. 105-125

This six tube AC-DC or five tube battery operated portable receiver has a built in loop antenna. To connect an external antenna and ground remove the screws in the back of the cabinet then remove the back. The external antenna and ground may now be connected to the two wires at the top side of the cabinet. Try reversing the connections of the two wires to obtain best results.

ALIGNMENT

The alignment of this receiver requires the use of a signal generator that will cover the frequencies of 455, 1400 and 1600 kc., and an output meter connected across the secondary of the output transformer. All alignments should be made with the set operating on the self-contained batteries.

TABULATION FOR ALIGNMENT

STEPS	USE IN SERIES WITH GENERATOR	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1.	.02 MFD IN EACH LEAD CONNECT HIGH SIDE OF GENERATOR TO GRID CAP OF 1A7G TUBE	455 Kc.	QUIET POINT	2ND I.F. TRIMMERS 1ST I.F. TRIMMERS	TOP OF I.F. TRANS.	MAXIMUM OUTPUT
2.	HIGH SIDE TO GRID OF 1N5 R.F. TO BE THRU .02 MFD.	1600 Kc.	MINIMUM	OSCILLATOR TRIMMER	HOLE IN TOP OF R.F. COIL CAN	
3.	HIGH SIDE TO GRID OF 1N5 R.F. TO BE THRU .02 MFD.	1400 Kc.	1400 Kc. & ROCK GANG	R.F. TRIMMER	ON GANG SEE FIG.	

2

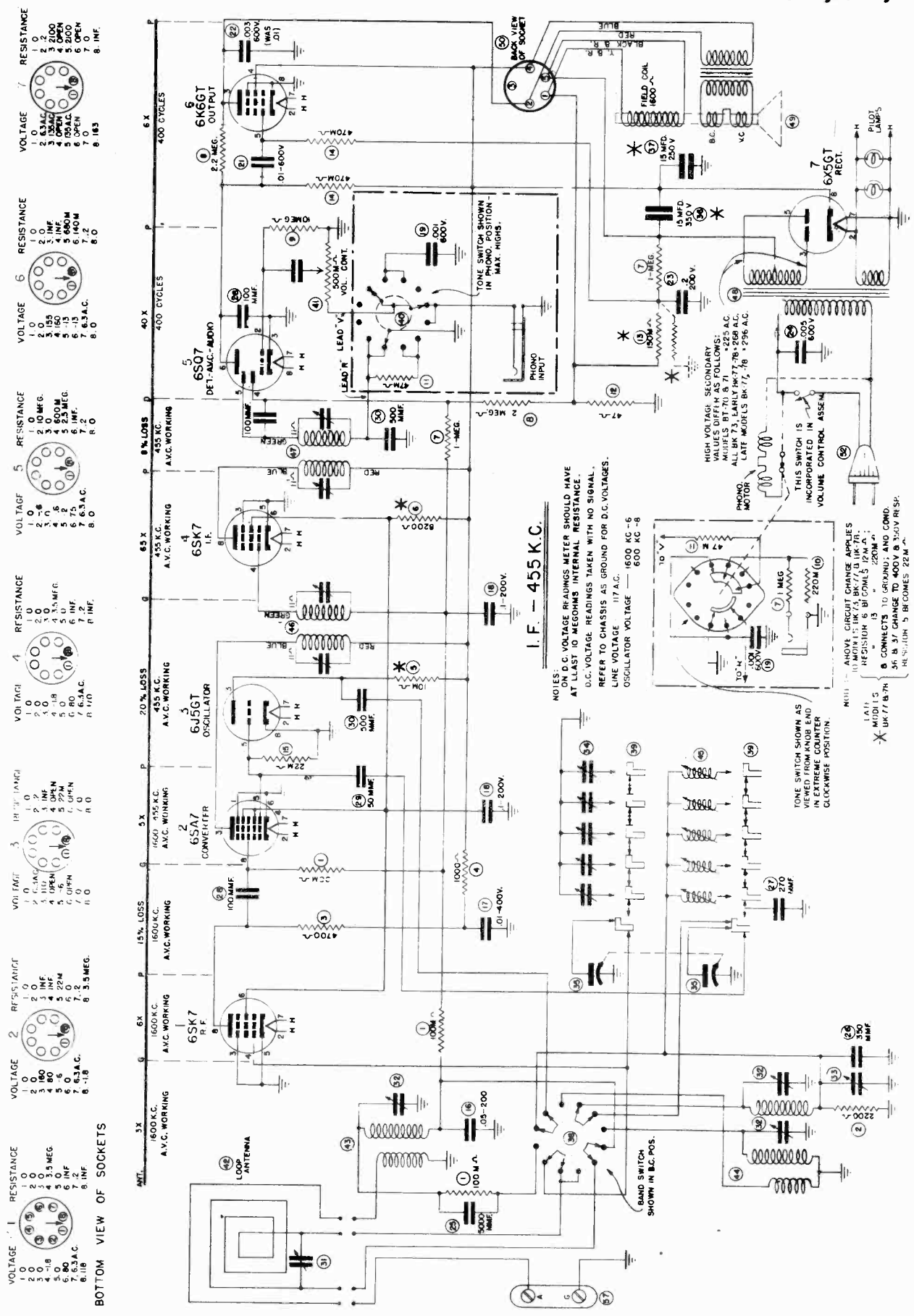
10

10

10

FARNSWORTH TELEV. & RADIO CORP.

MODELS BT70, BT71  
BK73, BK77, BK78

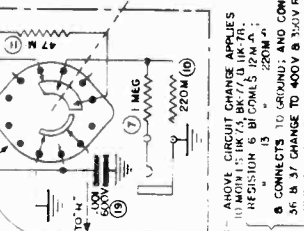


**BOTTOM VIEW OF SOCKETS**

Socket No.	Voltage	Resistance
1	1.0	1.0
2	2.0	2.0
3	3.0	3.0
4	4.0	4.0
5	5.0	5.0
6	6.0	6.0
7	7.0	7.0
8	8.0	8.0

**NOTES:**  
ON D.C. VOLTAGE READINGS METER SHOULD HAVE AT LEAST 10 MEGOHMS INTERNAL RESISTANCE.  
D.C. VOLTAGE READINGS TAKEN WITH NO SIGNAL.  
REFER TO CHASSIS AS GROUND FOR D.C. VOLTAGES.  
LINE VOLTAGE — 117 A.C.  
OSCILLATOR VOLTAGE — 1600 AC-6  
600 AC-8

**PHONO MOTOR**  
THIS SWITCH IS INCORPORATED IN VOLUME CONTROL ASSEMBLY.



**MULTIPLIER:**  
A - ABOVE CIRCUIT CHANGE APPLIES TO ALL MODELS.  
B - CONNECTS TO GROUND; AND COND. RESISTION 5 BECOMES 22 M.  
C - BK 77 & 78  
D - BK 77 & 78

SCHEMATIC BT-70, BT-71, BK-73, BK-77 AND BK-78

MODELS BT70, BT71, FARNSWORTH TELEV. & RADIO CORP. MODELS BK84 - BK85, etc.  
 BK73, BK77, BK78

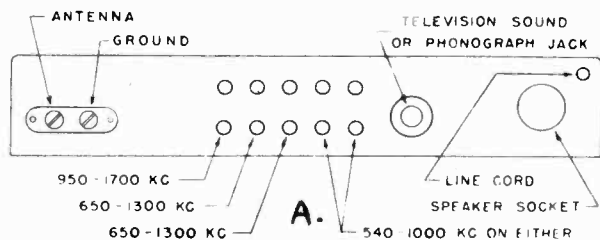
WHEN ALIGNING THIS RECEIVER A SIGNAL GENERATOR CALLIBRATED AT 455 Kc, 600 Kc, 1500 Kc, 1600 Kc, 6 Mc, 10 Mc, AND 18.1 Mc. ALSO AN OUTPUT INDICATOR ARE REQUIRED. ALL ADJUSTMENTS SHOULD BE MADE WITH THE VOLUME CONTROL SET FOR MAXIMUM VOLUME, KEEPING THE GENERATOR OUTPUT AS LOW AS POSSIBLE TO PREVENT A.V.C. ACTION AND FALSE READINGS. BEFORE RE-ALIGNING THE SET BE SURE ALL ADJUSTING SCREWS FOR THE IRON CORE OSCILLATOR COILS ARE FLUSH WITH OR INSIDE THE CHASSIS BASE.

CONNECT THE LOW SIDE OF THE SIGNAL GENERATOR TO THE TERMINAL MARKED G. (GROUND), AND THE HIGH SIDE OF THE GENERATOR TO THE TERMINAL MARKED A. (ANTENNA). (SEE FIG. A.)

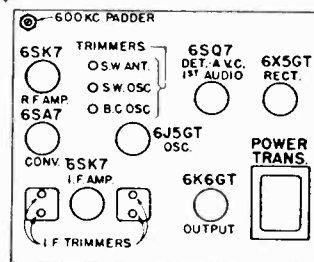
CAUTION--OFTEN TWO PEAKS ARE FOUND AT 18 Mc. USE THE ONE FOUND AT THE MAXIMUM SETTING OF THE OSCILLATOR TRIMMER.

**TABULATION FOR ALIGNMENT**

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.	455 Kc.	NOTE A	2ND I.F. TRIMMERS	TOP 2ND I.F. TRAN.	MAXIMUM OUTPUT	
3.				1ST I.F. TRIMMERS	TOP 1ST I.F. TRAN.		
4.				B.C.R.F. TRIMMER	SEE FIG.		
5.		1500 Kc.	NOTE B	B.C.R.F. TRIMMER	ON THE LOOP		
6.		600 Kc.		B.C.	SEE FIG.		
7.		RECHECK 1600 Kc.					
8.	400 OHMS	18.1 Mc.	NOTE A	S.W. Osc. TRIMMER			
9.		16 Mc.	NOTE B	S.W.R.F. TRIMMER			
10.	CHECK SIGNAL AT 6 Mc. NOTE A. SET GANG AT MINIMUM AND 10 Mc. NOTE B. STRONGEST SIGNAL AND ROCK GANG						



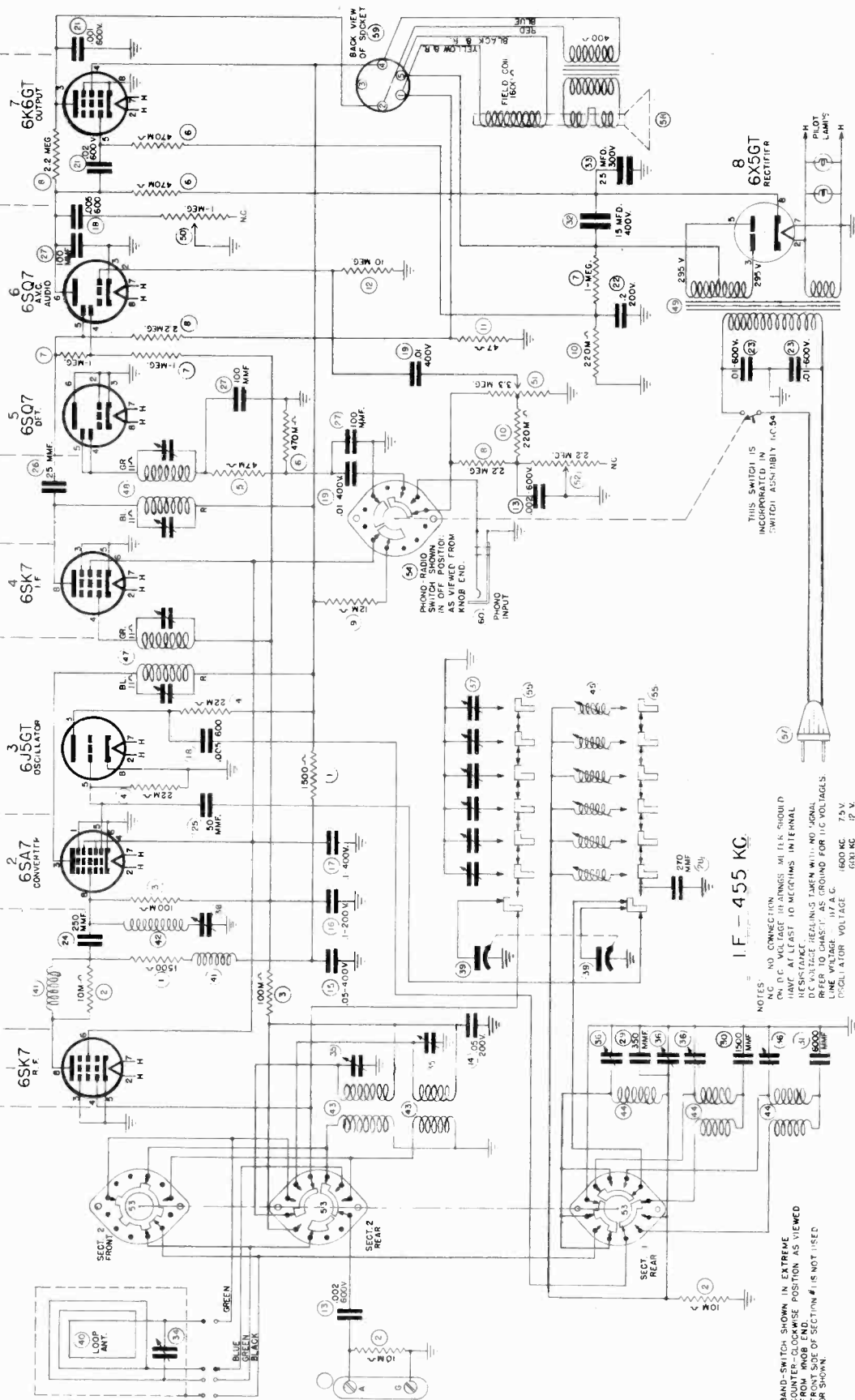
**B. CHASSIS LAYOUT**



TO PREVENT THE BUTTONS FROM BEING SET UP ON THE WRONG STATION A SIGNAL GENERATOR SHOULD BE USED. ADJUST THE LOWER SCREW FIRST AS THIS IS THE OSCILLATOR, UNTIL THE SIGNAL IS HEARD MOST CLEARLY (SEE FIG.). THEN ADJUST THE TRIMMER SCREW DIRECTLY ABOVE THE OSCILLATOR FOR MAXIMUM VOLUME.

FARNSWORTH TELEV. & RADIO CORP.

RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE
1 0	0	1 0	0	1 0	0	1 0	0	1 0	0	1 0	0
2 0	0	2 0	0	2 0	0	2 0	0	2 0	0	2 0	0
3 0	0	3 0	0	3 0	0	3 0	0	3 0	0	3 0	0
4 0	0	4 0	0	4 0	0	4 0	0	4 0	0	4 0	0
5 0	0	5 0	0	5 0	0	5 0	0	5 0	0	5 0	0
6 0	0	6 0	0	6 0	0	6 0	0	6 0	0	6 0	0
7 0	0	7 0	0	7 0	0	7 0	0	7 0	0	7 0	0
8 0	0	8 0	0	8 0	0	8 0	0	8 0	0	8 0	0
9 0	0	9 0	0	9 0	0	9 0	0	9 0	0	9 0	0
10 0	0	10 0	0	10 0	0	10 0	0	10 0	0	10 0	0
11 0	0	11 0	0	11 0	0	11 0	0	11 0	0	11 0	0
12 0	0	12 0	0	12 0	0	12 0	0	12 0	0	12 0	0
13 0	0	13 0	0	13 0	0	13 0	0	13 0	0	13 0	0
14 0	0	14 0	0	14 0	0	14 0	0	14 0	0	14 0	0
15 0	0	15 0	0	15 0	0	15 0	0	15 0	0	15 0	0
16 0	0	16 0	0	16 0	0	16 0	0	16 0	0	16 0	0
17 0	0	17 0	0	17 0	0	17 0	0	17 0	0	17 0	0
18 0	0	18 0	0	18 0	0	18 0	0	18 0	0	18 0	0
19 0	0	19 0	0	19 0	0	19 0	0	19 0	0	19 0	0
20 0	0	20 0	0	20 0	0	20 0	0	20 0	0	20 0	0
21 0	0	21 0	0	21 0	0	21 0	0	21 0	0	21 0	0
22 0	0	22 0	0	22 0	0	22 0	0	22 0	0	22 0	0
23 0	0	23 0	0	23 0	0	23 0	0	23 0	0	23 0	0
24 0	0	24 0	0	24 0	0	24 0	0	24 0	0	24 0	0
25 0	0	25 0	0	25 0	0	25 0	0	25 0	0	25 0	0
26 0	0	26 0	0	26 0	0	26 0	0	26 0	0	26 0	0
27 0	0	27 0	0	27 0	0	27 0	0	27 0	0	27 0	0
28 0	0	28 0	0	28 0	0	28 0	0	28 0	0	28 0	0
29 0	0	29 0	0	29 0	0	29 0	0	29 0	0	29 0	0
30 0	0	30 0	0	30 0	0	30 0	0	30 0	0	30 0	0
31 0	0	31 0	0	31 0	0	31 0	0	31 0	0	31 0	0
32 0	0	32 0	0	32 0	0	32 0	0	32 0	0	32 0	0
33 0	0	33 0	0	33 0	0	33 0	0	33 0	0	33 0	0
34 0	0	34 0	0	34 0	0	34 0	0	34 0	0	34 0	0
35 0	0	35 0	0	35 0	0	35 0	0	35 0	0	35 0	0
36 0	0	36 0	0	36 0	0	36 0	0	36 0	0	36 0	0
37 0	0	37 0	0	37 0	0	37 0	0	37 0	0	37 0	0
38 0	0	38 0	0	38 0	0	38 0	0	38 0	0	38 0	0
39 0	0	39 0	0	39 0	0	39 0	0	39 0	0	39 0	0
40 0	0	40 0	0	40 0	0	40 0	0	40 0	0	40 0	0
41 0	0	41 0	0	41 0	0	41 0	0	41 0	0	41 0	0
42 0	0	42 0	0	42 0	0	42 0	0	42 0	0	42 0	0
43 0	0	43 0	0	43 0	0	43 0	0	43 0	0	43 0	0
44 0	0	44 0	0	44 0	0	44 0	0	44 0	0	44 0	0
45 0	0	45 0	0	45 0	0	45 0	0	45 0	0	45 0	0
46 0	0	46 0	0	46 0	0	46 0	0	46 0	0	46 0	0
47 0	0	47 0	0	47 0	0	47 0	0	47 0	0	47 0	0
48 0	0	48 0	0	48 0	0	48 0	0	48 0	0	48 0	0
49 0	0	49 0	0	49 0	0	49 0	0	49 0	0	49 0	0
50 0	0	50 0	0	50 0	0	50 0	0	50 0	0	50 0	0
51 0	0	51 0	0	51 0	0	51 0	0	51 0	0	51 0	0
52 0	0	52 0	0	52 0	0	52 0	0	52 0	0	52 0	0
53 0	0	53 0	0	53 0	0	53 0	0	53 0	0	53 0	0
54 0	0	54 0	0	54 0	0	54 0	0	54 0	0	54 0	0
55 0	0	55 0	0	55 0	0	55 0	0	55 0	0	55 0	0



I F - 455 KC.

NOTES:  
 NC - NO CONNECTION  
 P.D.C. VOLTAGE IN DRAWING: ALL TUBE SHOULD  
 BE CONNECTED TO RESISTORS IN INTERNAL  
 RESISTANCE  
 D.C. VOLTAGE MEASUREMENTS TAKEN WITH NO SIGNAL  
 REFER TO CHARTS TAKEN WITH SIGNAL  
 LINE VOLTAGE 117 A.C. 600 KC. 75 V.  
 REGUL. FILTER VOLTAGE 600 KC. 12 V.

BAND-SWITCH SHOWN IN EXTREME  
 COUNTER-CLOCKWISE POSITION AS VIEWED  
 FROM FRONT SIDE OF SECTION # IS NOT USED  
 OR SHOWN.

SCHEMATIC FOR MODELS BC-82 AND BC-83

MODELS BC82, BC83

FARNSWORTH TELEV. & RADIO CORP.

ALIGNMENT INSTRUCTIONS

AN OUTPUT METER AND A SIGNAL GENERATOR ARE REQUIRED FOR PROPER ALIGNMENT OF THESE SETS. THE OSCILLATOR SHOULD BE CALIBRATED AT THE FOLLOWING POINTS, 455 Kc, 600 Kc, 900 Kc, 1500 Kc, 1600 Kc, 1.8 Mc, 5 Mc, 5.4 Mc, 6 Mc, 10 Mc, 16 Mc AND 18.1 Mc.

TABULATION FOR ALIGNMENT

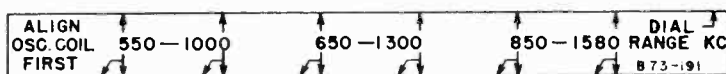
STEPS	IN SERIES WITH ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN	
1.	SET VOLUME AND TONE CONTROLS AT MAXIMUM						
2.	250 MMFD.	455 Kc.	NOTE A	2ND I.F. TRIMMERS	TOP OF I.F. TRANS.	MAX. OUTPUT	
3.				1ST I.F. TRIMMERS			
4.				WAVE TRAP TRIMMER	REAR OF CHASSIS	MIN. OUTPUT	
5.				1600 Kc.	Osc. B.C. TRIMMER	ON LOOP	SEE FIG.
6.		1500 Kc.	NOTE B	R.F. B.C. TRIMMER			
7.		600 Kc.	600 Kc. PAD				
8.		RECHECK 1500 Kc.					
9.	400 OHMS	5.4	NOTE A	OSC. POLICE TRIMMER*	ON LOOP	SEE FIG.	
10.		5 Mc.	NOTE B	R.F. POLICE TRIMMER**			
11.	CHECK 1.8 Mc.						
12.	400 OHMS	18.1 Mc.	NOTE A	OSC. S.W. TRIMMER*	ON LOOP	SEE FIG.	
13.		16 Mc.	NOTE B	R.F.S.W. TRIMMER**			
14.	CHECK 6 AND 10 Mc.						

\* TIGHTEN OSCILLATOR TRIMMER SCREW FOR MAXIMUM CAPACITY, THEN UNSCREW UNTIL SECOND PEAK IS SECURED.

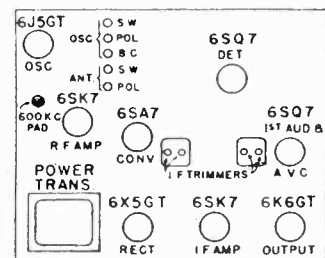
\*\* TIGHTEN R.F. TRIMMER SCREW FOR MAXIMUM CAPACITY, THEN UNSCREW UNTIL FIRST PEAK IS SECURED.

NOTE A. SET GANG AT MINIMUM.  
NOTE B. STRONGEST SIGNAL AND ROCK GANG.

BUTTON LAYOUT



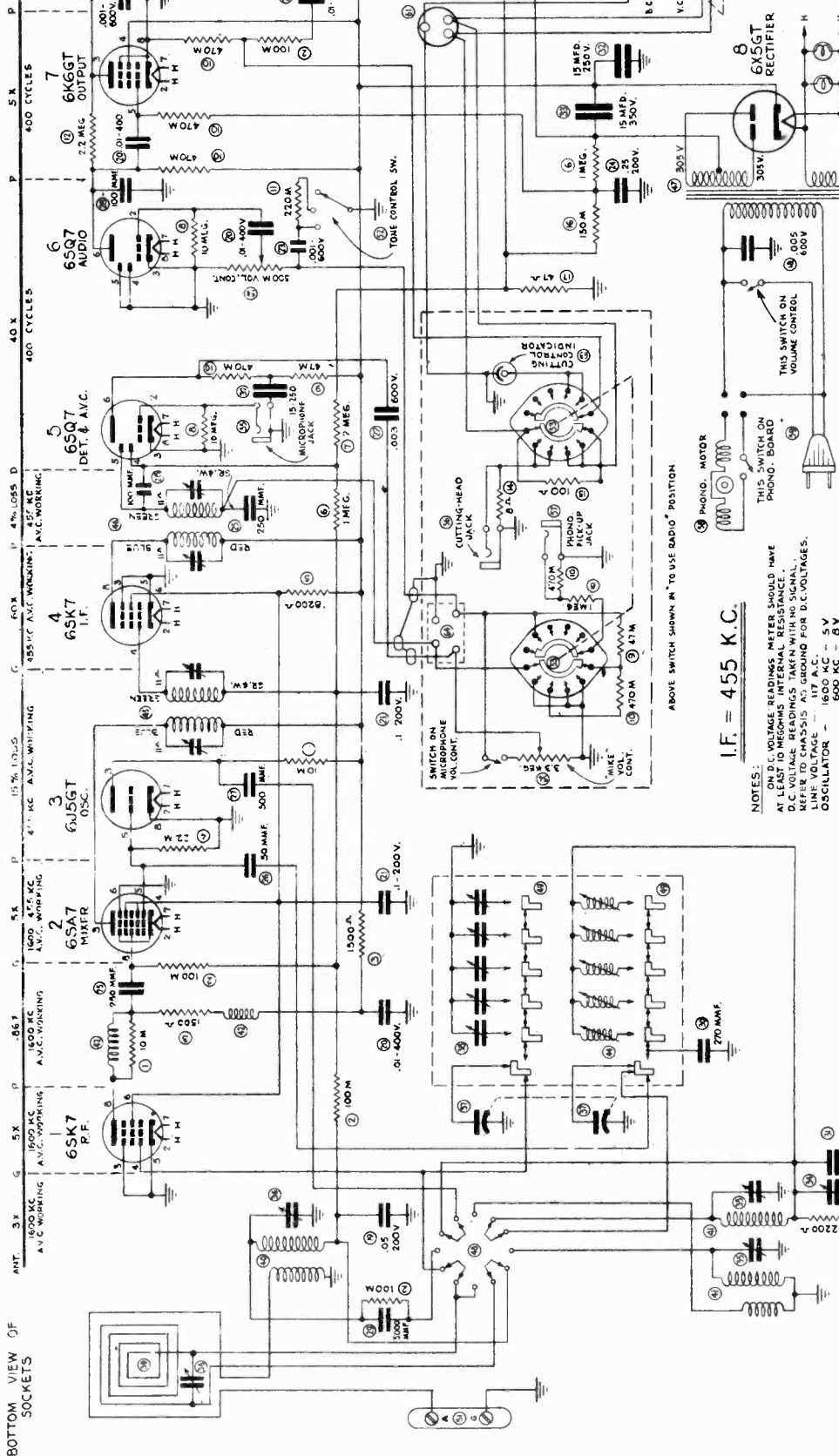
OSCILLATOR TRIMMERS — BOTTOM ROW



# FARNSWORTH TELEV. & RADIO CORP.

MODEL BKR84

VOLTAGE	RESISTANCE	VOLUME	VOLUME	PISTON UNIT	VOLUME	RESISTANCE	VOLUME	RESISTANCE	VOLUME	RESISTANCE
0	0	0	0	0	0	0	0	0	0	0
1	0.1	1	1	1	1	1	1	1	1	1
2	0.2	2	2	2	2	2	2	2	2	2
3	0.3	3	3	3	3	3	3	3	3	3
4	0.4	4	4	4	4	4	4	4	4	4
5	0.5	5	5	5	5	5	5	5	5	5
6	0.6	6	6	6	6	6	6	6	6	6
7	0.7	7	7	7	7	7	7	7	7	7
8	0.8	8	8	8	8	8	8	8	8	8
9	0.9	9	9	9	9	9	9	9	9	9
10	1.0	10	10	10	10	10	10	10	10	10
11	1.1	11	11	11	11	11	11	11	11	11
12	1.2	12	12	12	12	12	12	12	12	12
13	1.3	13	13	13	13	13	13	13	13	13
14	1.4	14	14	14	14	14	14	14	14	14
15	1.5	15	15	15	15	15	15	15	15	15
16	1.6	16	16	16	16	16	16	16	16	16
17	1.7	17	17	17	17	17	17	17	17	17
18	1.8	18	18	18	18	18	18	18	18	18
19	1.9	19	19	19	19	19	19	19	19	19
20	2.0	20	20	20	20	20	20	20	20	20
21	2.1	21	21	21	21	21	21	21	21	21
22	2.2	22	22	22	22	22	22	22	22	22
23	2.3	23	23	23	23	23	23	23	23	23
24	2.4	24	24	24	24	24	24	24	24	24
25	2.5	25	25	25	25	25	25	25	25	25
26	2.6	26	26	26	26	26	26	26	26	26
27	2.7	27	27	27	27	27	27	27	27	27
28	2.8	28	28	28	28	28	28	28	28	28
29	2.9	29	29	29	29	29	29	29	29	29
30	3.0	30	30	30	30	30	30	30	30	30
31	3.1	31	31	31	31	31	31	31	31	31
32	3.2	32	32	32	32	32	32	32	32	32
33	3.3	33	33	33	33	33	33	33	33	33
34	3.4	34	34	34	34	34	34	34	34	34
35	3.5	35	35	35	35	35	35	35	35	35
36	3.6	36	36	36	36	36	36	36	36	36
37	3.7	37	37	37	37	37	37	37	37	37
38	3.8	38	38	38	38	38	38	38	38	38
39	3.9	39	39	39	39	39	39	39	39	39
40	4.0	40	40	40	40	40	40	40	40	40
41	4.1	41	41	41	41	41	41	41	41	41
42	4.2	42	42	42	42	42	42	42	42	42
43	4.3	43	43	43	43	43	43	43	43	43
44	4.4	44	44	44	44	44	44	44	44	44
45	4.5	45	45	45	45	45	45	45	45	45
46	4.6	46	46	46	46	46	46	46	46	46
47	4.7	47	47	47	47	47	47	47	47	47
48	4.8	48	48	48	48	48	48	48	48	48
49	4.9	49	49	49	49	49	49	49	49	49
50	5.0	50	50	50	50	50	50	50	50	50
51	5.1	51	51	51	51	51	51	51	51	51
52	5.2	52	52	52	52	52	52	52	52	52
53	5.3	53	53	53	53	53	53	53	53	53
54	5.4	54	54	54	54	54	54	54	54	54
55	5.5	55	55	55	55	55	55	55	55	55
56	5.6	56	56	56	56	56	56	56	56	56
57	5.7	57	57	57	57	57	57	57	57	57
58	5.8	58	58	58	58	58	58	58	58	58
59	5.9	59	59	59	59	59	59	59	59	59
60	6.0	60	60	60	60	60	60	60	60	60



**I.F. = 455 K.C.**

NOTES: VOLTAGE READINGS MUST BE TAKEN WITH AT LEAST 10 MEGOHMS INTERNAL RESISTANCE. D.C. VOLTAGE READINGS TAKEN WITH NO SIGNAL. REFER TO CHASSIS AS GROUND FOR D.C. VOLTAGES. LINE VOLTAGE - 117 A.C. 50 C. 5 V. OSCILLATOR - 1600 KC - 5 V.

SCHEMATIC FOR MODEL BKR-84

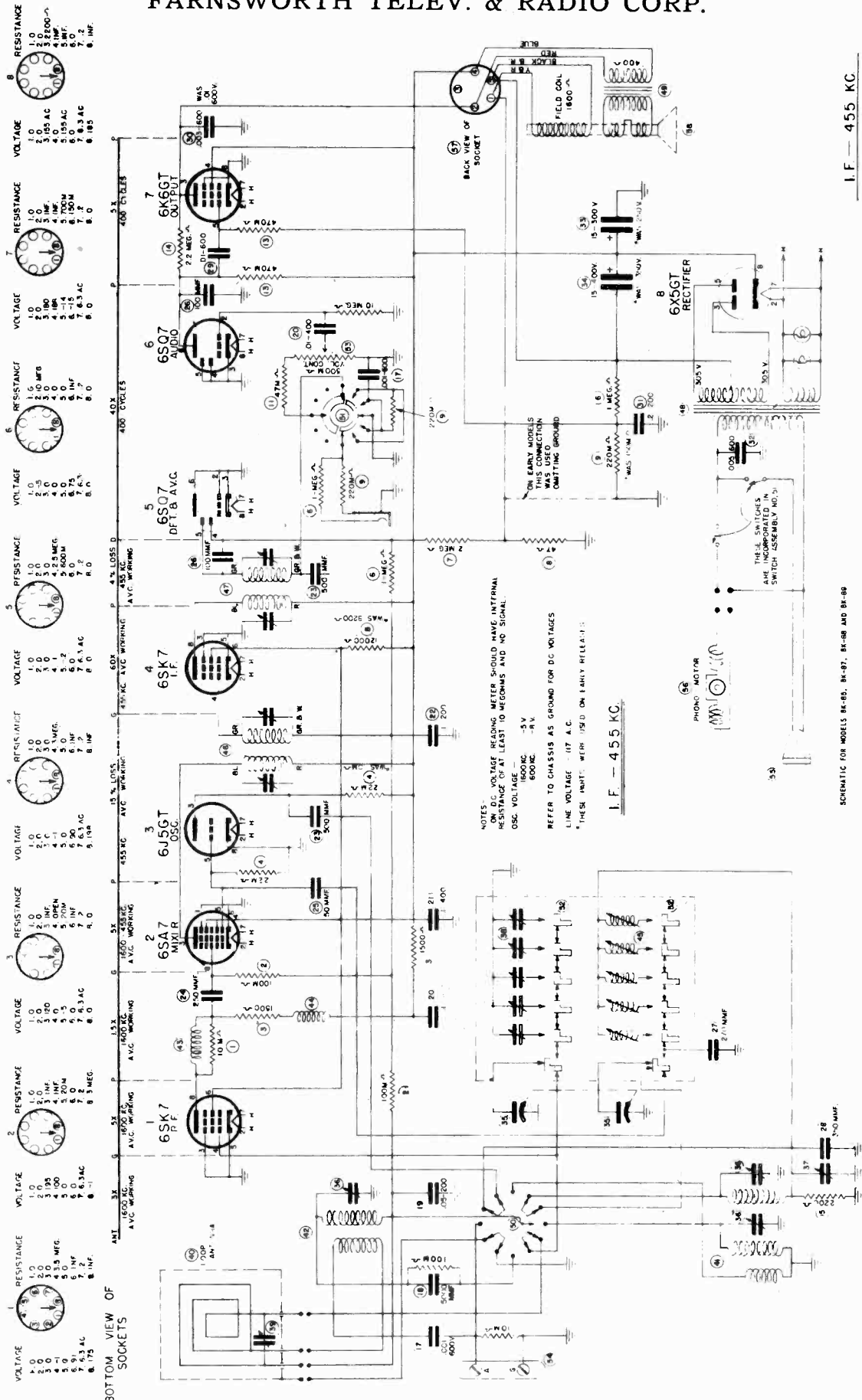
FOR OTHER DATA  
SEE INDEX

FOR GENERAL INDUSTRIES R-70 RECORD CHANGER SEE RIDER'S  
"AUTOMATIC RECORD CHANGERS AND RECORDERS".



MODELS BK85, BK87,  
BK88,  
BK89

FARNSWORTH TELEV. & RADIO CORP.



SOCKET	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE
1	2.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0
2	3.0	3.0	2.0	3.0	2.0	3.0	2.0	3.0
3	5.0	5.0	3.0	5.0	3.0	5.0	3.0	5.0
4	6.3 AC	6.3 AC	5.0	6.3 AC	5.0	6.3 AC	5.0	6.3 AC
5	6.3 AC	6.3 AC	5.0	6.3 AC	5.0	6.3 AC	5.0	6.3 AC
6	6.3 AC	6.3 AC	5.0	6.3 AC	5.0	6.3 AC	5.0	6.3 AC
7	6.3 AC	6.3 AC	5.0	6.3 AC	5.0	6.3 AC	5.0	6.3 AC
8	6.3 AC	6.3 AC	5.0	6.3 AC	5.0	6.3 AC	5.0	6.3 AC

NOTES:  
1. VOLTAGE RESONANCE AFTER SIGNAL HAVE INTERNAL RESISTANCE OF AT LEAST TO MEGAS AND NO SIGNAL.  
OSC. VOLTAGE -5V  
600KC. -R.V.  
REFER TO CHASSIS AS GROUND FOR DC VOLTAGES  
LINE VOLTAGE -117 A.C.  
\* THESE PARTS WERE USED ON EARLY RELEASES

I.F. - 455 KC.

I.F. - 455 KC.

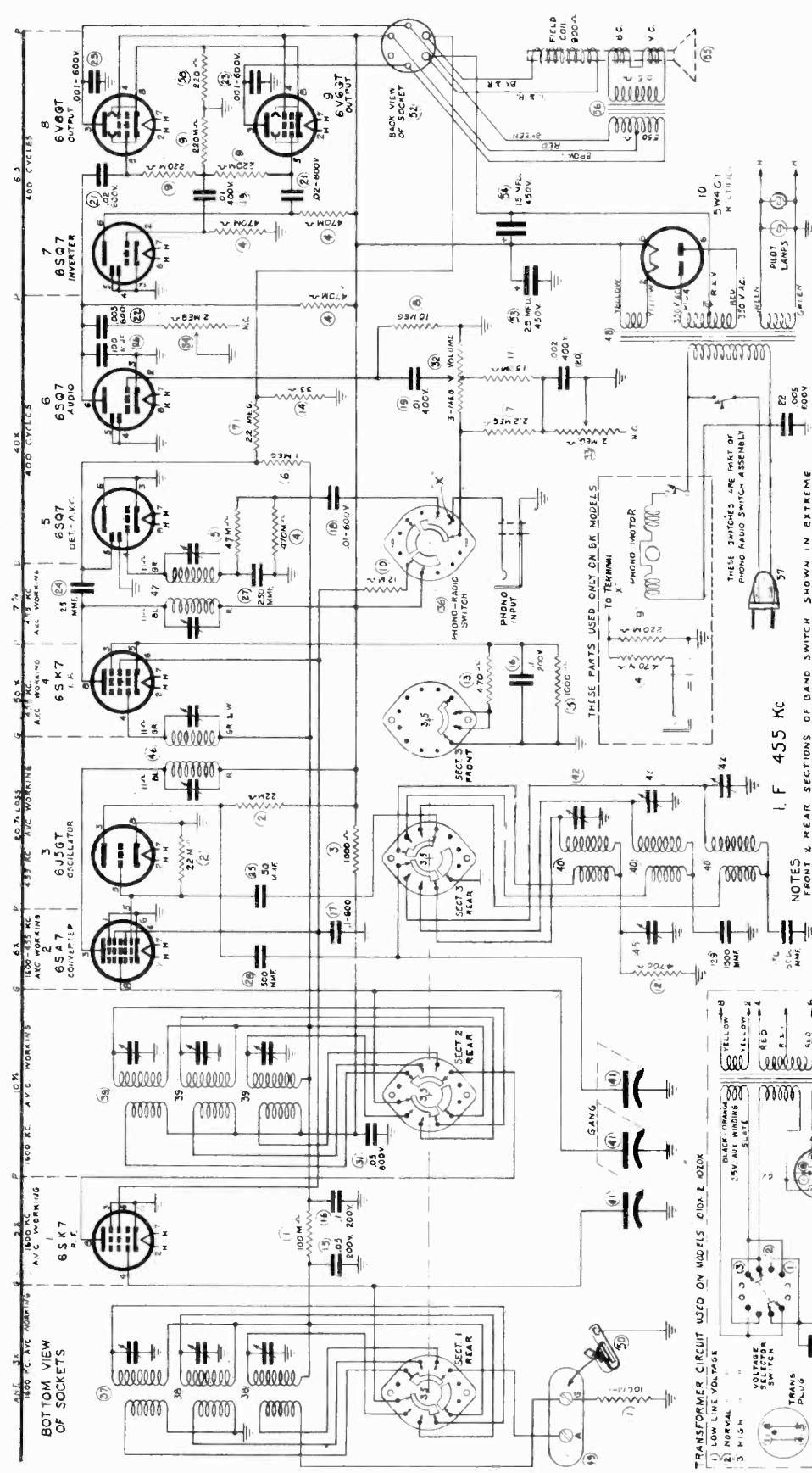
FOR OTHER DATA SEE INDEX

SCHEMATIC FOR MODELS BK-85, BK-87, BK-88 AND BK-89

FARNSWORTH TELEV. & RADIO CORP.

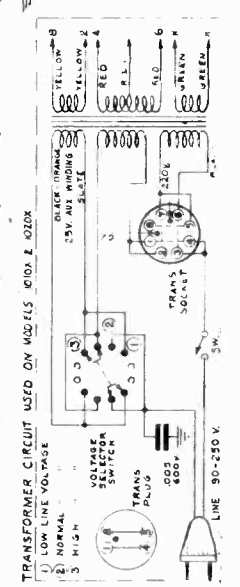
MODELS BT1010, BT1010X  
BC1020, BC1020X, BK10305

1		2		3		4		5		6		7		8		9		10	
VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0



NOTES:  
FRONT & REAR SECTIONS OF DIAL SWITCH SHOWN IN EXTREME  
COUNTER CLOCKWISE POSITION AS VIEWED FROM REAR END.  
WITH LINE VOLTAGE AT 117 AC. TAKE ABOVE VOLTAGE READINGS. WERE TAKEN WITH A VOLT-METER HAVING AT LEAST 10 MEGOHMS INTERNA.  
RESISTANCE READING:8. TAKE WITH NO SIGNAL. USE CHASSIS AS GROUND FOR VOLTAGE REFERENCE POINT.

I.F. 455 Kc  
SCHEMATIC FOR MODELS BT-1010, BC-1020,  
BC-10305, BT-1010X, BC-1020X



MODELS BT1010, BT1010X  
BC1020, BC1020X, BK10305

FARNSWORTH TELEV. & RADIO CORP.  
ALIGNMENT INSTRUCTIONS

THE OSCILLATOR SHOULD BE CALIBRATED AT THE FOLLOWING POINTS, 455 Kc, 600 Kc, 1500 Kc, 1900 Kc, 6 Mc, 7 Mc, 6 Mc, 10 Mc, 20 Mc, AND 22 Mc.

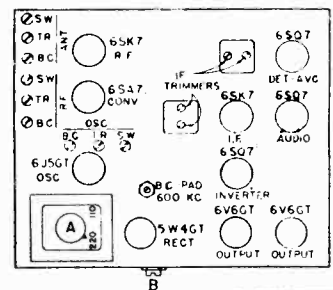
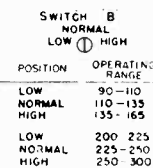
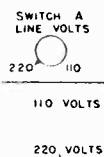
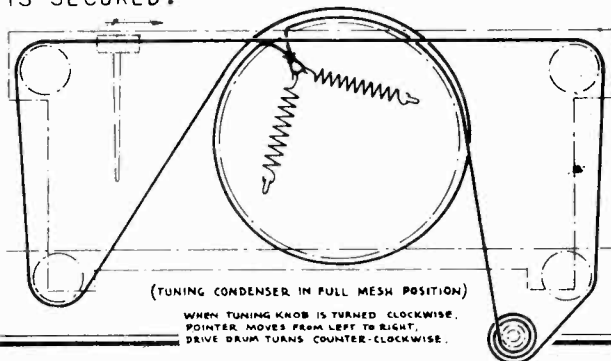
STEPS	IN SERIES WITH ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	To OBTAIN		
1.	SET VOLUME AND TONE CONTROLS AT MAXIMUM							
2.	1 MFD. COND TO 6SA7 GRID (ON VAR. COND)	455 Kc.	NOTE A	2ND I.F. TRIMMERS	TOP OF I.F. TRANS.	MAX. OUTPUT		
3.				1ST I.F. TRIMMERS				
4.	250 MMFD.	1900 Kc.		OSC. B.C. TRIMMER	SEE FIG.	MAXIMUM OUTPUT		
5.		1500 Kc.		R.F. B.C. TRIMMER				
6.				ANT. B.C. TRIMMER				
7.			600 Kc.	NOTE B			600 Kc. PAD.	
8.	RECHECK 1500 Kc.							
9.	400 OHMS	7.0	NOTE A	OSC. TROPICAL TRIMMER*			SEE FIG.	MAXIMUM OUTPUT
10.		6.0		R.F. TROPICAL TRIMMER**				
				ANT. TROPICAL TRIMMER**				
11.	RECHECK 6 Mc.							
12.	400 OHMS	22 Mc.	NOTE A	OSC. S.W. TRIMMER*	SEE FIG.	MAXIMUM OUTPUT		
13.		20 Mc.	NOTE B	R. F. S. W. TRIMMER**				
	ANT. S.W. TRIMMER**							
14.	RECHECK 20 Mc.							

NOTE A. SET GANG AT MINIMUM.  
NOTE B. STRONGEST SIGNAL AND ROCK GANG.

\*TIGHTEN OSCILLATOR TRIMMER SCREW FOR MAXIMUM CAPACITY, THEN UNSCREW UNTIL SECOND PEAK IS SECURED.

\*\*TIGHTEN R.F. TRIMMER SCREW FOR MAXIMUM CAPACITY, THEN UNSCREW UNTIL FIRST PEAK IS SECURED.

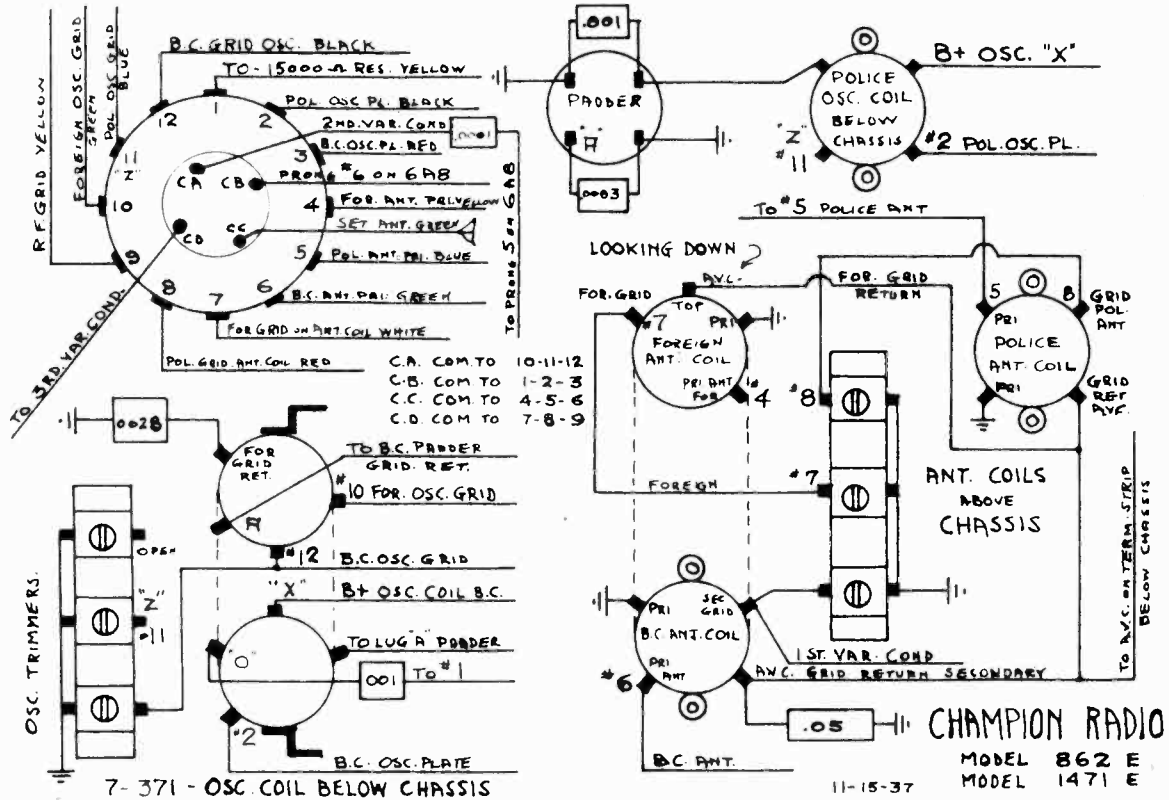
CHASSIS LAYOUT



FERGUSON RADIO, INC.

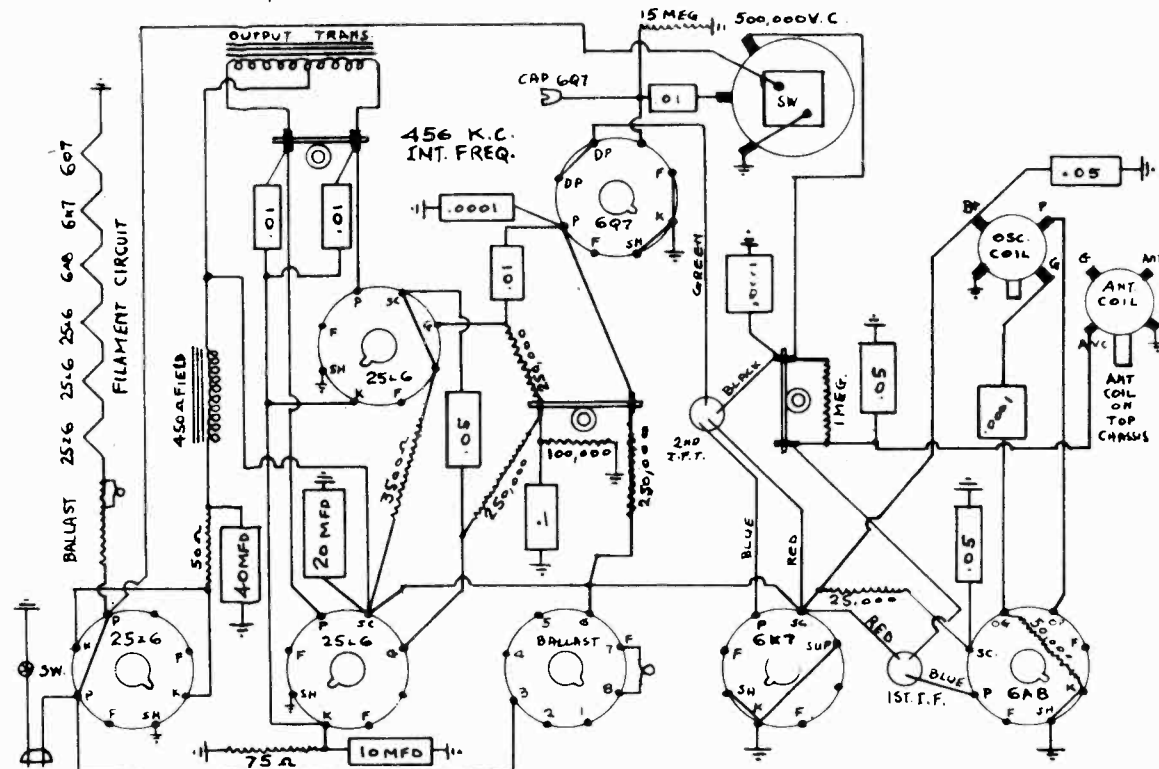
MODELS 862E, 1471E  
 MODEL 714AKS

3 GANG 3 BAND SUPERHETERODYNE DETAILS SHEET #2.



CHAMPION RADIO

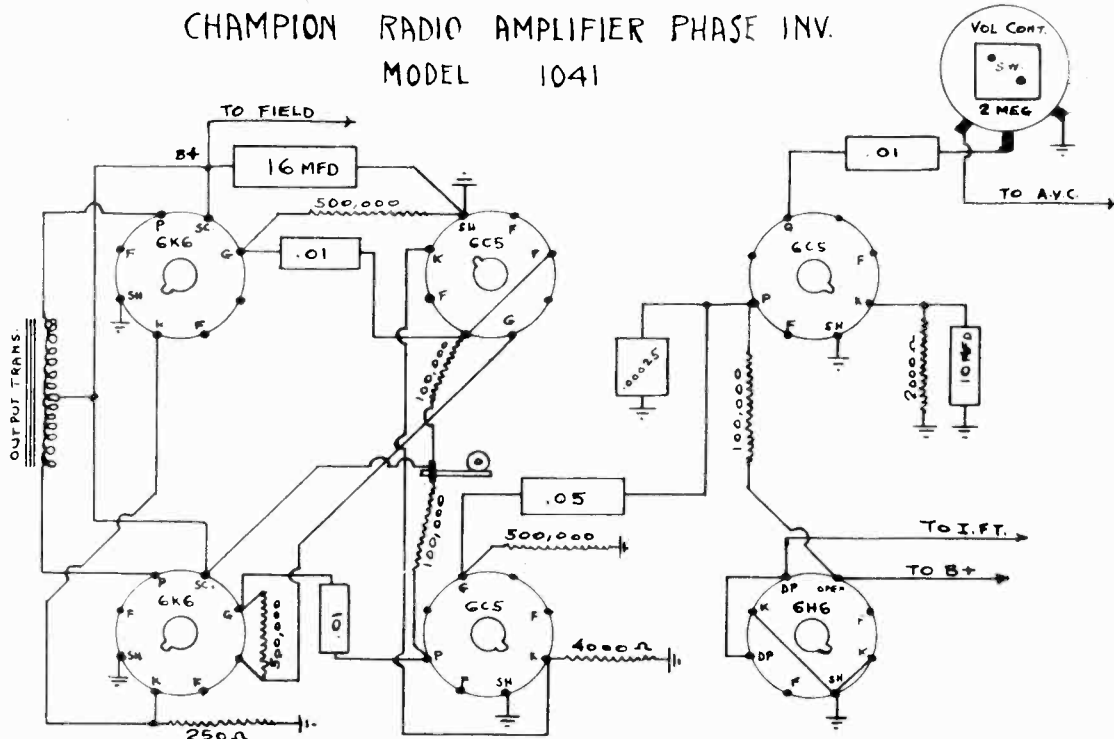
MODEL 714 AKS



MODEL 1041  
MODEL 7540 Ampl.

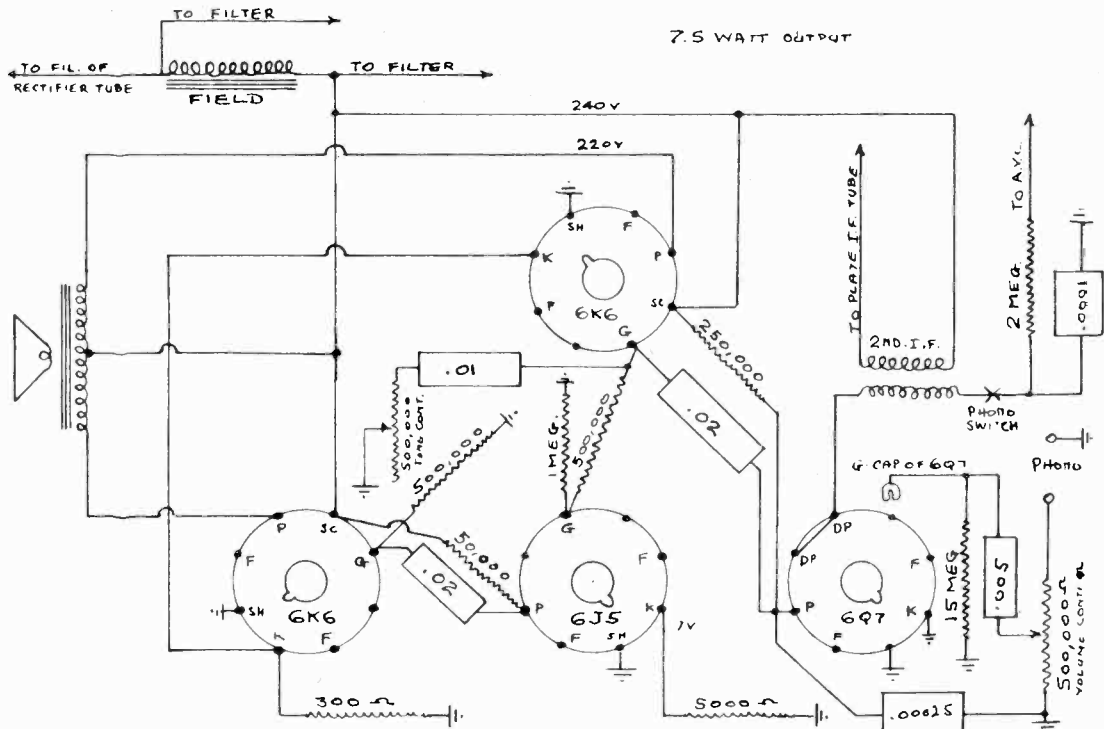
FERGUSON RADIO, INC.

CHAMPION RADIO AMPLIFIER PHASE INV.  
MODEL 1041



FERGUSON RADIO INC.

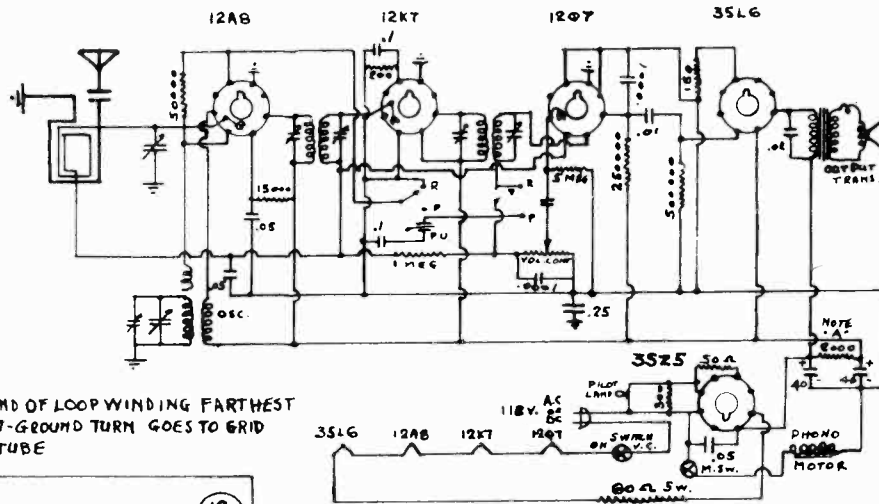
CHAMPION RADIO = MODEL 7540 PP AMPLIFIER USED WITH MODEL 6340 RADIO



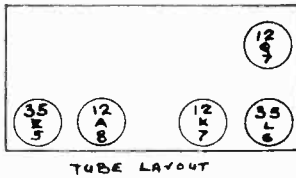
FERGUSON RADIO, INC.

MODEL 5142 SOC.  
MODEL 5142 KF

FERGUSON RADIO MODEL 5142 SOC.  
456 K.C.I.F.



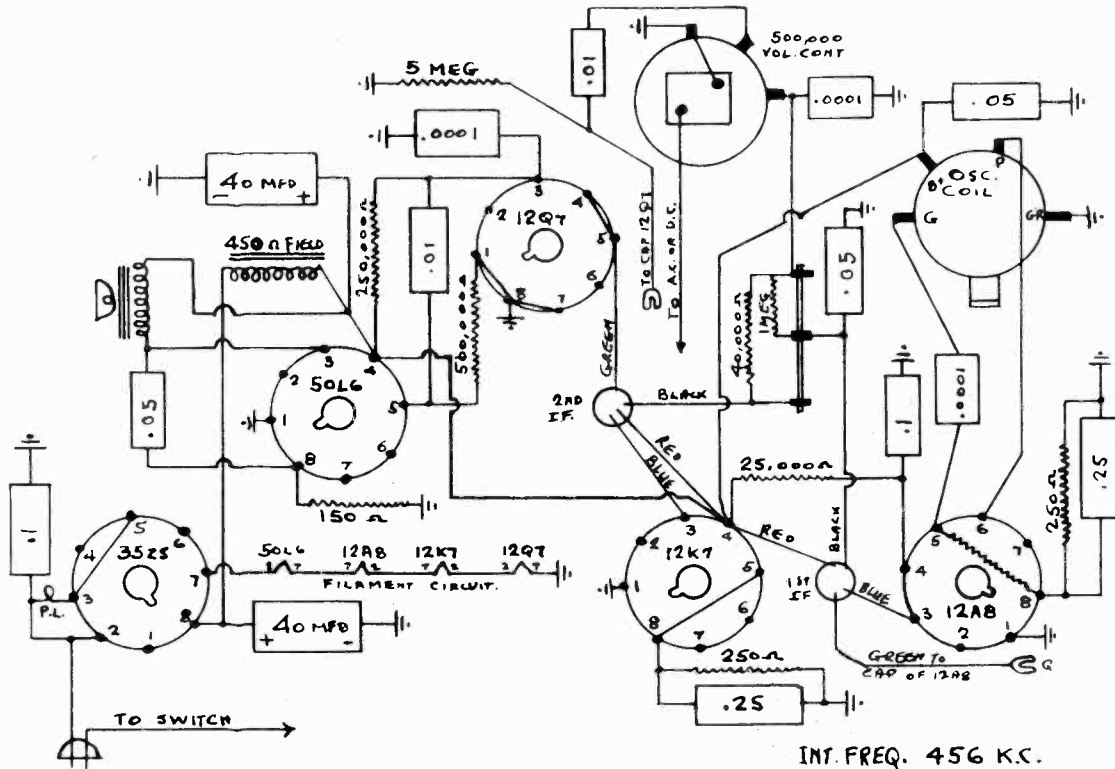
NOTE: THE END OF LOOP WINDING FARTHEST FROM ANT-GROUND TURN GOES TO GRID OF 12AB TUBE



NOTE "A" ON SOME MODELS A DYNAMIC SPEAKER IS USED INSTEAD OF A P.M. AND 450 Ω FIELD IS USED IN PLACE OF 2000Ω RES.

FERGUSON RADIO INC.

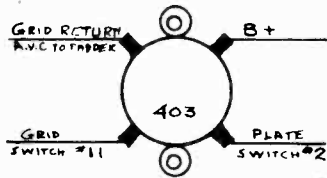
MODEL 5142 KF



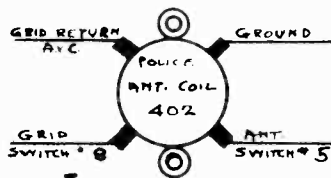
INT. FREQ. 456 K.C.

ALL WAVE SUPERHETERODYNE COIL DETAILS

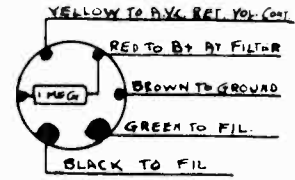
1937 CHASSIS



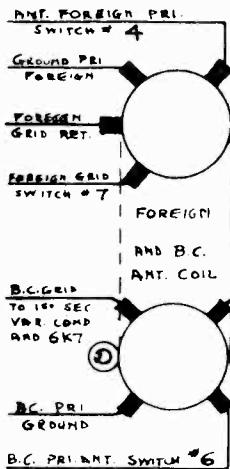
POLICE OSC. COIL



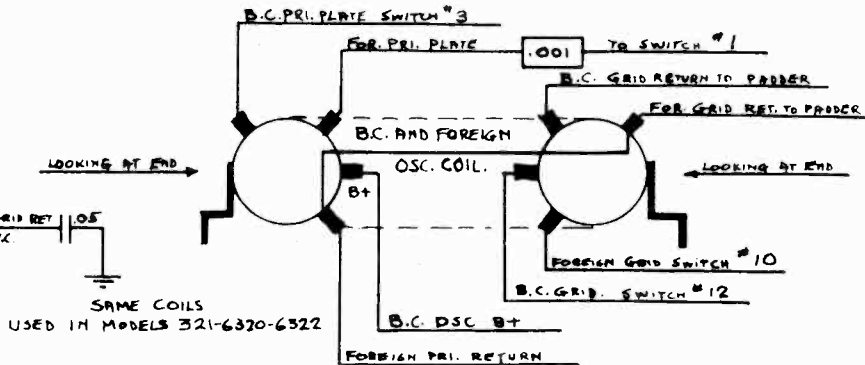
LOOKING DOWN AT TOP



REAR VIEW OF MAGIC EYE SOCKET

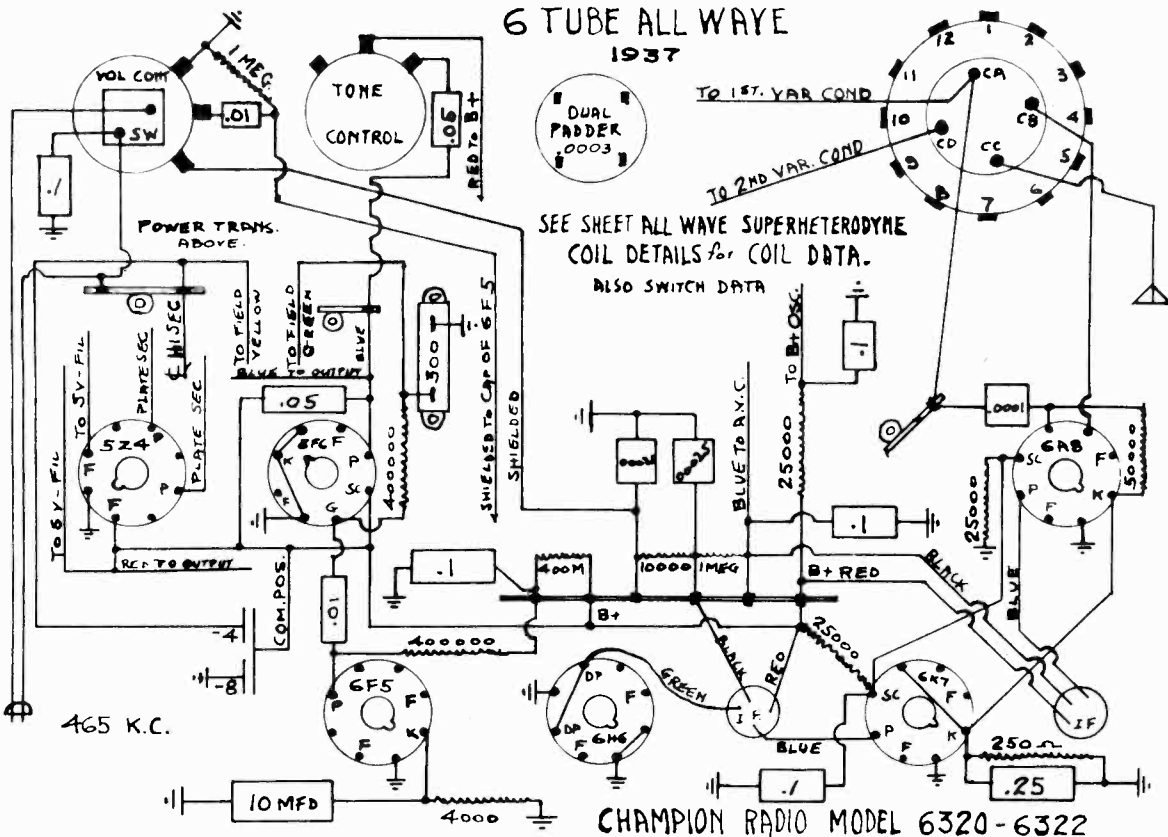


LOOKING DOWN FROM TOP OF COIL



SAME COILS USED IN MODELS 321-6320-6322

CHAMPION RADIO

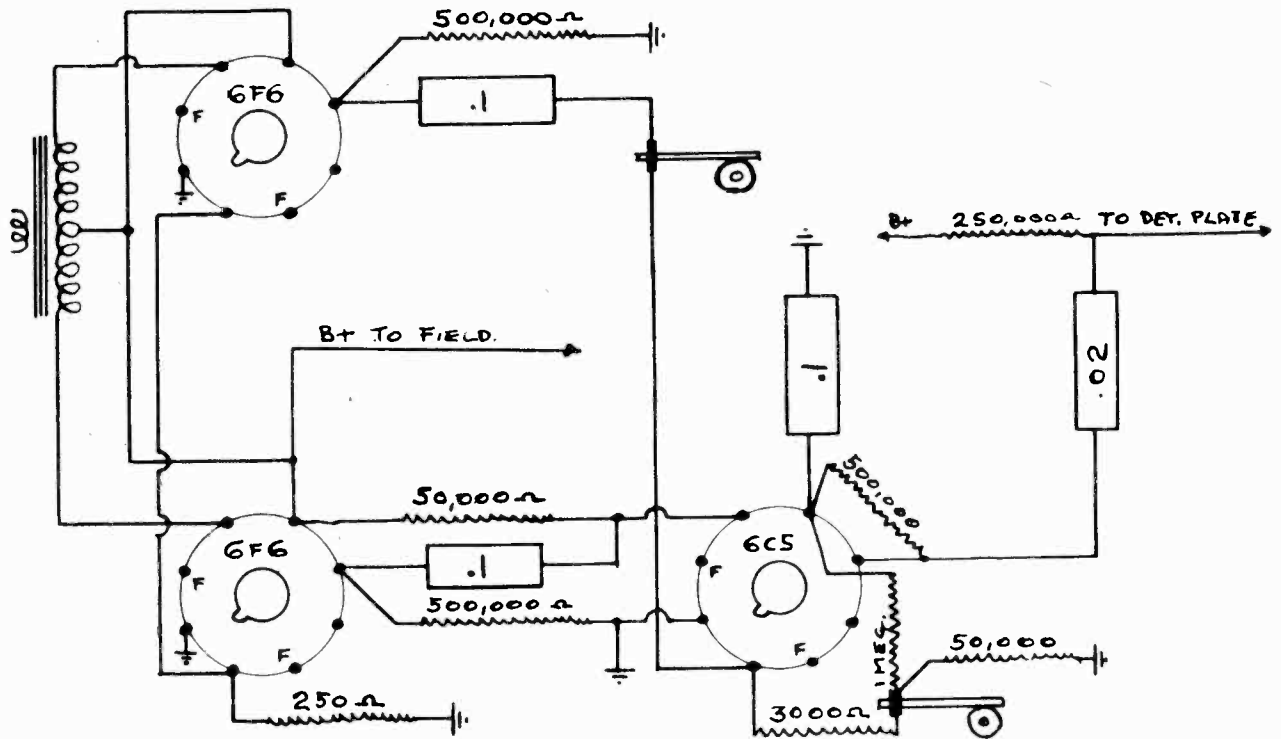


CHAMPION RADIO MODEL 6320-6322

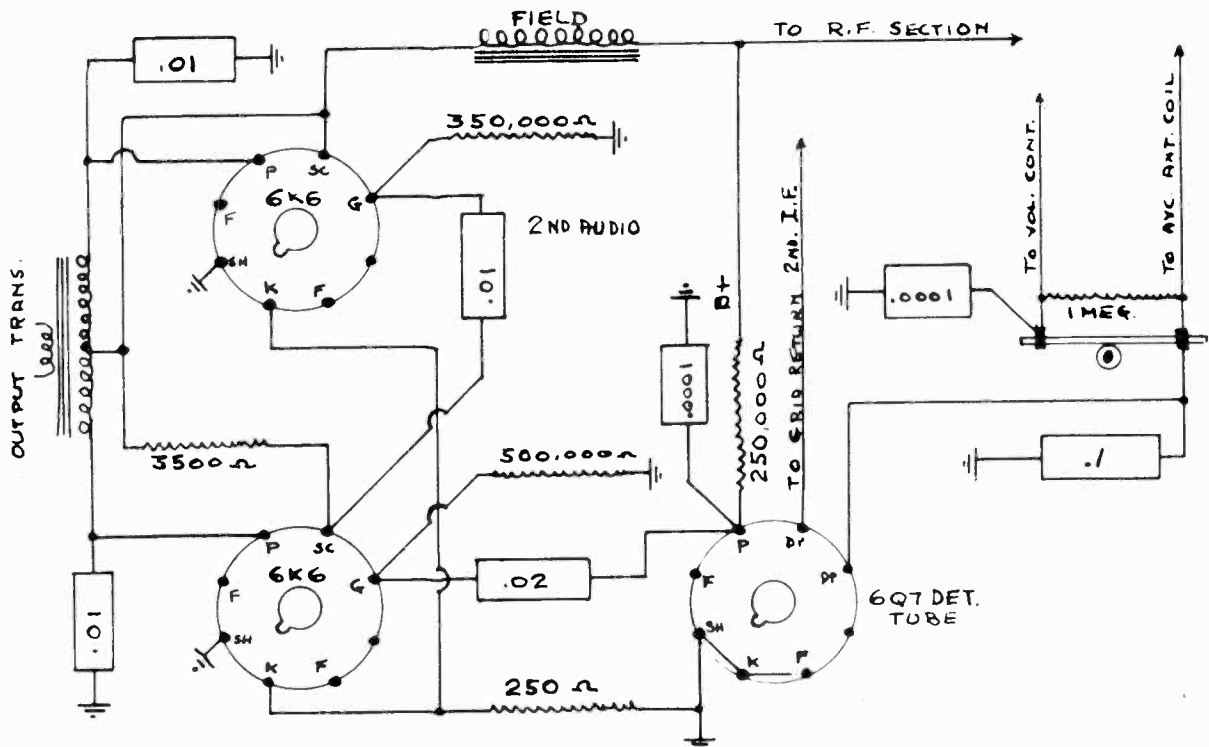
FERGUSON RADIO, INC.

MODEL 3-Tube Amplifier  
MODEL 7140

3 TUBE AMPLIFIER  
USED WITH CHAMPION 5 #6 TUBE TUNER



PUSH PULL AMPLIFIER USED ON MODEL 7140  
BALANCE OF CIRCUIT SAME AS MODEL 6140 AK.

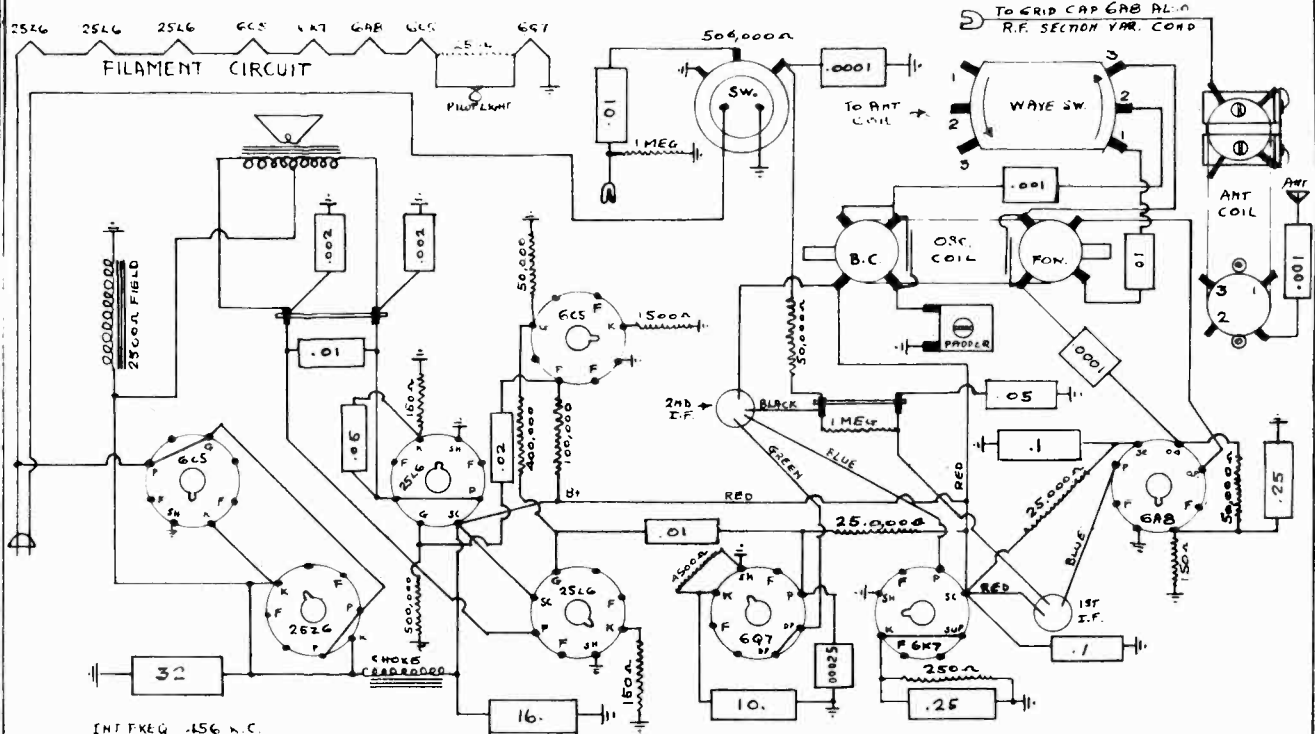




MODEL 7341 AKS  
MODEL 8341M

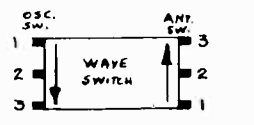
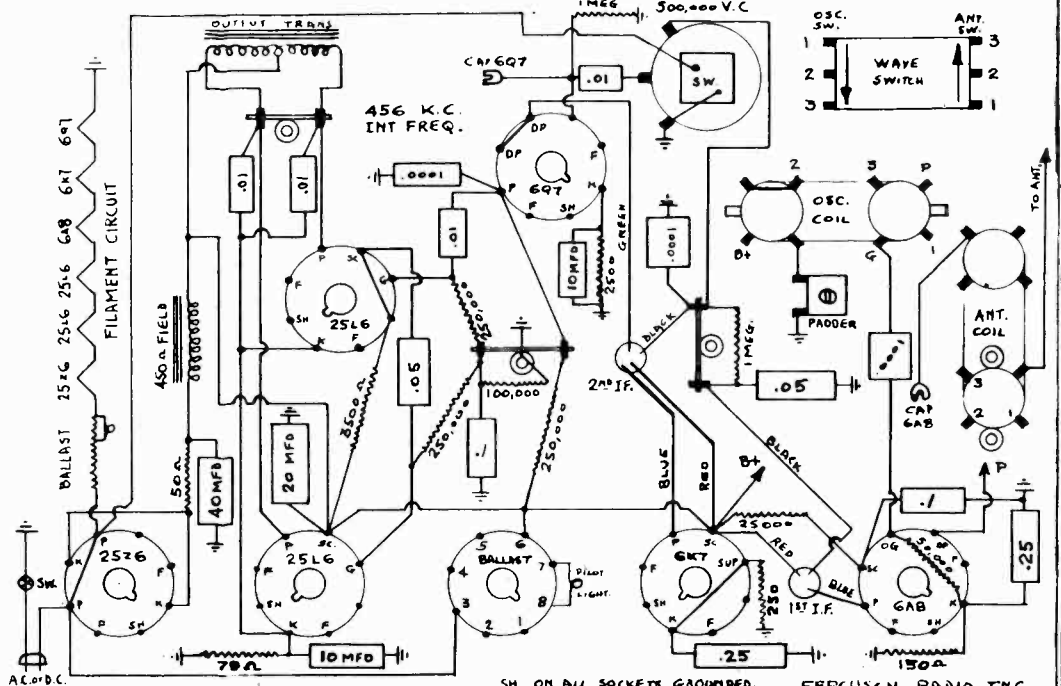
FERGUSON RADIO, INC.

CHAMPION RADIO MODEL 8341 M



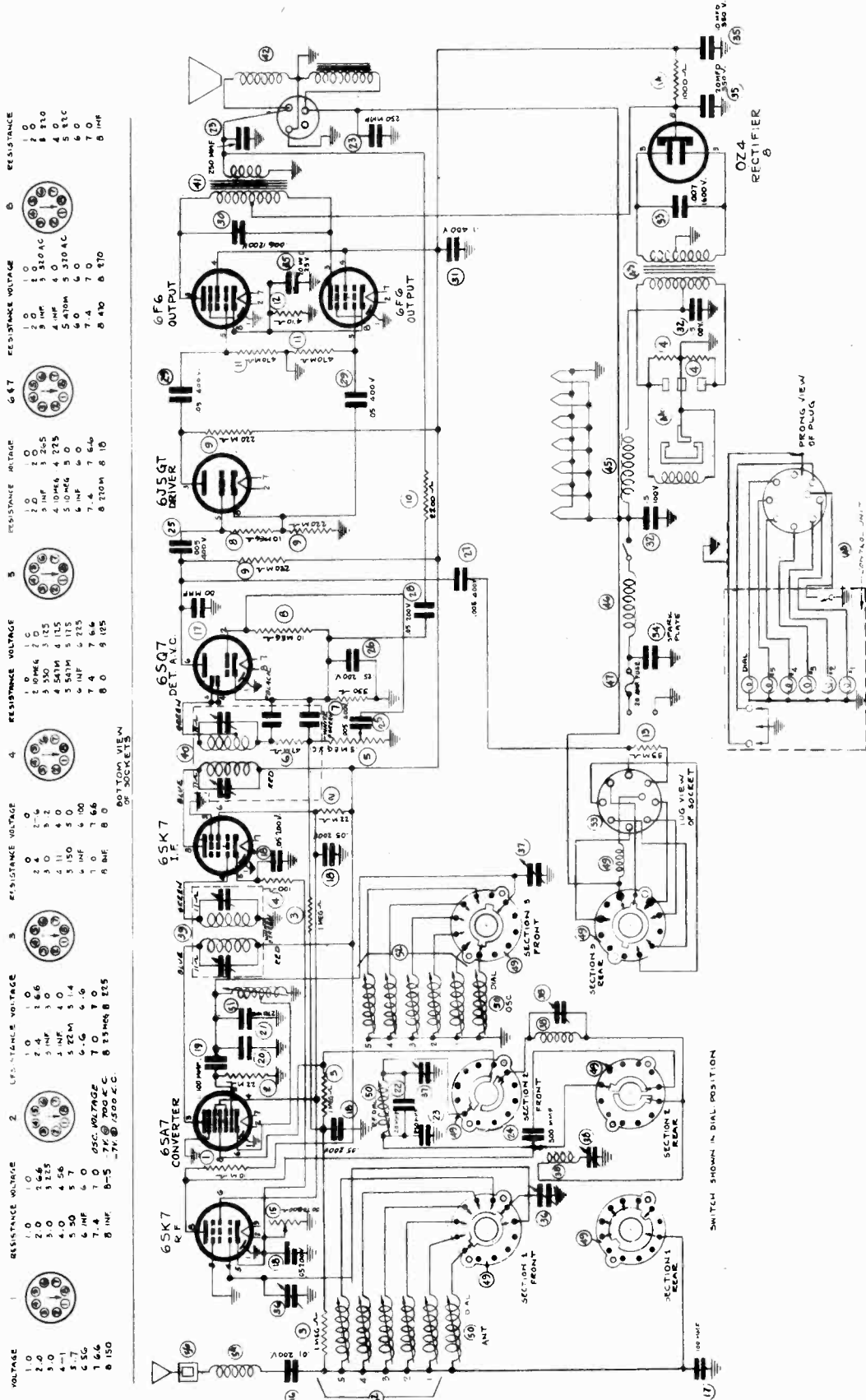
- INT FREQ. 456 K.C.
- PHD B.C. AT 600 K.C.
- TRIM B.C. AT 1450 K.C.
- TRIM FOR A1 15 M.C.
- POLICE BAND NO. ADJ.
- 105 VOLT A.C. 50 D.C.

CHAMPION RADIO MODEL 7341 AKS.



SH. ON ALL SOCKETS GROUNDED. FERGUSON RADIO INC.

FIRESTONE TIRE & RUBBER CO.



VOLTAGE	RESISTANCE VOLTAGE	RESISTANCE VOLTAGE	RESISTANCE VOLTAGE	RESISTANCE VOLTAGE	RESISTANCE VOLTAGE	RESISTANCE VOLTAGE	RESISTANCE VOLTAGE
1.0	0	0	0	0	0	0	0
2.0	1.66	1.66	2.4	2.4	2.4	2.4	2.4
3.0	3.25	3.25	3.0	3.0	3.0	3.0	3.0
4-1	4.56	4.56	4.11	4.11	4.11	4.11	4.11
5-1	5.90	5.90	5.30	5.30	5.30	5.30	5.30
6	7.4	7.4	6.74	6.74	6.74	6.74	6.74
7.66	0	0	7.1	7.1	7.1	7.1	7.1
8 150	0	0	8.0	8.0	8.0	8.0	8.0

6SK7 RF AMP: 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.4, 8.0  
 6SA7 CONVERTER: 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.4, 8.0  
 6SK7 I.F. AMP: 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.4, 8.0  
 6SQ7 DET. & AVC: 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.4, 8.0  
 6J5GT DRIVER: 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.4, 8.0  
 6F6 OUTPUT: 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.4, 8.0

IF PEAK 455 KC FOR PARTS LIST SEE INDEX

MODEL S7350-1

FIRESTONE TIRE & RUBBER CO.

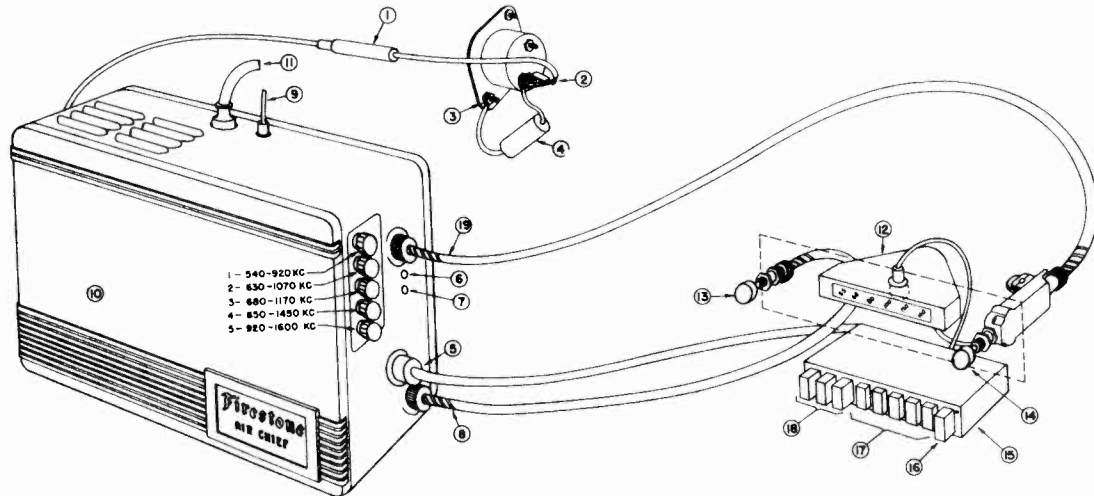


Figure 2

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>1. Fuse Container</li> <li>2. Connection to Ammeter</li> <li>3. Grounding of Ammeter Condenser</li> <li>4. Ammeter Condenser</li> <li>5. Push Button and Tone Control Cable</li> <li>6. Hole for Antenna Matching Adjustment (Man.)</li> <li>7. Hole for Antenna Matching Adjustment (P.B.)</li> <li>8. Volume Control Cable</li> <li>9. Antenna Lead-in Cable</li> </ul> | <ul style="list-style-type: none"> <li>10. Front Cover, Removable for Tube Replacement.</li> <li>11. Speaker Cable</li> <li>12. Manual Tuning Control</li> <li>13. On-Off Switch and Volume Control Knob.</li> <li>14. Station Selector Knob</li> <li>15. Push Button Tuning Control</li> <li>16. MONOMATIC TUNING BUTTON</li> <li>17. Station Call Letter Indicator</li> <li>18. TRIMATIC Tone Control Buttons</li> <li>19. Station Selector Cable</li> </ul> |
|--|--|

ALIGNMENT PROCEDURE

SET DIAL TO	GENERATOR FREQUENCY	DUMMY ANTENNA	ADJUSTMENTS (IN ORDER SHOWN)	TRIMMER FUNCTION
540 kc	455 kc	.1 mfd.	T2, T1	IF
600 kc	455 kc	.1 mfd.	C14*	IF Wave Trap
Highest Frequency	1600 kc	.0001 mfd.	VC-2	Osc.
600 kc	600 kc	.0001 mfd.	C4	Shunt Coil
1400 kc	1400 kc	.0001 mfd.	VC-1	Transl. & Ant.

IMPORTANT ALIGNMENT NOTES

\*The signal generator should be adjusted for high output and the trimmer should be adjusted for minimum response.

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

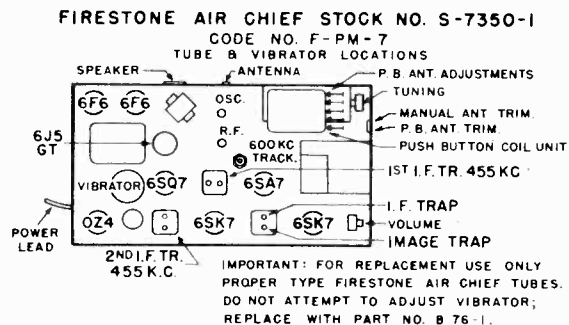
Always keep the output power from the generator at its lowest possible value to prevent AVC of the receiver from interfering with accurate alignment, except as noted by (\*) above.

To adjust image rejector, return set to button #5. Set generator to 1500 kc and adjust #5 button for maximum signal at 1500 kc.

THE GENERATOR CHARGING RATE

Unless the car has an automatic voltage regulator, it is usually necessary to advance the generator charging rate to compensate for

the additional drain of the radio. Under no conditions should the rate be increased beyond that specified by the manufacturer as the safe limit.



MODEL S7350-1

FIRESTONE TIRE & RUBBER CO.

MODEL S7350-1

MODEL S7399-2

SETTING UP THE MONOMATIC TUNING MECHANISM:

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, etc.

STATION	FREQUENCY RANGE
#1	540 to 920 kc
#2	630 to 1070 kc
#3	690 to 1170 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 #1 station, using the Station Selector knob.

Operate the Monomatic button until the #1 station indicator (furthest left of the station indicators) becomes illuminated.

Turn the knob, located on the side of the set, see Figure 2, which has the range 540-920 kc indicated below it, until the desired station is heard at maximum volume.

TO SET UP THE BUTTONS FOR AUTOMATIC TUNING:

1. Turn the set on and allow it to operate at least fifteen minutes before attempting to set up the buttons.
2. Make a list of the frequencies of five nearby stations to which you wish to set up the buttons. Be sure to select the most powerful nearby stations, since weak signals will not give as satisfactory results.
3. Turn the set around so that the back of the set is facing you and remove the cabinet back.
4. Just behind the dial plate, when viewed from the rear, will be seen ten push button adjusting screws (see Fig. 1). These screws are used to tune in the stations that the buttons are to be set to.
5. Each of the push buttons can be made to tune in stations in a definite frequency range as shown in Fig. 1.

Buttons No. 1 and 2 may be set up to any station which operates between 540 and 1000 KC. in frequency. Buttons No. 3 and 4 may be set up to stations operating between 750 and 1375 KC., while button No. 5 may be set up to stations operating between 980 and 1600 KC. ALWAYS TRY TO SELECT THE BUTTON WHICH CAN BE SET UP TO A STATION WHOSE FREQUENCY IS WELL WITHIN THE BUTTON'S OPERATING RANGE.

6. Turn the band switch to the "AM" position, push in the button labeled "MANUAL," then using the tuning knob (see Fig. 1) tune in the station you wish to set to button No. 1.
7. Push in button No. 1 and using a screwdriver, turn adjusting screw No. 1a (the extreme right hand screw) until the station you had previously tuned in is again heard. If it is not heard, advance the volume control and adjust the screw again. Be sure to adjust screw No. 1a to the point where the program is heard with the deepest tone.
8. Insert the screwdriver in screw No. 1b (just to the left of, and behind, 1a) and turn it until the program is heard with the maximum volume. Check the setting of screw No. 1a, making sure it still is adjusted to give deepest tone.
9. The set-up for button No. 1 is now complete.
10. To set up the remaining buttons use the same procedure; push in the "MANUAL" button; tune in the station, using the tuning knob; push in the button to be set up; adjust its associated "a" adjusting screw until the station is tuned in (screw 2a for button No. 2, etc., see Fig. 1); the associated "b" screw is then adjusted for maximum volume.
11. Call letter tabs which may be used to label the buttons are provided with your radio. They fit in the small space above each push button.
12. To use push buttons at any time, turn the band switch to the "AM" position and push the proper button.

Return to Manual then tune in your #2 station on the dial, then operate the Monomatic button until the #2 indicator becomes illuminated. Then proceed to adjust the knob for this station in the same manner as just done for the #1 station.

Proceed in the same manner for the remaining stations on your list. Insert the proper call letter, cut from the sheets supplied, in the indicator button slots.

After setting button #5 the antenna should be matched by adjusting the screw marked P.B. Antenna Trimmer in Fig. 2, as #7. This screw is covered by a 'snap button. Slowly turn this screw until maximum volume is secured.

After this adjustment is made, it is recommended that all the buttons be re-checked for maximum response.

After this re-check is completed, it is necessary to adjust the manual antenna trimmer, see Fig. 2, #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.

Be sure to replace snap buttons after completing these adjustments.

MODEL S7399-2

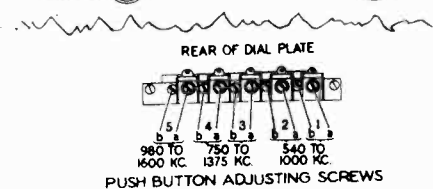
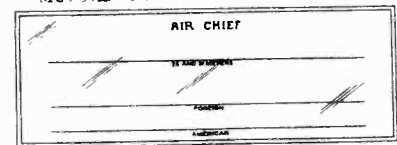


Fig. 1

MODEL S7350-1  
MODEL S7350-2

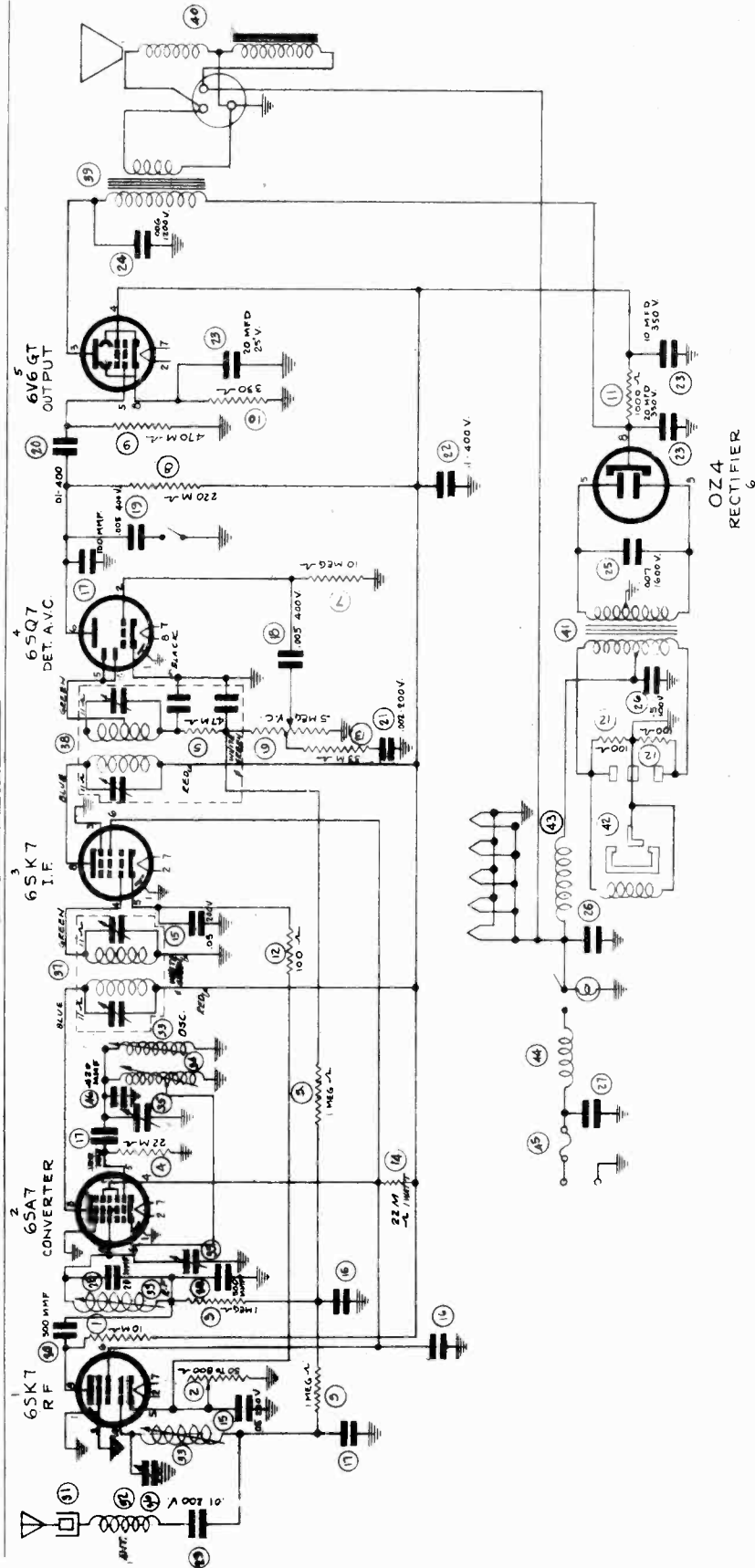
## FIRESTONE TIRE &amp; RUBBER CO.

S-7350-1							
PART NO.	NAME OF PART	LIST PRICE	PART NO.	NAME OF PART	LIST PRICE		
1.	773-14	10 M. Ohms.	.15	29.	25-105	.05-400	.15
2.	773-16	22 M. Ohms.	.15	30.	25-110	.006-1200	.15
3.	773-24	1 Meg. Ohms.	.15	31.	25-103	.1-400 V.	.17
4.	773-4	100 Ohms.	.15	32.	25-118	.5-100 V.	.22
5.	78-42	.5 Meg. Ohms. Volume Control	.15	33.	25-109	.007-1600 V.	.17
6.	773-18	47 M. Ohms.	.15	34.	25-100	Spark Plate	.17
7.	773-7	330 Ohms.	.15	35.	25-89	Electrolitic	.95
8.	773-29	10 Meg. Ohms.	.15	36.	26-113	Trimmer	.28
9.	773-21	220 M. Ohms.	.15	37.	26-114	Trimmer Ass'y	.40
10.	773-11	2200 Ohms.	.15	38.	38-276	R.F. Coil Ass'y	1.40
11.	773-23	470 M. Ohms.	.15	39.	38-274	1st I.F. Ass'y	1.40
12.	77-125	470 Ohms. 1 Watt	.15	40.	38-275-	2nd I.F. Ass'y	1.65
13.	773-17	33 M. Ohms.	.15	41.	94-79	Output Trans.	1.35
14.	77-123	1000 Ohms. W.W. 1 Watt	.15	42.	11-163	Speaker & Cable Ass'y	4.50
15.	78-31	Sensitivity C.	.40	43.	94-78	Power Trans.	3.25
16.	25-112	.01 - 200 V.	.15	44.	76-1	Vibrator	2.55
17.	253-1	100 MMF	.15	45.	38-277	Vib. Choke	.51
18.	25-111	.05 - 200	.15	46.	38-278	A. Choke	.40
19.	25-106	100 MMF XM-262	.17	47.	48-7	Fuse 20 Amp.	.06
20.	25-117	Comp. Cap.	.28	48.	41-71	Control Unit	11.70
21.	258-1	270 MMF Sil. Mica Cap.	.28	49.	90-70	Switch & Stepper Ass'y	4.10
22.	25-121	20 MMF	.15	50.	38-273	Premeability Tuner	5.10
23.	253-2	250 MMF	.17	51.	38-280	Shunt Tracking Coil	.70
24.	253-3	500 MMF	.17	52.	38-272	P.B. Coil Ass'y	7.25
25.	25-116	.005 400 V.	.15	53.	80-136	Control Socket	.17
26.	25-114	.25 200 V.	.17	54.	38-279	Ant. Spark Chole	.34
27.	25-104	.005-400 V.	.15	55.	56-628	Ant. Cable Recp.	.15
28.	25-102	.05-200	.15				
S-7350-2							
PART NO.	NAME OF PART	LIST PRICE	PART NO.	NAME OF PART	LIST PRICE		
1.	773-14	10 M Ohm.	.15	24.	25-110	.006 1200 V.	.17
2.	78-31	Sensitivity C.	.15	25.	25-109	.007-1600 V.	.17
3.	773-24	1 Meg.	.15	26.	25-118	.5-100 V.	.22
4.	773-16	22 M Ohm. 1/2 W.	.15	27.	25-100	Spark Plate	.17
5.	773-18	47 M Ohm.	.15	28.	25-121	20 MMF.	.15
6.	78-42	.5 Meg. Vol. Control	.95	29.	25-112	01-200 V.	.15
7.	773-29	10 Meg.	.15	30.	253-3	500 MMF.	.15
8.	773-21	220 M Ohm.	.15	31.	56-628	Antenna Cable Neck	.10
9.	773-23	470 M Ohm.	.15	32.	38-279	Antenna Spark Choke	.34
10.	773-7	330 Ohm.	.15	33.	38-273	Premeability Tuner	5.10
11.	77-123	1000 Ohm.	.15	34.	38-280	Shunt Tracking Coil	.70
12.	773-4	100 Ohm.	.15	35.	26-116	Trimmer Assembly	.40
13.	773-17	33 M Ohm.	.15	36.	26-115	Antenna Trimmer	.25
14.	77-69	22 M Ohm. 1 W.	.15	37.	38-274	1st I.F. Assembly	1.40
15.	25-111	.05 200 V.	.15	38.	38-275	2nd I.F. Assembly	1.40
16.	25-102	.05 200 V.	.15	39.	94-80	Output Transformer	1.20
17.	253-1	100 MMF.	.15	40.	11-164	Speaker & Cable	3.40
18.	25-104	.005-400 V.	.15	41.	94-78	Power Transformer	3.25
19.	25-116	.005-400 V.	.15	42.	76-1	Vibrator	2.55
20.	25-113	.01-400 V.	.15	43.	38-277	Vibrator Choke	.51
21.	25-119	.002-200 V.	.15	44.	38-278	A Choke	.40
22.	25-103	.1-400 V.	.17	45.	48-7	Fuse 20 Amp.	.10
23.	25-99	Electrolytic	.95	46.	25-124	Silver Mica Cond. 420 MMF.	.35

FIRESTONE TIRE & RUBBER CO.

VOLTAGE	1	RESISTANCE	VOLTAGE	2	RESISTANCE	VOLTAGE	3	RESISTANCE	VOLTAGE	4	RESISTANCE	VOLTAGE	5	RESISTANCE	VOLTAGE	6	RESISTANCE
1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2.0	2.0	2.0	2.4	2.0	2.6	2.4	2.0	2.6	2.0	2.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0

BOTTOM VIEW OF SOCKETS



IF PEAK 455 KC FOR PARTS LIST SEE INDEX

MODEL S7350-2

FIRESTONE TIRE & RUBBER CO.

ALIGNMENT PROCEDURE

PRELIMINARY

Output meter connections.....Across loud speaker voice coil  
 Connection of signal generator ground lead.....Receiver chassis  
 Connection of signal generator output lead.....Ant. Term  
 Dummy antenna value to be in series with generator output.....See chart below  
 Position of Volume Control.....Fully on  
 Position of Tone Control..... "Speech"

SET DIAL TO	GENERATOR FREQUENCY	DUMMY ANTENNA	ADJUSTMENTS (IN ORDER SHOWN)	TRIMMER FUNCTION
540 kc	455 kc	.1 mfd.	1st & 2nd I.F. TR.	I.F.
540 kc	455 kc	.1 mfd.	I.F. Wave Trap	I.F. Wave Trap
600 kc	600 kc	.0001 mfd.	600 kc Track	L.F. Pad
Highest Frequency	1600 kc	.0001 mfd.	Osc.	Osc.
600 kc	600 kc	.0001 mfd.	Antenna Tri.	Shunt Coil
1400 kc	1400 kc	.0001 mfd.	R.F.	Transl. & Ant.

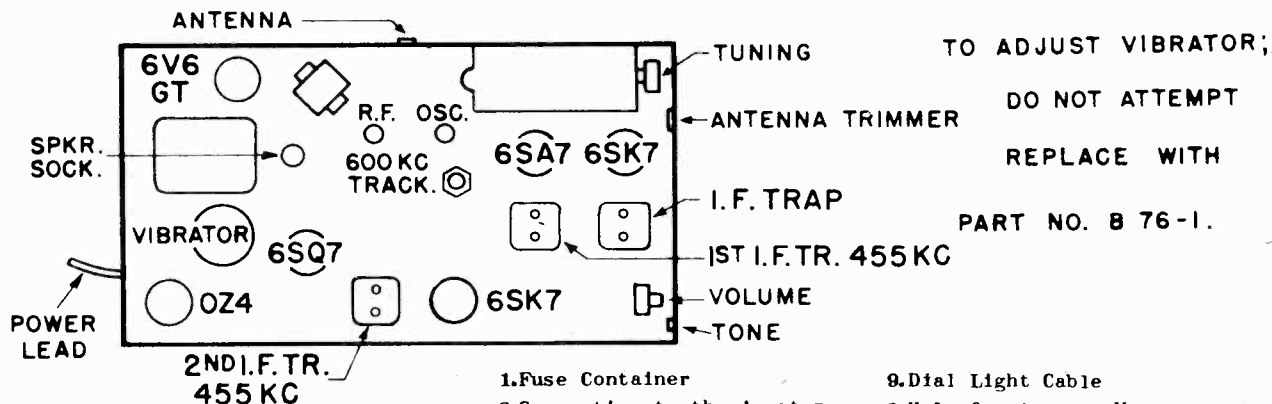
IMPORTANT ALIGNMENT NOTES

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

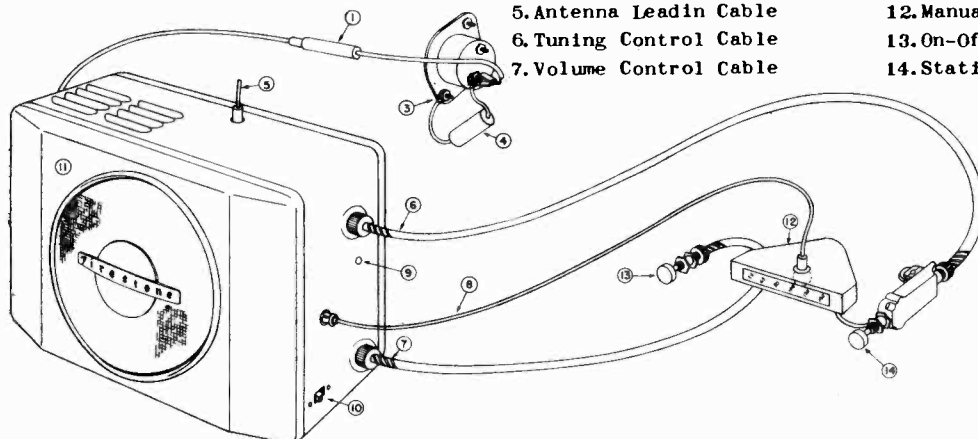
generator at its lowest possible value to prevent AVC of the receiver from interfering with accurate alignment, except as noted by (\*) above.

Always keep the output power from the

TUBE & VIBRATOR LOCATIONS

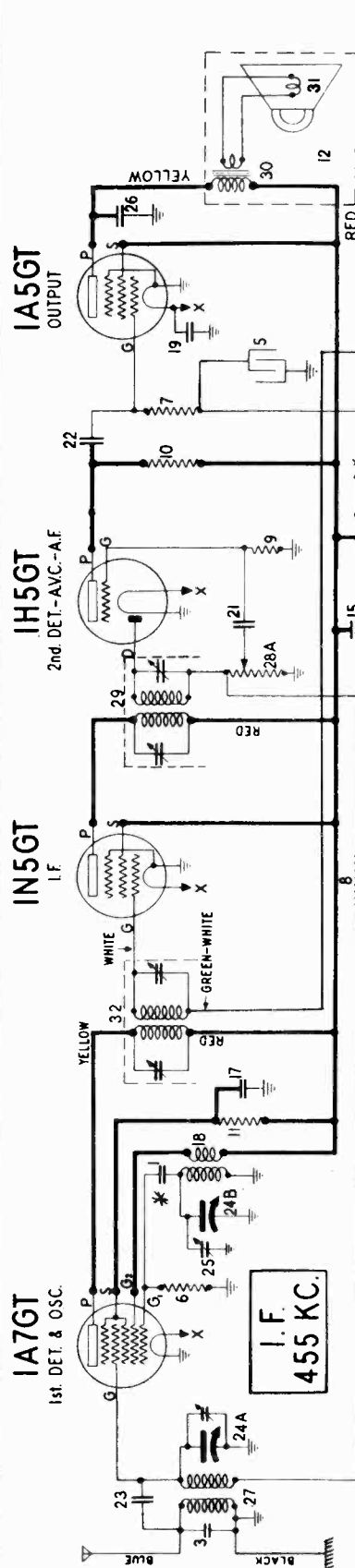


CONNECTING THE RECEIVER



FIRESTONE TIRE & RUBBER CO.

MODEL S7396-2  
MODEL S7405-3

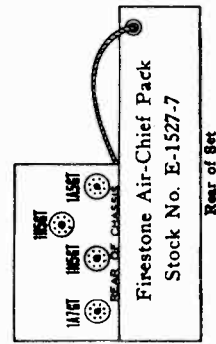


ALIGNMENT PROCEDURE

Dummy Ant. in Series with Sig. Gen.	Connection of Sig. Generator Output to Receiver	Signal Generator Frequency	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
1 MFD Condenser	Control Grid of IA7GT	455 KC	Any Point Where It Does Not Affect Signal	1-2	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
200 MMFD Condenser	Antenna Lead (Blue Wire)	1500 KC	1500 KC	3-4	1st I.F.	Adjust for maximum output.
200 MMFD Condenser	Antenna Lead (Blue Wire)	1500 KC	Tune To 1500 KC Generator Signal	5	Broadcast Oscillator (Shunt)	Adjust trimmer for maximum output.
				6	Broadcast Antenna	Adjust for maximum output.

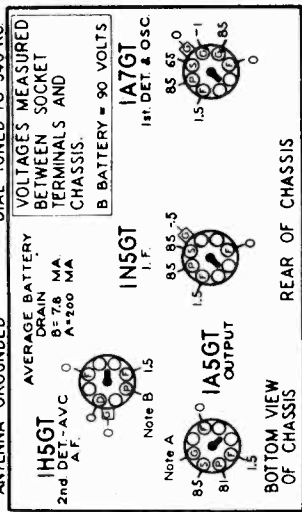
\*No. 1. In Model S7405-3. 260 mmf

TUBE LOCATIONS



- REAR OF SET
- 1-----85061 Condenser - mica 51 mmfd. .17
  - 2-----88783 Condenser - mica 110 mmfd. .23
  - 3-----35061 Condenser - mica 51 mmfd. .17
  - 5-----110377 Condenser - elect. 10 mfd. 35 V. .92
  - 6-----110553 Resistor - carbon 220,000 ohms 1/4 watt .14
  - 7-----110554 Resistor - carbon 1 meg. 1/2 watt .14
  - 8-9-----110560 Resistor - carbon 3.3 meg. 1/2 W. .14
  - 10-----110581 Resistor - carbon 600,000 ohms .14

DIAL TUNED TO 540 KC.



SOCKET VOLTAGES

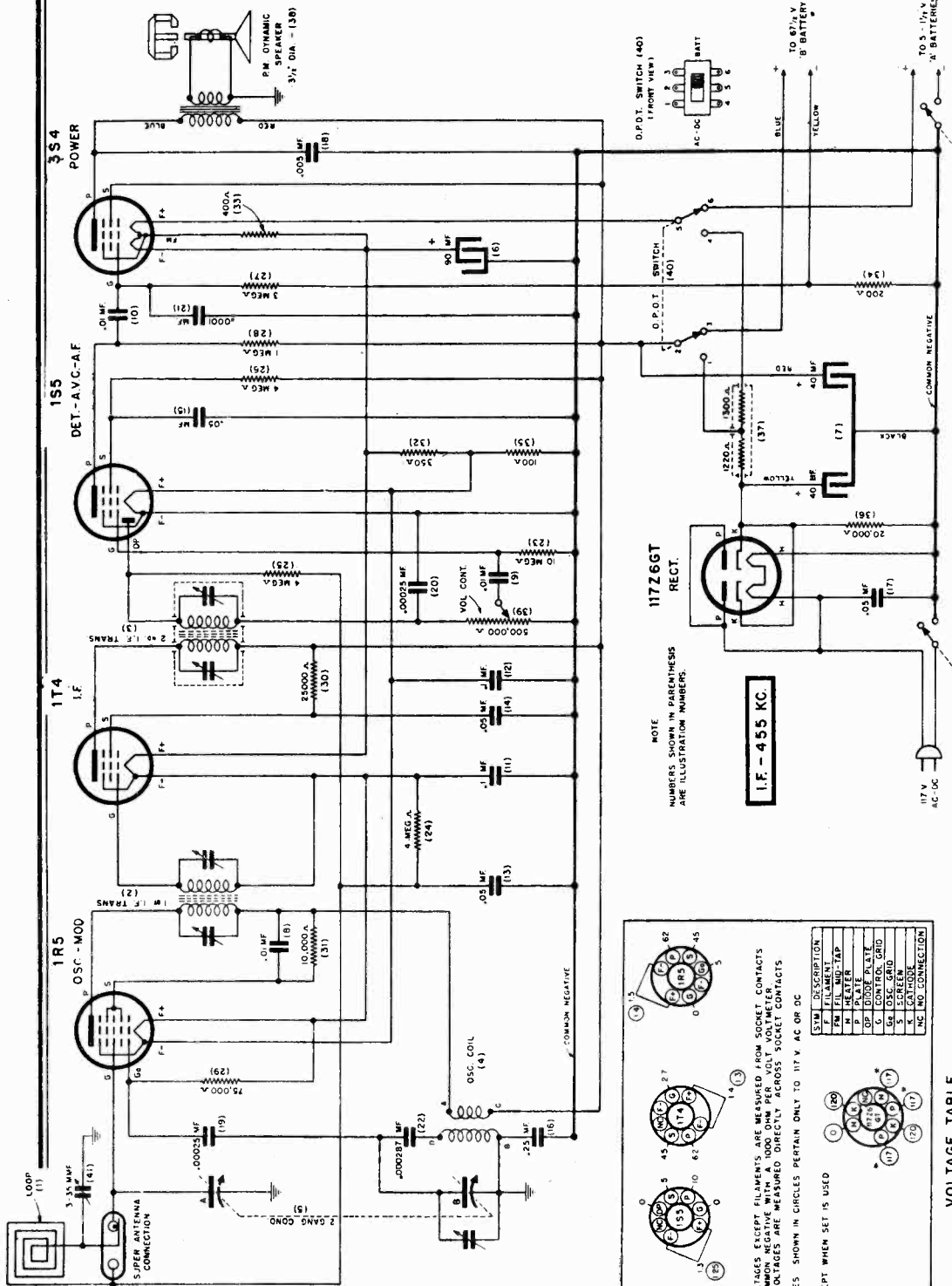
NOTE A: The bias for the control grid of the IA5GT tube is -5 volts measured across resistors 15 & 20.

NOTE B: Due to the high resistance of plate resistor RC. 10 only a slight deflection will be obtained when using a meter having a resistance of 1000 ohms per volt.



MODEL S7397-1

FIRESTONE TIRE & RUBBER CO.



MARCH 1941

TEST OSCILLATOR	
Set receiver dial to:	Attach output of test oscillator to:
Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:
Exactly 455 K. C.	0.2 Mfd. condenser
Exactly 1550 K. C.	None
Approx. 1400 K. C.	None

Refer to parts layout diagram for location of trimmers mentioned below:

Adjust each of the second I.F. transformer trimmers for maximum output, then adjust each of the first I.F. transformer trimmers for maximum output.

Adjust 1550 K. C. oscillator trimmer for maximum output.

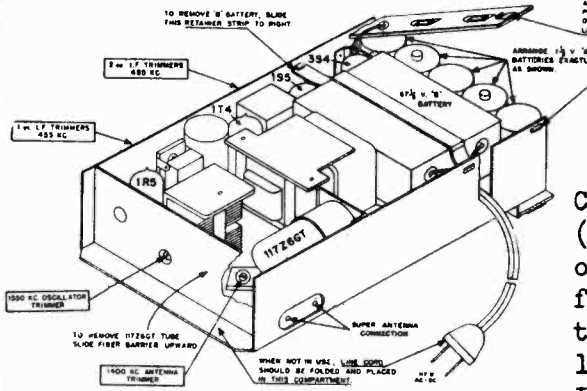
While rocking gang condenser adjust 1400 K. C. loop trimmer for maximum output.

ALIGNMENT PROCEDURE

MODEL S7397-1  
MODEL S7397-2(443)

Model S-7391-1

FIRESTONE TIRE & RUBBER CO.



**IMPORTANT: BEFORE ALIGNING, PLACE LOOP ANTENNA AND BATTERIES IN THE SAME POSITION THEY WILL BE IN WHEN THE SET IS IN THE CABINET. --** When adjusting 1550 kc. oscillator trimmer and 1400 kc. antenna trimmer, do not connect test oscillator to loop. Couple test oscillator to receiver loop by: (a) Make a loop consisting of five to ten turns of No. 20 to 30 size wire wound on a three inch form and attach a cross output of test oscillator, (b) Place test oscillator loop near set loop -- **BE SURE THAT NEITHER MOVES WHILE ALIGNING.**

**ALIGNMENT PROCEDURE**

Model S-7397-2

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. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment, check tuning dial adjustment by: turn gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial indicator 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 needle to correct position.

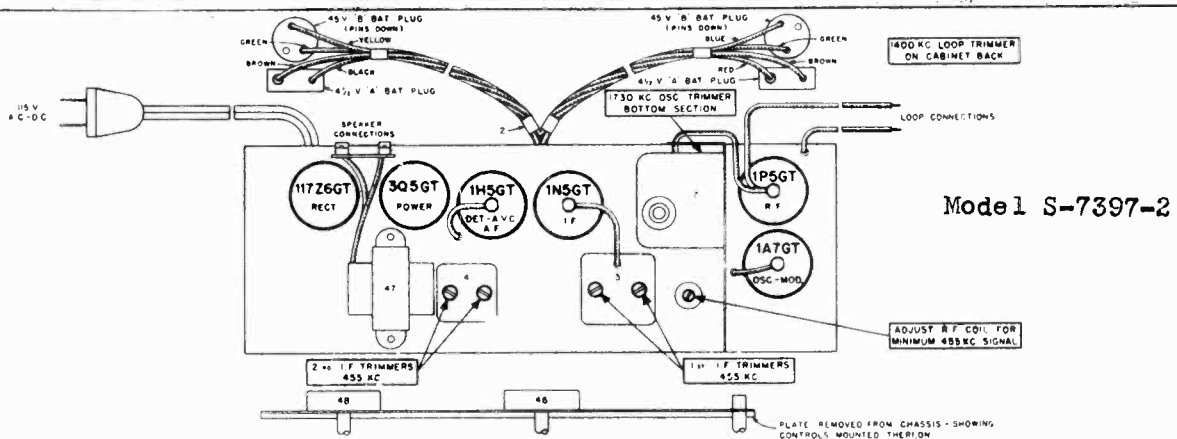
Use an accurately calibrated test oscillator with some type of output measuring device.

**BEFORE ALIGNING, PLACE LOOP ANTENNA AND THE BATTERY IN THE SAME APPROXIMATE POSITION IN THE BACK OF CHASSIS THAT THEY WILL BE IN WHEN THE SET IS IN THE CABINET AND THE CABINET BACK CLOSED.**

**AS THE DIAL SCALE PARTIALLY COVERS THE I.F. TRIMMER, IT IS NECESSARY TO REMOVE DIAL SCALE FROM FRAME ON WHICH IT IS MOUNTED BY REMOVING THE STUDS THAT HOLD SCALE IN PLACE WHEN ALIGNING I.F. TRANSFORMERS.**

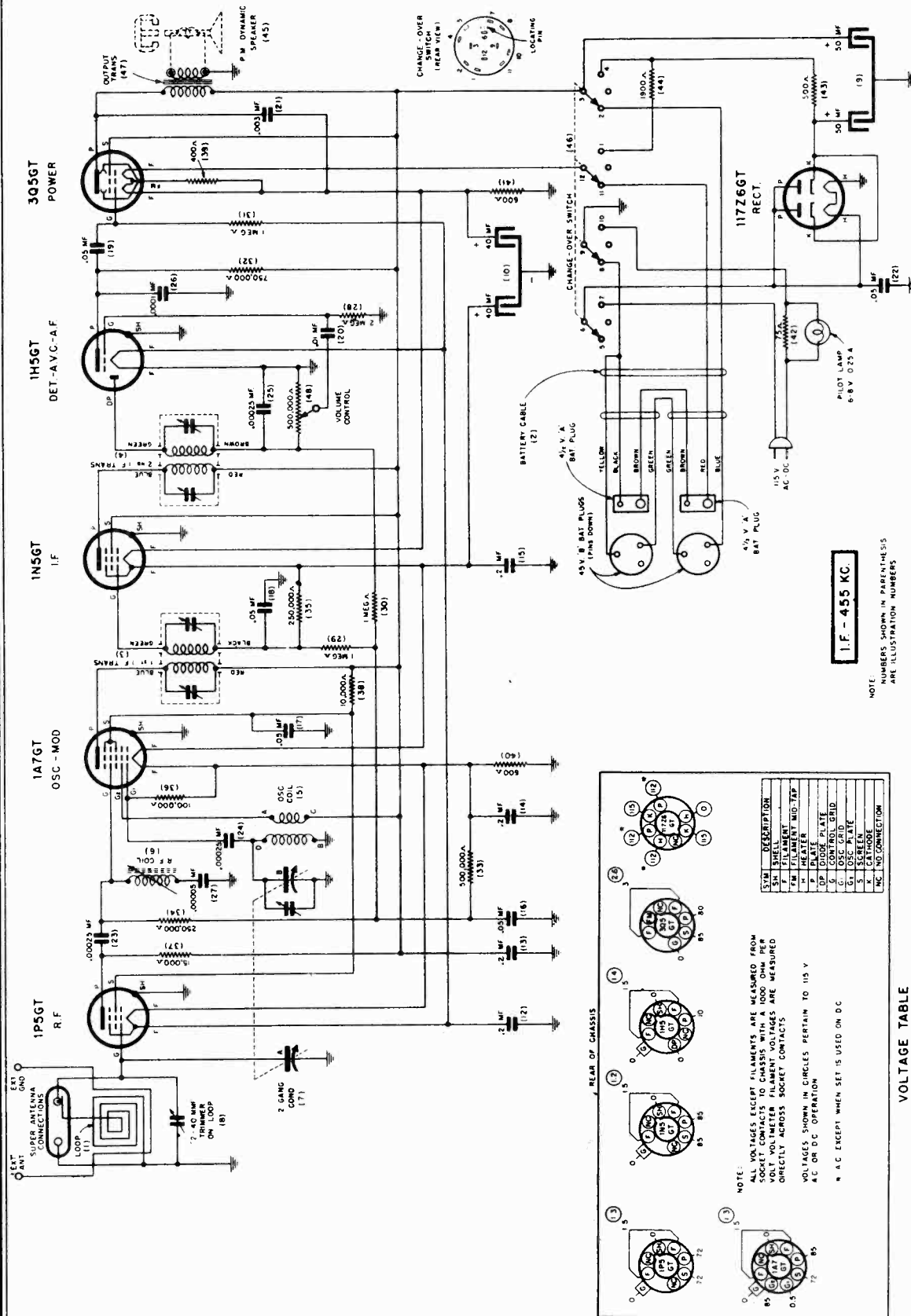
When adjusting 1600 kilocycle oscillator trimmer 600 K.C. padder, 455 K.C. R.F. trimmer and 1400 kilocycle antenna trimmer, do not connect test oscillator to loop. Couple test oscillator to receiver loop by: (a) Make a loop consisting of five to ten turns of No. 20 to 30 size wire wound on a three inch form and attach across output of test oscillator. (b) Place test oscillator loop near set loop—**BE SURE THAT NEITHER MOVES WHILE ALIGNING.**

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:	
Any point where no interfering signal is received.	Exactly 455 K.C.	0.2 Mfd. condenser	High side to grid cap of 1A7GT tube. Low side to frame of gang condenser.	Adjust each of the second I.F. transformer trimmers for maximum output, then adjust each of the first I.F. transformer trimmers for maximum output.
1 Rotate gang condenser to Maximum Capacity	Exactly 455 K.C.	None	Use Small Loop to couple test oscillator to receiver loop.	Adjust R.F. coil for minimum 455 K. C. signal.
2 Exactly 1730 K.C.	Exactly 1730 K.C.	None	Use Small Loop to couple test Oscillator to receiver loop.	Adjust 1730 K.C. oscillator trimmer for maximum output.
3 Approx. 1400 K.C.	Approx. 1400 K.C.	None	Use Small Loop to couple test Oscillator to receiver loop.	While rocking gang condenser adjust 1400 K.C. loop trimmer for maximum output.



MODEL S7397-2(443)

FIRESTONE TIRE & RUBBER CO.



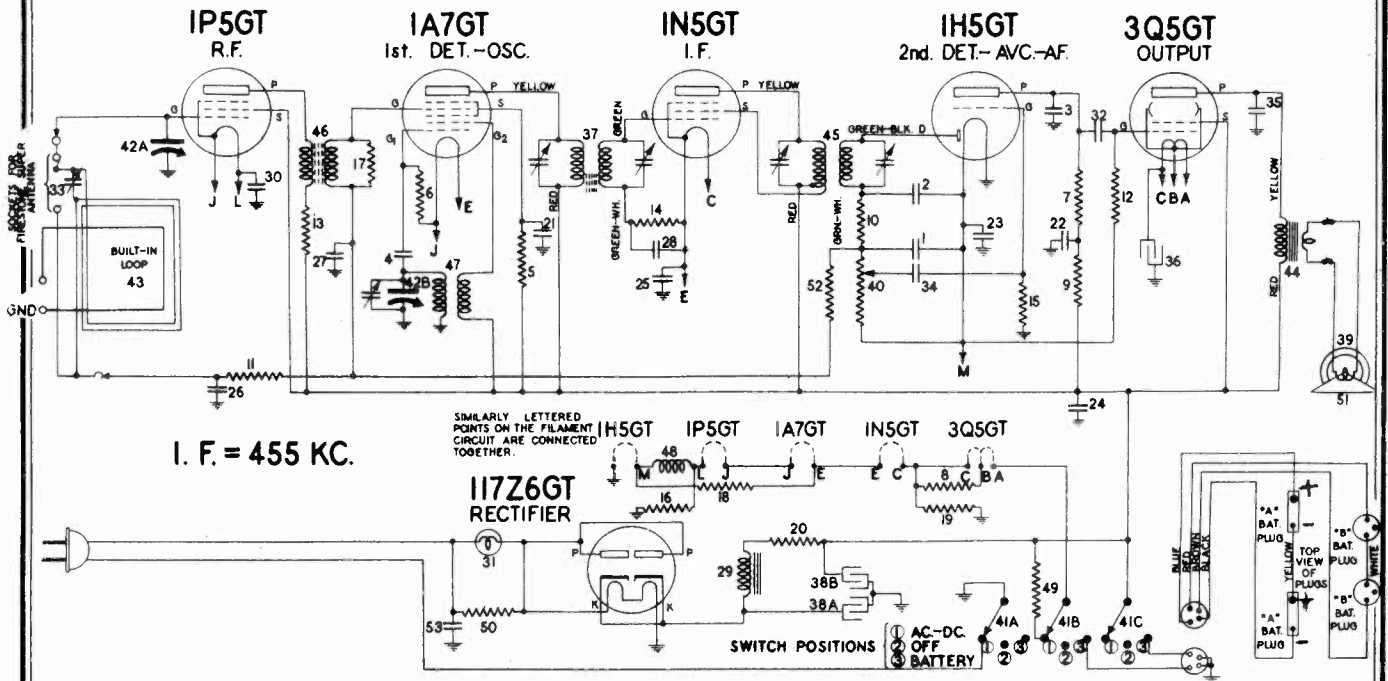
**THIS RECEIVER CAN BE OPERATED EITHER WITH DRY BATTERIES OR FROM 110-120 VOLT DIRECT CURRENT OR 50-60 CYCLE ALTERNATING CURRENT.** Thus the set may be operated on farms, in summer camps, hunting lodges, auto trailers, boats, or in any isolated districts where electric service is not available by using batteries. Where 110-120 volt direct current or 50-60 cycle alternating current is available, the radio may be operated direct from the electric lines without using the battery or making any change in the receiver.

**When the Power Switch is in the AC-DC position the batteries are entirely disconnected and the set receives all its power from the AC or DC electric line.**

FIRESTONE TIRE & RUBBER CO.

MODEL S7397-2

Code A-377



FOR PARTS LIST SEE NEXT PAGE

**WARNING:** THE ADJUSTMENTS DESCRIBED ON THIS PAGE ARE TO BE MADE BY A QUALIFIED SERVICE MAN ONLY. IF THESE ADJUSTMENTS ARE TAMPERED WITH BY ANYONE ELSE THE WARRANTY IS VOID.

**ALIGNMENT PROCEDURE**

FOR ALIGNMENT an output meter and an accurately calibrated signal generator are required.

1. Connect the output meter across the voice coil or between the plate of the 3Q5GT output tube and ground through a 0.1 Mfd. condenser, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)
2. Connect the ground lead of the signal generator through a .1 Mfd. condenser to the chassis.
3. Turn the volume control to the maximum volume position and keep it in this position while aligning.
4. With the gang condenser in full mesh, set the dial pointer to the low frequency end of the dial scale.

Dummy Ant. in Series with Sig. Gen.	Connection of Sig. Generator Output to Receiver	Signal Generator Frequency	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
.1 MFD. Condenser	Control Grid of 1A7GT	455 KC	Any Point Where It Does Not Affect Signal	1-2	2nd I.F.	Adjust for maximum output. Then repeat adjustment.
				3-4	1st I.F.	
200 MMFD. Condenser	Lead from sig. gen. placed near loop	1500 KC	1500 KC	5	Broadcast Oscillator (Shunt)	Adjust trimmer for maximum output.
200 MMFD. Condenser	Lead from sig. gen. placed near loop	1500 KC	Tune To 1500 KC Generator Signal	6	Broadcast Antenna	Adjust for maximum output.

MODEL S7397-2

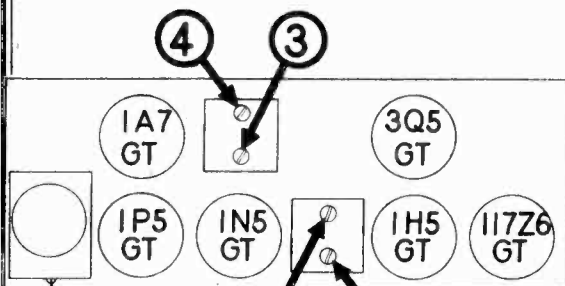
Code A-377

FIRESTONE TIRE & RUBBER CO.

INSTALLATION OF BATTERIES

BATTERIES USED

Quantity	Rating	Firestone Stock Number
2	4½ Volt "A"	E-1526-7
2	45 Volt "B"	E-1526-8



⑥ - ON CABINET BACK

These batteries are placed on their sides in the bottom compartment of the cabinet as shown on page two of this booklet and on the label at the rear of the chassis. After plugging the four-pronged plug on the battery cable into the socket on the rear of the chassis, plug the two three-prong plugs on the battery cable into the sockets on the ends of the "B" batteries and the two two-prong plugs into the sockets on the ends of the "A" batteries. The four prong plug on the opposite end of the battery cable must be plugged into the socket on the rear of the chassis before connecting the batteries.

ELECTRICAL PARTS

Diagram Number	Part Number	Description	List Price
1-2-3	83783	Condenser—mica 110 mmd.	\$0.20
4	85061	Condenser—mica 51 mmd.	.15
5	110552	Resistor—carbon 47,000 ohms ¼ watt	.12
6	110553	Resistor—carbon 220,000 ohms ¼ watt	.12
7	110554	Resistor—carbon 1 megohm ¼ watt	.12
8	110556	Resistor—carbon 330 ohm ¼ watt	.12
9	110559	Resistor—carbon 470,000 ohms ¼ watt	.12
10	110564	Resistor—carbon 100,000 ohms ¼ watt	.12
11-12	110570	Resistor—carbon 2.2 meg. ¼ watt	.15
13	110573	Resistor—carbon 2,200 ohms ¼ watt	.12
14-15	110580	Resistor—carbon 3.3 meg. ¼ watt	.12
16	112974	Resistor—carbon 220 ohm ¼ watt	.15
17	116052	Resistor—carbon 33,000 ohm 1/10 w.	.12
18-19	116080	Resistor—insulated 680 ohms ¼ watt	.15
20	116034	Resistor—220 ohms 2 watt w.w.	.20
21 to 23	116625	Condenser—.1 mfd. 600 volts.	.25
24	118290	Condenser—.5 mfd. 150 volt	.50
25	116706	Condenser—.2 mfd. 600 volts.	.35
26 to 28	116819	Condenser—.05 mfd. 600 volts	.20
29	117888	Filter choke	.85
30	118231	Condenser—.25 mfd. 150 volt	.32
31	118921	Lamp-dial (Mazda No. 47)	.15
32	119193	Condenser—.01 mfd. 600 volts.	.15
33	119345	Condenser—trimmer (loop)	.20
34-35	119875	Condenser—.002 mfd. 600 volts.	.15
36	161273	Condenser—electrolytic 50 mfd. 35 volt	.50
37	500759	Transformer—1st. I.F.	1.20
38A-38B	501213	Condenser—electrolytic { A—40 mfd. 150 volts } { B—20 mfd. 150 volts }	1.20
39	R501350	Speaker—P.M. dynamic (5")	5.40
40	501353	Volume control—1 meg.	1.00
41A to 41C	501354	Switch—A.C.-D.C. & battery	1.30
42A-42B	501355	Condenser—variable tuning (with drum)	1.80
43	501373	Loop antenna	1.80
44	501374	Transformer—output for speaker	1.60
45	501380	Transformer—2nd I.F.	.90
46	501382	Coil—R.F.	.60
47	501383	Coil—oscillator	.60

Diagram Number	Part Number	Description	List Price
48	501384	Choke coil	.35
49	501386	Resistor—1660 ohms 6 watts wire wound	.35
50	501390	Resistor—33 ohms 2 w. wire wound	.18
51	501445	Cone & V.C. for R-501350 speaker	1.50
52	110570	Resistor—carbon 2.2 meg. ¼ watt	.15
53	116819	Condenser—.05 mfd. 600 volts	.20

MISCELLANEOUS PARTS

Part Number	Description	List Price
501376	Battery cable—complete	\$1.20
114955	Clamp for dial cord	.01
112745	Clip—coil mounting	.01
113019	Clip—dial scale retaining	.01
116948	Cord—dial drive (supplied in 6 ft. lengths)	.18
114254	C-washer for tuning shaft	Per doz. .10
501371	Dial scale	.60
501352	Jack—for external loop	.45
501360	Knob	.15
12349	Nut—8-32 for mounting speaker	Per C .45
500748	Plug—2 prong male for battery cable	.03
116398	Plug—3 prong male for battery cable	.06
500747	Plug—4 prong male for battery cable	.05
501348	Pointer—dial	.15
501349	Pointer—power knob	.15
501357	Screen—speaker	.65
83624	Screw—self tapping 8 x ¼	.01
117716	Shield—tube	.07
501347	Socket—dial lamp	.20
500681	Socket—4 prong (battery cable)	.10
116690	Socket—octal base	.12
89027	Washer—spring type for tuning shaft	.01
501361	Window—dial	.35

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

NOTE: The possession of this price list by any person is not to be construed as an offer to sell to him, nor anyone else, the goods listed herein at prices stated.

Line Voltage—117 Volts A.C.

SOCKET VOLTAGES

No Sig. Input—Volume on Full

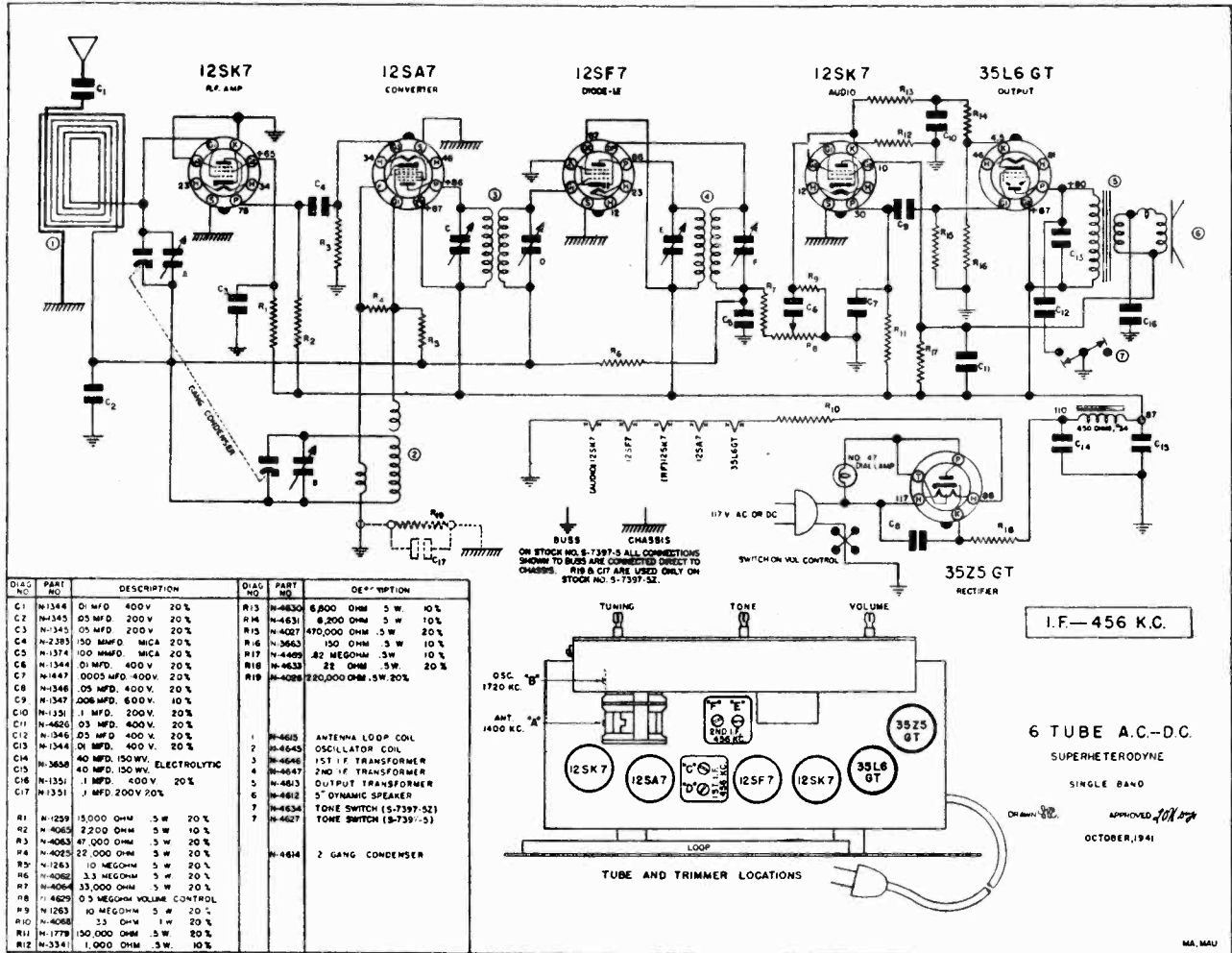
TUBE	FUNCTION	FIL.	K	G	G <sub>1</sub>	G <sub>2</sub>	S	P	D
1P5GT	R.F. Amp.	1.4	—	Note A	—	—	98	91	—
1A7GT	1st. Det.—Osc.	1.3	—	Note A	—2	98	58	98	—
1N5GT	I.F. Amp.	1.4	—	Note B	—	—	98	98	—
1H5GT	2nd. Det.—AVC. A.F.	1.4	—	0	—	—	—	13	Note A
3Q5GT	Output	1.4	—	Note A	—	—	98	94	—
117Z6GT	Rectifier	111 A.C.	121	VOLTAGE ON P <sub>1</sub> & P <sub>2</sub> = 111 VOLTS A.C.					

NOTE A: Voltage on these elements is 1.4 volts measured across filament of 1H5GT.

NOTE B: Voltage on the grid of the 1N5GT I.F. cannot be measured with a standard voltmeter. Use a voltmeter of 1,000 ohms per volt.

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Voltages shown on the circuit diagram are from socket terminals to ground buss. In measuring voltages use a voltmeter having a resistance of at least 1000 ohms per volt. Allowances should be made for variations in line voltage.



## 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. con-

denser. The ground on the test oscillator should be connected to the ground buss, 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.

MODEL S7398-1  
Beaumont

FIRESTONE TIRE & RUBBER CO.

### ALIGNMENT PROCEDURE

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.

**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 or 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.

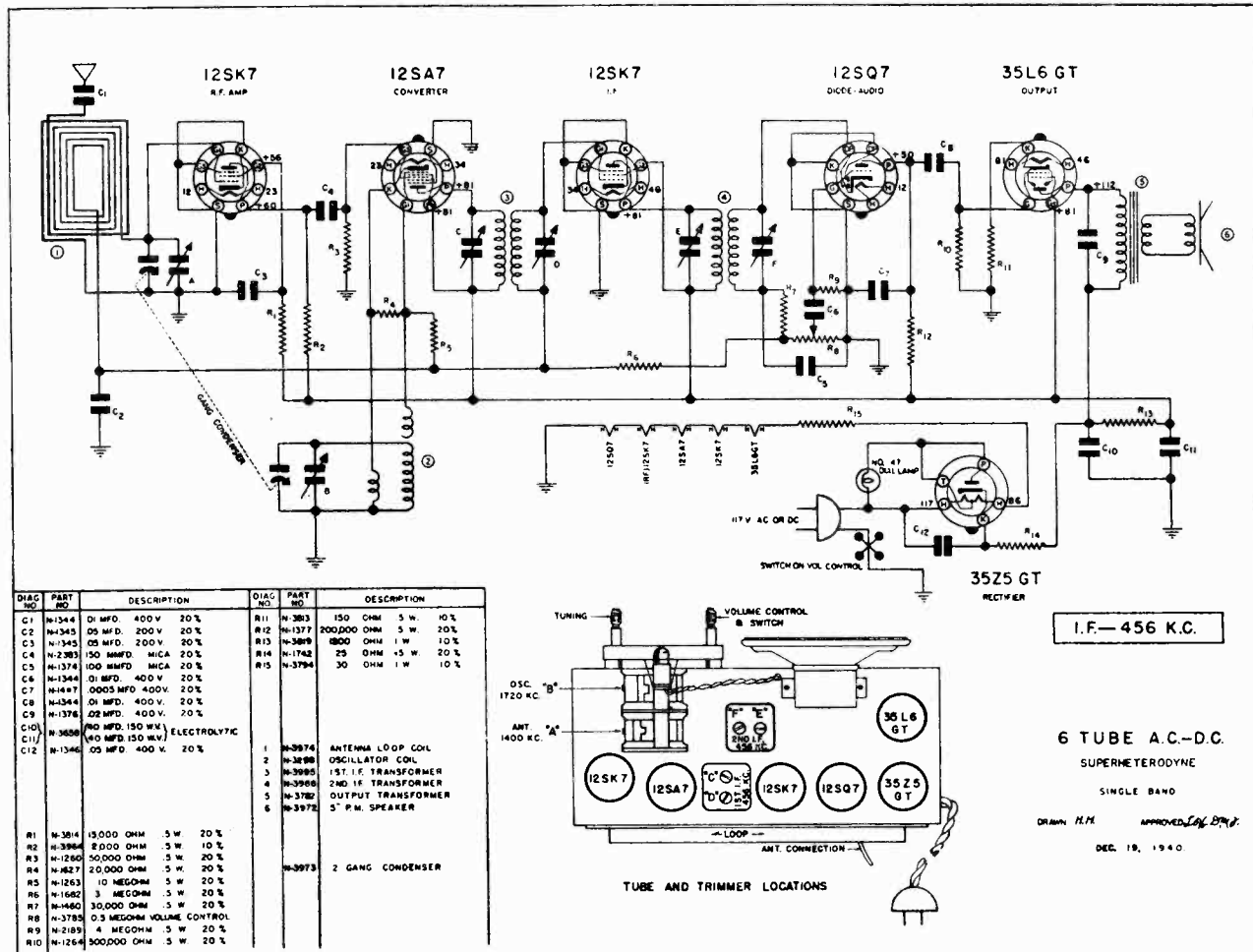
**I. F. ALIGNMENT.** With the gang condenser set at minimum, adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (12SA7) through a .05 or .1 mfd. con-

denser. The ground on the test oscillator should be connected to the chassis ground. 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. (.002) 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.

Voltages shown on the circuit diagram are from socket terminals to chassis base. In measuring voltages use a voltmeter having a resistance of at least 1000 ohms per volt. Allowances should be made for variations in line voltage.

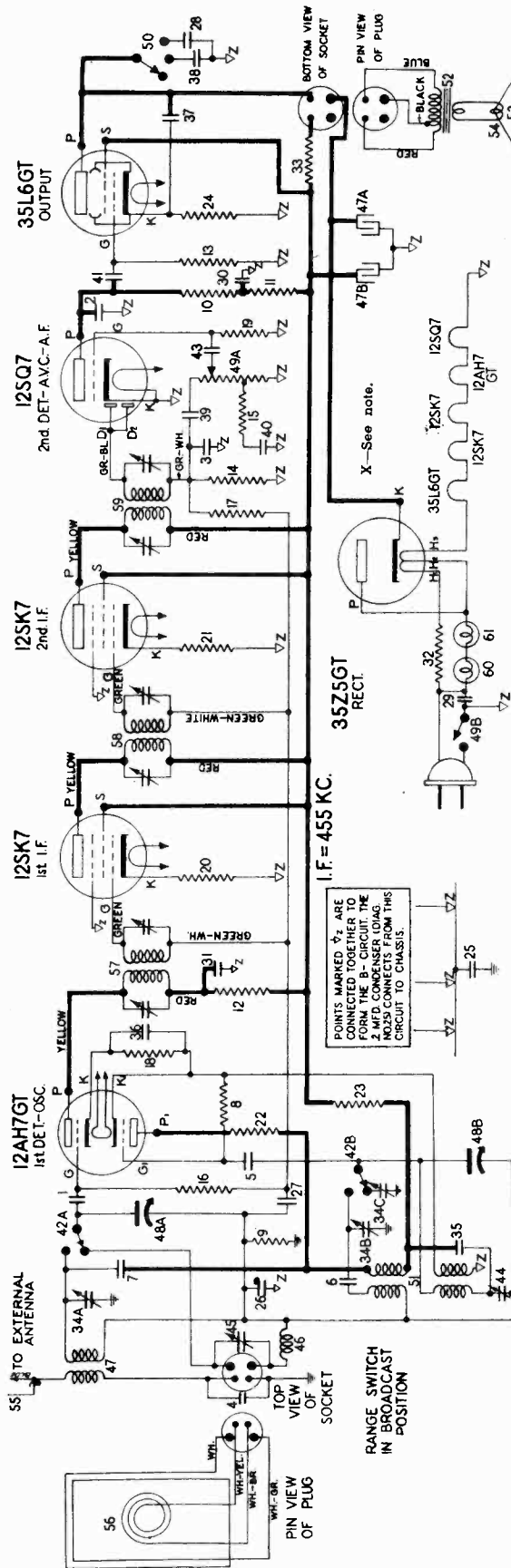


### TUNING RANGE

This receiver is designed to operate over the standard broadcast band which extends from 535 to 1720 Kilocycles (KC) (174 to 560 Meters) and includes the popular 1712 KC police channel.

FIRESTONE TIRE & RUBBER CO.

MODEL S7398-3  
Code A-368



NOTE: MENTION CODE NO. A-368 WHEN ORDERING PARTS.

ELECTRICAL PARTS

Diagram Number	Part Number	Description	List Price
1-2-3	83539	Condenser, Mica, 260 Mmfd.	\$0.20
4-5	87813	Condenser, Mica, .0042 Mfd.	.35
6	88587	Condenser, Wire, 3 Mmfd.	.12
7	110510	Resistor, Carbon, 47,000 Ohms 1/4 Watt	.12
8	110552	Resistor, Carbon, 220,000 Ohms 1/4 Watt	.12
9-10-11	110553	Resistor, Carbon, 470,000 Ohms 1/4 Watt	.12
12	110557	Resistor, Carbon, 470,000 Ohms 1/4 Watt	.12
13-14	110559	Resistor, Carbon, 22,000 Ohms 1/4 Watt	.12
15	110565	Resistor, Carbon, 2.2 Meg. 1/4 Watt	.12
16-17	110570	Resistor, Carbon, 2200 Ohms 1/4 Watt	.12
18	110573	Resistor, Carbon, 3.3 Meg. 1/4 Watt	.12
19	110580	Resistor, Carbon, 180 Ohms 1/4 Watt	.10
20-21-22	110590	Resistor, Carbon, 300 Ohms 1/4 Watt	.14
23	110592	Resistor, Carbon, 140 Ohms 1/4 Watt	.35
24	110596	Condenser, .05 Mfd. 600 Volt	.18
25	110619	Resistor, 20 Ohm 1 Watt	.15
26 to 31	117295	Resistor, Insulated, 1500 Ohms 1 Watt	.45
32	118835	Condenser, .01 Mfd. 600 Volt	.15
33	118835	Condenser, .02 Mfd. 600 Volt	.15
34A-34B-34C	119174	Switch, Band	.80
35-36-38-39	119143	Condenser, .002 Mfd. 600 Volt	.15
37-40	119147	Condenser, .002 Mfd. 600 Volt	.15
41	119154	Condenser, .002 Mfd. 600 Volt	.15
42A-42B	119534	Condenser, .002 Mfd. 600 Volt	.15
43	119875	Condenser, Padder	.36
44	119934	Condenser, Trimmer	.18
45	160449	Coil, Compensating	.50
46	500108	Coil, Short Wave Antenna	1.00
47	500249	Coil, Short Wave Antenna	1.00
47A-47B	500256	Electrolytic { A-40 Mfd. 150V. } 60 Cycle only	
		Condenser { B-20 Mfd. 150V. } 25 Cycle only	
		Electrolytic { B-20 Mfd. } 25 Cycle only	
	500744		

SOCKET VOLTAGES — ALL D.C. POTENTIAL MEASURED TO K ON THE 12SQ7 TUBE  
NO SIGNAL CONDITION  
DIAL TUNED TO 540 KC.

TUBE	FUNCTION	FIL. VOLTS	K	G	S	SU	P	D <sub>1</sub>	D <sub>2</sub>
12AH7GT*	1st DET.	11.0	3.5	0	0	63			
12SK7	OSC. (Elements marked,)	11.0	0	-5	62				
12SK7	1st I.F.	11.0	1.4	0	75	0			
12SK7	2nd I.F.	11.0	1.8	0	75	0			
12SQ7	2nd DET.—A.V.C.—A.F.	11.0	0	0	75	0			0
35L6GT	OUTPUT	30.0	4.0	0	75	0			0
35Z5GT	RECTIFIER	31.0	100						Plate—105 A.C.

\*See trimmer chart for pin layout on 12AH7GT tube.

Use a high resistance voltmeter of 1000 ohms per volt.

NOTE—A 20 Ohm Resistor (1 Watt) is added at point X on all 25 Cycle Receivers Part No. 117395, list price 16 cents.



MODEL S7398-3

FIRESTONE TIRE & RUBBER CO.

ALIGNMENT EQUIPMENT & PROCEDURE

FOR ALIGNMENT: An output meter and an accurately calibrated signal generator are required.

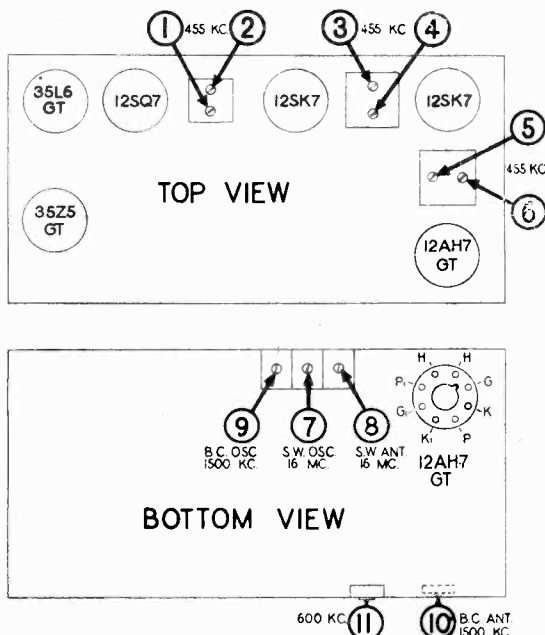
1. Connect the output meter across the voice coil or between the plate of the 35L6GT output tube and the cathode of the 12SQ7 through a .1 mfd. condenser. (The more sensitive type of meter should be connected across the voice coil.)
2. Connect the ground lead of the signal generator to B— through a .25 mfd. condenser. If oscillation is encountered try dressing leads and changing point of connection to B—.
3. Volume control in maximum position. Weak signal input.

Dummy Ant. in Series with Sig. Gen.	Connection of Sig. Generator Output to Receiver	Signal Generator Frequency	Band Switch Position	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
.1 MFD. Condenser	Lug on Rear Section of Gang Cond.	455 KC	American	Any Point Where It Does Not Affect the Signal	1-2	3rd I.F.	Adjust for Maximum Output. Then repeat Adjustment.
					3-4	2nd I.F.	
					5-6	1st I.F.	
400 OHM Carbon Resistor	Antenna Terminal (Blue Wire)	16 MC	Foreign	16 MC	7	Foreign Oscillator	Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 15.1 MC. If Image does not appear, Realign at 16 MC, with Trimmer Screw farther out. Recheck Image.
400 OHM Carbon Resistor	Antenna Terminal (Blue Wire)	16 MC	Foreign	Tune to 16 MC Generator Signal	8	Foreign Antenna	Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.
200 MMFD. Mica Condenser	Antenna Terminal (Blue Wire)	1500 KC	American	1500 KC	9	Broadcast Oscillator (Shunt)	Adjust for Maximum Output.

Now replace the chassis and loop antenna in the cabinet before proceeding further.

200 MMFD. Mica Condenser	Antenna Terminal (Blue Wire)	1500 KC	American	Tune to 1500 KC Generator Signal	10	Broadcast Antenna	Adjust for Maximum Output.
200 MMFD. Mica Condenser	Antenna Terminal (Blue Wire)	600 KC	American	Tune to 600 KC Generator Signal	11	Broadcast Oscillator (Series)	Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.

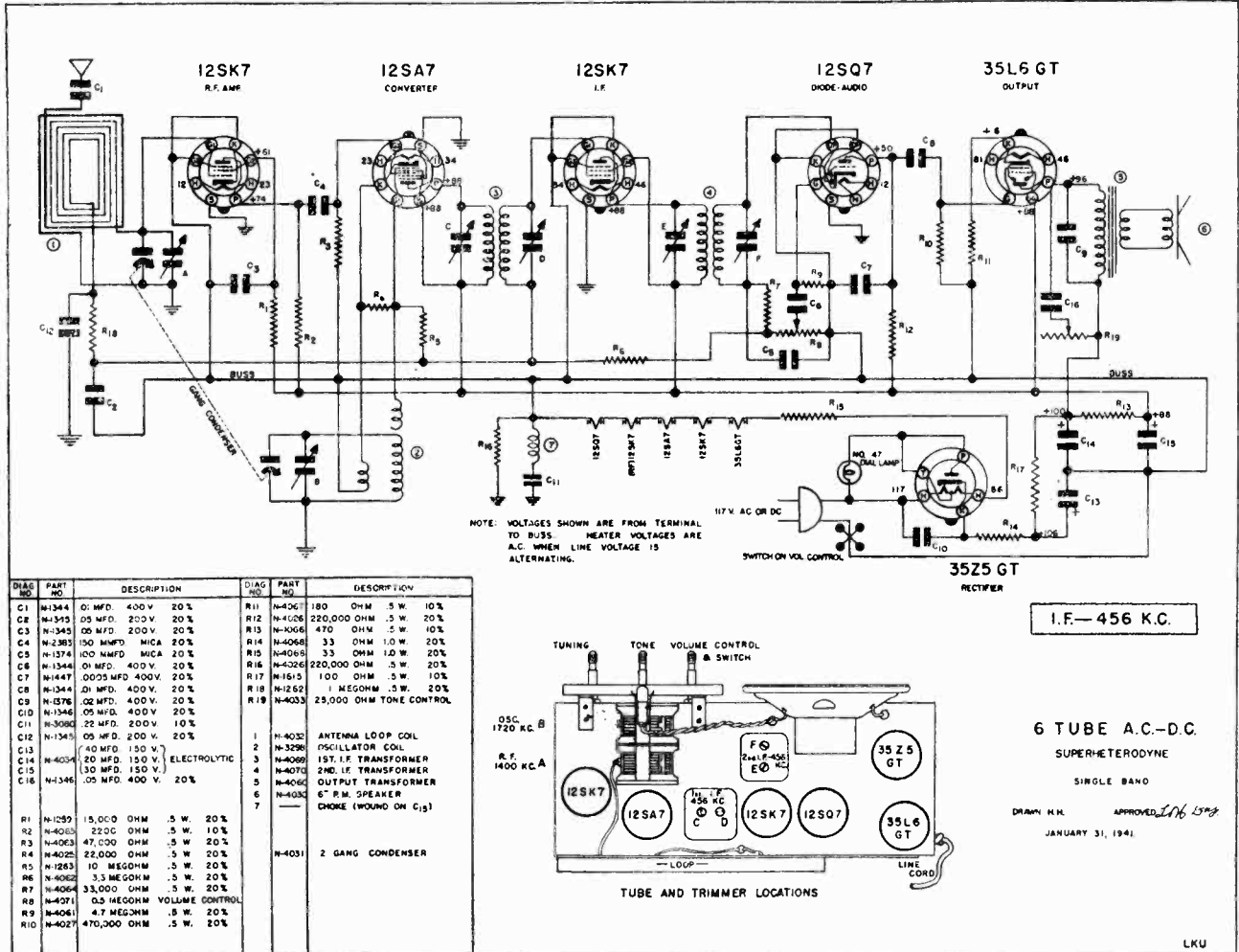
DIAL AND MISCELLANEOUS PARTS



Part Number	Description	List Price
116467	Base for Mtg. Electrolytic Cond.	\$0.04
114955	Clamp, for dial cord	.01
112745	Clip, Coil mounting	.01
113019	Clip, Dial scale retaining	.01
117057	Cord, Drive supplied in 3' lengths	.15
500330	Dial scale	.48
500474	Escutcheon, Dial	1.90
119644	Knob, volume & tuning	.18
119746	Knob, band or tone	.16
85296	Lamp—Dial 6 to 8 volt (Mazda 51)	.16
110496	Plug, Speaker (4 Prong)	.12
500310	Pointer	.18
81145	Retaining Ring for tuning shaft	Per C .50
119587	Screw, No. 2 x 3/8 Phillips Round Hd.	.02
116793	Socket, for dial light	.40
500351	Socket, for loop antenna	.15
110501	Socket, 4 prong (for Spkr.)	.16
160392	Socket, Octal (Rectifier)	.12
116690	Socket, Octal Base	.12
111090	Spacer, Steel, Mtg. for gang	.02
119823	Spring, Dial cord tension	.06
119525	Tuning shaft	.10
111456	Washer, spring washer for tuning shaft	Per C .50

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

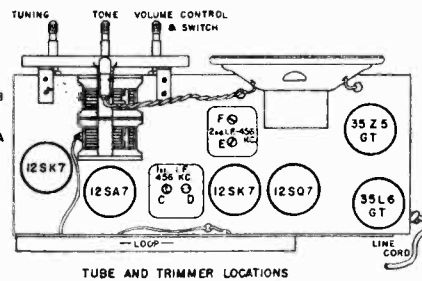
FIRESTONE TIRE & RUBBER CO.



I.F.—456 K.C.

6 TUBE A.C.-D.C.  
SUPERHETERODYNE  
SINGLE BAND

DRAWN K.H. APPROVED L.F. 1/31/34  
JANUARY 31, 1941



LKU

Voltages shown on the circuit diagram are from socket terminals to ground buss. In measuring voltages use a voltmeter having a resistance of at least 1000 ohms per volt. Allowances should be made for variations in line voltage.

**ALIGNMENT PROCEDURE**

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.

**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 or 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. con-

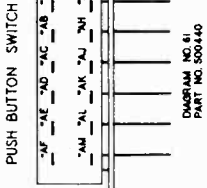
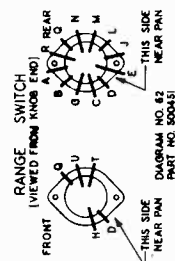
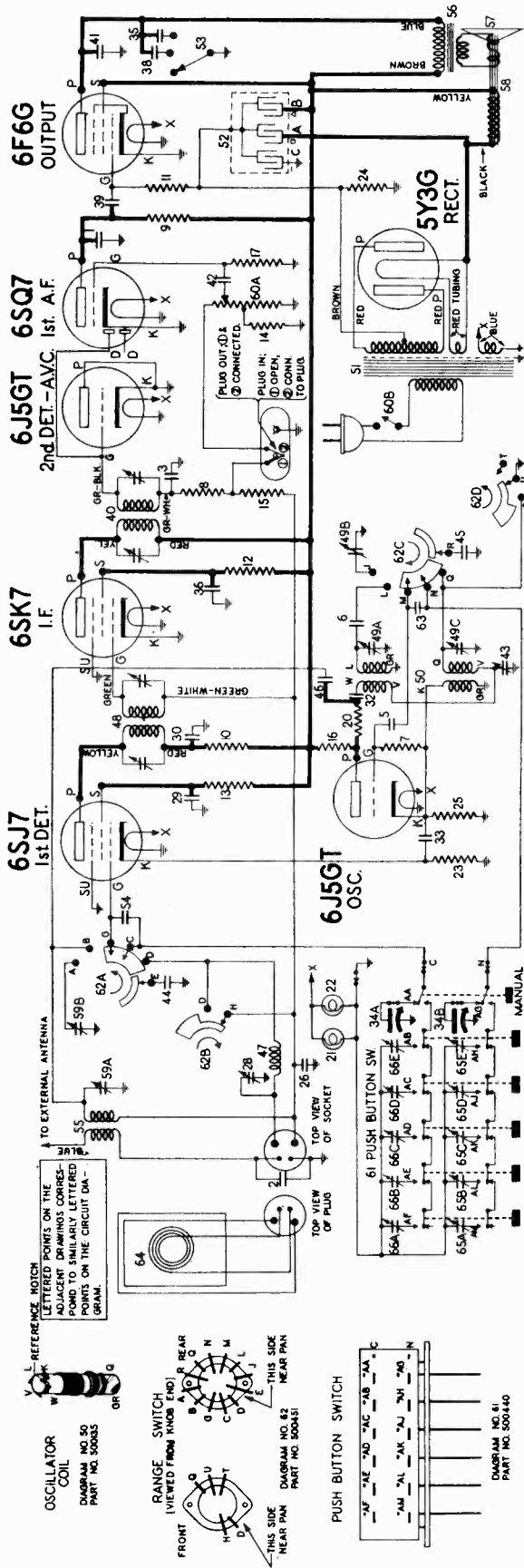
denser. The ground on the test oscillator should be connected to the ground buss, indicated in circuit diagram. Align all four I.F. trimmers to peak or maximum reading on the output meter.

**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.

**TUNING RANGE**

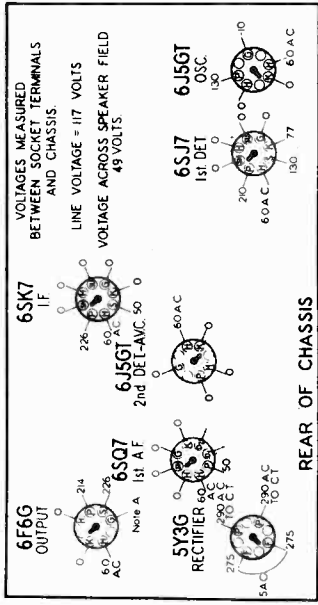
This receiver is designed to operate over the standard broadcast band which extends from 535 to 1720 Kilocycles (KC) (174 to 560 Meters) and includes the popular 1712 KC police channel.



NOTE: MENTION CODE NO. A-370 WHEN ORDERING PARTS.

SOCKET VOLTAGES

Volume on Full with no Signal  
Dial Tuned to 540 KC.



NOTE A: Grid voltage on the 6F6G output tube is -17 volts measured across resistor No. 24.  
Use a high resistance voltmeter of 1000 ohms per volt.

ELECTRICAL PARTS

Diagram Number	Part Number	Description	List Price
1-2,3	83539	Condenser—mica 260 mmfd.	\$0.20
5	85061	Condenser—mica 51 mmfd.	.15
6	88887	Condenser—mica 3042 mfd.	.35
8	110852	Resistor—carbon 47,000 ohms 1/4 watt.	.12
9	110853	Resistor—carbon 250,000 ohms 1/4 watt.	.12
10	110854	Resistor—carbon 470,000 ohms 1/4 watt.	.12
11	110855	Resistor—carbon 100,000 ohms 1/4 watt.	.12
12,13	110856	Resistor—carbon 22 Meg 1/4 watt.	.12
14	110857	Resistor—carbon 3.3 Meg 1/4 watt.	.12
15	110858	Resistor—carbon 10,000 ohms 1/4 watt.	.12
16	110859	Resistor—carbon 330,000 ohms 1/4 watt.	.12
17	110860	Resistor—carbon 180 ohms 1/4 watt.	.12
18-19	110861	Dial Light Bulb—6.3 volt (Mazda No. 44)	.10
20	112952	Resistor—carbon 3300 ohms 1/4 watt.	.16
21-22	117075	Resistor—300 ohm 1 watt w.w.	.12
23	116078	Resistor—560 ohms 1/4 watt.	.12
24	116919	Condenser—.05 mfd. 600 volt.	.20
25	119132	Condenser—trimmer	.20
26-27	119133	Condenser—.01 mfd. 600 volt.	.15
28	119291	Condenser—variable tuning	.15
29 to 33	119414	Condenser—.02 mfd. 600 volt.	.15
34A,34B	119415	Condenser—.08 mfd. 600 volt.	.15
35-36-37	119416	Condenser—.01 mfd. 600 volt.	.15
38	119417	Transformer—.01 mfd. 600 volt.	1.15
39	119418	Transformer—.01 mfd. 600 volt.	1.15
40	119419	Condenser—.01 mfd. 600 volt.	.15
41	119193	Condenser—.01 mfd. 600 volt.	.15
42	119193	Condenser—.01 mfd. 600 volt.	.15
43	119934	Condenser—padder	\$0.36
44-45	160646	Condenser—compensating, 100 mmfd.	.28
46	161315	Condenser—twisted wire 5 mmfd.	.16
47	500108	Coil—compensating	1.08
48	500131	Transformer—1st I.F.	.73
49	49A,49B,49C	Condenser—three section trimmer	3.50
50	500135	Coil—B.C. & S.W. Osc.	5.60
51	500137	Transformer—power (60 cycles)	1.35
52	500202	Condenser—electrolytic A—20 mid.—350 volt B—10 mid.—350 volt C—20 mid.—25 volt	5.60
53	500207	Switch—tone	.55
54	500212	Condenser—compensating, 200 mmfd.	.35
55	500248	Coil—short wave antenna	1.50
56	500270	Coil—short wave output for 500426 Spkr.	1.35
57	R 500711	Coil & Voice Coil for R-500426 Spkr.	1.85
58	R 500426	Speaker dynamometer two section	4.85
59A-59B	500438	Volume Control—1 Meg. (with switch)	1.40
60A-60B	500440	Switch—push button	1.25
61	500451	Switch—band	2.55
62A to 62D	500484	Condenser—compensating, 215 mmfd.	1.38
63	500490	Loop antenna & cabinet back	1.90
64	500553	Trimmers—push button (top bank)	1.10
65A to 65E	500554	Trimmers—push button (bottom bank)	1.10

INTERMEDIATE FREQUENCY 455 KC

# FIRESTONE TIRE & RUBBER CO.

## ALIGNMENT EQUIPMENT & PROCEDURE

THIS RECEIVER MAY BE ALIGNED IN THE CABINET WITH LOOP CONNECTED

1. Connect the output meter across the voice coil or from the plate of the 6F6G output tube to chassis through a .1 mfd. condenser.
2. Connect the ground lead of the signal generator to the receiver chassis.
3. Make sure that the wires coming from the chassis and push button switch are connected as shown in the figure below.
4. Push in the "manual" button and keep it pushed in. Check the pointer to see that it is correctly set to 540 KC. with gang in full mesh.
5. Turn the volume control to the maximum volume position, and the tone control to the "speech" position.
6. FOLLOW THE ORDER OF ALIGNMENT INDICATED BELOW

Dummy Ant. in Series with Sig. Gen.	Connection of Sig. Generator Output to Receiver	Signal Generator Frequency	Band Switch Position	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
.1 MFD Condenser	Lug on Outer Section of Gang Cond.	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.	
400 OHM Carbon Resistor	Blue Lead from Chassis	16 MC	Foreign	16 MC	5	Foreign Oscillator	Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 15.1 MC. If Image does not appear, Realign at 16 MC, with Trimmer Screw farther out. Recheck Image.
400 OHM Carbon Resistor	Blue Lead from Chassis	16 MC	Foreign	Tune to 16 MC Generator Signal	6	Foreign Antenna	Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.
400 OHM Carbon Resistor	Blue Lead from Chassis	11.5 MC	Intermediate	11.5 MC	7	Spread Band Oscillator	Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 10.6 MC. If Image does not appear, Realign at 11.5 MC, with Trimmer Screw farther out. Recheck Image.
400 OHM Carbon Resistor	Blue Lead from Chassis	11.5 MC	Intermediate	Tune to 11.5 MC Generator Signal	8	Spread Band Antenna	Adjust for Maximum Output.
No Connection	Place Lead from Signal Gen. Near Loop	1500 KC	Broadcast	1500 KC	9	Broadcast Oscillator (Shunt)	Adjust for Maximum Output.

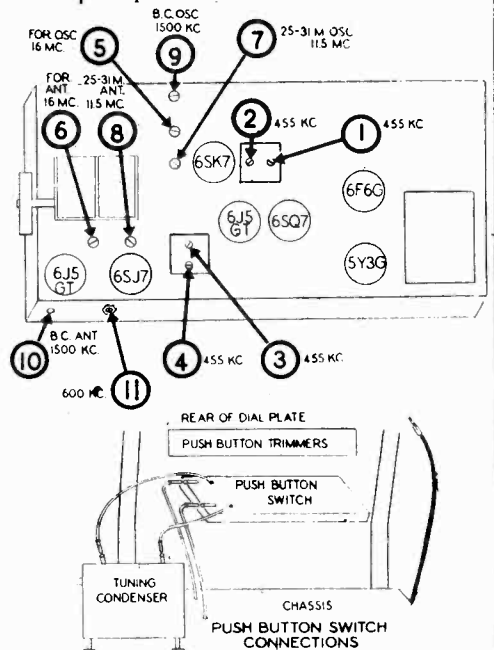
NOW PLACE THE CABINET BACK AND LOOP ANTENNA INTO POSITION AT THE BACK OF THE CABINET.

No Connection	Place Lead from Signal Gen. Near Loop	1500 KC	Broadcast	Tune to 1500 KC Generator Signal	10	Broadcast Antenna	Adjust for Maximum Output.
No Connection	Place Lead from Signal Gen. Near Loop	600 KC	Broadcast	Tune to 600 KC Generator Signal	11	Broadcast Oscillator (Series)	Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.

### MISCELLANEOUS PARTS

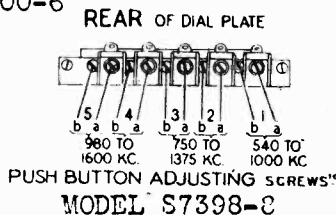
Part Number	Description	List Price
116467	Base for mounting electrolytic condenser	\$ .04
83552	Bolt—chassis mounting No. 10 7/8	.03
114955	Clamp for dial cord	.01
112745	Clip coil mounting	.01
117057	Cord—drive supplied in 3 lengths	.15
500436	Dial background	.14
500400	Dial scale	3.00
113402	Drum—dial cord drive	.56
500427	Knob—tone & range	.16
500406	Knob—tuning & volume	.16
12349	Nut—8-32 for mounting gang	Per C
119911	Phono—terminal strip	.45
500445	Pointer	.20
500405	Pushbutton	.12
81145	Retaining ring for tuning shaft	Per C
83624	Screw—self tapping 8 x 1/4	.01
85827	Set screw—8-32 square head	.02
500411	Shaft—tuning	.30
111090	Spacer—steel mounting for gang	.02
113177	Spring—dial cord tension	.09
500051	Socket for loop antenna	.15
119791	Socket—octal	.12
114876	Socket—octal (rectifier)	.15
114878	Socket—octal with special ground	.15
117315	Tabs—station call letter	.55
111456	Washer—spring washer for tuning shaft	5Q

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE



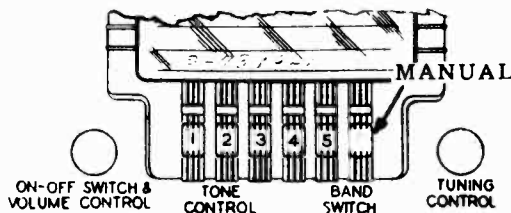
MODEL S7398-3  
 MODEL S7399-1  
 MODEL S7400-6

FIRESTONE TIRE & RUBBER CO.

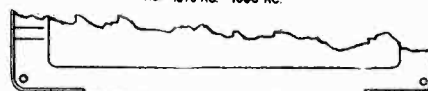
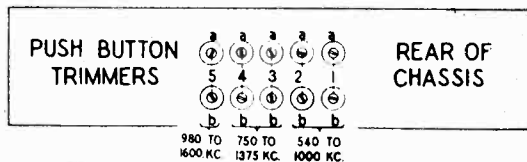


TO SET UP THE BUTTONS FOR AUTOMATIC TUNING: FOR ALL MODELS

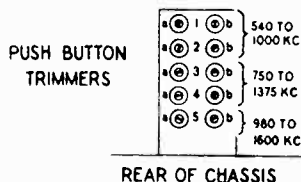
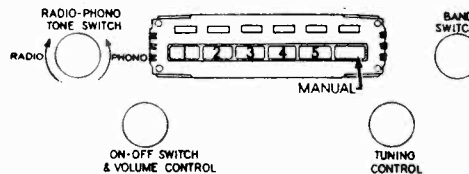
1. Turn the set on and allow it to operate at least fifteen minutes before attempting to set up the buttons.
2. Make a list of the frequencies of five nearby stations to which you wish to set up the buttons. Be sure to select the most powerful nearby stations, since weak signals will not give as satisfactory results.
3. Turn the set around so that the back of the set is facing you. Through the ten holes in the back of the chassis will be seen ten adjusting screws. (See Fig. 1). These screws are used to tune in the stations that the buttons are to be set to.
4. Each of the push buttons can be made to tune in stations in a definite frequency range as shown in Fig. 1. It is imperative that in setting up the buttons you select stations whose frequency is in the indicated range of that button. **ALWAYS TRY TO SELECT THE BUTTON WHICH CAN BE SET UP TO A STATION WHOSE FREQUENCY IS WELL WITHIN THE BUTTON'S OPERATING RANGE.**
5. Turn the band switch to the "AM" position, push in the button labeled "MANUAL," then using the tuning knob (see Fig. 1) tune in the station you wish to set to button No. 1.
6. Push in button No. 1 and using a screwdriver turn adjusting screw No. 1a (the top one) until the station you had previously tuned in is again heard. If it is not heard, advance the volume control and adjust the screw again. Be sure to adjust screw No. 1a to the point where the program is heard with the deepest tone.
7. Insert the screwdriver in adjusting screw No. 1b (the one below 1a) and turn it until the program is heard with the deepest tone. Now again check the setting of screw No. 1a, making sure it is adjusted to give the deepest tone.
8. The set-up for button No. 1 is now complete.
9. To set up the remaining buttons use the same procedure; push in the "MANUAL" button; tune in the station, using the tuning knob; push in the button to be set up; adjust its associated "a" adjusting screw until the station is tuned in (screw 2a for button No. 2, etc., see Fig. 1); the associated "b" screw is then adjusted for deepest tone as before.
10. Call letter tabs which may be used to label the buttons are provided with your radio. They fit in the small space above each push button.
11. To use push button at any time, turn the band switch to the "AM" position and push the proper button.



MODEL S7399-1



MODEL S7400-6



Voltage S-7399-1 only

SOCKET VOLTAGES — ALL D.C. POTENTIAL MEASURED TO CHASSIS

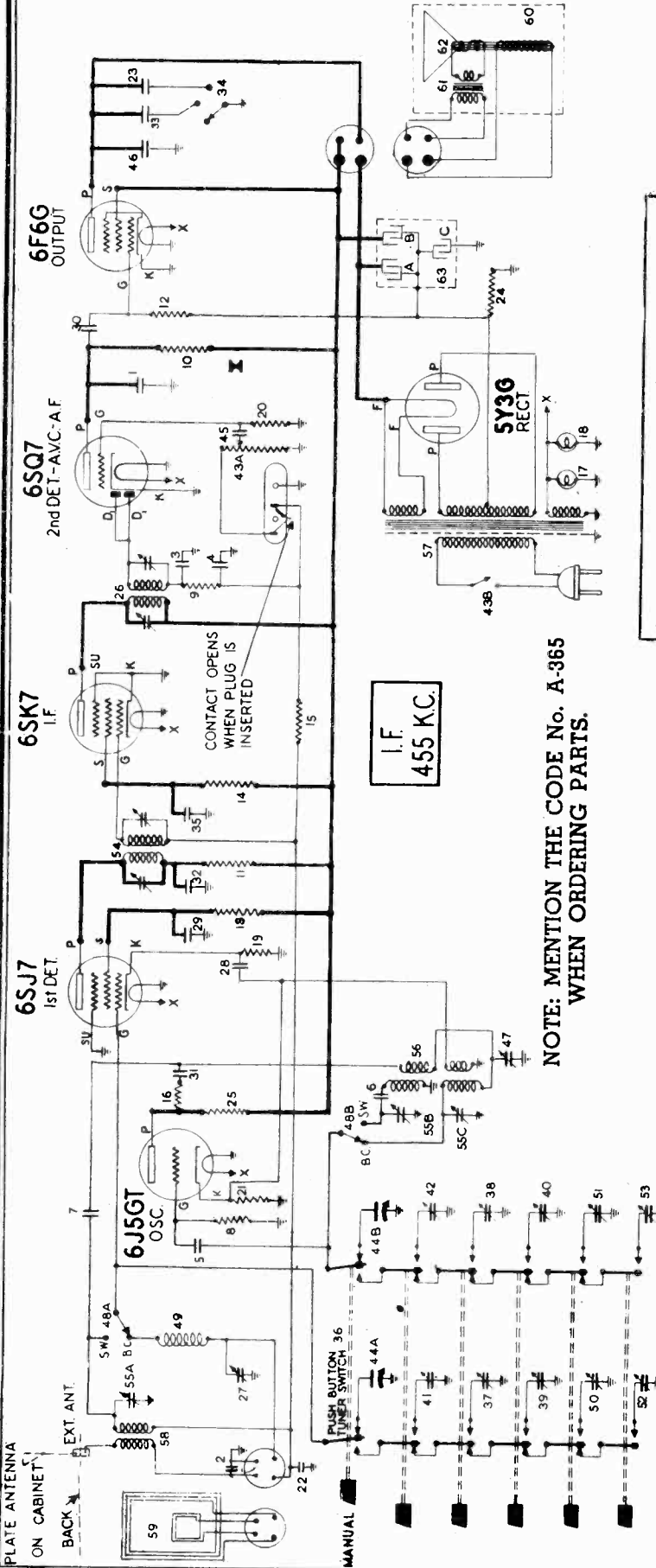
NO SIGNAL CONDITION		DIAL TUNED TO 540 KC.							
TUBE	FUNCTION	H	K	G	S	SU	P	D <sub>1</sub>	D <sub>2</sub>
6SJ7	1st DET.	6.0 A.C.	.5	0	160	0	225		
6J5GT	OSC.	6.0 A.C.	0	-5			150		
6SK7	I.F.	6.0 A.C.	0	0	62	0	230		
6SQ7	2nd DET. — A.V.C. & A.F.	6.0 A.C.	0	0			92	0	0
6F6G	OUTPUT	6.0 A.C.	0	Note A	230		215		
5Y3G	RECTIFIER	5.0 A.C.							

NOTE A: The bias for this grid is -15 volts measured across resistor No. 24.

Use a high resistance voltmeter of at least 1000 ohms per volt.

FIRESTONE TIRE & RUBBER CO.

MODEL S7399-1



NOTE: MENTION THE CODE NO. A-365 WHEN ORDERING PARTS.

I.F. 455 KC.

IN SOME MODELS A 150,000 OHM RESISTOR BYPASSED TO GROUND BY A .05 MFD. CONDENSER HAS BEEN INSERTED AT POINT "X."

ELECTRICAL PARTS

Diagram Number	Part Number	Description	List Price
1	83539	Condenser—mica 260 mmfd.	\$0.20
2-3-4	83783	Condenser—mica 110 mmfd.	.20
5	85061	Condenser—mica 51 mmfd.	.15
6	88587	Condenser—mica 0042 mfd.	.35
7	110510	Condenser—wire 3 mmfd.	.12
8-9	110552	Resistor—carbon 47,000 ohms 1/4 watt.	.12
10	110553	Resistor—carbon 220,000 ohms 1/4 watt.	.12
11	110557	Resistor—carbon 470,000 ohms 1/4 watt.	.12
12	110559	Resistor—carbon 470,000 ohms 1/4 watt.	.12
13-14	110564	Resistor—carbon 100,000 ohms 1/4 watt.	.12
15	110570	Resistor—carbon 2.2 meg. 1/4 watt.	.15
16	110590	Resistor—carbon 180 ohms 1/4 watt.	.12
17-18	110629	Dial light bulb—6.3 volt.	.15
19	112952	Resistor—carbon 3,300 ohms 1/4 watt.	.10
20	112975	Resistor—carbon 10 meg. 1/4 watt.	.12
21	116078	Resistor—560 ohms 1/4 watt.	.12
22-23	117075	Resistor—300 ohm 1 watt W.W.	.20
24	118805	Resistor—carbon 10,000 ohms 1 watt.	.16
25	119024	Transformer—2nd I.F.	.12
26	119132	Condenser—trimmer	.15
27	119183	Condenser—.01 mfd. 600 volt.	.20
28 to 33	119289	Switch—tone	.15
34	119414	Condenser—.02 mfd. 600 volt.	.60
35	119603	Push Button Switch.	.15
36	119634	Condenser—Push Button trimmer (750-1375 KC.)	2.30
37 to 40	119664	Condenser—Push Button trimmers (980-1600 KC.)	.24
41-42	119779	Volume control—1/2 meg. (with switch).	1.25
43A-43B	119812	Gang condenser	2.05
44A-44B	119817	Condenser—.004 mfd. 600 volt.	.15
45-46	119817	Condenser—.004 mfd. 600 volt.	.15
Diagram Number	Part Number	Description	List Price
47	11934	Condenser—padder	\$0.36
48A-48B	500057	Switch—band	1.20
49	500108	Coil—compensator	.50
50 to 53	500127	Condenser—push button trimmer (340-1000 KC)	.24
54	500131	Transformer—1st I.F.	1.00
55A-55B-55C	500133	Condenser—three section trimmer	.50
56	500135	Coil—B.C. & S.W. Osc.	.75
57	500137	Transformer—power (60 cycles)	3.50
	{ 500202	Transformer—power (25 cycles)	5.60
Diagram Number	Part Number	Description	List Price
58	500147	Coil—short wave antenna	\$0.55
59	500179	Loop antenna	2.40
60	M-500180	Speaker—dynamic (8")	6.50
61	M-500194	Transformer—output for M-500180 speaker	1.75
62	M-500195	Cone & Voice coil for M-500180 speaker	1.70
63A-63C	500201	Condenser—electrolytic	1.35
	A=20 mfd.—350 V.		
	B=10 mfd.—350 V.		
	C=20 mfd.—25 V.		

MODEL S7399-1

FIRESTONE TIRE & RUBBER CO.

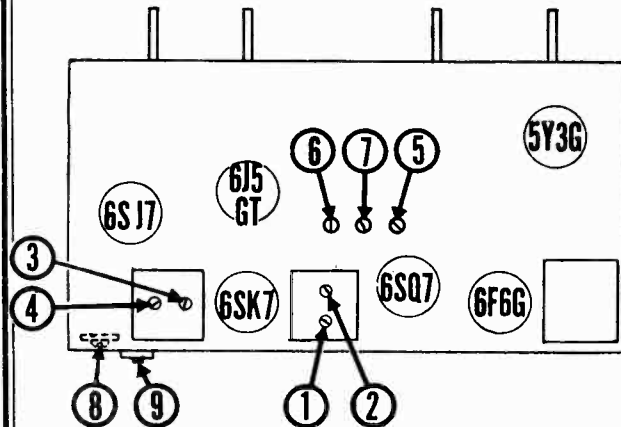
ALIGNMENT EQUIPMENT & PROCEDURE

NOTE: THIS SET MAY BE COMPLETELY ALIGNED WITHOUT REMOVING FROM THE CABINET.  
 FOR ALIGNMENT: An output meter and an accurately calibrated signal generator are required.

1. Connect the loop as indicated in the circuit diagram and keep it in the circuit at all times.
2. Connect the output meter across the voice coil or from the plate of the 6F6G output tube to chassis through a .1 mfd. condenser. Connect the ground lead of the signal generator to the receiver chassis.
3. Turn volume control to the maximum position and keep it in this position throughout alignment procedure.
4. Push the MANUAL button in and keep it pushed in.

Dummy Ant. in Series with Sig. Gen.	Connection of Sig. Generator Output To Receiver	Signal Generator Frequency	Band Switch Position	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
.1 MFD. Condenser	Rear Lug of Gang Condenser	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.	
400 OHM Carbon Resistor	External Antenna Terminal Blue Wire	16 MC	Foreign	16 MC	5	Foreign Oscillator (Shunt)	Adjust for maximum output. Check to see if proper peak was obtained by tuning in image at approx. 15.1 MC. If image does not appear realign at 16 MC. with trimmer screw farther out. Recheck image.
400 OHM Carbon Resistor	External Antenna Terminal Blue Wire	16 MC	Foreign	Tune to 16 MC. Generator Signal	6	Foreign Antenna	Adjust for maximum output. Try to increase output by detuning trimmer and retuning receiver dial until maximum output is obtained.
200 MMFD. Mica Condenser	External Antenna Terminal Blue Wire	1500 KC	Broadcast	1500 KC	7	Broadcast Oscillator (Shunt)	Adjust for maximum output.
200 MMFD. Mica Condenser	External Antenna Terminal Blue Wire	1500 KC	Broadcast	Tune To 1500 KC Generator Signal	8	Broadcast Antenna	Adjust for maximum output.
200 MMFD. Mica Condenser	External Antenna Terminal Blue Wire	600 KC	Broadcast	Tune To 600 KC Generator Signal	9	Broadcast Oscillator (Series Pad)	Adjust for maximum output. Try to increase output by detuning trimmer and retuning receiver dial until maximum output is obtained.

TRIMMER LOCATIONS

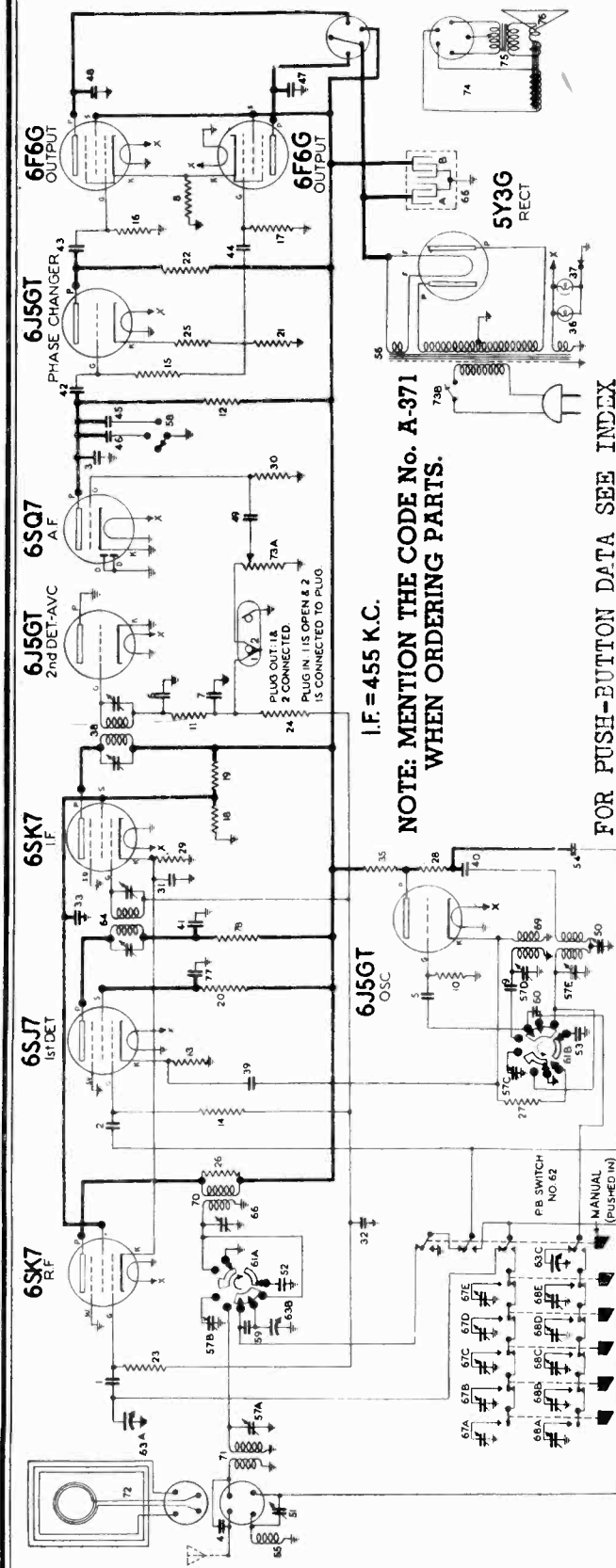


DIAL AND MISCELLANEOUS PARTS

Part Number	Description	List Price
116467	Base for mtg. electrolytic condenser	\$0.04
500181	Cabinet back complete	1.50
119559	Clamp—dial scale	.08
114955	Clamp—for dial cord	.01
112745	Clip—coil mounting	.15
117057	Cord—drive (supplied in 3' lengths)	.35
500139	Dial scale	.06
119782	Dial background	.85
500167	Escutcheon—dial	.18
119644	Knob—push on	.16
119746	Knob—range	.02
116584	Plug (rubber)	.14
119781	Pointer	.16
119911	Phono-terminal strip	.06
119654	Push button	.50
81145	Retaining ring for tuning shaft.	Per C.
114914	Screw—special head for mtg. escutcheon	Per Dz.
119778	Shaft—tuning	.10
110501	Socket—4 prong (for spkr.)	.16
111008	Socket—dial lamp	.12
114878	Socket—octal—with special ground	.15
119791	Socket—octal	.12
114876	Socket—octal (rectifier)	.15
500051	Socket for loop antenna	.15
119823	Spring dial cord tension	.06
119739	Station call tabs	.48
111456	Washer—spring washer	Per C.

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

FIRESTONE TIRE & RUBBER CO.



**FOR PUSH-BUTTON DATA SEE INDEX**

Diagram Number	Part Number	Description	List Price
57A to 57E	500168	Condenser—trimmer (5 section)	55 68A to 500861
58	500207	Condenser—trimmer (5 section)	55 68E
59-60	500484	Switch—tone	38 69
61A-61B	500794	Condenser—compensating 215 mmfd.	180 70
62	500795	Switch—band	290 71
63A to 63C	500796	Condenser—variable tuning	350 72
64	500801	Transformer—1st I.F.	1.20 73A-73B 500877
65	500807	Condenser—electrolytic	74 M-500880
		A-20 mfd.—400 volt	75 M-501309
		B-15 mfd.—400 volt	76 M-501310
66	500842	Condenser—trimmer	20 77
67A to 67E	500860	Condenser—push but. trimmers (top bank)	1.10 78
		Condenser—push but. trimmers (bottom bank)	1.10
		Coil—oscillator (B.C. & S.W.)	1.30
		Coil—broadcast R.F.	.80
		Coil—short wave antenna	.78
		Loop antenna	1.60
		Volume control—1/2 meg (with switch)	1.25
		Speaker—dynamic (12") with transformer	1.10
		Transformer—output for M-500880 spkr.	1.80
		Cone & voice coil for M-500880 spkr.	1.80
		Condenser—.01 mfd. 600 volt	.15
		Resistor—carbon 6800 ohms 1/4 watt	.12

**SOCKET VOLTAGES—ALL D.C. POTENTIAL MEASURED TO CHASSIS**

NO SIGNAL CONDITION

TUBE	FUNCTION	H	K	G	S	SU	P	D <sub>1</sub>	D <sub>2</sub>
6SK7	R.F.	6.0 A.C.	3	0	85	0	210		
6SJ7	1st Det.	6.0 A.C.		0	150	0	190		
6J5GT	Osc.	6.0 A.C.		-3			140		
6SK7	I.F.	6.0 A.C.	3	0	85	0	210		
6J5GT	2nd Det A.V.C.	6.0 A.C.		0			0		
6SQ7	A.F.	6.0 A.C.		0			75	0	0
6J5GT	Phase Changer	6.0 A.C.	38	*0			160		
(2) 6F6G	Output	6.0 A.C.	16	0	210		310		
5Y3G	Rectifier	5.0 A.C.							Plates 370 V.A.C. to C.T.

\*to K

**ELECTRICAL PARTS**

Diagram Number	Part Number	Description	List Price
1-2-3	83539	Condenser—mica 280 mmfd.	12
4-5	83783	Condenser—mica 110 mmfd.	12
6-7	85061	Condenser—mica 51 mmfd.	20
8	88462	Resistor—W.W. 270 ohms 1/4 watt	15
9	89557	Condenser—mica .0042 mfd.	35
10-11	110552	Resistor—carbon 47,000 ohms 1/4 watt	12
12	110553	Resistor—carbon 220,000 ohms 1/4 watt	12
13	110557	Resistor—carbon 470,000 ohms 1/4 watt	12
14 to 17	110559	Resistor—carbon 15,000 ohms 1/4 watt	30
18-19	110561	Resistor—carbon 100,000 ohms 1/4 watt	12
20	110564	Resistor—carbon 220,000 ohms 1/4 watt	12
21-22	110565	Resistor—carbon 2.2 meg. 1/4 watt	12
23-24	110570	Resistor—carbon 2.200 ohms 1/4 watt	12
25	110573	Resistor—carbon 220 ohms 1/4 watt	12
26	110588	Resistor—carbon 6800 ohms 1/4 watt	12
27-28	110590	Resistor—carbon 180 ohms 1/4 watt	12
29	117994	Resistor—carbon 220 ohms 1/4 watt	16
30	116050	Resistor—insulated 10 meg. 1/4 watt	25
31	116625	Condenser—.05 mfd. 600 volt	20
32-33-34	116819	Resistor—carbon 10,000 ohms 1 watt	12
35	118805	Lamp-Dial (Mazda No. 47)	15
36-37	118921	Transformer—2nd I.F.	1.15
38	119024	Condenser—.01 mfd. 600 volt	15
39-40-41	119193	Condenser—.02 mfd. 600 volt	15
42-43-44	119416	Condenser—.008 mfd. 600 volt	15
45	119415	Condenser—.004 mfd. 600 volt	15
46-47-48	119817	Condenser—.002 mfd. 600 volt	15
49	119875	Condenser—padder	36
50	119934	Condenser—trimmer (Loop)	18
51	160449	Condenser—compensating 100 mmfd.	28
52-53	160646	Condenser—twisted wire 5 mmfd.	16
54	161315	Coil—compensating	50
55	500108	Transformer—power (60 cycles)	6.50
56	500116	Transformer—power (25 cycles)	8.00

Use a high resistance voltmeter of at least 1000 ohms per volt.



MODEL S7399-2

## FIRESTONE TIRE & RUBBER CO

# ALIGNMENT EQUIPMENT & PROCEDURE

THIS RECEIVER MAY BE ALIGNED IN THE CABINET WITH LOOP CONNECTED

1. Connect the output meter across the voice coil or from plate to plate of the 6F6G output tubes.
2. Connect the ground lead of the signal generator to the receiver chassis.
3. Push in the "manual" button and keep it pushed in. Check the pointer to see that it is correctly set to 540 KC. with gang in full mesh.
4. Turn the volume control to the maximum volume position, and the tone control to the "speech" position.
5. FOLLOW THE ORDER OF ALIGNMENT INDICATED BELOW.

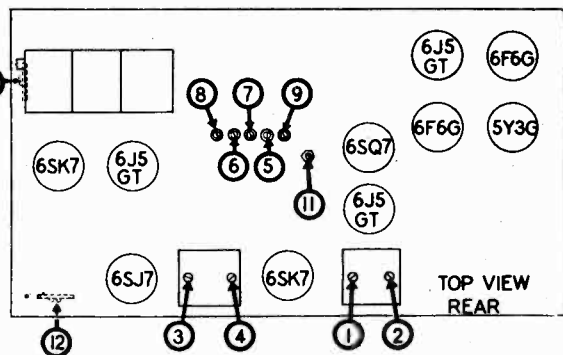
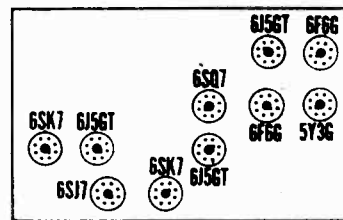
Dummy Ant. In Series with Sig. Gen.	Connection of Sig. Generator Output to Receiver	Signal Generator Frequency	Band Switch Position	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
.1 MFD Condenser	Lug on Middle Section of Gang Cond.	455 KC	American	Any Point Where It Does Not Affect the Signal	1-2	2nd I.F.	Adjust for Maximum Output. Then repeat Adjustment.
					3-4	1st I.F.	
400 OHM Carbon Resistor	Blue Lead from Chassis	16 MC	Foreign	16 MC	5	Foreign Oscillator	Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 15.1 MC. If Image does not appear, Realign at 16 MC, with Trimmer Screw farther out. Recheck Image.
400 OHM Carbon Resistor	Blue Lead from Chassis	16 MC	Foreign	Tune to 16 MC Generator Signal	6	Foreign Antenna	Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.
400 OHM Carbon Resistor	Blue Lead from Chassis	11.5 MC	25-31 M.	11.5 MC	7	Spread Band Oscillator	Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 10.6 MC. If Image does not appear, Realign at 11.5 MC, with Trimmer Screw farther out. Recheck Image.
400 OHM Carbon Resistor	Blue Lead from Chassis	11.5 MC	25-31 M.	Tune to 11.5 MC Generator Signal	8	Spread Band Antenna	Adjust for Maximum Output.
No Connection	Place Lead from Signal Gen. Near Loop	1500 KC	American	1500 KC	9	Broadcast Oscillator (Shunt)	Adjust for Maximum Output.
No Connection	Place Lead from Signal Gen. Near Loop	1500 KC	American	Tune to 1500 KC Generator Signal	10	Broadcast Detector	Adjust for Maximum Output.
No Connection	Place Lead from Signal Gen. Near Loop	600 KC	American	Tune to 600 KC Generator Signal	11	Broadcast Oscillator (Series)	Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.
No Connection	Place Lead from Signal Gen. Near Loop	1500 KC	American	Tune to 1500 KC Generator Signal	12	Broadcast Antenna	Adjust for Maximum Output.

### MISCELLANEOUS PARTS

Part Number	Description	List Price
116584	Bumper plug (rubber)	\$0.02
500883	Cabinet back	.80
114955	Clamp—for dial cord	.01
112745	Clip—coil mounting	.01
117057	Cord—drive (supplied in 3 ft. lengths)	.15
500800	Dial scale	1.80
113402	Drum—dial cord drive	.56
500500	Escutcheon—push button	1.10
160193	Knob—Volume & Tuning	.18
161366	Knob—Band & Tone	.18
119911	Phono—terminal strip	.16
500856	Pointer	.18
500405	Push button	.12
81145	Retaining ring for tuning shaft	Per C .50
114914	Screw—special head for mtg escutcheon	per Dz. .15
85827	Set screw—8-32 square head for drive drum	.02
500411	Shaft—tuning	.30
119791	Socket—octal	.12
114876	Socket—octal (rectifier)	.15
114878	Socket—octal, with spec. ground	.15
500051	Socket for loop antenna	.15
160026	Socket—condenser mtg.	.04
117704	Socket—for speaker, 5 prong	.13
113177	Spring—dial cord tension	.09
114041	Tabs—station call letters	.35
111456	Washer—spring washer for tuning shaft	Per C .50

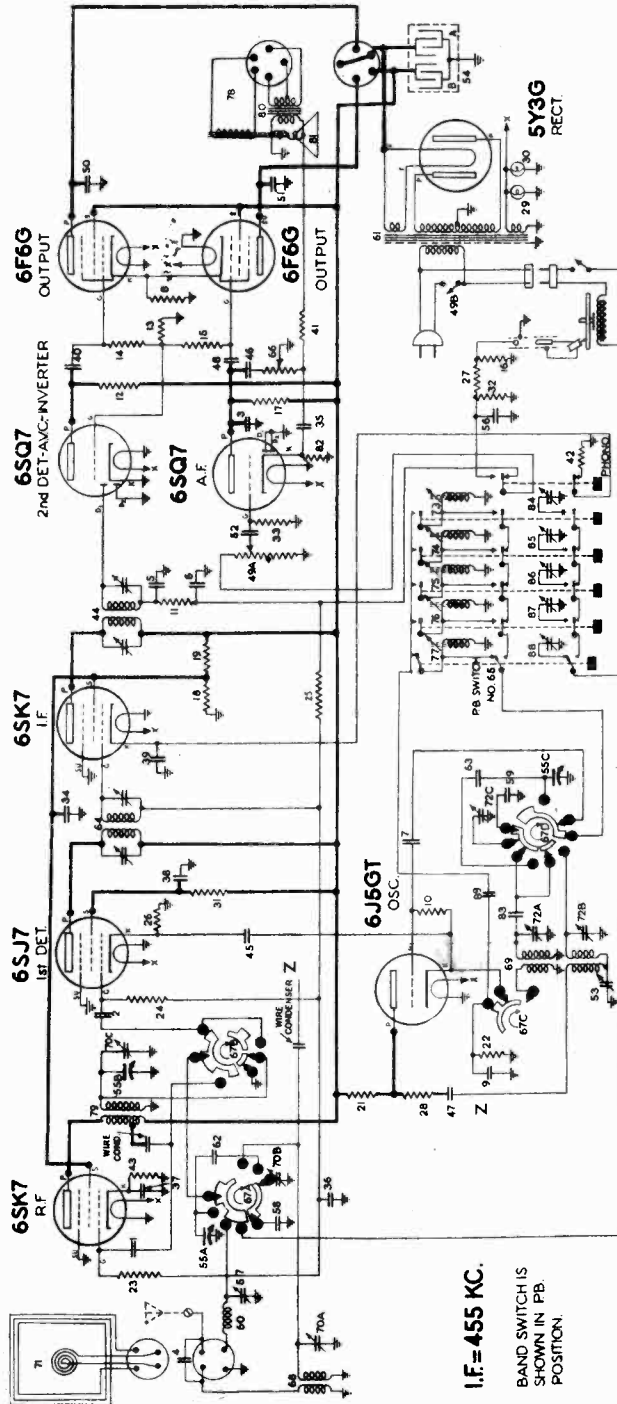
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### TUBE LOCATIONS



FIRESTONE TIRE & RUBBER CO.

MODEL S7400-2  
Air Chief



"Z" POINTS  
CONNECT  
TOGETHER.

NOTE: Mention  
Code No. A-372  
when ordering  
parts.

I.F. = 455 KC.

BAND SWITCH IS  
SHOWN IN PB  
POSITION.

ELECTRICAL PARTS

Diagram Number	Part Number	Description	List Price
1-2-3	83539	Condenser—mica 260 mmd.	\$0.20
4-5-6	83783	Condenser—mica 110 mmd.	.20
7	85061	Condenser—mica 51 mmd.	.15
8	88462	Resistor—wire wound 270 ohms 1 watt	.15
9	89114	Condenser—800 mmd.	.12
10-11	110552	Resistor—carbon 47,000 ohms 1/4 watt	.12
12 to 15	110553	Resistor—carbon 220,000 ohms 1/4 watt	.12
16	110554	Resistor—carbon 1 megohm 1/4 watt	.12
17	110559	Resistor—carbon 470,000 ohms 1/4 watt	.12
18-19	110561	Resistor—carbon 15,000 ohms 1/4 watt	.12
21-22	110569	Resistor—carbon 2,000 ohms 1/4 watt	.12
23-24-25	110570	Resistor—carbon 22,000 ohms 1/4 watt	.12
26	110580	Resistor—carbon 180 ohms 1/2 watt	.12
28-30	110629	Diode Light Bulb—6.3 volt (Marza No. 44)	.12
31-32	112962	Resistor—Carbon 150,000 ohms 1/4 watt	.12
33	112975	Resistor—carbon 10 meg. 1/4 watt	.12
34-35	116625	Condenser—.1 mfd. 600 volt.	.25
36 to 40	116819	Resistor—.05 mfd. 600 volt.	.20
41	118805	Resistor—carbon 10,000 ohms 1 watt	.12
42-43	118827	Resistor—carbon 270 ohms 1/4 watt	.10
44	119024	Transformer—2nd I.F.	1.15
45-46-47	119193	Condenser—.01 mfd. 600 volt	.15
48	119414	Condenser—.02 mfd. 600 volt	.15
49A-49B	119602	Volume Control—.1 meg. (with switch)	1.25
50-51	119817	Condenser—.004 mfd. 600 volt	.15
52	119875	Condenser—.002 mfd. 600 volt	.15
53	119934	Condenser—padder { A-30 mfd. 450 volt } { B-15 mfd. 450 volt }	.36
54	160008	Condenser—electrolytic	1.50
55A to 55C	160373	Condenser—variable tuning	3.20
56	160430	Condenser—.001 mfd. 600 volt	.15
57	160449	Condenser—trimmer (loop)	.18
58-59	160646	Condenser—compensating 100 mmd.	.28

NO SIGNAL CONDITION  
SOCKET VOLTAGES—ALL D.C. POTENTIAL MEASURED TO CHASSIS  
DIAL TUNED TO 540 KC.

TUBE	FUNCTION	H	K	G	S	SU	P	D <sub>1</sub>	D <sub>2</sub>
6SK7	R.F.	6.0 A.C.	2	0	72	0	190		
6SJ7	1st Det.	6.0 A.C.	5	0	100	0	190		
6J5GT	Osc.	6.0 A.C.	0	—3			140		
6SK7	I.F.	6.0 A.C.	2	0	72	0	190		
6SQ7	2nd Det.—A.V.C. Inverter	6.0 A.C.	0	0			50	0	0
6SQ7	A.F.	6.0 A.C.	2	0			50	0	0
2 (6F6G)	Output	6.0 A.C.	12	0	190		290		
5Y3G	Rectifier	5.0 A.C.							Plates 350 V.A.C. to C.T.

Use a high resistance voltmeter of at least 1000 ohms per volt.

MODEL S7400-2  
Air Chief

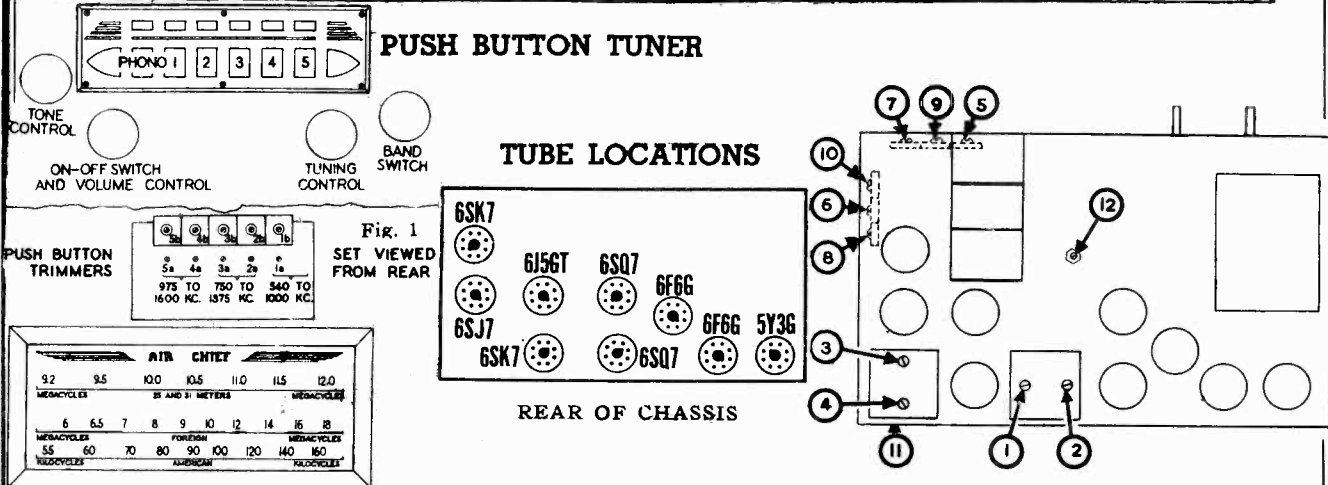
FIRESTONE TIRE & RUBBER CO.

1. Connect the output meter across the voice coil or from plate to plate of the 6F8G output tubes.
2. Connect the ground lead of the signal generator to the receiver chassis.
3. Turn the volume control to the maximum volume position, and the tone control to the high position.
4. FOLLOW THE ORDER OF ALIGNMENT INDICATED BELOW.

Dummy Ant. in Series with Sig. Gen.	Connection of Sig. Generator Output to Receiver	Signal Generator Frequency	Band Switch Position	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
.1 MFD Condenser	Lug on Middle Section of Gang Cond.	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.	
400 OHM Carbon Resistor	Blue Lead from Chassis	16 MC	Foreign	16 MC	5	Foreign Oscillator	Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 15.1 MC. If Image does not appear, Realign at 16 MC, with Trimmer Screw farther out. Recheck Image.
400 OHM Carbon Resistor	Blue Lead from Chassis	16 MC	Foreign	Tune to 16 MC Generator Signal	6	Foreign Antenna	Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.
400 OHM Carbon Resistor	Blue Lead from Chassis	11.5 MC	25-31M	11.5 MC	7	Spread Band Oscillator	Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 10.6 MC. If Image does not appear, Realign at 11.5 MC, with Trimmer Screw farther out. Recheck Image.
400 OHM Carbon Resistor	Blue Lead from Chassis	11.5 MC	25-31M	Tune to 11.5 MC Generator Signal	8	Spread Band Antenna	Adjust for Maximum Output.
No Connection	Place Lead from Signal Gen. Near Loop	1500 KC	Broadcast	1500 KC	9	Broadcast Oscillator (Shunt)	Adjust for Maximum Output.

NOW PLACE THE CHASSIS AND LOOP ANTENNA INTO THE SAME RELATIVE POSITION AS WHEN IN THE CABINET.

No Connection	Place Lead from Signal Gen. Near Loop	1500 KC	Broadcast	Tune to 1500 KC Generator Signal	10	Broadcast Detector	Adjust for Maximum Output.
No Connection	Place Lead from Signal Gen. Near Loop	1500 KC	Broadcast	Tune to 1500 KC Generator Signal	11	Broadcast Antenna	Adjust for Maximum Output.
No Connection	Place Lead from Signal Gen. Near Loop	600 KC	Broadcast	Tune to 600 KC Generator Signal	12	Broadcast Oscillator (Series)	Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.



Turn the BAND SWITCH to the "AM" position, then using the tuning knob (see Fig. 1) tune in the station you wish to set to button No. 1.

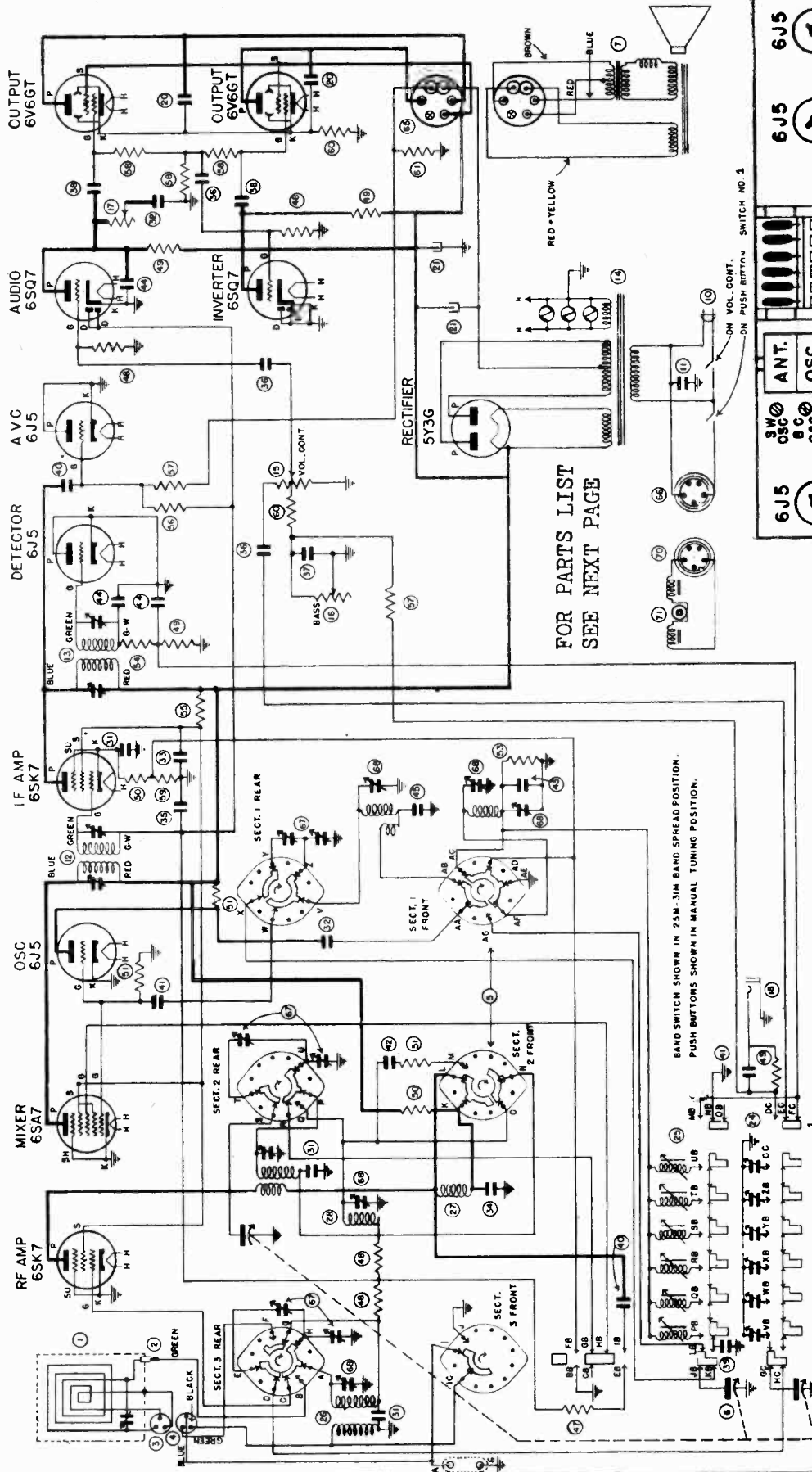
Turn the Band Switch to the "AUT" position and push in button No. 1. Using a screwdriver turn adjusting screw No. 1a until the station you had previously tuned in is again heard. If it is not heard, advance the volume control and adjust the screw again. Be sure to adjust screw No. 1a to the point where the program is heard with the deepest tone.

Insert the screwdriver in adjusting screw No. 1b and turn it until the program is heard with maximum volume. Now again check the setting of screw No. 1a making sure it is adjusted to give the deepest tone.

The set-up for button No. 1 is now complete.

To set up the remaining buttons use the same procedure; turn the Band Switch to the "AM" position, tune in the station using the tuning knob; turn the Band Switch to the "AUT" position; push in the button to be set up; adjust its associated "a" adjusting screw until the station is tuned in (screw "2a" for button No. 2, etc., see Fig. 1); the associated "b" screw is then adjusted for maximum volume as before.

FIRESTONE TIRE & RUBBER CO.



FOR PARTS LIST  
SEE NEXT PAGE

6J5 SW OSC 600 KC PAD. 6J5 RC OSC. 6SK7 SW RF ANT. 6J5 RC RF ANT. 6SK7 SW ANT. 455 KC OSC. 6SQ7 SW ANT. 6V6GT 6V6GT 6V6GT. POWER TRANS. BC ANT TRIMMER IS IN LOOP ANT

ELECTRICAL PARTS  
ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Part No.	Diagram No.	Description	List Price
38-386	1	Loop Antenna	6.10
26-31	2	Loop Trimmer & Jack	.15
8011-1	3	3 Prong Loop Socket	.15
809-1	4	3 Prong Plug for Loop	.15
90-107	5	Band Switch	2.35
26-159	6	Gang Condenser	4.25
81-54	7	14" Speaker	11.00

FOR FARNSWORTH CAPE-  
HART P-2 RECORD  
CHANGER, SEE RIDER'S  
"AUTOMATIC RECORD  
CHANGERS AND RE-  
CORDERS".

FIRESTONE TIRE & RUBBER CO.

ELECTRICAL PARTS

Part No.	Diagram No.	Description	List Price
38-364	26	S. W. Antenna Coil	.60
38-367	27	Plate Choke	.60
38-362	28	B. C. Mixer Coil	.50
38-363		S. W. Mixer Coil	.65
38-365	30	B. C. & S. W. Osc. Coil, includ. con.	1.25
256-1	31	.05 Mfd 200V Condenser	.15
255-1	32	.005 Mfd. 400V Condenser	.15
25-34	33	0.1 Mfd. 400V Condenser	.20
255-2	34	.05 Mfd. 400V Condenser	.20
256-2	35	0.1 Mfd 200V Condenser	.15
255-1	36	.01 Mfd 400V Condenser	.15
255-4	37	.002 Mfd 400V Condenser	.15
255-3	38	.02 Mfd. 400V Condenser	.15
258-1	39	270 Mmf Silver Mica Condenser	.25
253-2	40	250 Mmf. Mica Condenser	.15
253-5	41	50 Mmf. Mica Condenser	.15
25-49	42	10 Mmf. Mica Condenser	.15
258-2	43	350 Mmf Silver Mica Condenser	.30
253-1	44	100 Mmf. Mica Condenser	.15
2514-1	45	6000 Mmf. Mica Condenser	.40
773-19	47	Carbon Resistor 100,000 Ohms	.15
773-29	48	Carbon Resistor 10 Meg. Ohms	.15
773-23	49	Carbon Resistor 470,000 Ohms	.15
773-10	50	Carbon Resistor 1,500 Ohms	.15
773-16	51	Carbon Resistor 22,000 Ohms. 1 Watt	.15
773-14	53	Carbon Resistor 10,000 Ohms	.15
773-18	54	Carbon Resistor 47,000 Ohms	.15
77-155	55	Carbon Resistor 12,000 Ohms. 2 Watt	.15
773-24	56	Carbon Resistor 1 Meg. Ohms	.15
773-26	57	Carbon Resistor 2.2 Meg. Ohms	.15
773-21	58	Carbon Resistor 220,000 Ohms	.15
773-10	59	Carbon Resistor 3,300 Ohms	.15
77-61	60	220 Ohms. W. W. 2W. Resistor	.20
774-3	61	22 Ohms. W. W. 1/2 W. Resistors	.15
804-2	65	Speaker Socket	.10
22-131	66	Plug & Wire Assy	.60
26-162	67	Dual Trimmer Strip	.40
26-161	68	6 Gang Trimmer Strip	.80
80-28	70	Male Plug Phono Motor	.15
44-27	71	60 Cycle Motor	.70
		A.V.C. Coupling Condenser 40 is 25 Mmf. Part number 253-4	.15
		A.V.C. Isolating Resistors for 6SK7 & 6SA7 marked 48 should be 47 100,000 Ohms.	
		Bass Boost Resistor marked 60 should be 58 220,000 Ohms	
27-118	10	Line Cord and Plug	.55
25-31	11	Line Buffer	.20
36-158	12	1st I. F. Transformer	1.60
38-160	13	2nd I. F. Transformer	1.60
944-1	14	60 Cycle Transformer	5.75
78-17	15	Volume Control	.80
78-53	16	Bass Control	.75
78-54	17	Treble Control	.75
805-1	18	Phono Jack	.15
80-33		A-G Terminal Strip	.15
255-1	20	.01 Mfd. 400V Condenser	.15
2511-1	21	25 Mfd.—450 Volt Electrolytic	.75
90-34		Push Button Switch	3.50
26-46	24	Trimmer Strip (Push Button)	1.15

SOCKET VOLTAGES—ALL D.C. VOLTAGES MEASURED TO CHASSIS

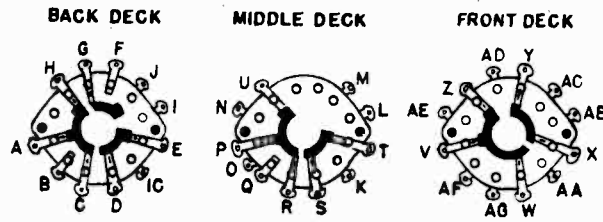
ANTENNA GROUNDED

DIAL TUNED TO 540 K.C.

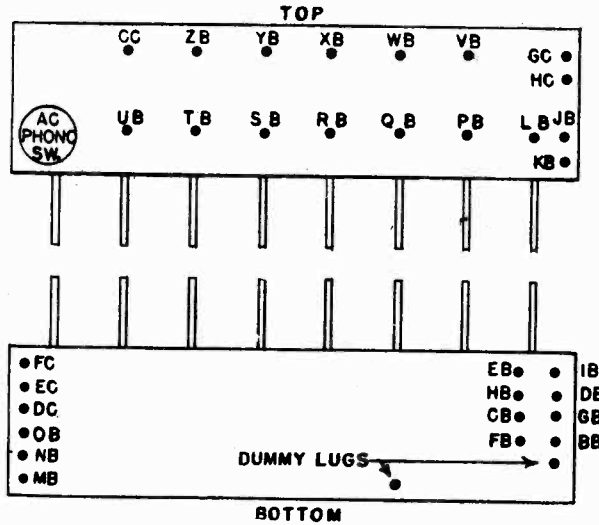
TUBE	FUNCTION	H	K	G	G <sub>1</sub>	S	SU	P	D <sub>1</sub>	D <sub>2</sub>
6SK7	R.F.	6.3	0	Note A		105		235		
6SA7	Mixer	6.3	0	Note A		105		255		
6J5	Oscillator	6.3	0					130		
6SK7	I.F.	6.3	8.5	Note A		105		255		
6J5	Detector	6.3	0					0		
6J5	A. V. C.	6.3	0	Note A				0		
6SQ7	1st Audio	6.3	0					62	Note A	Note A
6SQ7	Inverter	6.3	0					62	0	0
6V6GT	Audio	6.3	15			255		240		
6V6GT	Audio	6.3	15			255		240		
5Y3G	Rectifier	5					350 A.C.			

NOTE A: Due to the high resistance in the circuit, only very slight deflections of the voltmeter will be obtained.

BACK VIEW OF RANGE SWITCH DECKS



PUSH BUTTON TUNER SWITCH



LETTERS ON TERMINALS OF SWITCHES SHOWN ABOVE CORRESPOND TO SIMILARLY LETTERED TERMINALS ON THE SWITCHES SHOWN IN THE CIRCUIT DIAGRAM.

A Firestone "Powerscope" is built into this receiver and under normal conditions will give satisfactory reception. In locations remote from broadcasting stations, or where poor receiving conditions exist, it may be necessary to use an outside antenna. This antenna may be a single wire from 35 feet to 75 feet long, including the lead-in wire, erected as high as possible and as far from electric light wires (or other sources of noise) as possible. When an antenna is used a good ground should also be used. The antenna wire is connected to the screw marked "Ant." and the ground to the terminal, marked "Gnd." located at the rear of the chassis.

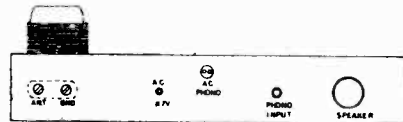


Fig. 1

The "Powerscope" in these instruments is rotatable and may be turned by means of the right hand knob on the panel. A stop is provided to prevent the "Powerscope" from turning too far. This knob should be used to adjust the "Powerscope" towards the station, or that direction which gives the best reception, i. e., loudest signals with least interference. In some locations it may be found that stations can only be received with the "Powerscope" in one position. This is a local condition and may be due to local shielding.

# FIRESTONE TIRE & RUBBER CO.

FOR TUNER DATA SEE MODEL S7400-4

## ALIGNMENT PROCEDURE

FOR ALIGNMENT: An output meter and an accurately calibrated signal generator are required.

1. Connect the output meter across the voice coil or across the plates of the 6F6G output tubes depending on the type of meter. (The more sensitive type should be connected across the voice coil.)
2. Connect the ground lead of the signal generator to the receiver chassis or to the "G" terminal at the back of the chassis.
3. Turn the volume control to within 15° of the maximum volume position and keep it in this position throughout the alignment procedure.
4. Push in the "Manual" button and keep it pushed in. Check the pointer to see that it is correctly set.

Dummy Ant. in Series with Sig. Gen.	Connection of Sig. Generator Output to Receiver	Signal Generator Frequency	Band Switch Position	Receiver Dial Setting	Trimmer Description	Type of Adjustment
.1 MFD Condenser	Lug on Rear Section of Gang. Cond.	455 KC	Broadcast	Any Point Where It Does Not Affect the Signal	2nd I.F. 1st I.F.	Adjust for Maximum Output. Then Repeat Adjustment.
250 MMF.	"Ant." Terminal	1600 KC	Broadcast	1600 KC	Broadcast Oscillator (Shunt)	Adjust for Maximum Output.
250 MMF.	"Ant." Terminal	1500 KC	Broadcast	Tune to 1500 KC Generator Signal	Broadcast R.F. Loop Trimmer	Adjust for Maximum Output.
250 MMF.	"Ant." Terminal	600 KC	Broadcast	Tune to 600 KC Generator Signal	600 KC Padder	Adjust for Maximum Output. Try to Increase Output by Rocking the Gang until Maximum Output is Obtained.
400 OHM Carbon Resistor	"Ant." Terminal	18.1 MC	Foreign	18.1 MC	Shortwave Oscillator	Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 17.2 MC. If Image does not appear, Realign at 18.1 MC, with Trimmer Screw farther out. Recheck Image.
400 OHM Carbon Resistor	"Ant." Terminal	16 MC	Foreign	Tune to 16 MC Generator Signal	Shortwave Antenna Shortwave R.F.	Adjust for Maximum Output. Try to Increase Output by Rocking the Gang until Maximum Output is Obtained.
400 OHM Carbon Resistor	"Ant." Terminal	9.5 MC	25M-31M	9.5 MC	Band Spread* Oscillator Pad	Adjust for Maximum Output. To check for Correct Alignment Tune Generator to 10.4 MC. If Image comes in alignment is correct.
400 OHM Carbon Resistor	"Ant." Terminal	9.5 MC	25M-31M	9.5 MC	Band Spread* R. F. Pad.	Adjust for Maximum Output.
400 OHM Carbon Resistor	"Ant." Terminal	9.5 MC	25M-31M	9.5 MC	Band Spread* Ant. Pad	Adjust for Maximum Output.
400 OHM Carbon Resistor	"Ant." Terminal	12 MC	25M-31M	12 MC	Band Spread* Osc. Trimmer	Adjust for Maximum Output. To Check for Correct Alignment Tune Generator to 12.9 MC. If Image Comes In Alignment is Correct.
400 OHM Carbon Resistor	"Ant." Terminal	12 MC	25M-31M	12 MC	Band Spread* R.F. Trimmer.	Adjust For Maximum Output.
400 OHM Carbon Resistor	"Ant." Terminal	12 MC	25M-31M	12 MC	Band Spread* Ant. Trimmer	Adjust For Maximum Output.

\*BAND SPREAD CONDENSERS MOUNTED UNDEREATH CHASSIS PAN. SEE ILLUSTRATION BELOW.

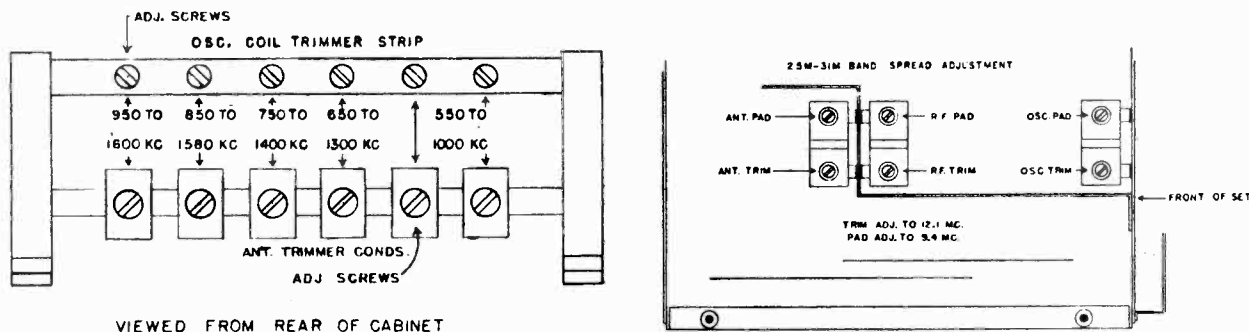
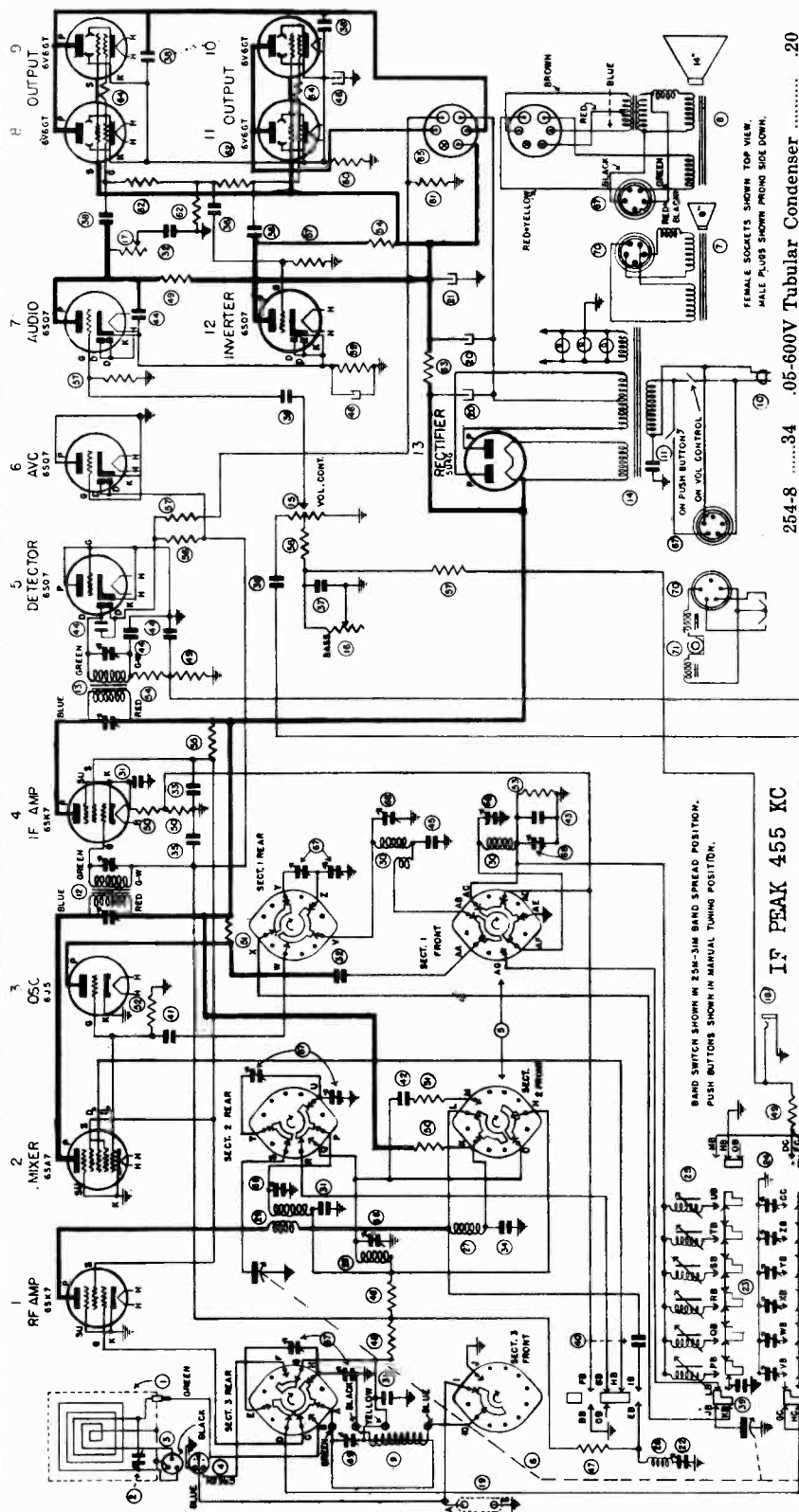


Fig. 3

FIRESTONE TIRE & RUBBER CO.

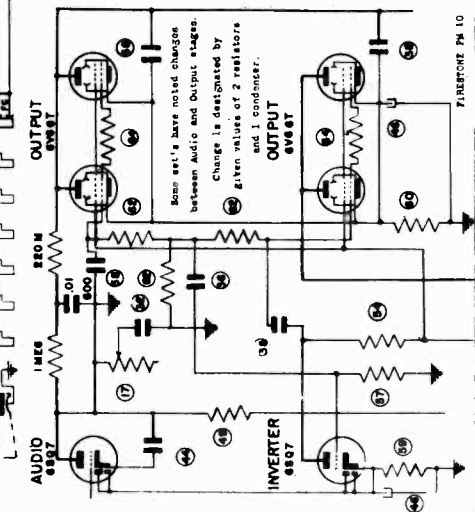
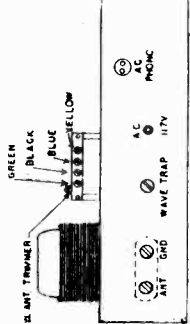


FEMALE SOCKETS SHOWN TOP VIEW.  
MALE PLUGS SHOWN FRONT SIDE DOWN.

254-8	34	.05-600V Tubular Condenser	.20
256-2	35	0.1-200V Tubular Condenser	.15
255-1	36	.01-400V Tubular Condenser	.15
255-4	37	.002-400V Tubular Condenser	.15
254-6	38	.02-600V Tubular Condenser	.15
258-1	39	270 Mmf. Silver Mica Condenser	.25
253-2	40	250 Mmf. Mica Condenser	.15
253-5	41	50 Mmf. Mica Condenser	.15
25-49	42	10 Mmf. Mica Condenser	.15
258-2	43	350 Mmf. Silver Mica Condenser	.30
253-1	44	100 Mmf. Mica Condenser	.15
2514-1	45	6000 Mmf. Mica Condenser	.40

Part Diagram No. No.	Description	List Price
26-46	Trimmer Strip (Push Button)	1.15
38-148	Oscillator Coil Strip	2.45
38-82	Wave Trap Coil	.60
38-367	Plate Choke	.60
38-362	B. C. Mixer Coil	.50
38-363	S. W. Mixer Coil	.65
38-365	Osc. Coil (BC & SN) includes condenser	1.25
256-1	.05-200V Tubular Condenser	.15
254-1	.005-600V Tubular Condenser	.15
254-7	0.1-600V Tubular Condenser	.20
25-158	25 Mmf. 25V Electrolytic	.25
773-19	47 Carbon Resistor 100,000 Ohms	.15

FOR OTHER PARTS  
SEE NEXT PAGE



FOR FARNSWORTH CAPEHART RECORD CHANGER  
P-2, SEE RIDER'S "AUTOMATIC RECORD  
CHANGERS AND RECORDERS".

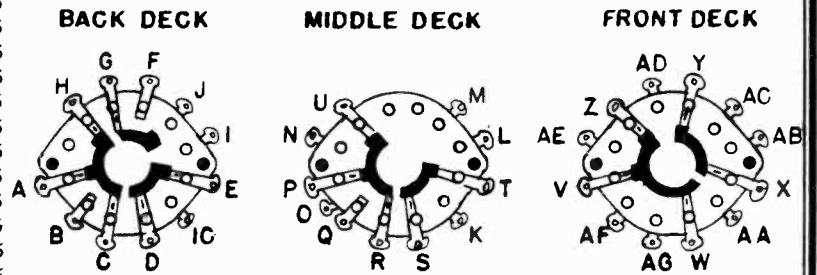
FIRESTONE TIRE & RUBBER CO. MODELS S7400-4, S7400-5

PARTS LIST CONT.

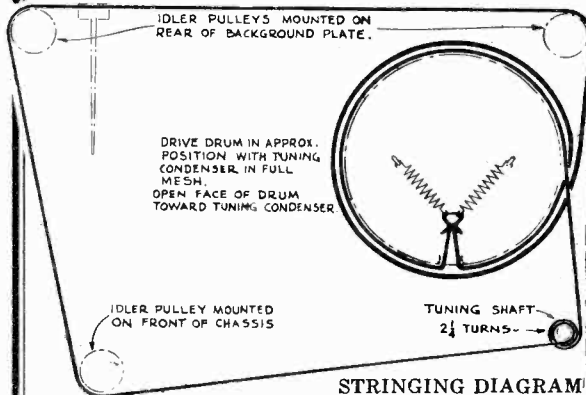
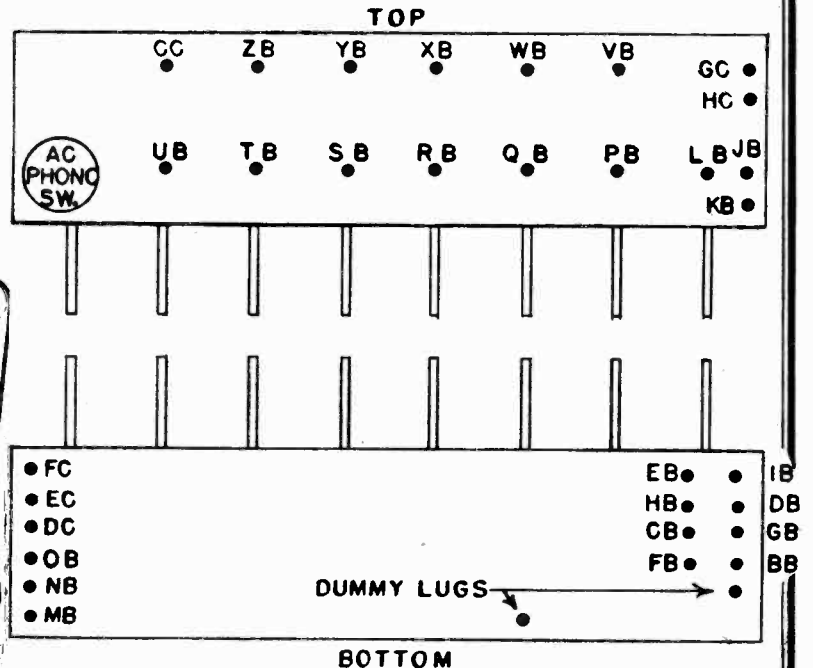
771-19	48	Carbon Resistor 100,000 Ohms	15
773-23	49	Carbon Resistor 470,000 Ohms	15
773-10	50	Carbon Resistor 1,500 Ohms	15
773-16	51	Carbon Resistor 22,000 Ohms	15
77-156	52	Carbon Resistor 22,000 Ohms	15
771-14	53	Carbon Resistor 10,000 Ohms	15
773-18	54	Carbon Resistor 47,000 Ohms	15
77-155	55	Carbon Resistor 12,000 Ohms	15
773-24	56	Carbon Resistor 1 Meg. Ohms	15
773-25	57	Carbon Resistor 2.2 Meg. Ohms	15
773-21	58	Carbon Resistor 220,000 Ohms	15
773-12	59	Carbon Resistor 3,300 Ohms	15
77-153	60	150W. W. W. 4 Watt Resistor	25
77-152	61	15W. W. W. 1/2 Watt Resistor	15
773-20	62	150M Ohm. Carbon Resistor	15
77-64	63	100 Ohm. 4 Watt W. W. Resistor	15
773-6	64	220 Ohm. Carbon Resistor	15
804-2	65	Speaker Socket 6 Prong	10
22-131	66	Plug & Wire Assby.	60
26-162	67	Dual Trimmer Strip	40

LETTERS ON TERMINAL OF SWITCHES SHOWN TO THE RIGHT, CORRESPOND TO SIMILARLY LETTERED TERMINALS ON THE SWITCHES SHOWN IN THE CIRCUIT DIAGRAM.

BACK VIEW OF RANGE SWITCH DECKS



PUSH BUTTON TUNER SWITCH



SOCKET VOLTAGES—ALL D.C. VOLTAGES MEASURED TO CHASSIS

ANTENNA GROUNDED

DIAL TUNED TO 540 K.C. PUSH BUTTON ADJUSTMENT

TUBE	FUNCTION	H	K	G	G <sub>1</sub>	S	SU	P	D <sub>1</sub>	D <sub>2</sub>
6SK7	R.F.	6.3 A.C.	0	Note A		105	0	250		
6SA7	Mixer	6.3 A.C.	0	Note A	Note A	105	0	255		
6J5	Oscillator	6.3 A.C.	0					125		
6SK7	I. F.	6.3 A.C.	7.4			105	7.4	255		
6SQ7	Detector	6.3 A.C.	0						Note A	Note A
6SQ7	A.V.C.	6.3 A.C.		0				0	Note A	Note A
6SQ7	1st Audio	6.3 A.C.	1	0				105	1	1
6SQ7	Inverter	6.3 A.C.	1	0				105	1	1
6V6GT	Audio	6.3 A.C.	18			255		250		
6V6GT	Audio	6.3 A.C.	18			255		250		
6V6GT	Audio	6.3 A.C.	18			255		250		
6V6GT	Audio	6.3 A.C.	18			255		250		
5U4G	Rectifier	5 A.C.					350 A.C.			

Directly back of dial assembly are 6 screws. The right hand pair connect with left hand button looking from front. (1) Make list of 6 stations in order of freqs. (2) Press "Manual" button, tune in lowest freq. station. (3) Press button selected for station. (4) Adj. upper brass screw until station is heard clearly. (5) Adj. lower screw in same pair for maximum volume.

NOTE A: Due to the high resistance in the circuit, only very slight deflections of the voltmeter will be obtained.



MODELS S7400-4, S7400-5

FIRESTONE TIRE & RUBBER CO.

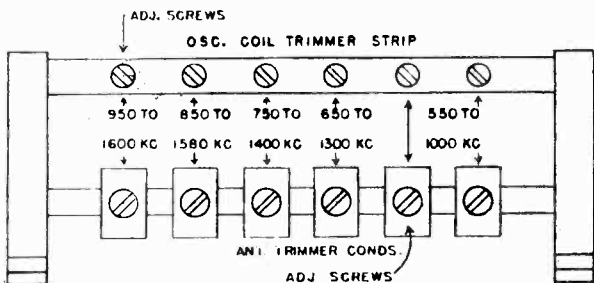
ALIGNMENT PROCEDURE

FOR ALIGNMENT: An output meter and an accurately calibrated signal generator are required.

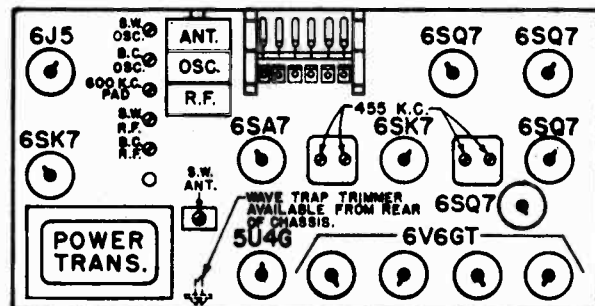
1. Connect the output meter across the voice coil or across the plates of the 6V6GT output tubes depending on the type of meter. (The more sensitive type should be connected across the voice coil.)
2. Connect the ground lead of the signal generator to the receiver chassis or to the "G" terminal at the back of the chassis.
3. Turn the volume control to within 15° of the maximum volume position and keep it in this position throughout the alignment procedure.
4. Push in the "Manual" button and keep it pushed in. Check the pointer to see that it is correctly set.

Dummy Ant. in Series with Sig. Gen.	Connection of Sig. Generator Output to Receiver	Signal Generator Frequency	Band Switch Position	Receiver Dial Setting	Trimmer Description	Type of Adjustment
.1 MFD Condenser	Lug on Rear Section of Gang. Cond.	455 KC	Broadcast	Any Point Where It Does Not Affect the Signal	2nd I.F.	Adjust for Maximum output.
250 MMF.	"Ant." Terminal	455 KC	Push in No. 6 Button	Any Point Where It Does Not Affect the Signal	1st I.F.	Adjust for Maximum Output. Tighten screw next to 6SA7. Adjust other screw for maximum output. Adjust screw next to 6SA7 for maximum output. Do not touch the other screw again.
250 MMF.	"Ant." Terminal	1600 KC	Broadcast	1600 KC	Broadcast Oscillator (Shunt)	Adjust for Maximum Output.
250 MMF.	"Ant." Terminal	1500 KC	Broadcast	Tune to 1500 KC Generator Signal	Broadcast R.F. Loop Trimmer	Adjust for Maximum Output.
250 MMF.	"Ant." Terminal	600 KC	Broadcast	Tune to 600 KC Generator Signal	600 KC Padder	Adjust for Maximum Output. Try to increase output by Rocking the Gang until Maximum Output is Obtained.
400 OHM Carbon Resistor	"Ant." Terminal	18.1 MC	Foreign	18.1 MC	Shortwave Oscillator	Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 17.2 MC. If Image does not appear, Realign at 18.1 MC, with Trimmer Screw Farther out. Recheck Image.
400 OHM Carbon Resistor	"Ant." Terminal	16 MC	Foreign	Tune to 16 MC Generator Signal	Shortwave Antenna	Adjust for Maximum Output.
400 OHM Carbon Resistor	"Ant." Terminal	9.5 MC	25M-31M	9.5 M.C	Shortwave R.F.	Try to Increase Output by Rocking the Gang until Maximum Output is Obtained.
400 OHM Carbon Resistor	"Ant." Terminal	9.5 MC	25M-31M	9.5 M.C	Band Spread* Oscillator Pad	Adjust for Maximum Output. To check for Correct Alignment Tune Generator to 10.4 MC. If Image comes in alignment is correct.
400 OHM Carbon Resistor	"Ant." Terminal	9.5 MC	25M-31M	9.5 M.C	Band Spread* R. F. Pad	Adjust for Maximum Output.
400 OHM Carbon Resistor	"Ant." Terminal	9.5 MC	25M-31M	9.5 M.C	Band Spread* Ant. Pad	Adjust for Maximum Output.
400 OHM Carbon Resistor	"Ant." Terminal	12 MC	25M-31M	12 MC	Band Spread* Osc. Trimmer	Adjust for Maximum Output. To check for Correct Alignment Tune Generator to 12.9 MC. If Image Comes in Alignment is Correct.
400 OHM Carbon Resistor	"Ant." Terminal	12 MC	25M-31M	12 MC	Band Spread* R.F. Trimmer.	Adjust For Maximum Output.
400 OHM Carbon Resistor	"Ant." Terminal	12 MC	25M-31M	12 MC	Band Spread* Ant. Trimmer	Adjust For Maximum Output.

\*BAND SPREAD CONDENSERS MOUNTED UNDERNEATH CHASSIS PAN. SEE ILLUSTRATION BELOW.

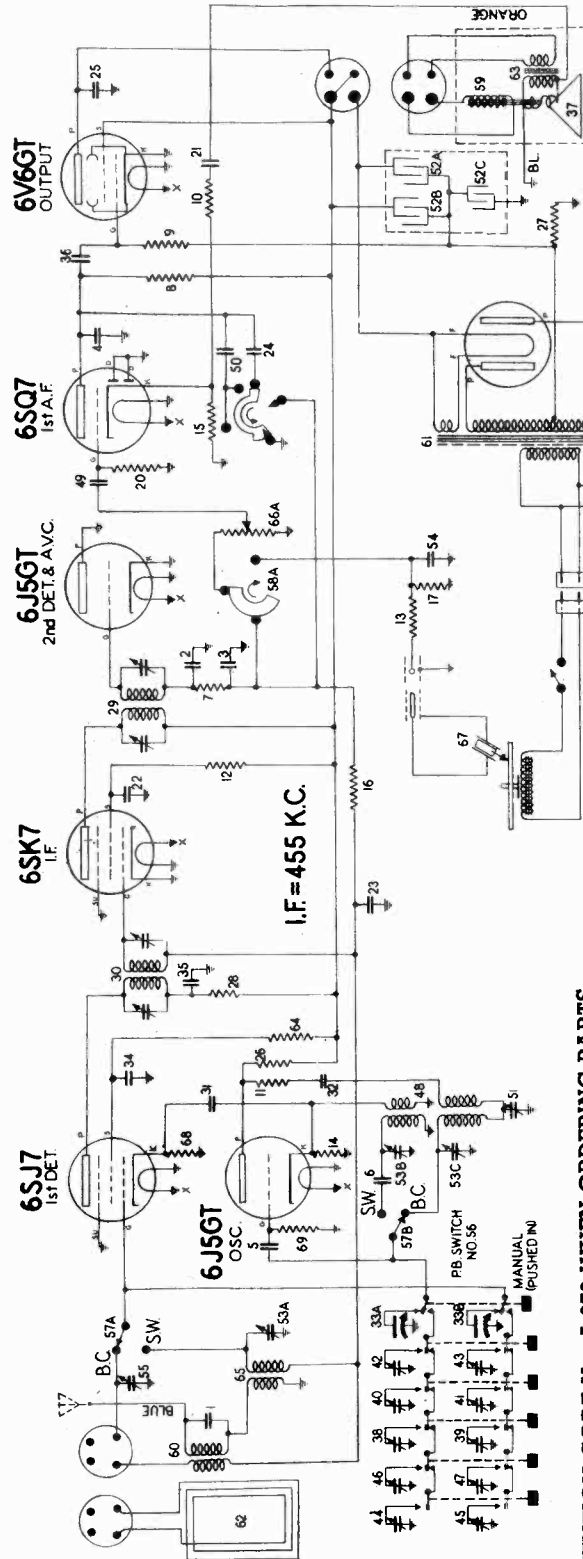


VIEWED FROM REAR OF CABINET  
Push Button Adjustment



B.C. ANT TRIMMER IS IN LOOP ANT

FIRESTONE TIRE & RUBBER CO.



NOTE: MENTION CODE No. A-973 WHEN ORDERING PARTS.

Diagram Number	Part Number	Description	List Price
1 to 4	83783	Condenser, mica 110 mmd.	\$0.20
5	8061	Condenser, mica .0042 mid.	.15
6	88587	Condenser, mica .0042 mid.	.35
7	110552	Resistor-carbon 47,000 ohms 1/4 watt.	.12
8-9	110553	Resistor-carbon 220,000 ohms 1/4 watt.	.12
10	118816	Resistor-carbon 8800 ohms 1/4 watt.	.12
11	110590	Resistor-carbon 100,000 ohms 1/4 watt.	.12
12-13	110564	Resistor-carbon 100,000 ohms 1/4 watt.	.12
14-15	116078	Resistor-carbon 560 ohms 1/4 watt.	.12
16	110570	Resistor-carbon 2.2 meg. 1/4 watt.	.15
17	110584	Resistor-carbon 330,000 ohms 1/4 watt.	.12
18-19	112636	Lamp-dial (Marzda No. 44 frosted)	.12
20	112975	Resistor-carbon 10 meg. 1/4 watt.	.12
21	116625	Condenser-.1 mid. 600 volt.	.15
22	119414	Condenser-.02 mid. 600 volt.	.20
23	118219	Condenser-.008 mid. 600 volt.	.15
24	119415	Condenser-.006 mid. 600 volt.	.15
25	118807	Resistor-carbon 10,000 ohms 1 watt	.12
26	118812	Resistor-carbon 180 ohms 1 watt W.W.	.12
27	110557	Resistor-carbon 4700 ohms 1/4 watt.	.12
28	110557	Resistor-carbon 4700 ohms 1/4 watt.	.12
29	119024	Transformer-2nd I.F.	1.15
30	500801	Transformer-1st I.F.	1.20
31-32	119193	Condenser-.01 mid. 600 volt.	.15
33A-33B	119414	Condenser-variable tuning	2.75
34-35-36	119414	Condenser-.02 mid. 600 volt.	.15
37	M.500969	Cone & Voice coil for M.500948 speaker.	2.00
38 to 41	119653	Condenser-push button trimmer (med. freq.)	.24
42-43	119654	Condenser-push button trimmer (high freq.)	.24
44 to 47	119753	Condenser-push button trimmer (low freq.)	1.00
48	500248	Coll-oscillator	1.00
49-50	119875	C.ad.,ser-.002 mid. 600 volt.	.15
51	119934	Condenser-padder	.36

ELECTRICAL PARTS

Diagram Number	Part Number	Description	List Price
52	160174	Condenser-electrolytic Section A-20 mid. 400 volt	\$1.30
		Section B-15 mid. 400 volt	.48
		Section C-10 mid. 25 volt	.18
53A to 53C	160415	Condenser-trimmer (3 section).	2.60
54	160430	Condenser-.001 mid. 600 volt.	1.20
55	500059	Switch-push button	2.60
56	500059	Switch-push button	2.60
57A-57B	501028	Switch-Radio-Phono tone	1.25
58A-58B	M.500948	Speaker-Dynamic (10")	7.65
59	500255	Coil-compensating	1.05
60	500255	Coil-compensating	1.05

NO SIGNAL CONDITION  
DIAL TUNED TO 540 KC.

TUBE	FUNCTION	H	K	G	S	SU	P	D <sub>1</sub>	D <sub>2</sub>
6SJ7	1st Det.	6.0 A.C.	9.0	0	105	0	220		
6I5GT	Osc.	6.0 A.C.	0	-3		0	165		
6SK7	I.F.	6.0 A.C.	0	0	46	0	230		
6I5GT	2nd Det.-A.V.C.	6.0 A.C.	0	0		0	0		
6SQ7	1st A.F.	6.0 A.C.	1	0		75	0		0
6V6GT	Output	6.0 A.C.	0	Note A	230		220		
5Y3G	Rectifier	5.0 A.C.							Plates 350 V.A.C. to C.T.

NOTE A: The 6V6GT grid bias voltage is -13.5 volts measured across resistor No. 27.

Use a high resistance voltmeter of at least 1000 ohms per volt.

FOR PUSH-BUTTON DATA SEE INDEX

MODEL S7400-6

FIRESTONE TIRE & RUBBER CO.

**ALIGNMENT EQUIPMENT & PROCEDURE**

1. Connect the output meter across the voice coil or from plate of the 6V6GT output tube to chassis through a .1 mfd. condenser. (The more sensitive type should be connected across the voice coil.)
2. Connect the ground lead of the signal generator to the receiver chassis.
3. Turn the RADIO-PHONO TONE SWITCH to the extreme clockwise position.
4. Turn the volume control to the maximum position and keep it in this position throughout the alignment procedure.
5. Push in the "Manual" button and keep it pushed in. Check the pointer to see that it is correctly set to 540 KC. with gang in full mesh.
6. The loop must be connected as indicated in circuit diagram at all times.

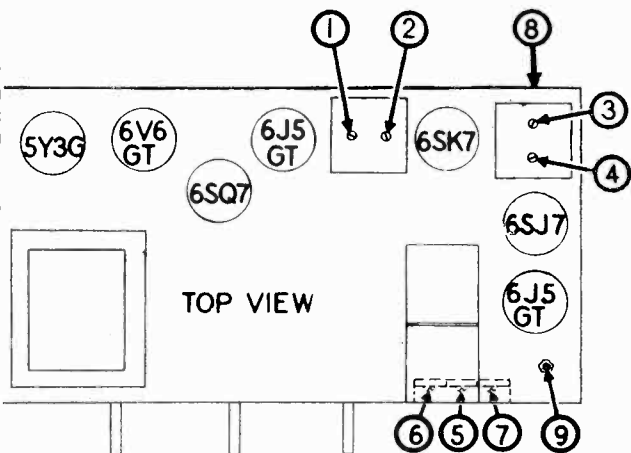
Dummy Ant. In Series with Sig. Gen.	Connection of Sig. Generator Output to Receiver	Signal Generator Frequency	Band Switch Position	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
1 MFD. Condenser	Lug on rear Section of Gang Cond.	455 KC	American	Any Point Where It Does Not Affect the Signal	1-2	2nd I.F.	Adjust for Maximum Output. Then repeat Adjustment.
					3-4	1st I.F.	
400 OHM Carbon Resistor	Antenna Terminal (Blue Wire)	16 MC	Foreign	16 MC	5	Foreign Oscillator	Adjust for Maximum Output. Check to see if Proper Peak was Obtained by Tuning in Image at Approx. 15.1 MC. If Image does not appear, Realign at 16 MC, with Trimmer Screw farther out. Recheck Image.
400 OHM Carbon Resistor	Antenna Terminal (Blue Wire)	16 MC	Foreign	Tune to 16 MC Generator Signal	6	Foreign Antenna	Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.
200 MMFD. Mica Condenser	Antenna Terminal (Blue Wire)	1500 KC	American	1500 KC	7	Broadcast Oscillator (Shunt)	Adjust for Maximum Output.

Now replace the chassis and loop antenna in the cabinet before proceeding further.

200 MMFD. Mica Condenser	Antenna Terminal (Blue Wire)	1500 KC	American	Tune to 1500 KC Generator Signal	8	Broadcast Antenna	Adjust for Maximum Output.
200 MMFD. Mica Condenser	Antenna Terminal (Blue Wire)	600 KC	American	Tune to 600 KC Generator Signal	9	Broadcast Oscillator (Series)	Adjust for Maximum Output. Try to Increase Output by Detuning Trimmer and Retuning Receiver Dial until Maximum Output is Obtained.

**MISCELLANEOUS PARTS**

Part Number	Description	List Price
500936	Cabinet Back	\$.50
160395	Cable, Motor	.48
117493	Cable, Pickup	.40
114955	Clamp, for Dial Cord	.01
112745	Clip, Coil Mounting	.01
117057	Cord, Drive (Supplied in 3 ft. Lengths)	.15
500100	Dial Scale	1.00
117029	Drive Drum & Bushing	.50
500110	Escutcheon, Dial (with Glass)	1.30
500111	Escutcheon, Push Button	.40
119644	Knob, Volume & Tuning	.18
119746	Knob, Band or Tone	.16
160269	Pointer	.18
500112	Push Button	.12
81145	Retaining Ring for Tuning Shaft	Per C .50
114914	Screw Special Head for Mtg. Escutcheon	Per Doz. .15
85827	Set Screw, 8-32 Square Head	.02
500051	Socket for Loop Antenna	.15
160039	Socket, Phono	.08
110501	Socket, 4 Prong (for Speaker)	.16
119791	Socket, Octal	.12
114876	Socket, Octal (Rectifier)	.15
114878	Socket, Octal with Special Ground	.15
716467	Socket, Condenser Mtg.	.04
111090	Spacer, steel, Mtg. for Gang	.02
113177	Spring, Dial Cord Tension	.09
117315	Tabs, Station Call Letters	.55
118606	Tuning Shaft	.18
111456	Washer, Spring Washer for Tuning Shaft	Per C .50



FOR GENERAL INDUSTRIES 201 RECORD CHANGER, SEE RIDER'S "AUTOMATIC RECORD CHANGERS AND RECORDERS".

# ALIGNMENT PROCEDURE

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.

**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 or 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.

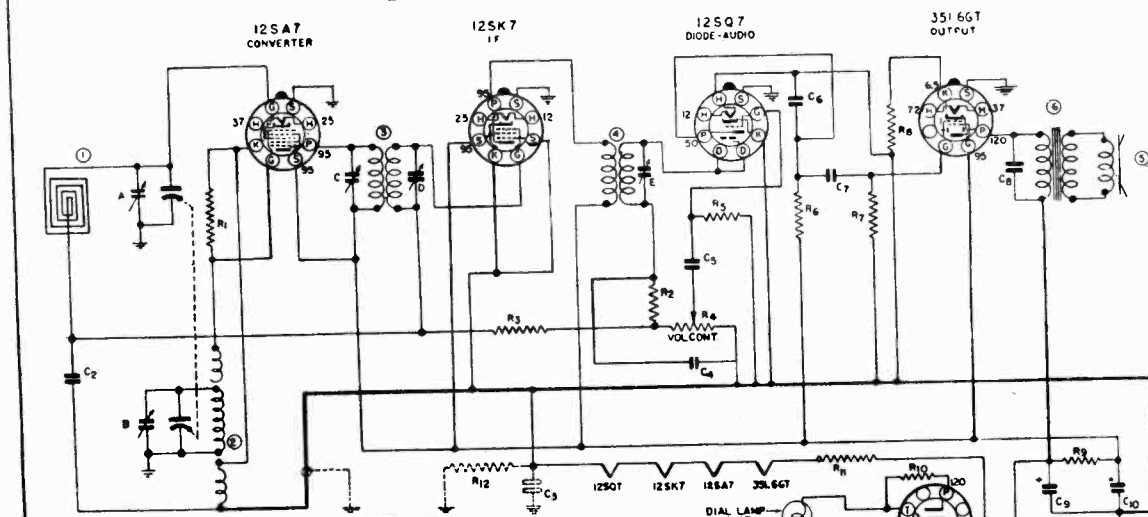
**CORRECT ALIGNMENT PROCEDURE.** Remove the chassis from the cabinet and set on a bench taking care that no iron or other metal is near the loop. (See section on replacement of tubes). Do not make this setup on a metal bench. The intermediate frequency (I.F.) stages should be aligned properly as the 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 chassis ground. Align all three I.F. trimmers to peak or maximum reading on the output meter.

**BROADCAST BAND ALIGNMENT.** Connect the test oscillator to a loop transmitter and couple to the loop antenna on the receiver. With the gang condenser set at minimum capacity, set the test oscillator at 1720 K.C. 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.

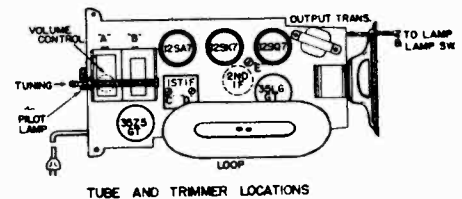
Voltages shown on the circuit diagram are from socket terminals to chassis base. In measuring voltages use a voltmeter having a resistance of at least 1000 ohms per volt. Allowances should be made for variations in line voltage.

## SCHEMATIC DIAGRAM



DIAG. NO.	PART NO.	DESCRIPTION	DIAG. NO.	PART NO.	DESCRIPTION
R1	N-4627	20,000 OHM .5W. 20%	1	N-3063	ANTENNA COIL LOOP
R2	N-1471	25,000 OHM .5W. 20%	2	N-3026	OSCILLATOR COIL
R3	N-262	1 MEGOHM .5W. 20%	3	N-3055	1ST I.F. TRANSFORMER
R4	N-3309	5 MEGOHM VOL. CONT.	4	N-2890	2ND I.F. TRANSFORMER
R5	N-419	5 MEGOHM .5W. 20%	5	N-3053	4" SPEAKER
R6	N-226	250,000 OHM .5W. 20%	6	N-3562	OUTPUT TRANSFORMER
R7	N-1264	500,000 OHM .5W. 20%			
R8	N-816	250 OHM .5W. 10%			
R9	N-334	1000 OHM .5W. 20%			
R10	N-4782	25 OHM .5W. 20%			
R11	N-468	80 OHM .5W. 10%			
R12	N-4779	150,000 OHM .5W. 10%			
C2	N-1345	.05 MFD. 200V.			
C3	N-3080	22 MFD. 200V.			
C4	N-1374	100 MFD. 200V.			
C5	N-2712	.004 MFD. 400V.			
C6	N-447	.0005 MFD. 400V.			
C7	N-1346	.01 MFD. 400V.			
C8	N-1344	.01 MFD. 400V.			
C9	N-3086	40 MFD. 150V. ELECT.			
C10	N-1346	.05 MFD. 50V. 400V.			
C11	N-1346	.05 MFD. 400V.			

**NOTE:** VOLTAGES SHOWN ARE FROM TERMINAL TO BUS. HEATER VOLTAGES ARE A.C. WHEN LINE VOLTAGE IS ALTERNATING.



5 TUBE AC-DC  
TABLE LAMP-RADIO  
SUPERHETERODYNE  
SINGLE BAND  
DRAWN: W.F. APPROVED: [Signature]  
AUG. 8, 1940

KC-KCU

MODEL S7401-1

Lumitone

FIRESTONE TIRE & RUBBER CO.

This new Radio-Lamp of yours incorporates the latest developments and refinements that radio engineers have devised. In order to realize the advantages to the fullest extent you must thoroughly understand its operation and use. Therefore it is important that you read the following pages carefully. PLEASE READ THESE INSTRUCTIONS ALL THE WAY THROUGH BEFORE ATTEMPTING TO USE THE RECEIVER.

**ASSEMBLY OF LAMP.** Screw the small shade on the lamp socket and screw the lamp bulb in the socket. Then place the large shade on the small shade and the assembly is complete.

**TYPE OF LAMP BULB REQUIRED.** The lamp is designed to use a three light bulb. This type of bulb will give three intensities of light and comes in two sizes. For normal illumination use the 30,

**POWER SUPPLY.** This receiver is designed to operate on any alternating current supply (AC) ranging from 110 to 120 volts, 50 to 60 cycles; or on any direct current supply (DC) ranging from 110 to 120 volts.

**SPECIAL INSTRUCTIONS FOR DC OPERATION.** When operating from a DC (direct current) power supply, it may be necessary to reverse the power cord plug in the wall socket before the receiver will function, due to the polarity condition of a direct current supply. If the receiver fails to perform after being turned on one minute, simply reverse the power plug.

**LAMP SWITCH.** The switch located in lamp socket must be turned in a clockwise direction to secure the three intensities of light if a

Remove the shades and lamp bulb to prevent damage. Next loosen screw H and slip off washer G and the dial F. Next unscrew E and the screw next to it. (These screws have red heads). At the top of lamp just below the lamp socket, will be found nut A which must be loosened sufficiently to allow collar B to be moved high enough to allow the two halves of the lamp base to be separated.

This receiver is designed to operate over the standard broadcast band which extends from 535 to 1720 Kilocycles (KC) (174 to 560 Meters) and includes the popular 1712 KC police channel.

70 and 100 watt size with a medium base. For better illumination use the 50, 100 and 150 watt size with a medium base. Standard 60 or 100 watt bulbs can be used successfully in the lamp, but only one intensity of light will be obtained.

**TUBES USED.** Five tubes are used. Their type numbers and locations are shown on the tube location diagram inside the base of the lamp. Before attempting to replace tubes see the section on **replacement of tubes.**

**ANTENNA AND GROUND.** This radio lamp has a self contained loop antenna and requires no external antenna or ground. On weak stations the signal can be improved by rotating the lamp slightly.

**TUNING DIAL. (Station Selector)**—Rotate the dial in the base of the lamp slowly over a narrow range of the dial at a point where the desired station is located, until the station is received with maximum volume; then readjust the volume control to the proper level. **Never** use the station selector to adjust volume as this practice results in distorted tone quality and deficient bass response. The Volume Control only is to be used for this purpose. For maximum clarity the indicator knob should be adjusted to the center of the area covered by the station being tuned.

**CONTROLS AND OPERATION**

three light bulb is used. If a standard single light bulb is used only one intensity of light will be obtained.

**REPLACEMENT OF TUBES**

(See Figure 1)

If tubes are removed from their sockets for test or replacement purposes, make certain that each tube is placed in its proper socket. (See tube layout diagram in the base of the lamp). Failure to replace the tubes in their proper sockets may result in damage to the tube, or the receiver, or both.

**TUNING RANGE**

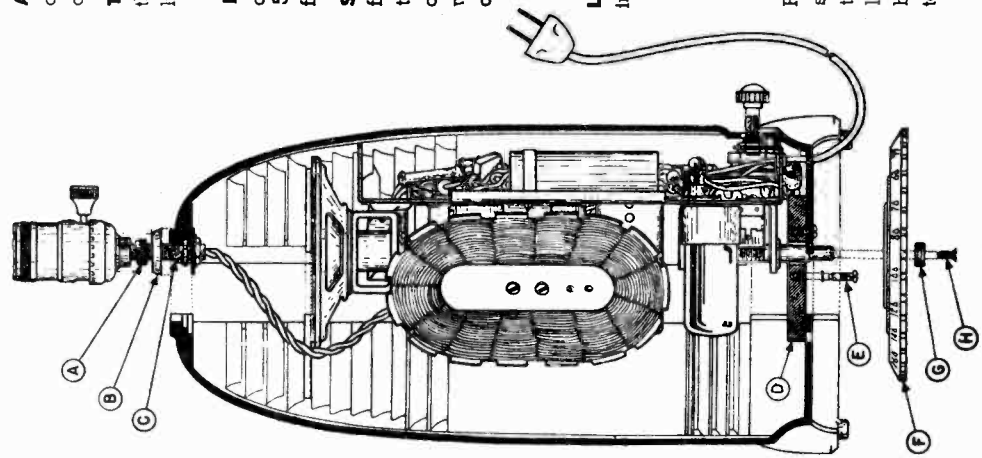
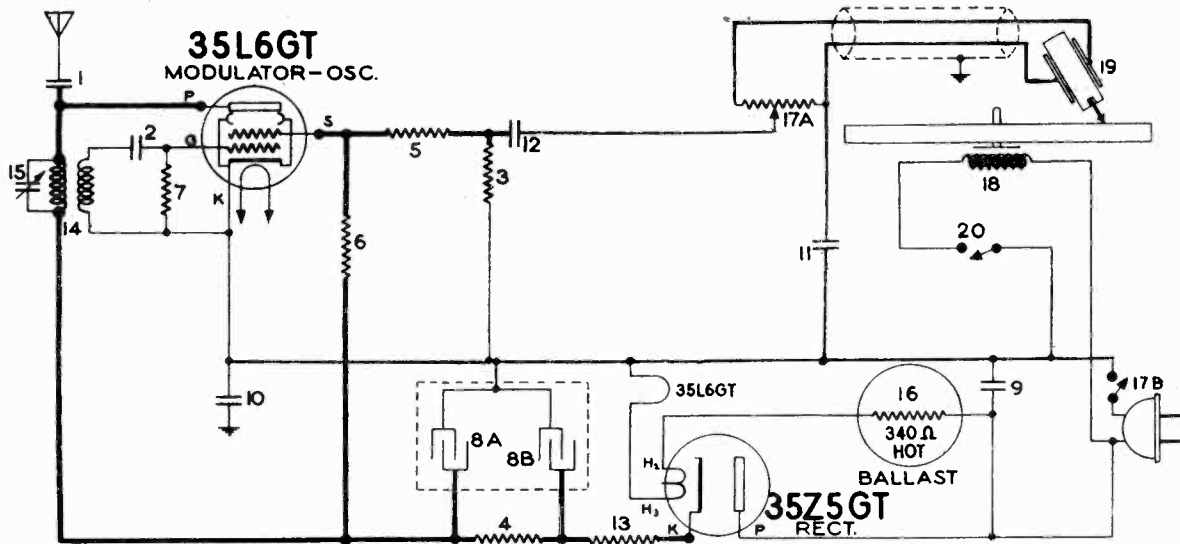


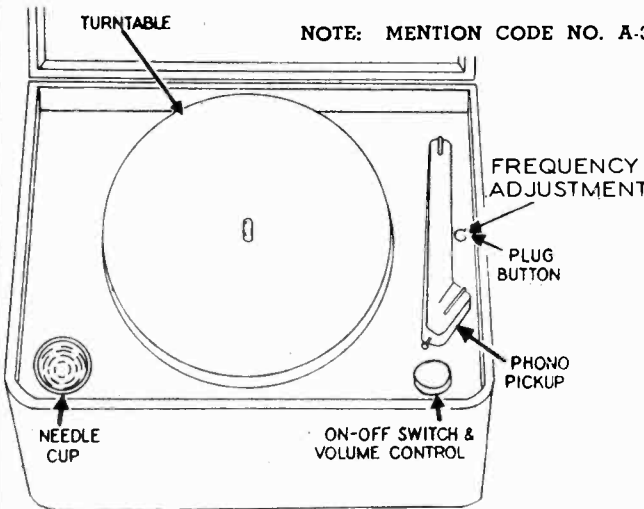
FIGURE 1.

FIRESTONE TIRE & RUBBER CO.

MODEL S7401-6 Phono.



NOTE: MENTION CODE NO. A-367 WHEN ORDERING PARTS



ADJUSTMENTS

Set the receiver that is to be used with this record player to some frequency between 540 and 750 KC. Choose a frequency that is clear and free from interfering stations. Keep in mind the fact that strong signals may be present at night where there are no signals in the daytime. Remove the plug near the volume control on top of the record player. Using an insulated screwdriver turn the screw, located beneath this plug, until the signal from the record player is heard in the receiver. This will be heard as a reduction in noise as the signal comes in tune with the receiver. If a record is being played, the music or sound from it may be tuned in. If it is desired to change the frequency, set the receiver to the new frequency and turn the screw until the signal is heard. Turning the adjusting screw clockwise increases the frequency and turning it counter-clockwise lowers the frequency.

When the record player is located at some distance from the receiver, or under conditions when the signal from it is too weak, the coil of wire from the record player should be uncoiled enough to give a satisfactory signal. Under no conditions should more wire be uncoiled than is necessary for a reasonably strong signal in the receiver.

HOWLS OR SQUEALS

Howls or squeals from this unit may be caused by the following:

1. Interference caused by choosing a frequency which is not clear. To remedy, change the record player frequency to one where there is no interference.
2. Too weak a signal permitting interference from a weak station. To remedy, uncoil some of the wire from the coil under the record player, or move the record player nearer the set.
3. Too strong a signal permitting vibration from the speaker to cause microphonics. (The record player and receiver are in this case usually very close together.) To remedy, place the record player on another support or mount it on sponge rubber. Coiling up the wire coming from the chassis may help if the signal is too strong.

ELECTRICAL PARTS

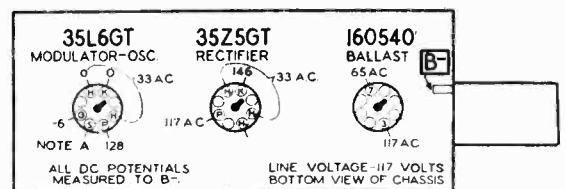
Diagram Number	Part Number	Description	List Price
1	83539	Condenser—mica, 260 mmfd.	\$0.20
2	83783	Condenser—mica, 110 mmfd.	.20
3	110559	Resistor—carbon 470,000 ohms 1/4 watt.	.12
4	110569	Resistor—carbon 10,000 ohms 1/4 watt.	.12
5	110578	Resistor—carbon 68,000 ohms 1/4 watt.	.12
6	110580	Resistor—carbon 3.3 meg. 1/4 watt.	.12
7	116051	Resistor—insulated 33,000 ohms 1/4 watt.	.15
8A-8B	116470	Condenser—electrolytic 20-20 mfd. 150 volt.	.95
9-10	116625	Condenser—.1 mfd. 600 volt.	.25
11-12	116819	Condenser—.05 mfd. 600 volt.	.20
13	118823	Resistor—1000 ohms 1 watt Wire Wound.	.15
14	160499	Coil—oscillator	.26
15	160501	Condenser—tuning	.22
16	160540	Ballast tube	.60
17A-17B	160576	Volume control—250,000 ohms with switch.	1.45
18	160603	Motor—less turntable	5.65
19	160617	Crystal cartridge	4.50
20	160693	Switch—On-Off	.42

MISCELLANEOUS PARTS

Part Number	Description	List Price
116467	Base for mtg. electrolytic condenser.	\$.04
112798	Clip—for mtg. oscillator coil.	.01
160617	Crystal cartridge	4.50
161104	Idler wheel with rubber rim.	1.00
160219	Knob—push on	.06
160033	Needle cup	.08
113463	Rubber bushing—motor mtg.	.03
119791	Socket—8 prong	.12
114876	Socket—octal base (for rectifier)	.15
161105	Turntable—9"	2.00

PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

SOCKET VOLTAGES



NOTE A: Voltage on the screen of the 35L6GT cannot be measured with the ordinary voltmeter because of the high resistance of resistor No. 6. Use a voltmeter of at least 1000 ohms per volt.

MODEL S7402-5

Commentator

FIRESTONE TIRE & RUBBER CO.

### TUNING RANGE

This receiver is designed to operate over the standard broadcast band which extends from 535 to 1720 Kilocycles (KC) (174 to 560 Meters) and includes the popular 1712 KC police channel.

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 or 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.

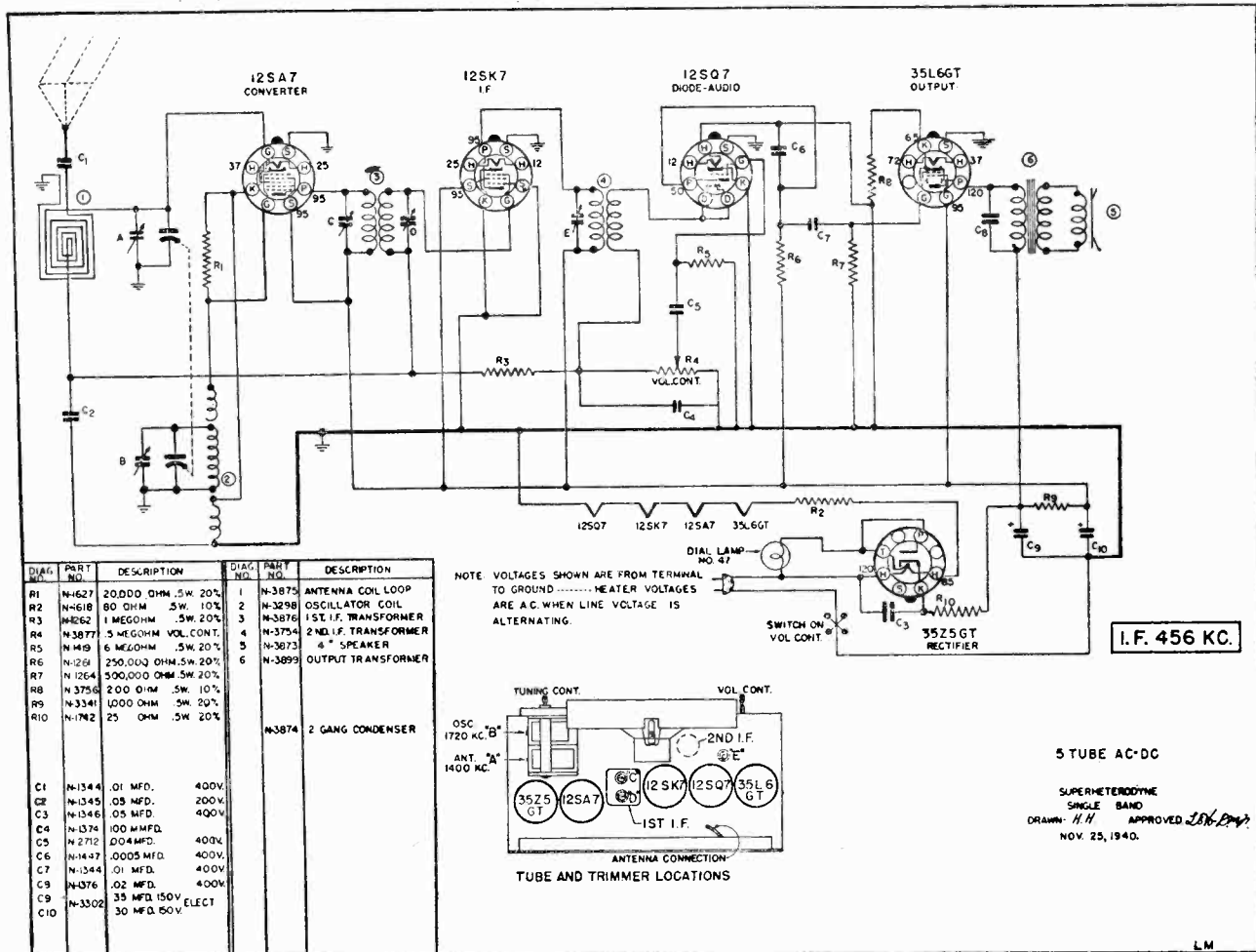
**I. F. ALIGNMENT.** With the gang condenser set at minimum, adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (12SA7) through a .05 or .1 mfd. condenser. The ground on the test oscillator should be connected to

the chassis ground. Align all three I.F. trimmers to peak or maximum reading on the output meter.

**BROADCAST BAND ALIGNMENT.** Remove chassis, and loop antenna from cabinet and set them up on the bench so that they occupy exactly the same respective positions on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench.

Connect the test oscillator to the antenna of the set through a 100 mmfd. (.0001) 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.

Voltages shown on the circuit diagram are from socket terminals to chassis base. In measuring voltages use a voltmeter having a resistance of at least 1000 ohms per volt. Allowances should be made for variations in line voltage.



FIRESTONE TIRE & RUBBER CO.

TUNING RANGE

This receiver is designed to operate over the standard broadcast band which extends from 535 to 1720 Kilocycles (KC) (174 to 560 Meters) and includes the popular 1712 KC police channel.

ALIGNMENT PROCEDURE

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**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.

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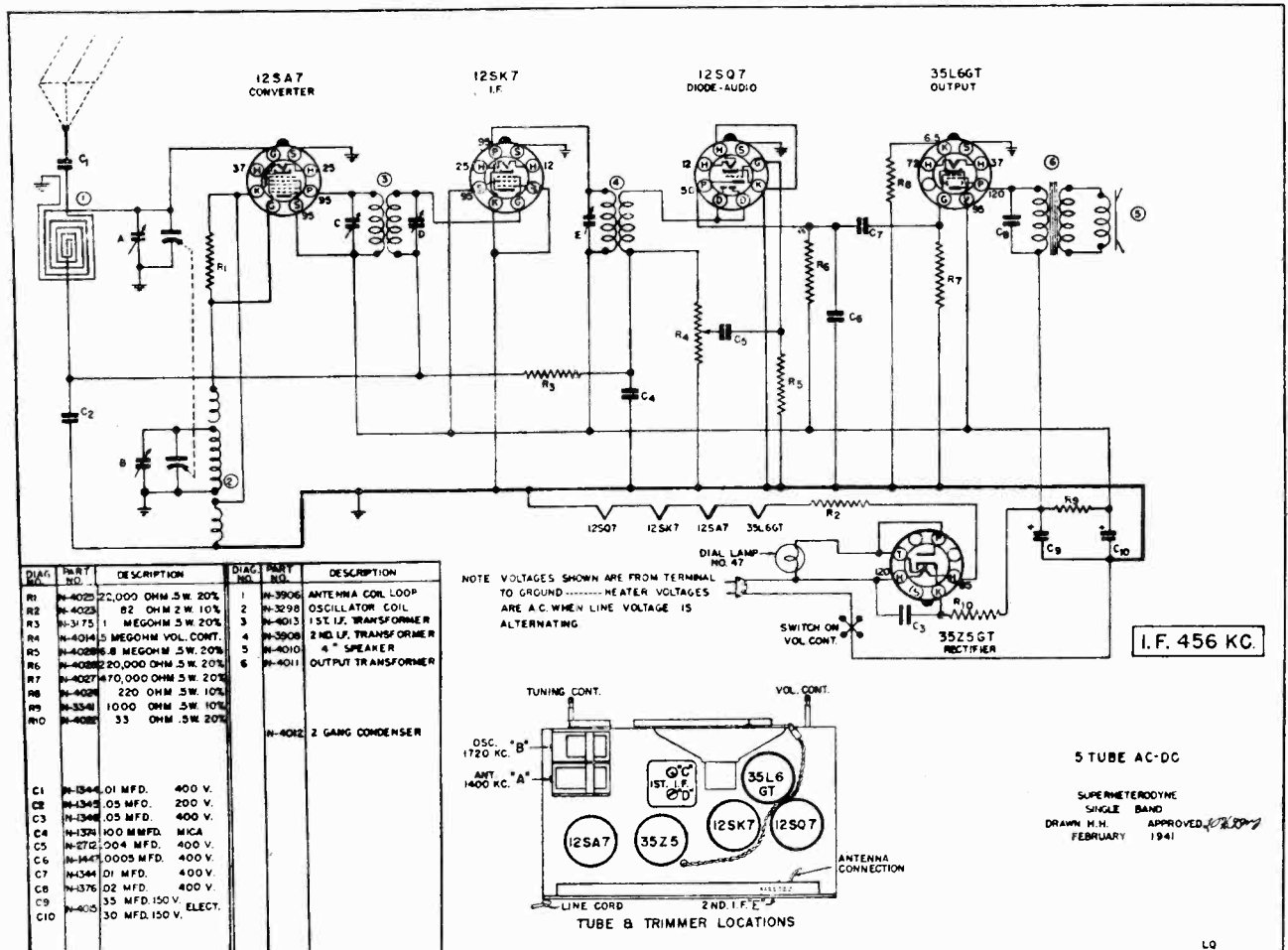
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the chassis ground. Align all three I.F. trimmers to peak or maximum reading on the output meter.

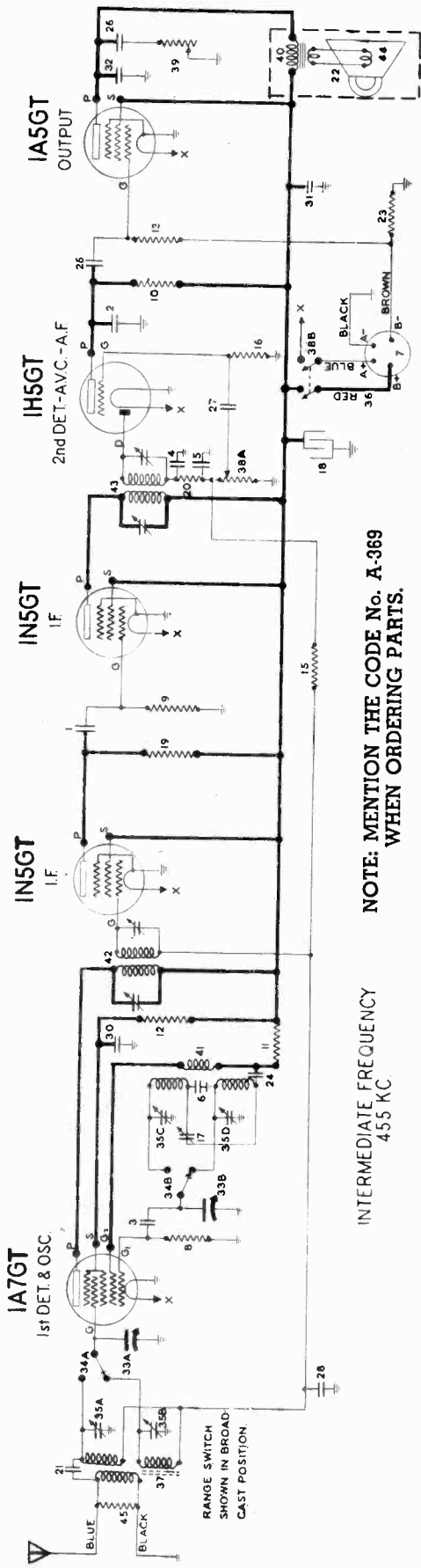
**BROADCAST BAND ALIGNMENT.** Remove chassis, and loop antenna from cabinet and set them up on the bench so that they occupy exactly the same respective positions on the bench as they did in the cabinet. Care should be taken to have no iron or other metal near the loop. Do not make this set-up on a metal bench.

Connect the test oscillator to the antenna of the set through a 100 mmfd. (.0001) 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.

Voltages shown on the circuit diagram are from socket terminals to chassis base. In measuring voltages use a voltmeter having a resistance of at least 1000 ohms per volt. Allowances should be made for variations in line voltage.



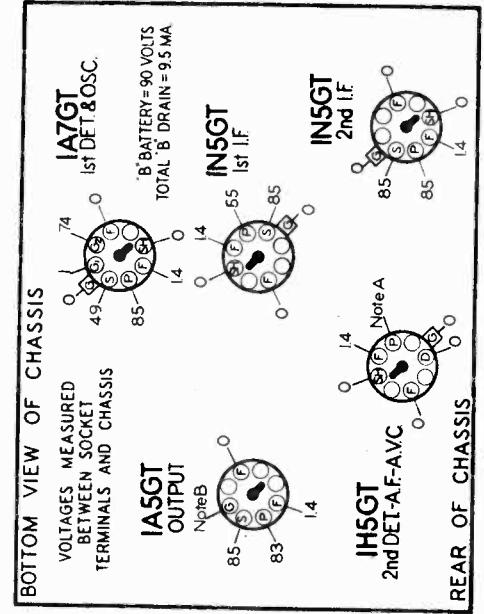




NOTE: MENTION THE CODE No. A-369 WHEN ORDERING PARTS.

INTERMEDIATE FREQUENCY 455 KC

SOCKET VOLTAGES  
DIAL TUNED TO 540 KC.  
ANTENNA GROUNDED



Note A: Only a small voltage will be measured at the plate of the 1H5GT when using a voltmeter having a resistance of 1000 ohms per volt.  
Note B: The bias on the 1A5GT grid is -5 volts measured across resistor No. 21.  
**MISCELLANEOUS PARTS LIST IS ON OTHER SIDE**

**ELECTRICAL PARTS**

Diagram Number	Part Number	Description	List Price
1	83539	Condenser—mica, 260 mmfd.	.20
2	83783	Condenser—mica, 110 mmfd.	.20
3-4-5	85061	Condenser—mica, 51 mmfd.	.15
6	88587	Condenser—mica, .0042 mfd.	.35
7	88631	Plug—4 prong, male.	.06
8	110553	Resistor—carbon, 220,000 ohms, 1/4 watt	.12
9	110580	Resistor—carbon, 3.3 meg., 1/4 watt.	.12
10	110554	Resistor—carbon 1 megohm 1/4 watt.	.12
11	110557	Resistor—carbon, 4,700 ohms, 1/4 watt.	.12
12	110566	Resistor—carbon, 33,000 ohms, 1/4 watt.	.12
13	110570	Resistor—carbon, 2.2 meg., 1/4 watt.	.15
15-16	110580	Resistor—carbon, 3.3 meg., 1/4 watt.	.12
17	112799	Condenser—padder	.36
18	112898	Condenser—electrolytic 16 mfd., 150 volt	.50
19	116063	Resistor—carbon, 10,000 ohms, 1/4 watt	.12
20	110565	Resistor—carbon, 22,000 ohms, 1/4 watt.	.12
21	114969	Condenser—mica, 15 mmfd.	.12
22	M-500350	Speaker—P.M. (8")	6.30

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

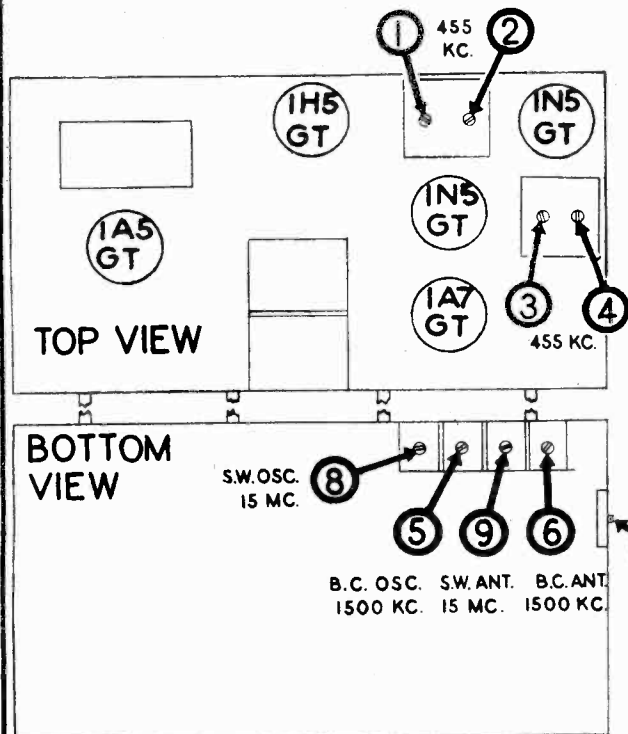
FIRESTONE TIRE & RUBBER CO.

**ALIGNMENT PROCEDURE**

FOR ALIGNMENT an output meter and an accurately calibrated signal generator are required.

1. Connect the output meter across the voice coil or between the plate of the 1A5GT output tube and ground through a 0.1 Mfd. condenser, depending on the type of meter. (The more sensitive type should be connected across the voice coil.)
2. Connect the ground lead of the signal generator to the black ground wire or the chassis.
3. Turn the volume control to the maximum volume position and keep it in this position while aligning.
4. With the gang condenser in full mesh, set the dial pointer to the low frequency edge of the dial scale.

Dummy Ant. in Series with Sig. Gen.	Connection of Sig. Generator Output To Receiver	Signal Generator Frequency	Band Switch Position	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
.1 MFD. Condenser	Control Grid of 1A7GT	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	Antenna Lead (Blue Wire)	1500 KC	Broadcast	1500 KC	5	Broadcast Oscillator (Shunt)	Adjust for maximum output.
200 MMFD. Mica Condenser	Antenna Lead (Blue Wire)	1500 KC	Broadcast	Tune To 1500 KC Generator Signal	6	Broadcast Antenna	Adjust for maximum output.
200 MMFD. Mica Condenser	Antenna Lead (Blue Wire)	600 KC	Broadcast	Tune To 600 KC Generator Signal	7	Broadcast Oscillator (Series Pad)	Adjust for maximum output. Try to increase output by detuning trimmer and retuning receiver dial until maximum output is obtained.
400 OHM Carbon Resistor	Antenna Lead (Blue Wire)	15 MC	Foreign	15 MC	8	Foreign Oscillator (Shunt)	Adjust for maximum output. Check to see if proper peak was obtained by tuning in image at approx. 14.1 MC. If image does not appear realign at 15 MC, with trimmer screw farther out. Recheck image.
400 OHM Carbon Resistor	Antenna Lead (Blue Wire)	15 MC	Foreign	15 MC	9	Foreign Antenna	Adjust for maximum output. Try to increase output by detuning trimmer and retuning receiver dial until maximum output is obtained.

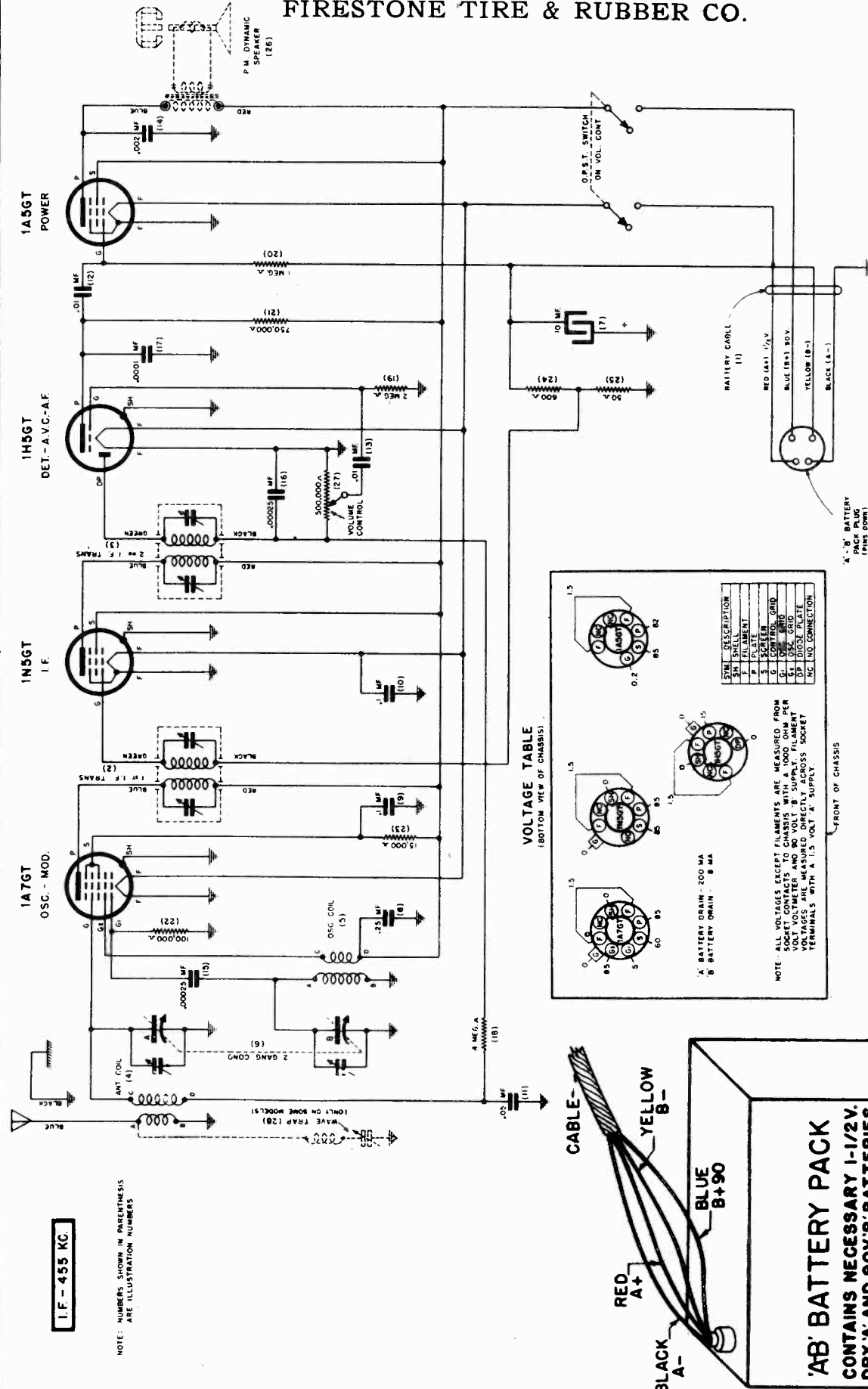


**MISCELLANEOUS PARTS**

Part Number	Description	List Price
500368	Cabinet back	\$.070
114955	Clamp, for Dial Cord	.01
112745	Clip, Coil Mounting	.01
117057	Cord, Drive supplied in 3 Ft. Lengths	.15
500359	Dial Scale	.50
500395	Escutcheon—Dial	1.50
119644	Knob, (Unmarked)	.16
119746	Knob, Band	.16
500382	Lever, for on-off indicator	.12
88631	Plug, 4 prong male for battery cable	.06
160436	Pointer	.18
81145	Retaining Ring, for tuning shaft	Per C .50
114914	Screw, Special Head for Mtg. Escutcheon	Per Doz. .15
85827	Set Screw, 8-32 Sq. Head for Ind. Lever	.02
500354	Shaft, tuning	.12
600116592	Shield, Tube	.10
KC.119791	Socket, Octal	.12
111090	Spacer, Steel Mtg. for gang	.02
114968	Spring, Dial cord tension	.03
117157	Spring, for On-Off indicator	.03
111456	Washer, Spring washer for tuning shaft	Per C .50

MODEL S7405-8 (445)

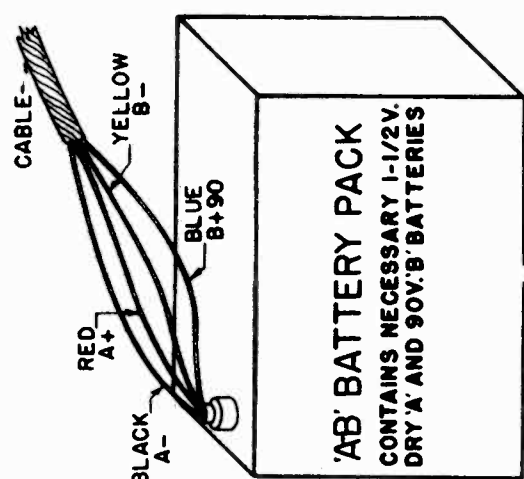
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The diagram illustrates connection of battery designed for use with your Model S-7405-8 Firestone Radio. Before attempting to install battery TURN ON-OFF SWITCH TO "OFF" POSITION.

BATTERY LIFE depends on the number of hours per day the set is operated, and the quality of the battery used.

Firestone battery stock No. E-1527-7 is built of the finest material and is especially designed for best operation of your radio. When used on an average of two to three hours per day it will provide approximately 750-1000 hours' service.



SHOWING PLUG INSERTED IN RECEPTACLE ON TOP OF "AB" BATTERY PACK

I.F. - 455 KC.

NOTE: NUMBERS SHOWN IN PARENTHESIS ARE ILLUSTRATION NUMBERS

# FIRESTONE TIRE & RUBBER CO.

## AERIAL

USE A GOOD AERIAL—RECEPTION WILL BE POOR IF THE RADIO IS OPERATED WITHOUT AN AERIAL OR WITH A POOR ONE—WITH A GOOD AERIAL GOOD RESULTS CAN BE EXPECTED. AS THE BEST AERIAL TO USE DEPENDS ON THE LOCATION, SURROUNDING OBJECTS, ETC., BE SURE TO:

1. Always use the best possible aerial. Remember an outdoor aerial erected as high as possible is the best one to use. If it is impractical to use an outdoor aerial, erect one in the attic or around the picture moulding.
2. A 35 to 100 foot aerial should be ample for most locations. While in shielded locations and in remote districts a longer aerial may have to be used, always keep the aerial as short as possible consistent with satisfactory reception.
3. Insulate aerial from its supports by glass or porcelain insulators, and keep lead-in wire away from buildings, etc., with stand-off insulators.
4. Use insulated window lead-in strip to bring aerial lead-in into house.
5. Use an approved lightning arrester.
6. Connect aerial lead-in to blue lead coming out rear of chassis.
7. Attach a good ground to the black lead coming out at rear of chassis. A cold water pipe, steam radiator, or an iron rod driven two to four feet in moist ground will provide a good ground.

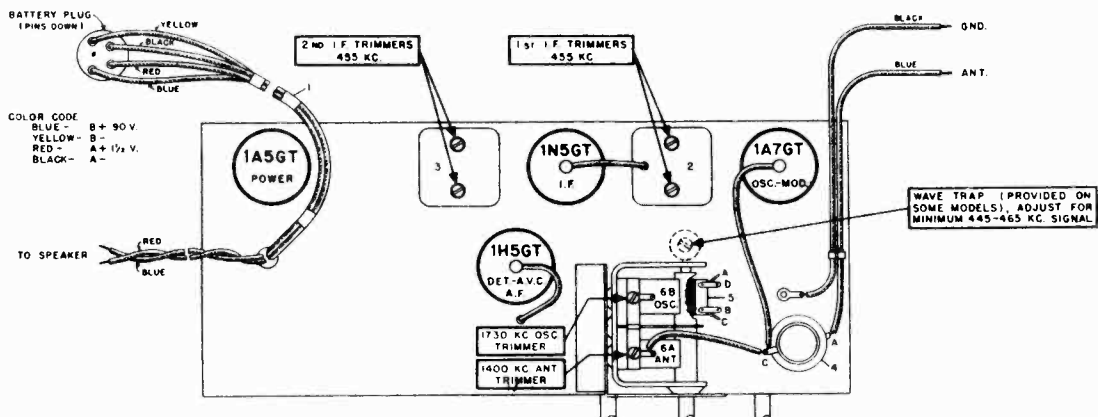
## ALIGNMENT PROCEDURE

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. If more than one adjustment is required on any one band, make the adjustment marked (1) first, (2) next, (3) third.

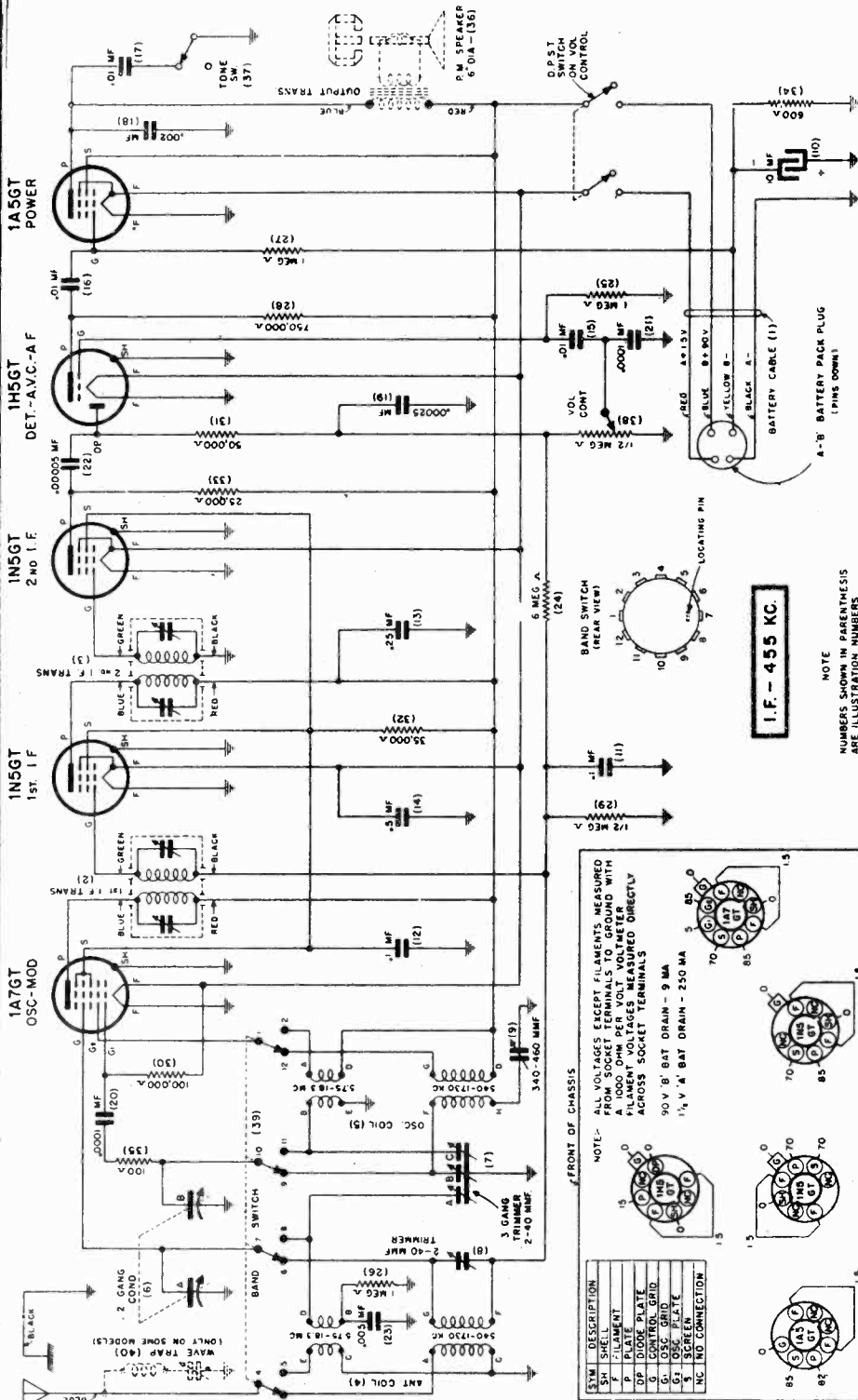
Before starting alignment:

- (a) Check tuning dial adjustment by turning 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 the last line move to correct position.
- (b) Use an accurately calibrated test oscillator with some type of output measuring device.
- (c) Have ground lead of test oscillator attached to chassis.

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:	
I.F. Any point where no interfering signal is received	455 K. C.	.02 MFD condenser	High side to grid terminal of 1A7GT tube DO NOT REMOVE CAP.	Adjust each of the second I. F. transformer trimmers for maximum output—then adjust each of the first I. F. trimmers for maximum output.
(1) Exactly 1730 K. C.	Exactly 1730 K. C.	.00025 MFD condenser	Receiver blue antenna lead	Adjust 1730 K. C. oscillator trimmer for maximum output.
(2) Approx. 1400 K. C.	Exactly 1400 K. C.	.00025 MFD condenser	Receiver blue antenna lead	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.



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**VOLTAGE TABLE**  
(BOTTOM VIEW OF CHASSIS)

SYM.	DESCRIPTION	VOLTS
SH	SHELL	0
F	FILAMENT	5
DP	DIODE PLATE	250
G	CONTROL GRID	0
GT	OSC. GRID	0
PL	SCREEN GRID	0
NC	NO CONNECTION	

NOTE: ALL VOLTAGES EXCEPT FILAMENTS, MEASURED FROM SOCKET TERMINALS TO GROUND WITH A 1,000 OHM PER VOLT VOLTMETER. ALL OTHER VOLTAGES MEASURED DIRECTLY ACROSS SOCKET TERMINALS.  
90V B' BAT DRAIN - 9 MA  
1 1/2 V 'A' BAT DRAIN - 250 MA

**PARTS LIST**

Illus. Part No.	Part Name	Description	List Price
1	13068 Cable	Battery with 4 Prong Plug	\$.40
2	13301 Coil	First I.F. Transformer	.90
3	13301 Coil	Second I.F. Transformer	.90
4	12319 Coil	Antenna	.60
5	12320 Coil	Oscillator	.55
6	12321 Condenser	Tuning (2 Gang) with Pulley	1.65
7	3762 Condenser	Trimmer (3 Gang)	.47
8	1597 Condenser	Trimmer 3-35 MMF	.21
9	3287 Condenser	Padding Total Range 200-600 MMF. Working Range 380-460 MMF	.45
10	1693 Condenser	Tubular Dry Elec. (10 Mid. 25 V.	
11	1151 Condenser	1151	
12	1151 Condenser	1151	
13	9032 Condenser	9032	
14	2131 Condenser	2131	
15	9468 Condenser	9468	
16	9468 Condenser	9468	
17	9468 Condenser	9468	
18	10762 Condenser	10762	
19	9458 Condenser	9458	
20	7934 Condenser	7934	
21	7934 Condenser	7934	
22	1544 Condenser	1544	
23	10892 Condenser	10892	
24	2333 Resistor	2333	
25	7998 Resistor	7998	

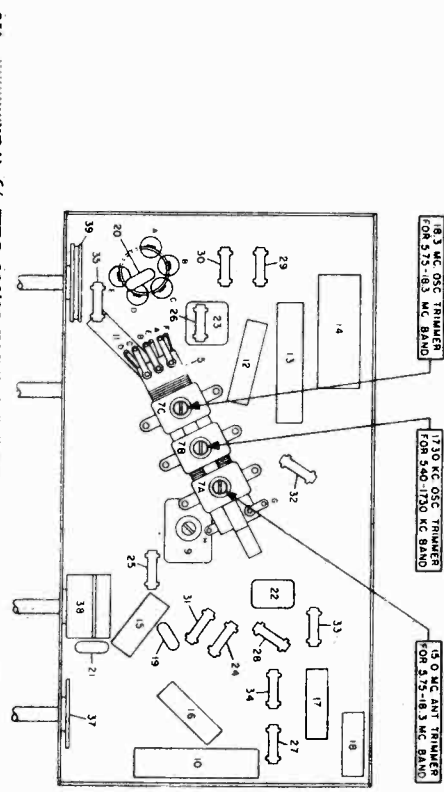
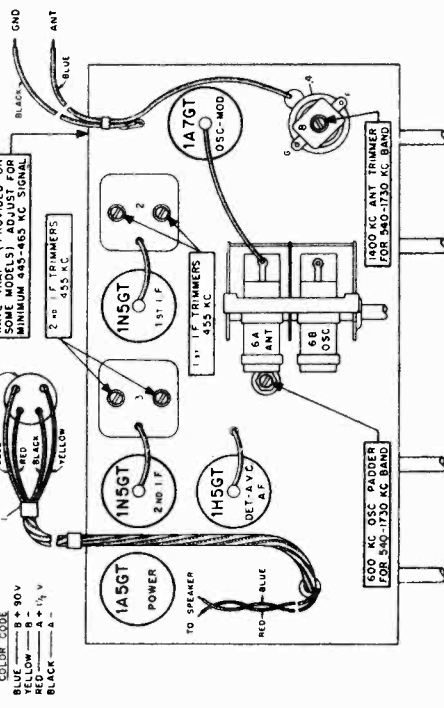
**D.C. Working**

Tubular .1 Mid. 200 Volt	.75
Tubular .1 Mid. 200 Volt	.20
Tubular .25 Mid. 200 Volt	.23
Tubular .5 Mid. 200 Volt (Shielded)	.55
Tubular .01 Mid. 400 Volt	.17
Tubular .01 Mid. 400 Volt	.17
Tubular .002 Mid. 400 Volt	.18
Mica .00025 Mfd. + or - 20%	.21
Mica .0001 Mfd. + or - 20%	.21
Mica .0001 Mfd. + or - 20%	.21
Mica .00005 Mfd. + or - 3%	.21
Mica .005 Mfd. + or - 3%	.21
Carbon 6 Meg Ohm 1/3 Watt	.19
Carbon 1 Meg Ohm 1/3 Watt	.19

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33	8907	Resistor	Carbon 25,000 Ohm 1/3 Watt	.19
34	1562	Resistor	Carbon 600 Ohm 1/3 Watt	.19
35	2431	Resistor	Carbon 100 Ohm 1/3 Watt	.19
36	13304	Speaker	6" P.M.	4.25
37	12322	Switch	Tone Control (S.P.S.T.)	.40
38	12297	Volume Control	(With D.P.S.T. Switch)	.80
39	12134	Switch	Band Selector	.65
40	11540	Wave Trap	(Optional)	.50

Illus. Part No.	Part Name	Description	Price
26	7998	Resistor	Carbon 1 Meg Ohm 1/3 Watt
27	7998	Resistor	Carbon 1 Meg Ohm 1/3 Watt
28	2673	Resistor	Carbon 750,000 Ohm 1/3 Watt
29	6984	Resistor	Carbon 500,000 Ohm 1/3 Watt
30	8000	Resistor	Carbon 100,000 Ohm 1/3 Watt
31	6879	Resistor	Carbon 50,000 Ohm 1/3 Watt
32	1618	Resistor	Carbon 35,000 Ohm 1/3 Watt



**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. If more than one adjustment is required on any one band, make the adjustment marked before starting alignment: (a) Check tuning dial adjustment by turning 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 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) Have ground lead of test oscillator attached to chassis.

Place band switch for operation on:	Set receiver dial to:	TEST OSCILLATOR	
		Adjust test oscillator frequency to:	Attach output of test oscillator to:
1. I. F. alignment use any band position.	Any point where no interfering signal is received.	455 K.C.	High side to grid terminal of 1A7G tube. DO NOT REMOVE CAP
1730 to 540 K.C. Band	1 Exactly 1730 K.C.	.00025 MFD. condenser	High side to Receiver blue antenna lead
	2 Exactly 1400 K.C.	.00025 MFD. condenser	High side to Receiver blue antenna lead
	3 Approx. 600 K.C.	.00025 MFD. condenser	High side to Receiver blue antenna lead
5.75 to 18.3 M.C. Band	1 Exactly 18.3 M.C.	100 Ohm carbon resistor	High side to Blue Antenna Lead
	2 Approx. 15 M.C.	400 Ohm	High side to Blue Ant. Lead

Refer to parts layout diagram for location of trimmers mentioned below:

Adjust each of the second J. F. transformer trimmers for maximum output—then adjust each of the first I. F. trimmers for maximum output.

Adjust 1730 K.C. oscillator trimmer for maximum output.

While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.

While rocking gang condenser adjust 600 K.C. oscillator pad for maximum output.

Adjust 18.3 M.C. oscillator trimmer for maximum output—be sure to use proper peak. If more than one peak is noticed, back off trimmer to minimum capacity, then screw down trimmer (add capacity) until the second peak—which is the proper one to use—is tuned in.

While rocking gang condenser adjust 15 M.C. antenna trimmer for maximum output.

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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 or 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.

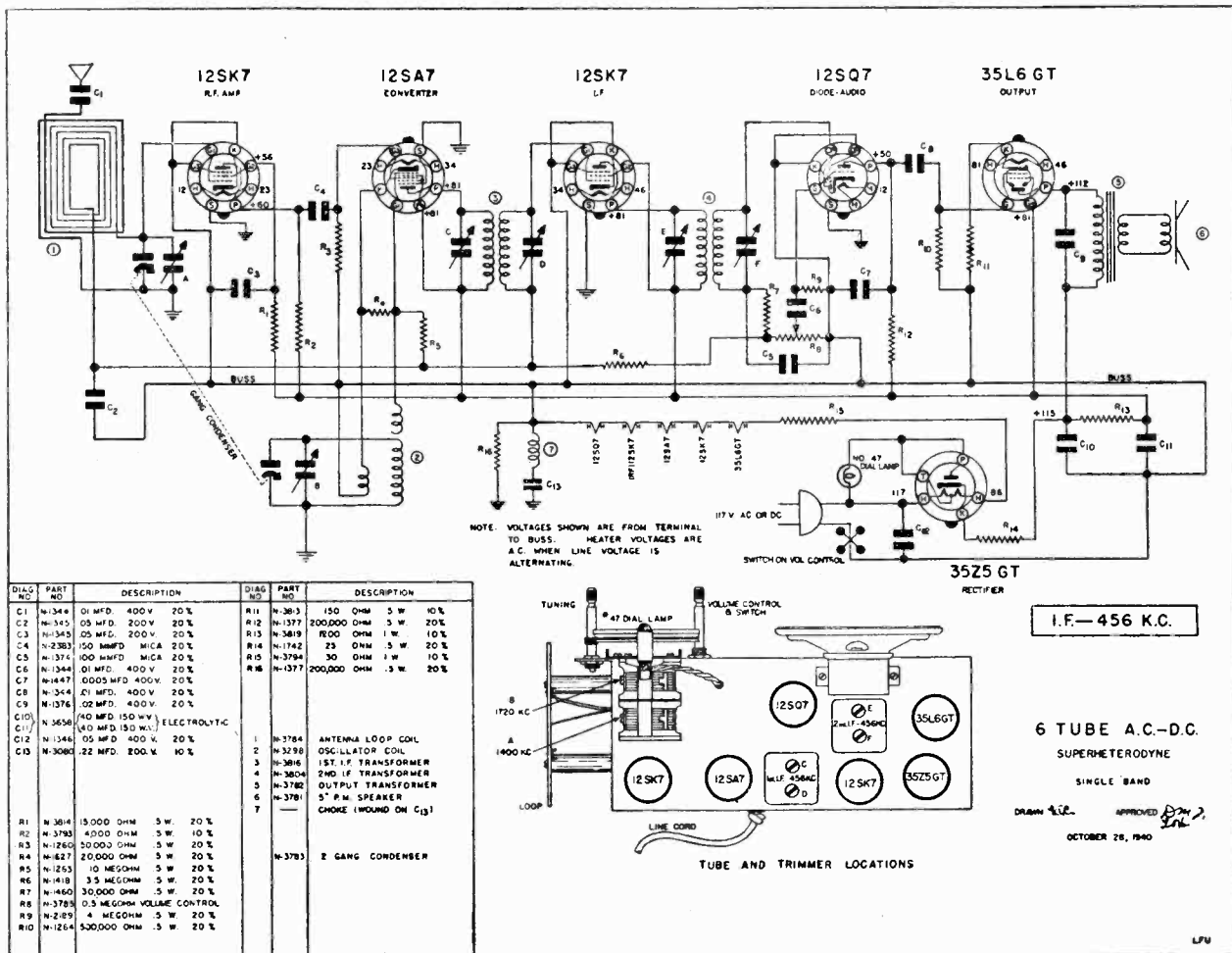
**I. F. ALIGNMENT.** With the gang condenser set at minimum, adjust the test oscillator to 456 KC and connect the output to the grid of the first detector tube (12SA7) through a .05 or .1 mfd. con-

denser. The ground on the test oscillator should be connected to the ground buss, 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.

Voltages shown on the circuit diagram are from socket terminals to chassis base. In measuring voltages use a voltmeter having a resistance of at least 1000 ohms per volt. Allowances should be made for variations in line voltage.



FIRESTONE TIRE & RUBBER CO.

MODELS S7425-6(Late),  
S7425-9

**ALIGNMENT PROCEDURE**

FOR OTHER DATA  
SEE FIRESTONE  
PAGE 11-24 IN  
RIDER'S VOL. XI

**ALIGNMENT:** An output meter and an accurately calibrated signal generator are required.  
Connect the output meter across the voice coil or, using a .1 mfd. condenser in series, connect as follows:  
**MODEL S-7425-9:** Between the 35L6GT plate and B— terminal shown on voltage chart.  
**MODEL S-7425-6:** Between the 35L6GT plate and chassis.

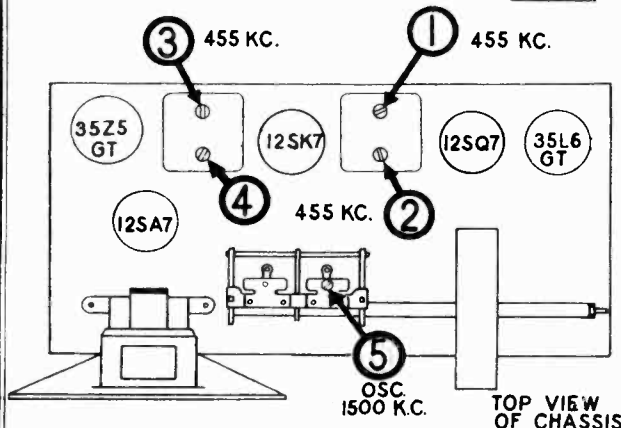
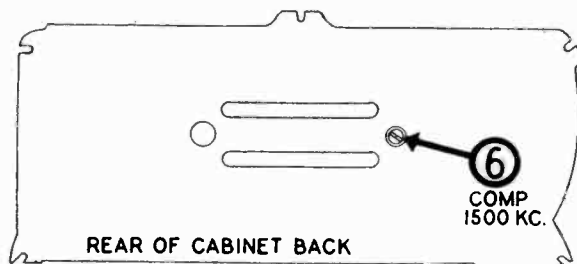
Connect the ground lead of the signal generator to the chassis of the receiver through a .25 mfd. condenser and keep it connected in this manner throughout the entire alignment procedure. Failure to do this may have serious results as one side of the power line may be grounded in the signal generator. If oscillation or hum occurs in the model S-7425-9, connect the ground lead of the signal generator through a .25 condenser to B— as shown on the Voltage Chart.

**TO CALIBRATE THE DIAL:**—Remove the chassis from the cabinet and set it on a flat surface (insulated from ground). With the gang in full mesh, the last dial division (just below 55) on the low frequency end, should be exactly 4 3/8 inches above the table surface. If this is not the case, release the set screw in the collar which connects the gang condenser shaft with the tuning unit, and holding the gang in full mesh, turn the dial until the last division is exactly 4 3/8 inches above the table surface. Now re-tighten the set screw in the collar. The 4 3/8 inch division on the ruler (when measured vertically from table surface), is to be used as the dial indicator for all calibrations and alignment.

Dummy Ant. in Series with Signal Generator	Connection of Sig. Generator Output to Receiver	Signal Generator Frequency	Receiver Dial Setting	Trimmer Number	Trimmer Description	Type of Adjustment
.1 MFD. Condenser	Green wire of Loop (Loop must be connected)	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	"Ant." Terminal	1500 KC	1500 KC	5	Broadcast Oscillator (Shunt)	Adjust trimmer to bring in signal.
200 MMFD. Mica Condenser	"Ant." Terminal	1500 KC	Tune to 1500 KC Generator Signal	6	Broadcast Antenna (Shunt)	Adjust for maximum output.

Now remove the output meter and signal generator connections and replace the set in the cabinet. Replace the cabinet back and MAKE SURE THAT THE GREEN WIRE GOES TO THE UPPER RECEPTACLE OF THE LOOP AND THE GREEN-WHITE WIRE TO THE LOWER RECEPTACLE. Place the antenna lead from the signal generator near the back of the cabinet and turn the output up until the 1500 KC signal is weakly heard. Adjust trimmer No. 6 for maximum output by ear.

**MISCELLANEOUS PARTS**



Part Number	Description	List Price
117231	Back—cabinet, for S-7425-6	\$0.20
117865	Back—cabinet, for S-7425-9	.20
117211	Cabinet	3.60
112745	Clip—coil mounting	.01
113558	Clutch spring—for tuner (on cam shaft)	.04
113504	Collar—coupling (between tuner unit and gang cond. shaft)	.08
113560	Dial Scale—celluloid strip	.22
113592	Felt Pad (cabinet feet ivory) 3/16"	.06
113549	Felt Strip—(white) behind push button levers	.03
113572	Key—for push button (right hand)	.24
113557	Key—for push button tuner (left hand)	.24
113531	Knob—tuning (ivory)	.30
113574	Knob—volume (ivory)	.18
113500	Mechanical tuner unit—less tenite tips for push buttons	3.90
116689	Pad—for push button levers	.02
83624	Screw—self tapping 8 x 1/4"	.01
85827	Set Screw—8/32 Square head	.02
113538	Screw—for tuning knob (chrome head)	.14
113636	Screw—No. 8 x 3/4" chassis mtg.	.01
113699	Screw—No. 8 x 1" for chassis mtg.	.01
113542	Socket—dial lamp—insulated	.10
116690	Socket (octal base) (small)	.12
113559	Spring—for key return	.02
113550	Tab—station call letter	.28
113529	Tip—for push button (ivory)	.05
114132	Window for dial	.16



MODEL S7427-7

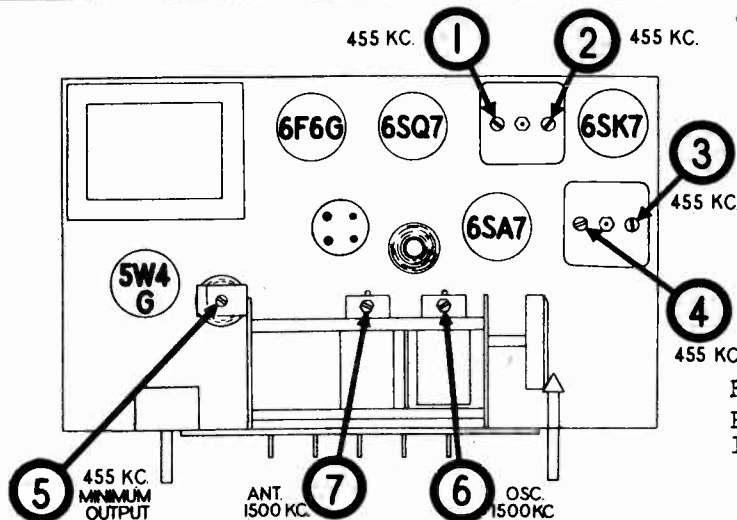
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**ALIGNMENT EQUIPMENT & PROCEDURE**

FOR ALIGNMENT: An output meter and an accurately calibrated signal generator with a tuning range from 455 KC to 1500 KC are required.

1. Connect the output meter across the voice coil or between the plate of the 6F6-G output tube and ground, depending on the type of meter. (The more sensitive type should be connected across the voice coil).
2. Connect the ground lead of the signal generator to the "G" terminal or the chassis.
3. Turn the volume control to the maximum volume position and keep it in this position throughout the entire alignment procedure.
4. Remove the connector from between the "A" and "X" terminals on the antenna strip.

DUMMY ANT. IN SERIES WITH SIG. GEN.	CONNECTION OF SIG. GENERATOR OUTPUT TO RECEIVER	SIGNAL GENERATOR FREQUENCY	RECEIVER DIAL SETTING	TRIMMER NUMBER	TRIMMER DESCRIPTION	TYPE OF ADJUSTMENT
.1 MFD CONDENSER	LEFT LUG ON GANG COND.	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	"A" TERMINAL	455 KC	ANY POINT WHERE IT DOES NOT AFFECT THE SIGNAL	5	WAVE TRAP	ADJUST FOR MINIMUM OUTPUT USING A STRONG GENERATOR SIGNAL.
200 MMFD. MICA CONDENSER	"A" TERMINAL	1500 KC	1500 KC	6	BROADCAST OSCILLATOR (Shunt)	ADJUST FOR MAXIMUM OUTPUT.
200 MMFD. MICA CONDENSER	"A" TERMINAL	1500 KC	TUNE TO 1500 KC GENERATOR SIGNAL	7	BROADCAST ANTENNA (Shunt)	ADJUST FOR MAXIMUM OUTPUT.



FOR OTHER DATA SEE  
FIRESTONE PAGE 11-39  
IN RIDER'S VOL. XI

**HOW TO SET UP AND USE THE PUSH BUTTON TUNER**

To set up the push buttons, proceed as follows:

1. Turn on the set and allow it to operate for at least one-quarter hour before attempting to set up the push buttons. Be sure that the set is connected to an antenna system before starting.
2. Select the five stations to which the buttons are to be set. Be sure to select nearby, powerful stations, since weak signals will generally give better results when tuned in manually. Any button may be set to any desired station.
3. Grasp the tuning knob and push it in (the movement is slight, about 1/8 inch) so that the drive pinion engages the condenser drive gear and the set may be tuned manually.
4. Tune in the station to which you wish to set the particular button. Be sure to tune in the station correctly by TUNING TO THE POINT WHERE THE PROGRAM IS HEARD WITH THE LEAST HISS OR DISTORTION.
5. Grasp the push button being set up, and turn it to the left (counter-clockwise) about one whole turn.
6. Push this button all the way in, and then release it. Now turn it to the right (clockwise) until reasonably tight. This completes the set-up operation.
7. Set up the remaining four buttons in a similar manner.
8. Label each button with the call letters of the stations you have selected, using the call letter tabs packed with your receiver. Paste the call letter tab in the recess above the push button.
9. To use your push button tuner, push in the button labelled with the call letters of the desired station. Be sure to push the button all the way in.