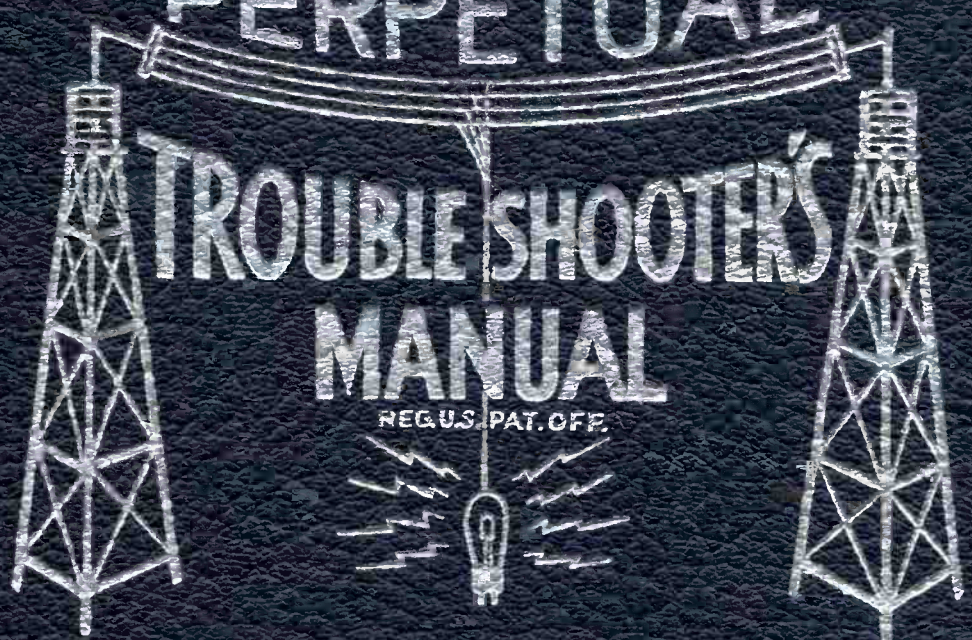
VOLUME X

PERPETUAL TROUBLESHOOTER'S MANUAL

REG. U.S. PAT. OFF.



JOHN F. RIDER

Elec.Automatic Tuner
Data,Procedure,Assembly

GALVIN MFG. CORP.

MODEL 9-49 (E5T)
MODEL 9-69 (E5T)
MODEL 15-F (E6T)
MODELS 20-P,21-L,24-K
MODELS 22-S,25-N (E6T)

ELECTRIC AUTOMATIC TUNER

Types E5T, E6T and E7T

NOTE: All three tuners are identical in construction, except for the condenser gang.

E5T has a 3-gang condenser and is used in Models 9-49 and 9-69.

E6T has a 2-gang condenser and is used in Models 15-F, 20-P, 21-L, 22-S, 24-K, and 25-N.

E7T has a special high frequency condenser gang and is used in Police Cruiser Model P-69-14.

SERVICE SUGGESTIONS

MOTOR DOES NOT RUN

1. MOTOR CONTACTS IN CONTROL HEAD NOT CLOSING. Open the control head and inspect the motor contacts. If the gap is too great, contact will not be made when the button is pressed. Adjust by bending carefully.
2. POOR CONTACT AT PUSH-BUTTON PLUG. Inspect the contacts between the plug and the receptacle on the chassis.
3. OPEN CIRCUIT IN MOTOR. Check all connections to motor and check motor winding for continuity.
4. MOTOR BRUSHES NOT MAKING CONTACT. Check contact between brushes and commutator. Clean dirty commutator with carbon tetrachloride.
5. LOW BATTERY VOLTAGE. A weak or defective battery in the car would not deliver sufficient voltage to run the motor.
6. FLEXIBLE TUNING SHAFT BINDS. Binding in the flexible tuning shaft places an additional load on the motor. If this load is too great, it will prevent the motor from turning the mechanism.
7. MAGNET FAILS TO RELEASE. If the magnet which has previously been energized, fails to release the latch bar for any reason, the motor cannot turn the mechanism.

MECHANISM RUNS SLUGGISHLY

1. LOW BATTERY VOLTAGE. A weak or defective battery will not deliver sufficient voltage to turn the motor at normal speed.
2. HIGH RESISTANCE CONTACT IN CONTROL HEAD. High resistance at the push-button contacts will cause a voltage drop which will prevent the motor from turning at normal speed.
3. POOR CONTACT BETWEEN PUSH-BUTTON PLUG AND RECEPTACLE. This will also result in voltage drop, and lessened motor power.
4. BINDING IN TUNING SHAFT. Binding in the flexible tuning shaft will place an additional load on the motor which can slow it down considerably. Install tuning shaft with minimum amount of bending and check alignment where the tuning shaft enters the receiver housing.
5. GEARS NOT PROPERLY MESHED. Check all gears in assembly for binding due to improper meshing.
6. DEFECTIVE MOTOR. - Replace.

MOTOR FAILS TO REVERSE

1. REVERSING SWITCH NOT PROPERLY ADJUSTED. See instructions elsewhere in this book.
2. OPEN CIRCUIT IN MOTOR. If one side of motor circuit is open, motor will run in one direction only.
3. OPEN MAGNET WINDING. An open magnet will not pull latch down; consequently will not cause motor switch to reverse.
4. LATCH BAR SPRING TOO TIGHT. If the latch bars operate under too much tension the magnet may not be able to pull the latch down.

FAILS TO RETAIN ORIGINAL SETTING

1. LATCH RINGS NOT LOCKED SECURELY. The locking screw must be pulled down securely, otherwise, the shock of the sudden stopping will tend to slide the rings away from the original setting.
2. ORIGINAL SETTING NOT ACCURATE. Resetting of magnets may be necessary after several days' use, during which time the mechanism goes through a "shaking down" process.
3. ELECTRICAL DRIFT. This is usually the result of a great change in temperature. Automatic compensation is provided in the circuit to take care of the normal operating temperature range. Before making original setting, turn the set on and permit it to play long enough to arrive at a constant operating temperature. In zero weather do not expect the set to tune "on the nose" until after a constant temperature has been reached. In severe cases of electrical drift occurring at normal operating temperature, change the compensating condenser.

IMPOSSIBLE TO SET UP STATIONS

1. TOO MUCH TENSION ON LOCKING LEVERS. When the automatic locking screw is loose, the station rings should move freely. If the levers still hold the station rings partially locked, the screws which hold the levers should be loosened one-quarter to one-half turn.
2. LATCH RINGS "OUT OF RANGE". If the loosened latch rings slip on the drum until the notch fall beyond reach of the latch bar, they can be brought back to position by following exactly the "setting procedure" outlined elsewhere in this book.

FAILS TO STOP AT STATION

1. OPEN MAGNET WINDING. Check for continuity and replace if necessary.
2. MAGNET CONTACT IN CONTROL HEAD NOT CLOSING. Inspect contacts. Adjust or clean if necessary.
3. LATCH BAR DEFECTIVE. Inspect latch bar to make sure that it has not been damaged. Replace latch bar, if required.
4. POOR CONTACT AT PUSH BUTTON PLUG. A poor contact here means a voltage drop which reduces the pulling power of the magnet.
5. IMPROPER SPACING OF MAGNET. Check the spacing between the latch bar armature and the magnet pole. When the tip of the latch bar is seated all the way down in the notch in the latch ring, the armature should not quite touch the magnet pole. A hair line of light should be visible between them.
6. LATCH RINGS NOT LOCKED SECURELY. If the latch rings are very loose the motor will continue to turn the gang until the plates are completely meshed.

LATCH BAR STICKS IN NOTCH

1. MANUAL TUNING SHAFT BINDS. Binding in the tuning control shaft causes the latch bar to press hard against one side of the notch and may prevent it from releasing as the magnet is de-energized.
2. LATCH BAR SPRING WEAK. Check latch bar tension spring to make sure it is pulling away from the magnet with sufficient force. Spring tension is adjustable.
3. MAGNET CONTACT IN CONTROL HEAD STUCK. Check the magnet switch in the control head to make sure it breaks contact when pressure is released on the bottom. Check for frozen contact points, or for sticking button.
4. ARMATURE RIVET WORN. There is a brass rivet at the tip of the armature. If this rivet is worn down, permitting the steel armature to actually touch the magnet pole, it may freeze in that position.
5. BUR ON TIP OF LATCH. Latch tip should be smooth and shiny.
6. BINDING IN LATCH BEARINGS. Latch must move freely but not sloppy.
7. LATCH TIPS NOT CENTERED ON LATCH RINGS. Latch tips must not rub bakelite guide rings. The latch bar bearing shaft is adjustable.
8. FRICTION CLUTCH TOO TIGHT. A tension washer between the motor pinion and the brass pinion collar acts as a friction clutch to absorb the shock of stopping the motor quickly when a station is tuned. If the tension is too tight, the torque of the stopped motor will hold the latch bar tip in the notch.
9. MOTOR BRUSHES TOO TIGHT. Too much friction between the motor brushes and the commutator will cause the same thing.

TO SET AUTOMATIC TUNER

NOTE: Before setting any station, let the set warm up for not less than ten minutes. If you wish you can "set" the automatic tuner on the service bench before installing the radio in the car. Use a short aerial and peak the antenna trimmer to it. Then readjust the antenna trimmer after the installation in the car.

IMPORTANT—You will note that the 9-contact plug on the end of the control head cable has one pin that is shorter than the others. For the "setting up" procedure, this plug should be inserted in the receptacle on the receiver only half way. This will cause all of the magnet terminals to be connected during the adjustment, since the short pin will not make contact, thereby holding the motor circuit open. The motor should not run at any time during the "setting up" procedure.

1. From the set of call letter tabs provided, detach the proper ones for the six stations. The station tabs should then be inserted in the space provided in the fact of station tuning buttons. Cover the tab with a small rectangular piece of celluloid. Both tabs and celluloide snap into position.
2. Loosen the AUTOMATIC LOCKING SCREW. This screw should be turned counter-clockwise four or five revolutions—far enough to assure plenty of looseness.
3. Turn the dial all the way to the low frequency end (535 K.C.)
4. Press the first button and hold it down. A faint "click" should be heard, indicating that the tuning magnet has attracted the latch bar.
5. Holding the magnet energized, turn the dial manually all the way to the high frequency end (1550 K.C.) and then all the way back to the low frequency end (535 K.C.)
6. Still pressing on the button, tune in the station to be set on that button.
7. Proceed to set the remaining five stations. For each station follow steps 3, 4, 5, and 6, as outlined above. AT NO TIME IN THE SETTING UP PROCEDURE SHOULD THE TUNING MOTOR BE PERMITTED TO RUN.
8. Tighten the automatic locking screw very securely. Do not hold the tuning knob while locking the automatic, but allow the mechanism to turn to its natural stop.
9. Push the plug all the way into the receptacle on the receiver housing so the short motor pin will also make contact.

Figure 1.

REVERSING SWITCH AND MUTING RELAY ADJUSTMENT

NOTE: Four adjusting screws extend upward through the switch mounting plate, three of them in line, and one set off by itself. (See Fig. 1).

1. Turn the rotor assembly until the HIGH sides of all latch rings rest opposite the latch tips.
2. Turn screw "A" in until all latch bar tips touch HIGH side of ring and then turn the screw back one half turn. (Spacing between latch tip and high side of ring at point "X" should be 8 to 12 thousandths of an inch.)

MODEL 9-49
MODEL 9-69
MODEL 15-F
MODELS 20P,21L,24K

GALVIN MFG. CORP.

Procedure,Part 2
Schematic of Tuner
Assembly,Parts List

AUTOMATIC SERVICE PROCEDURE--Continued

3. Hold any latch bar tip down on HIGH side of ring and adjust screw "C" (center screw) until the bakelite insulator on the center switch leaf just barely misses touching the heel of the latch bar at point "Y". (Check adjustment by pressing other latch bars. The depressed latch bar must not lift the center contact even slightly.)

4. With latch bar at rest position adjust screw "B" (front screw) until top motor contact is lifted from center contact by 12 to 15 thousandths of an inch at point "Z". (15 thousandths = 1/64").

5. Turn rotor until LOW side of ring rests under latch tip. Press any latch bar down and make sure switch actually reverses. (Bottom contact must break and top contact make sufficiently to lift the top switch leaf slightly from the bakelite spacer.)

6. Turn screw "D" (rear screw) until muting relay armature rests 15 to 20 thousandths of an inch from the magnet pole. (Too close spacing will cause intermittent muting due to vibration.) (15 thousandths = 1/64").

TO REMOVE LATCH BAR ASSEMBLY

1. Back up on front switch adjustment screw (A) until latch tips rest outside the diameter of the bakelite ring separators.

2. Remove comb shaped latch tension spring. (E)

3. Remove the hex-head machine screw which extends through the small angle bracket into the brass latch bar bearing shaft underneath the tuner. (Screw not visible in photo.)

4. Pull out latch and shaft assembly. (F)

NOTE: To re-assemble, reverse the above procedure, and take particular care that:

1. Latch bar tips center on latch rings. They should not rub bakelite ring separators. (Spacing is adjustable through elongated hole in small bracket under tuner.)

2. When readjusting screw (A), turn it all the way in until latch tips touch high side of rings; then back screw up one-half turn (See reversing switch adjustment on Page .)

TO REMOVE LATCH RING ASSEMBLY

1. Back up on switch adjustment screw (A) until latch tips rest outside the diameter of the bakelite ring separators.

2. Remove locking screw. (G)

3. Remove the three locking levers. (H)

4. Lift the locking nut off the end of the rotor shaft.

5. Carefully loosen the three screws (J) which hold the ring assembly to the rotor hub, and remove all rings and separators as a unit, being careful to keep the three screws in position through the assembly.

NOTE: To reassemble, reverse the above procedure. Work carefully - do not let the rings and separators get off the screws.

TO REPLACE DEFECTIVE LATCH RING

1. Remove the entire latch ring assembly from the rotor hub. (See instructions above.)

2. Lay assembly on flat surface with screw heads down.

3. Remove rings, separators and brass spacing collars, one at a time, until the defective ring is exposed.

NOTE: Reassemble parts one at a time, being careful that rings, separators, and spacers are in the correct position.

CAUTION: Be careful to replace rings in original position. Turning the ring over will reverse the position of the notch and will result in faulty tuning.

TO REMOVE DEFECTIVE HUB AND GEAR

1. Remove the entire latch ring assembly from the rotor hub. (See instructions above.)

2. Loosen the four Bristo set screws in the rotor hub.

3. Loosen the one Bristo set screw in the bakelite flexible shaft coupling.

4. Pull the rotor hub off the gang shaft. The manual tuning gear and coupling will have to be removed at the same time. The brass collar on the motor shaft may also need to be removed.

NOTE: When installing a new hub, turn the gang to full mesh and the hub gear against its stop before tightening set screws.

3S7111	Set Screw (8-32x3/16 Brl. Hd.) Blk.	.DOZ. $0.85
3S7114	Set Screw (8-32x1/4 Slab Hd.)	PERC. 1.50
3S7243	Screw (5-40x7/8 Sl. Hdls. MS) CP.	PERC. 1.05
3S7244	Screw (5-40x5/8 Sl. Hdls. MS) CP.	PERC. 1.00
3S7245	Screw (5-40x3/8 Sl. Hdls. MS) CP.	PERC. 1.00
4S7616	Washer (5/16-.171-.016) Brass	.DOZ. .10
8A10306	Tub. Cond. & Strap (.03-100V.)	.15
64A11245	Switch Holding Plate	.DOZ. .25
8K11624	Muting Magnet Assembly (Black)	.45
4X11633	Spring Washer (.562-.190-.008)	.DOZ. .10
9A13298	Plug Receptacle (9 Prong)	.30
62B13302	Rotor Hub	.40
43B13303	Station Ring	.25
32A13310	Spacer Ring (.015)	.DOZ. .70
43A13311	Latch Collar	.10
49A13312	Clamping Screw Disc	.DOZ. .15
1X13313	E5T Tuner Assembly Complete with Gang	18.00
2A13314	Clamping Lever Nut	.DOZ. .75
41A13315	Latch Spring (6 Finger)	.05
45A13318	Clamping Lever	.DOZ. .35
45B13319	Latch Arm (No. 1)	.20
45K13320	Latch Arm (No. 6)	.20
45B13321	Latch Arm (No. 3)	.20
45K13322	Latch Arm (No. 4)	.20
45B13323	Latch Arm (No. 2)	.20
45K13324	Latch Arm (No. 5)	.20
32K13325	Spacer Ring (.031)	.10
4K13328	Idler Gear Assembly	.75
59B13330	Tuner Motor (6-8V.D.C.)	3.90
47A13331	Latch Shaft	.30
47A13332	Idler Shaft	.10
7A13334	Shaft Retainer Bracket	.05
44A13335	Motor Pinion (1/2" PD)	.20
43A13336	Clutch Collar	.10
41A13338	Clamp Tension Spring	.DOZ. .20
7K13341	Idler Shaft Support (.062)	.05
7A13342	Idler Shaft Support (.109)	.10
4A13343	Clutch Washer (.562-.189-.019)	.DOZ. .10
4A13344	Spacer Washer (.312-.169-.090)	.DOZ. .25
19B13348	Variable Condenser (3 Gang) For E5T	4.00
1X13350	Rotor Assembly Complete	3.00
1K13353	Tuner Magnet Assembly (Black)	.45
1X13356	Latch Assembly Complete	1.50
1X13357	Tuner Switch Assembly	.90
7A13362	Relay Bracket	.05
1X13413	E6T Tuner Assembly Complete with Gang	17.50
3A13731	Screw (8-32x7/8 Spec. MS) CP.	.DOZ. .10
3A13732	Screw (8-32x3/4 Spec. MS) CP.	.DOZ. .10
19B14154	Variable Condenser (2 Gang) for E6T	3.50
1X14214	E7T Tuner Assembly Complete with Gang	21.50
19B14653	Variable Condenser (Hi-Frequency) P-69-14	7.50

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

A. Switch adjustment screw
B. Switch adjustment screw
C. Switch adjustment screw
D. Switch adjustment screw
E. Latch tension spring
F. Latch and shaft assembly
J. Latch ring assembly screw
K. Manual tuning gear and coupling
L. Motor pinion
M. Pinion collar
N. Tuning Motor
P. Muting relay coil
R. Reversing switch
G. Locking Screw
H. Locking lever

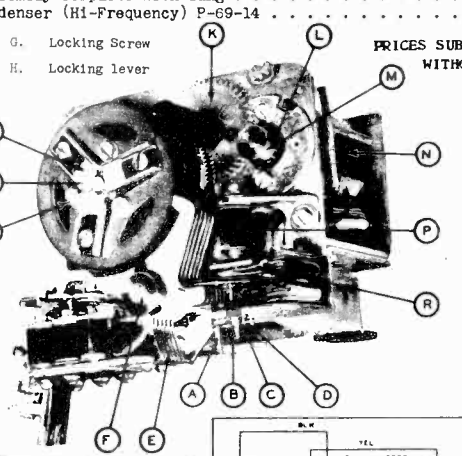


Figure 2.

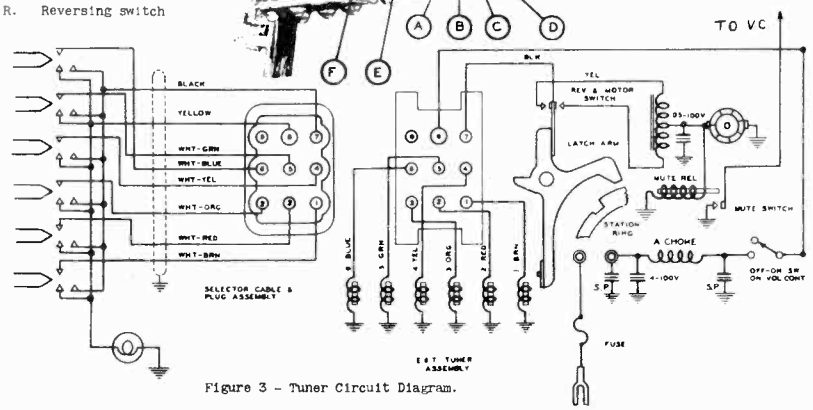


Figure 3 - Tuner Circuit Diagram.

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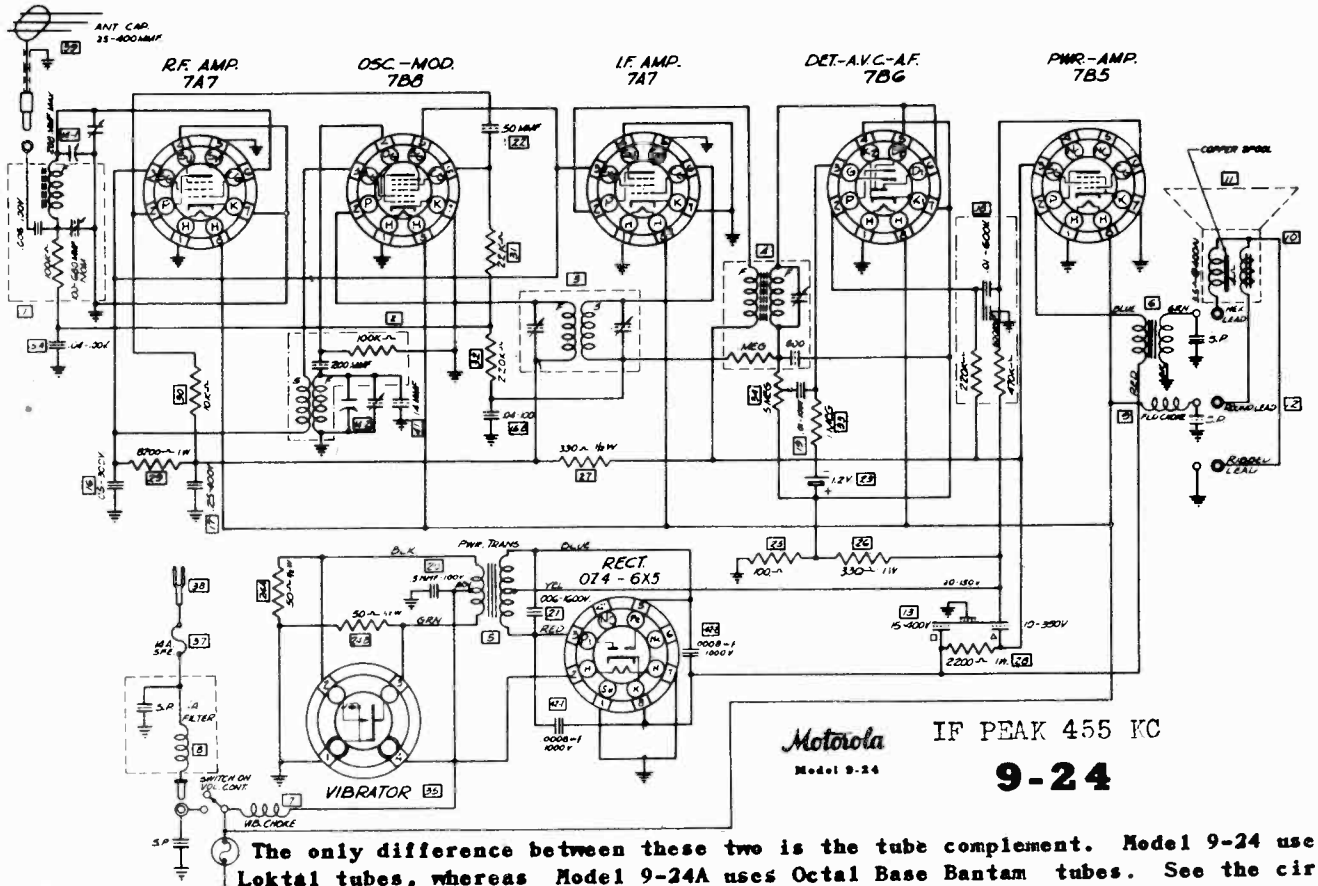
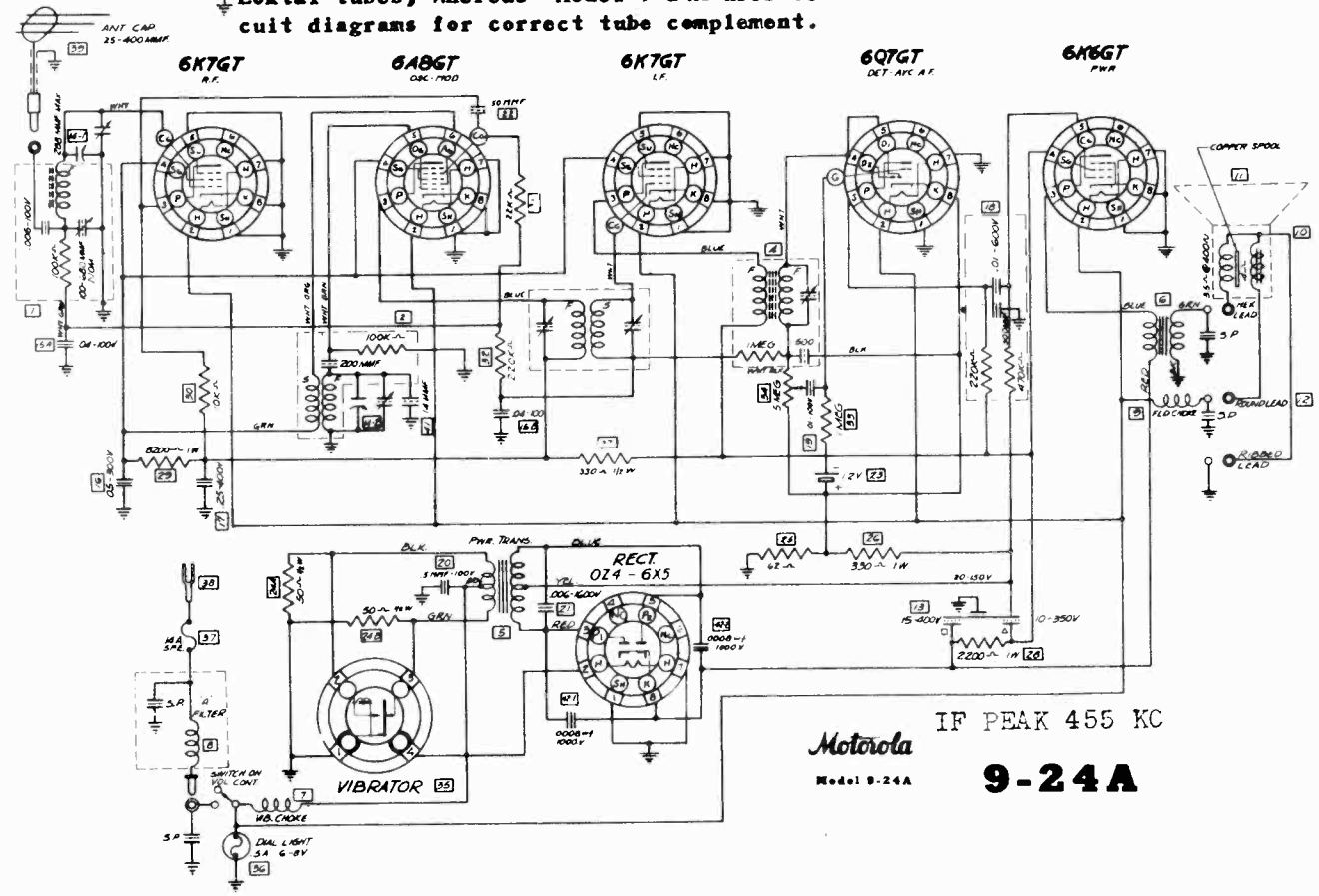
MODEL 9-24
MODEL 9-24A
Schematics



The only difference between these two is the tube complement. Model 9-24 uses Loktal tubes, whereas Model 9-24A uses Octal Base Bantam tubes. See the circuit diagrams for correct tube complement.



ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Connect the speaker and battery.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

I. F. ALIGNMENT

1. Connect the signal generator to the antenna lead through a .1 MF condenser and to chassis ground. Turn the condenser gang completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 455 K.C. and carefully adjust the single trimmer in the Diode coil can to the point showing the highest reading on the output meter. (Advance the signal generator attenuator if necessary to pick up signal.)

3. Adjust the two trimmers in the I.F. coil can to the pount showing the highest output reading.

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

R. F. ALIGNMENT

1. Change to 40 MMF condenser in signal generator lead. Set signal generator at 1550 K.C. and with the condenser gang still completely out of mesh, adjust the oscillator trimmer to the point showing the highest output reading.

2. Set the signal generator at 1400 K.C. and turn the condenser gang to the signal at 1400 K.C. Adjust the antenna trimmer on the condenser gang to the point showing the highest output reading.

3. Set the signal generator at 600 K.C. and rock the pointer at the 600 K.C. position on the dial scale, while adjusting the antenna padder, until a combination is found which gives highest output reading.

NOTE: The antenna padder is reached through a hole in the bottom of the chassis base, directly under the antenna coil can.)

SENSITIVITY AND STAGE GAIN MEASUREMENTS

These stage gain measurements will, if properly used, enable you to localize trouble quickly. They are intended for use with a signal generator that is accurately calibrated in microvolts.

Starting with the second detector - first audio stage, and working back step by step to I.F., Osc.-Mod., R.F. and finally to the antenna terminal, the circuit in which the trouble exists will quickly be determined by evidence of low gain, when signal generator attenuation readings are compared to the normal values as shown in the table.

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500M ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a 40 MMF condenser in place of the .1 MF. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
20,000	455 K.C.	IF Grid	.1 MF	.5 Meg	1.87 Volts
200	455 K.C.	Mod. Grid	.1 MF	.5 Meg	1.87 Volts
250	600 K.C.	Mod. Grid	.1 MF	.5 Meg	1.87 Volts
125	600 K.C.	RF Grid	.1 MF	.5 Meg	1.87 Volts
10	600 K.C.	Ant. Lead	40 MMF	None	1.87 Volts

* For one watt output.
** Meter connected across voice coil.

V.C. Resistance -3.5 ohms at 400 cycles.
1.87 Volts equals 1 watt output.

VOLTAGE CHART

TUBE	POSITION	PLATE	SCREEN	CATHODE	OSC. PLATE
7A7 or 6K7GT	RF	120	95	0	-
7B8 or 6A8GT	Osc.-Mod.	175	95	0	95
7A7 or 6K7GT	IF	175	95	0	-
7B6 or 6Q7GT	Det.Avc.	65	-	-2.5	-
7B5 or 6K6GT	Output	225	180	0	-
0Z4 or 6X5	Rect.	AC	-	230	-

All measurements from chassis ground to socket terminal using 1000 ohms per volt meter.
Current Consumption 6.5 Amps.
Battery voltage 6.3 V.
Maximum Power Output 5 Watts.

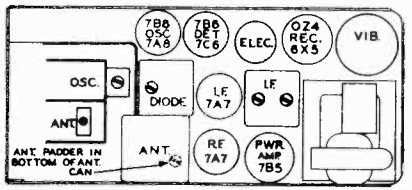


Figure 1 - Trimmer Locations

DIAL DRIVE CORD ASSEMBLY - PART NO. 1X14731

1. Remove broken cord, dial scale and dial pointer.

2. If exact Motorola assembly is not available, cut a piece of 30 lb. silk fish cord 32 inches long. CONDENSER GANG MUST BE MESHED.

3. Double the cord at a point 11 inches from one end and thread the loop through the hole in the drive raceway. See Fig.

4. Tie a large knot in the cord or use an eyelet large enough to prevent the cord from passing through the hole in the raceway. You will now have cord (A) 21 inches long, and cord (B) 11 inches long extending from the raceway as in Fig. 3.

5. Loop cord (A) under and over idler pulley No. 1, as shown in Fig. 4 and holding the end of the cord tight, turn the raceway 2½ turns to the right (clockwise), thereby winding 2½ turns of cord (A) on the raceway.

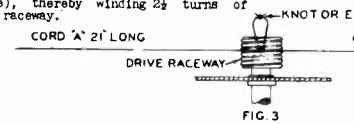


FIG. 3

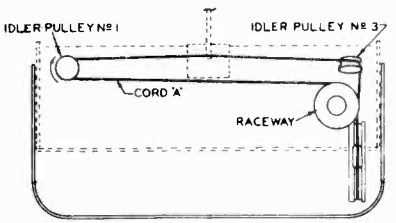


FIG. 4

6. Use a common ordinary paper clip to clip the loose end of cord (A) to the front plate of the chassis, so you can work on cord (B) for a while.

7. Take cord (B) and bring it over the raceway and under idler pulley No.2 as shown in Fig.5.

8. Make one complete turn around drive pulley as shown in Fig. 5 and clip the end of cord (B) to the edge of the chassis with a paper clip.

9. Remove the paper clip holding cord (A) and continue its routing from idler pulley No. 1 over idler pulley No. 3 and 1/2 turn around the drive pulley as shown in Fig. 5.

10. Bring both loose ends of cord through the slot in the drive pulley and tie them together tightly inside the slot.

11. Then tie in one end of the tension spring, Part No. 41A12854 and hook the other end of the spring on the ear stamped out of the washer. Cut off surplus cord.

12. Replace pointer and dial scale.

13. To set pointer to correct frequency, tune in a station of known frequency and adjust position of pointer on string.

14. Secure pointer to string with a drop of shellac.

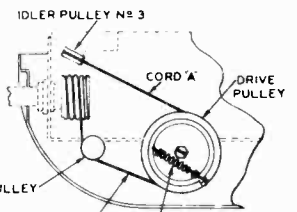


FIG. 5

DIAL CORD INSTRUCTIONS

BACKLASH CORD AND SPRING ASSEMBLY - PART NO. 1X14730

NOTE: If exact Motorola assembly is not available, use original spring and 30 lb. silk fish cord to make up assembly to dimensions as shown at the top of Fig. 2.

1. Turn gang to fully meshed position.

2. Loop long end of cord around set screw (A) in condenser gear and hook around third tooth of gear ahead of set screw.

3. Make one complete turn around condenser rotor shaft.

4. Stretch spring and loop other end around set screw (B) in tuner gear.

NOTE: Spring tension must be sufficient to take up all backlash in gear train. To increase tension, hook cord around fourth tooth in Step 2. To decrease tension, hook around second tooth.

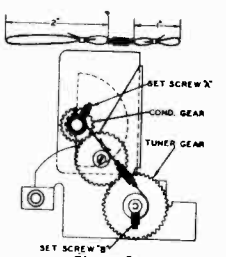


Figure 2.

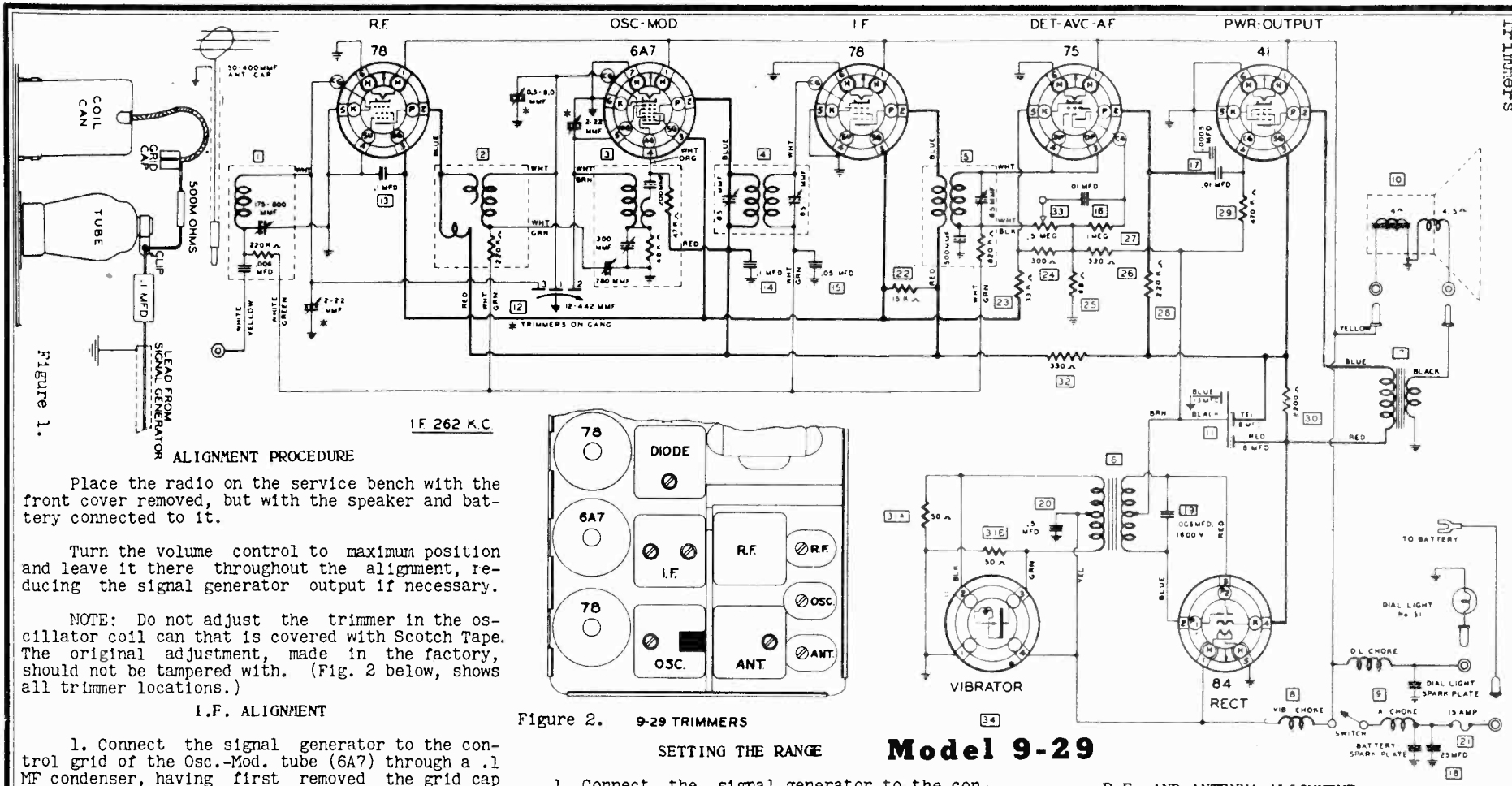


Figure 1.

I.F. 262 K.C.

Figure 2. 9-29 TRIMMERS

Model 9-29

ALIGNMENT PROCEDURE

Place the radio on the service bench with the front cover removed, but with the speaker and battery connected to it.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

NOTE: Do not adjust the trimmer in the oscillator coil can that is covered with Scotch Tape. The original adjustment, made in the factory, should not be tampered with. (Fig. 2 below, shows all trimmer locations.)

I.F. ALIGNMENT

1. Connect the signal generator to the control grid of the Osc.-Mod. tube (6A7) through a .1 MF condenser, having first removed the grid cap from the top of the tube. Connect a 500,000 ohm leak resistor from the grid of the tube to the grid cap just removed from the tube. (See Fig. 1.) Turn the condenser gang completely out of mesh. Connect an output meter across speaker voice coil.

2. Set the signal generator at 262 K.C. and carefully adjust the single trimmer in the Diode coil can to he point showing the highest reading on the output meter.

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

SETTING THE RANGE

1. Connect the signal generator to the control grid of the R.F. tube (78) using the same .1 MF condenser and the same 500,000 ohm leak resistance.

2. Set the signal generator at 1560 K.C. and with the condenser gang completely out of mesh adjust the trimmer on the oscillator section of the condenser gang to the point showing the highest output reading.

3. Set the signal generator at 535 K.C. Turn the condenser gang completely in mesh and adjust the 600 K.C. trimmer in the Oscillator coil can for the highest output reading.

NOTE: The adjustments above set the range so the receiver will track with the calibrations in the control head.

R.F. AND ANTENNA ALIGNMENT

1. Connect the signal generator to the antenna lead through a 40 MMF condenser and to chassis ground. Set the signal generator at 600 K.C. and turn the condenser gang until the signal is heard. Adjust the trimmer on the antenna coil can for the maximum output reading.

2. Set the signal generator at 1400 K.C. Turn the condenser gang until the signal is heard. Adjust the trimmer on the antenna section of the condenser gang for maximum output reading.

3. Adjust the trimmer on the R.F. section of the condenser gang for maximum output reading.

4. Recheck steps 1, 2, and 3, for accuracy.

MODEL 9-29
Voltage, Sensitivity, Gain
MODEL 9-49
Alignment, Sensitivity
Socket Trimmers, Gain

GALVIN MFG. CORP.

AUTOMOBILE RECEIVER

Model 9-49

SENSITIVITY AND STAGE GAIN MEASUREMENTS

These stage gain measurements will, if properly used, enable you to localize trouble quickly. They are intended for use with a signal generator that is accurately calibrated in microvolts.

Starting with the second detector - first audio stage, and working back step by step to I.F., Osc.-Mod., R.F. and finally to the antenna terminal, the circuit in which the trouble exists will quickly be determined by evidence of low gain, when signal generator attenuation readings are compared to the normal values as shown in the table.

All stage-gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500M ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a 40 MMF condenser in place of the .1 MF. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
.25 Volts	400 cycles	7B6 Grid	.1 MF	.5 Meg	1.74 Volts
25,000	262 K.C.	7A7 Grid(I.F.)	.1 MF	.5 Meg.	1.74 Volts
700	262 K.C.	7B8 Grid	.1 MF	.5 Meg	1.74 Volts
800	600 K.C.	7B8 Grid	.1 MF	.5 Meg	1.74 Volts
45	600 K.C.	7A7 Grid(R.F.	.1 MF	.5 Meg	1.74 Volts
2	600 K.C.	Ant. Lead	40 MMF	None	1.74 Volts

* For one watt output.

** Meter connected across voice coil.

V.C. impedance - 3 ohms at 400 cycles.

1.74 volts equals 1 watt output.

CAUTION

If you use a screw driver to pry out Loktal tubes, be careful that you do not crack the glass bead around the tube pins.

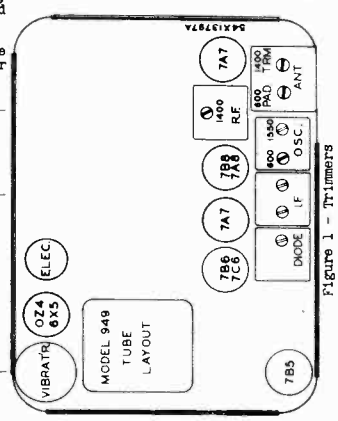


Figure 1 - Trimmers

ALIGNMENT:
For alignment, follow procedure as for Model 9-44.

AUTOMOBILE RECEIVER

Model 9-29

SENSITIVITY AND STAGE GAIN MEASUREMENTS

These stage gain measurements will, if properly used, enable you to localize trouble quickly. They are intended for use with a signal generator that is accurately calibrated in microvolts.

Starting with the second detector - first audio stage, and working back step by step to I.F., Osc.-Mod., R.F. and finally to the antenna terminal, the circuit in which the trouble exists will quickly be determined by evidence of low gain, when signal generator attenuation readings are compared to the normal values as shown in the table.

All stage-gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the top grid terminal of the tube through a .1 MF condenser, with a 500M Ohm resistor connected as a leak resistance between the grid of the tube and the grid cap which has been removed. (See Fig. 1 on Page 1.)

When measuring over-all sensitivity at the antenna terminal, use a 40 MMF condenser in place of the .1 MF. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
.25 Volts	400 Cycles	7B Grid	.1 MF	.5 Meg	2.2 Volts
25,000	262 K.C.	7B Grid (I.F.)	.1 MF	.5 Meg	2.2 Volts
700	262 K.C.	6A7 Grid	.1 MF	.5 Meg	2.2 Volts
800	600 K.C.	6A7 Grid	.1 MF	.5 Meg	2.2 Volts
45	600 K.C.	7B Grid (R.F.)	.1 MF	.5 Meg	2.2 Volts
3	600 K.C.	Ant. Lead	40 MMF	None	2.2 Volts

* For one watt output.

** Meter connected across voice coil.

V.C. Resistance - 5 ohms at 400 cycles.

2.2 Volts equals 1 watt output.

VOLTAGE CHART - MODEL 9-29

TUBE	POSITION	PLATE	SCREEN	CATHODE	OSC. PLATE
7B *	RF	185	85	-	-
6A7 *	Osc.-Mod.	185	85	-	100
7B *	IF	185	85	-	-
7B	Det.-Avc.	150	-	-2	-
41 **	Output	235	200	-	-
84	Rect.	AC	-	250	-

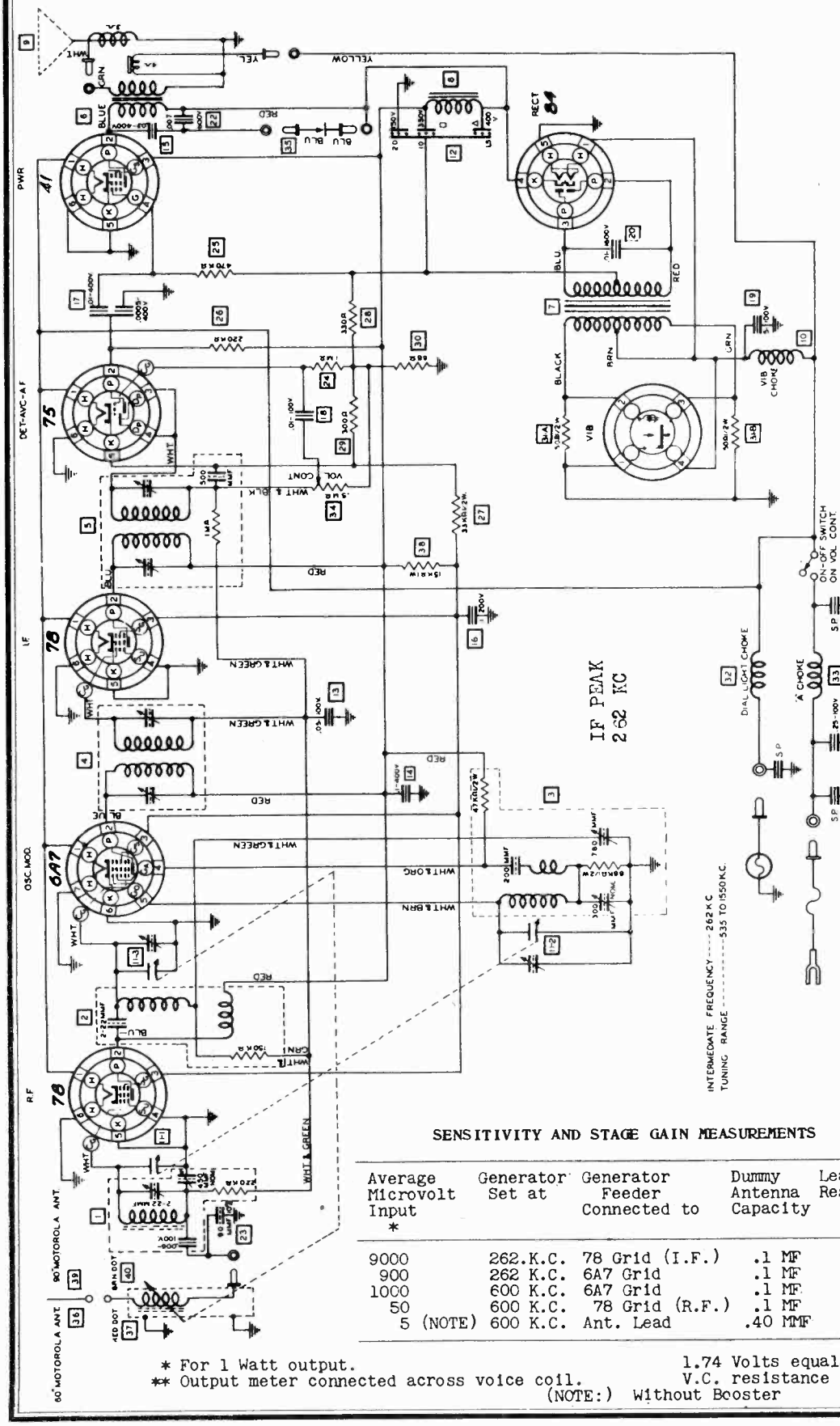
Current - 6.5 Amps. at 6.3 Volts

* Bias —3 V from B stick Maximum power output - 3.5 Watts

** Bias —17 V from B stick All readings from chassis ground with 1000 ohms per volt meter.

GALVIN MFG. CORP.

MODEL 9-44
Schematic, Voltage, Gain
Sensitivity



SENSITIVITY AND STAGE GAIN MEASUREMENTS

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
9000	262.K.C.	78 Grid (I.F.)	.1 MF	.5 Meg	1.74 Volts
900	262 K.C.	6A7 Grid	.1 MF	.5 Meg	1.74 Volts
1000	600 K.C.	6A7 Grid	.1 MF	.5 Meg	1.74 Volts
50	600 K.C.	78 Grid (R.F.)	.1 MF	.5 Meg	1.74 Volts
5 (NOTE)	600 K.C.	Ant. Lead	.40 MMF	None	1.74 Volts

* For 1 Watt output.
** Output meter connected across voice coil.
1.74 Volts equals 1 Watt output.
V.C. resistance - 3 ohms.
(NOTE:) Without Booster

MODEL 9-44
Socket, Trimmers, Drive
Alignment
MODEL 9-49
Alignment

GALVIN MFG. CORP.

MODEL 9-69
Sensitivity, Gain, Socket
Trimmers, Alignment, Voltage

SENSITIVITY AND STAGE GAIN MEASUREMENTS
MODEL 9-69

These stage gain measurements will, if properly used, enable you to localize trouble quickly. They are intended for use with a signal generator that is accurately calibrated in microvolts.

Starting with the second detector - first audio stage, and working back step by step to I.F., Osc.-Mod., R.F. and finally to the antenna terminal, the circuit in which the trouble exists will quickly be determined by evidence of low gain, when signal generator attenuation readings are compared to the normal values as shown in the tables.

All stage-gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500 M Ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a 40 MMF condenser in place of the .1 MF.

It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
20,000	262 K.C.	7A7 Grid (IF)	.1 MF	.8 Meg	1.74 Volts
400	262 K.C.	7B8 Grid	.1 MF	.5 Meg	1.74 Volts
500	600 K.C.	7B8 Grid	.1 MF	.5 Meg	1.74 Volts
30	600 K.C.	7A7 Grid(RF)	.1 MF	.5 Meg	1.74 Volts
1	600 K.C.	Ant. Lead	40 MMF	None	1.74 Volts

1.74 Volts equals 1 Watt output.

* For 1 Watt output.

V.C. resistance - 3 ohms.

** Output meter connected across voice coil.

VOLTAGE CHART - MODEL 9-69

TUBE	POSITION	PLATE	SCREEN	CATHODE	OSC. PLATE
7A7	RF	240	85	4	-
7B8	Osc.-Mod.	240	85	4	110
7A7	I.F.	240	85	4	-
7A6	Det.Avc.	0	0	0	-
7B6	A.F.	140	-	0	-
7C5	Output	250	250	15	-
7C5	Output	250	250	15	-
0Z4	Rect.	AC	-	260	-

All voltages measured from socket terminal to chassis ground using 1000 Ohms per volt meter.

CAUTION

If you use a screw driver to pry out Loktal tubes, be careful that you do not crack the glass bead around the tube pins.

ALIGNMENT: To align, follow procedure of Model 9-44.

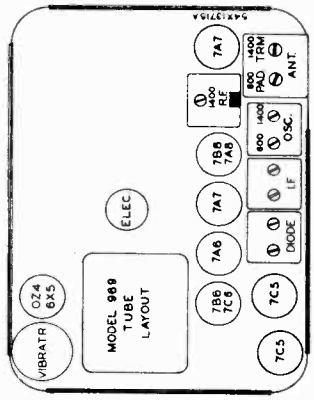


Figure 1 - Trimmers

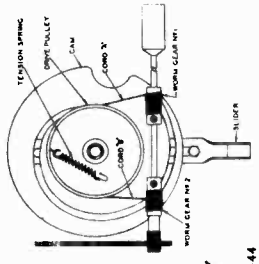


Figure 2

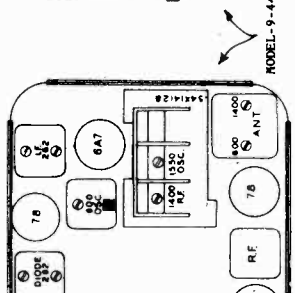


Figure 1 — Trimmers

ALIGNMENT FOR MODELS 9-44, 9-49 & 9-69

Place the radio on the service bench with the front cover removed, but with the speaker and battery connected to it.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output, if necessary.

NOTE: Do not adjust trimmer in the oscillator coil can that is covered with Scotch Tape. The original adjustment made in the factory should not be tampered with.

Fig. 1 shows all trimmer locations.

I.F. ALIGNMENT

1. Connect the signal generator to the control grid of the Osc.-Mod. tube (6A7). Turn the condenser gang completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 262 K.C. and carefully adjust the two trimmers in the Diode coil can to the point showing the highest reading on the output meter.

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and Diode adjustments several times for maximum accuracy.

SETTING THE RANGE

1. Connect the signal generator to the control grid of the R.F. tube (7B), using the same .1 MF condenser.

2. Set the signal generator at 1550 K.C. and with the condenser gang completely out of mesh adjust the oscillator trimmer on the middle section of the condenser gang to the point showing the highest output reading.

3. Set the signal generator at 535 K.C. Turn the condenser gang completely in mesh and adjust the 600 K.C. padder in the oscillator coil can for the highest output reading.

NOTE: Adjustments above set the range so the receiver will track with the calibrations in the control head.

RF AND ANTENNA ALIGNMENT

1. Connect the signal generator to the antenna lead through a 40 MMF condenser and to chassis ground. Set the signal generator at 600 K.C. and turn the condenser gang until the signal is heard. Adjust the 600 K.C. padder in the antenna coil can for maximum output reading, while slightly rocking the condenser gang.

2. Set the signal generator at 1400 K.C. Turn the condenser gang until the signal is heard. Adjust the 1400 K.C. trimmer in the antenna coil can for maximum output reading.

3. Adjust the 1400 K.C. R.F. trimmer on the inside section of the condenser gang for maximum output reading.

4. Recheck steps 1, 2, and 3, for accuracy.

TO RESTRING BOOST-O-MATIC DRIVE MODEL 9-44

1. Turn the condenser gang to the fully open position.

2. Turn the booster pulley and cam assembly until the forked slider has been drawn all the way in and the hole in the rim of the drive pulley is at the top, lining up with the pulley stud and the slider, as indicated in Fig. 2.

3. If the old string is broken, cut a new piece of 30 pound test silk fish cord, 31" long, and tie knots or eyelets in both ends so the length between the knots is exactly 29½".

4. Double the cord at its exact center and push the loop through the hole in the rim of the drive pulley.

5. Tie the tension spring in the loop thus formed, but do not hook it under the ear stamped out of the pulley. You will now have two equal lengths of string extending from the hole in the pulley which we shall call Cord "A" and Cord "B", as indicated in Fig. 2.

6. Take Cord "A" and wind it clockwise one complete revolution around the drive pulley, counter to the direction of the arrow stamped on the pulley. Hook the end of Cord "A" under the ear stamped out of the pulley. Cord "A" will now be wound around the pulley in the groove provided for the cord.

7. Loosen the set screws in worm gear #1 and hook the knot in Cord "A" in the slot in the end of the worm drive.

8. Turn the worm drive towards you just enough to take up the slack in Cord "A" and tighten the set screws.

9. Hold Cord "B" in your left hand and turn the tuning shaft manually until the condenser gang is closed. This will wind Cord "A" on worm drive #1.

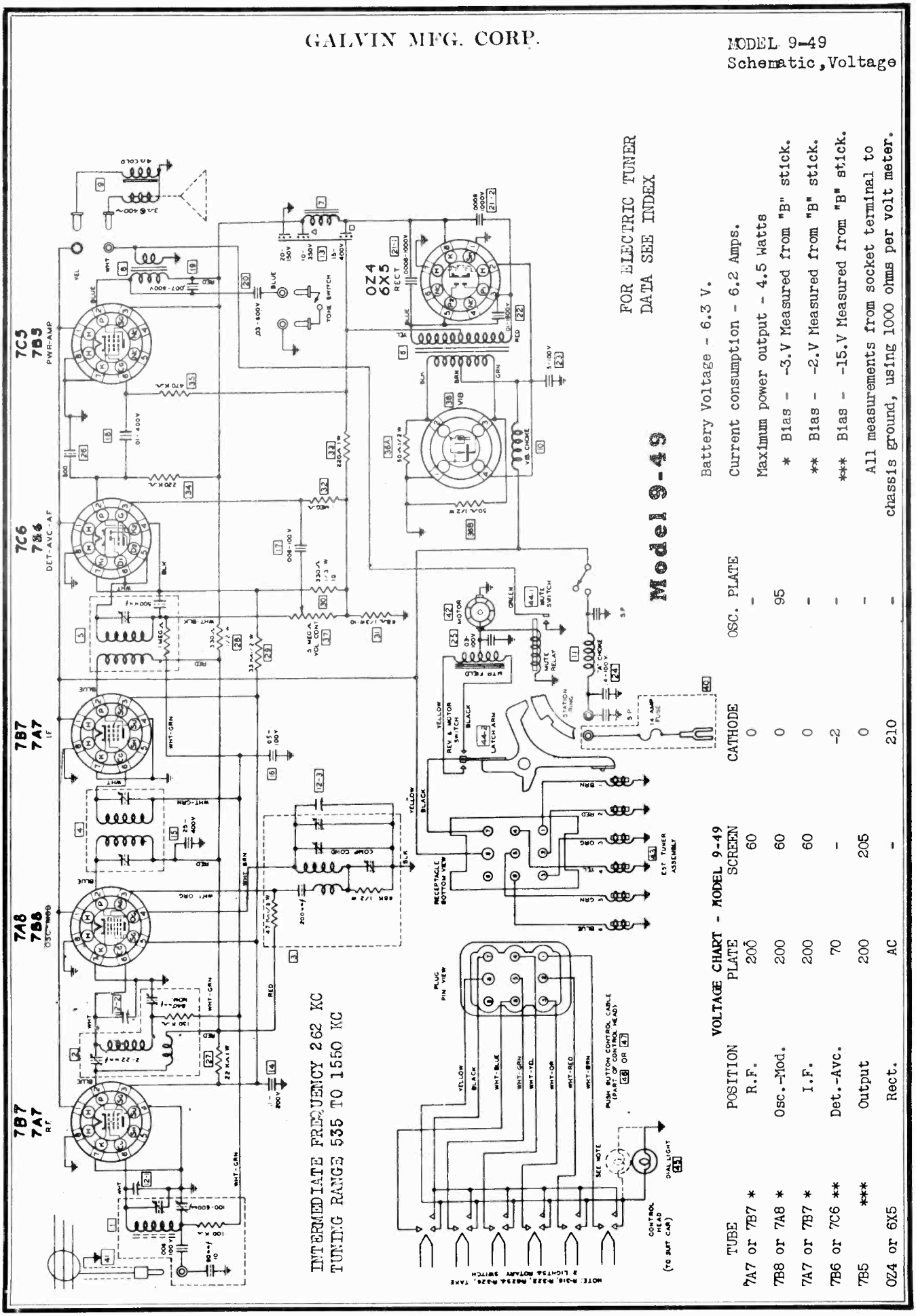
10. Loosen the set screws in worm drive #2 and hook the knot in Cord "B" in the slot in the end of worm drive #2.

11. Turn worm drive #2 away from you just enough to take up the slack in Cord "B" and tighten the set screws.

12. Hook the end of the cord tension spring under the ear stamped out of the pulley. 2 how Cord "A" passes over worm drive #1, whereas, Cord "B" passes under worm drive #2.

GALVIN MFG. CORP.

MODEL 9-49
Schematic, Voltage



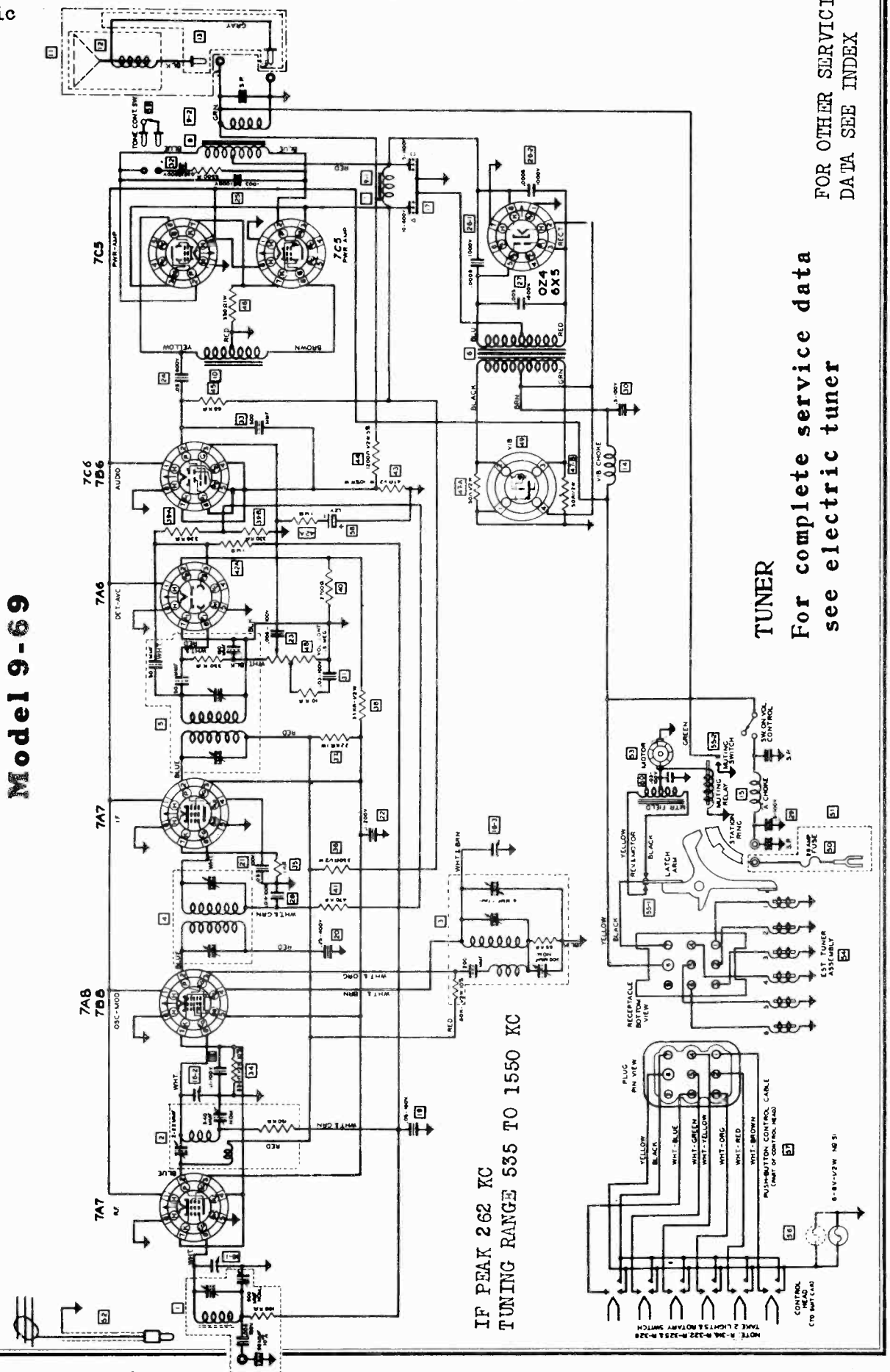
Battery Voltage - 6.3 V.
Current consumption - 6.2 Amps.
Maximum power output - 4.5 Watts
* Bias - -3.V Measured from "B" stick.
** Bias - -2.V Measured from "B" stick.
*** Bias - -15.V Measured from "B" stick.
All measurements from socket terminal to chassis ground, using 1000 ohms per volt meter.

VOLTAGE CHART - MODEL 9-49

TUBE	POSITION	PLATE	SCREEN	CATHODE	OSC. PLATE
7A7 or 7B7 *	R.F.	200	60	0	-
7B8 or 7A8 *	Osc.-Mod.	200	60	0	95
7A7 or 7B7 *	I.F.	200	60	0	-
7B6 or 7C6 **	Det.-Avc.	70	-	-2	-
7B5 ***	Output	200	205	0	-
OZ4 or 6X5	Rect.	AC	-	210	-

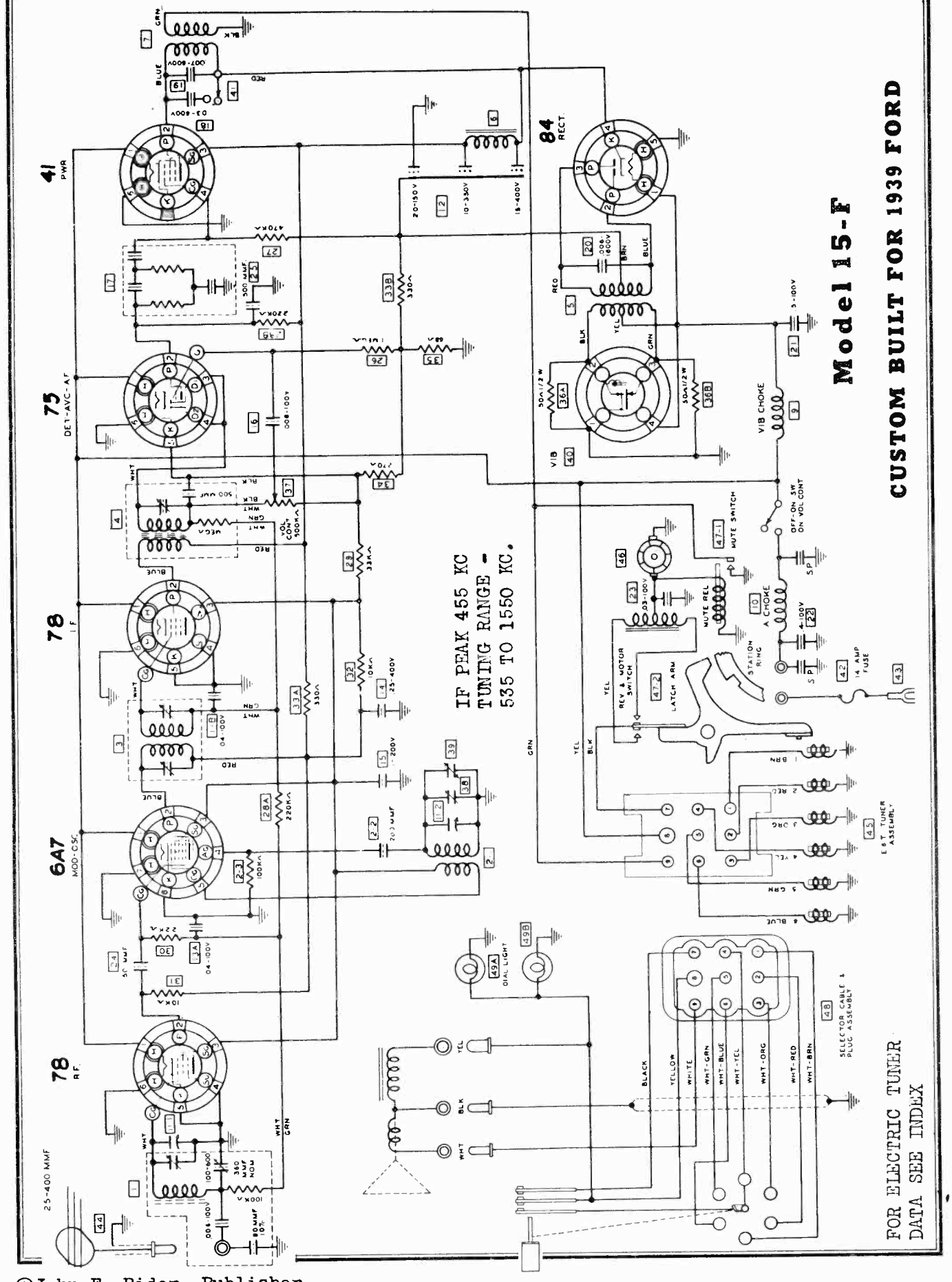
MODEL 9-69
Schematic

GALVIN MFG. CORP.



GALVIN MFG. CORP.

MODEL 15F
Schematic



MODEL 15F
Sensitivity, Gain, Voltage
Alignment, Socket, Trimmers

GALVIN MFG. CORP.

ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Connect the speaker and battery.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

I. F. ALIGNMENT

1. Connect the signal generator to the antenna lead through a .1 MF condenser and to chassis ground. Turn the condenser gang completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 455 K.C. and carefully adjust the single trimmer in the Diode coil can to the point showing the highest reading on the output meter. (Advance the signal generator attenuator if necessary to pick up signal.)

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

R. F. ALIGNMENT

1. Change to 40 MMF condenser in signal generator lead. Set signal generator at 1550 K.C. and with the condenser gang still completely out of mesh, adjust the oscillator trimmer to the point showing the highest output reading.

2. Set the signal generator at 1400 K.C. and turn the condenser gang to the signal at 1400 K.C. Adjust the antenna trimmer on the condenser gang to the point showing the highest output reading.

3. Set the signal generator at 600 K.C. and rock the pointer at the 600 K.C. position on the dial scale, while adjusting the antenna padder, until a combination is found which gives highest output reading.

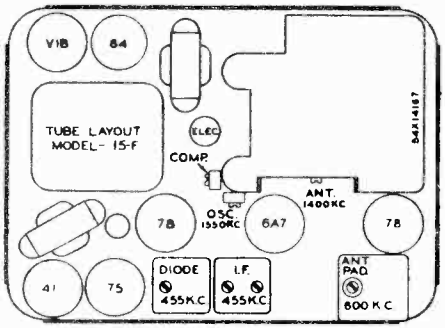


Figure 1 - Trimmers

SENSITIVITY AND STAGE GAIN MEASUREMENTS

These stage gain measurements will, if properly used, enable you to localize trouble quickly. They are intended for use with a signal generator that is accurately calibrated in microvolts.

Starting with the second detector - first audio stage, and working back step by step to I.F., Osc.-Mod., R.F. and finally to the antenna terminal, the circuit in which the trouble exists will quickly be determined by evidence of low gain, when signal generator attenuation readings are compared to the normal values as shown in the table.

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500M ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a 40 MMF condenser in place of the .1 MF. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
20,000	455 K.C.	IF Grid	.1 MF	.5 Meg	1.74 Volts
200	455 K.C.	Mod. Grid	.1 MF	.5 Meg	1.74 Volts
250	600 K.C.	Mod. Grid	.1 MF	.5 Meg	1.74 Volts
125	600 K.C.	RF Grid	.1 MF	.5 Meg	1.74 Volts
10	600 K.C.	Ant. Lead	40 MMF	None	1.74 Volts

* For 1 Watt output. 1.74 Volts equals 1 Watt output.

** Output meter connected across voice coil. V.C. resistance - 3 ohms.

VOLTAGE CHART

TUBE	POSITION	PLATE	SCREEN	CATHODE	OSC. PLATE
78*	RF	145	85	0	-
6A7	Osc.-Mod.	200	85	0	90
78	IF	205	85	0	-
75**	Det.Avc.	85	-	-2.5	-
41***	Output	200	205	0	-
84	Rect.	AC	-	215	-

All measurements from chassis ground to socket terminal using 1000 ohms per volt meter.

Battery voltage 6.3 V. * Bias- -3.V from "B" Stick.

Current Consumption 6.5 Amps. ** Bias- -2.V from "B" Stick.

Maximum Power Output 5 Watts. *** Bias- -17.V from "B" Stick.

GALVIN MFG. CORP.

MODEL 16C
Schematic, Socket
Trimmers

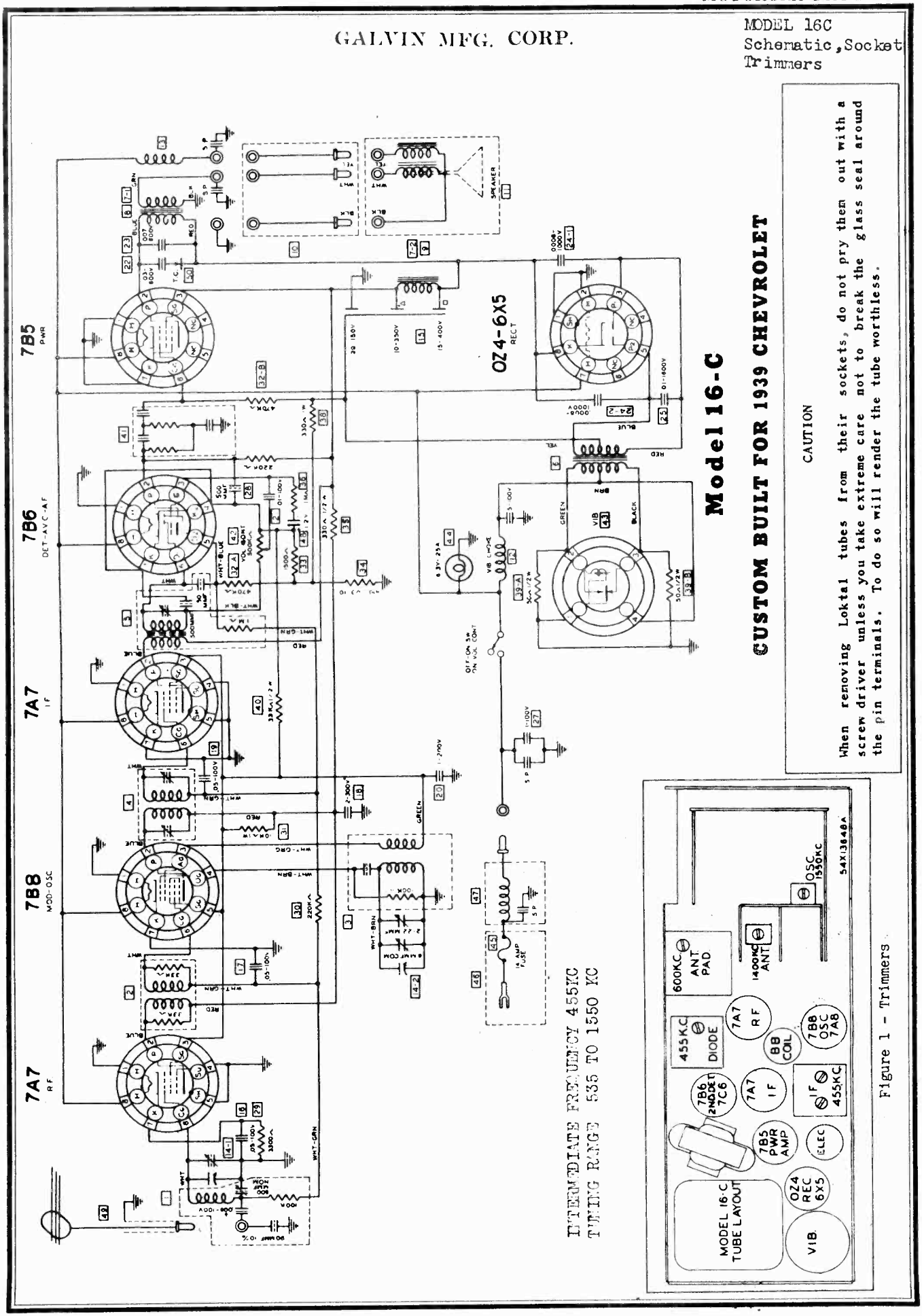


Figure 1 - Trimmers

ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Connect the speaker and battery.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

I. F. ALIGNMENT

1. Connect the signal generator to the antenna lead through a .1 MF condenser and to chassis ground. Turn the condenser gang completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 455 K.C. and carefully adjust the single trimmer in the Diode coil can to the point showing the highest reading on the output meter. (Advance the signal generator attenuator if necessary to pick up signal.)

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

R. F. ALIGNMENT

1. Change to 40 MMF condenser in signal generator lead. Set signal generator at 1550 K.C. and with the condenser gang still completely out of mesh, adjust the oscillator trimmer to the point showing the highest output reading.

2. Set the signal generator at 1400 K.C. and turn the condenser gang to the signal at 1400 K.C. Adjust the antenna trimmer on the condenser gang to the point showing the highest output reading.

3. Set the signal generator at 600 K.C. and rock the pointer at the 600 K.C. position on the dial scale, while adjusting the antenna padder, until a combination is found which gives highest output reading.

DIAL DRIVE CORD ASSEMBLY

1. Remove broken cord.
2. If exact Motorola assembly is not available, cut a piece of 30 lb. silk fish cord 30 inches long. CONDENSER GANG MUST BE MESHED.
3. Double the cord in the middle and thread the loop through the hole in the drive raceway. See Fig. 3.
4. Tie a large knot in the cord or use an eyelet large enough to prevent the cord from passing through the hole in the raceway. You will now have cord (A) and cord (B) each 15 inches long extending from the raceway as in Fig. 3.
5. Loop cord (A) under idler pulley No. 1, and across the chassis to idler pulley No. 2.
6. Holding the end of cord (A) tight, turn the raceway two and one half turns to the right clockwise), thereby winding two and one half turns of cord (A) on the raceway. (Stop when the hole is at the top.)
7. Use a common paper clip to clip the loose end of cord (A) to the chassis, so you can work on cord (B) for a while.
8. Take cord (B) and bring it over to idler pulley No. 3, as shown in Fig. 4.
9. Continue cord (B) around the drove pulley to the hole and thread the end of the cord through the hole, after which it should be clipped to the chassis.
10. Remove the paper clip holding cord (A) and continue its routing around idler pulley No. 2 to the hole in the drive pulley. Thread the end of the cord through the hole.
11. Tie the loose ends of both cords tightly together inside the hole in the pulley. Then tie in the tension spring and hook the other end around the ear stamped out of the pulley. Cut off surplus cord.
12. To set pointer to correct frequency, tune in a station of known frequency and adjust position of pointer on string.
13. Secure pointer to string with a drop of shellac.
14. Add auxiliary tension spring between cord (A) and cord (B), as shown in Fig. 4.

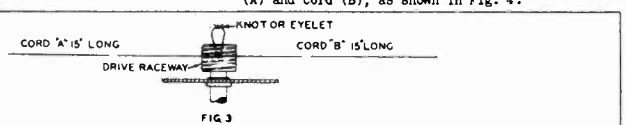


FIG. 3

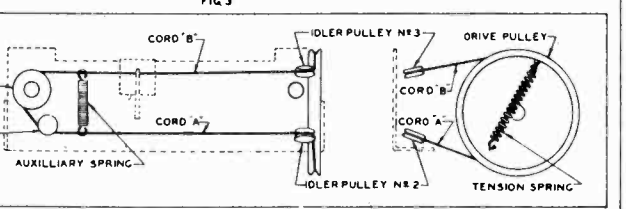


FIG. 4 FIG. 5

Figures 3, 4 and 5

SENSITIVITY AND STAGE GAIN MEASUREMENTS

These stage gain measurements will, if properly used, enable you to localize trouble quickly. They are intended for use with a signal generator that is accurately calibrated in microvolts.

Starting with the second detector - first audio stage, and working back step by step to I.F., Osc.-Mod., R.F. and finally to the antenna terminal, the circuit in which the trouble exists will quickly be determined by evidence of low gain, when signal generator attenuation readings are compared to the normal values as shown in the table.

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500M ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a 40 MMF condenser in place of the .1 MF. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
10,000	455 K.C.	IF Grid	.1 MF	.5 Meg	1.74 Volts
150	455 K.C.	Mod. Grid	.1 MF	.5 Meg	1.74 Volts
200	600 K.C.	Mod. Grid	.1 MF	.5 Meg	1.74 Volts
50	600 K.C.	RF Grid	.1 MF	.5 Meg	1.74 Volts
5	600 K.C.	Ant. Lead	40 MMF	None	1.74 Volts

* For 1 Watt output. 1.74 Volts equals 1 Watt output.

** Output meter connected across voice coil. V.C. resistance - 3 ohms.

VOLTAGE CHART — MODEL 16-C

TUBE	POSITION	PLATE	SCREEN	CATHODE	OSC. PLATE
7A7	RF	210	95	0	-
7B6	Osc.-Mod.	200	95	0	95
7A7	IF	210	95	0	-
7B6	Det.-Avc.	100	-	6	-
7B5	Output	210	205	0	-
0Z4 or 6X5	Rect.	AC	-	215	-

All measurements from chassis ground to socket terminal using 1000 ohms per vole meter.
Battery voltage 6.3 V. Current Consumption 6.8 Amps. Maximum Power Output 5 Watts.

DIAL CORD INSTRUCTIONS

BACKLASH CORD AND SPRING ASSEMBLY

NOTE: If exact Motorola assembly is not available, use original spring and 30 lb. silk fish cord to make up assembly to dimensions as shown at the top of Fig. 2.

1. Turn gang to fully meshed position.
2. Loop short end of cord around set screw (A) in condenser gear.
3. Make one complete turn clockwise around condenser gear hub.
4. Stretch spring and make one complete turn around the tuner gear hub with the long end of the backlash cord.
5. Loop the end of the cord around drive pin "B".

NOTE: Spring tension must be sufficient to take up all backlash in gear train.

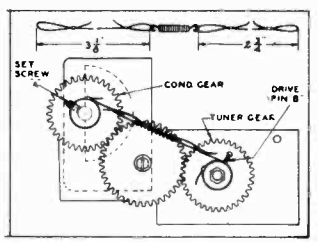
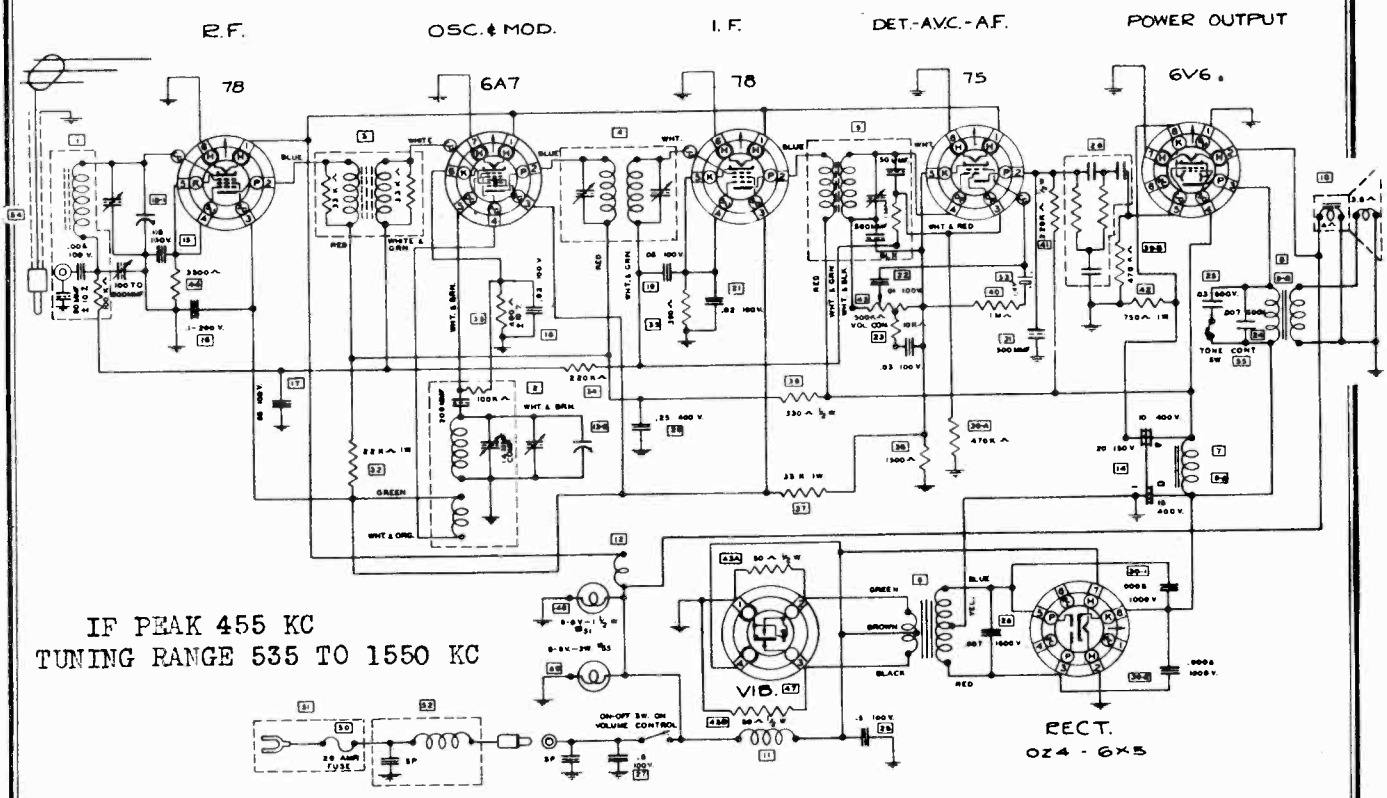


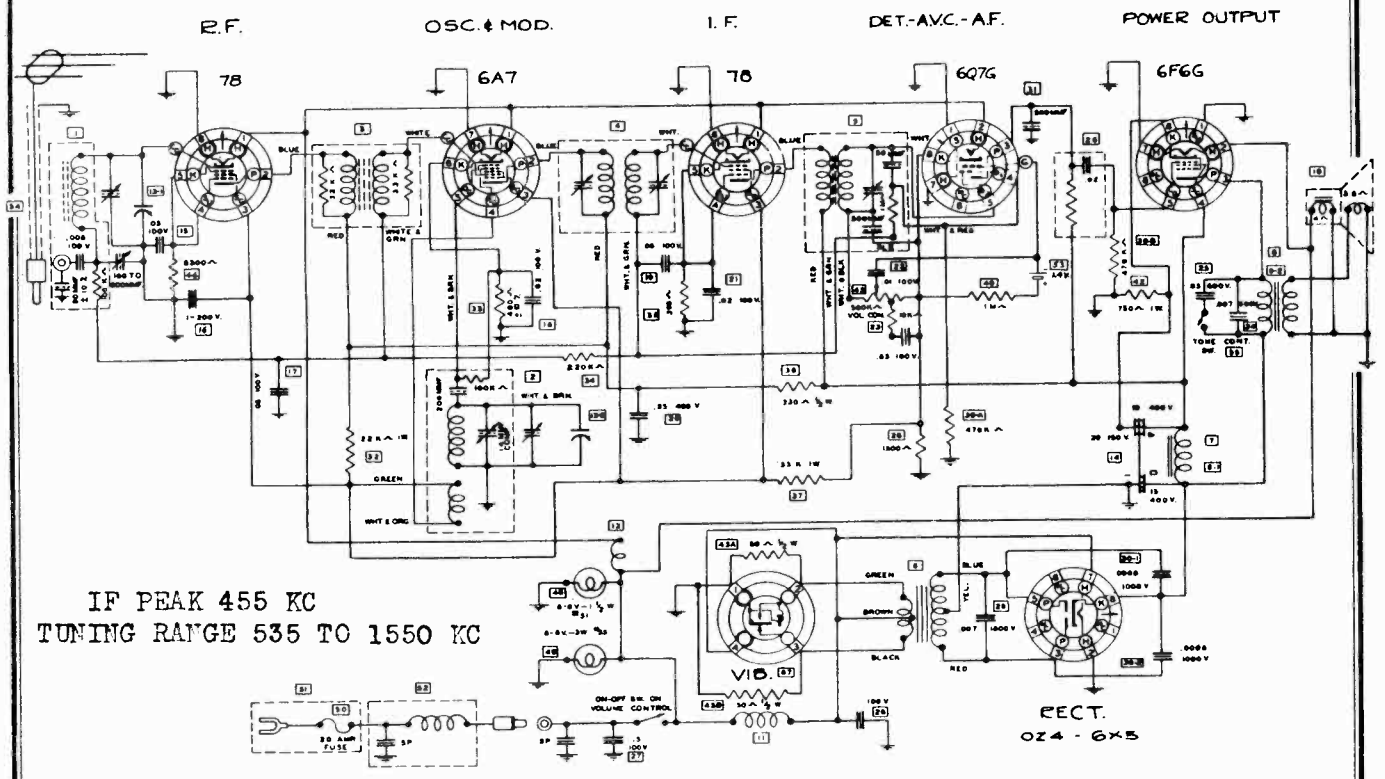
Figure 2

GALVIN MFG. CORP.

MODEL 17-D
MODEL 17-D-A
Schematics



MODEL 17-D



MODEL 17-D-A

ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Connect the speaker and battery.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

I. F. ALIGNMENT

1. Connect the signal generator to the antenna lead through a .1 MF condenser and to chassis ground. Turn the condenser gang completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 455 K.C. and carefully adjust the single trimmer in the Diode coil can to the point showing the highest reading on the output meter. (Advance the signal generator attenuator if necessary to pick up signal.)

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

FIG. 3

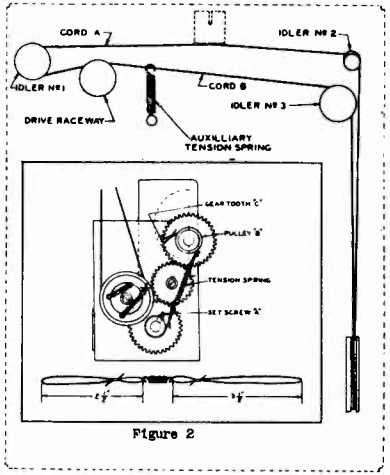


Figure 2

FIG. 4

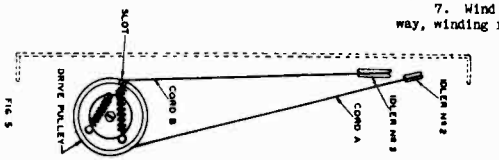


FIG. 5

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

R. F. ALIGNMENT

1. Change to 40 MMF condenser in signal generator lead. Set signal generator at 1550 K.C. and with the condenser gang still completely out of mesh, adjust the oscillator trimmer to the point showing the highest output reading.

2. Set the signal generator at 1400 K.C. and turn the condenser gang to the signal at 1400 K.C. Adjust the antenna trimmer on the condenser gang to the point showing the highest output reading.

3. Set the signal generator at 600 K.C. and rock the pointer at the 600 K.C. position on the dial scale, while adjusting the antenna padder, until a combination is found which gives highest output reading.

NOTE: The antenna padder is reached through a hole in the side of the chassis base, directly under the antenna coil can.

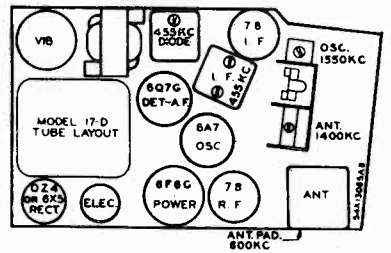


Figure 1 - Trimmers

DIAL DRIVE CORD ASSEMBLY - PART NO. 1X14744

1. Remove broken cord.

2. If exact Motorola assembly is not available, cut a piece of 30 lb. silk fish cord 46 inches long. CONDENSER GANG MUST BE MESHED.

3. Double the cord in the middle and thread the loop through the hole in the drive raceway. See Fig.

4. Tie a large knot in the cord or use an eyelet large enough to prevent the cord from passing through the hole in the raceway. You will now have cord "A" 23 inches long, and cord "B" 23 inches long extending from the raceway as in Fig. 3.

5. Loop cord "A" under and over idler pulley No. 1 and across the chassis to small idler pulley No. 2. (See Fig. 4).

6. Continue cord "A" around idler pulley No. 2, and use a paper clip to clip the cord to the chassis while you work on cord "B" for a while.

7. Wind three turns of cord "B" on the raceway, winding from the hole to the outside rim.

8. Continue cord "B" to idler pulley No. 3 and down to the drive pulley, making one-half turn around the pulley to the slot.

9. Clip cord "B" to the chassis and continue cord "A" around the drive pulley one complete turn to the slot.

10. Bring cord "A" and cord "B" both inside the slot and tie them together securely.

11. Then tie in the tension spring and hook it on the stud in the drive pulley as shown in Fig. 5.

12. To set pointer to correct frequency, tune in a station of known frequency and adjust position of pointer on string.

13. Secure pointer to string with a drop of shellac.

14. Connect auxilliary tension spring as shown in Fig. 4.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

These stage gain measurements will, if properly used, enable you to localize trouble quickly. They are intended for use with a signal generator that is accurately calibrated in microvolts.

Starting with the second detector - first audio stage, and working back step by step to I.F., Osc.-Mod., R.F. and finally to the antenna terminal, the circuit in which the trouble exists will quickly be determined by evidence of low gain, when signal generator attenuation readings are compared to the normal values as shown in the table.

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500M ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a 40 MMF condenser in place of the .1 MF. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
25,000	455 K.C.	IF Grid	.1 MF	.5 Meg	1.87 Volts
200	455 K.C.	Mod. Grid	.1 MF	.5 Meg	1.87 Volts
250	600 K.C.	Mod. Grid	.1 MF	.5 Meg	1.87 Volts
75	600 K.C.	RF Grid	.1 MF	.5 Meg	1.87 Volts
5	600 K.C.	Ant. Lead	40 MMF	None	1.87 Volts

* For one watt output.
** Meter connected across voice coil.
V.C. Resistance -3.5 ohms at 400 cycles.
1.87 Volts equals 1 watt output.

VOLTAGE CHART - MODEL 17-D

TUBE	POSITION	PLATE	SCREEN	CATHODE	OSC. PLATE
7S	RF	300	100	8.5	-
6A7	Osc.-Mod.	290	100	3	100
7S	IF	300	100	3.5	-
75 or 6Q7G	Det.-Avc.	120	-	5	-
6V6 or 6F6G	Output	290	180	18	-
0Z4 or 6X5	Rect.	AC	-	300	-

All measurements from chassis ground to socket terminal using 1000 ohms per volt meter.
Battery voltage 6.3 V. Current Consumption 7.5 Amps.
Maximum Power Output 8 Watts.

DIAL CORD INSTRUCTIONS - MODEL 17-D
BACKLASH CORD AND SPRING ASSEMBLY - PART NO. 1X14743

NOTE: If exact Motorola assembly is not available, use original spring and 30 lb. silk fish cord to make up assembly to dimensions as shown at the bottom of Fig. 2.

1. Turn gang to open position.
2. Loop short end of cord around set screw "A" in tuner gear.
3. Make one complete turn counter-clockwise around tuner gear hub.
4. Stretch spring and make one complete turn counter-clockwise around pulley "B"
5. Hook the loop in the end of the cord on gear tooth "C" of condenser gear.

NOTE: Spring tension must be sufficient to take up all backlash in gear train. Regulate tension through selection of gear tooth in Step 5 above.

Model 17-D

CUSTOM BUILT FOR 1939

CHRYSLER **DESOTO** **DODGE** **PLYMOUTH**

GALVIN MFG. CORP.

MODEL 18-0
Schematic, Socket
Trimmers

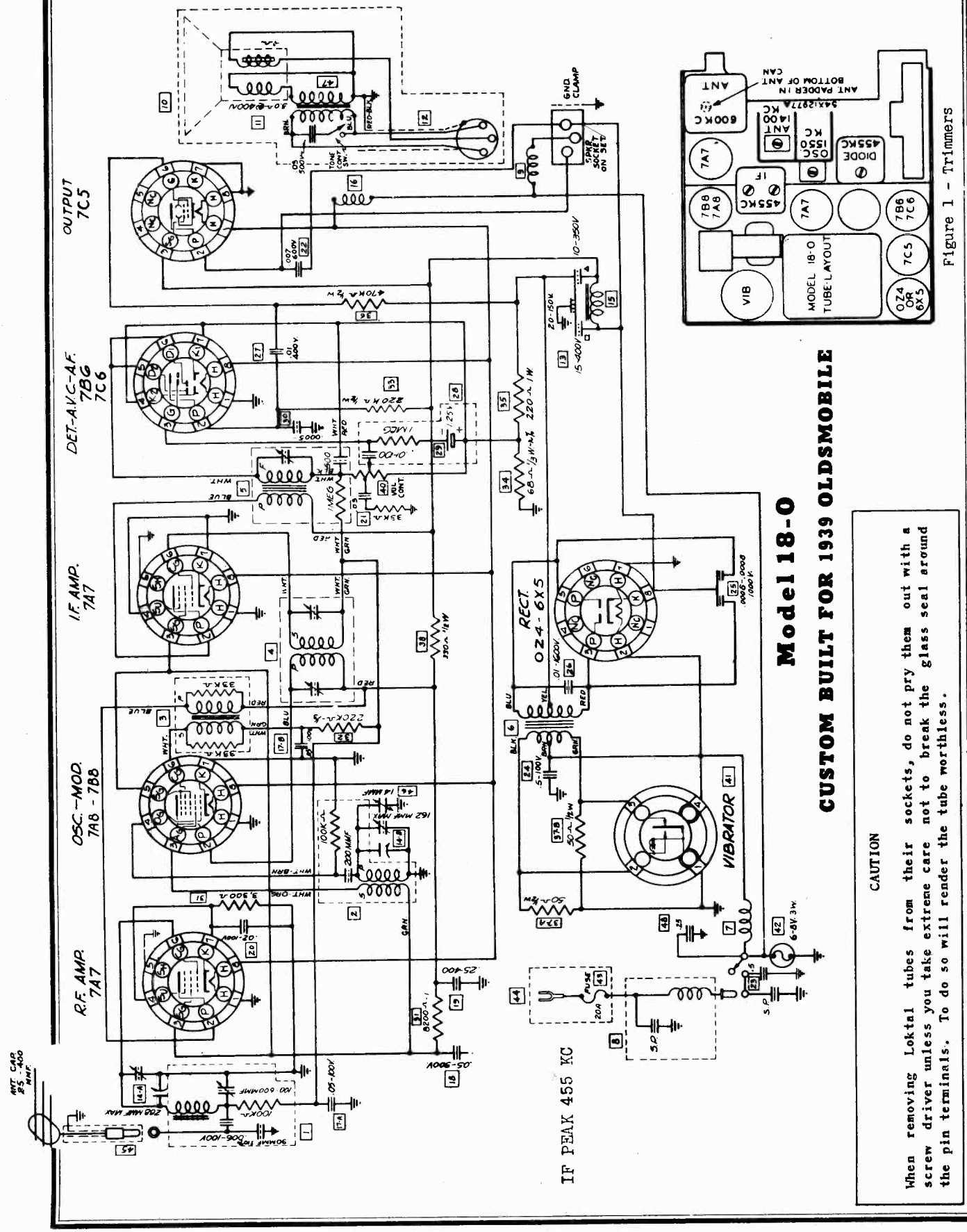


Figure 1 - Trimmers

ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Connect the speaker and battery.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

I. F. ALIGNMENT

1. Connect the signal generator to the antenna lead through a .1 MF condenser and to chassis ground. Turn the condenser gang completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 455 K.C. and carefully adjust the single trimmer in the Diode coil can to the point showing the highest reading on the output meter. (Advance the signal generator attenuator if necessary to pick up signal.)

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

R. F. ALIGNMENT

1. Change to 40 MMF condenser in signal generator lead. Set signal generator at 1550 K.C. and with the condenser gang still completely out of mesh, adjust the oscillator trimmer to the point showing the highest output reading.

2. Set the signal generator at 1400 K.C. and turn the condenser gang to the signal at 1400 K.C. Adjust the antenna trimmer on the condenser gang to the point showing the highest output reading.

3. Set the signal generator at 600 K.C. and rock the pointer at the 600 K.C. position on the dial scale, while adjusting the antenna padder, until a combination is found which gives highest output reading.

NOTE: The antenna padder is reached through a hole in the bottom of the chassis base, directly under the antenna coil can.)

DIAL DRIVE CORD ASSEMBLY - PART NO. 1X14746

1. While not essential, you will find it easier to work if you remove the front plate from the chassis. This requires removal of the dial light bracket, the broad band coil bracket, the volume control, and the unsoldering of the ground connection of 8X14120 condenser.
2. If the exact Motorola assembly is not available, cut a piece of 30 lb. test silk fish cord 43 inches long.
3. The condenser gang must be open.
4. Double the cord in the middle and thread the loop through the hole in the drive raceway. See Fig. 3.
5. Tie a large knot in the cord or use an eyelet large enough to prevent the cord from passing through the hole. You will now have cord "A" and cord "B", each approximately 21 inches long, extending from the raceway as in Fig. 3.
6. Loop cord "A" over idler pulley No. 1 and across the chassis to idler pulley No. 2 and holding the end of the cord tight, turn the raceway 2½ turns to the right (clockwise), thereby winding 2½ turns of cord "A" on the raceway.
7. Use a paper clip to clip the loose end of cord "A" to the front plate so you can work on cord "B" for a while.
8. Loop cord "B" over idler pulley No. 3, and across the chassis to idler pulley No. 4.
9. Both cords should now be clipped to the front plate while the plate is reinstalled on the chassis.
10. Continue cord "B" down to the drive pulley and make 1½ turns around the pulley to the slot in the rim.
11. Continue cord "A" down to the slot in the rim of the drive pulley.
12. Bring both loose ends of cord through the slot in the drive pulley and tie them together tightly inside the slot.
13. Then tie in one end of the tension spring and hook the other end over the stud as shown in Fig. 4.
14. To set the pointer to correct frequency, tune in a station of known frequency and adjust the position of the pointer on the string, securing it with a drop of shellac.

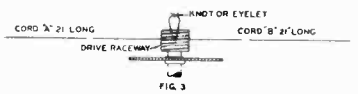


FIG. 3

DIAL CORD INSTRUCTIONS

BACKLASH CORD AND SPRING ASSEMBLY - PART NO. 1X14745

NOTE: If exact Motorola assembly is not available, use original spring and 30 lb. silk fish cord to make up assembly to dimensions as shown at the top of Fig. 2.

1. Turn gang to fully meshed position.

2. Loop long end of cord around set screw (A) in tuner gear.

3. Make one complete turn around tuner gear hub.

4. Stretch spring and loop other end around set screw (B) in condenser gear.

NOTE: Spring tension must be sufficient to take up all backlash in gear train.

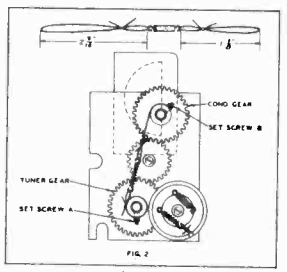


FIG. 2

Figure 2

VOLTAGE CHART — MODEL 18-O

TUBE	POSITION	PLATE	SCREEN	CATHODE	OSC. PLATE
7A7 or 7B7*	R.F.	185	100	7.7	-
7B8 or 7A8*	Osc.-Mod.	185	100	0	100
7A7 or 7B7*	I.F.	185	100	0	-
7B6 or 7C6	Det.-Avc.	75	-	0	-
7C5**	Output	195	190	0	-
0Z4 or 6X5	Rect.	AC	-	200	-

* Bias - -2.8 V. Measured from "B" stick. ** Bias - -13.V. Measured from "B" stick.

All measurements from socket terminal to chassis ground, using 1000 ohms per volt meter.

Battery Voltage - 6.3 V. Current Consumption - 6.5 Amps.

Maximum Power Output - 7.5 Watts.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

These stage gain measurements will, if properly used, enable you to localize trouble quickly. They are intended for use with a signal generator that is accurately calibrated in microvolts.

Starting with the second detector - first audio stage, and working back step by step to I.F., Osc.-Mod., R.F. and finally to the antenna terminal, the circuit in which the trouble exists will quickly be determined by evidence of low gain, when signal generator attenuation readings are compared to the normal values as shown in the table.

All stage-gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500M ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a 40 MMF condenser in place of the .1 MF. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characterisitcs, etc.

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
.25 Volts	400 cycles	7B6 Grid	.1 MF	.5 Meg.	1.74 Volts
10,000	455 K.C.	7A7 Grid(I.F.)	.1 MF	.5 Meg.	1.74 Volts
150	455 K.C.	7B8 Grid	.1 MF	.5 Meg	1.74 Volts
200	600 K.C.	7B8 Grid	.1 MF	.5 Meg	1.74 Volts
50	600 K.C.	7A7 Grid (R.F.)	.1 MF	.5 Meg	1.74 Volts
4	600 K.C.	Ant. Lead	40 MMF	None	1.74 Volts

* For one watt output. V.C. impedance - 3 ohms at 400 cycles.

** Meter connected across voice coil. 1.74 volts equals 1 watt output.

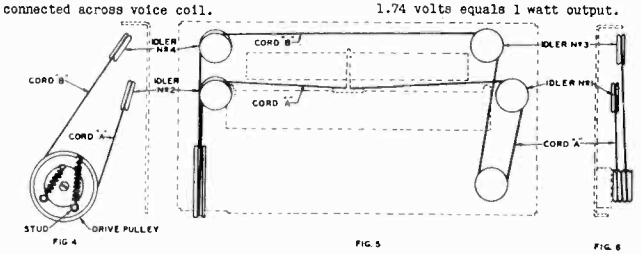


FIG. 4 FIG. 5 FIG. 6

GALVIN MFG. CORP.

MODEL 19B
Schematic, Socket
Trimmers

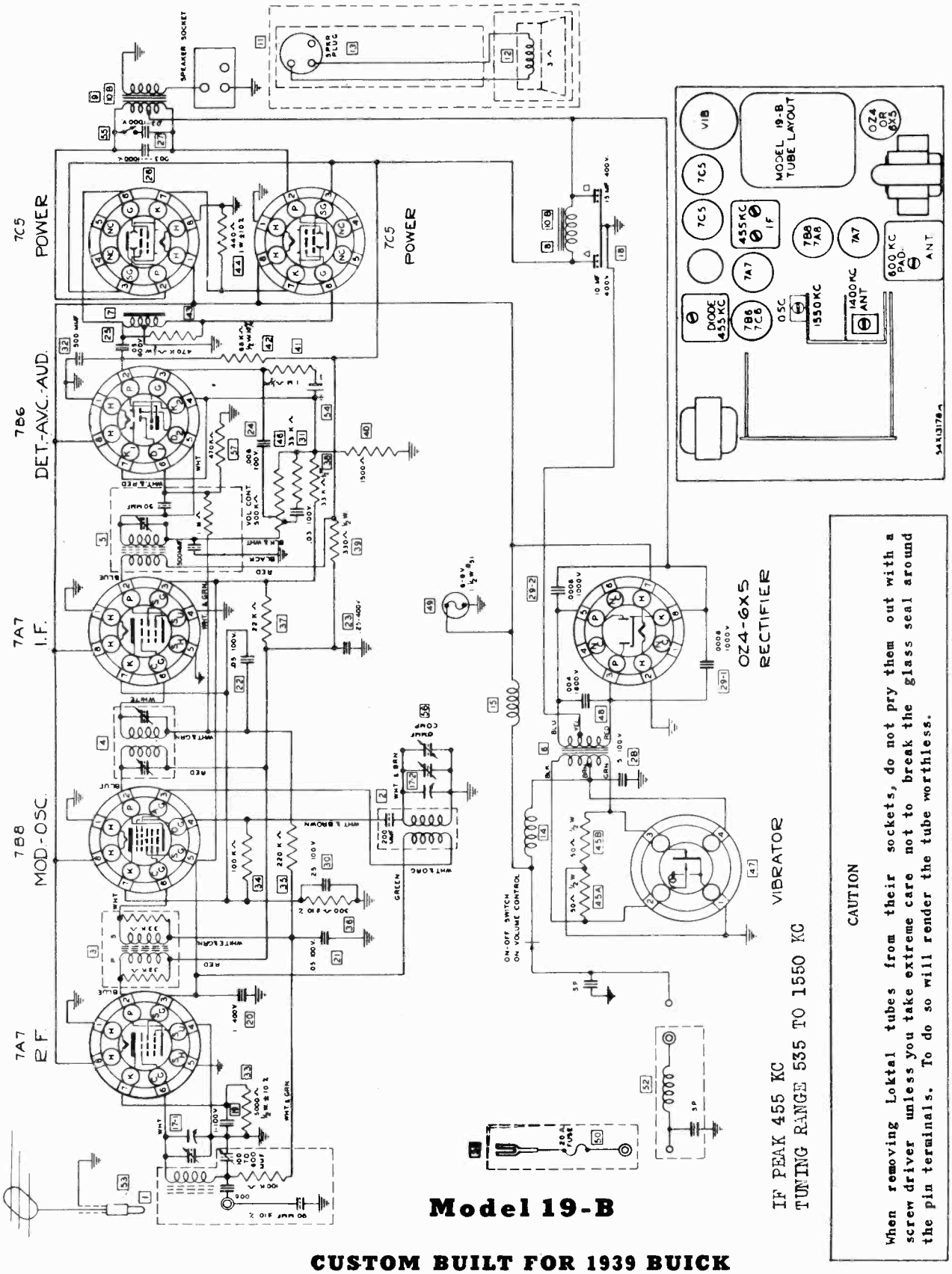


Figure 1 - Trimmers

CAUTION

When removing Loktal tubes from their sockets, do not pry them out with a screw driver unless you take extreme care not to break the glass seal around the pin terminals. To do so will render the tube worthless.

ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Connect the speaker and battery.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

I. F. ALIGNMENT

1. Connect the signal generator to the antenna lead through a .1 MF condenser and to chassis ground. Turn the condenser gang completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 455 K.C. and carefully adjust the single trimmer in the Diode coil can to the point showing the highest reading on the output meter. (Advance the signal generator attenuator if necessary to pick up signal.)

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

R. F. ALIGNMENT

1. Change to 40 MMF condenser in signal generator lead. Set signal generator at 1550 K.C. and with the condenser gang still completely out of mesh, adjust the oscillator trimmer to the point showing the highest output reading.

2. Set the signal generator at 1400 K.C. and turn the condenser gang to the signal at 1400 K.C. Adjust the antenna trimmer on the condenser gang to the point showing the highest output reading.

3. Set the signal generator at 600 K.C. and rock the pointer at the 600 K.C. position on the dial scale, while adjusting the antenna padder, until a combination is found which gives highest output reading.

DIAL DRIVE CORD ASSEMBLY - PART NO. 1X14731

1. Remove broken cord, and dial pointer.
2. If exact Motorola assembly is not available, cut a piece of 30 lb. silk fish cord 44 long. CONDENSER GANG MUST BE MESHED.
3. Double the cord in the middle and thread the loop through the hole in the drive raceway. See Fig.
4. Tie a large knot in the cord or use an eyelet large enough to prevent the cord from passing through the hole in the raceway. You will now have cord(A) 22 inches long,and cord(B) 22 inches long, extending from the raceway as in Fig. 3.
5. Loop cord (A) under idler pulley No. 1, as shown in Fig. 5 and holding the end of the cord tight, turn the raceway 2½ turns to the right (clockwise), thereby winding 2½ turns of cord (A) on the raceway.
6. Continue cord (A) across the front of the receiver, around idler pulley No. 2, and fasten the loose end of the cord to the edge of the chassis with a common paper clip, so you can work on cord (B) for a while.
7. Take cord (B) and bring it over the raceway and under idler pulley No. 3, as shown in Fig.
8. Continue cord (B) across the front of the chassis, around idler pulley No. 4, and make one complete turn around the drive pulley, after which the end of the cord should be clipped to the chassis.
9. Remove the paper clip holding cord (A) and continue its routing to the drive pulley, making 1/2 turn around it to the slot.
10. Bring both loose ends of cord through the slot in the drive pulley and tie them together tightly inside the slot.
11. Then tie in one end of the tension spring, Part No. 41A12968 and hook the other end of the spring on the small stud as shown in Fig. 6.
12. Replace dial pointer.
13. To set pointer to correct frequency, tune in a station of known frequency and adjust position of pointer on string.
14. Secure pointer to string with a drop of shellac.

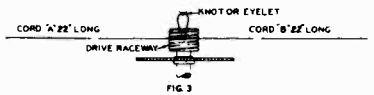


FIG. 3

DIAL CORD INSTRUCTIONS

BACKLASH CORD AND SPRING ASSEMBLY - PART NO. 1X14730

NOTE: If exact Motorola assembly is not available, use original spring and 30 lb. silk fish cord to make up assembly to dimensions as shown at the top of Fig. 2.

1. Turn gang to fully meshed position.
2. Loop long end of cord around set screw (A) in tuning unit.
3. Make one complete turn around gear hub.
4. Stretch spring and loop other end around set screw (B) in condenser gear.

NOTE: Spring tension must be sufficient to take up all backlash in gear train.

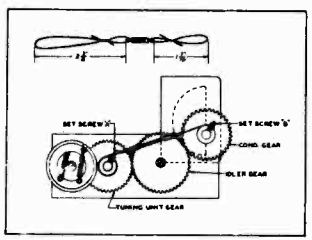


Figure 2.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

These stage gain measurements will, if properly used, enable you to localize trouble quickly. They are intended for use with a signal generator that is accurately calibrated in microvolts.

Starting with the second detector - first audio stage, and working back step by step to I.F., Osc.-Mod., R.F. and finally to the antenna terminal, the circuit in which the trouble exists will quickly be determined by evidence of low gain, when signal generator attenuation readings are compared to the normal values as shown in the tables.

All stage-gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500 M Ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a 40 MMF condenser in place of the .1 MF.

It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
7,000	455 K.C.	7A7 Grid (IF)	.1 MF	.5 Meg	1.74 Volts
100	455 K.C.	7B8 Grid	.1 MF	.5 Meg	1.74 Volts
150	600 K.C.	7B8 Grid	.1 MF	.5 Meg	1.74 Volts
15	600 K.C.	7A7 Grid (RF)	.1 MF	.5 Meg	1.74 Volts
1	600 K.C.	Ant. Lead	40 MMF	None	1.74 Volts

* For 1 Watt output. 1.74 Volts equals 1 Watt output.

** Output meter connected across voice coil. V.C. resistance - 3 ohms.

VOLTAGE CHART - MODEL 19-B

TUBE	POSITION	PLATE	SCREEN	CATHODE	OSC. PLATE
7A7	RF	250	75	7.5	-
7B8	Osc.-Mod.	250	75	3.5	75
7A7	IF	250	75	3.5	-
7B6	Det.-Avc.	150	-	4.5	-
7C5	Output	250	250	18	-
7C5	Output	250	250	18	-
0Z4	Rect.	AC	-	260	-

All voltages measured from socket terminal to chassis ground using 1000 Ohms per volt meter.

Current - 7.0 Amps. at 6.3 Volts. Maximum power output - 12 Watts.

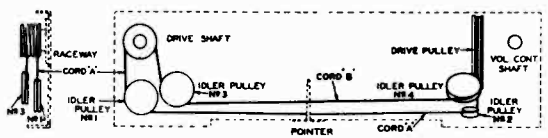


FIG. 4 FIG. 5

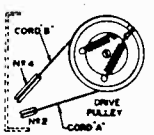
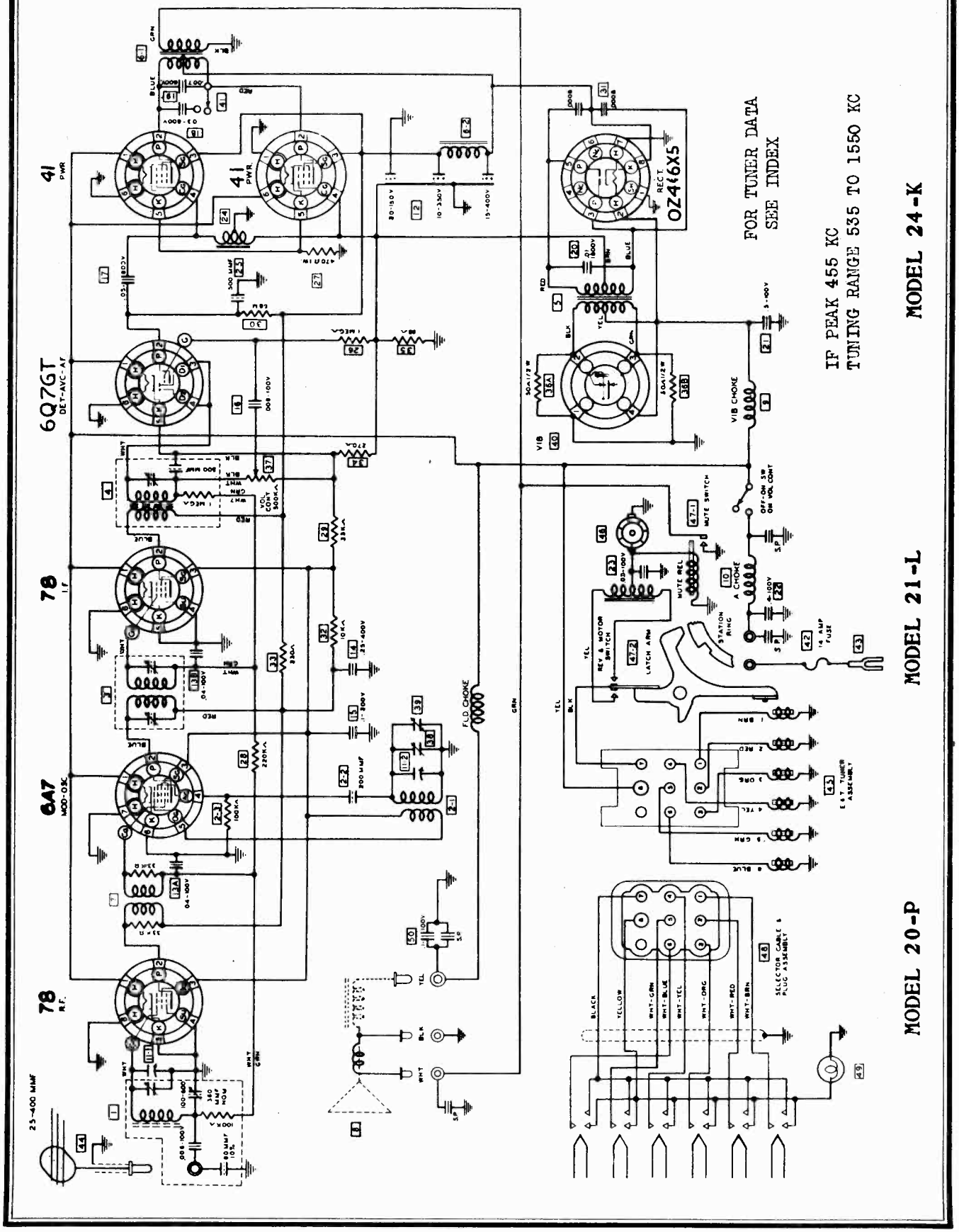


FIG. 6

GALVIN MFG. CORP.

MODELS 20P,21L,24K
Schematic



MODELS 20P,21L,24K
Alignment,Socket,Trimmers
Gain,Sensitivity

GALVIN MFG CORP.

SENSITIVITY AND STAGE GAIN MEASUREMENTS

These stage gain measurements will, if properly used, enable you to localize trouble quickly. They are intended for use with a signal generator that is accurately calibrated in microvolts.

Starting with the second detector - first audio stage, and working back step by step to I.F., Osc. - Mod., R.F. and finally to the antenna terminal, the circuit in which the trouble exists will quickly be determined by evidence of low gain, when signal generator attenuation readings are compared to the normal values as shown in the table.

All stage gain measurements must be made with the volume control set for full volume. The shielded lead from the signal generator is connected to the grid terminal of the tube through a .1 MF condenser, with a 500M ohm resistor connected as a leak resistance between the grid of the tube and the grid lead which has been removed.

When measuring over-all sensitivity at the antenna terminal, use a 40 MMF condenser in place of the .1 MF. It must be remembered that the figures in the table are average and allowance must be made for variations between two sets of the same general type, due to difference of tube characteristics, etc.

Average Microvolt Input *	Generator Set at	Generator Feeder Connected to	Dummy Antenna Capacity	Leak Resistance	Output Meter Reading **
15,000	455 K.C.	IF Grid	.1 MF	.5 Meg	1.74 Volts
400	455 K.C.	Mod. Grid	.1 MF	.5 Meg	1.74 Volts
450	600 K.C.	Mod. Grid	.1 MF	.5 Meg	1.74 Volts
25	600 K.C.	RF Grid	.1 MF	.5 Meg	1.74 Volts
2	600 K.C.	Ant. Lead	40 MMF	None	1.74 Volts

* For one watt output. V.C. impedance - 3 ohms at 400 cycles.
** Meter connected across voice coil. 1.74 volts equal 1 watt output.

3. Set the signal generator at 600 K.C. and rock the pointer at the 600 K.C. position on the dial scale, while adjusting the antenna padder, until a combination is found which gives highest output reading.

2. Set the signal generator at 1400 K.C. and turn the condenser gang to the signal at 1400 K.C. Adjust the antenna trimmer on the condenser gang to the point showing the highest output reading.

VOLTAGE CHART - MODELS 20-P, 21-L, AND 24-K

TUBE	POSITION	PLATE	SCREEN	CATHODE	OSC. PLATE
78*	RF	180	80	0	-
6A7*	Osc.-Mod.	180	80	0	80
78 *	IF	180	80	0	-
6Q7GT**	Det.-Avc.	80	-	-2.6	-
41	Output	190	180	15	-
41	Output	190	180	15	-
0Z4	Rect.	AC	-	190	-

* Bias -2.6 V. from B stick Current - 6.5 Amps. at 6.3 Volts
** Bias -3.5 V. from B stick Maximum power output 4.5 Watts
All readings from chassis ground with 1000 ohms per volt meter.

ALIGNMENT PROCEDURE

Remove the chassis from its housing and place it on the service bench. Connect the speaker and battery.

Turn the volume control to maximum position and leave it there throughout the alignment, reducing the signal generator output if necessary.

I. F. ALIGNMENT

1. Connect the signal generator to the antenna lead through a .1 MF condenser and to chassis ground. Turn the condenser gang completely out of mesh. Connect an output meter across the speaker voice coil.

2. Set the signal generator at 455 K.C. and carefully adjust the single trimmer in the Diode coil can to the point showing the highest reading on the output meter. (Advance the signal generator attenuator if necessary to pick up signal.)

3. Adjust the two trimmers in the I.F. coil can to the point showing the highest output reading.

4. Repeat the I.F. and Diode adjustment several times for maximum accuracy.

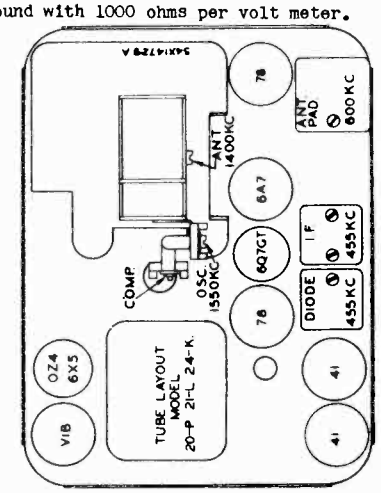
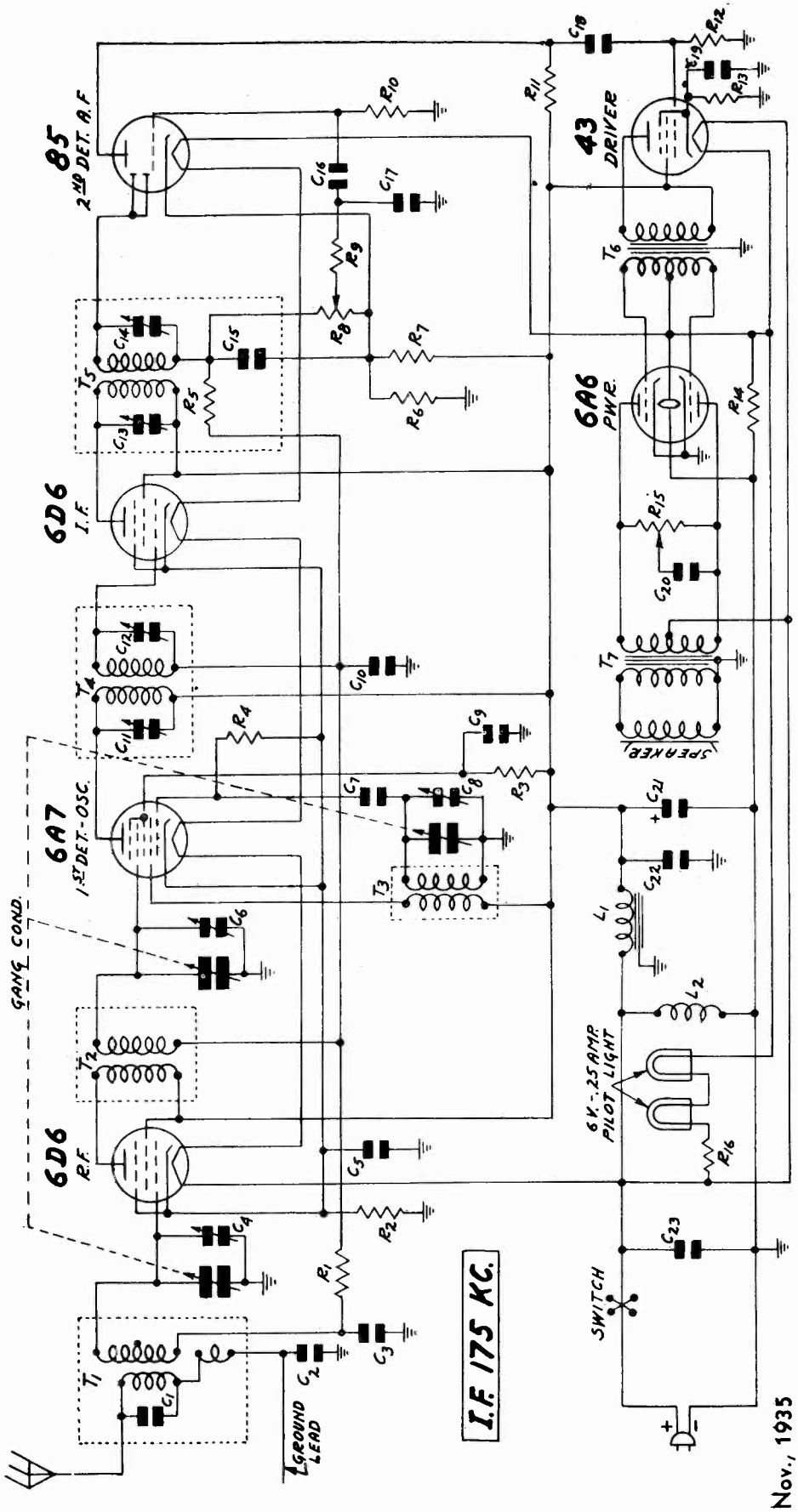


FIGURE 1. TRIMMERS
R. F. ALIGNMENT

1. Change to 40 MMF condenser in signal generator lead. Set signal generator at 1550 K.C. and with the condenser gang still completely out of mesh, adjust the oscillator trimmer to the point showing the highest output reading.

GAMBLE SKOGMO, INC.

MODEL 6D
Schematic



6 Tube - 32 Volt D. C.

Superheterodyne Receiver

T1 ANTENNA INTERSTAGE TRANS. P-94452
T2 INTERSTAGE R.F. TRANS P-94453
T3 OSC. INDUCTORS
T4 1ST I.F. TRANS.
T5 2ND I.F. TRANS.
T6 1ST AUDIO TRANS.
T7 OUTPUT TRANS.
L1 FILTER REACTOR P-52X33
L2 SPEAKER FIELD 100 OHM.

C1	250 MMF MOULDED	C21	30 MF 50 V. WET ELECTROLYTIC P-44X25
C2	.05 MF 180 V.	C22	25 MF 180 V.
C3	.05 MF 180 V.	C23	25 MF 180 V.
C4	GANG TRIMMER	R1	100 000 OHM .2 W.
C5	.05 MF 180 V.	R2	450 OHM .2 W.
C6	GANG TRIMMER	R3	30 000 OHM .2 W.
C7	35 MMF MOULDED	R4	100 000 OHM .2 W.
C8	GANG TRIMMER	R5	1.0 MEGOHM .2 W.
C9	.05 MF 180 V.	R6	350 OHM .2 W.
C10	.05 MF 180 V.	R7	6000 OHM .2 W.
C11	40-100 MMF } DUAL	R8	.50 MEGOHM VOL. CONTROL P-36X213
C12	40-100 MMF } P-17A39	R9	50 000 OHM .2 W.
C13	40-100 MMF } DUAL	R10	2.0 MEGOHM .2 W.
C14	40-100 MMF } P-17A39	R11	80000 OHM .2 W.
C15	100 MMF MOULDED	R12	1.0 MEGOHM .2 W.
C16	.01 MF 180 V.	R13	400 OHM 2 W.
C17	50 MMF MOULDED	R14	100 OHM 1.0 W.
C18	.01 MF 180 V.	R15	75000 OHM TONE CONTROL
C19	12. MF 25 V. DRY ELECTROLYTIC P-45X207	R16	• 67 OHM 4.0 W ARMORED WIRE WOUND
C20	.10 MF 180 V.		

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

Nov., 1935

MODEL 6D
Alignment, Voltage
Trimmers, Voltage

GAMBLE SKOGMO, INC.

SPECIFICATIONS

Socket
Resistance
Coil Data

Power Consumption - 1.2 Amperes at 32 Volts DC
Power Output - - - - - .25 Watts Undistorted
Selectivity - - 29 KC Broad at 1000 times Signal
Sensitivity - - - - - 10 Microvolts Absolute

Tuning Range - - - - - - - 530 to 1750 KC
Intermediate Frequency - - - - - - - 175 KC
Speaker - - - - - - - - - - - 6" Dynamic

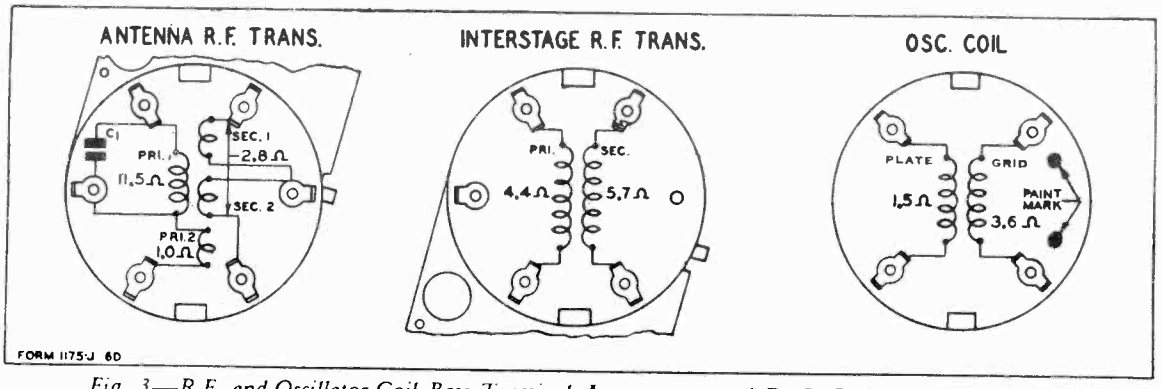


Fig. 3—R.F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

D. C. Resistance of Windings

Refer to Fig. 3

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

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

I. F. Adjustment 175 KC.

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

1750 KC Adjustment

Connect the antenna lead of the signal generator to the antenna lead of the receiver through a 200 mmf. condenser. Adjust the trimmer of the oscillator section

1500 KC Adjustment

Loosen the pointer screw and set the pointer at the 1500 KC mark on the dial scale. Retighten the pointer screw.

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

VOLTAGES AT SOCKETS
Volume Control at Maximum —
Antenna Connected to Ground LEAD

Type of Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground	Normal Plate MA.
6D6	R.F.	6.4	81	31	2	1.5
6A7	1st Det. & Osc.	6.4	31 31(1)	18	2	.2 .65(1)
6D6	I.F.	6.4	31	31	2	1.5
85	2nd Det.	6.4	12.5		1.8	.20
43	1st Audio	25.6	28	31	3.5	7.
6A6	Output	6.4	31		0	11 (per plate)

(1) Anode Grid

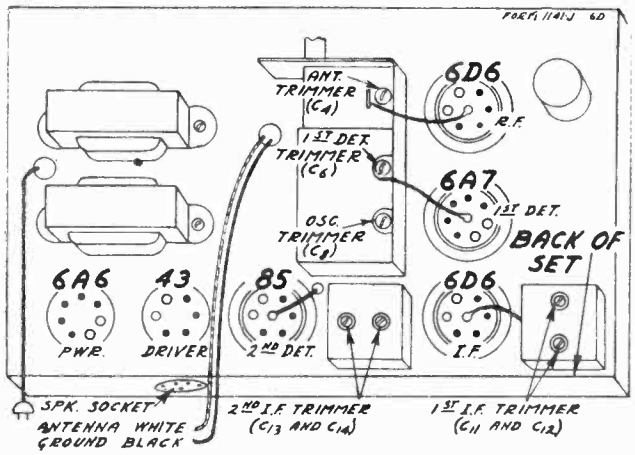


Fig. 4—Tube Arrangement

GAMBLE-SKOGMO, INC.

MODEL 15C6
Schematic
Voltage, Data

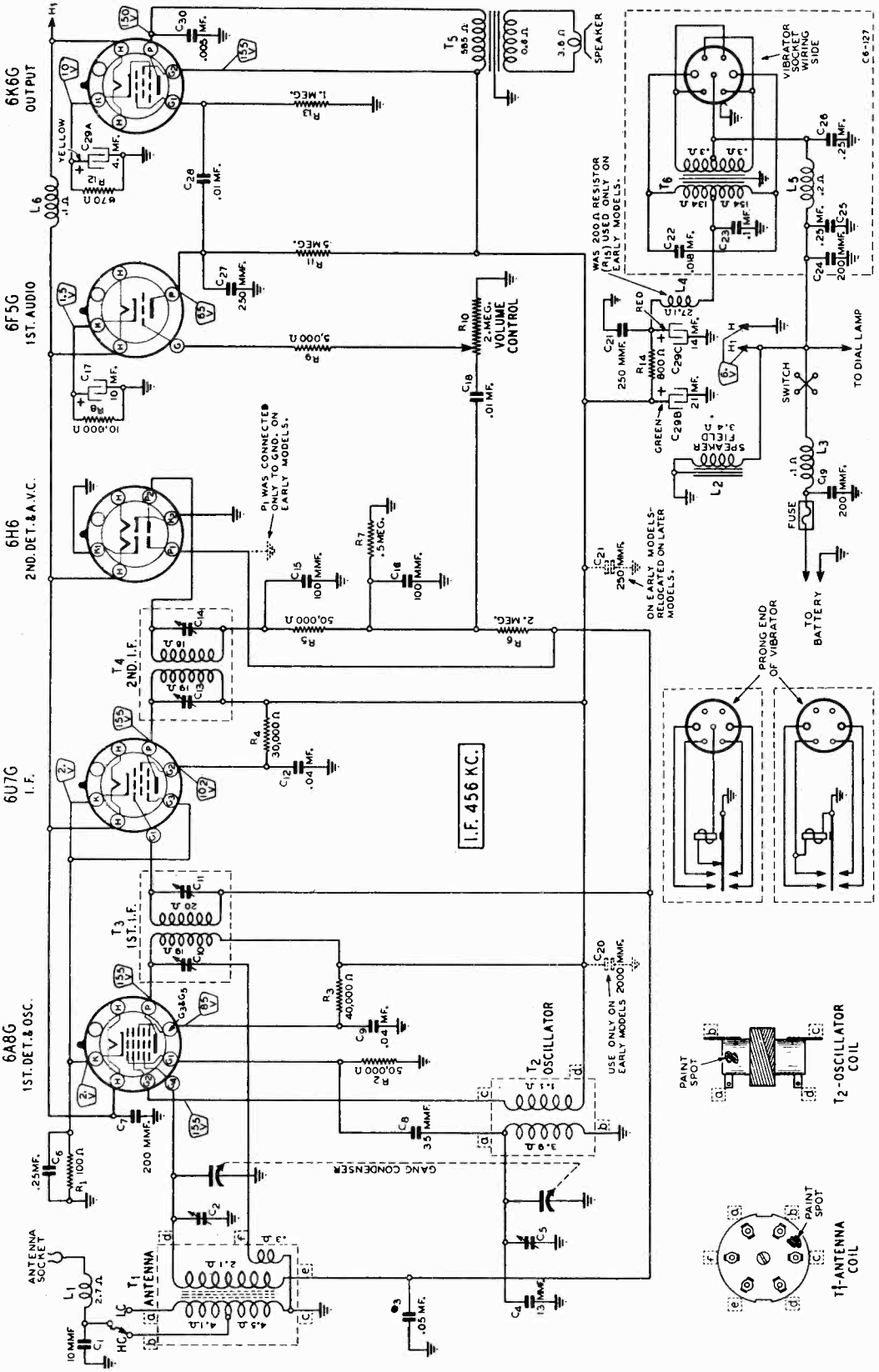


Fig. 1—Schematic Circuit Diagram

15C6

APRIL, 1938

Tuning Frequency Range	528 to 1550 KC
Intermediate Frequency	456 KC
Speaker	6" Dynamic
Power Consumption	5.5 Amperes at 6.3 Volts
Power Output	.8 Watt Undistorted
Sensitivity	10 Microvolts at .5 Watt Output
Selectivity	42.5 KC Broad at 1000 Times Signal

MODEL 15C6
Alignment, Drive Data
Changes, Notes, Socket

GAMBLE SKOGMO, INC.

Alignment Procedure

Remove the bottom and front chassis covers. Directions for removing the bottom cover are in the instruction book.

To remove the front cover, first pull the knobs and buttons off the shafts. Remove the 2 screws at the top and the 2 screws at the sides of the front cover. Press in the sides of the chassis case to release the lugs at the sides of the front cover. Pull outward on the bottom of the front cover and then push the cover up until the lugs at the top are released.

Do not remove the back of the chassis case. This back can be taken off of the No. 2 and later issue sets.

Set the signal generator for 456 KC and connect the output of the signal generator through a .05 mf. condenser to the control grid of the 1st Detector. Connect the ground lead of the signal generator to the chassis. Set the volume control at maximum. Attenuate the signal from the signal generator to prevent the leveling off action of the AVC.

Then adjust the 4 I.F. trimmers until maximum output is obtained. These trimmers can be reached through the 4 holes in the back wall of the chassis case. It will be necessary to pull out the fiber insulating sheet a slight amount.

Insert the antenna cable plug in the antenna socket on the chassis.

Rotating Pointer Models—If the antenna is connected at the HC terminal and the entire 60-inch shielded cable (70 mmf.) is being used, connect the antenna wire at the other end through a 120 mmf. condenser to the antenna post of the signal generator.

If the antenna is connected at the LC terminal, the antenna cable has been cut as explained in the instructions. If cut in half (30-inch length), the capacity of the antenna cable is approximately 35 mmf. Connect the antenna wire, in this case, through a 25 mmf. condenser to the antenna post of the signal generator.

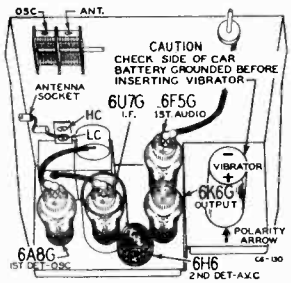


Fig. 4—Location of Tubes

Sliding Pointer Models—If the antenna is connected at the HC terminal and the 60-inch shielded cable (70 mmf.) is being used, connect the antenna wire at the other end through a 230 mmf. condenser to the antenna post of the signal generator.

If the antenna is connected at the LC terminal and the short shielded cable (19 mmf.) is being used, connect the antenna wire, in this case, through a 20 mmf. condenser to the antenna post of the signal generator. If the long cable has been cut to length and is being used, the total capacity of the cable and the series condenser should be 38 to 40 mmf.

Both Models—Set the signal generator for 1550 KC. Turn the rotor of the tuning condenser to the full open position. Adjust the trimmer of the oscillator section of the gang condenser until maximum output is obtained. See Fig. 4 for location of this trimmer.

Set the signal generator for 1400 KC. Turn the rotor of the tuning condenser carefully until maximum output is obtained. Adjust the trimmer of the antenna section of the gang condenser for maximum output.

Calibration—Rotating Pointer Models—To obtain dial scale calibration, tune in an 800 KC signal. Hold the tuning shaft and turn the pointer disc until the pointer is at the correct position when the chassis front cover is put back in place.

Calibration—Sliding Pointer Models—The pointer assembly is clamped to the drive cord and it is seldom necessary to reset it to obtain proper dial calibration. If re-calibration is required, loosen the clamps with a screw driver, bringing the pointer assembly first down to one end of the dial scale and then down to the other end. Tune in a signal of known frequency near one end of the dial scale. Move the pointer assembly to this frequency on the scale and tighten the clamps with long nose pliers.

Drive Cord Replacement—Rotating Pointer Models

Tie a knot with a small loop at one end of the new drive cord. The free end of the drive cord is tied to the tension spring. The distance between knots should be 23⅛ inches.

Turn the gang condenser to full open position.

Place the looped end of the drive cord over the hook on condenser drive drum A—See Fig. 2 (Shown with gang condenser half open). Bring the cord up through the slot in the drum rim and wind one-half turn to the rear (from front of chassis) around the drive drum. Pass cord around the pulley B as shown. Wind one turn clockwise (from front of chassis) around pointer disc pulley C. Loop cord through the notches on the outside rim of the pointer disc pulley as shown. Wind 2½ turns clockwise, progressing from a point midway between the bracket arms toward the chassis, on tuning control shaft D. Bring cord to the left under pointer disc pulley C and around pulley E as shown. Pass cord to top of drive drum A and wind one turn to the rear around the drum rim.

Pass the remaining drive cord and tension spring through the slot in the drum rim. Place free end of spring over the hook on the condenser drive drum.

Setting Pointer Disc—Tune in an 800 KC signal. Hold the tuning shaft and turn the pointer disc until the pointer is at the correct position when the chassis front cover is put back in place.

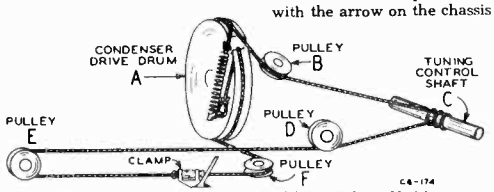


Fig. 3—Replacing Drive Cord—Sliding Pointer Models

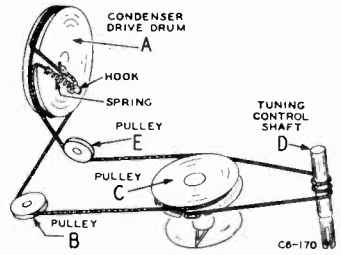


Fig. 2—Replacing Drive Cord—Rotating Pointer Models

Drive Cord Replacement—Sliding Pointer Models

Remove the celluloid dial scale. Open the clamps on the back of the dial pointer in order to remove the old drive cord.

It is not necessary to remove the dial and drive bracket assembly in order to replace the drive cord.

Tie a knot with a small loop at one end of the new drive cord. Slide a ½ inch length of fabric tubing on the cord. Tie the free end of the drive cord to the tension spring. The distance between knots should be 28⅝ inches.

Turn the gang condenser to full open position.

Place the looped end of the drive cord over the hook on condenser drive drum A—See Fig. 3. Bring the cord up through the slot in the drum rim.

Turn the drive drum to the position shown in Fig. 3.

Wind one turn down and around drive drum A and around pulley B as shown. Wind 3½ turns on tuning control shaft C, progressing from a point midway between the two bracket arms toward the chassis. Bring cord under pulley D and around pulleys E and F as shown. See that the fabric tubing is now between pulleys E and F. Bring the drive cord to the rear around drive drum A and through the slot in the drum rim as shown.

Turn the gang condenser to full open position and place the free end of the tension spring over the hook on drive drum A.

Dial Pointer Adjustment—Mount the celluloid dial scale on the dial bracket. Tune in a signal of known frequency near one end of the dial scale. Move the pointer assembly to this frequency on the dial scale and tighten the clamps with long nose pliers.

Inserting Vibrator Unit

IMPORTANT—The vibrator unit can be inserted in two ways. The proper method of insertion will depend on which terminal of the car battery is grounded. If the POSITIVE (+) terminal of the car battery is grounded, line up the + mark on the top of the vibrator with the arrow on the chassis base. If the NEGATIVE (—) terminal of the car battery is grounded, line up the — mark on the top of the vibrator with the arrow on the chassis base.

Antenna Capacity

Rotating Pointer Models—The antenna coil is designed for car antennas with a capacity of 190 mmf. for the HC connection and 60 mmf. for the LC connection. This capacity is the total capacity of the antenna and the shielded lead.

Complete information regarding car antenna installation will be found in the instruction book packed with the radio.

Sliding Pointer Models—The information for this type of radio is the same as above except that the HC capacity is 300 mmf. and the LC capacity is 38 mmf.

Two Models

One model has a rectangular dial scale with a sliding pointer.

The other model has a circular dial scale with a rotating pointer disc.

The 2 models also differ in the capacities of the antennas which may be used. The values are shown in article "Antenna Capacity."

Issue No. 1

Mechanical Assembly—The 2 front mounting studs are attached to the top of the chassis case.

The I.F. coil cans have a spring clip by means of which they are secured to the chassis.

The back of the chassis case is not removable.

Electrical Assembly—See electrical changes under "Issue No. 2."

Issue No. 2

Mechanical Changes—The chassis case is supplied with a front mounting bracket and this bracket is secured to the instrument panel of the car by means of 2 separate bolts.

The I.F. cans use a threaded spade lug which extends through the chassis base and is secured in place with nuts and lock washers.

The back of the chassis case can be removed.

Electrical Changes—The following changes are all illustrated in the schematic—Fig. 1.

The 6H6 tube plate No. 1, which was connected originally to ground is removed from ground and connected as shown in the schematic.

Condenser C20 is removed.

The position of condenser C21 is changed as shown.

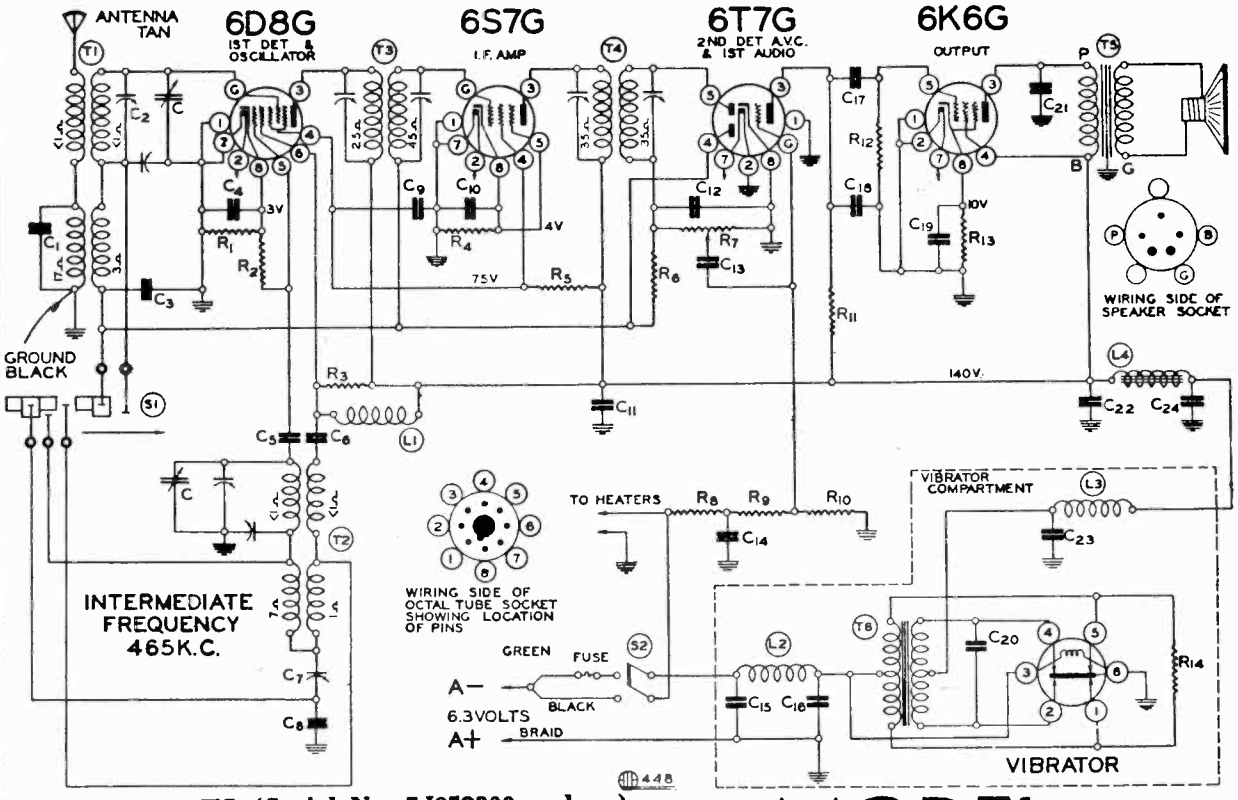
Resistor R15 (200 ohms) is removed and replaced by choke L4.

Trimmers, Voltage

MODEL 489
Schematic, Socket

GAMBLE-SKOGMO, INC.

BAND	DIAL SCALE	FREQUENCY RANGE
Broadcast	Upper	535 to 1720 K.C. (Kilocycles)
Short Wave	Lower	5.5 to 18.1 M.C. (Megacycles)



2 Band 6-Volt Storage Battery Operated Superheterodyne Receiver

MODEL 489

REPAIR PARTS (Serial No. 7J852300 and up)

No.	Part No.	Description
		RESISTORS
R1	130-54	500 ohm - 1/3 w.
R2	130-12	50M ohm - 1/3 w.
R3	130-12	50M ohm - 1/3 w.
R4	130-26	1000 ohm - 1/3 w.
R5	130-149	15M ohm - 1/3 w.
R6	130-4	3 megohm - 1/3 w.
R7	101-91	1 meg volume control
R8	130-191	1.5 megohm - 1/3 w.
R9	130-4	3 megohm - 1/3 w.
R11	180-9	200M ohm - 1/3 w.
R12	130-3	500M ohm - 1/3 w.
R13	130-153	700 ohm - 1/3 w.
R14	130-84	200 ohm - 1/3 w.
R10	130-191	1.5 meg - 1/3 w.
		CONDENSERS
C	102-43	2 gang variable
C1	129-5	.0001 Mica
C2	124-39B	Adj. Cond. 2-25 mmf.
C3	100-22	.05 x 200
C4	100-20	.1 x 200
C5	129-39	.00005 Mica
C6	100-25	.002 x 600
C7	124-38	Series pad 600 mmf. W. C.
C8	129-54	.003 Mica
C9	100-20	.1 x 200
C10	100-20	.1 x 200
C11	100-11	.01 x 400
C12	129-5	.0001 Mica
C13	100-11	.01 x 400
C14	100-11	.01 x 400
C15	100-40	.5 x 200
C16	100-40	.5 x 200
C17	100-26	.02 x 400
C18	129-2	.0005 Mica
C19	119-22	10.0 mfd. 25 v. lytic
C20	100-34	.005 x 1200
C21	100-19	.006 x 600
C22	119-28B	5.0 mfd. lytic
C23	100-20	.1 x 200
C24	119-28B	5.0 mfd. lytic C22 C24 in same unit
		PARTS
T1	111-83	Antenna coil complete
T2	110-66B	Oscillator coil complete
T3	108-105B	Input I.F. complete 465 kc.
T4	108-106B	Output I.F. complete 465 kc.
T5	114-96	6" speaker (P.M.)
T6	104-62E	Power Transformer
L1	123-4	R. F. "B" Choke
L2	105-19	A Choke
L3	123-3	R. F. "B" Choke
L4	105-30E	"B" Filter Choke (400 ohms)
S1	125-39	Wave Band Switch
S2		Switch on volume control

BATTERY CONNECTIONS:

Referring to Fig. 1, connect the battery cable to the storage battery in the following manner:

(a) The storage battery should be located as far from the receiver as the battery cable will permit.

(b) Connect the lead (containing the fuse receptacle) marked A negative (—) to the negative (—) post of the storage battery.

(c) Connect the lead marked A positive (+) to the positive (+) post of the storage battery.

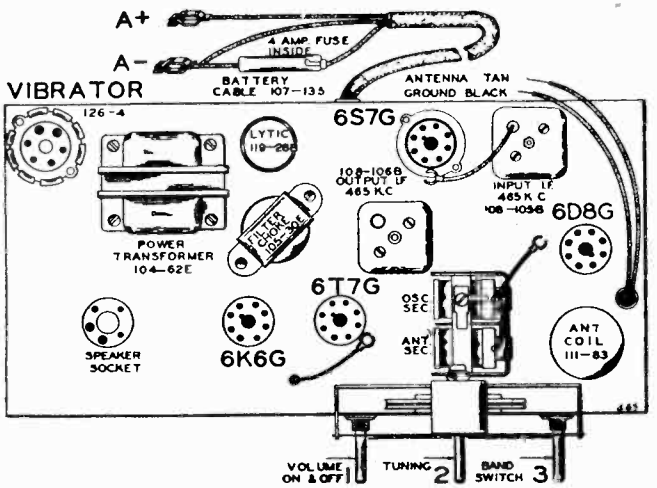
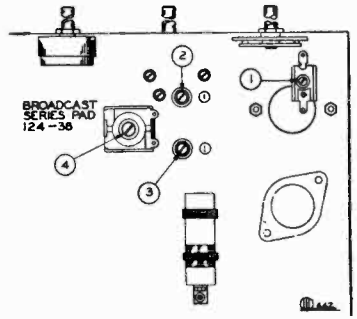


FIG. 1—TOP VIEW

MODEL 489



SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AERIAL AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

All voltages are to be measured with 6.3 volts input to receiver. Resistances of coils and transformer windings are indicated in ohms on schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser, open by-pass condensers frequently cause oscillation and distorted tone.

ALIGNING INSTRUCTIONS:

CAUTION: No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as defective tubes, poor installations, open or ground antenna systems, defective condensers and resistors

In order to properly align this chassis, an oscillator (generator) is necessary.

All adjustments should be made with a non-metallic screw driver.

RESONANCE INDICATOR:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or by means of an adapter between the plate and screen terminals of the type 6K6G output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

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

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

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

ALIGNING I.F. TRANSFORMERS: (465 K. C.):

Part No. 108-106B Output I.F. Transformer
Part No. 108-105B Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser in its minimum capacity position, plates entirely out of mesh, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6S7G tube, and adjust the output I.F. transformer (No. 108-106B) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6S7G to grid cap of 6D8G and adjust input I.F. transformer (No. 108-105B) to resonance.

SHORT WAVE BAND ALIGNMENT:
5.5 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the antenna and ground leads, make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator trimmer to resonance.
   This adjustment is the trimmer mounted on the top of rear section of the variable gang condenser (see Fig. 1, top view).
   (b) Adjust short wave antenna trimmer (Adjustment Number 1), to resonance (see Fig. 3, bottom view).

BROADCAST BAND ALIGNMENT:
535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to antenna and ground leads make following adjustments:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance. (Adjustment number 3, see bottom view of chassis, Fig. 3).
   (b) Re-set external oscillator to 1400 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer (adjustment number 2) to resonance.
   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad (adjustment number 4), to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3).
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1400, 1000, and 600 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**

MODEL 761A

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

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

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

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

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-106E Output I.F. Transformer
Part No. 108-105 Input I.F. Transformer

These I. F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view, Fig. 1).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6K7 tube, and adjust the output I.F transformer (No. 108-106E) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap of 6A8 and adjust input I.F. transformer (No. 108-105) to resonance.

BROADCAST BAND ALIGNMENT:
540 to 1750 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:
   (a) Set external oscillator to 1750 K.C. and adjust broadcast oscillator trimmer to resonance (adjustment E; see top view, Fig. 1).
   (b) Re-set external oscillator to 1400 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer (Adjustment A') to resonance; also adjust preselector trimmer which is mounted on the top of the rear section of the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of this adjustment.)
   (c) Re-set external oscillator to 600 K.C. and adjust broadcast series pad (Adjustment F') to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained.
   (d) Repeat adjustments "a" and "c" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1000 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**

SHORT WAVE BAND ALIGNMENT:
5.5 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator (Adjustment G') and short wave antenna (Adjustment C') to resonance.
   (b) Re-set external oscillator to 6 megacycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 18.1 megacycles and 5.5 megacycles for band coverage.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. An example of this is an image of a fundamental 17 megacycle signal appears near 16.1 megacycles.

MIDDLE WAVE BAND ALIGNMENT:
1730 to 5800 Kilocycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5000 kilocycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 5000 kilocycles and adjust middle wave oscillator (Adjustment D') and middle wave antenna (Adjustment B') to resonance.
   (b) Re-set external oscillator to 1900 kilocycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-check broadcast band alignment.

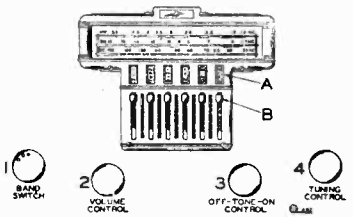


FIG. 2—FRONT VIEW

PROCEDURE FOR SETTING THE AUTOMATIC TUNER LEVERS:

There are six levers on the dial by means of which six stations may be selected, (See "B", Fig. 2).

Make a list of local stations you tune in regularly; any number up to and including 6

Punch out from the set of station call letter tabs supplied, the call letters of the stations you have selected.

Above each automatic tuner lever an opening in the escutcheon is provided for inserting the call letter tabs, (See "A" Fig. 2). Any order of grouping may be used, however, it is recommended that the left hand three automatic levers be used for high frequency stations (1750 to 1000 K.C.) and the right hand three automatic levers for low frequency stations (1000 to 540 K.C.).

Insert the call letter tabs in the rectangular openings in the escutcheon above each of the automatic tuner levers. One of the small celluloid tabs supplied should be snapped into place over each of the station call letter tabs.

Press DOWN ALL THE WAY any one of the automatic tuner levers. Holding it down FIRMLY, tune in by means of the tuning knob (No. 4) the station indicated on the station call letter tab above this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position) until the signal is clearest. The station will then be accurately tuned in. Release the lever

Press down another automatic tuner lever. Holding it down FIRMLY, carefully tune in the station indicated on the call letter tab above this lever. Release this lever.

Follow this procedure until you have selected all of your favorite stations.

Rotate the tuning knob (No. 4) to the right (clockwise) as far as it will turn. Now remove from the right side of the cabinet the metal button, and, with a screw driver inserted through the hole, tighten the locking adjustment screw "C". It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT.

This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Locking screw "C" is loose when radio is shipped from factory).

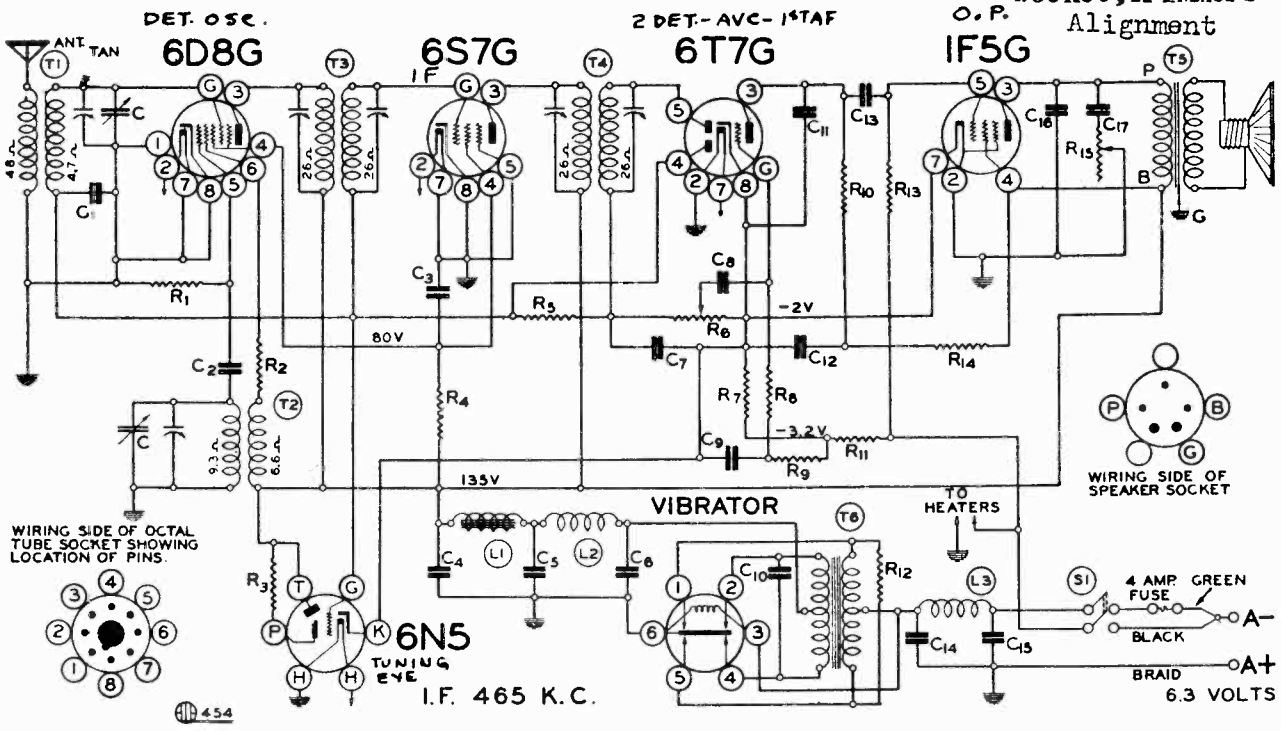
If you should desire to change any station you selected to another, loosen the locking screw "C" four or five complete turns; select the new station as explained. (Note: If the dial mechanism works hard when setting up a new station for one of the automatic tuner levers, it is due to the locking screw being too tight. Loosen the locking screw "C" until the dial mechanism works freely with the tuner lever pressed down.)

BE SURE TO RETIGHTEN the LOCKING SCREW, otherwise the stations you have selected will not stay adjusted to the levers.

The automatic dial is now set up for quick tuning. Press down on the lever and—Presto!—your favorite station is selected.

GAMBLE SKOGMO, INC.

MODEL 504
Schematic, Voltage,
Socket, Trimmers
Alignment



CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION
VOLUME V111

Sensitivity Check at
600 KC and 1000 KC

IF ALIGNMENT

ADJ. at 465 KC thru .1 mf cond.

RF ALIGNMENT

THRU 200 mmf cond. :
Adj. osc. trim. at 1720 KC -
Adj. Ant. trim. at 1400 KC -

Frequency Range — 535-1720 Kilocycles

REPAIR PARTS (Serial No. 7J852900 and up)

No.	Part No.	Description
		RESISTORS
R1	130-76	30M ohm - 1/3 w.
R2	130-23	2M ohm - 1/3 w.
R3	130-186	250M ohm - 1/10 w. - in tuning indicator
R4	130-123	15M ohm - 1/2 w.
R5	130-121	3.2 megohm - 1/3 w.
R6	101-56	1 megohm volume control
R7	106-36	10 ohms - resistor strip
R8	130-19	1 megohm - 1/3 w.
R9	130-19	1 megohm - 1/3 w.
R10	130-100	150M ohm - 1/3 w.
R11	106-36	25 ohms - resistor strip
R12	130-84	200 ohms - 1/3 w.
R13	130-19	1 megohm - 1/3 w.
R14	130-20	100M ohm - 1/3 w.
R15	101-72	300M ohm - tone control R7 and R11 in same unit
		CONDENSERS
C	102-38	2 gang variable
C1	100-9	.05 x 200 v.
C2	129-39	.0005 Mica
C3	100-33	.1 x 200 v.
C4	119-28	5.0 mfd. - 200 w. v. lytic
C5	119-28	5.0 mfd. - 200 w. v. lytic
C6	100-33	.1 x 200 v.
C7	129-5	.0001 Mica
C8	100-11	.01 x 400 v.
C9	100-11	.01 x 400 v.
C10	100-34	.005 x 1200 v.
C11	129-12	.00025 Mica
C12	100-33	.1 x 200 v.
C13	100-11	.01 x 400 v.
C14	100-40	.5 x 200 v.
C15	100-40	.5 x 200 v.
C16	100-37	.003 x 600 v.
C17	100-11	.01 x 400 v. C4 and C5 in same unit
		PARTS
T1	111-66	Antenna coil complete
T2	110-45	Oscillator coil complete
T3	108-84	Input I.F. coil complete - 465 kc.
T4	108-85	Output I.F. coil complete - 465 kc.
T5	114-63	P.M. Speaker
T6	104-62	Power Transformer
L1	105-30	Filter Choke
L2	123-3	R. F. "B" Choke
L3	105-19	"A" Choke
S1		Switch on volume control
	126-4	Vibrator

BATTERY CONNECTIONS:

Referring to Fig. 1, connect the battery cable to the storage battery in the following manner:

(a) The storage battery should be located as far from the receiver as the battery cable will permit.

(b) Connect the lead (containing the fuse receptacle) marked A negative (—) to the negative (—) post of the storage battery.

(c) Connect the lead marked A positive (+) to the positive (+) post of the storage battery.

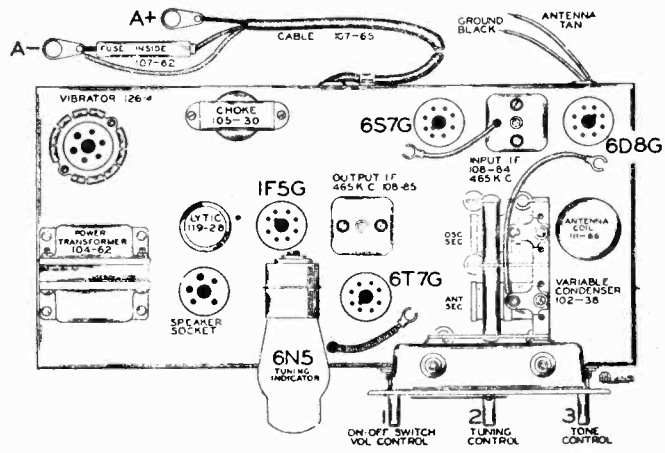
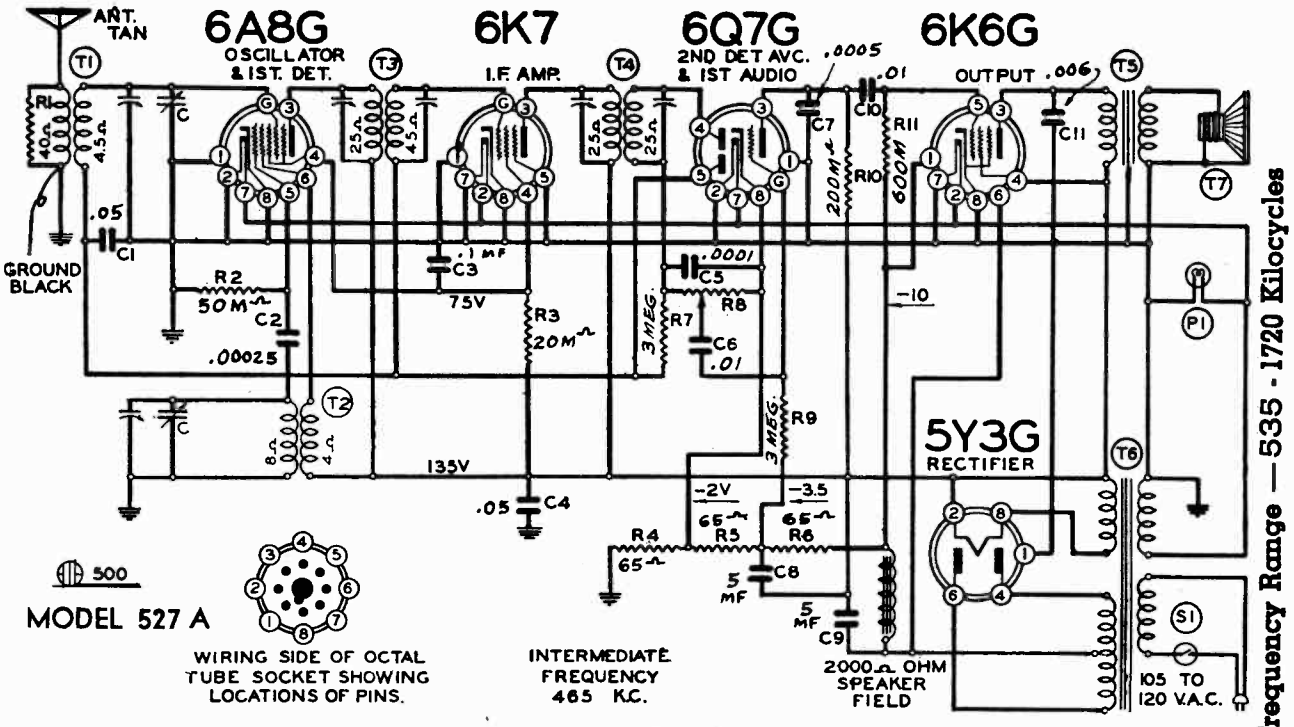


FIG. 1—TOP VIEW

MODEL 527A
Schematic, Voltage, Alignment
Socket, Trimmers,

GAMBLE SKOGMO, INC.



500
MODEL 527 A

WIRING SIDE OF OCTAL TUBE SOCKET SHOWING LOCATIONS OF PINS.

INTERMEDIATE FREQUENCY 465 K.C.

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-95B Output I.F. Transformer
Part No. 108-96 Input I. F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see Fig. 1).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with .1 mfd. condensor, to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-95B) to resonance.
   (b) Move oscillator output clip from grid of 6K7 to grid of 6A8G and adjust input I.F. transformer (No. 108-96) to resonance.
   (c) With oscillator still connected to 6A8G, readjust output I.F. transformer (108-95B) if necessary.

R.F. ALIGNMENT: (535-1720 K.C.)

1. With the gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 100 mmf. condensor to the antenna lead and chassis ground and make the following adjustments:
   (a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer to resonance. This adjustment is on the top of rear section of variable gang condenser. (See Fig. 1).
   (b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance. (Top of front section of gang condenser).
   (c) Check sensitivity at 600 and 1000 kilocycles.

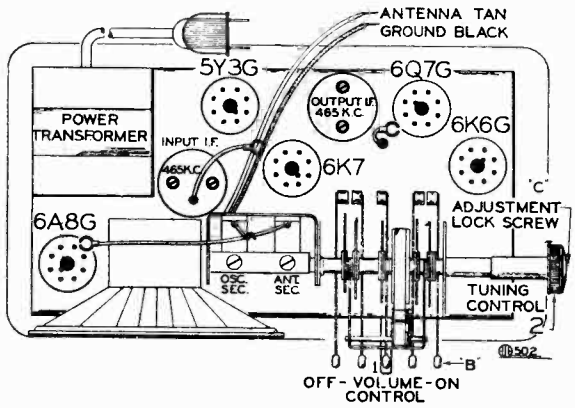


FIG. 1—TOP VIEW

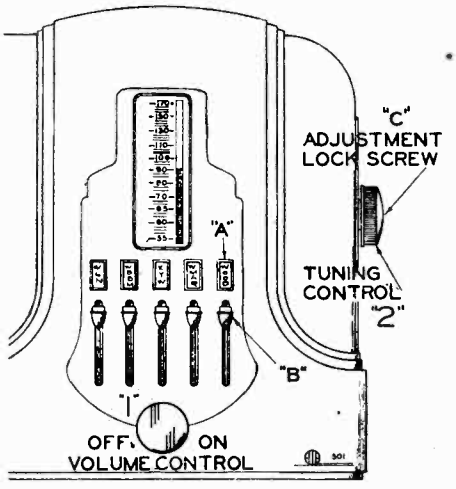


FIG. 2—FRONT VIEW

FOR TUNER PROCEDURE, SEE DATA ON MODEL 677A

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on diagram are measured with 115 volts on the primary of the power transformer.

Resistances of coil windings are indicated in ohms on the schematic circuit diagram.

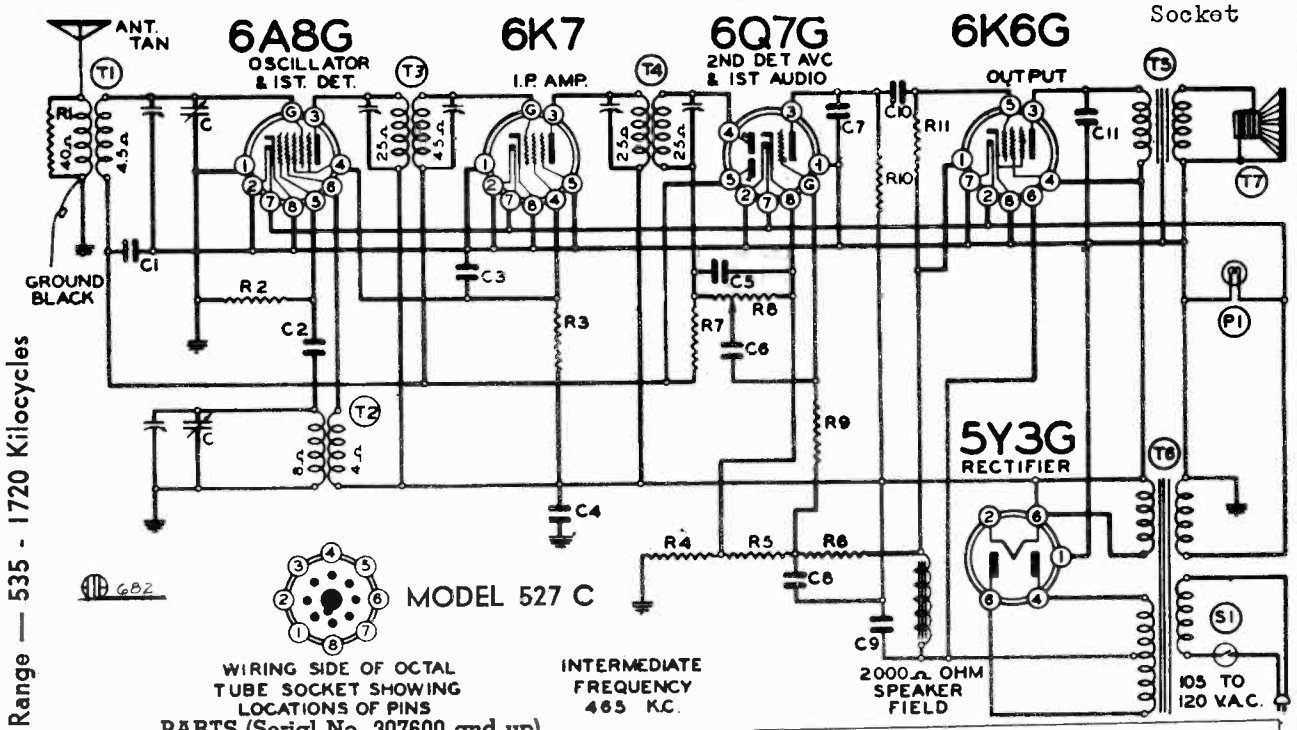
To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.

Voltage, Alignment

GAMBLE-SKOGMO, INC.

MODEL 527C
Schematic
Socket



Range — 535 - 1720 Kilocycles

MODEL 527 C

WIRING SIDE OF OCTAL TUBE SOCKET SHOWING LOCATIONS OF PINS

INTERMEDIATE FREQUENCY 465 K.C.

PARTS (Serial No. 307600 and up)

Code No.	Part No.	Description
		RESISTORS
R1	13021	20M ohm—⅓ w.
R2	13012	50M ohm—⅓ w.
R3	13021	20M ohm—⅓ w.
R4	10635	Resistor Strip—65 ohm
R5	10635	45 ohm—resistor strip
R6	10635	220 ohm—resistor strip
R7	130170	3 megohm—⅓ w.
R8	101141	500M ohm volume control
R9	130170	3 megohm—⅓ w.
R10	1309	200M ohm—⅓ w.
R11	130118	600M ohm—⅓ w.
		CONDENSERS
C	10290	2 gang variable condenser
C1	1009	.05 x 200 v.
C2	12912	.00025 Mica
C3	1001	.1 x 400 v.
C4	10013	.05 x 400 v.
C5	1295	.0001 Mica
C6	10011	.01 x 400 v.
C7	1292	.0005 Mica
C8	11947E	5.0 mfd.—250 w. v. lytic
C9	11947E	5.0 mfd.—250 w. v. lytic
C10	10011	.01 x 400 v.
C11	10019	.006 x 600 v.
		PARTS
T1	11192	Antenna coil complete
T2	11073	Oscillator coil complete
T3	10896F	Input I. F.—465 kc. complete
T4	10895E	Output I. F.—465 kc. complete
T5	10555D	Output Transformer
T6	104149	Power Transformer
T7	114113	5" Dynamic Speaker (2000 ohm Field)
S1		Off-on switch on volume control
P1	10794	6-8 v. pilot light

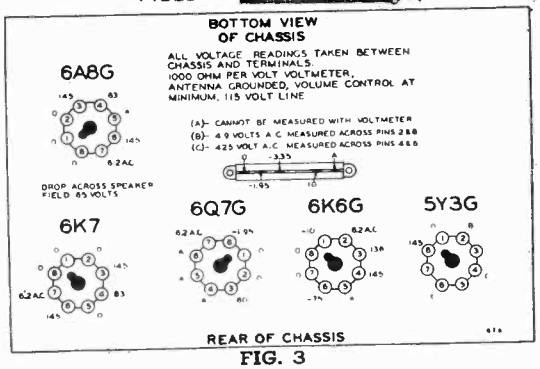


FIG. 3

TUBES:

1—Type 6A8G Pentagrid Mixer, First Detector-oscillator.
1—Type 6K7 Remote Cut-off Pentode, I.F. Amplifier (465 K.C.)
1—Type 6Q7G Duplex Diode Triode Second Detector, A.V.. C. and First Audio.
1—Type 6K6G Pentode Output Amplifier.
1—Type 5Y3G High Vacuum Rectifier.

DESCRIPTION:

The tube complement of this chassis consists of the following octal base glass and metal tubes.

The type and function of each tube is as follows:

ALIGNMENT PROCEDURE

- Volume control—Maximum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

The following equipment is required for aligning:

- An all wave signal generator.
- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antennas—.1 mf., 100 mmf.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Variable Condenser Setting	Trimmers Adjusted (in Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Grid of 6A8G	Rotor full open (Plates out of mesh)	Four trimmers (See Fig. 1)	Input I. F. and Output I. F.	Adjust to maximum output
BROAD-CAST BAND	1720 Kc.	100 mmf.	Antenna Lead	Rotor full open (Plates out of mesh)	Trimmer—Top of rear section of gang (See Fig. 1)	Broadcast Oscillator	Adjust to maximum output
	1400 Kc.	100 mmf.	Antenna Lead	Set dial at 1400 Kc.	Trimmer—Top of front section of gang (See Fig. 1)	Broadcast Antenna	Adjust to maximum output

FREQUENCY RANGE
535 to 1720 K.C.

Power Consumption—50 Watts
Power Output—1 Watt Undistorted, 1.7 Watts Maximum
Intermediate Frequency—465 K.C.

MODEL 587 - Series A

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1," "Dummy 2," and "Dummy 3."

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

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

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

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-76A Output I.F. Transformer
Part No. 108-75A Input I.F. Transformer.

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1," to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-76A) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap to 6A8 and adjust input I.F. transformer (No. 108-75A) to resonance.
   (c) With oscillator still connected to 6A8, readjust output I.F. transformer (108-76A) if necessary.

BROADCAST AND SHORT WAVE BAND ALIGNMENT

Broadcast Band:—535 to 1720 Kilocycles.
Short Wave Band:—2280 to 6600 Kilocycles.

Important:—These adjustments must be made in the following order:

SHORT WAVE OSCILLATOR ADJUSTMENT:

1. With band switch in the short wave band position, extreme right of its rotation, and with the gang condenser in its minimum capacity position, plates entirely out of mesh, and with the external oscillator connected in series with "Dummy 1" to grid cap of the 6A8 tube, make the following adjustment:
   (a) Set external oscillator to 6.6 megacycles and adjust short wave oscillator trimmer to resonance. This adjustment is marked "S.W. Osc." (see top view of chassis, Fig. 1, for location of this adjustment).

NOTE: Make certain that the fundamental 6.6 megacycles signal has been tuned in and not the image frequency, noting that the image appears when the tuning knob is moved to approximately 5.7 megacycles.

BROADCAST BAND OSCILLATOR ADJUSTMENT:

1. With band switch in the broadcast position, extreme left of its rotation, and with the gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 1" to grid cap of the 6A8 tube, make the following adjustment:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance. This adjustment is the trimmer mounted on the front section of the variable gang condenser.

BROADCAST BAND ANTENNA ADJUSTMENT:

1. With the band switch still in the broadcast position, move the external oscillator from the grid cap of the 6A8 tube to the tan antenna lead and black ground lead, in series with "Dummy 2" and make the following adjustments:
   (a) Set external oscillator to 1550 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer to resonance. This adjustment is marked "B.C. Ant." (See top view of chassis, Fig. 1, for location of this adjustment.)
   (b) Re-set external oscillator to 600 K.C. and adjust broadcast series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until, by adjusting series pad, maximum output is attained. This adjustment is located on the top of the chassis directly in front of the antenna coil. (See top view of chassis, Fig. 1).
   (c) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

SHORT WAVE BAND ANTENNA ADJUSTMENT:

1. With the band switch in the short wave position, and with external oscillator connected in series with "Dummy 3," to the tan antenna lead and black ground lead, make following adjustment:
   (a) Set external oscillator to 6 megacycles and adjust the short-wave antenna trimmer to resonance. This adjustment is the trimmer mounted on the rear section of the variable gang condenser.

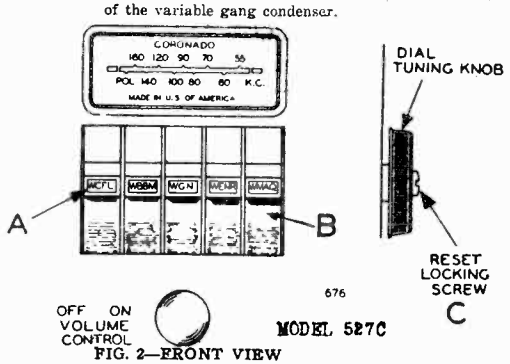


FIG. 2—FRONT VIEW

MODEL 527C

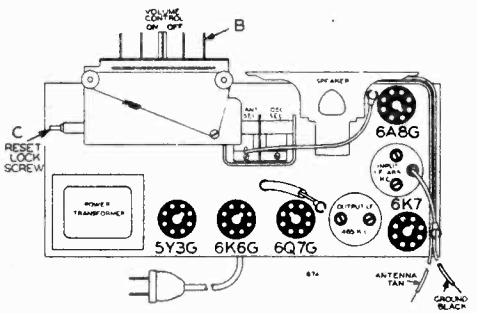


FIG. 1—TOP VIEW

PROCEDURE FOR SETTING THE AUTOMATIC LEVERS:

There are five levers on the dial by means of which five stations may be selected, (See "B" Fig. 2)

Make a list of local stations you tune in regularly; any number up to and including five.

Punch out from the set of station call letter tabs supplied, the call letters of the stations you have selected.

On the front of each automatic tuner button an opening is provided for inserting the call letter tabs, (See "A" Fig. 2).

Insert the call letter tabs in the rectangular openings of each of the automatic tuner buttons. One of the small celluloid tabs supplied should be snapped into place over each of the station call letter tabs.

Press DOWN ALL THE WAY any one of the automatic tuner lever buttons. Holding it down FIRMLY, tune in by means of the tuning knob (No. 2) the station indicated on the station call letter tab on this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position) until the signal is clearest. The station will then be accurately tuned in. Release the lever.

Press down another automatic tuner lever button. Holding it down FIRMLY, carefully tune in the station indicated on the call letter tab on this lever. Release this lever.

Follow this procedure until you have selected all of your favorite stations.

Now rotate the tuning knob (No. 2) to the right (clockwise) as far as it will turn, and with a coin (half dollar), tighten the special locking screw ("C") in the center of the tuning knob, (See Fig. 2).

It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT.

This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Locking screw "C" is loose when radio is shipped from factory).

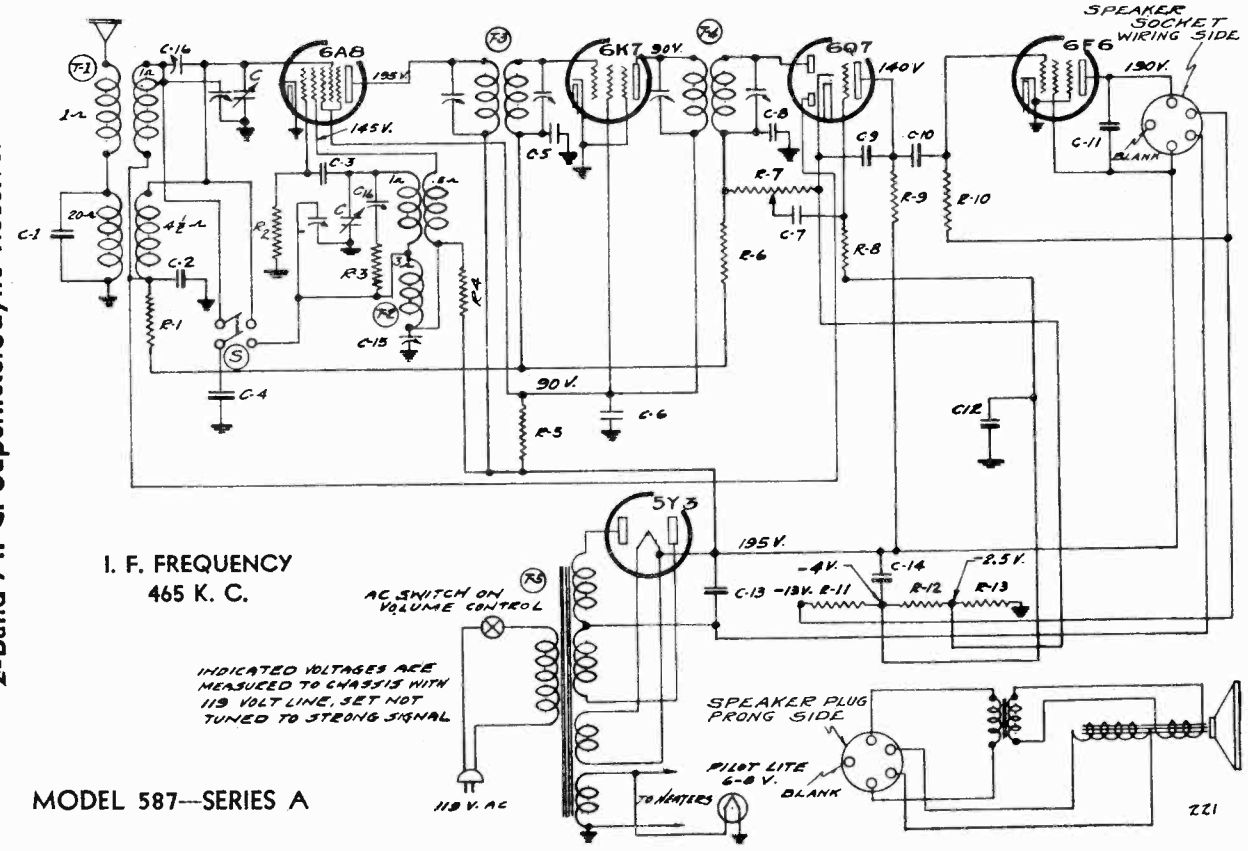
If you should desire to change any station you selected to another, hold the tuning knob No. 2 securely and with a coin loosen the locking screw "C" one or two turns; select the new station as explained. Be sure to retighten the locking screw, otherwise the stations you have selected will not stay adjusted to the levers.

The automatic dial is now set up for quick tuning. Press down on the lever and—your favorite station is selected.

MODEL 587 Series A
Schematic, Voltage
Socket, Trimmers

GAMBLE-SKOGMO, INC.

2-Band A. C. Superheterodyne Receiver



I. F. FREQUENCY
465 K. C.

MODEL 587—SERIES A

PARTS (Serial No. 6G310775 and up)

RESISTORS

No.	Part No.		Description
R1	130-111	100M	Ohms 1/10W—20%—50V Carbon
R2	130-12	50M	Ohms 1/3 W—20%—20V Carbon
R3	130-112	100	Ohms 1/10W—20%—10V Carbon
R4	130-22	5M	Ohms 1/3 W—20%—10V Carbon
R5	130-77	10M	Ohms 1 W—20%—100V Carbon
R6	130-110	1 meg	Ohm 1/10W—10%—100V Carbon
R7	101-49	1 meg	Ohm Volume Control
R8	130-113	2 meg	Ohm 1/10W—20%—100V Carbon
R9	130-20	100M	Ohms 1/3W—20%— 50V Carbon
R10	130-100	150M	Ohms 1/3W—20%— 50V Carbon
R11	106-26	220	Ohms
R12	106-26	33	Ohms
R13	106-26	52	Ohms

NOTE: R11, R12, and R13 in one unit—106-26

CONDENSERS

C1	129-63	.0004 Mica—W—10%
C2	100-26	.02 x 400 Volt—25%
C3	129-62	.00003 Mica—0—10%
C4	129-61	.0017 Mica—W—2½%
C5	100-9	.05 x 200 Volt—25%
C6	100-6	.25 x 200 Volt—25%
C7	100-11	.01 x 400 Volt—25%
C8	129-12	.00025 Mica—0—20%
C9	129-12	.00025 Mica—0—20%
C10	100-11	.01 x 400 Volt—25%
C11	100-19	.006 x 600 Volt—25%
C12	100-6	.25 x 200 Volt—25%
C13	103-6	8 mfd. x 350 Volt Electrolytic
C14	103-7	8 mfd. x 300 Volt Electrolytic
C15	124-29	Adjustable condenser 390 mmf. working capacity
C16	124-30	Adjustable Dual Condenser

TUNING RANGE—

Standard Broadcast Band
535-1720 Kilocycles.

Short Wave Band
2280-6600 Kilocycles

MISCELLANEOUS PARTS

T1	111-56A	Antenna Coil
T2	110-44	Oscillator Coil
T3	108-75A	Input I.F. 465 Kc.
T4	108-76A	Output I.F. 465 Kc.
T5	104-56	Power Transformer—60 Cycles
S	125-19	Band Switch
C	102-31	One Section of Two Gang Condenser

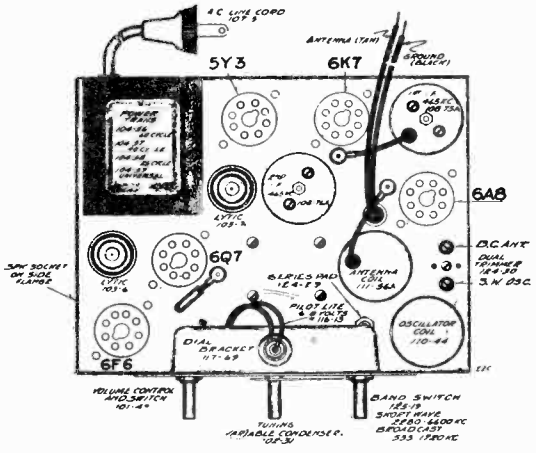


FIG. 1—TOP VIEW

DESCRIPTION:

TUBES:

The tube complement of this chassis consists of the following tubes.

The type and function of each tube is as follows:

1—Type 6A8 Pentagrid Mixer, First Detector-oscillator

1—Type 6K7 Remote Cut-Off Pentode, I. F. Amplifier (465 K.C.)

1—Type 6Q7-G Duplex Diode Triode Second Detector, A.V.C. and First Audio.

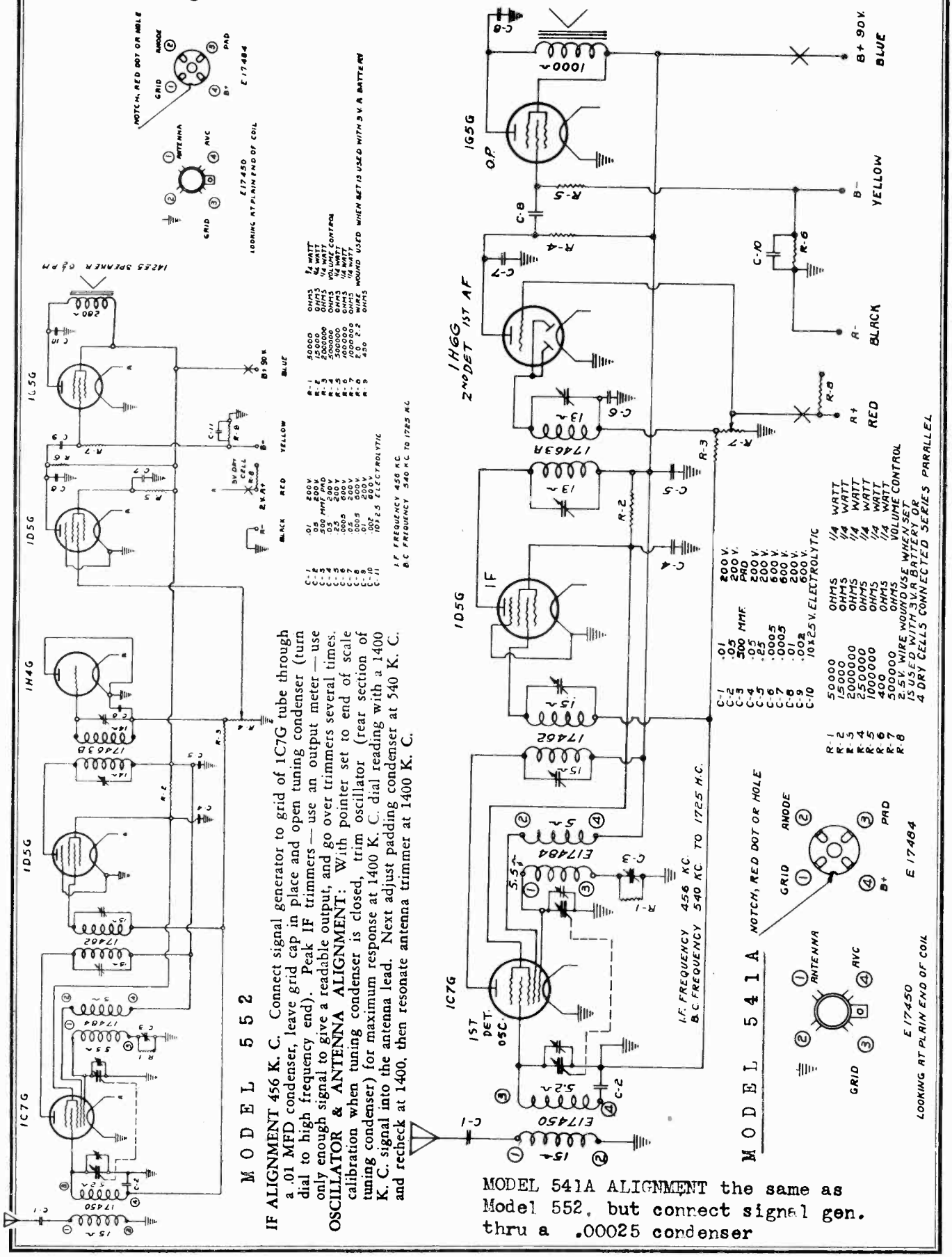
1—Type 6F6-G Pentode Output Amplifier.

1—Type 5Y3 High Vacuum Rectifier.

Transformers are available and chassis are sometimes equipped with universal transformers for operation on 40 and 60 cycles and with primary taps for 108, 125, 150, 220 and 250 volts (see parts list) and also sometimes equipped with 25 cycle transformers with 105-115 volt or 220 volt primaries, not universals.

MODEL 541A
MODEL 552
Schematics, Alignment

GAMBLE-SKOGMO, INC.



MODEL 552

IF ALIGNMENT 456 K. C. Connect signal generator to grid of 1C7G tube through a .01 MFD condenser, leave grid cap in place and open tuning condenser (turn dial to high frequency end). Peak IF trimmers — use an output meter — use only enough signal to give a readable output, and go over trimmers several times.

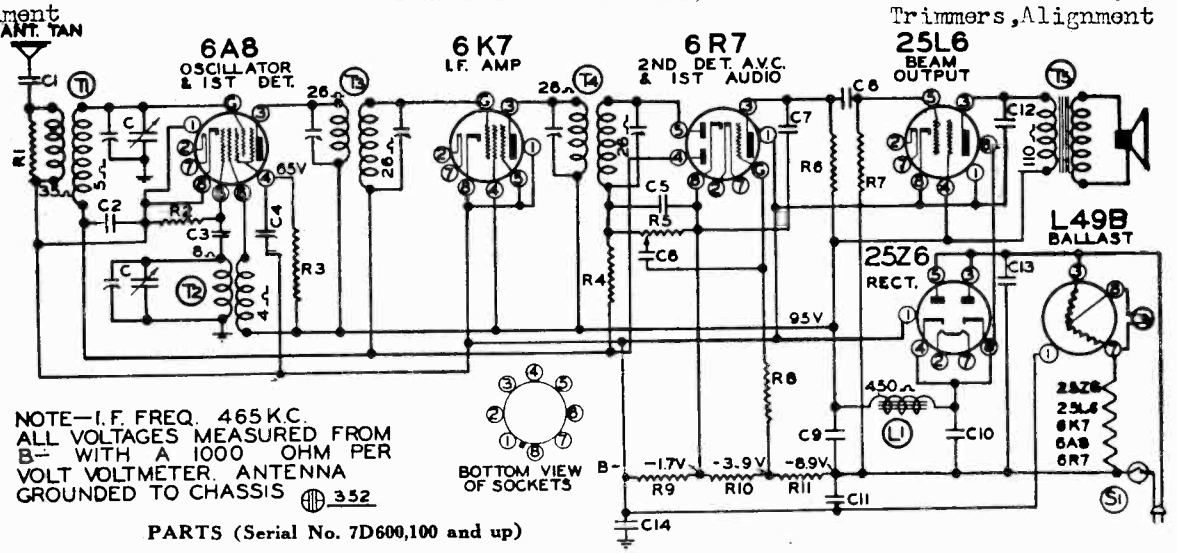
OSCILLATOR & ANTENNA ALIGNMENT: With pointer set to end of scale calibration when tuning condenser is closed, trim oscillator (rear section of tuning condenser) for maximum response at 1400 K. C. dial reading with a 1400 K. C. signal into the antenna lead. Next adjust padding condenser at 540 K. C. and recheck at 1400, then resonate antenna trimmer at 1400 K. C.

MODEL 541A ALIGNMENT the same as Model 552, but connect signal gen. thru a .00025 condenser

MODEL 602B
MODEL 602C
Alignment

GAMBLE SKOGMO, INC.

MODEL 602
Schematic, Voltage, Socket
Trimmers, Alignment



PARTS (Serial No. 7D600,100 and up)

RESISTORS

No.	Part No.	Description	
R1	130-17	10M ohm - 1/3 w.	20%
R2	130-12	50M ohm - 1/3 w.	20%
R3	130-149	15M ohm - 1/3 w.	20%
R4	130-4	3 meg ohm - 1/3 w.	20%
R5	101-77	Volume Control (1 Meg)	
R6	130-12	50M ohm - 1/3 w.	20%
R7	130-20	100M ohm - 1/3 w.	20%
R8	130-19	1 megohm - 1/3 w.	20%
R9	106-38	30 ohm	
R10	106-38	40 ohm	
R11	106-38	55 ohm	
		R9, R10, and R11 in one unit	

CONDENSERS

No.	Part No.	Description	
C	102-48	2 gang variable	
C1	100-25	.002 x 600	25%
C2	100-9	.05 x 200	25%
C3	129-12	.00025 Mica	20%
C4	100-22	.05 x 200	25%
C5	129-5	.0001 Mica	20%
C6	100-11	.01 x 400	25%
C7	129-2	.0005 Mica	20%
C8	100-22	.05 x 200	25%
C9	119-39	20 mfd. lytic - 100 w.v.	
C10	119-39	15 mfd. lytic - 100 w.v.	
C11	100-20	.1 x 200	25%
C12	100-13	.05 x 400	25%
C13	100-39	.1 x 400	20%
C14	100-53	.25x400	20%

PARTS

T1	111-58B	Antenna Coil Complete
T2	110-46	Oscillator Coil Complete
T3	108-82B	Input I. F. Complete
T4	108-83B	Output I. F. Complete
T5	114-71	Dynamic Speaker
L1		450 ohm speaker field
S1		Switch on Volume Control

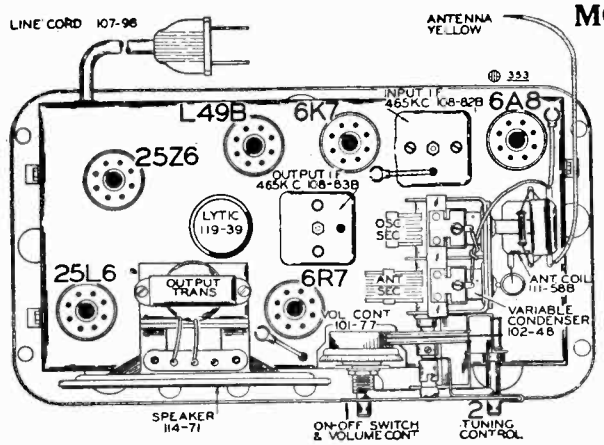


FIG. 1—TOP VIEW

MODEL 602 — Range 535-1720 Kilocycles

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on diagram are measured with 119 volt A.C. or D.C. line.

Resistances of coil windings are indicated in ohms on the schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.

RESONANCE INDICATOR:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or by means of an adapter between the plate and screen terminals of the type 25L6G output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

I.F. ALIGNMENT - 465 KC - Model 602
I.F. ALIGNMENT -470 KC - Models 602 B & C

Part No. 108-83B Output I.F. Transformer

Part No. 108-82B Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see Fig. 1).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with .1 mfd. condenser, to the control grid cap of the type 6K7G tube, and adjust the output I.F. transformer (No. 108-83B) to resonance.
   (b) Move oscillator output clip from grid of 6K7G to grid of 6A8G and adjust input I.F. transformer (No. 108-82B) to resonance.
   (c) With oscillator still connected to 6A8G, readjust output I.F. transformer (108-83B) if necessary.

Models 602, 602B & 602C

R.F. ALIGNMENT: (535-1720 K.C.)

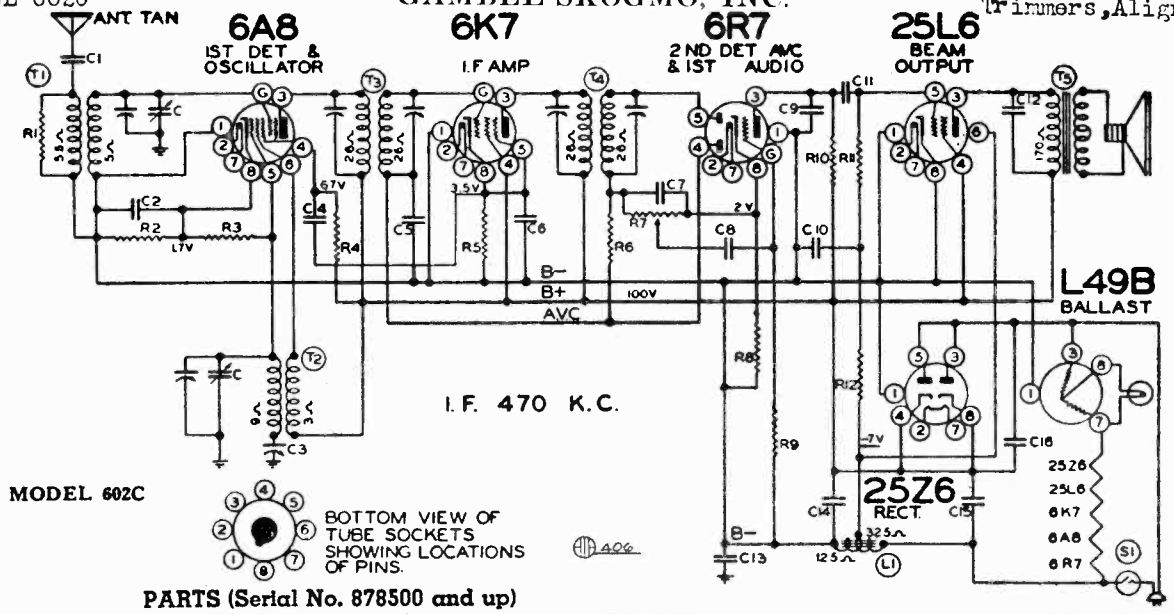
1. With gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 200 mmf. condenser to the antenna lead and chassis ground and make the following adjustments:
   (a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer to resonance. This adjustment is on the top of rear section of variable gang condenser. (See Fig. 1).
   (b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance. (Top of front section of gang condenser).
   (c) Check sensitivity at 600 and 1000 kilocycles.

MODEL 602B
MODEL 602C

GAMBLE-SKOGMO, INC.

Schematics, Socket Trimmers, Alignment

Frequency Range 535-1720 Kilocycles



MODEL 602C

BOTTOM VIEW OF TUBE SOCKETS SHOWING LOCATIONS OF PINS.

406

PARTS (Serial No. 878500 and up)

No.	Part No.	Description		No.	Part No.	Description		No.	Part No.	Description	
		CONDENSERS		C12	100-67	.025 x 400	25%	R9	130-19	1 megohm — 1/3 w.	20%
C	102-55	2 Gang Variable Condenser		C13	100-53	.25 x 400	20%	R10	130-94	50M ohm — 1/3 w.	10%
C1	100-25	.002 x 600	25%	C14	119-42	5. mfd. lytic 100 w. v.		R11	130-103	100M ohm — 1/3 w.	10%
C2	100-22	.05 x 200	25%	C15	119-42	20. mfd. lytic 100 w. v.		R12	130-194	35M ohm — 1/3 w.	10%
C3	129-75	.0003386 Compression Type Condenser 1%		C16	100-39	.1 x 400	20%			**PARTS**	
						RESISTORS		T1	111-79	Antenna Coil Complete	
C4	100-22	.05 x 200	25%	R1	130-17	10M ohm — 1/3 w.	20%	T2	110-62	Oscillator Coil Complete	
C5	100-9	.05 x 200	25%	R2	130-97	200 ohm — 1/3 w.	10%	T3	108-82B	Input I. F. Complete	
C6	100-20	.1 x 200	25%	R3	130-12	50M ohm — 1/3 w.	20%	T4	108-83B	Output I. F. Complete	
C7	129-21	.0002 Mica	20%	R4	130-149	15M ohm — 1/3 w.	20%	T5	114-88	5" Dynamic Speaker	
C8	100-11	.01 x 400	25%	R5	130-54	500 ohm — 1/3 w.	20%	L1		Speaker field 450 ohm— total tapped 125 ohm	
C9	129-2	.0005 Mica	20%	R6	130-4	3 megohm — 1/3 w.	20%				
C10	100-75	.22 x 200	10%	R7	101-77	Volume Control (1 meg)		S1		Switch on volume control	
C11	100-10	.05 x 200	10%	R8	130-193	3M ohm — 1/3 w.	10%				

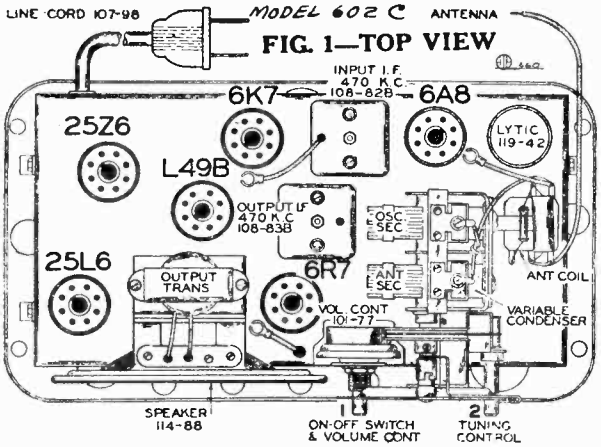


FIG. 1—TOP VIEW

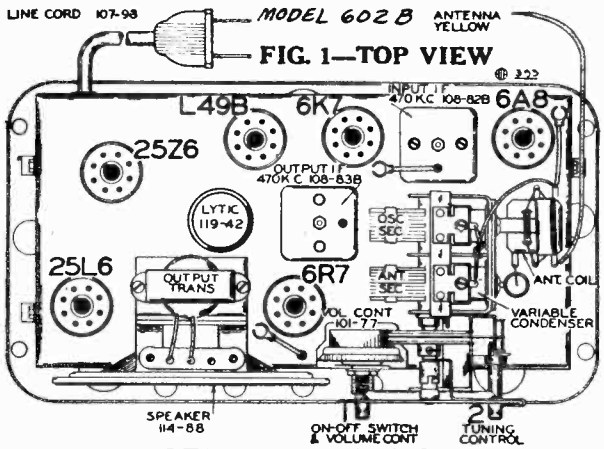
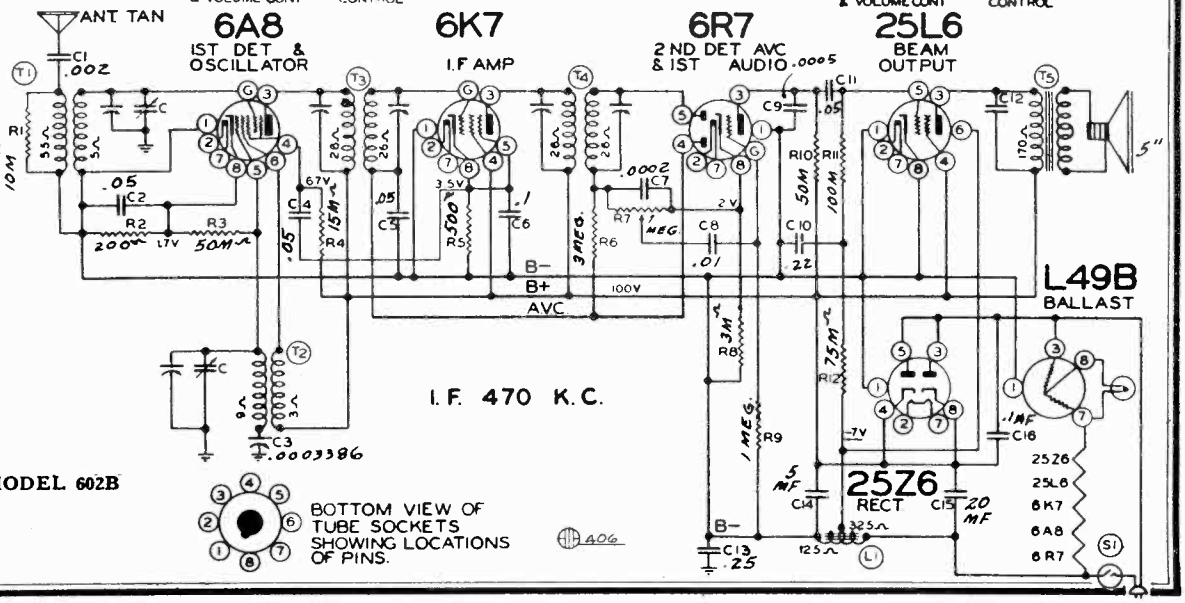


FIG. 1—TOP VIEW

ALIGNMENT FOR MODELS 602B and 602C
THE SAME AS MODEL 602, EXCEPT I.F.
ADJUSTMENT IS AT 470 KC
Range 535-1720 Kilocycles



MODEL 602B

BOTTOM VIEW OF TUBE SOCKETS SHOWING LOCATIONS OF PINS.

406

Socket, Trimmers
Parts, Notes

GAMBLE-SKOGMO, INC.

MODEL 666
Schematic, Voltage

The tube complement consists of the latest "Metal-Glass" tubes which are interchangeable with metal tubes.

NOTE.

C3, C4, C9, C15, in one unit—part No. 116-18.
C5, C8, C10, C11, in one unit—part No. 116-17.
C12, C17, C19, in one unit—part No. 116-16.
C24, C25, in one unit—part No. 119-21.

DESCRIPTION:

Model No. 666 is a six-tube superheterodyne receiver having a tuning range of 530 K.C. to 1550 K.C., operates from a 6.0 volt storage battery and uses the automotive type 6.3 volt tubes. The "B" supply is obtained from a vibrator with a tube rectifier.

The I.F. frequency used is 465 K.C., the R.F. end of the receiver consisting of a high gain iron core antenna coil which gives high signal to noise ratio and an R.F. stage especially designed to give high image rejection and high I.F. attenuation. The I.F. transformers are designed to give high gain and selectivity and yet to have a broad nose for ease of tuning and hi-fidelity response. They are of the air core type and wound with solid wire to give *minimum* drift and variation of gain due to climatic changes.

The receiver is so designed that it may be used as either a single or two unit installation. Taps are provided on the output transformer to a pin jack terminal board, a red dot distinguishing dual speaker tap and green dot for single speaker operation.

For complete details see illustration and Header speaker data chart.

Dash kits for the remote control head are available for 1936 cars drilled for dash plates.

This receiver has been carefully designed to facilitate servicing, the top and bottom covers are both removable and are fastened in place by spring clips, self tapping screws and trimount buttons.

All adjustments are accessible and any part replaceable without removing the chassis from the case.

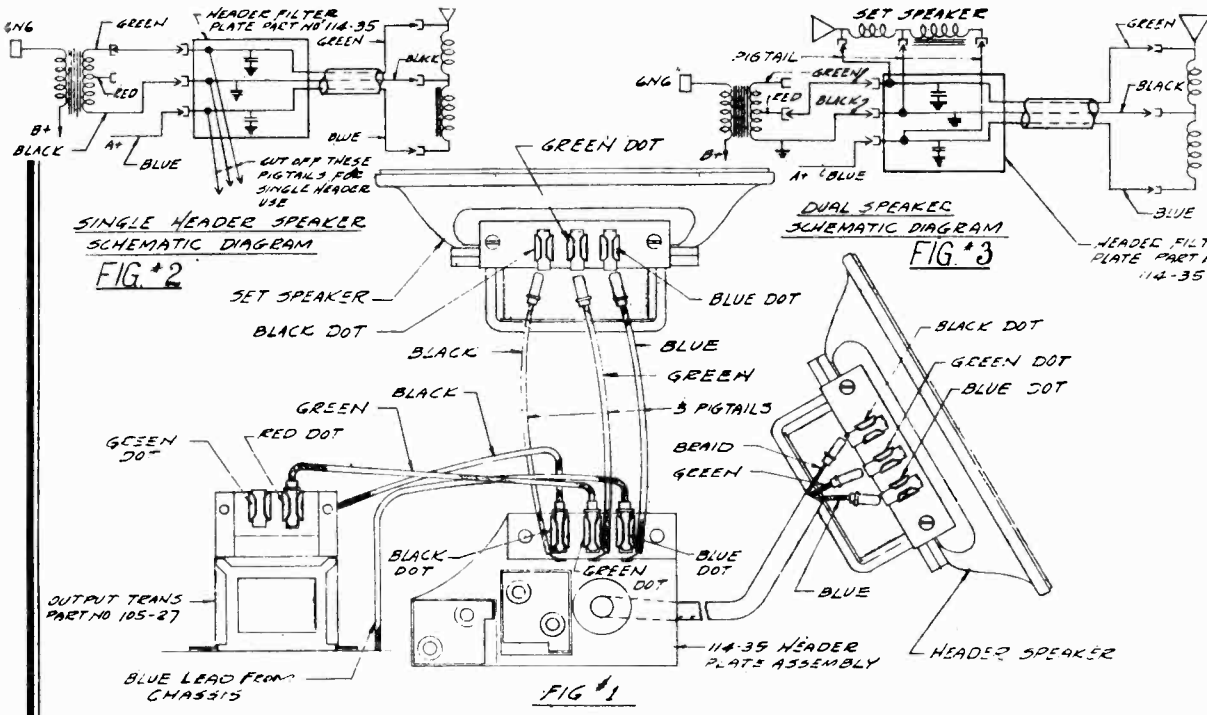
T6	102-26	Three Gang Variable Condenser					
T7	108-72	Output I.F. Coil—465 Kc.					
T8	105-27	Output Transformer					
T9	104-51	Power Transformer					
L1	105-23	Filter Choke					
L2	105-19	"A" Choke					
L3	105-24	"A" Choke					
L4	105-26	"A" Choke					
L5	114-34	5¼" Speaker (Field Resistance—4 Ohms)					
V	126-1	Vibrator					

CONDENSERS						RESISTORS			
	C		Spark Plate			R2	130-99	300 Ohm - ½ Watt - 20% - 10 Volt - Carbon
	C1	129-3	.00002 Mica - "O" - 20%			R3	130-94	50M Ohm - ½ Watt - 10% - 10 Volt - Carbon
	C2	129-49	.00009 Mica - "O" - 5%			R4	130-98	1500 Ohm - ½ Watt - 20% - 25 Volt - Carbon
	C3	116-18	.05 x 200 Volt			R5	130-42	20M Ohm - ½ Watt - 20% - 100 Volt - Carbon
	C4	116-18	.25 x 200 Volt					
	C5	116-17	.05 x 200 Volt			R6	130-70	500 Ohm - ½ Watt - 10% - 10 Volt - Carbon
	C6	129-21	.0002 Mica - MT - "O" - 20%			R7	130-95	12M Ohm - 1.2 Watt - 10% - 100 Volt - Carbon
	C7	124-17	Single Padder J-4-S			R8	130-97	200 Ohm - ½ Watt - 10% - 10 Volt - Carbon
	C8	116-17	.1 x 400 Volt					
	C9	116-18	.1 x 400 Volt			R9	130-3	500M Ohm - ½ Watt - 20% - 100 Volt - Carbon
	C10	116-17	.1 x 200 Volt					
	C11	116-17	.1 x 200 Volt			R10	130-108	40M Ohm - ½ Watt - 10% - 100 Volt - Carbon
	C12	116-16	.05 x 200 Volt					
	C13	129-5	.0001 Mica - MT - "O" - 20%			R11	130-107	800 Ohm - ½ Watt - 10% - 10 Volt - Carbon
	C14	129-2	.0005 Mica - MT - "O" - 20%			R12	101-42	50M Ohm - Volume Control and Switch
	C15	116-18	.02 x 200 Volt			R13	130-22	5M Ohm - ½ Watt - 20% - 10 Volt - Carbon
	C16	129-5	.0001 Mica - MT - "O" - 20%			R14	130-68	1 Meg Ohm - ½ Watt - 10% - 20 Volt - Carbon
	C17	116-16	.05 x 400 Volt			R15	130-9	200M Ohm - ½ Watt - 20% - 20 Volt - Carbon
	C18	100-37	.003 x 600 Volt - 10%					
	C19	116-16	.01 x 800 Volt			R16	130-3	500M Ohm - ½ Watt - 20% - 100 Volt - Carbon
	C20	100-35	.5 x 200 Volt - 50% - 10%					
	C21	100-35	.5 x 200 Volt - 50% - 10%			R17	101-45	1 Meg Ohm - Tone Control
	C22	100-35	.5 x 200 Volt - 50% - 10%					
	C23	100-36	.01 x 1400 Volt - 10%					
	C24	119-21	8.0 mfd. Lytic Cond. 350 Working Volts					
	C25	119-21	4.0 mfd. Lytic Cond. 350 Working Volts					
	C26		5.0 mmf. Gimmick					

PARTS		
T1	111-48	Antenna Filter Coil Assembly
T2	111-47	Antenna Coil Assembly
T3	109-27	R.F. Coil Assembly
T4	110-37	Oscillator Coil Assembly
T5	108-69	Input I.F. Coil—465 Kc.

MODEL 666
Speaker Data,
Alignment

GAMBLE-SKOGMO, INC.



DIAL ADJUSTMENT

Tune set to some station of a known frequency (between 800 and 1200 K.C.), hold selector knob, then remove pilot light assembly from back of remote head and with a screw driver adjust the slotted screw through this opening and in this way adjust the dial pointer to the correct frequency setting.

SINGLE HEADER SPEAKER CONNECTIONS

Consult Fig. No. 1. On this application, all that is required is to remove speaker from receiver case and place in header board of car. Install the special seven foot shielded speaker cable and header filter plate assembly and insert the three leads. (which formerly connected the radio to the speaker) to the pin jacks on the header filter plate assembly. Remove the three short pigtail leads from the header filter plate assembly, namely, black, green and blue. These leads are only used when dual (two) speakers are to be used, one in the header and the other in the receiver case.

DUAL SPEAKER CONNECTIONS

Consult Fig. No. 1. On this application, leave speaker in receiver case, install a complete header speaker in the header board of the automobile and assemble header filter plate assembly and seven foot shielded cable to front cover of receiver case.

The speaker leads from the radio are removed from the terminal board of the set speaker and plugged into the pin jacks of the header filter plate assembly, making certain to match the colors of the leads with the color dots on the pin jacks. The three short pigtail leads from the header filter plate assembly are then connected to the set speaker. Shift the green lead which runs to the output transformer (No. 105-27) to the pin jack with red dot for dual speaker operation.

For further explanation, consult Fig. No. 2 Single Header Speaker schematic diagram, and Fig. No. 3, Dual Speaker schematic diagram.

A more technical explanation of the manner of interconnecting the set speaker with the header speaker and header filter plate is that for dual speaker operation the two speakers are connected in parallel and for single header speaker operation, three pigtail leads from the header filter plate terminal assembly are cut off. All leads are color-coded and correspond to color dots on the pin jacks mounted on the speakers and the terminal board of the header filter plate assembly. A tapped output transformer is provided for impedance matching.

The dummy antennas referred to in the following instructions are:

"I.F. Dummy" —A .1 mfd. condenser connected in series with the test oscillator output lead.

"Broadcast Dummy"—A 175 mmfd. condenser connected in series with the output lead of the test oscillator.

I.F. ALIGNMENT

1. With variable condenser in its minimum capacity position (plates entirely out of mesh) and with volume control full on, connect test oscillator set at 465 K.C. in series with I.F. dummy antenna, to grid of 6K7 I F. tube.
2. Adjust trimmer condensers of output I.F. transformer No. 108-72 to resonance with oscillator.
3. Move test oscillator connection to grid of 6A8 tube and adjust trimmer condensers of input I.F. transformer No. 108-69 to resonance with oscillator. See top view for location of these transformers. There are two adjustments on each and they are accessible from the top of the transformer shield and should be adjusted with an insulated screw driver.

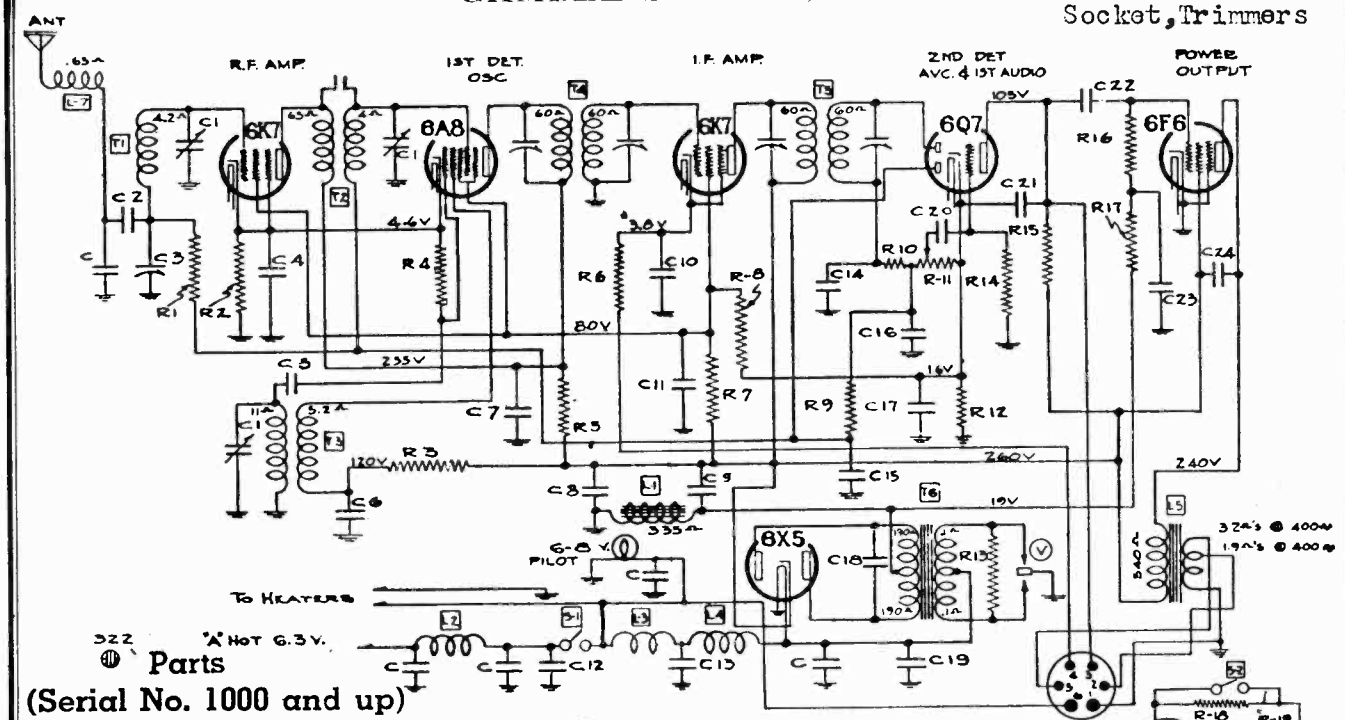
BROADCAST ALIGNMENT

1. With variable condenser in its minimum capacity position, connect test oscillator set at 1550 K.C. in series with broadcast dummy to the antenna lead of receiver.
2. Adjust oscillator trimmer of variable condenser to resonance. (This adjustment is on the middle section of the three-gang condenser—see top view .
3. Shift test oscillator to 1400 K.C. and pick up signal by rotating condenser and adjust R.F. and antenna trimmers to resonance (see top view).
4. Re-set test oscillator to 600 K.C. and rotate variable condenser to 600 KC. Adjust series pad rocking gang condenser to and fro at the same time adjusting series pad for maximum gain. This adjustment is accessible from the top of chassis (see top view.
5. Go back and check 1400 K.C. If adjustment is made here, check 600 K.C. again.
6. Check for sensitivity at 1000 K.C. by setting test oscillator to this frequency and picking up the signal by rotating variable condenser. Under no circumstances bend plates of variable condenser sections to correct tracking.

Alignment, Parts

GAMBLE SKOGMO, INC.

MODEL 667
Schematic, Voltage
Socket, Trimmers



Parts
(Serial No. 1000 and up)

		CONDENSERS
C		Spark Plate
C1	102-45	3 Gang Condenser
C2	129-73	.002 Mica - MW-W - 10%
C3	124-36	Series Pad
C4	116-20	.1 x 200 v. - 20%
C5	129-12	.00025 Mica - MT - 20%
C6	116-19	.1 x 400 - 20%
C7	116-19	.1 x 400 - 20%
C8	119-34	8. mfd. - 350 W v.
C9	119-34	4 mfd. 350 W v.
C10	116-19	.05 x 200 v. - 20%
C11	116-20	.25 x 200 v. - 20%
C12	100-31	.5 x 120 v. - 10-50% - Braid leads
C13	100-31	.5 x 120 v. - 10-50%
C14	129-5	.0001 Ceramicon - 20%
C15	116-19	.05 x 200 v. - 20%
C16	129-5	.0001 Ceramicon - 20%
C17	116-20	.02 x 200 - 20%
C18	100-36	.01 x 1400 v. - 20% - 10%"A"
C19	100-31	.5 x 120 v. - 10% - 50%
C20	116-20	.02 x 200 - 20%
C21	129-5	.0001 Mica - 20%
C22	100-55	.01 x 400 - 25%
C23	100-48	.25 x 200 - 20%
C24	100-54	.006 x 600 - 25%
C25	100-11	.01 x 400 - 25%

C4, C11, C17, C20 All in Block 116-20
C7, C6, C10, C15 All in Block 116-19

		RESISTORS
R1	130-141	250M ohm - 1/3 w. Insulated
R2	130-54	500 ohm - 1/3 w.
R3	130-138	50M ohm - 1/2 w. Insulated
R4	130-52	50M ohm - 1/3 w.
R5	130-31	1500 ohm - 1/3 w.
R6	130-154	1000 ohm - 1/3 w. Insulated
R7	130-143	30M ohm - 1.2 w.
R8	130-139	40M ohm - 1/3 w. Insulated
R9	130-19	1 meg - 1/3 w.
R10	130-162	50M ohm - 1/3 w. Insulated
R11	101-73	250M ohm - Volume Control
R12	130-153	700 ohm - 1/3 w.
R13	130-84	200 ohm - 1/3 w.
R14	130-19	1 meg ohm - 1/3 w.
R15	130-11	250M ohm - 1/3 w.
R16	130-5	300M ohm - 1/3 w.
R17	130-11	250M ohm - 1/3 w.
R18	130-161	4000 ohm - 1/3 w. Insulated
R19	101-45	Tone Control 1 Meg ohm

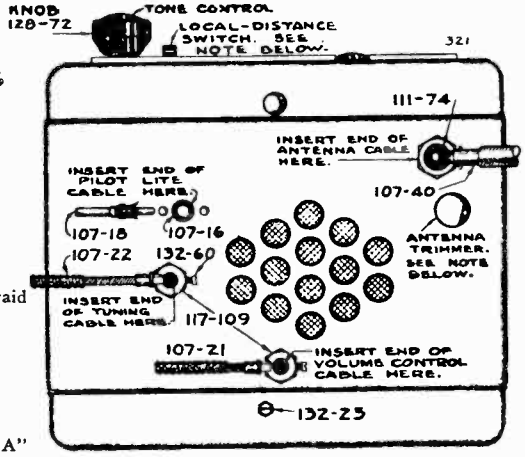


FIG. 1—SIDE VIEW

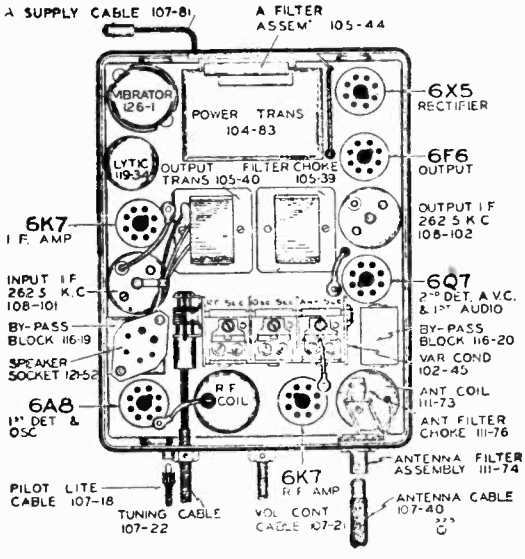


FIG. 2—TOP VIEW

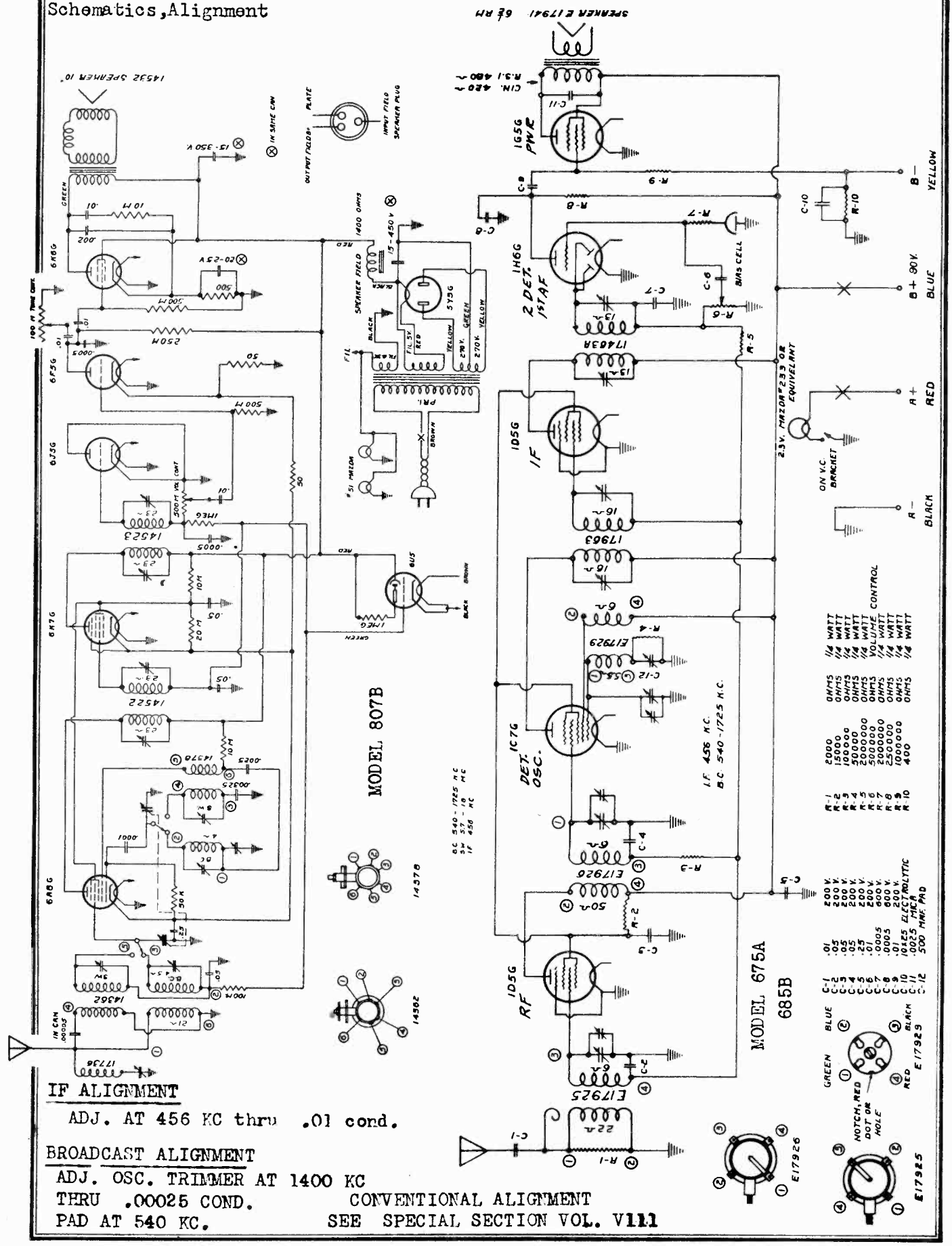
NOTE— I.F. FREQ. 262.5 K.C.
ALL VOLTAGES MEASURED FROM GROUND WITH A 1000Ω/V VOLTMETER
* CATHODE of I.F. AMP. TO END 3.6V IN DISTANCE POSITION of LOCAL DISTANCE SWITCH, 7V IN LOCAL POSITION.

I.F. ALIGNMENT - Adj at 262.5 KC thru .5 mf condenser
B.C. ALIGNMENT - Adj. osc. trim. thru 17 mmf cond. at 1500 KC. - Adj. RF & Ant. trim. at 1400 KC. - Pad at 600 KC.
SENSITIVITY - 1000 KC. CHECK

CONVENTIONAL ALIGNMENT - SEE SPECIAL SECTION VOLUME VIII

MODELS 675A, 685B
MODEL 807B
Schematics, Alignment

GAMBLE-SKOGMO, INC.



IF ALIGNMENT

ADJ. AT 456 KC thru .01 cond.

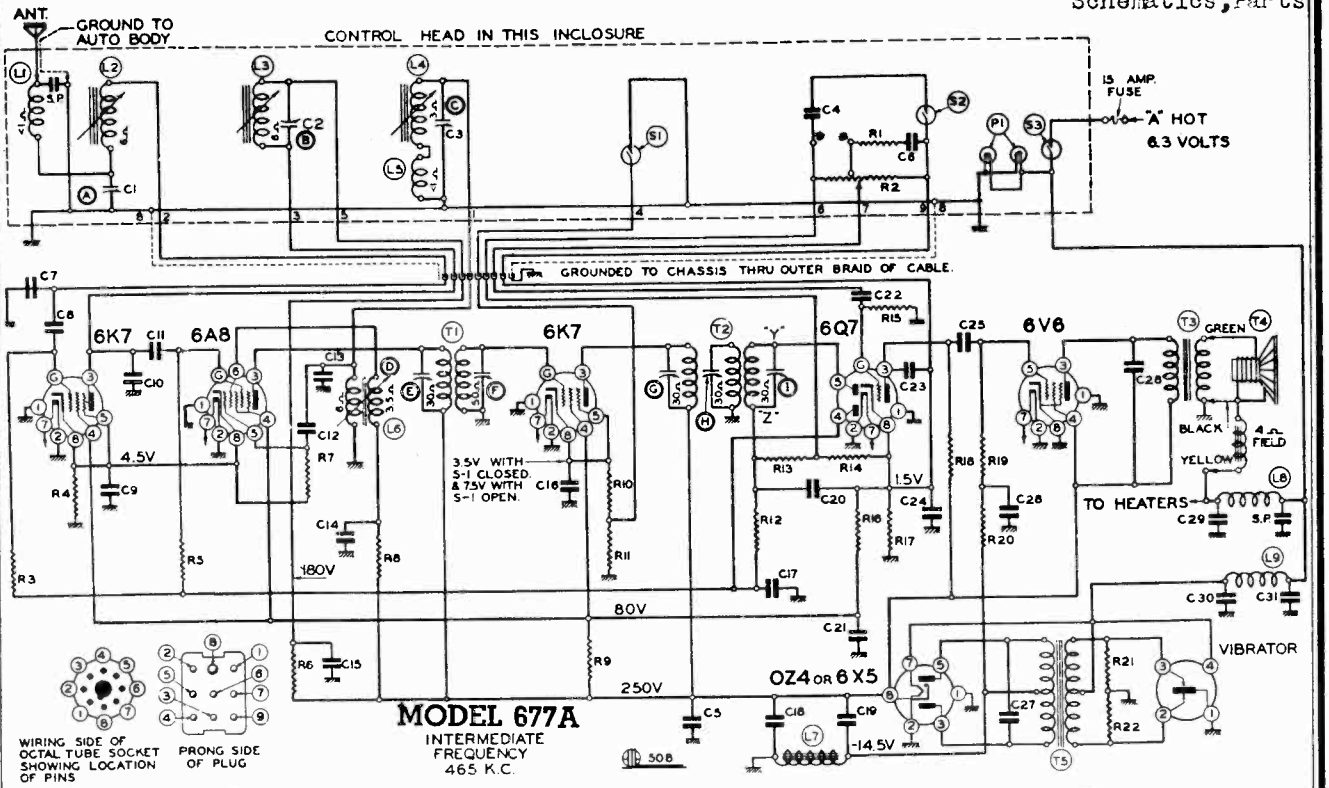
BROADCAST ALIGNMENT

ADJ. OSC. TRIMMER AT 1400 KC
THRU .00025 COND.
PAD AT 540 KC.

CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII

GAMBLE-SKOGMO, INC.

MODEL 677A
MODEL 677B
Schematics, Parts

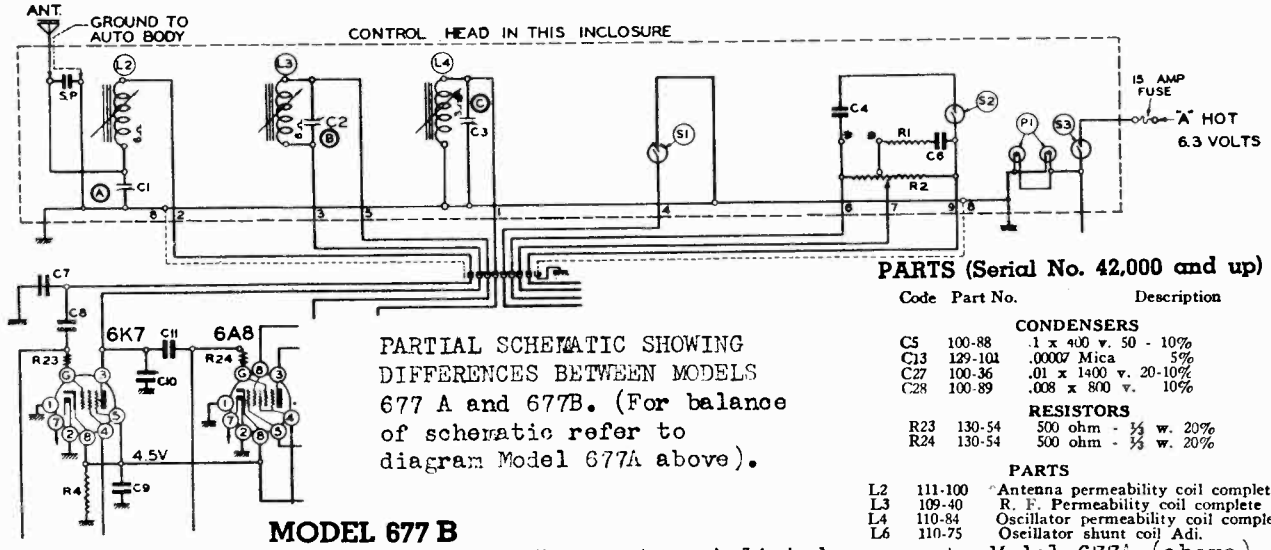


MODEL 677A

INTERMEDIATE FREQUENCY 465 K.C.

PARTS (Serial No. 30,001 and up)

Code	Part No.	Description
		CONDENSERS
C1	124-45	Antenna trimmer 50 - 450 w. c. 350 mmf.
C2	127-82	R. F. Trimmer - 5-30 mmf.
C3	127-84	Oscillator Trimmer 5 - 30 mmf.
C4	100-25	.002 x 600 v. - 25%
C5	100-74	.1 x 400 v. 50 - 10%
C6	100-19	.006 x 600 v. - 25%
C7	129-95	.00015 Mica 2½%
C8	129-39	.00005 Mica 20%
C9	100-22	.05 x 200 v. 25%
C10	129-96	.000035 Mica 5%
C11	129-2	.0005 Mica 20%
C12	129-12	.00025 Mica 20%
C13	129-97	.00005 Mica 5%
C14	100-13	.05 x 400 v. 25%
C15	116-24	By pass block .25 x 400 v. 20-10%
C16	100-9	.05 x 200 v. 25%
C17	100-22	.05 x 200 v. 25%
C18	119-51	8.0 mfd. 350 w.v. lytic
C19	119-51	8.0 mfd. 350 w.v. lytic
C20	129-5	.0001 Mica 20%
C22	100-11	.01 x 400 v. 25%
C21	116-24	.25 x 400 v. 20-10% By pass block
C23	129-5	.0001 Mica 20%
C24	100-26	.02 x 400 v. 25%
C25	100-11	.01 x 400 v. 25%
C26	116-24	.25 x 200 v. 20-10%
C27	100-23	.01 x 1400 v. 20-10%
C28	100-38	.01 x 800 v 10%
C29	129-6	.002 Mica 20%
C30	100-31	.5 x 120 v. 50-10%
C31	100-31	.5 x 120 v. 50-10%
SP		Spark Plates (2)
		C15, C21 and C26 in same unit
		C18 and C19 in same unit
		RESISTORS
R1	130-214	30M - ½ w. 20%
R2	101-109	1.2 meg. volume control
R3	130-19	1 megohm - ½ w. 20%
R4	130-79	400 ohm - ½ w. 10%
R5	130-19	1 megohm - ½ w. 20%
R6	130-21	20M ohm - ½ w. 20%
R7	130-12	50M ohm - ½ w. 20%
R8	130-12	50M ohm - ½ w. 20%
R9	130-65	30M ohm - 1 watt 20%
R10	130-39	700 ohm - ½ w. 20%
R11	130-85	3M ohm - ½ w. 20%
R12	130-19	1 megohm - ½ w. 20%
R13	130-20	100M ohm - ½ w. 20%
R14	130-118	600M ohm - ½ w. 20%
R15	130-19	1 megohm - ½ w. 20%
R16	130-208	40M ohm - ½ w. 20%
R17	130-101	600 ohm - ½ w. 10%
R18	130-11	250M ohm - ½ w. 20%
R19	130-5	300M ohm - ½ w. 20%
R20	130-11	250M ohm - ½ w. 20%
R21	130-56	100 ohm - ½ w. 20%
R22	130-56	100 ohm - ½ w. 20%
		PARTS
L1	111-96	Antenna Choke (No. 111-97)
L2	111-96	Antenna permeability coil complete
L3	109-40	R. F. Permeability coil complete
L4	110-77	Oscillator permeability coil complete
L5	110-77	Oscillator series coil (No. 110-79)
L6	110-75	Oscillator shunt coil Adj.
L7	105-62	Filter Choke - 250 ohms
L8	105-66	"A" Choke
L9	105-65	"A" Choke
T1	108-96C	Input I. F. Complete - 465 kc.
T2	108-115	Output I. F. Complete - 465 kc.
T3	105-61	Output Transformer
T4	114-113	8" Dynamic speaker
T5	104-132	Power Transformer
S1	125-47	Sensitivity switch
S2	125-47	Tone control switch
S3		Off-on switch on volume control
P1	107-97	6-8 v. pilot light (2)



PARTIAL SCHEMATIC SHOWING DIFFERENCES BETWEEN MODELS 677 A and 677B. (For balance of schematic refer to diagram Model 677A above).

MODEL 677 B

PARTS (Serial No. 42,000 and up)

Code	Part No.	Description
		CONDENSERS
C5	100-88	.1 x 400 v. 50 - 10%
C13	129-101	.00007 Mica 5%
C27	100-36	.01 x 1400 v. 20-10%
C28	100-89	.008 x 800 v. 10%
		RESISTORS
R23	130-54	500 ohm - ½ w. 20%
R24	130-54	500 ohm - ½ w. 20%
		PARTS
L2	111-100	Antenna permeability coil complete
L3	109-40	R. F. Permeability coil complete
L4	110-84	Oscillator permeability coil complete
L6	110-75	Oscillator shunt coil Adj.

For parts not listed, see parts, Model 677A (above).

MODEL 677A
MODEL 677B
Alignment, Socket, Trimmers
Automatic Tuner Procedure

MODEL 527A
Tuner Procedure

PROCEDURE FOR SETTING THE AUTOMATIC LEVERS:

There are six levers on the dial by means of which six stations may be selected. (See "B" Fig. 2).

Make a list of local stations you tune in regularly; any number up to and including six.

Punch out from the set of station call letter tabs supplied, the call letters of the stations you have selected.

Above each automatic tuner lever an opening in the escutcheon is provided for inserting the call letter tabs, (See "A" Fig. 2).

Insert the call letter tabs in the rectangular openings in the escutcheon above each of the automatic tuner levers. One of the small celluloid tabs supplied should be snapped into place over each of the station call letter tabs.

Press DOWN ALL THE WAY any one of the automatic tuner levers. Holding it down FIRMLY, tune in by means of the tuning knob (No. 2) the station indicated on the station call letter tab above this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position) until the signal is clearest. The station will then be accurately tuned in. Release the lever.

Press down another automatic tuner lever. Holding it down FIRMLY, carefully tune in the station indicated on the call letter tab above this lever. Release this lever.

Follow this procedure until you have selected all of your favorite stations.

Now Rotate the turning knob (No. 2) to the left (counter clockwise) as far as it will turn, and tighten the special reset lock screw ("C") located on left side of remote turner unit. (See Fig. 2).

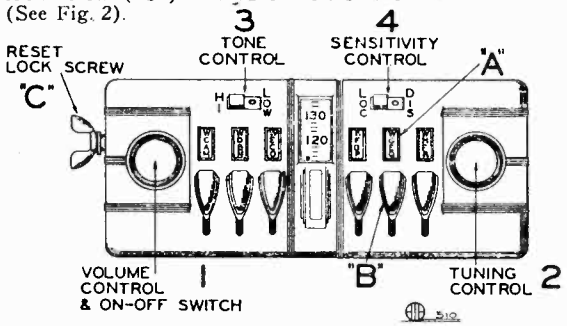


Fig. 2—Front View of Remote Tuner Unit

It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT.

This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Reset lock screw "C" is loose when radio is shipped from factory).

If you should desire to change any station you selected to another, loosen the locking screw "C" one or two turns; select the new station as explained. Be sure to retighten the locking screw, otherwise the stations you have selected will not stay adjusted to the levers.

The automatic dial is now set up for quick tuning. Press down on the lever and Presto!—your favorite station is selected.

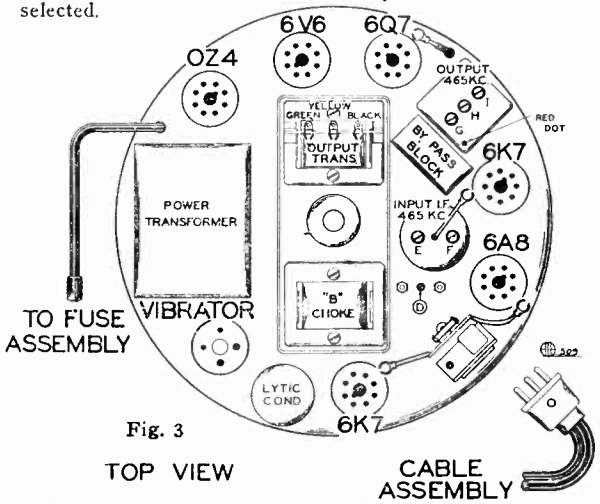


Fig. 3

I.F. ALIGNMENT: (465 K.C.)

IMPORTANT:

To align the output I.F. transformer without using a cathode ray oscillograph a 10M ohm resistor must be shunted across the tertiary coil of this unit.

Connect the resistor as indicated by points "Y" and "Z" on the circuit diagram as follows:

Locate the wires coming from the bottom of the output I.F. coil assembly on the underside of the radio chassis.

The white lead with green tracer which is connected to diode plate terminal No. 5 on the 6Q7 tube socket is one point and the white lead with brown tracer which is connected to the end terminal of the terminal strip is the other point. Proceed as follows:

1. With the dial of the Remote Tuner Unit set at 1400 K.C. and with volume control full on, connect test oscillator

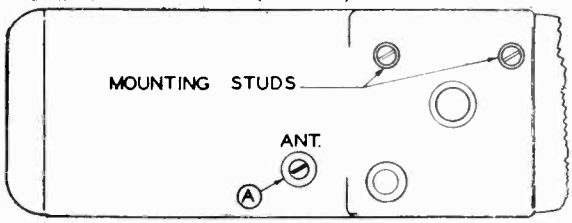
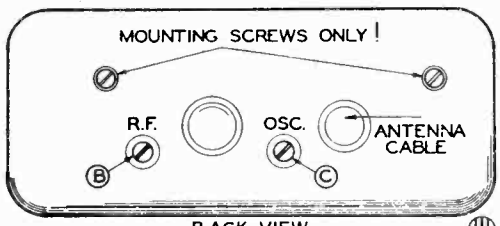


Fig. 4 SIDE VIEW



BACK VIEW

set at 465 K.C. in series with I.F. dummy to grid of 6K7 I.F. tube. (.5MF COND.)

2. Adjust trimmers "G" and "H" of output I.F. transformer for maximum gain, (See Fig. 3, top view).
3. Disconnect the 10M ohm resistor which has been shunted across the tertiary winding and adjust trimmer "I" for maximum gain.
   (a) This transformer is now correctly tuned. Under no circumstances re-adjust trimmers "G" and "H" after the 10M ohm resistor has been removed.
   (b) For alignment of the output I.F. transformer using a cathode ray oscillograph the 10M ohm resistor is not used and the procedure is similar to the alignment of any two circuit I.F. transformer; merely tune for a symmetrical curve of maximum amplitude.
   (c) Output connections for the cathode ray oscillograph should be made to pin No. 8 on 6Q7 tube socket and to the end terminal on the terminal strip; at this point the diode load resistors terminate.
4. Move test oscillator connection to grid of 6A8 tube and adjust trimmer condensers "E" and "F" of input I.F. transformer for maximum gain.

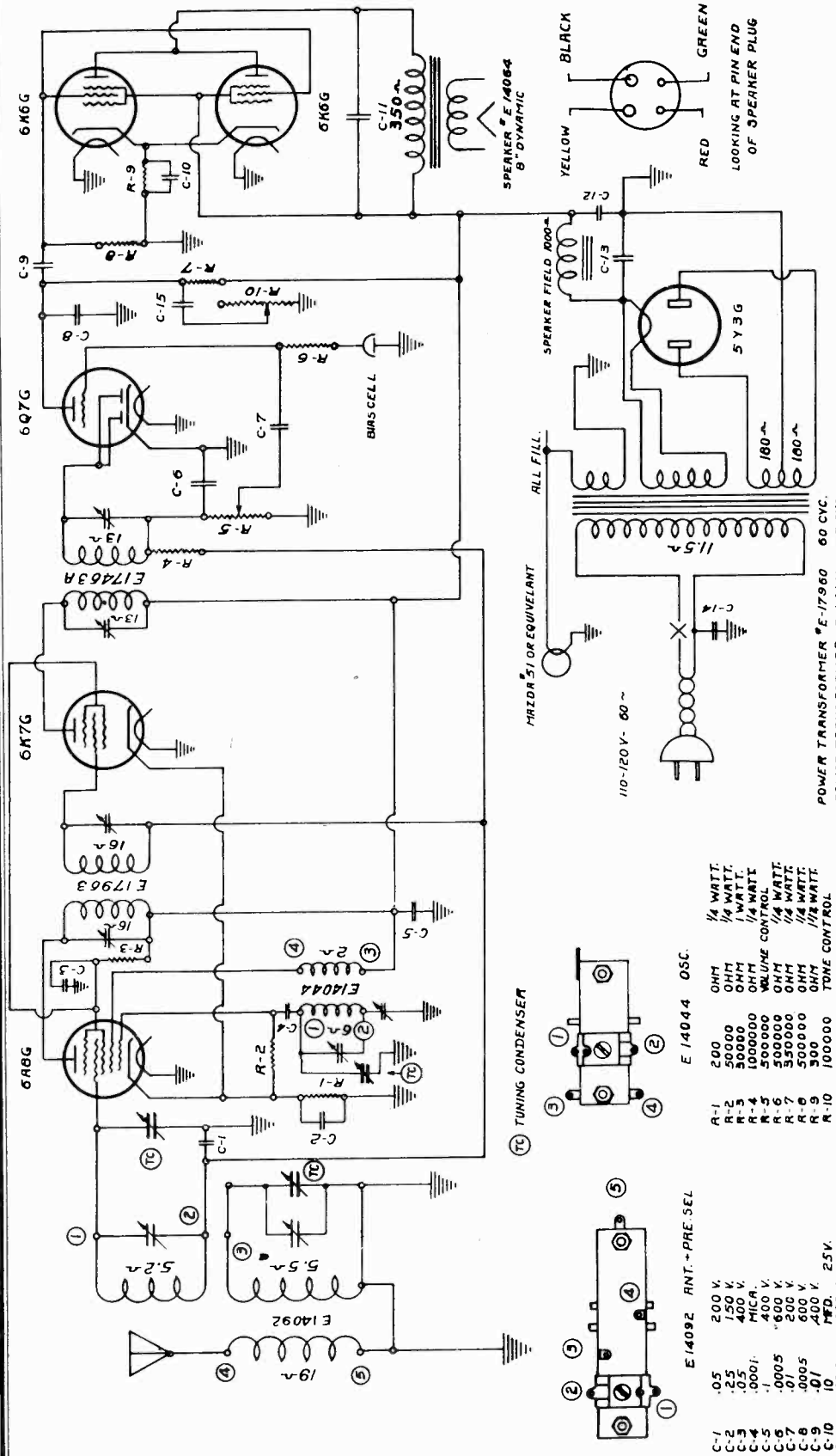
NOTE: A red dot on top of output I.F. can designates location of trimmer "G"

BROADCAST ALIGNMENT:

1. With the dial on the Remote Tuner Unit set at 1560 K. C., connect test oscillator set at 1560 K. C. in series with broadcast dummy to the antenna lead of receiver. (175MMF COND)
2. Adjust oscillator trimmer (adjustment "C", on back of Remote Tuner Unit) to resonance. (See Fig. 4, back view).
3. Re-set test oscillator to 1400 K.C. and pick up signal by rotating dial on Remote Tuner Unit. Adjust R. F. trimmer (adjustment "B", on back of Remote Tuner Unit), and Antenna Trimmer (adjusment "A", on side of Remote Tuner Unit), to resonance.
4. Re-set test oscillator to 600 K.C. and rotate Remote Tuner Unit dial to 600 K. C.
   Adjust shunt oscillator adjustment "D", rotating dial to and fro at the same time adjusting shunt oscillator for maximum gain. This adjustment is accessible from the top of the radio chassis, (See Fig. 3, top view).
5. Go back and check 1400 K. C. If adjustment is made here, check 600 K. C again.

GAMBLE-SKOGMO, INC.

MODEL 690B
Schematic
Alignment



R-1	200	OHM	1/4 WATT.
R-2	50000	OHM	1/4 WATT.
R-3	50000	OHM	1 WATT.
R-4	1000000	OHM	1/4 WATT.
R-5	500000	VOLUME CONTROL	
R-6	500000	OHM	1/4 WATT.
R-7	350000	OHM	1/4 WATT.
R-8	500000	OHM	1/4 WATT.
R-9	300	OHM	1/2 WATT.
R-10	100000	TONE CONTROL	

C-1	.05	200 V.
C-2	.25	150 V.
C-3	.05	400 V.
C-4	.0001	MICA.
C-5	.1	400 V.
C-6	.0005	600 V.
C-7	.01	200 V.
C-8	.0005	600 V.
C-9	.01	400 V.
C-10	.10	MFD. 25V.
C-11	.005	600 V.
C-12	16	MFD. 250V
C-13	16	MFD. 350V.
C-14	.05	400V.
C-15	.01	400V.

C-10 - C-12 - C-13 ALL IN SAME CAN

TUBE FUNCTIONS: "6A8G" First detector - oscillator, "6K7G" Intermediate amplifier, "6Q7G" Second detector and first audio, two "6K6G" as parallel power tubes, "5Y3G" rectifier.

IF ALIGNMENT: Connect signal generator to grid of 6A8G tube, through a .01 condenser, leave grid cap in place and turn tuning condenser open - peak IF transformers at 456 KC.

BROADCAST ALIGNMENT: Check pointer setting - should reach end of scale with condenser closed - may be changed slightly by loosening set screw on lower pulley and slipping pulley around on tuning shaft. Connect signal generator to antenna terminal through .00025 condenser. Trim oscillator at 1400 KC-- this trimmer is reached through hole in top of chassis to the right of antenna coil. Pad at 540 KC, recheck at 1400, and trim preselector trimmer on coil on top of chassis, and antenna trimmer on gang condenser at 1400 KC. Use as low output from generator as possible for final adjustments and it is best to use an output meter connected across speaker to indicate "peak".

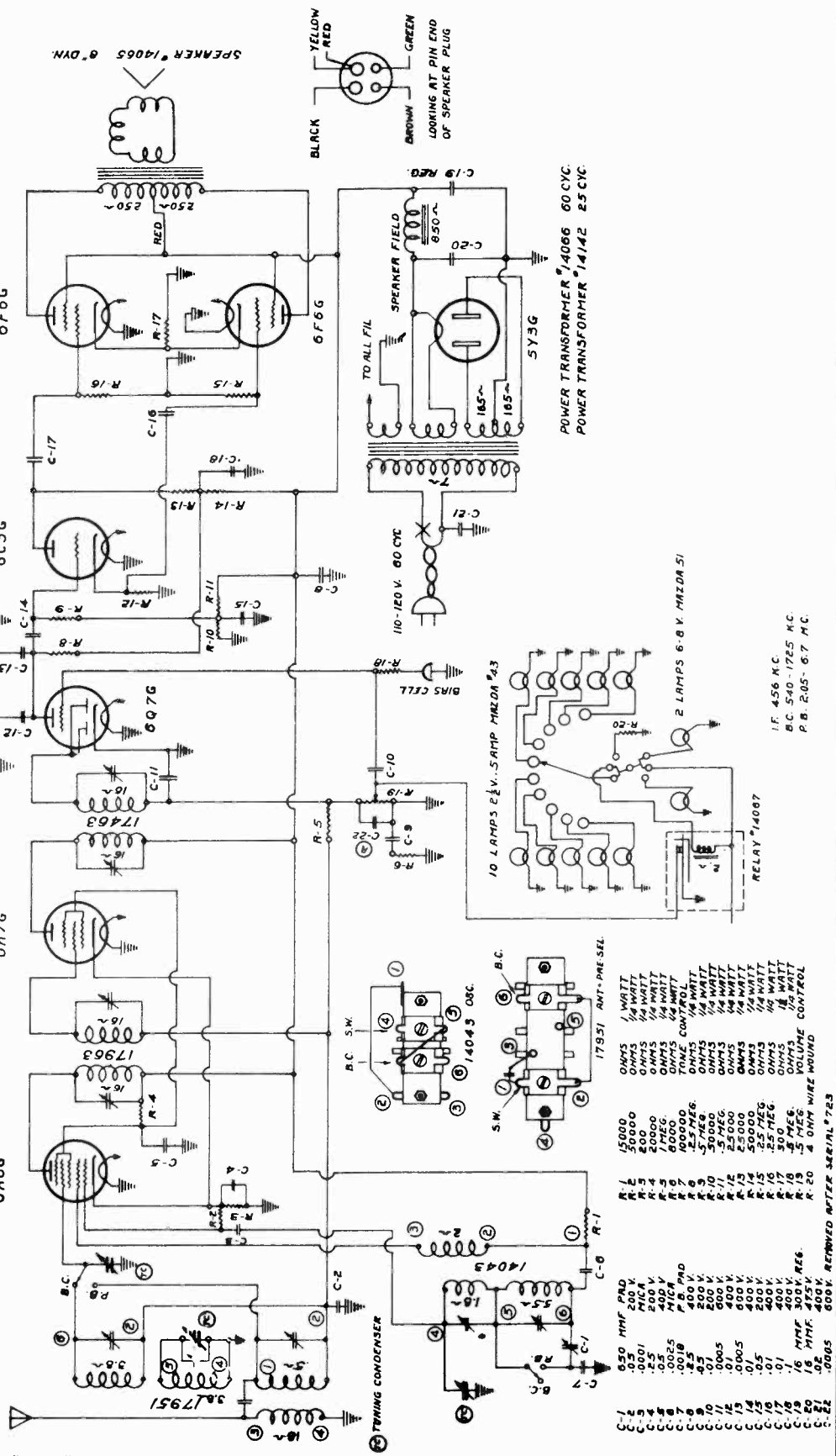
MODEL 715B
Schematic
Alignment

GAMBLE-SKOGMO, INC.

IF ALIGNMENT: Connect signal generator to grid of 6A8G tube, through a .01 condenser, leave grid cap in place and turn tuning condenser open - peak IF transformers at 456 KC.

BROADCAST ALIGNMENT: Connect signal generator to antenna terminal through a .00025 condenser. Trim oscillator at 1400 KC (see picture of coil on circuit diagram for location of trimmer). Adjust padder condenser at 540 KC, recheck at 1400 KC, then peak antenna and preselector trimmers at 1400 KC. (See picture on diagram for location of antenna trimmer, preselector trimmer is on gang condenser.)

SHORT WAVE ALIGNMENT: Connect signal generator to antenna terminal through a 300 or 400 ohm resistor. Be sure wave switch is to the "left". Trim SW oscillator at 6 MC., also SW antenna coil at same frequency. The SW pad condenser is fixed for proper range.

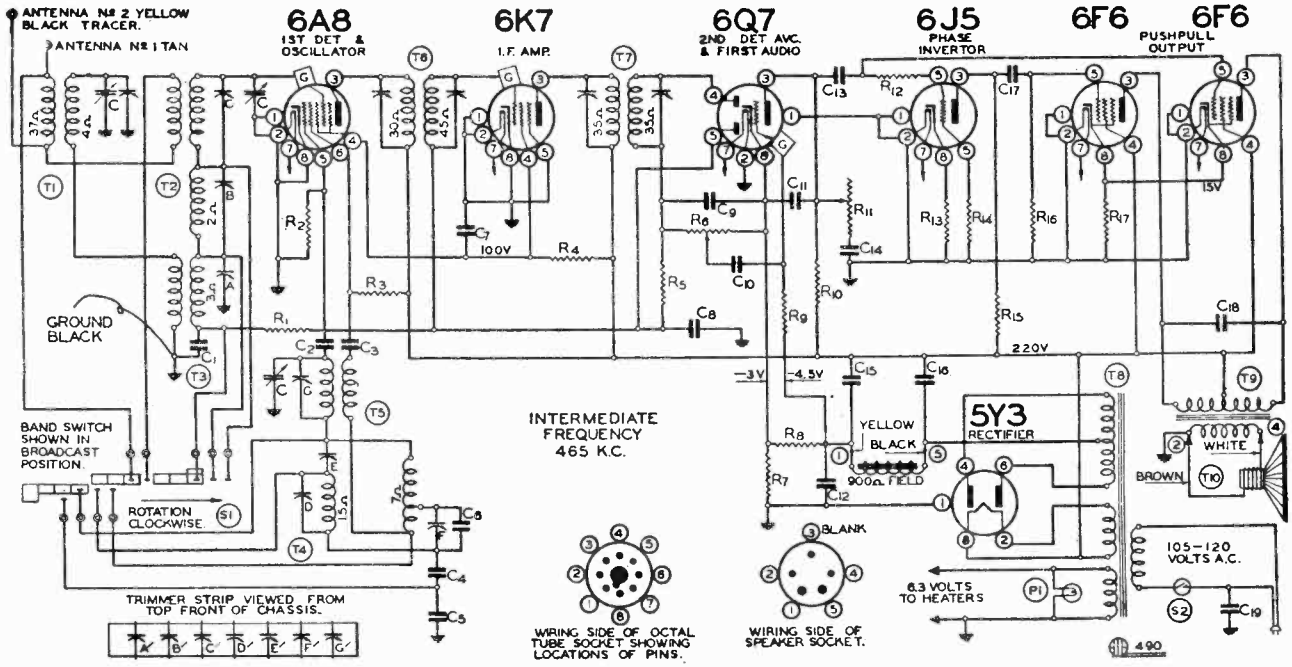


TUBE FUNCTIONS & CIRCUIT: "6A8G" First detector - oscillator, "6K7G" Intermediate amplifier, "6Q7G" Second detector and first audio, "6C5G" Phase invertor, two "6F6G" as push-pull power tubes, "5Y3G" Rectifier.

MODEL 761A
Schematic, Voltage
Socket, Trimmers

GAMBLE-SKOGMO, INC.

BAND	DIAL SCALE	FREQUENCY RANGE
Broadcast	Lower Scale	540 to 1750 K.C. (Kilocycles)
Middle Wave	Upper Scale	1730 to 5800 K.C. (Kilocycles)
Short Wave	Center Scale	5.5 to 18.1 M.C. (Megacycles)



PARTS (Serial No. 8A973750 and up)

Code No.	Part No.	Description
		RESISTORS
R1	130-103	100M ohm - 1/3 w. 10%
R2	130-12	50M ohm - 1/3 w. 20%
R3	130-123	15M ohm - 1/2 w. 10%
R4	130-196	30M ohm - 1 w. 10%
R5	130-4	3 megohm - 1/3 w. 20%
R6	101-104	1 megohm volume control
R7	130-198	40 ohm - 1/2 w. 10%
R8	130-197	20 ohm - 1/3 w. 10%
R9	130-4	3 megohm - 1/3 w. 20%
R10	130-103	100M ohm - 1/3 w. 10%
R11	101-105	300M ohm - tone control
R12	130-163	400M ohm - 1/3 w. 10%
R13	130-22	5M ohm - 1/3 w. 20%
R14	130-103	100M ohm - 1/3 w. 10%
R15	130-12	50M ohm - 1/3 w. 20%
R16	130-102	500M ohm - 1/3 w. 10%
R17	130-195	250 ohm - 1.2 w. 10%
		CONDENSERS
C	102-62	3 gang variable
C1	100-22	.05 x 200 v. 25%
C2	129-67	.00004 Mica 10%
C3	100-25	.002 x 600 v. 25%
C4	129-83	.0027 Mica 2-1/2%
C5	129-84	.003 Mica 2-1/2%
C6	129-88	.0006 Mica 5%

MODEL 761 A

FOR ALIGNMENT AND TUNER DATA SEE INDEX

Code No.	Part No.	Description
C7	100-39	.1 x 400 v. 20%
C8	100-26	.02 x 400 v. 25%
C9	129-5	.0001 Mica 20%
C10	100-26	.02 x 400 v. 25%
C11	129-2	.0005 Mica 20%
C12	100-20	.1 x 200 v. 25%
C13	100-26	.02 x 400 v. 25%
C14	100-57	.006 x 600 v. + 10 - 20%
C15	103-14	16 mfd. lytic 275 w.v. Reg.
C16	103-6	8 mfd. lytic 350 w.v.
C17	100-26	.02 x 400 v. 25%
C18	100-37	.003 x 600 v. 10%
C19	100-61	.02 x 600 v. bakelite 20%

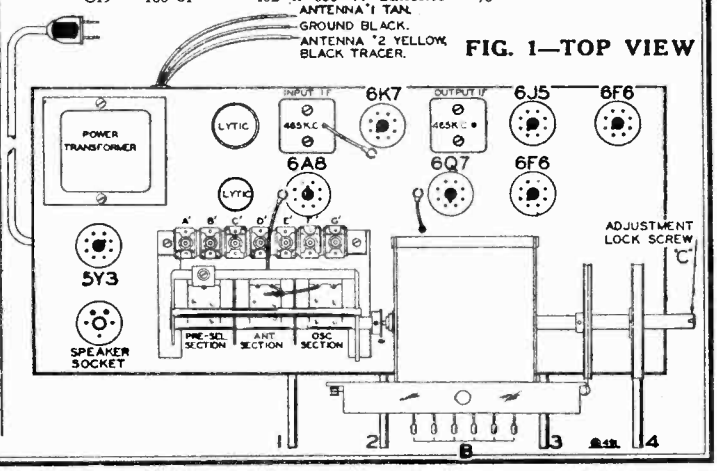


FIG. 1—TOP VIEW

NOS. 9, 10, & 11 — 17 BUTTON TELEPHONE DIAL

NOS. 3 & 7 — PHANTOM LIGHT DIAL

APRIL, 1937

Identification of Dial and Chassis

The following description will identify the different dials:

No. 9 Dial—17 Button Telephone Dial—Station call letters in black push buttons.

No. 11 Dial—Same as No. 9 Dial except push buttons are brown.

No. 10 Dial—17 Button Telephone Dial—Station call letters are rectangular in shape and are mounted in rectangular openings in escutcheon ring. Equipped with visible tone and volume indicators.

No. 3 Dial—Glass dial—Moving beam of light indicators—Tone and volume indicated by series of circles.

No. 7 Dial—Glass dial—Moving beam of light indicators—Tone and volume indicated by slanting lines.

Telephone Dial Assembly

The telephone dial assembly provides a means of pre-setting a number of broadcasting stations and tuning in these stations at any time by depressing a button and rotating the dial to a stop position.

The apparatus is mounted on an assembly attached at the front of the chassis. An examination of this assembly will clearly show the method of operation.

Silencer Circuit—A silencer circuit is provided which results in silent tuning between stations when using the telephone dial buttons.

When a telephone dial button is depressed, a circuit is established between the ungrounded end of the volume control and the chassis ground. Referring to Fig. 1 it will be noted that contact is made between the line from the volume control, contact ring, contact washer arm (when button is depressed), spring and pulley ring stud. Since the pulley ring is at ground potential, this grounds the audio voltage and no signal will be heard until the button is released to break the contact.

It should be noted that the contact ring is part of the pulley ring assembly, but is insulated from it.

In the case of powerful local stations a slight amount of signal may be heard when the button is depressed.

Telephone Dial Adjustments

Noise When Tuning in a Signal with a Telephone Dial Button

As explained in the article on "Silencer Circuit" in this manual, no noise or signal should be heard when tuning in a signal with a telephone dial button until the button is released. If noise is heard while tuning in a signal with one of these buttons, it can be corrected as follows:

If Noise Occurs on All Buttons—This is probably due to a poor contact between the flat contact spring and the contact ring—See Fig. 1. Clean the flat contact spring and contact ring to insure a good electrical connection. Ordinary cleaning fluid may be used and will be effective in most cases in cleaning the surface without affecting the plating. If the contact is still not satisfactory, a piece of fine emery cloth may be used.

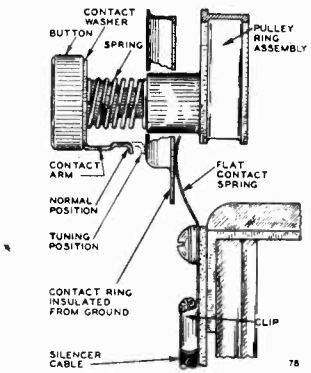


Fig. 1—Silencer Assembly

If Noise Occurs on One Button Only—This is due to a poor contact between the pulley ring stud, spring, contact washer, and contact ring—See Fig. 1. Clean all of these items of the particular button, in the same manner as mentioned previously, so as to provide a good electrical connection.

Telephone Dial Drive Cord Slipping

If the telephone dial drive cord slips on the tuning shaft pulley, this may be remedied by adjusting the drive cord tension pulley. Loosen the tension pulley bracket screw and adjust pulley assembly until the desired tension is obtained.

Position of Stop Pin

When the telephone dial assembly is on the chassis, the gang condenser rotor should not completely open or close. The travel of the rotor in this respect is controlled by the gang stop pin on the pulley ring—See Fig. 4. This is necessary to protect the gang condenser in case the telephone dial is swung rapidly to either of the extreme positions. When the gang stop pin is properly set, it will serve as the stop at both extreme positions. If the rotor is seen to open completely or close completely, the stop pin should be pulled back and re-set to overcome this condition.

Greasing and Oiling

After a period of time, put some light grease on the pulley ring shaft and on the teeth of the pulley ring. Use light oil on the drive shaft assembly bearing, care being taken not to get any on the drive cord.

Telephone Dial Replacements

Replacing Complete Dial and Condenser Assembly

Remove the grid lead clip from tube grid cap.

Remove silencer cable from the contact spring assembly. Unsolder dial lamp lead from terminal of tube socket.

Unsolder the three stator section connections of the gang condenser. Unsolder the three braided shield leads which ground the gang condenser frame to the chassis, taking care not to loosen the connections of any other units which are grounded at these common points.

At the back of the gang condenser is a stud which secures the assembly to an "L" bracket which is secured to the chassis.

Through this stud is a cotter pin. Remove only the cotter pin, metal washer, and rubber washer.

Viewing the assembly from the back, on the left is a brass bolt which holds the dial support bracket to the chassis—remove this bolt from underneath the chassis.

Grasp the dial support brace and move entire assembly toward the front of the chassis. When the support casting rubber cushions slip clear of the slot in front of chassis, lift entire assembly clear of chassis.

To replace this assembly, reverse the procedure as given above.

Replacing Pulley and Button Ring Assembly Only

Remove drive cord.

From underneath the chassis, unsolder the dial lamp lead from prong of the tube socket. Pull this lead through and out to the front of the assembly.

Remove the four escutcheon screws which hold the escutcheon ring and glass crystal in place. The dial scale pointer is removed by unhooking it from the center stud. Unscrew and remove center stud, washers, and dial scale. Slide pulley ring assembly off the center shaft.

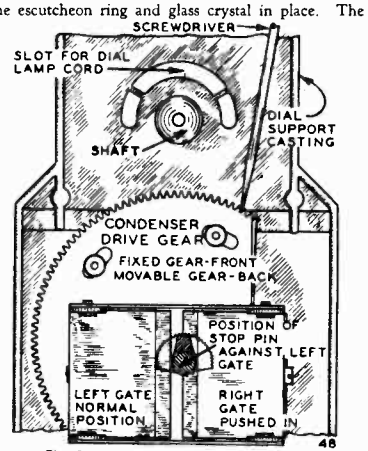


Fig. 2—Replacing Pulley Ring Assembly

On the No. 10 dial, two strips of celluloid between the escutcheon ring and the glass crystal will have to be removed.

To replace the pulley ring assembly, proceed as follows: Lay the assembly face down and adjust the stop pin. The stop pin (Fig. 2) is directly in back of the wide spacer on the dial button ring. Pull this pin back and adjust it to the center position —See Fig. 2.

Rotate tuning condenser rotor counter-clockwise (from front) as far as possible—See. Fig. 2.

Place the pulley ring assembly on the shaft with the knot of the dial lamp lead at the top—do not engage the gears.

Pull the dial lamp lead through the slot in the pulley ring gear and through the long slot in the dial support casting. Then place this lead through the clip under the dial support brace and out through the opening in the back of this brace.

With the gears still disengaged, rotate the pulley ring clockwise (from front) ½ revolution until the stop pin passes over the right gate and comes to rest against the left gate—See Fig. 2.

With the condenser rotor fully closed, push the pulley ring on the shaft until the pulley ring gear engages the *fixed gear only* (front) of the condenser drive gear assembly. Hold the pulley ring assembly and with a fine blade screw driver, move the movable (back) gear clockwise one tooth relative to the fixed gear—See Fig. 2. Then push the pulley ring all of the way on, engaging the movable gear.

Now lay the chassis on its back. Replace in the order given the large washer with rectangular hole, dial scale, washers, center stud, dial pointer, glass crystal, and escutcheon. Resolder the lamp lead.

For the No. 10 dial, before putting the escutcheon on, lay the two celluloid strips on the glass crystal with the inside flange facing away from the glass. Then lay the escutcheon on top of the celluloid strips. The section not cut out for station call letters should be at the wide spacer in the button spacer ring. Center the small holes in the celluloid discs in the station call letter openings and then tighten the escutcheon screws.

The stop pin must now be adjusted, as explained in article "Position of Stop Pin," until the condenser does not open or close fully. Injury to the condenser will result if allowed to open or close fully.

Replace the drive cord as explained in the article "Replacing Drive Cord."

Replacing Gates

After a great amount of use, one or both of the stop gates may wear, making it necessary to replace the stop gate assembly. This is done by first removing the pulley ring assembly as explained in the article "Replacing Pulley and Button Ring Assembly."

The stop gate assembly is then removed by taking out the two screws at the bottom of the assembly

Phantom Light Dial
Assembly Views, Data
Parts List

GAMBLE SKOGMO, INC.

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Phantom Light Dial - Replacing Drive Cord

Remove the dial assembly as follows: Take out the screw which secures the dial frame brace to the back of the gang condenser. Take out the two screws which secure the brackets on the bottom of the dial frame to the chassis. Lay the dial assembly face down in front of the chassis—it is not necessary to remove the volume control and tone control indicator cords.

Remove the phantom light assembly from the drive drum by taking out the screw.

Take off the old cord and tension spring. Tie a knot with a small loop in it in one end of the new cord. Then tie the other end of this cord to the hook on the tension spring. The distance from the loop on one end to the tension spring is 17¾ inches.

From the front of the chassis, place the looped end of the cord through the drum hole located near the cord track opening, and hook it over the hook provided for it at the back of the drum.

Bring the cord up and around the right side of the drum, keeping the cord in the grooved track of the drum.

Bring the cord down to the right side of the drive shaft and wind it three and one-third times around this shaft progressing toward the back.

Then bring the cord up and around the left side of the drive drum. Hook the tension spring on the hook of the drive drum.

Replace the phantom light and the dial assembly.

Fig. 6—Drive Cord Replacement. Phantom Light Dial

Phantom Light Dial Parts

See article "Identification of Dial and Chassis" in this manual in order to determine the correct dial and chassis assembly number.

Prices Subject to Change Without Notice.

DESCRIPTION	No. 3 DIAL PARTS PART NO.	No. 3 DIAL PARTS LIST PRICE	No. 7 DIAL PARTS PART NO.	No. 7 DIAL PARTS LIST PRICE
DIAL ASSEMBLY				
Dial Assembly, Complete with Dial Glass, Dial Assembly Mounting Plate, Brace, Support Bracket, Celluloid Dial Background, Indicator Tension Spring, Indicator Cords, Indicator Cord Takeup Collars, Slide Reflectors, Lamp Sockets and Lamps, Fibre Strips, and Fibre Light Shield		$10.05	Specify Type of Dial, Name on Dial or Escutcheon, Model or Series of Radio	$10.70
Dial Glass Only		.95	See Above	.80
Dial Glass Only	(Series A1-A5)	.95	See Above	.70
Dial Glass Only	(Series A1-A5)	.45	1X41	.40
Celluloid Background for Dial		.45	1X42	.40
Celluloid Background for Dial	(Series A4)	.45	1X42	.40
Dial Assembly Mounting Plate with Tone & Volume Indicators, and Indicator Pulleys	25X381	.90	25X411	1.00
Dial Assembly Brace (Attached to Gang Condenser)	25X383	.10	25X383	.10
Fibre Strip (At Back of Tone and Volume Indicator Lamps)	11X58	.10	11X58	.10
Tension Spring for Tone and Volume Indicators	28X88	.10	28X88	.10
8" Black Cord for Indicators		doz. .20		doz. .20
Brass Collars with Set Screws—to secure Indicator Cords to Shaft	29X20	ea. .10	29X20	ea. .10
Dial Lamp Reflector (Right From Front)	41X18	.10	41X18	.10
Dial Lamp Reflector (Left From Front)	41X17	.10	41X17	.10
Dial Lamp Sockets and Clips (For Edge Lighting of Dial and Tone & Volume Indicators)	7A42	.10	7A42	.10
Dial Lamp Socket Assembly (4 Sockets) Less Lamps	7A44	.40	7A44	.40
Dial Lamp (No. 51 Bayonet Type)	7A32	.20	7A32	.20
Phantom Light Assembly Complete with Lamps (Series A1-A5)	25A1A44	1.45	25A1A44	1.45
Phantom Light Assembly Complete with Lamps (Series A4)	25A207	1.30	25A207	1.30
Springs for Lamps of Above Assembly	28X84	.10	28X84	.10
Brass Collars for Lamps of Above Assembly	42261	ea. .10	19X61	ea. .10
Bracket (To secure Phantom Light Assembly to Drum)	25X340	.10	25X340	.10
Fibre Strip (At bottom of Dial Glass)	11X59	.10	11X59	.10
DRIVE ASSEMBLY				
Tuning Shaft Only	24X248	.15	24X248	.15
Tuning Drive Cord—20"		doz. .45		doz. .45
Tension Spring for Above Cord	28X27	ea. .10	28X27	ea. .10
Drive Drum & Hub	24X279	.40	24X279	.40
Rubber Cushion (Front) for Assembly Mounting	8X43	ea. .10	8X43	ea. .10
Rubber Cushion (Rear)—Gang Mounting	8X44	ea. .10	8X44	ea. .10
Rubber Cushion (Rear—under Chassis)—Gang Mounting	8X45	ea. .10	8X45	ea. .10
Rear Mounting Foot for Gang Condenser	25X283	ea. .10	25X283	ea. .10
Support Bracket and Drive Shaft Bushing for Gang Condenser	25X380	.45	25X380	.45

Fig. 4—Holding a Push Button Shaft in Place

Fig. 5—Putting a Hair Spring on a Push Button Shaft

Fig. 3—Drive Cord Replacement-Telephone Dial

Replacing a Telephone Dial Button or Button Shaft

A telephone dial button or button shaft may be replaced without removing the chassis from the cabinet.

Rotate the dial until the button shaft to be replaced is in the position shown in Fig. 4. Using a wooden wedge block or any other wedge, hold this button shaft in place as shown. Remove the clear celluloid disc and the call letter disc with the point of a pin from the button of the shaft to be replaced (No. 10 dial—brown opaque celluloid disc only).

Remove the hairpin spring from the front of this shaft, spreading it with an ice pick or screwdriver. Take off the button, metal washer, molded bushing, and spring. Take out the wedge block, remove the button shaft to be replaced from the back of the dial assembly and put in the new one. Then put the wedge block back in place again as illustrated.

Lay the cabinet back down against a chair so that it will be about 30 degrees from the vertical position.

Assemble the spring, molded bushing, metal washer, and button in the order shown in Fig. 5. (Last three items may be in one unit). Push the button and spring assembly over the button shaft with the tab of the metal washer in the normal position—See illustration in instruction book. Hold the tab and rotate the button until the flat in the shank coincides with the flat on the shaft. Push the button all of the way on.

Put the hairpin spring in place, as shown in Fig. 5, with the upper part of the slot near the end of the button shaft and the lower part over the end of the shaft. Place the blade of a screwdriver at the center of the lower part of the spring and push down until the spring snaps into place in the slot on the shaft. Remove the wedge block.

MODEL 762
MODEL 774
MODEL 776
Telephone Dial
Parts List

GAMBLE-SKOGMO, INC.

Telephone Dial Replacement Parts

See article "Identification of Dial and Chassis" in this manual in order to determine the correct dial and chassis assembly number.

Replacing Drive Cord

Remove the old drive cord and tension spring. Rotate telephone dial clockwise (from back of chassis) as far as it will go.

Viewing the pulley ring drum from above and to the back, place the knotted end of the drive cord in the slot provided for it, catching the knot in back of the rib as shown in Fig. 3.

Bring the cord down and around the right side (from back) of the drum at front part of groove in pulley ring drum and under the drive shaft pulley making one-half turn on this pulley. Then bring the cord around the right side (from back) of the adjustable tension pulley and up to the upper left side of the pulley ring drum in front of the cord already on.

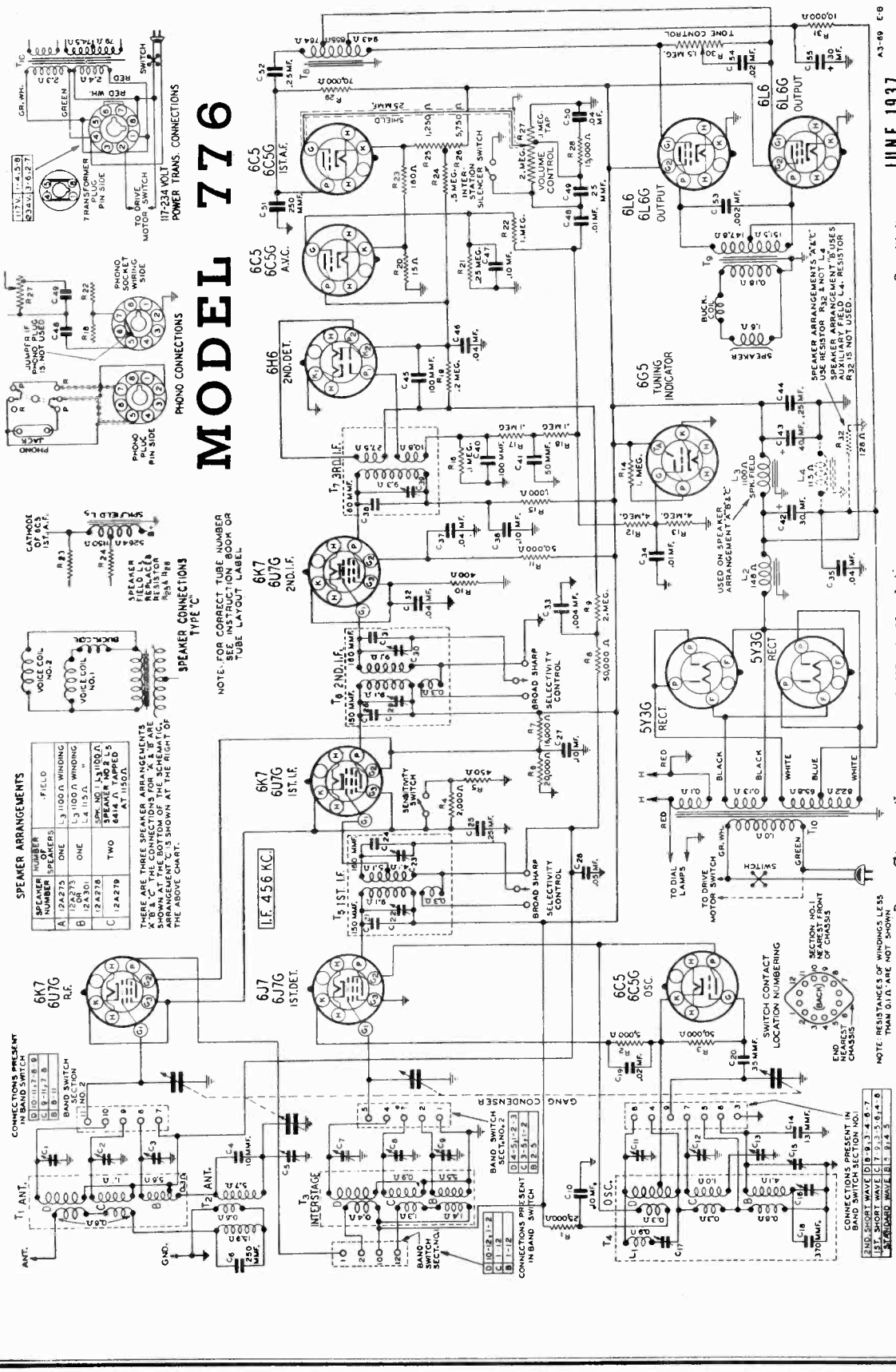
Hold the cord in the left hand and rotate the dial counter-clockwise with the right hand. Feed the cord on the drum in such a way that after passing the two openings at the top of the pulley ring drum, it passes to the back of the groove in the drum. After the pulley ring drum makes one complete revolution, place the cord through the left drum opening into the slot and secure the tension spring hook over the pin provided for it—See Fig. 3.

DESCRIPTION	No. 9 DIAL PARTS		No. 11 DIAL PARTS		No. 10 DIAL PARTS	
	PART NO.	LIST PRICE	PART NO.	LIST PRICE	PART NO.	LIST PRICE
Pulley, Button Ring and Gang Cond. Assy. complete with Buttons, Dial Scale, Pointer and Glass Crystal (A1, A2, A5, and A7 Chassis)	11A103	$23.20	11A121	$23.40	11A114	$25.50
Pulley, Button Ring, and Gang Condenser Assembly, as above (A3 Chassis)	11A111	24.60	11A120	25.00	11A113	27.00
Support Casting for above	25X368	1.35	25X368	1.35	25X410	1.45
Brace for above Casting (over Tuning Cond.) (A1, A2, A5, and A7 Chassis)	25X371	.15	25X371	.15	25X371	.15
Brace as above (A3 Chassis)	25X367	.20	25X367	.20	25X367	.20
Hex. Brass Stud (Support Bracket Mounting)	20X152	.04	20X152	.04	20X152	.04
Rubber Grommet for above Stud	6X8	.10	6X8	.10	6X8	.10
"L" Bracket—Rear Gang Mounting (A1, A2, A5, and A7 Chassis)	25X362	.08	25X362	.08	25X362	.08
"L" Bracket—Rear Gang Mounting (A3 Chassis)	25X382	.10	25X282	.10	25X382	.10
Stud (Rear Gang Mounting)	20X150	.08	20X150	.08	20X150	.08
Rubber Washer for Gang Mounting on "L" Bracket	2X236 doz.	.15	2X236 doz.	.15	2X236 doz.	.15
Rubber Grommet for Gang Mounting on "L" Bracket	6X16 doz.	.30	6X16 doz.	.30	6X16 doz.	.30
Rubber Cushions for Support Bracket (Front)	8X43	.10	8X43	.10	8X43	.10
Drive Cord Tension Spring	28X114 doz.	.35	28X114 doz.	.35	28X114 doz.	.35
Drive Cord	10X23	.65	10X23	.65	10X23	.65
Cord Tension Adjustment Assembly complete	26A59	.20	26A59	.20	26A59	.20
Drive Shaft only (Tuning)	26X245	.10	26X245	.10	26X245	.10
Front Brass Bearing Race and Drive Pulley for Drive Shaft	29X74	.10	29X74	.10	29X74	.10
Rear Brass Bearing Race for Drive Shaft	29X73	.15	29X73	.15	29X73	.15
8 Ball Bearings in Retainer (Two sets used on above Shaft)	20X151	.10	20X151	.10	20X151	.10
Horseshoe Washer for Drive Shaft	19X67 doz.	.15	19X67 doz.	.15	19X67 doz.	.15
Gate Assembly complete	25A154	.45	25A154	.45	25A154	.45
Spring only for Gate Assembly	28X45 doz.	.10	28X45 doz.	.10	28X45 doz.	.10
Condenser Drive Gear Assembly complete	25A153	.60	25A153	.60	25A153	.60
Gear Spreader Spring for above	28X102 doz.	.20	28X102 doz.	.20	28X102 doz.	.20
Pulley and Button Ring complete (Less Dial Crystal, Dial Crystal Escutcheon, Dial Scale, Dial Scale Washers, Dial Pointer and Stud, and Dial Lamps and Sockets)	26A61	11.50	26A62	11.50	26A62	11.50
Pulley Ring Casting only	25A162	3.20	25A162	3.20	25A162	3.20
Button Spacer Ring only	24X273	1.70	24X285	1.70	24X285	1.70
Silencer Contact Ring	30X79	.30	30X79	.30	30X79	.30
Push Button Assembly complete (Including Hairpin Spring, Button Spring, Push Button, Button Bushing, Button Shaft, Metal Washer and Tab)	26A63	.40	26A64	.40	26A64	.40
Push Button only	10A105	.10	10A111	.10	10A111	.10
Metal Washer and Tab	19X66	.10	19X66	.10	19X66	.10
Bakelite Bushing for Push Button	10A104	.10	10A104	.10	10A104	.10
Shaft for Push Buttons	26X238	.15	26X238	.15	26X238	.15
Hairpin Springs for Push Button Assembly	28X111 doz.	.10	28X111 doz.	.10	28X111 doz.	.10
Springs for Push Buttons	28X109 doz.	.10	28X126 doz.	.10	28X126 doz.	.10
Stop Pin Shaft Assembly (Behind Wide Spacer)	26A60	.30	26A60	.30	26A60	.30
Stop Pin Shaft	26X244	.25	26X244	.25	26X244	.25
Spring for above Stop Pin	28X112 doz.	.10	28X112 doz.	.10	28X112 doz.	.10
Dial Scale (Specify Type of Dial, Name of Radio, and Series or Model Number)		.55		.55		1.20
Washer, Dial Spacer (Large with rectangular hole)	19X74 doz.	.10	19X74 doz.	.10	19X74 doz.	.10
Washer, Dial Clamp (Small with round hole)	19X73 doz.	.10	19X73 doz.	.10	19X73 doz.	.10
Dial Pointer	15X95	.20	15X95	.20	15X95	.20
Dial Pointer Cap	15X96	.10	15X104	.10	15X104	.10
Dial Pointer Stud	20X171	.10	20X171	.10	20X171	.10
Glass Crystal	17X21	.15	17X21	.15	17X21	.15
Glass Crystal Escutcheon	4X174	.45	4X196	.40	4X184	.40
Dial Lamp Socket	7A62 ea.	.10	7A62 ea.	.10	7A62 ea.	.10
Dial Lamp Socket Assembly (3 Sockets) Less Lamps	7A63	.50	7A63	.50	7A63	.50
Dial Lamp (No. 51 Bayonet Type)	7A32	.20	7A32	.20	7A32	.20
Celluloid Dial Light Diffusers	41X16	.10	41X16	.10	41X16	.10
Silencer Contact Spring Assembly	26A57	.10	26A57	.10	26A57	.10
Complete Set of Station Call Letter Discs with 25 Celluloid Discs	26A56	.35	26A56	.35	26A56	.35
Tone Indicator Assembly (Less Dial Light Socket and Dial Lights, Take up Cord and Collar)					26A65	.35
Celluloid Indicator and Arm (Tone or Volume)					26A67	.20
Indicator Mounting Bracket (Tone)					25X407	.10
Spring for Tone or Volume Indicator					28X133 doz.	.60
Brass Collar, Cord Take up (Tone or Volume)					29X20	.10
3" Tone and Volume Indicator Cord					doz.	.10
Volume Indicator Assembly (Less Dial Light Socket, Dial Light, Take up Cord and Collar)					26A66	.35
Indicator Mounting Bracket (Volume)					25X408	.10
Call Letter Holder, Celluloid					58X254	.25
Brown Opaque Discs for Telephone Dial Buttons					58X217 doz.	.10
Dial Lamp Socket Assembly (For Tone or Volume Indicator)					7A57	.10
Paper Light Diffuser—Circular 4⅝" Diameter					41X22	.10
Complete Set of Station Call Letter Cards					26A58	.40
Blank Sheet of Call Letter Cards (Used for Export Sets Only)					58X240	.15

Prices Subject to Change Without Notice.

MODEL 776
Schematic, Phono.
Speaker Data

GAMBLE-SKOGMO, INC.



MODEL 776
Alignment, Socket
Trimmers, Voltage
Coils, Notes

GAMBLE-SKOGMO, INC.

ALIGNMENT PROCEDURE

Local-Distance Switch — Distance Position.
Volume Control—Maximum All Adjustments.
Selectivity Control—Sharp Position All Adjustments.
Connect Radio Chassis to Ground Post of Signal Generator With a Short Heavy Lead.
Allow Chassis and Signal Generator to "Heat Up" for several minutes.

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

STEP (Follow Order as Given)	BAND SWITCH SETTING	DUMMY ANTENNA	SIGNAL GENERATOR FREQUENCY SETTING	SIGNAL GENERATOR CONNECTION AT RADIO	TRIMMERS ADJUSTED See Illustration	PROCEDURE INITIAL STEPS	PROCEDURE ADJUSTMENT
I.F.							
3rd I.F.	Range B	.1 mf.	456 KC	Grid of 2nd I.F. Tube	3rd I.F. (C39)	Turn Rotor to Full Open	Adjust to Maximum Output
2nd I.F.	Range B	.1 mf.	456 KC	Grid of 1st I.F. Tube	2nd I.F. (C29) & (C30)	Turn Rotor to Full Open	Adjust to Maximum Output
1st I.F.	Range B	.1 mf.	456 KC	Grid of 1st Det.	1st I.F. (C22) & (C23)	Turn Rotor to Full Open	Adjust to Maximum Output
RANGE B							
1830 KC	Range B	200 mmf.	1830 KC	Antenna Lead	Oscillator Range B (C15)	Turn Rotor to Full Open	Adjust to Maximum Output
1500 KC	Range B	200 mmf.	1500 KC	Antenna Lead	1st & 2nd Ant. Range B (C5) & (C3)—Int. Range B (C9)	Turn Rotor to Max. Output Set Indicator to 1500 KC—See Note A	Adjust to Maximum Output
600 KC	Range B	200 mmf.	600 KC	Antenna Lead	600 KC (C16)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE C							
6350 KC	Range C	400 Ohm	6350 KC	Antenna Lead	Oscillator Range C (C12)	Turn Rotor to Full Open	Adjust to Maximum Output
6000 KC	Range C	400 Ohm	6000 KC	Antenna Lead	Ant. Range C (C2) Int. Range C (C8)	Turn Rotor to Max. Output	Adjust to Maximum Output
2000 KC	Range C	400 Ohm	2000 KC	Antenna Lead	2000 KC (C13)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
RANGE D							
22,000 KC	Range D	400 Ohm	22,000 KC	Antenna Lead	Oscillator Range D (C11)	Turn Rotor to Full Open	Adjust to Maximum Output
20,000 KC	Range D	400 Ohm	20,000 KC	Antenna Lead	Ant. Range D (C1) Int. Range D (C7)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B
7000 KC	Range D	400 Ohm	7000 KC	Antenna Lead	7000 KC (C17)	Turn Rotor to Max. Output	Adjust to Maximum Output Rock Rotor — See Note B

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

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

NOTE A—In sets using the telephone dial tuning, there will be seen inside the telephone dial button ring an escutcheon plate held in place by four screws. Loosen the 2 screws nearest the pointer. An extension of the pointer will be seen protruding over the edge of this escutcheon plate. Move the pointer to the 1500 KC mark on the dial and then tighten the 2 escutcheon screws. (Do not tighten these screws too much.)

On the electric drive models, the pointer is held to the shaft by a friction clip arrangement. With the electric-manual lever in the manual position, hold the tuning knob and move the pointer to the 1500 KC mark on the dial.

In sets using any other type of dial mechanism, it will be necessary to adjust the position of the indicator until it is at the 1500 KC mark.

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

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

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

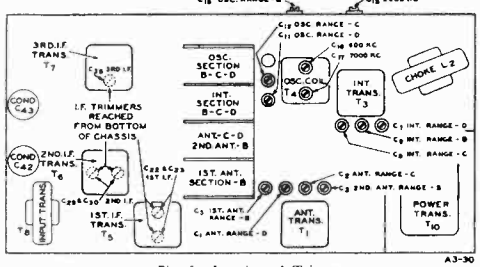


Fig. 3—Location of Trimmers

VOLTAGES AT SOCKETS

Line Voltage: 117—Volume Control Maximum
Local-Distance Switch in Distance Position
Readings taken with 1000 Ohm-per-volt meter

Antenna Shorted to Ground
Position of Band Switch: Standard Wave

TUBE	FUNCTION	VOLTAGE BETWEEN SOCKET PRONG AND GROUND (Unless otherwise indicated) Prong No. 1	Prong No. 2	Prong No. 3	Prong No. 4	Prong No. 5	Prong No. 6	Prong No. 7	Prong No. 8
6K7—6U7G	R.F.	0	6.1(1)	250	130	10.0(2)		6.1(1)	10.0(2)
6J7—6J7G	1st Det.	0	6.1(1)	250	115	0		6.1(1)	6.0
6C5—6C5G	Osc.	0	6.1(1)	115				6.1(1)	0
6K7—6U7G	1st I.F.	0	6.1(1)	250	130	10.0(2)		6.1(1)	10.0(2)
6K7—6U7G	2nd I.F.	0	6.1(1)	240	130	5.0		6.1(1)	5.0
6H6	2nd Det.	0	6.1(1)					6.1(1)	0
6C5—6C5G	A.V.C.	0	6.1(1)	5(3)				6.1(1)	.5
6C5—6C5G	1st A.F.	0	6.1(1)	145				6.1(1)	6.0
6L6—6L6G	Output	0	6.1(1)	330	250	21(4)		6.1(1)	0
5Y3G	Rectifier	0	4.7(5)		1100(6)		1100(6)		4.7(5)
6G5	Tuning Indicator	Plate to Ground 20(3)		Target to Ground 250		Cathode to Ground 0		Across Heater 6.1 A.C.	

(1) A.C. voltage as read across heater terminals 2 and 7.
(2) Subject to variation.
(3) As read with a 1000 Ohm-per-volt meter (500 volt scale).
(4) Bias as read across L4 or R32, depending on speaker arrangement. See Schematic Diagram.
(5) A.C. voltage as read across filament terminals 2 and 8.
(6) A.C. voltage as read across terminals 4 and 6.

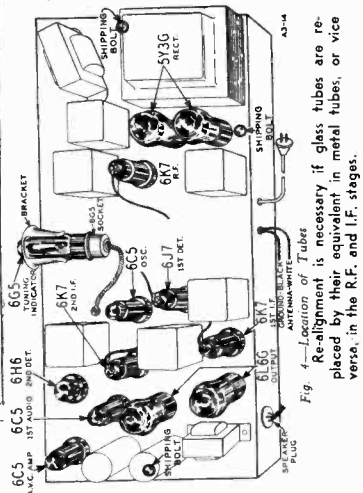


Fig. 4—Location of Tubes

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

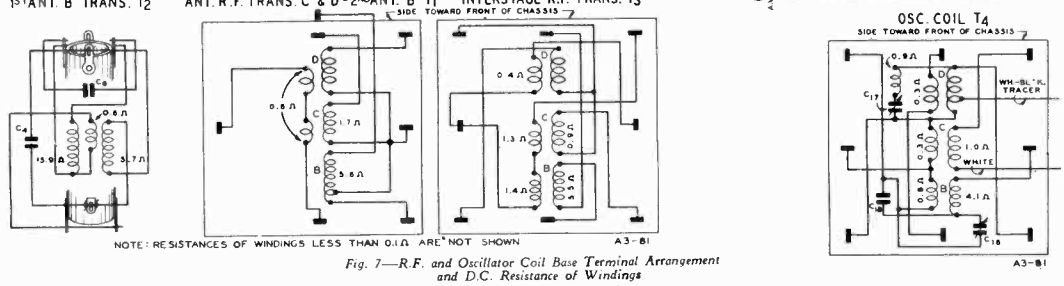
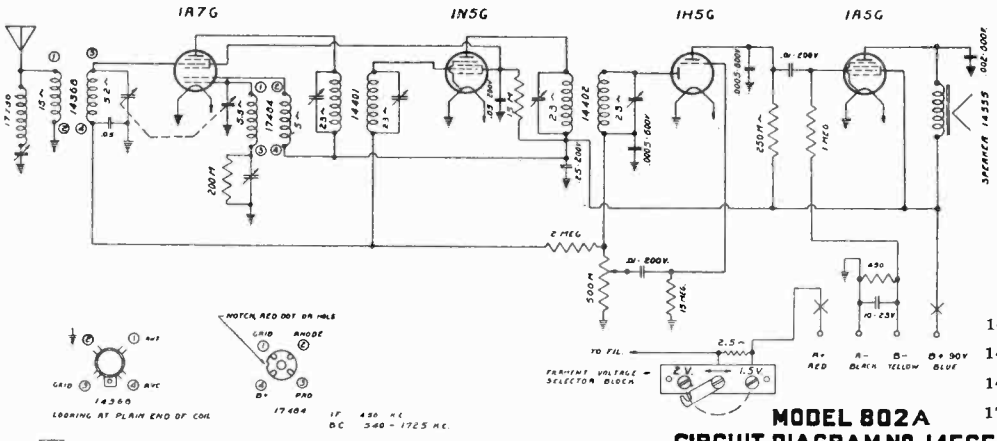


Fig. 7—R.F. and Oscillator Coil Base Terminal Arrangement and D.C. Resistance of Windings

Schematics, Parts

GAMBLE-SKOGMO, INC.

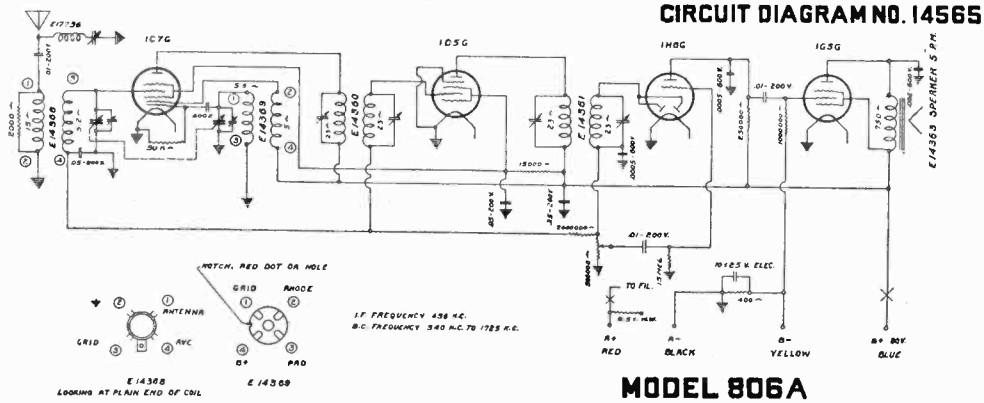
MODEL 802A
MODEL 806A
MODEL 813A
MODEL 813B



MODEL 802A
CIRCUIT DIAGRAM NO. 14565

Model 802-A

Part No.	Description
14368	Coil—Antenna .....
17484	Coil—Oscillator .....
14464	Condenser—Tuning ..
17451	Control—Volume with Switch .....
14589	Disc—Dial Pointer with Hub .....
14555	Speaker—5" P. M. ....
14401	Transformer—IF Input
14402	Transformer—IF Output
17736	Trap—Wave .....

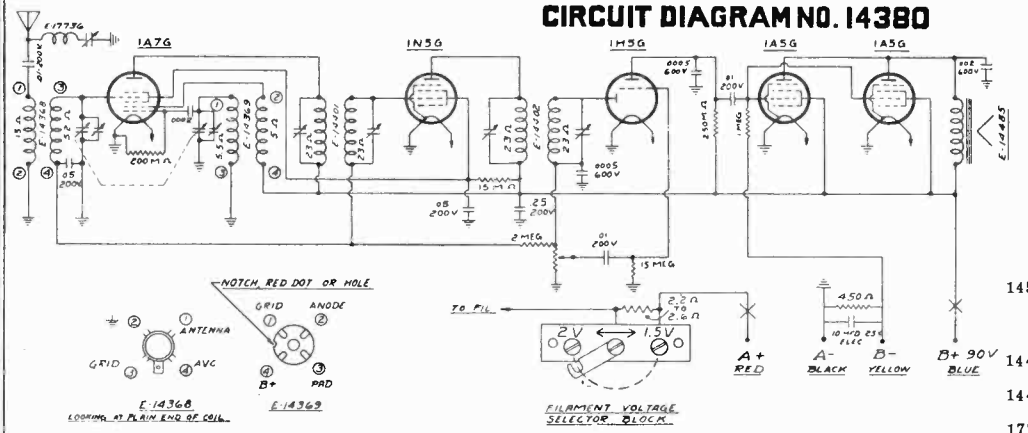


MODEL 806A
CIRCUIT DIAGRAM NO. 14380

SERVICE - PARTS
MODEL ——— 806A

Part	List Price
14368 COIL ANT	.60
14369 COIL OSC	.60
14305 COND TUNING	2.50
14357 CABLE BAT	1.00
14358 CONTROL VOL	.75
14316 KNOB LARGE	.20
14359 KNOB SMALL	.15
14317 POINTER	.10
14319 SCALE DIAL	.25
14363 SPEAKER	3.50
14360 I. F. INPUT	1.30
14361 I. F. OUTPUT	1.30
17736 TRAP WAVE	.50
17582 RESISTOR (DRY CELL)	.30

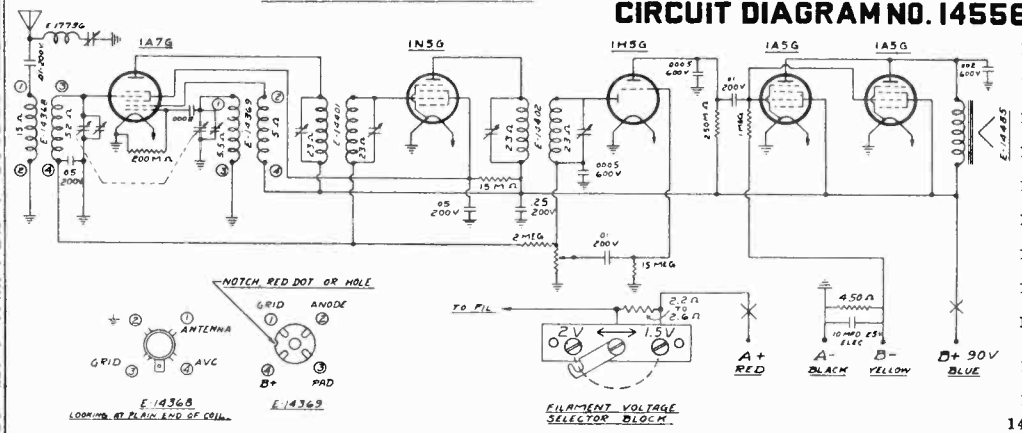
ORDER CONDENSERS AND RESISTORS BY VALUE ON DIAGRAM.



MODEL 813B
CIRCUIT DIAGRAM NO. 14556

Model 813-B

Part No.	Description
14384	Button Push .....
14437	Belt—Tuning .....
14368	Coil—Antenna .....
14369	Coil—Oscillator ....
14455	Condenser—Tuning
14573	Tuning Unit Assembly complete with tuning condenser .....
14401	Transformer—IF Input
14402	Transformer—IF Output
17736	Trap—Wave .....



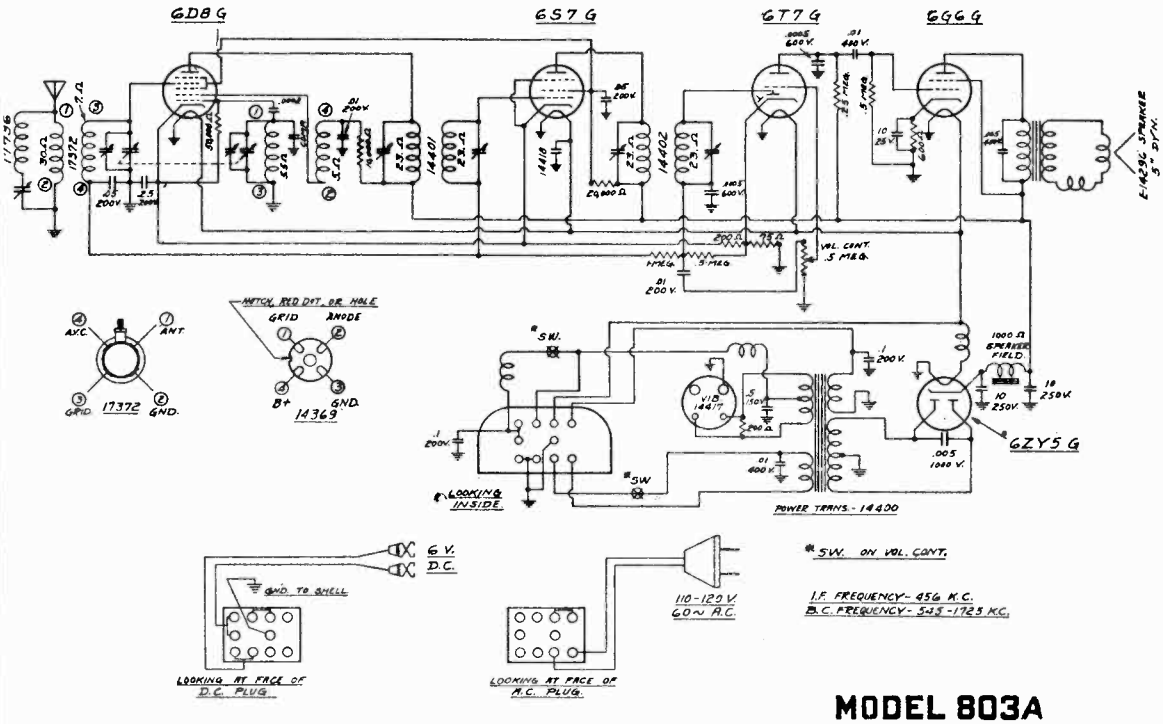
MODEL 813A
CIRCUIT DIAGRAM NO. 14556

Part No.	Description
14384	Button Push .....
14437	Belt—Tuning .....
14368	Coil—Antenna ....
14369	Coil—Oscillator ....
14455	Condenser—Tuning
14475	Control—Volume ...
14345	Dial—Scale .....
14425	Escutcheon—Dial with Crystal .....
14485	Speaker—5 Inch PM.
14364	Socket—Octal .....
14401	Transformer—IF Input
14402	Transformer—IF Output
17736	Trap—Wave .....

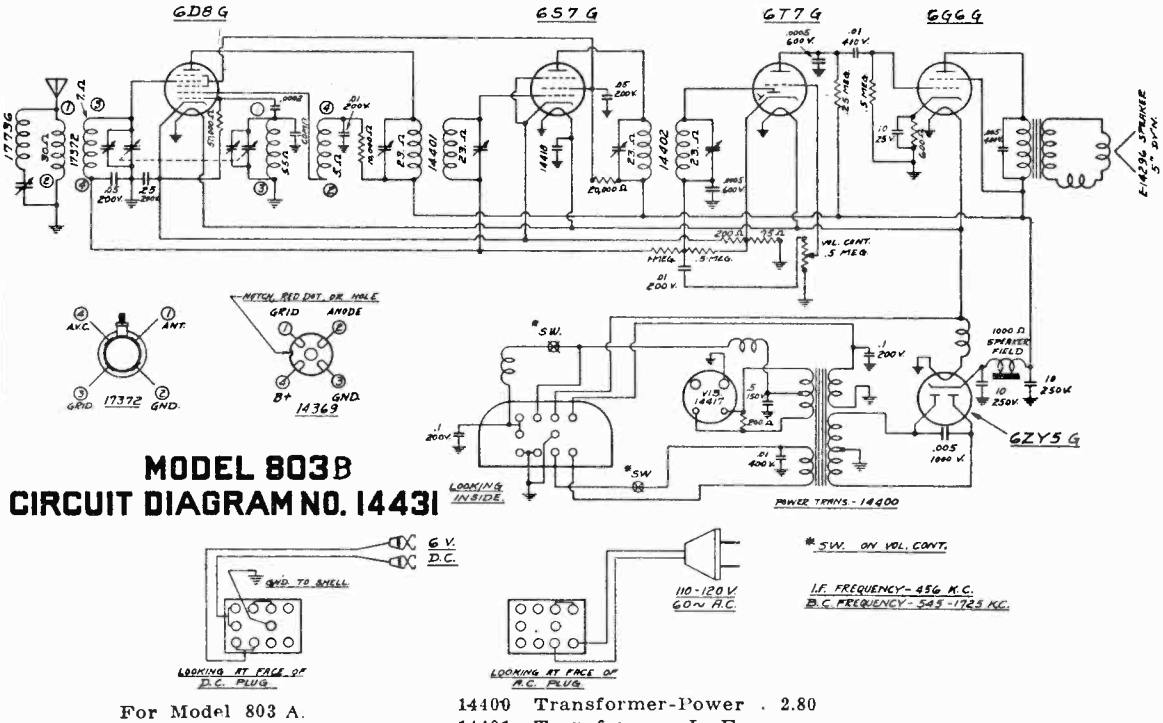
MODEL 803A
MODEL 803B

GAMBLE-SKOGMO, INC.

Schematics



MODEL 803A
CIRCUIT DIAGRAM NO. 14431



MODEL 803B
CIRCUIT DIAGRAM NO. 14431

CHANGES IN ABOVE CIRCUIT FOR 803-B

Speaker field is replaced with filter choke No. 17790
Speaker changed to 6½ P. M.

For Model 803 A.

Part No.	Name	List Price
14429	Clip "A" Battery	.15
14403	Condenser - Filter 10-250-10-250	.90
17080	Condenser - Filter 10-25	.60
14399	Control - Volume with Switch	1.50
14369	Coil-Oscillator	.60
17372	Coil-Antenna	.80
14404	Transformer-Speaker	.70
17736	Trap-Wave	.50
14400	Transformer-Power .	2.80
14401	Transformer - I. F. Input	1.20
14402	Transformer - I. F. Output	1.20
14417	Vibrator-6 Volt	2.50

For Model 803-B

Part No.	Name	List Price
14403	Condenser - Filter 10-250-10-250	.90
17080	Condenser - Filter 10-25	.60
17790	Choke—Filter	.80
14369	Coil-Oscillator	.60
17372	Coil-Antenna	.80
14571	Control—Volume with Switch	1.50
14404	Transformer-Speaker	.70
17736	Trap-Wave	.50
14400	Transformer-Power .	2.80
14401	Transformer - I. F. Input	1.20
14402	Transformer - I. F. Output	1.20
14417	Vibrator-6 Volt	2.50

Socket, Tuner, Coils
Sensitivity

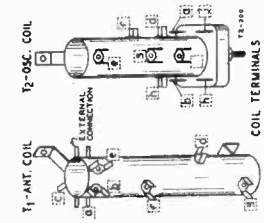
GAMBLE SKOGMO, INC.

MODEL 810(1938)
Schematic, Voltage

SPECIFICATIONS

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

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



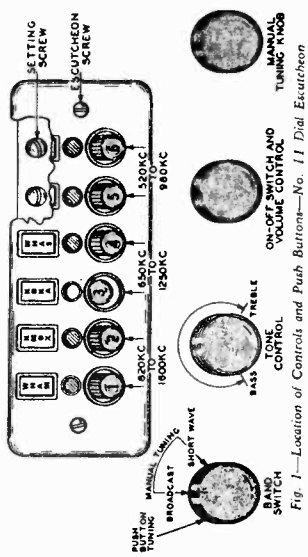


Fig. 1—Location of Controls and Push Buttons—No. 11 Dial Escutcheon

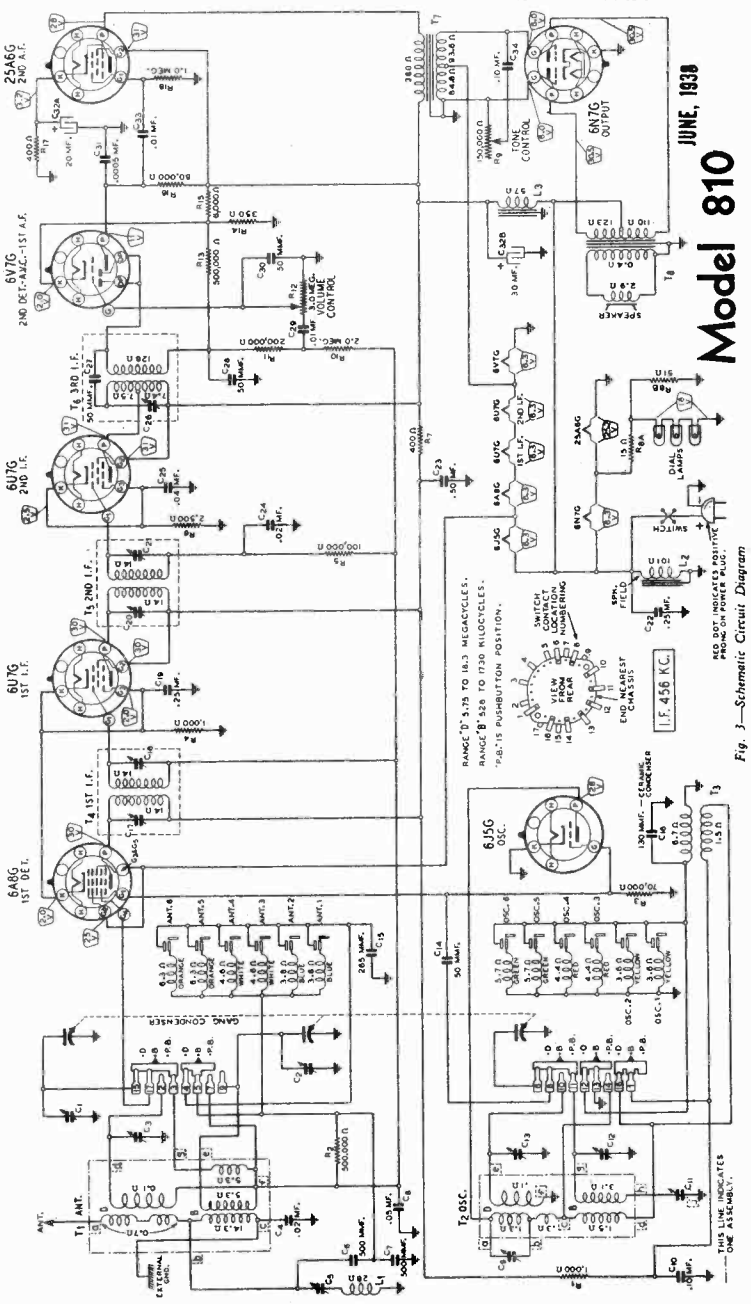
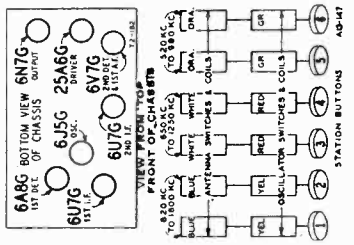


Fig. 3—Schematic Circuit Diagram



This model is a two band 32 Volt DC operated radio. A 6 button inductive type automatic tuning system is employed. This system is separate from the variable condenser tuned circuits which are used for the 2 manual tuning ranges.

A 3 position rotary switch is used to switch the tuning circuits from automatic (push button) tuning to either of the 2 manual tuning ranges.

In AUTOMATIC TUNING, the gang condenser is not used. A single tuned circuit is used before the 1st detector.

The antenna circuit is connected to the automatic tuning antenna coils numbered 1 to 6 on the schematic. When the band switch is in the automatic tuning position and one of the automatic tuning buttons is depressed, the coil corresponding to the button depressed is connected to the control grid circuit of the 1st detector tube. The antenna coil is tuned by fixed condensers C7 and C15. The antenna transformer B band No. 1 secondary is short circuited and the B band No. 2 secondary is open circuited. The antenna transformer D band secondary is open circuited.

The primary of the automatic tuning oscillator tracking coil assembly T3 is connected to the B+ line. The secondary of this assembly is connected through the band switch to the control grid circuit of the oscillator tube. This secondary coil is tuned by fixed condenser C16 and the inductance of one of the automatic tuning oscillator coils numbered 1 to 6 on the schematic.

The oscillator coil assembly B and D band grid coils are open circuited.

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

Alignment between the oscillator and antenna tuning coils is obtained by moving the antenna (rear) coil position while the iron core remains stationary.

MODEL 810(1938)
Alignment, Trimmers

GAMBLE-SKOGMO, INC.

ALIGNMENT PROCEDURE

Volume Control—Maximum All Adjustments.

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

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

The following equipment is required for aligning:

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

Output Indicating Meter—Non-Metallic Screwdriver.

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

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

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

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

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

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

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

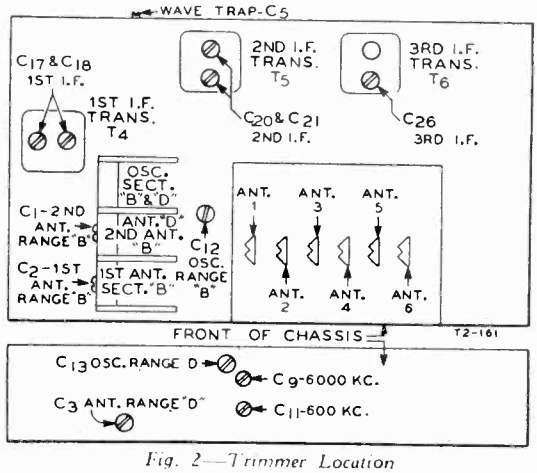


Fig. 2—Trimmer Location

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

GAMBLE-SKOGMO, INC.

MODEL 867A
Schematic, Voltage
Parts

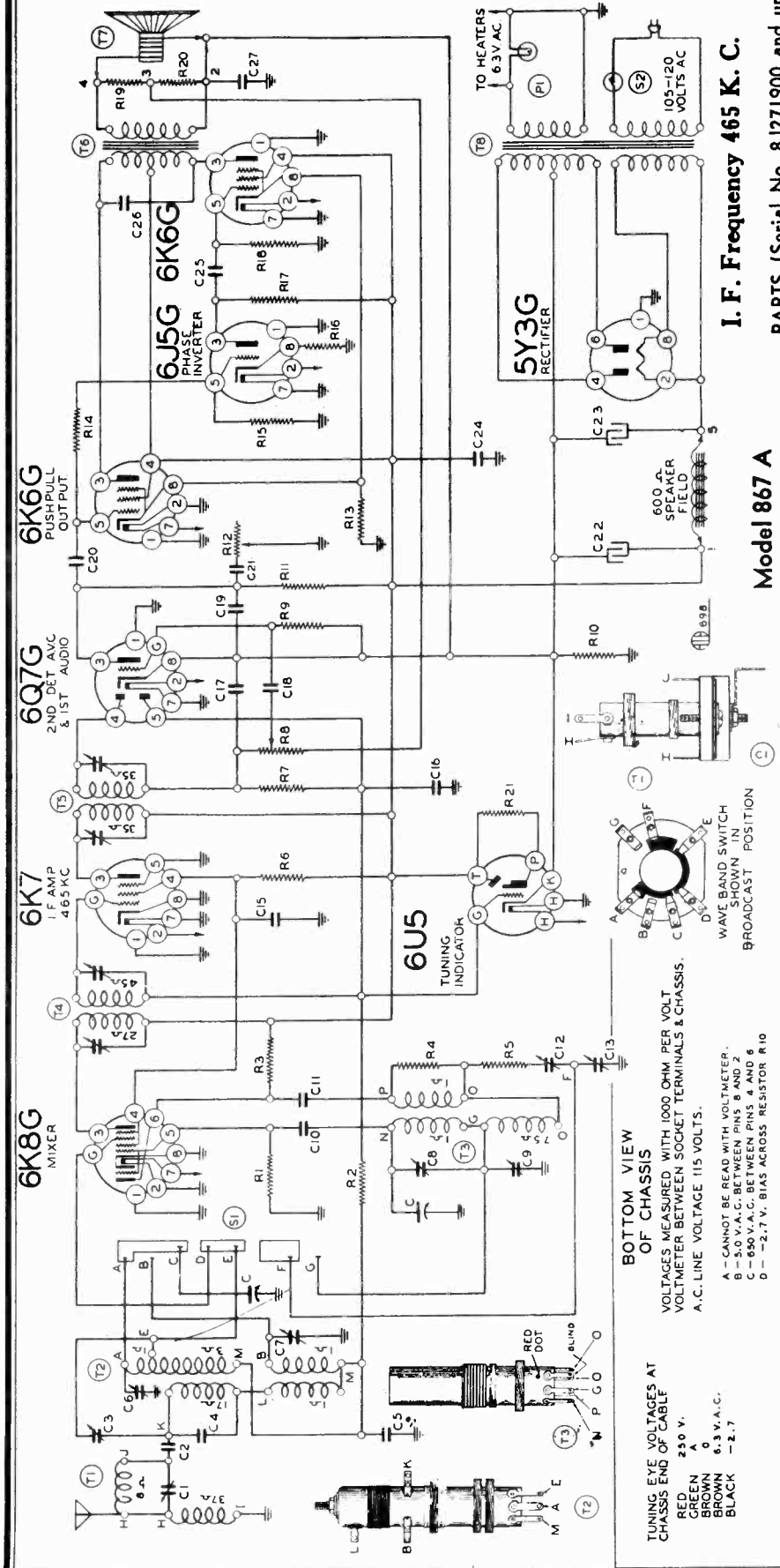


FIG. 5

PARTS (Serial No. 8J271900 and up)

Diagram Ref. No.	Part No.	Description
		RESISTORS
R1	13094	50M ohm—½ w.
R2	13011	250M ohm—½ w.
R3	13030	25M ohm—1 watt
R4	13031	1500 ohm—½ w.
R5	130231	75 ohm—½ w.
R6	13030	25M ohm—1 watt
R7	1304	3 megohm—½ w.
R8	101144	1 megohm volume control
R9	130225	15 megohm—½ w.
R10	130240	30 ohm—½ w.
R11	130103	100M ohm—½ w.
R12	101145	1 megohm tone control
R13	130220	300 ohm—1 watt
R14	130163	400M ohm—½ w.
R15	130103	100M ohm—½ w.
R16	130218	5M ohm—½ w.
R17	13094	50M ohm—½ w.
R18	130102	500M ohm—½ w.
R19	130168	100 ohm —½ w.
R20	130215	25 ohm—½ w.
R21	130110	1 megohm— 1/10 in tuning indicator socket
		CONDENSERS
C	10292	2 gang variable condenser
C1	12467	Wave Trap Trimmer
C2	10011	.01 x 400 v.
C3	12468	Image Adj. Trimmer
C4	129132	.000125 mica
C5	129131	.002775 mica
C6	12469	B. C. Antenna Trimmer
C7	12469	S. W. Antenna Trimmer
C8	12470	S. W. Oscillator trimmer
C9	12470	B. C. Oscillator Trimmer
C10	12939	.00005 mica
C11	10025	.002 x 600 v.
C12	12466	.000422 compression type B. C. Oscillator Pad
C13	12466	.001366 compression type S. W. Oscillator Pad
C15	1001	.1 x 400 v.
C16	1009	.05 x 200 v.
C17	1295	.0001 mica
C18	10019	.006 x 600 v.
C19	1292	.0005 mica
C20	10026	.02 x 400 v.
C21	10013	.05 x 400 v.
C22	11974	10 mfd. lytic—350 w. v.
C23	11973	16 mfd. lytic—400 w. v.
C24	1001	.1 x 400 v.
C25	10026	.02 x 400 v.
C26	10012	.003 x 600 v.
C27	10020	.1 x 200 v.
		PARTS
T1	108125	Wave Trap
T2	111112	B. C. and S. W. Antenna Coils
T3	11098	B. C. and S. W. Oscillator Coils
T4	108105B	Input I. F.—465 kc.
T5	108106M	Output I. F.—465 kc.
T6	10554B	Output Transformer
T7	114135	8" Dynamic Speaker (600 ohm field)
T7	114136	10" Dynamic Speaker (600 ohm field)
T8	104143B	Power Transformer
S1	12568	Wave Band Switch
S2		Off-on Switch on Vol. Control
P1	10794	6-8 v. Pilot Light

ALIGNMENT PROCEDURE

- Volume control—Maximum all adjustments.
- Connect radio chassis to ground post of signal generator with a short heavy lead.
- Connect dummy antenna value in series with generator output lead.
- Connect output meter across primary of output transformer.
- Allow chassis and signal generator to "heat up" for several minutes.

The following equipment is required for aligning:

- An all wave signal generator which will provide an accurately calibrated signal at the test frequencies as listed.
- Output indicating meter.
- Non-metallic screwdriver.
- Dummy antennas—.1 mf., 200 mmf. and 400 ohms.

BAND	SIGNAL GENERATOR Frequency Setting	Dummy Antenna	Connection to Radio	Position of Band Switch	Variable Condenser Setting	Trimmers Adjusted (In Order Shown)	Trimmer Function	Adjustment
I. F.	465 Kc.	.1 MFD.	Grid of 6K7	Broadcast (Extreme left rotation)	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 1)	Output I. F.	Adjust to maximum output
	465 Kc.	.1 MFD.	Grid of 6K8G	Broadcast (Extreme left rotation)	Rotor full open (Plates out of mesh)	Two trimmers on top (See Fig. 1)	Input I. F.	Adjust to maximum output
BROAD-CAST BAND	1730 Kc.	200 mmf.	Antenna lead	Broadcast (Extreme left rotation)	Rotor full open (Plates out of mesh)	Trimmer (C9) (See Fig. 4)	Broadcast oscillator	Adjust to maximum output
	1500 Kc.	200 mmf.	Antenna lead	Broadcast (Extreme left rotation)	Set Dial at 1500 Kc.	Trimmer (C6) (See Fig. 4)	Broadcast antenna	Adjust to maximum output
	600 Kc.	200 mmf.	Antenna lead	Broadcast (Extreme left rotation)	Set Dial at 600 Kc.	Trimmer (C12C) (See Fig. 4)	Broadcast oscillator series pad	Adjust to maximum rock dial. (See note "A")
	465 Kc.	200 mmf.	Antenna lead	Broadcast (Extreme left rotation)	Set Dial at 600 Kc.	Trimmer (C1) (See Fig. 4)	I. F. Wave Trap	Adjust for minimum output
IMAGE REJECTION ADJUST-MENTS	2330 Kc.	200 mmf.	Antenna lead	Broadcast (Extreme left rotation)	Pick up signal at 1400 Kc. on dial	Trimmer (C3) (See Fig. 4)	Image rejection	Adjust for minimum output (See note "B")
SHORT WAVE BAND	17 Mc.	400 ohms	Antenna lead	Short Wave (Extreme right rotation)	Set Dial at 17 Mc.	Trimmer (C8) (See Fig. 4)	Short Wave oscillator	Adjust to maximum output
	17 Mc.	400 ohms	Antenna lead	Short Wave (Extreme right rotation)	Dial Set at 17 Mc.	Trimmer (C7) (See Fig. 4)	Short Wave antenna	Adjust to maximum output
	6 Mc.	400 ohms	Antenna lead	Short Wave (Extreme right rotation)	Set Dial at 6 Mc.	Trimmer (C13) (See Fig. 4)	Short Wave oscillator series pad	Adjust to maximum rock dial. (See note "A")

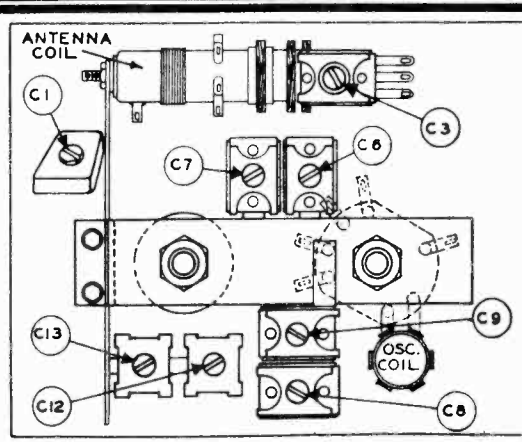


FIG. 4

C1—WAVE TRAP TRIMMER 465 K.C.
C3—IMAGE REJECTION TRIMMER
C6—B.C. ANT. TRIMMER
C7—S.W. ANT. TRIMMER
C8—S.W. OSC. TRIMMER
C9—B.C. OSC. TRIMMER
C12—B.C. OSC. PAD
C13—S.W. OSC. PAD

NOTE "A" Turn the dial back and forth slightly (rock) and adjust trimmer until the peak of greatest intensity is obtained.

NOTE "B" 1400KC is the image frequency of 2330KC. Adjust Trimmer (C3) until a minimum output is obtained.

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

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

BAND SWITCH	BAND	FREQUENCY RANGE
Extreme Right Rotation	Short Wave	5.6 to 18 MC.
Extreme Left Rotation	Broadcast	540 to 1730 KC.

Power Consumption.....80 Watts (At 115 volts 50-60 cycles)
Power Output.....5 Watts Undistorted, 7 Watts Maximum
Intermediate Frequency.....465 KC.

BAND	DIAL SCALE	FREQUENCY RANGE
Broadcast	Upper	540 to 1730 KC. (Kilocycles)
Short Wave	Lower	5.6 to 18.0 MC. (Megacycles)

GAMBLE SKOGMO, INC.

MODEL 867A
Socket, Trimmers
Tuner Data, Notes

PROCEDURE FOR SETTING THE AUTOMATIC TUNER LEVERS:

IMPORTANT—Read carefully before setting the automatic levers.

There are six levers by means of which six stations may be selected. Make a list of local stations or stations you tune in regularly; any number up to and including six.

Punch out from the set of station call letter tabs supplied, the call letters of the stations you have selected.

On the front of each automatic tuner lever button an opening is provided for inserting the call letter tabs.

Insert the call letter tabs in the rectangular openings of each of the automatic tuner buttons. One of the small celluloid tabs supplied should be inserted into place over each of the station call letter tabs.

NOW, PROCEED AS FOLLOWS:—

1. Pull the dial tuning knob **all the way out** (See Illus. "B," Fig. 3), and rotate the tuning knob to the **left** (counterclockwise) until it cannot be turned any further (See Illus. "D," Fig. 3). This will unlock the automatic tuner mechanism. (NOTE:—Automatic tuner mechanism is locked tight when radio is shipped from the factory.)

2. Press **down all the way** any one of the automatic tuner levers. Holding it down **firmly**, press in on the dial tuning knob No. 3 and tune in the station indicated on the station call letter tab on this lever. You will note that in order to tune the station, the dial tuning knob will have to be **pressed in** (See Illus. "E" Fig. 3). Turn the dial tuning knob very slowly back and forth **(while still holding the automatic tuner lever in downward position)**, noting the width of the shadow on the screen of the cathode-ray tuning indicator. Minimum width on the tuning indicator indicates the ideal tuning position (resonance). The station will then be clearest and accurately tuned in.

3. Press down another automatic tuner lever. Holding it down **firmly, press** in on the dial tuning knob and carefully tune in the station indicated on the call letter tab on this lever.

4. Follow this procedure until you have selected all of your favorite stations.

5. Pull the dial tuning knob **all the way out** (See Illus. "B," Fig. 3) and rotate the tuning knob to the **right** (clockwise) until it cannot be turned any further (See Illus. "C," Fig. 3). This will lock the automatic tuner mechanism and the stations you have set up for automatic tuning will be locked in place. After you have locked the tuner mechanism, push the dial tuning knob **in.**

6. If you should desire to change any station you selected to another, pull the dial tuning knob all the way **out** and rotate the knob to the left (counterclockwise) and unlock the tuner mechanism. Select the new station as explained. (NOTE:—If the dial mechanism works hard when setting up a new station for one of the automatic tuner levers, it is due to the tuner mechanism not being unlocked all the way. Pull the dail tuning knob out all the way and rotate the knob to the left (counterclockwise) until it will turn no further. The dial mechanism should work freely with the tuner lever pressed down).

7. After you have selected the new station, pull the dial tuning knob all the way **out** and rotate the knob to the **right** (clockwise) to lock the tuner mechanism. Be sure the knob is turned until it will turn no further, then **press** the dial tuning knob in.

8. The automatic tuner levers are now set up for quick tuning. Press down the lever key and—YOUR FAVORITE STATION IS SELECTED!

The **important** steps to remember when setting up stations on the tuner levers for automatic tuning are:

1. **To unlock** the tuner mechanism pull the dial tuning knob **all the way out.** You may find it necessary to rotate the knob slightly when pulling it out to make certain that the gears mesh properly. Rotate the dial tuning knob to the left (counterclockwise) as far as it will turn without forcing.

2. **To set a lever,** press down **all the way** and **hold** in this position while tuning in by means of the dial tuning knob the station you want this lever to be tuned to. (NOTE:—you will notice that it will be necessary to keep pressing in on the dial tuning knob while tuning in the station as a spring tends to push the knob out.) Set all the levers in the same manner before locking the mechanism.

3. **To lock** the tuner mechanism pull the dial tuning knob **all the way out.** Rotate the dial tuning knob to the right as far as it will turn making certain that it is tight, but it is not necessary to use force.

4. After locking or unlocking the tuner mechanism always return the dial tuning knob to its normal position **(pushed in).**

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on the voltage chart are measured with 115 volts A. C. on the primary of the power transformer.

Resistances of coil windings are indicated in ohms on the schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D. C. voltages is usually caused by a shorted electrolytic condenser; open by-pass condensers frequently cause oscillation and distorted tone.

DIAL CALIBRATION:

To correct dial calibration rotate the tuning knob to the right until the dial pointer reaches the extreme end of the dial scale; then rotate the tuning knob to the left until the pointer reaches the other extreme end of the dial scale.

Stop clamps on the pointer slider bar make the pointer self-aligning, thereby correcting dial calibration.

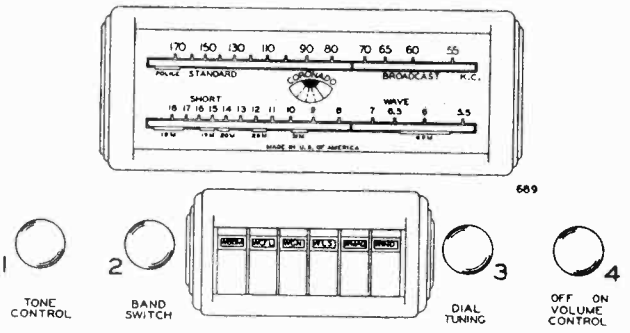
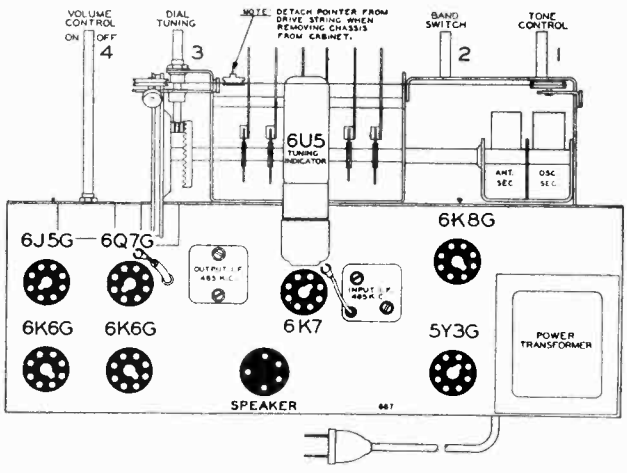
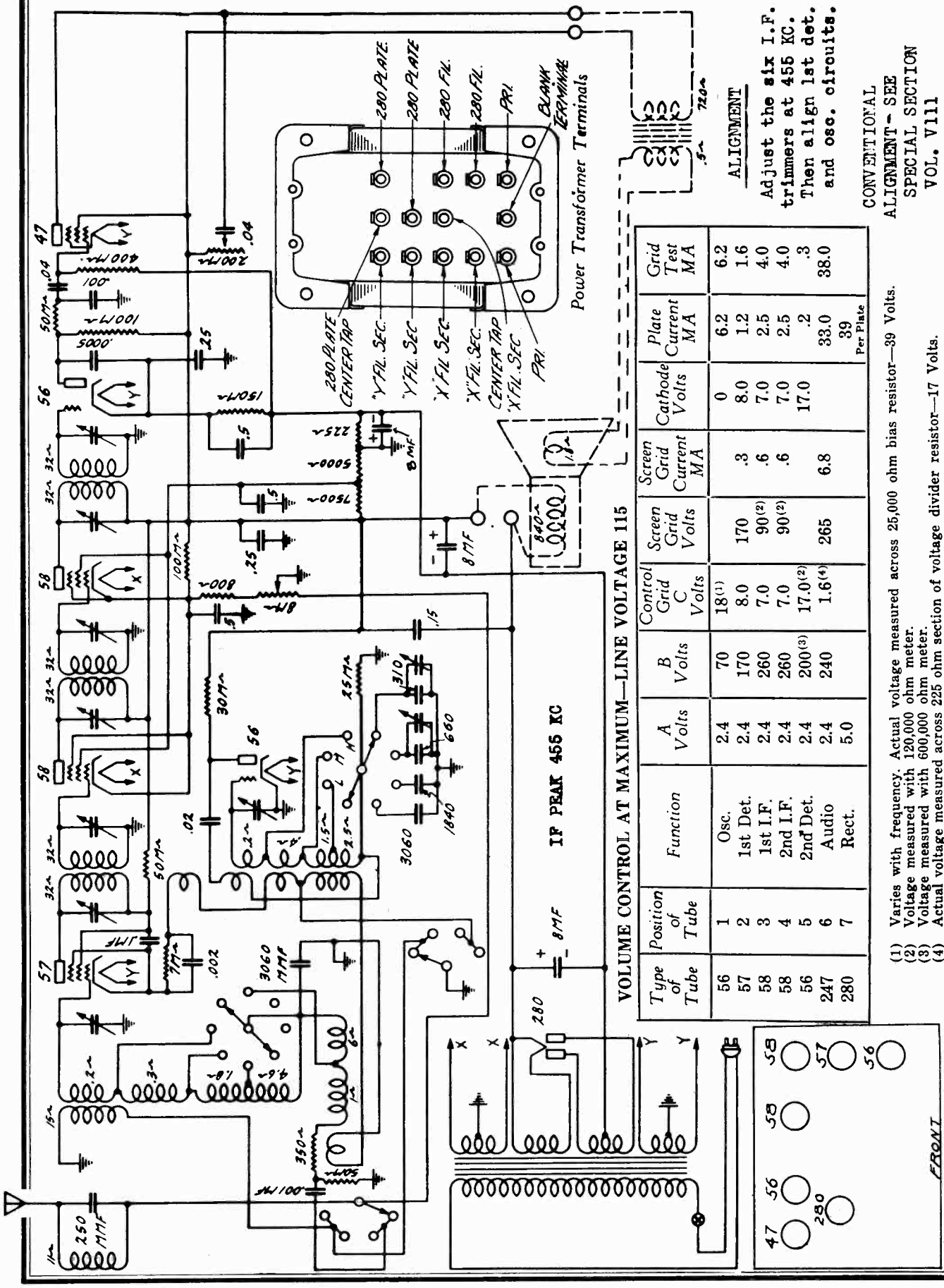


FIG. 2—FRONT VIEW



MODEL 2056AW
Schematic, Voltage
Socket, Alignment

GAMBLE SKOGMO, INC.



Type of Tube	Position of Tube	Function	A Volts	B Volts	Control Grid C Volts	Screen Grid Volts	Screen Grid Current MA	Cathode Volts	Plate Current MA	Grid Test MA
56	1	Osc.	2.4	70	18(1)	170	.3	0	6.2	6.2
57	2	1st Det.	2.4	170	8.0	90(2)	.6	8.0	1.2	1.6
58	3	1st I.F.	2.4	260	7.0	90(2)	.6	7.0	2.5	4.0
58	4	2nd I.F.	2.4	260	7.0	90(2)	.6	7.0	2.5	4.0
56	5	2nd Det.	2.4	200(3)	17.0(2)			17.0	.2	.3
247	6	Audio	2.4	240	1.6(4)	265	6.8		33.0	38.0
280	7	Rect.	5.0						39 Per Plate	

(1) Varies with frequency. Actual voltage measured across 25,000 ohm bias resistor—39 Volts.
(2) Voltage measured with 120,000 ohm meter.
(3) Voltage measured with 600,000 ohm meter.
(4) Actual voltage measured across 225 ohm section of voltage divider resistor—17 Volts.

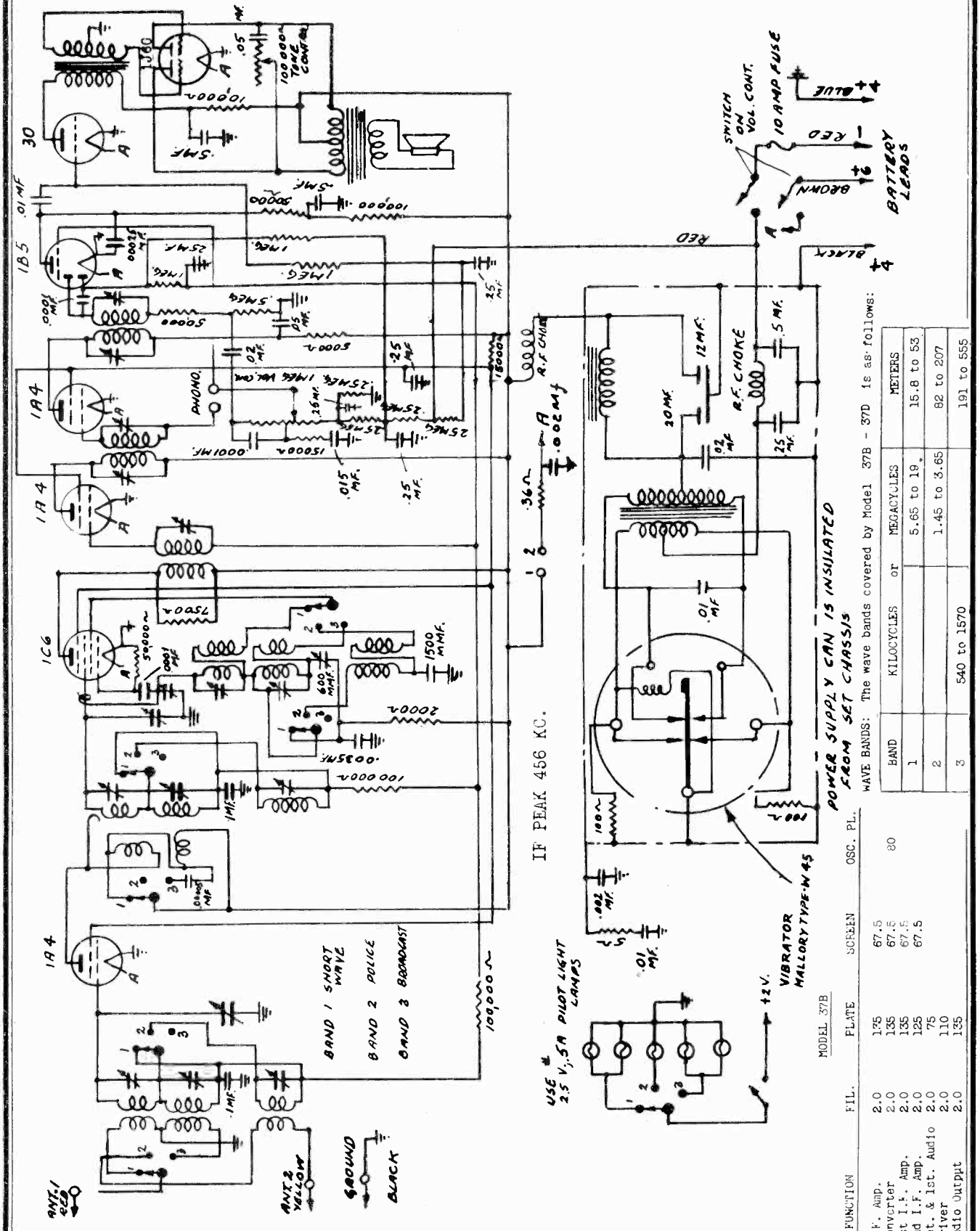
ALIGNMENT

Adjust the six I.F. trimmers at 455 KC. Then align 1st det. and osc. circuits.

CONVENTIONAL ALIGNMENT- SEE SPECIAL SECTION VOL. VIII

GAROD RADIO CORP.

MODELS 37B, 37D
Schematic, Voltage



WAVE BANDS: The wave bands covered by Model 37B - 37D is as follows:

BAND	KILOCYCLES	or	MEGACYCLES	METERS
1			5.65 to 19.	15.8 to 53
2			1.45 to 3.65	82 to 207
3	540 to 1570			191 to 555

MODEL 37B

TUBE	FUNCTION	FIL.	PLATE	SCREEN	OSC. PL.
1A4	R.F. Amp.	2.0	175	67.5	
1C6	Converter	2.0	135	67.5	80
1A4	1st I.F. Amp.	2.0	135	67.5	
1A4	2nd I.F. Amp.	2.0	125	67.5	
1B5/25S	Det. & 1st. Audio	2.0	75		
80	Driver	2.0	110		
1J60	Audio Output	2.0	135		

All voltages are measured from socket terminals to chassis and with a 1000 Ohms per volt voltmeter. The set must be in operation and the Wave Band switch in broadcast position with Battery fully charged and new "B" Batteries.

Filament voltages are taken from filament prong to filament prong at tube socket.

MODELS 37B,37D
Alignment,Socket

GAROD RADIO CORP.

MODEL 159
Schematic,Socket
Trimmers

I.F. ADJUSTMENT - The signal generator is set at 456 kc. and is connected to the grid of the first detector (1C6). With the oscillator section of the tuning condenser short-circuited and the receiver volume control at its maximum position, the i.f. trimmers are adjusted for maximum output. These trimmers may be found on tops of the i.f. transformer shield cans.

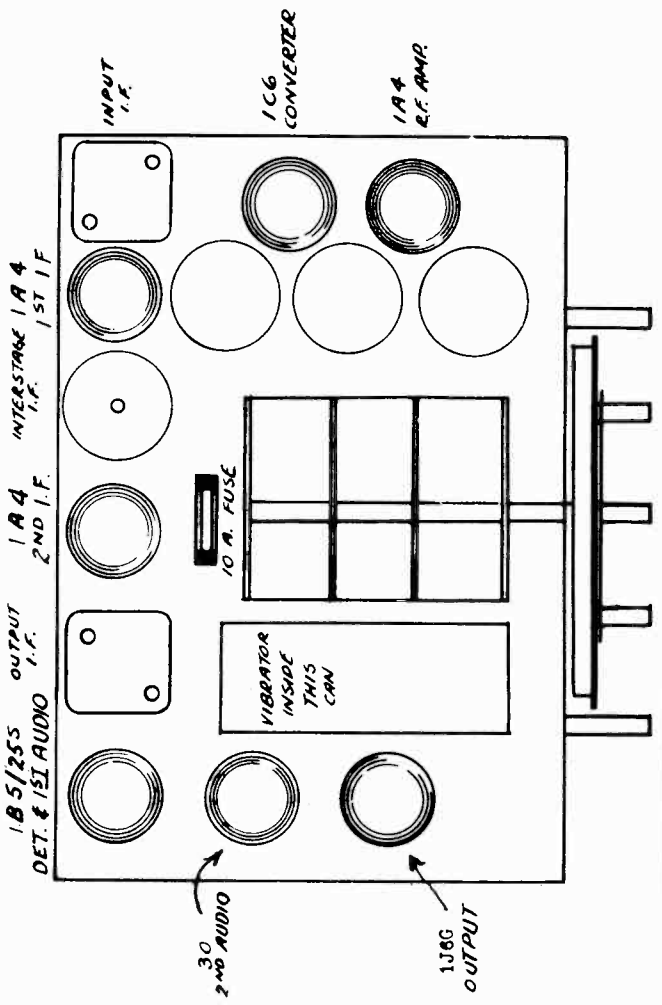
18 MEGACYCLE ADJUSTMENT - The high side of the signal generator is connected to the antenna lead of the receiver and the low side to the ground lead. The receiver and the signal are both tuned to a frequency of 18 mc. with the selector switch in position for band no. 1. The oscillator trimmer condenser is adjusted so that the 18 mc signal is tuned in exactly at the 18 mc calibration point, with the volume control on full and the signal generator adjusted for minimum imput. The antenna preselector and first detector trimmers are then adjusted in the order named for maximum output. These trimmers are located on the sides of the shield cans and are opposite the lower openings. This is the only adjustment on Band #1.

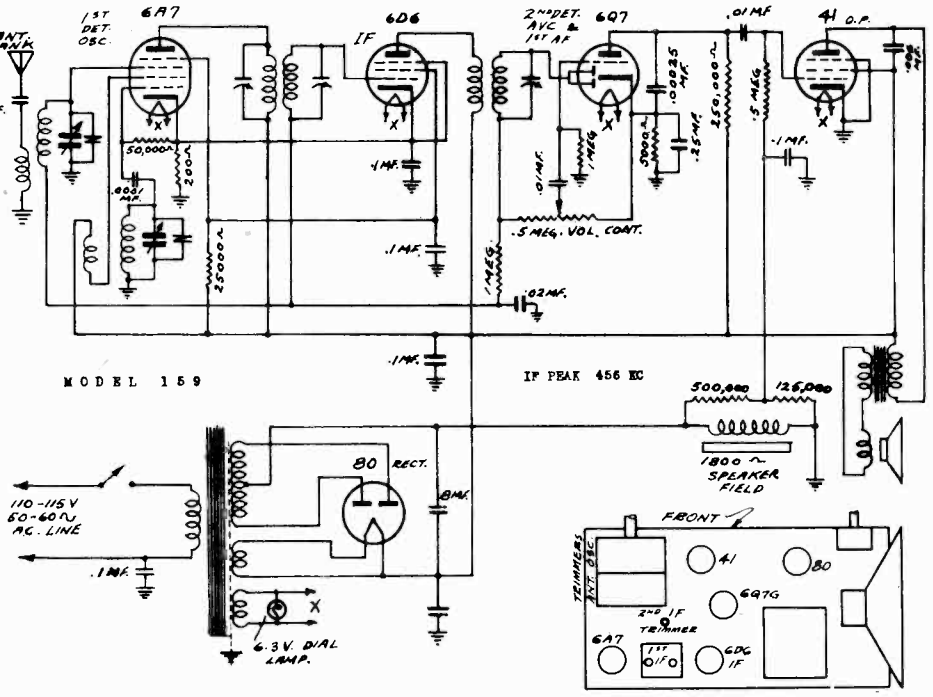
1500 K.C. ADJUSTMENT - With the band selector switch in position for operation on band no. 3. and the receiver and signal generator both set at 1500 K.C. the procedure outlined above is repeated. The oscillator trimmer is found on the rear coil can, and is opposite the upper opening. The antenna preselector and interstage coil trimmers are located in the same positions on the corresponding shield cans.

The signal generator is set at 600 K.C. and the signal tuned in on the dial. The padder condenser for this band is adjusted for maximum gain while the gang tuning condenser is rocked slightly to the right and left. The 1500 K.C. adjustment should then be rechecked. The 600 K.C. Padder is located as indicated in the sketch.

3 MC. ADJUSTMENT - The band selector switch is set in position for operation on the No. 2. band. The receiver and signal generator are both set at 3 M.C. and the procedure outlined above is repeated. The oscillator trimmer is found on the Police Band Coil located under the chassis and is towards the rear. The other trimmers for this band are located in similar positions on the corresponding coils.

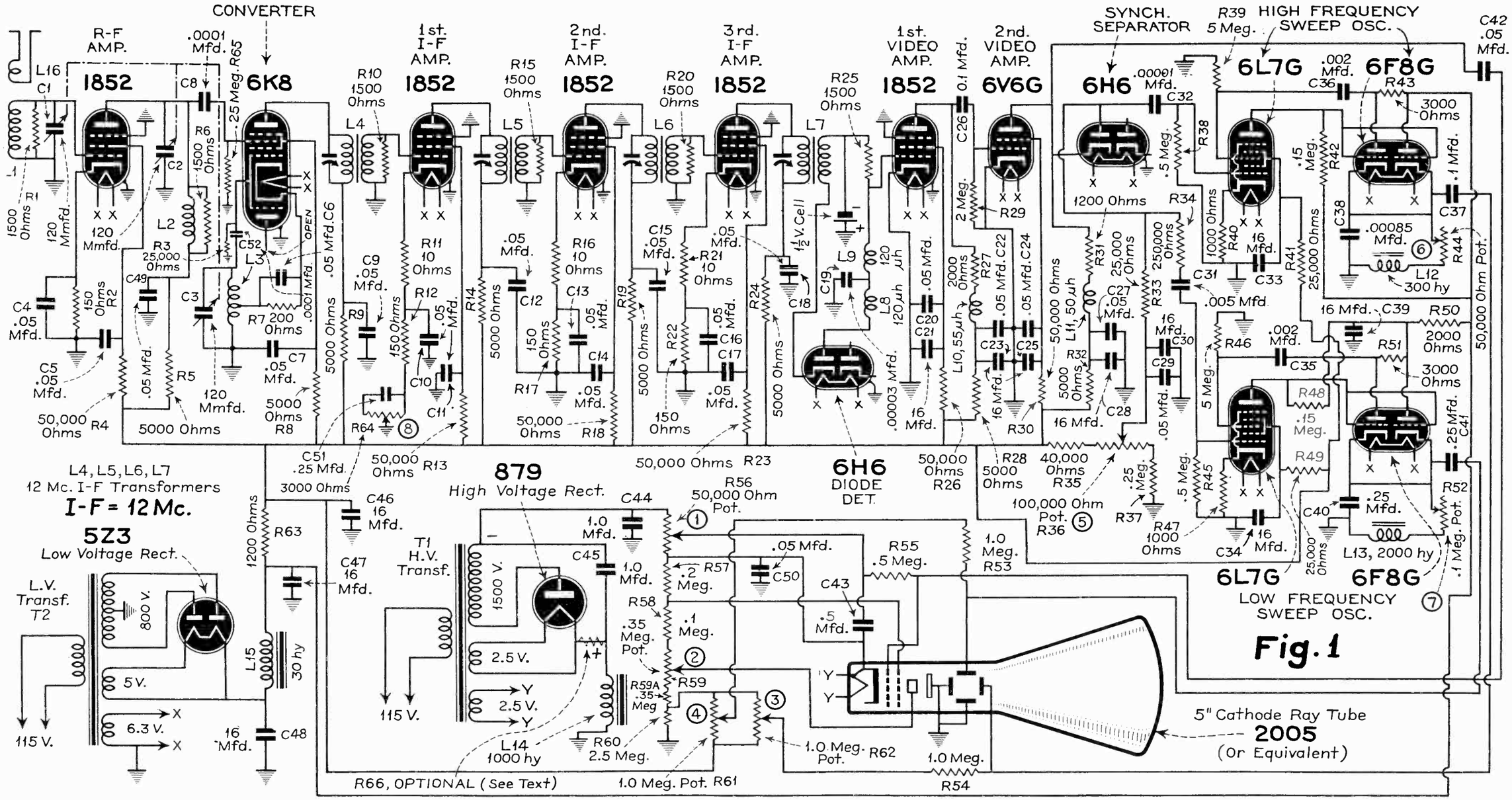
The signal generator is set at 1.7 M.C. and the signal tuned in on the dial. The padder condenser for the police band is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 3 M.C. adjustment should then be rechecked. The 1.7 MC. padder is located as indicated.





GAROD RADIO CORP.

MODEL 100
Schematic



MODEL 100
Chassis Wiring (Top)

GAROD RADIO CORP.

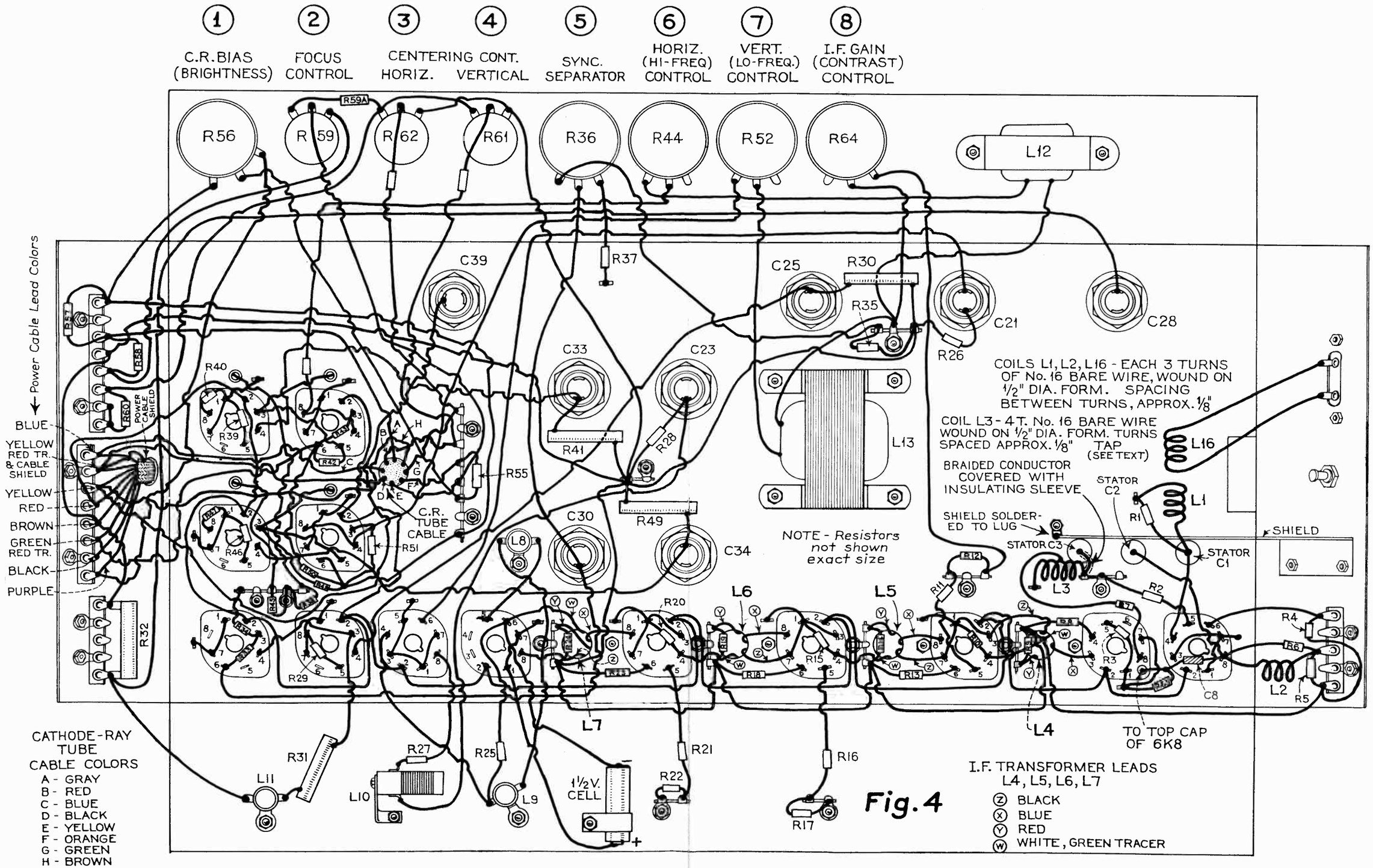
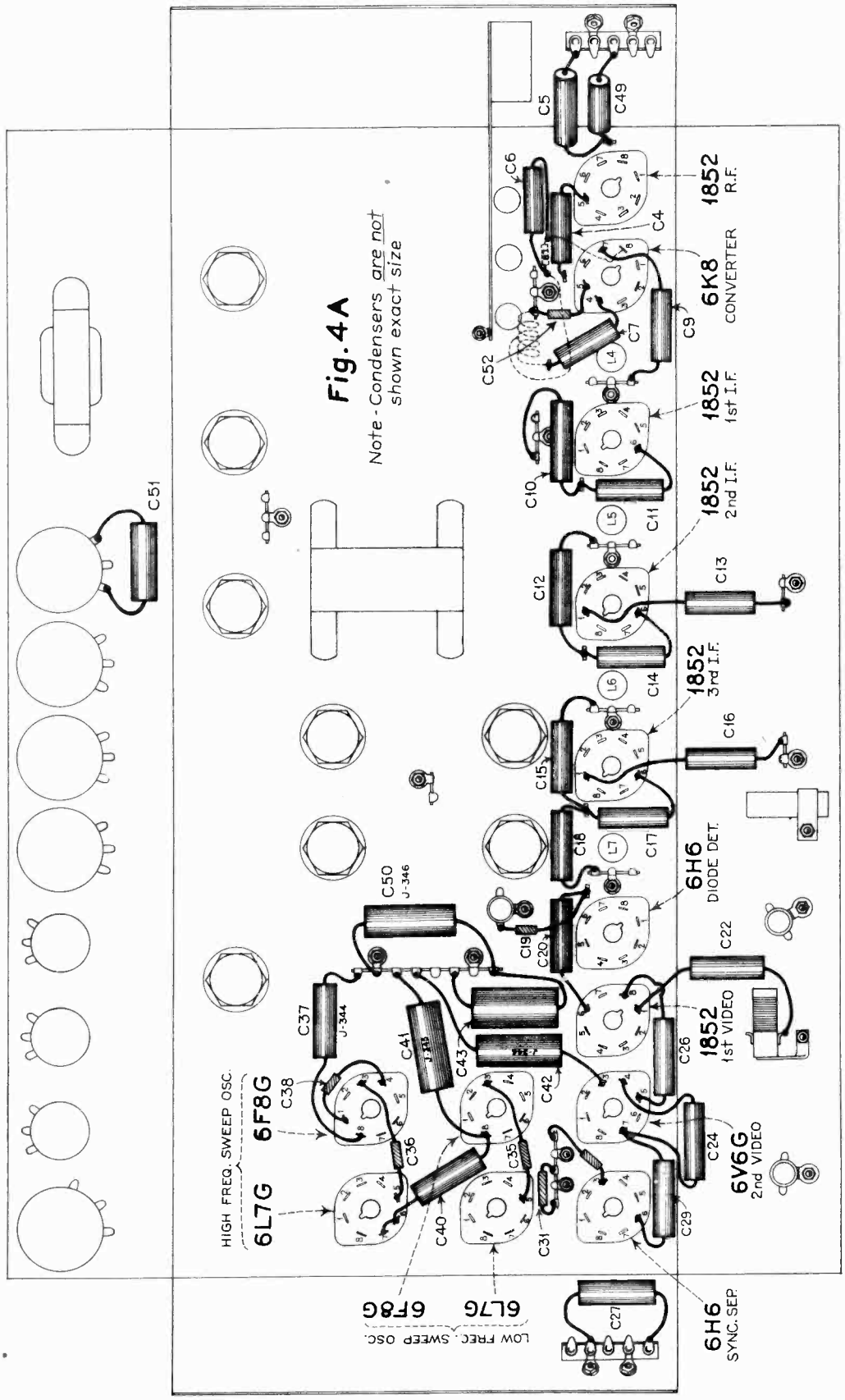


Fig. 4

MODEL 100
Chassis Wiring
(Bottom)

GAROD RADIO CO.



MODEL 100
Chassis View
Socket, Controls

GAROD RADIO CORP.

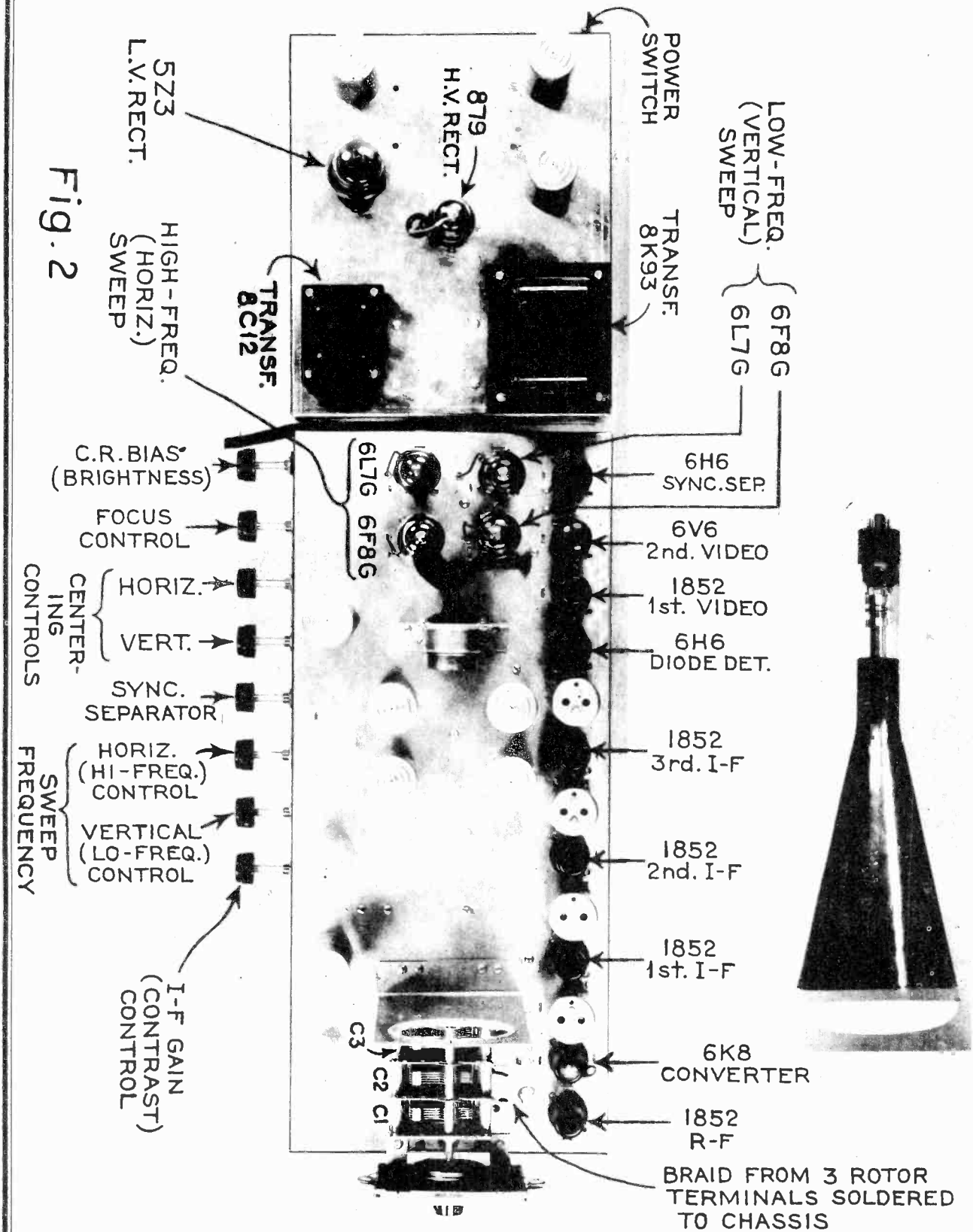


Fig. 2

GAROD RADIO CORP.

MODEL 100
Circuit Data
Assembly, Wiring Notes

Fig. 1 shows the Schematic circuit. It will be noted that is is of the Superheterodyne type. The antenna primary L 16 is connected to the Dipole (or other type) antenna thru a twisted pair. The secondary is tuned to the carrier frequency by the first section of the three gang condenser, and is fed into the grid of the 1852 R.F. amplifier. The plate circuit feeds thru inductor L 2 as a plate load into the control grid of the 6K8 converter (thru the .0001 mfd coupling condenser). The oscillator is of the Hartley type, although the elements have been used in a somewhat unconventional manner. Note that the oscillator plate (#6 pin) is not used. It was found that better stability was obtained with the circuit as shown, than with the conventional arrangement. The converter is followed by three I.F. stages operating at 12 M.C. The 6H6 is used as a diode detector in the usual way. The two chokes L8 – L9 together with the .00003 mfd condenser serve as a filter to remove the I.F. component from the VIDEO channel. The 1852 and 6V6 act as 1st and 2nd /IDEO AMPLIFIERS respectively for the picture signal. A single 1½volt cell such as is used for Pen-Lite flashlights supplies the "C" bias for the 1852 first video stage. This cell is not supplied with the kit, but can be obtained at any Five and Ten Cent store or hardware store. This cell will last for a considerable period, since no current is drawn. The output of the 6H6 is connected to the control grid of the Cathode Ray tube as well as the SYNCH. SEPARATOR.

A second 6H6 serves as a SYNCH. SEPARATOR. This function is accomplished by putting a negative bias on the DIODE plate. This bias may be varied by means of the 100,000 POT.(R36). Thus, since no current can flow until this negative bias is overcome, we have a means of selecting a part of the incoming wave, by adjusting this bias. Since the synchronizing impulses are of considerably higher amplitude than the picture signals, we can adjust our bias so as to bar the passage of these picture signals and permit only the high amplitude Synch. signals to come thru the diode.

The Low and High Frequency SYNCH impulses are then separated by frequency discrimination. The low frequency pulses cannot pass thru the .0001 condenser which couples to the high frequency sweep, but are attenuated very little by the .005 leading to the Low Frequency sweep oscillator.

The Sweep circuit oscillators are of the multi-vibrator type, are very stable in operation, and can be readily controlled by the SYNCH. pulses, which are introduced into the respective grids of the 6L7 tubes. Both sweeps utilize the same circuit arrangement, except of course, that different constants are used for the Horizontal (HIGH) and Vertical (LOW) sweep frequencies. The saw-tooth waves generated in such a multi-vibrator, are, if no compensating means is used, logarithmic in form.Chokes L12 and L13 are therefore inserted to correct this deficiency and produce a saw-tooth, substantially linear, so that the Electron beam is carried across the tube at a uniform rate.

The Synchronized saw-tooth pulses are then fed to the two sets of deflecting plates to scan the face of the Picture tube by means of the Electron Beam emitted by the Electron Gun in the neck of the tube. This beam is in turn modulated (thru the control grid) by the picture impulses obtained from the output of the 6V6.

An 879 Rectifier fed by a separate transformer supplies the High Voltage for the Cathode Ray tube. The 5Z3 serves as a full wave rectifier for the sweep circuits, and other receiver functions. Adequate filtering is used to eliminate any hum voltages that might otherwise interfere with proper operation.

Means are provided for centering the picture by varying the fixed positive potential on the two sets of deflecting plates. Other controls focus the beam by changing the potential on the focusing electrode (R59) and adjust the bias on the Cathode Ray tube (R56) to set the average brightness. (CONTRAST)

Note that the I.F. as well as R.F. circuits are very heavily loaded, so as to broaden the response curves sufficiently to pass the wide band required for good definition.

ASSEMBLY AND WIRING

The assembly of the component parts may be seen from the photographs FIGS 2 and 3 and diagrams 4, 4A and 5. All parts should be assembled as shown and checked against the circuit diagram to prevent any possibility of error. The dial assembly is shown in the sketch. (FIG 6) The 2 angle brackets which hold the dial to the chassis are fastened with Self-Tapping screws, which are provided. The cord is strung as indicated. The dial crystal is held by 2 TRIMOUNTS which are also provided. These are simply pressed into the holes, and may be removed to calibrate the scale by pushing them out from the rear. The pointer is fastened to the dial cord by pressing the prongs together, over the piece of sleeving, which has been slipped over the cord to prevent chafing.

Note that the end of the shield on the underside of the chassis is soldered to a lug fastened under one of the screws which holds the gang condenser. (See FIG 4)

The large rubber grommet is slipped into the hole in the REAR picture tube support bracket and serves to insulate the leads from the tube socket.

Other grommets are located as shown in the various figures.

Coils L1, L2, L3, and L16 are wound with #16 bare wire (supplied with kit). A½" diameter form is used and removed after winding. Turns are spaced approximately 1/8". The number of turns is indicated in the diagram.

It is important that the wiring shown in FIGS 4 and 4A be followed carefully. As each wire or component is put in, it should be checked off on both schematic and picture diagrams. The grounds and heaters should be wired first, then the various B voltages, I.F. transformers; then resistors, mica and tubular condensers. All wiring should be as short and direct as possible. Particular care should be taken in wiring the Video Amplifier to avoid high Grid or Anode capacities to ground, since this will result in a loss of high frequencies with consequent poor detail. This applies especially to leads from the Diode detector to the 1852 and coupling condenser from 1852 to 6V6 as well as wiring from L 11. These should be lifted away from the chassis ¼ to ½ inch. Do not fasten the GRID LEAD from the picture tube to the chassis or wrap it around the other leads in the cable.

After the receiver has been assembled and wired it should be very carefully checked over, to see that it is wired in exact accordance with the schematic and pictorial diagrams. When this has been ascertained, insert all tubes into their respective sockets, as shown in the photograph.

CAUTION

Approximately 1400 volts is supplied to the high voltage Anode. This voltage should be treated with great respect, since under certain conditions it may be *DANGEROUS*. Be sure that the power switch is *OFF* or better still, remove the line cord from the outlet, when making any changes, or touching any parts, other than the control knobs.

With a High Resistance (1000 ohms per volt) Voltmeter, measure all voltages, with respect to the chassis. Results should be approximately as tabulated. Variations will occur due to line voltage conditions and tubes. If there is any SUBSTANTIAL deviation in voltage from that given in this table, ascertain the reason, and correct it before proceeding further, or damage to tubes or other components may result.

WARNING

Be sure that the Voltmeter prongs are well insulated and use great care in making these measurements to avoid shock from the High Voltage supply.

MODEL 100
S.P.U.Chassis Wiring
Voltage

GAROD RADIO CORP.

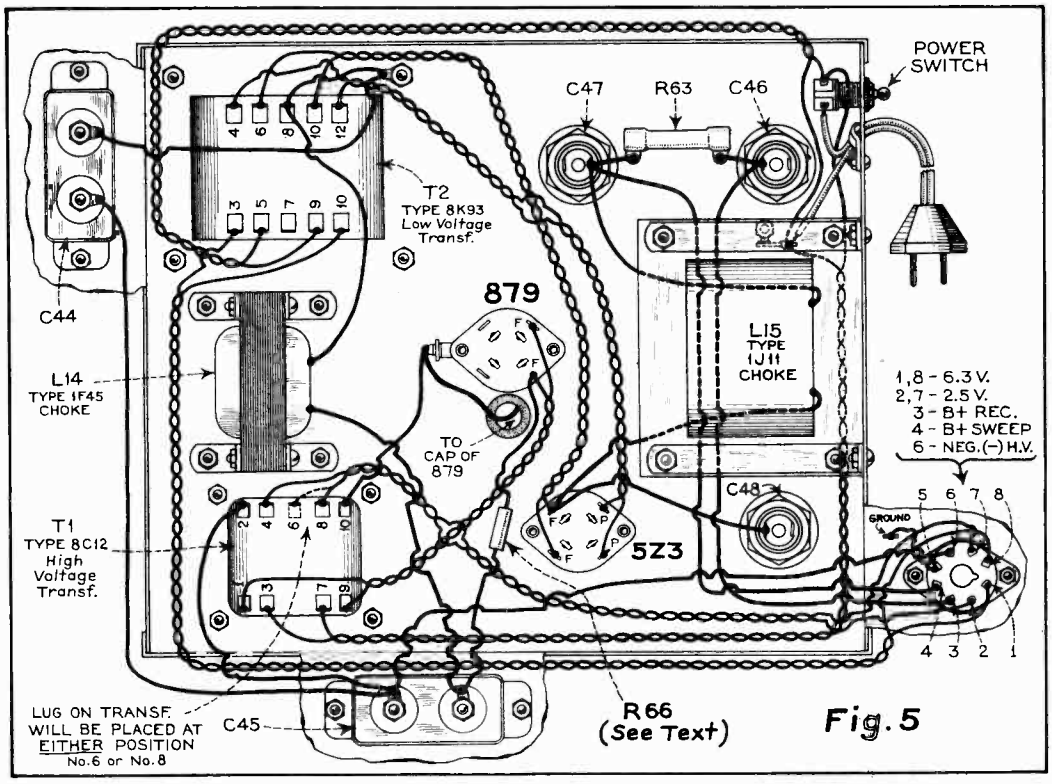


Fig. 5

VOLTAGE TABLE — TELEVISION RECEIVER

		CAP.	1		2		3		4		5		6		7		8	
1852	R. F. Amp.		SH.	0	H	6 A. C.	Sup.	0	GR.	0	K	2	SC.	160	H	0	P	290
6K8	Converter	Contr. GR.0	SH.	0	H	6 A. C.	P	275	SC	135	Osc. GR.	0	Osc. Pl.	0	H	0	K	1.4
1852	1st I.F. Amp.		SH.	0	H	6 A. C.	Sup.	0	GR.	0	K	7	SC.	157	H	0	P	290
1852	2nd I.F. Amp.		SH.	0	H	6 A. C.	Sup.	0	GR.	0	K	2	SC.	170	H	0	P	150
1852	3rd I.F. Amp.		SH.	0	H	6 A. C.	Sup.	0	GR.	0	K	2	SC.	170	H	0	P	150
6H6	Diode Det.		SH.	0	H	6 A. C.	D.P.2	X	K-2	X	D.P.1	-15	X		H	0	K-1	-1.5
1852	1st Video		SH.	0	H	6 A. C.	Sup.	0	GR.	0	K	0	SC.	160	H	0	P	235
6V6G	2nd Video		X		H	6 A. C.	P	90	SC	125	G	-2	X		H	0	K	0
6H6	SYNC. Sep.		SH.	0	H	6 A. C.	D.P.2	100	K-2	92	D.P.1		X		H	0	K-1	
6L7G	Hi-Freq. Sweep	Contr. GR. 2	X	0	H	6 A. C.	P	150	SC	150	Inj.GR	2	X		H	0	K	10
6F8G			X	0	H	6 A. C.	P-2	435	K-2	250	G-1	150	P-1	435	H	0	K	-1250
6L7G	Low Freq. Sweep	Contr. GR. 2	X	0	H	6 A. C.	P	110	SC	135	Inj.Gr	2	X		H	0	K	8
6F8G			X	0	H	6 A. C.	P-2	235	K-2	270	G-1	110	P-1	240	H	0	K-1	170
2005	Videotron		A-2 (Black)	0	H	2.2 AC to #7 (Blue)	A-1 (Yellow)	-850	Def-1 Pl.	85 (Red)	GR-1 (Orange)	-1250	Def-3 Pl. (Green)	100	H&K (Brown)	-1250	GR#2 (Grey)	-1000
5Z3	Low Voltage Rect.		F	5AC 470	P				F	5AC 470								
879	High Voltage Rect.	-1380	F	2.3AC					F	2.3AC								

ALL VOLTAGES MEASURED WITH A HIGH - RESISTANCE D.C. VOLT METER (EXCEPT HEATERS)
ALL CONTROLS TURNED ALL WAY TO THE RIGHT (CLOCKWISE)

SH - Shell
H - Heater
Sup. - Supressor Grid
GR. - Grid
K - Cathode
SC. - Screen
P - Plate
D.P. - Diode Plate
Def.Pl.- Deflecting Plate
A - Anode
Inj. Grid. - Injector Grid
F. - Filament
X. - No connection

ALIGNMENT AND OPERATION

Set the Picture Tube bias control (#1) all the way to the right. Set the Horizontal and Vertical Sweep (#6 and 7) controls approximately half way.

Now turn the Spot locating control (#3) all the way to the left and rotate the other spot control (#4) thru its entire range. If neither a spot nor a Raster (the scanning pattern) appears, move the first spot locating control (#3) slightly to the right and rotate the other locating control thru its entire range again. Continue this procedure step by step until something appears upon the viewing screen of the Cathode Ray Tube.

Now adjust the Vertical and Horizontal Sweep controls until a complete raster appears. This should be approximately 4" square (The actual picture will be somewhat smaller due to the presence of the Blanking and Sync pulses in the station carrier).

By means of the Spot Location controls (#3 and #4) this Pattern may now be centered on the tube face. The Cathode Ray Tube socket can be rotated to level the Raster.

The size of the picture is determined by two factors, namely; the sweep circuit voltage and the voltage applied to the second anode. The picture increases with increase in sweep voltage and decreases INVERSELY as the square of the second or High voltage Anode potential. The saw-tooth voltage developed by the multi-vibrators is a function of the "B" voltage applied to the plates. Since we are operating near the voltage limit of the 5Z3 rectifier tube, it is impractical to obtain any improvement in this direction. Amplifiers could be used to increase the sweep voltages, but this would complicate matters greatly. The other alternative is to reduce the 2nd Anode voltage. Referring to the circuit diagram, a 100,000 ohm (R66) dropping resistor is indicated in series with the low voltage filter system, This results in a larger picture, at only a slight sacrifice in brilliance. The use of this resistor is optional, depending upon which characteristic is the more desirable.

The Image Ratio should be 4:3. If the picture does not conform to this ratio, a rearrangement of resistors in the sweep plate and screen circuits will correct this. Potentiometers could be inserted to control the voltages applied to the deflection plates, but these additional controls are hardly necessary, since once this adjustment is made, it need not be changed, for a given set of tubes.

After this has been satisfactorily checked, we may proceed to the I.F. amplifier adjustments. An output meter or preferably an Oscilloscope is connected across the output of the Video amplifier (6V6 plate). A signal from a Signal Generator or equivalent source is now introduced at the converter grid (6K8). The Intermediate Frequency is 12M.C. The I.F. transformers are now adjusted for maximum output in the conventional way.

Now introduce a signal, whose frequency is approximately that of the principal station to be received, into the antenna circuit. Tune this signal by rotating the dial, then align the antenna and R.F. circuits for maximum output by means of the trimmers on the variable condenser.

After this has been done, the receiver is ready for a test on the air. It is best to make adjustments on the fixed pattern transmitted by Television stations during test periods preceeding the regular scheduled programs. The I.F. system should now be readjusted by staggering the peaks to accept a wide band of frequencies (2 Megacycles). This will result in considerable improvement in picture detail, with relatively slight loss in gain.

The I.F. transformers are heavily loaded (with 1500 ohms across each secondary). It is possible to omit these, with an increase in gain if they are carefully realigned so as to stagger the peaks, with a resultant "square top" resonance curve over the desired band.

The R.F. circuits should now be realigned for best tracking. It may be necessary to adjust the R.F. coil inductances slightly to obtain the proper range and tracking. If necessary the end plates of the variable condenser may be bent to accomplish this.

About 20 Volts at the Control Grid of the Cathode Ray Tube is necessary in order to obtain a good picture. If everything is functioning properly this should be easily obtained from stations within range. This can be checked with a vacuum tube voltmeter or calibrated oscilloscope.

A little experience will enable the user to tune in a station quickly and clearly. Proper manipulation of the controls is important, and the function of each should be studied carefully and thoroughly understood. A cathode bias control in the first I.F. stage sets the over-all gain. Other controls locate the pattern, Vertically and Horizontally; set the Vertical and Horizontal Sweep Frequencies; adjust Focus of the Picture Tube, fix the Average Brightness (Contrast); and adjust the Sinc separator and Selector. See Illustration.

RECEIVING ANTENNA

The installation of an antenna for Television reception is extremely important. In residential locations, the antenna should be elevated as high as possible and located in such a way as to be furthest from sources of interference. Automobile ignition systems cause considerable interference, as do electrical devices having sparking or intermittant contacts. Reflections from buildings, bridges and steel or other metal structures may result in multiple transmission, thereby producing 2 or more images superimposed upon each other, due to the slight time difference in the arrival of the several reflected waves.

This effect may become extremely critical in large cities where a great number of these high structures are present. If possible a "line of sight" transmission path from the transmitter antenna should be selected. Again, care must be taken to obtain the maximum freedom from electrical interference, since this will result in spotting and blotching of the picture.

It is noticed that less of this "noise" interference, from automobile ignition systems particularly, is picked up when using a Horizontally polarized antenna than with a vertical antenna. Since, from all other considerations, it is equally as effective it is therefore desirable to use such an antenna for our Television receiver, when the field strength is sufficient to give us the necessary signal for satisfactory operation.

A simple dipole with twisted-pair lead-in (or a transposed lead-in) will usually give satisfactory results. These dipoles are available with arms of adjustable length and so arranged that they can be rotated. For a given station, maximum pickup will be obtained when the dipole is at right angles to the signal path from the transmitter. Where several stations are to be received, or the field strength is inadequate, more complicated forms of antennae may be required, or in the case of a directive antenna, a compromise may have to be reached so as to include all the desired stations within range. The length of the dipole is adjusted for maximum pickup from desired stations. An overall length of 120 inches is suggested for a start. In some cases, it may be desirable to use separate antennas facing in different directions for different stations.

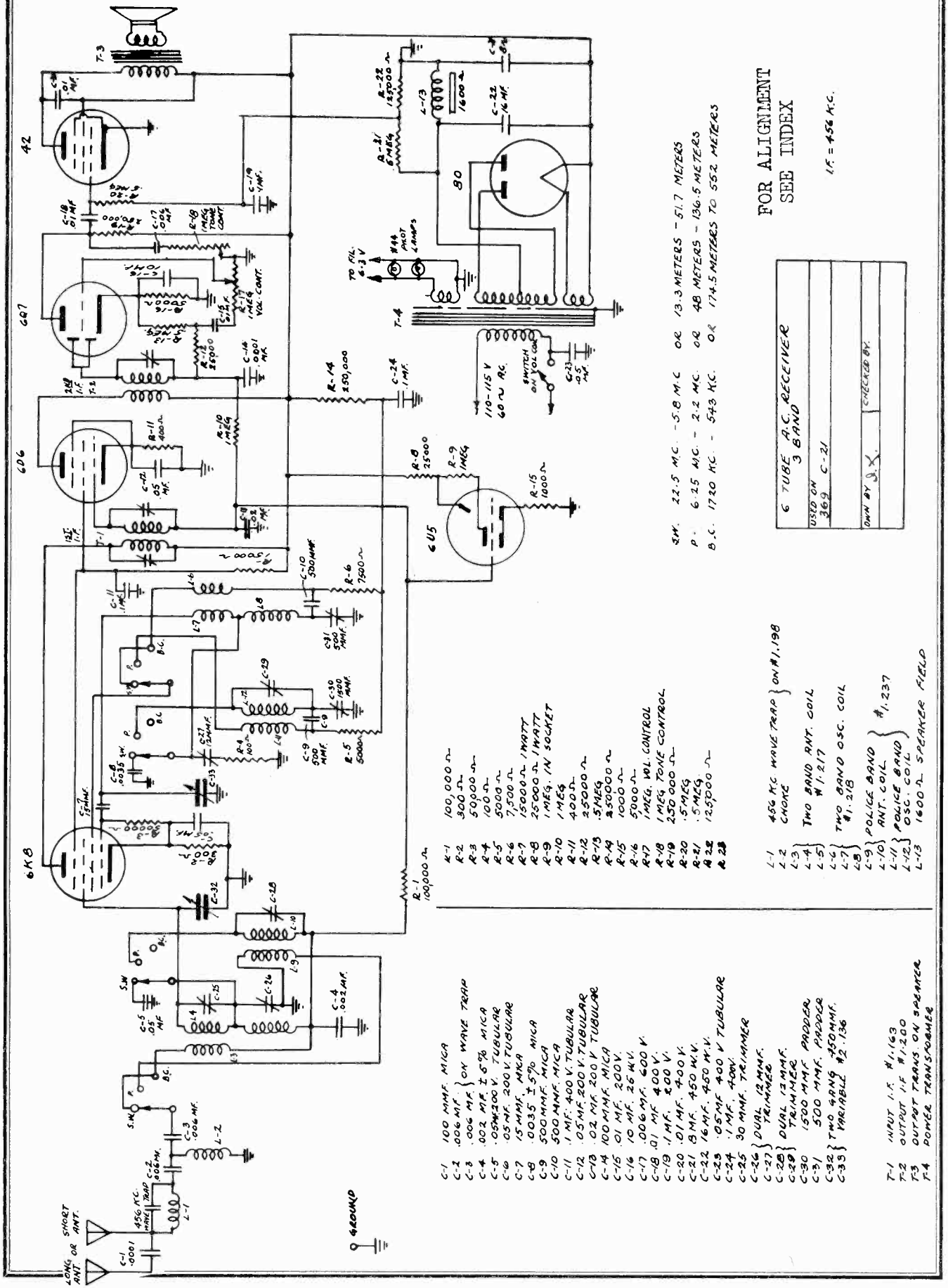
It is extremely important that the antenna be securely fastened so as to prevent swinging of either the antenna itself, or the transmission line, since this may result in intermittent blurring or loss of the picture. (To avoid complications, no A.V.C. system has been incorporated in this receiver.)

It is strongly recommended that the builder study all literature available on Television and Ultra Short waves before attempting to go ahead with the construction so as to enable him to proceed intelligently. A knowledge of the exact function of each component will help greatly towards the successful accomplishment of the desired results.

References: QST - Dec, Jan, Feb, Mar, Apr, May 1937
ELECTRONICS - 1937-38
TELEVISION - Vol I and II - RCA Technical Press.

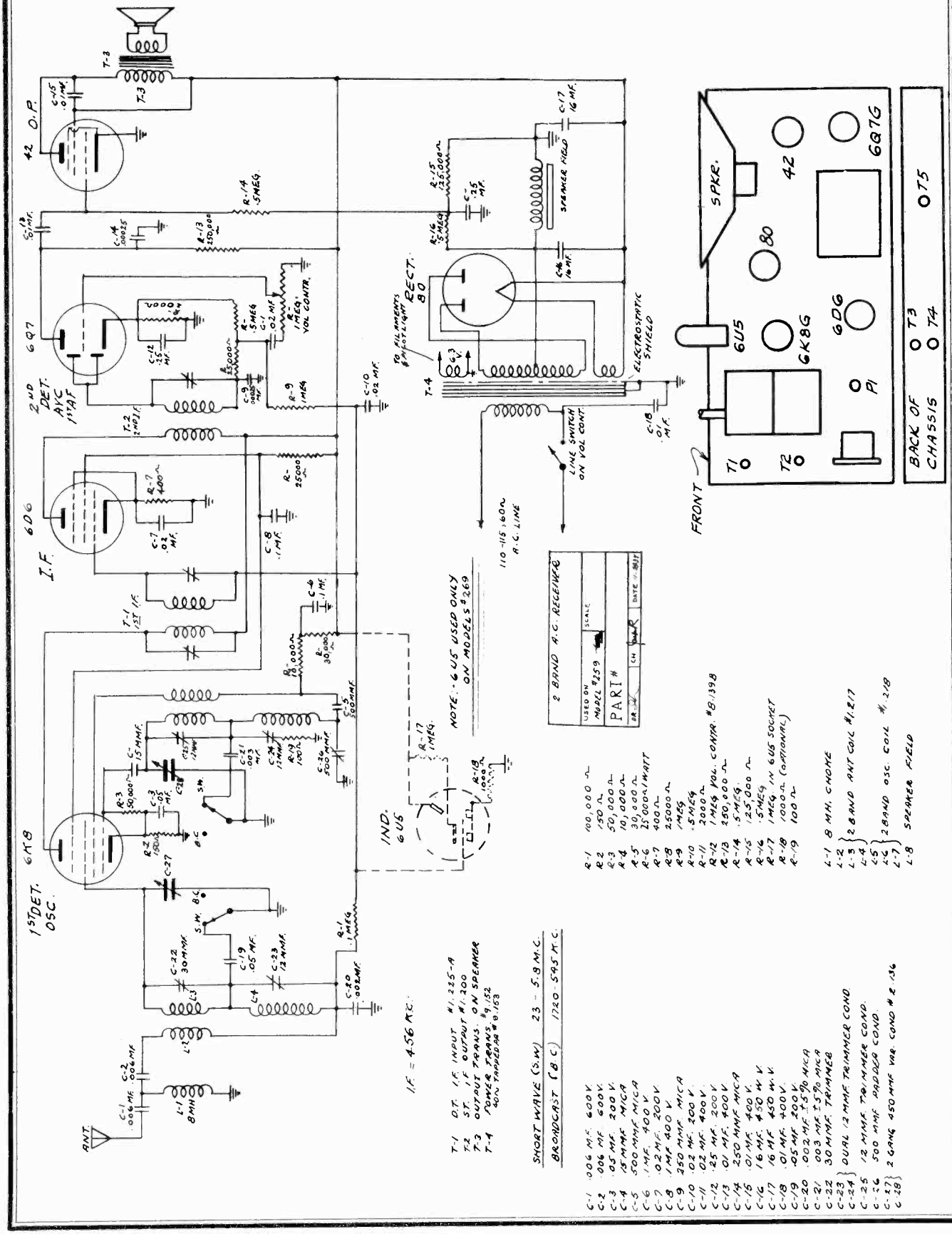
MODEL 369
Schematic

GAROD RADIO CORP.



GAROD RADIO CORP.

MODELS 259,269
Schematic, Socket
Trimmers



MODELS 259,269
MODEL 369
MODELS 629,729
MODEL 739
MODEL 7390

GAROD RADIO CORP.

Alignment

ALIGNMENT - MODELS 259,269,629,729,739,7390, and 369.

Re-alignment of this receiver should not be attempted unless all other possible causes have been thoroughly investigated. An accurately calibrated signal generator which will cover the necessary wave bands, and an output meter for indicating the effect of adjustments are required.

During the alignment proceedure all adjustments should be made under the following conditions.
1) Line voltage as indicated on instruction sheet
2) Volume and tone control at maximum volume positions.
3) Minimum input from signal generator.
If this proceedure is not adhered to, all adjustments will appear very broad. This is due to the action of the automatic volume control.

I.F. ADJUSTMENT The signal generator is set at 456 KC and is connected to the grid of the converter tube (6K8) through a .5 MFD condenser. Be sure to connect a resistor of approximately 25,000 ohms between the converter grid and ground so that the grid circuit is at ground potential for D.C.

The Band switch should be set on Broadcast and the pointer set at 550 kc. The Imput I.F. transformer trimmers are located on the rear chassis apron, between the variable condenser and the 6D6 I.F. tube. Both screws are adjusted for maximum output as indicated by the output meter connected across either the voice coil or the primary coil of the loud speaker output transformer.

The output I.F. transformer trimmer is located on the rear chassis apron, under the power transformer adjust the trimmer for maximum output as indicated on the output meter. The Input I.F. should now be re-checked for maximum output.

BROADCAST BAND

The dummy antenna for this band consists of only a 250 MMFD condenser. Set the band Switch in the Broadcast position and condenser plates completely out of mesh.

MODEL 259,269.

Set the signal generator at 1720 KC and adjust the broadcast oscillator trimmer located on top of the chassis (it is the trimmer to the rear of the chassis) until a response is indicated on the output meter. The generator is now set at 1500 KC. Turn the variable condenser until a response is indicated. The dial pointer should now co-incide with the 1500 KC mark on the dial. Adjust the 1500 KC Antenna trimmer (located on top of the chassis, near the variable condenser. It is the trimmer to the front of the chassis.) for maximum output.

MODEL 629,729.

Set the signal generator at 1770 KC and adjust the broadcast oscillator trimmer on top of the chassis, to the right of the gang condenser. The oscillator trimmer is the front adjustment, until a response is indicated. The dial pointer should now co-incide with the 1500 KC mark on the dial. Adjust the 1500 KC Antenna for maximum output.

MODEL 739, 7390

Set the signal generator at 1720 KC and adjust the broadcast oscillator trimmer (under the chassis, behind the tone control. The oscillator trimmer is the one nearest the band switch) until a response is indicated on the output meter. The generator is now set at 1500 KC. Turn the variable condenser until a response is indicated. The dial pointer should now coincide with the 1500 KC mark on the dial. Adjust the 1500 KC Antenna trimmer (located adjacent to the oscillator trimmer, under the chassis) for maximum output.

Set the generator at 600 KC and turn the variable condenser control until a response is indicated. Adjust the broadcast oscillator padder condenser (located directly behind the variable condenser) for maximum response while "rocking" the gang condenser. The high frequency adjustments should now be rechecked.

SHORT-WAVE BAND #1 ADJUSTMENT. (right position) FOR MODEL 369 ONLY

Set the band switch to the extreme left hand position which is short wave band #1. Turn the dial control knob to the extreme high frequency end so that the condenser plates are entirely out of mesh. The signal generator is connected to the "short-antenna" lead through a dummy antenna consisting of a 250 MMFD condenser and a 400 ohm non-inductive resistor in series. With the generator set at 22MC (22.5MC) the short wave oscillator trimmer is opened until a response is heard. The trimmer condenser is then opened further (capacity reduced) until a second response is heard. This response (with trimmer at low capacity) is the correct response to use, the other being the image.

With the generator set at 23MC FOR MODELS 629,729.

Set the generator at 19MC Turn the condenser until a response is indicated. The pointer should coincide with the 19MC mark on the dial. Adjust the antenna trimmer for the short-wave band (located under the chassis, on the antenna coil) for maximum output while rocking the condenser gang from left to right.

SHORT WAVE BAND #2 *MODEL 369 ONLY*

Set the band switch to the middle position. Turn the dial control knob to the extreme high frequency end so that the condenser plates are entirely out of mesh. The signal generator is left connected as for band #1. The generator is set at 6.25 MC and the Band #2 oscillator trimmer is opened until a response is indicated at the lower capacity setting of the trimmer. (Located on top of the chassis, behind the dial bracket. The one is the front trimmer). Set the generator at 6MC and turn the variable condenser until a response is indicated. The pointer should now co-incide with the 6 MC mark on the dial. The antenna trimmer is then adjusted for maximum output while the condenser gang is rocked from right to left. The antenna trimmer is located on the top of the chassis, in line with and directly behind the oscillator trimmer. Set the generator at 2.4 MC and turn the variable condenser knob until a response is indicated. The padder for this band, which is located on top of the chassis and is the projecting adjacent screw to the right of the oscullator trimmer, is now adjusted for maximum output while rocking the condenser gang from left to right. The high frequency adjustments should then be rechecked.

LONG WAVE BAND *MODEL 7390 ONLY*

The dummy antenna for this band is the same one used in aligning the broadcast band.

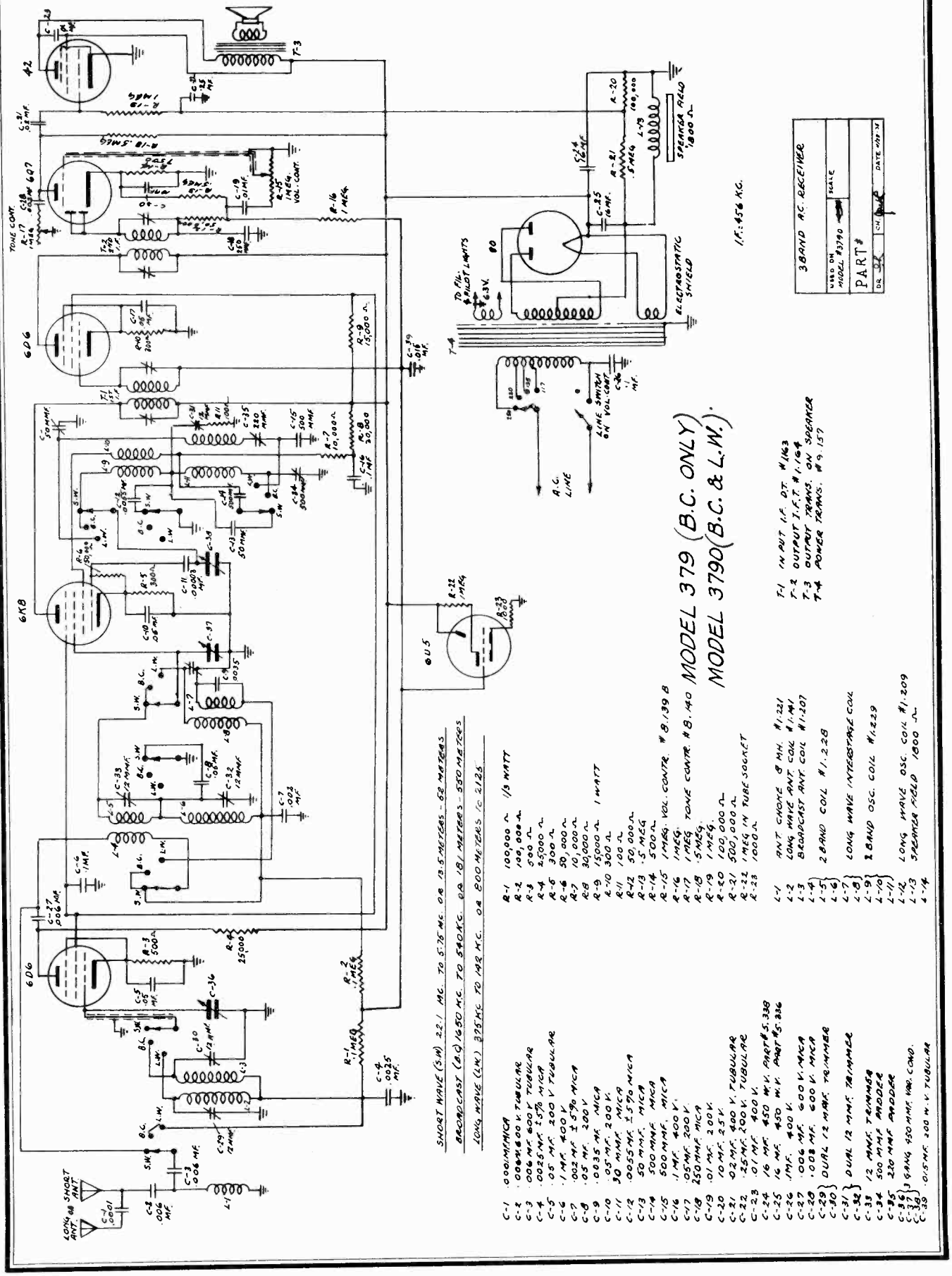
Set the generator at 300 KC. Set the dial pointer so as to coincide with the 300 KC mark on the dial. The long-wave oscillator trimmer (located on top of chassis, right hand side, behind the right hand dial bracket. The oscillator is the rear trimmer) is now adjusted until a response is indicated. The long wave antenna trimmer (located adjacent to the oscillator trimmer)is now adjusted for maximum output.

Set the generator at 150 KC and tune for a response. Adjust the Long-Wave padding condenser (located on top of chassis to the right and forward of the oscillator antenna trimmers for maximum output while "rocking" the gang condenser. The high frequency adjustments should now be rechecked.

Now set the signal generator at about 1200 kc and leave THE BAND SWITCH ON THE LONG WAVE POSITION. Adjust the generator output voltage until a response is heard. The 1200 kc wave trap on top right of the chassis is now adjusted for MINIMUM response.

GAROD RADIO CORP.

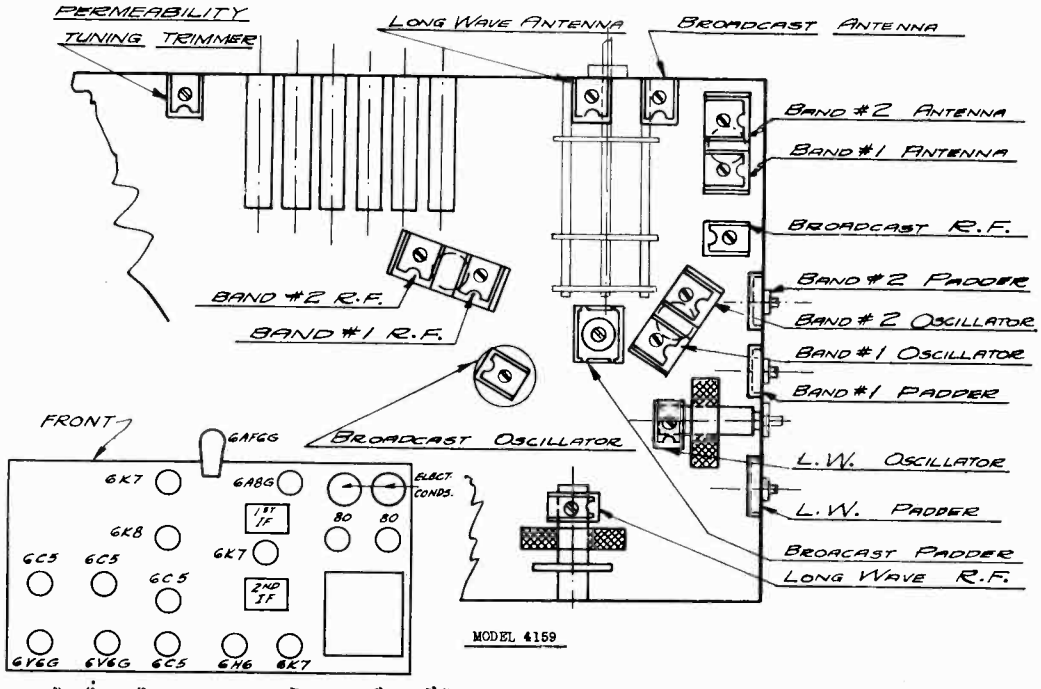
MODELS 379, 3790
Schematic



MODELS 379,3790
Socket,Trimmers
Tuner Data

GAROD RADIO CORP.

MODEL 4159
Socket,Trimmers



MODELS 379 and 3790

PROCEDURE FOR SETTING STATION BUTTONS

Select the six favorite broadcast stations which you wish to set up for automatic tuning. The stations chosen should be from amount those received most clearly when using dial tuning. It is not advisable to use this system of tuning for short wave or distant broadcast stations.

Although each button will cover the entire dial range it may be most advisable, from the standpoint of convenience, to arrange the stations chosen in order of frequency.

SETTING THE STATION BUTTONS: The proper procedure is as follows-- grasp the first button to be set with the finger tips and loosen it by unscrewing it about one-half turn to the left or in a counter clockwise direction. Now tune in the station which you desire to set on this button, using the regular tuning knob. After the station is perfectly tuned, hold the knob firmly with one hand and depress the button just loosened as far as it will go. Then tighten it gently by turning it to the right, or in a clockwise direction. The button should be kept depressed in the meantime, and the dial knob should be held firmly so that the station does not become detuned.

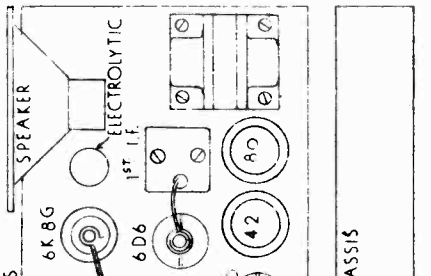
Now release the push button and turn it again in a clockwise direction to make sure it is firmly tightened. Then tune the dial off the station and try depressing the push button as far as it will go. The station should then be perfectly retuned. If it is not tuned properly that is, if you are able to retune it better with the dial, it will be necessary to repeat the above procedure.

The other five buttons may now be set up in the same manner as described above, tuning each to one of the favorite stations which you have selected.

The tabs bearing the station call letters may now be removed from the sheet provided, and placed in the slots below the pushbuttons.

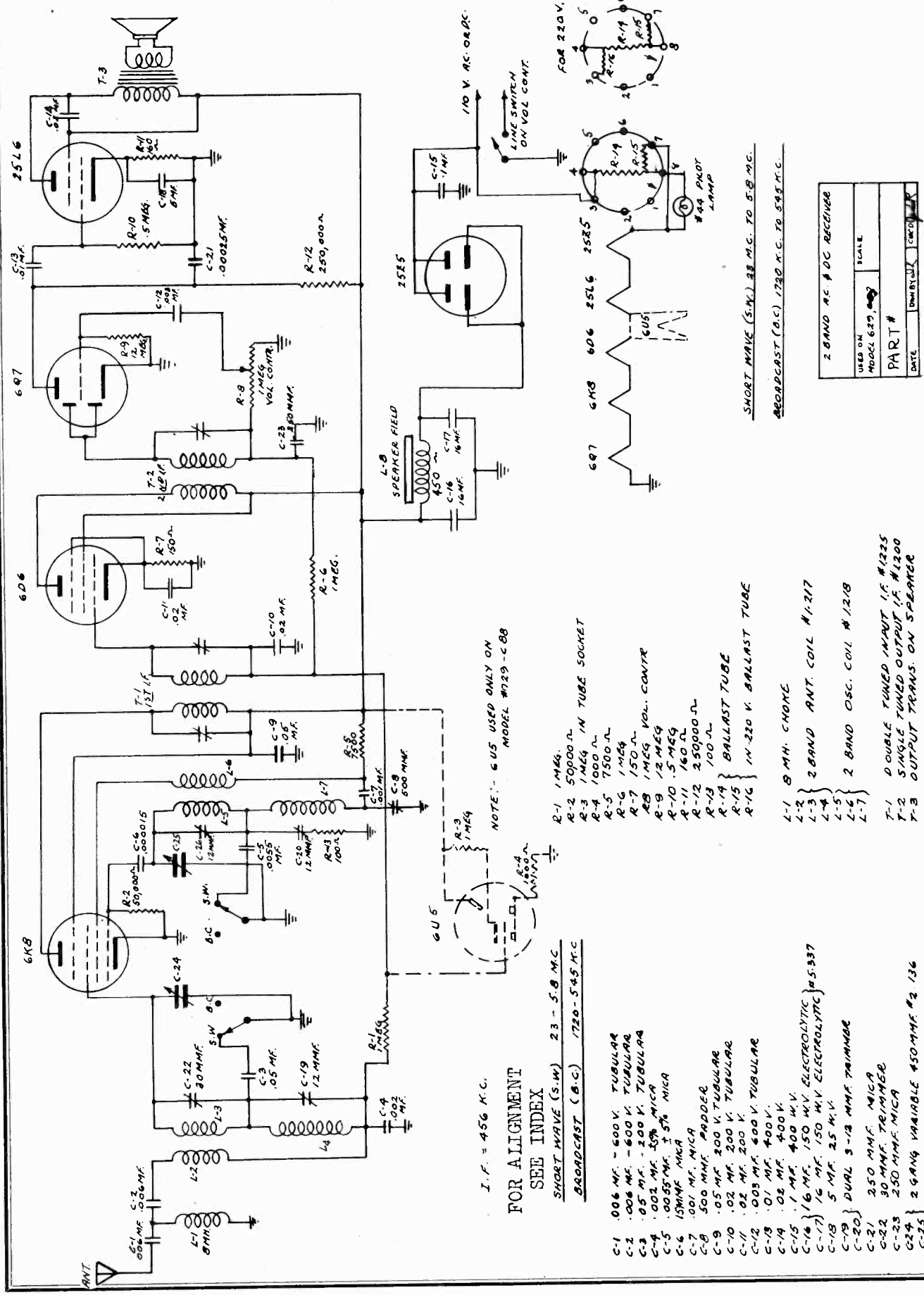
When tuning with the pushbuttons, it must be remembered that this is a mechanically driven device, depending upon pressure for proper operation. For this reason the pushbuttons must be depressed firmly, otherwise the dial may not come to the correct setting before the button is released.

If at any time it is desired to change one of the stations which is set up for automatic tuning, this may be done without disturbing the settings of the other stations. Merely set up the new station on the button which was used for the station no longer desired.



MODELS 629, 729
Schematic

GAROD RADIO CORP.



R-1 1 MEG.
R-2 50000 Ω
R-3 1 MEG IN TUBE SOCKET
R-4 1000 Ω
R-5 7500 Ω
R-6 1 MEG
R-7 150 Ω
R-8 1 MEG VOL. CONTR
R-9 .12 MEG
R-10 .5 MEG
R-11 160 Ω
R-12 250000 Ω
R-13 100 Ω
R-14 } BALLAST TUBE
R-15 } IN-220 V. BALLAST TUBE
R-16 }

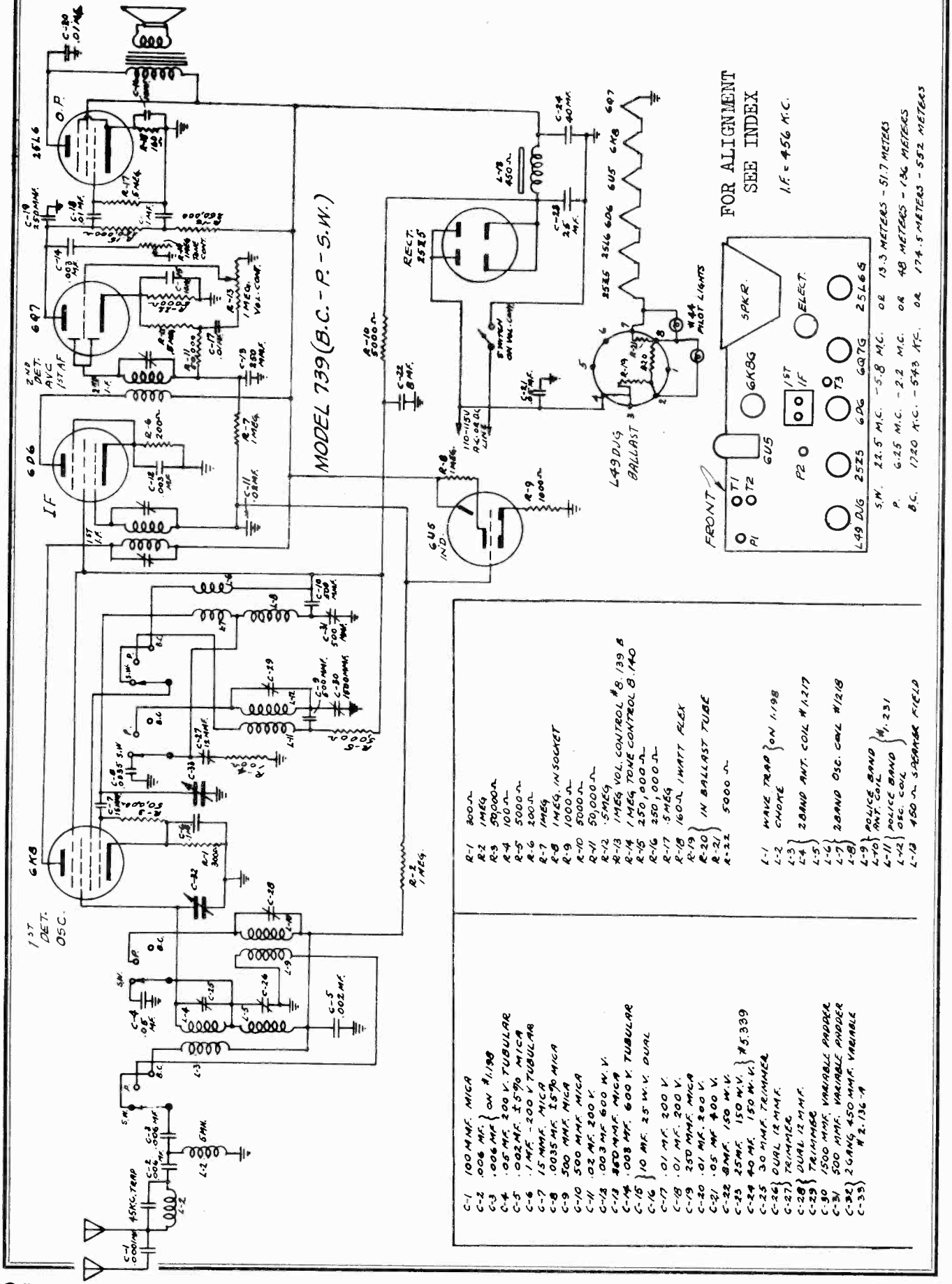
L-1 8 MH. CHOKE
L-2 } 2 BAND ANT. COIL #1217
L-3 }
L-4 }
L-5 } 2 BAND OSC. COIL #1218
L-6 }
L-7 }

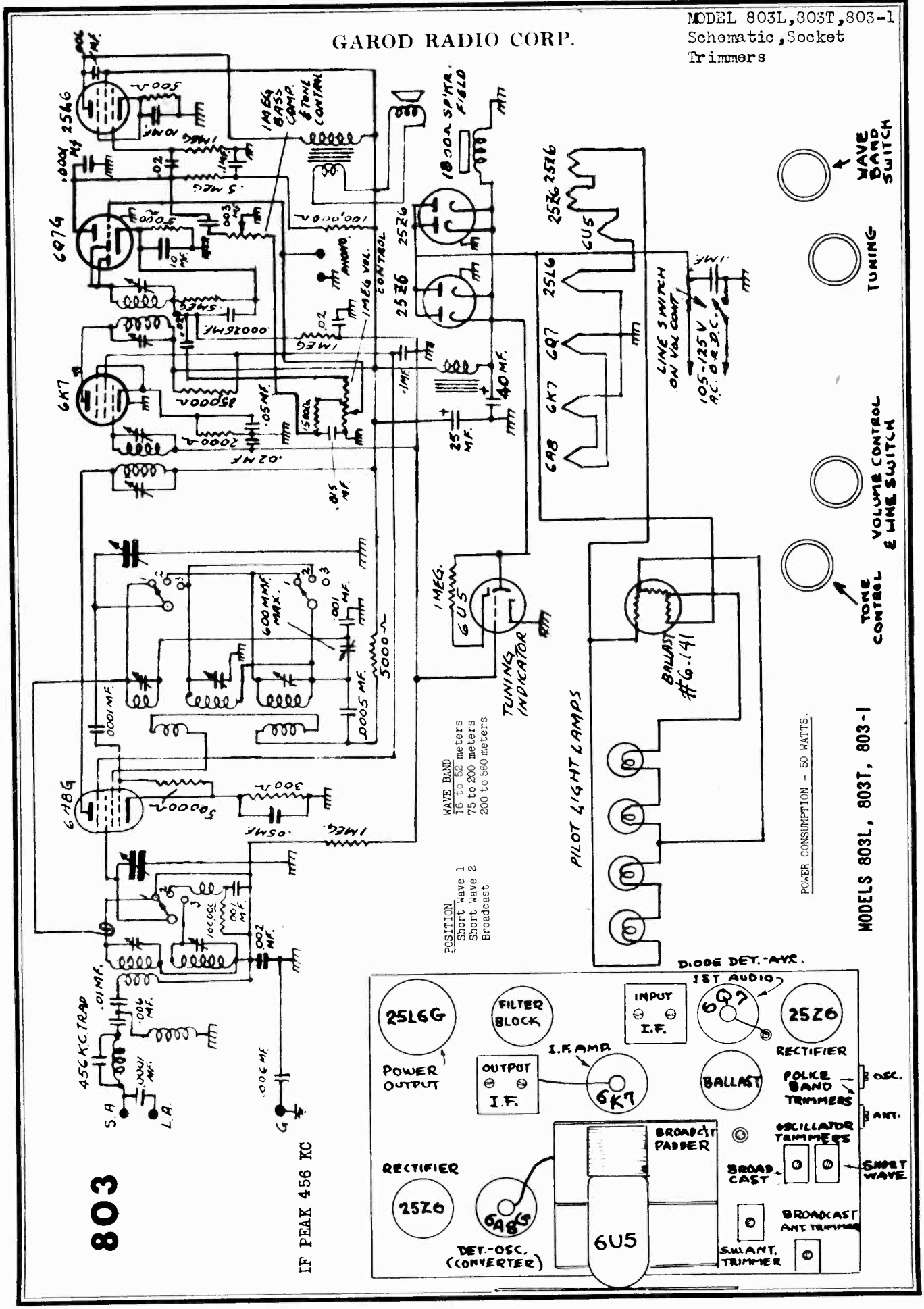
T-1 DOUBLE TUNED INPUT I.F. #1225
T-2 SINGLE TUNED OUTPUT I.F. #1200
T-3 OUTPUT TRANS. ON SPEAKER

C-1 .006 MF. - 600 V. TUBULAR
C-2 .006 MF. - 600 V. TUBULAR
C-3 .05 MF. - 200 V. TUBULAR
C-4 .002 MF. 5% MICA
C-5 .0055 MF. 5% MICA
C-6 .00015 MF. MICA
C-7 .001 MF. MICA
C-8 500 MMF. PADDER
C-9 .05 MF. 200 V. TUBULAR
C-10 .02 MF. 200 V. TUBULAR
C-11 .02 MF. 200 V.
C-12 .003 MF. 400 V. TUBULAR
C-13 .01 MF. 400 V.
C-14 .02 MF. 400 V.
C-15 .1 MF. 400 W.V.
C-16 } 16 MF. 150 W.V. ELECTROLYTIC } #5337
C-17 } 16 MF. 150 W.V. ELECTROLYTIC }
C-18 5 MF. 25 W.V.
C-19 } DUAL 3-13 MMF. TRIMMER
C-20 }
C-21 250 MMF. MICA
C-22 30 MMF. TRIMMER
C-23 250 MMF. MICA
C-24 } 2 GANG VARIABLE 450 MMF. #2136
C-25 }

MODEL 739
Schematic, Socket
Trimmers

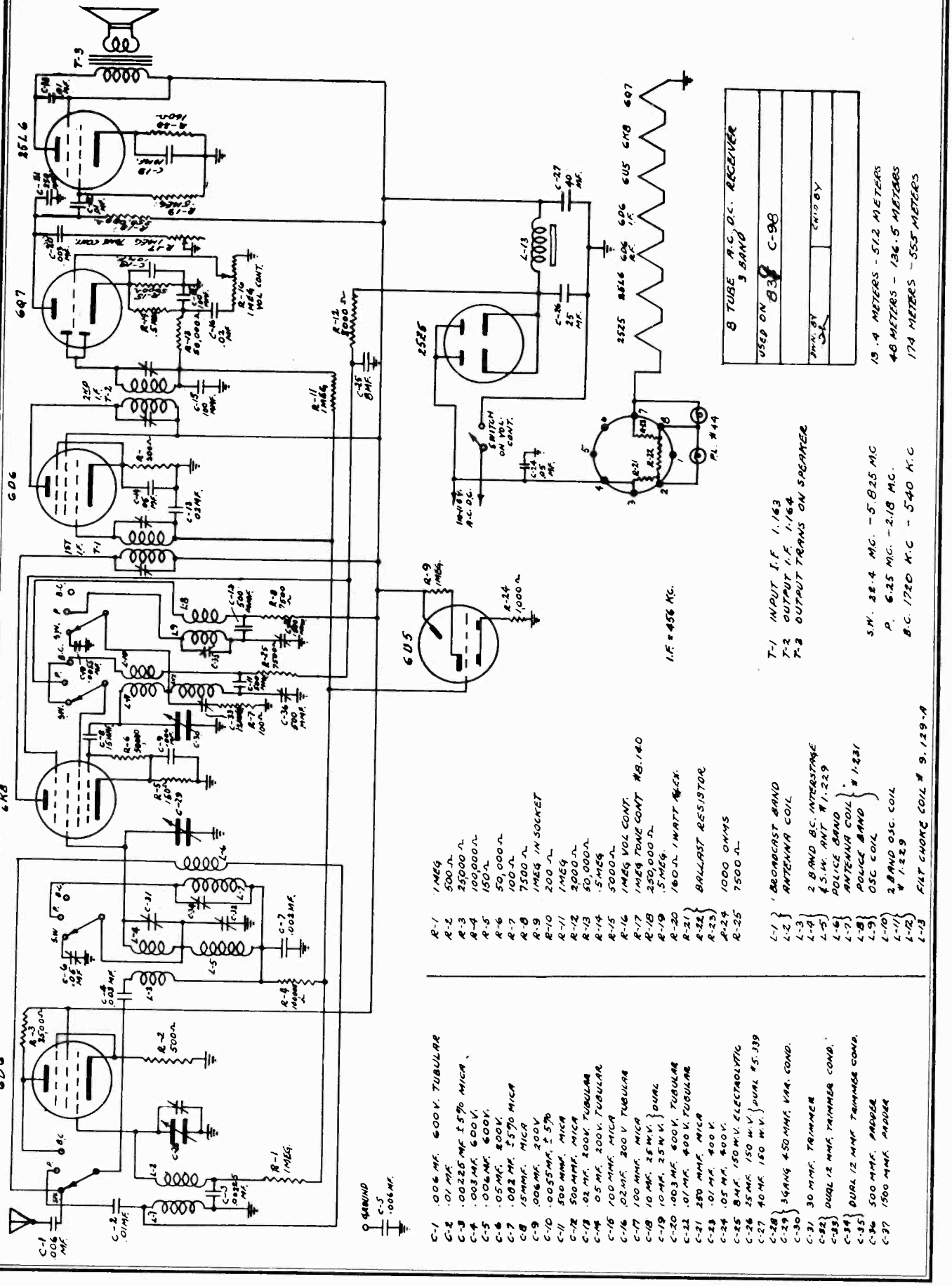
GAROD RADIO CORP.





MODEL 839
Schematic

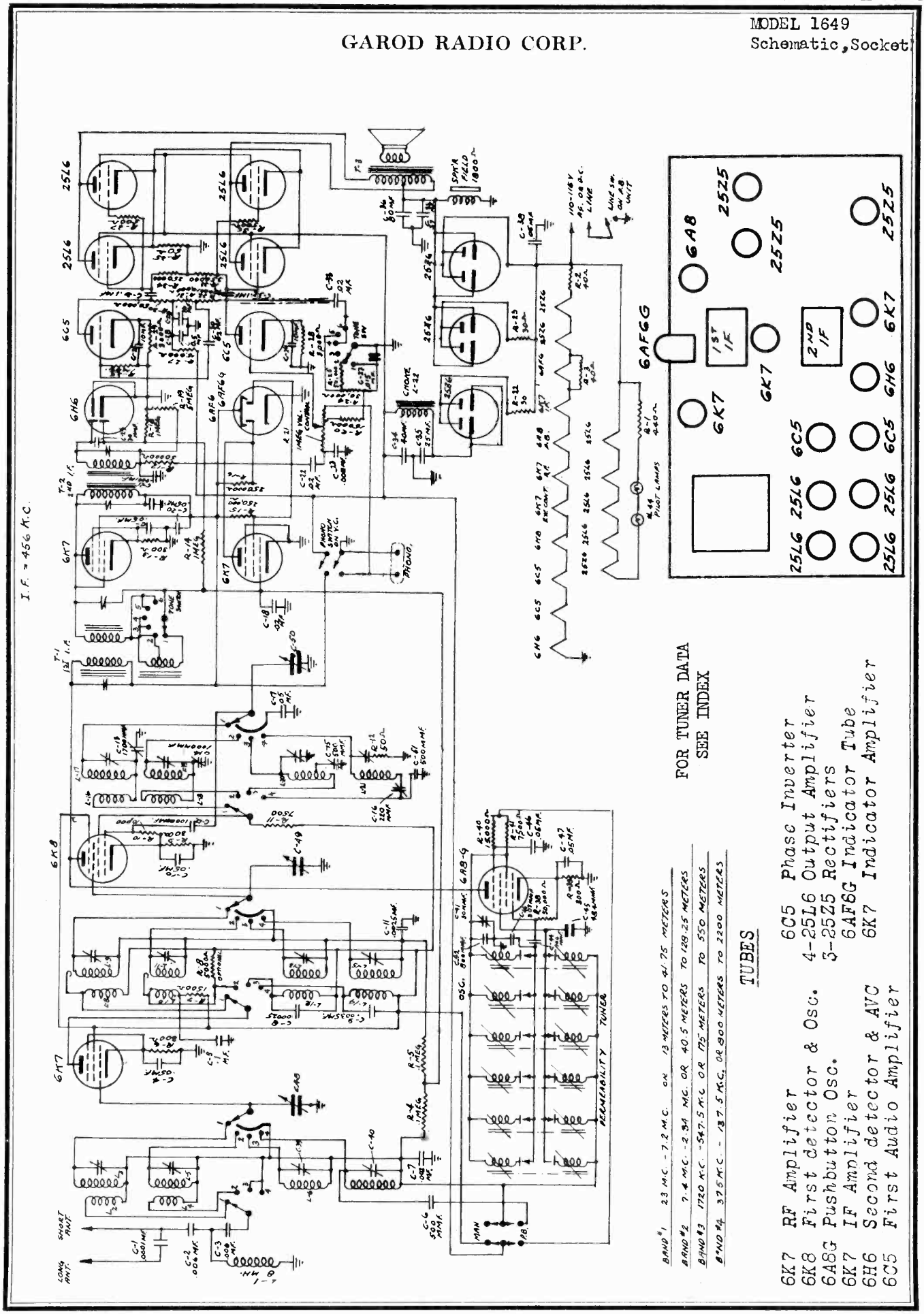
GAROD RADIO CORP.



C-1	.006 MF. 600 V. TUBULAR	R-1	1 MEG
C-2	.01 MF.	R-2	500 Ω
C-3	.00225 MF ± 5% MICA	R-3	25000 Ω
C-4	.003 MF. 600 V.	R-4	100,000 Ω
C-5	.006 MF. 600 V.	R-5	150 Ω
C-6	.05 MF. 200 V.	R-6	50,000 Ω
C-7	.002 MF. ± 5% MICA	R-7	100 Ω
C-8	15 MMF. MICA	R-8	7500 Ω
C-9	.006 MF. 200 V	R-9	1 MEG IN SOCKET
C-10	.0055 MF. ± 5%	R-10	200 Ω
C-11	500 MMF. MICA	R-11	1 MEG
C-12	500 MMF. MICA	R-12	2,000 Ω
C-13	.02 MF. 200 V. TUBULAR	R-13	50,000 Ω
C-14	.05 MF. 200 V. TUBULAR	R-14	.5 MEG
C-15	100 MMF. MICA	R-15	3000 Ω
C-16	.02 MF. 200 V TUBULAR	R-16	1 MEG VOL CONT.
C-17	100 MMF. MICA	R-17	1 MEG TONE CONT #8.140
C-18	10 MF. 25 W.V. } DUAL	R-18	250,000 Ω
C-19	10 MF. 25 W.V. }	R-19	.5 MEG.
C-20	.003 MF. 600 V. TUBULAR	R-20	160 Ω 1 WATT WIR.
C-21	.01 MF. 400 V. TUBULAR	R-21 }	BALLAST RESISTOR
C-22	250 MMF. MICA	R-22 }	
C-23	.01 MF. 400 V.	R-23 }	
C-24	.05 MF. 400 V.	R-24	1000 OHMS
C-25	8 MF. 150 W.V. ELECTROLYTIC	R-25	7500 Ω
C-26	25 MF. 150 W.V. } DUAL #5.339		
C-27	40 MF. 150 W.V. }		
C-28 }	3 GANG 450 MMF. VAR. COND.	L-1 }	BROADCAST BAND
C-29 }		L-2 }	ANTENNA COIL
C-30		L-3 }	
C-31	30 MMF. TRIMMER	L-4 }	2 BAND S.C. INTERSTAGE
C-32 }	DUAL 12 MMF. TRIMMER COND.	L-5 }	4.5 W. ANT. #1.229
C-33 }		L-6 }	POLICE BAND
C-34 }	DUAL 12 MMF. TRIMMER COND.	L-7 }	ANTENNA COIL } #1.231
C-35 }		L-8 }	POLICE BAND
C-36	500 MMF. MICA	L-9	OSC COIL
C-37	1500 MMF. MICA	L-10 }	2 BAND OSC. COIL
		L-11 }	#1.229
		L-12 }	
		L-13	FLAT CHOKE COIL # 9.129-A

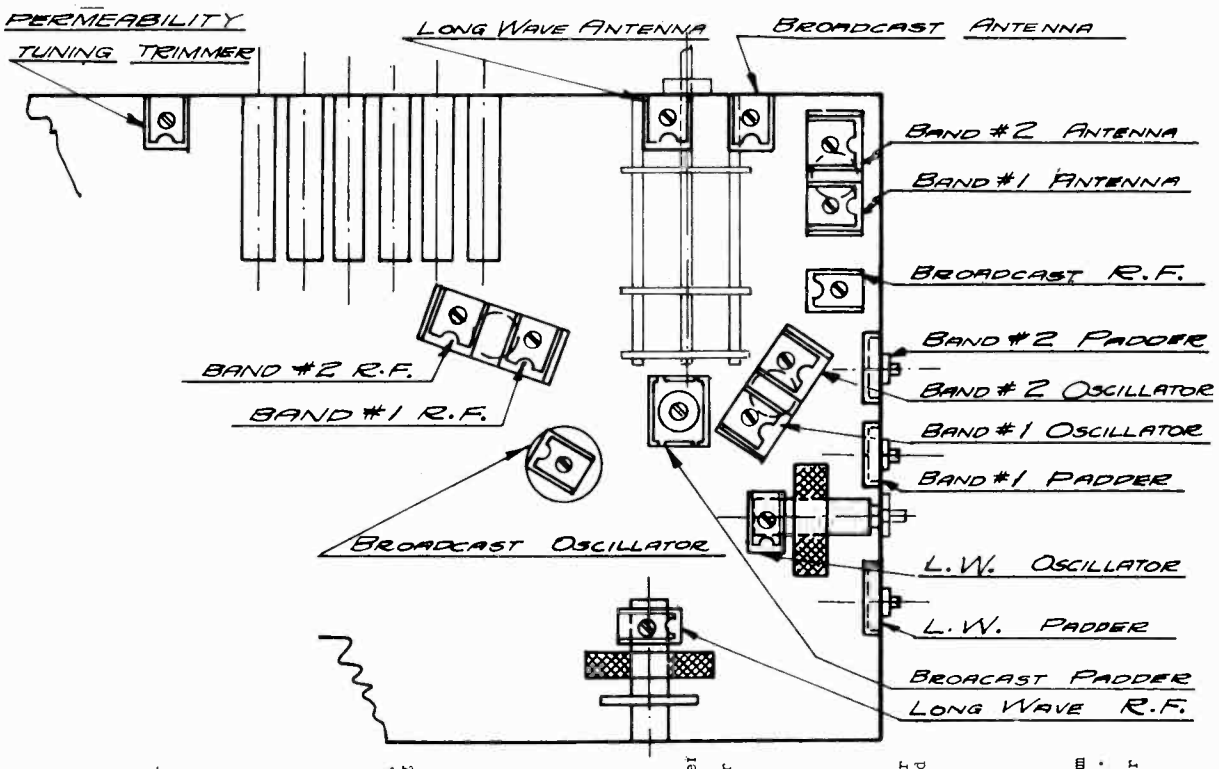
GAROD RADIO CORP.

MODEL 1649
Schematic, Socket



MODEL 1649
Alignment, Trimmers

GAROD RADIO CORP.



16 TUBE . . . 4 BAND . . . AC - DC RECEIVER

MODEL #1649 C 14

Realignment of this receiver should not be attempted unless all other possible causes of faulty operation have been thoroughly investigated. An accurately calibrated signal generator which will cover the necessary wave-bands and an output meter for indicating the effect of adjustments are required.

It is important to remember that in receivers of this kind which are equipped with automatic volume control it is necessary to use the minimum possible signal from the signal generator; otherwise the A.V.C. action will tend to nullify the variations in output as the trimmers are adjusted.

I.F. Adjustment: The signal generator is set at 456 kc and is connected through a .5 mmfd condenser to the grid of the first detector (6K8). With the band switch set on "Broadcast", the pointer set at 550 kc and the receiver volume control at its maximum position, the I.F. trimmers are adjusted for maximum output. These trimmers may be found on tops of the I.F. transformer shield cans.

Band #1 Adjustment: Turn the dial control knob so that the condenser plates are entirely out of mesh. Set the band switch to band #1. The signal generator should be connected to the short-antenna binding post through the dummy antenna consisting of a 250 mmfd mica condenser and a 400 ohm non-inductive resistor. The oscillator trimmer condenser should be opened to minimum capacity and the signal generator then set to 23 megacycles. The oscillator trimmer is then increased in capacity until maximum response is obtained. Two responses are possible and it is important that the high frequency response (oscillator trimmer low capacity) be used. The signal generator is then set to 21 MC and the variable condenser turned until a response is obtained. The pointer should coincide with the 21 MC mark on the dial. The antenna preselector and first detector trimmers are then adjusted in the order named, for maximum output. The variable condenser should be rocked slightly during this last adjustment. The signal generator is now set at 7.2 mc and the signal tuned in on the dial. The padder condenser for this band is adjusted for maximum reading of the output meter while the generator tuning condenser is rocked slightly to right and left. The high frequency adjustment should then be rechecked.

Band #2: The band selector switch is set in position for operation on short wave band #2. The variable condenser is opened so that the plates are completely unmeshed and the oscillator trimmer is opened to minimum capacity. The signal generator is set to 7.4 mc and the oscillator trimmer condenser is increased in capacity until a response is heard. Two responses are possible and it is important that the higher frequency response (oscillator trimmer low capacity be used. Set the signal generator at 7 mc and turn the tuning control until a response is indicated on the output meter. The pointer should now coincide with the 7 mc marker on the dial. The antenna preselector and first detector trimmers are then adjusted in the order named for maximum output. After high frequency adjustments have been made set the signal generator at 2.5 mc and turn the variable gang condenser until a response is observed. Adjust the padding condenser for this band for maximum gain while rocking the tuning condenser slightly to the right and the left. The higher frequency adjustment should then be rechecked.

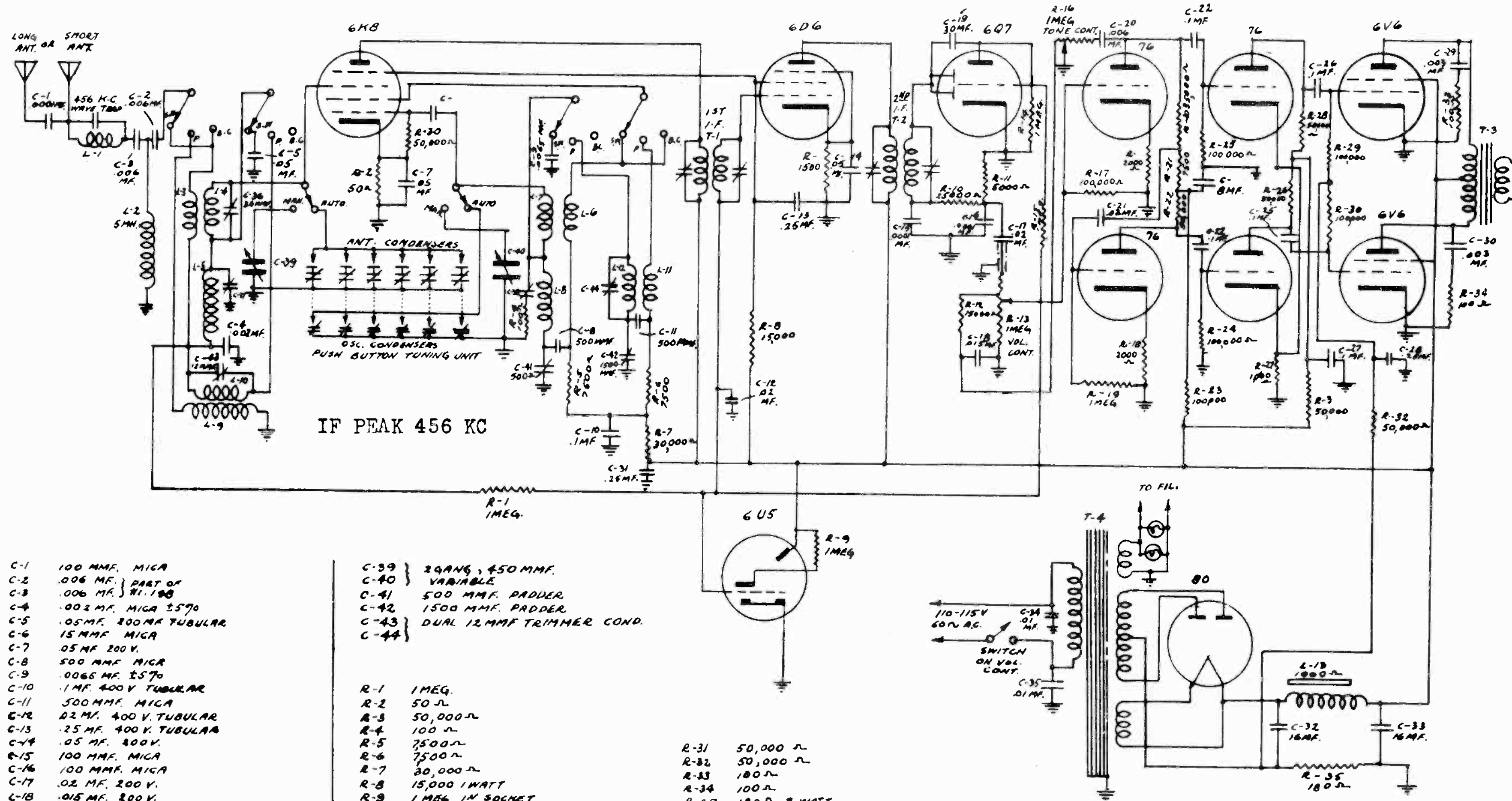
Broadcast Band: The dummy antenna for this band should consist of a 250 mmfd condenser only. The signal generator is set at 1720 kc, the band switch set at broadcast position. The variable condenser should be opened so that the plates are entirely out of mesh. The oscillator trimmer is then adjusted for maximum response on that frequency (1720kc). Set the signal generator at 1500 kc and tune the receiver until a response is indicated. The dial pointer should coincide with the 1500 kc mark on the dial. Then adjust the antenna and detector trimmers in the order indicated for maximum output. The signal generator is then set at 600 kc and the receiver tuned until a response is indicated. The padder condenser is then adjusted for maximum gain while the tuning gang condenser is rocked slightly to the left and right. The 1500 kc adjustment should then be rechecked.

Long Wave Band: The band selector switch is set in position for operation on the long wave band. The receiver and generator are both tuned to 300 kc and the oscillator trimmer is adjusted for maximum response. The antenna and first detector trimmers are adjusted in the order named for maximum output.

The signal generator is then set at 150 kc and the signal is tuned in. The long wave padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the left and right. The 300 kc adjustment should then be rechecked.

MODEL 3119
Schematic

GAROD RADIO CORP.



C-1	100 MMF. MICA	
C-2	.006 MF.	PART OF #1.198
C-3	.006 MF.	PART OF #1.198
C-4	.002 MF. MICA ±5%	
C-5	.05 MF. 200 MF TUBULAR	
C-6	15 MMF MICA	
C-7	.05 MF 200 V.	
C-8	500 MMF MICA	
C-9	.0065 MF. ±5%	
C-10	.1 MF. 400 V TUBULAR	
C-11	500 MMF. MICA	
C-12	.02 MF. 400 V. TUBULAR	
C-13	.25 MF. 400 V. TUBULAR	
C-14	.05 MF. 200 V.	
C-15	100 MMF. MICA	
C-16	100 MMF. MICA	
C-17	.02 MF. 200 V.	
C-18	.015 MF. 200 V.	
C-19	30 MMF. MICA	
C-20	.006 MF. 600 V. TUBULAR	
C-21	.02 MF 400 V. TUBULAR	
C-22	.1 MF. 400 V. TUBULAR	
C-23	.1 MF. 400 V. TUBULAR	
C-24	8 MF. 450 W.V. ELECTROLYTIC	
C-25	.1 MF. 400 V. TUBULAR	
C-26	.1 MF. 400 V. TUBULAR	
C-27	.1 MF. 400 V. TUBULAR	
C-28	.25 MF. 200 V.	
C-29	.003 MF. 600 W.V.	
C-30	.003 MF. 600 W.V.	
C-31	.25 MF. 400 W.V.	
C-32	16 MF. 450 W.V. WET ELECTROLYTIC	
C-33	16 MF. 450 W.V.	
C-34	.01 MF. 400 TUBULAR	
C-35	.01 MF. 400 TUBULAR	
C-36	30 MMF. TRIMMER	
C-37, C-38	DUAL 12 MMF. TRIMMER	
C-39, C-40	2 GANG, 450 MMF. VARIABLE	
C-41	500 MMF. PADDER	
C-42	1500 MMF. PADDER	
C-43, C-44	DUAL 12 MMF TRIMMER COND.	

R-1	1 MEG.
R-2	50 Ω
R-3	50,000 Ω
R-4	100 Ω
R-5	7500 Ω
R-6	7500 Ω
R-7	30,000 Ω
R-8	15,000 1 WATT
R-9	1 MEG IN SOCKET
R-10	25,000 Ω
R-11	.5 MEG
R-12	15000 Ω
R-13	1 MEG VOL. CONT TAP AT 175000 Ω
R-14	1 MEG
R-15	1 MEG
R-16	1 MEG TONE CONTROL
R-17	100,000 Ω
R-18	2000 Ω
R-19	1 MEG.
R-20	350,000 Ω
R-21	7,500 Ω
R-22	50,000 Ω
R-23	100,000 Ω
R-24	100,000 Ω
R-25	100,000 Ω
R-26	50,000 Ω
R-27	1000 Ω
R-28	50,000 Ω
R-29	100,000 Ω
R-30	100,000 Ω
R-31	50,000 Ω
R-32	50,000 Ω
R-33	180 Ω
R-34	100 Ω
R-35	180 Ω 3 WATT

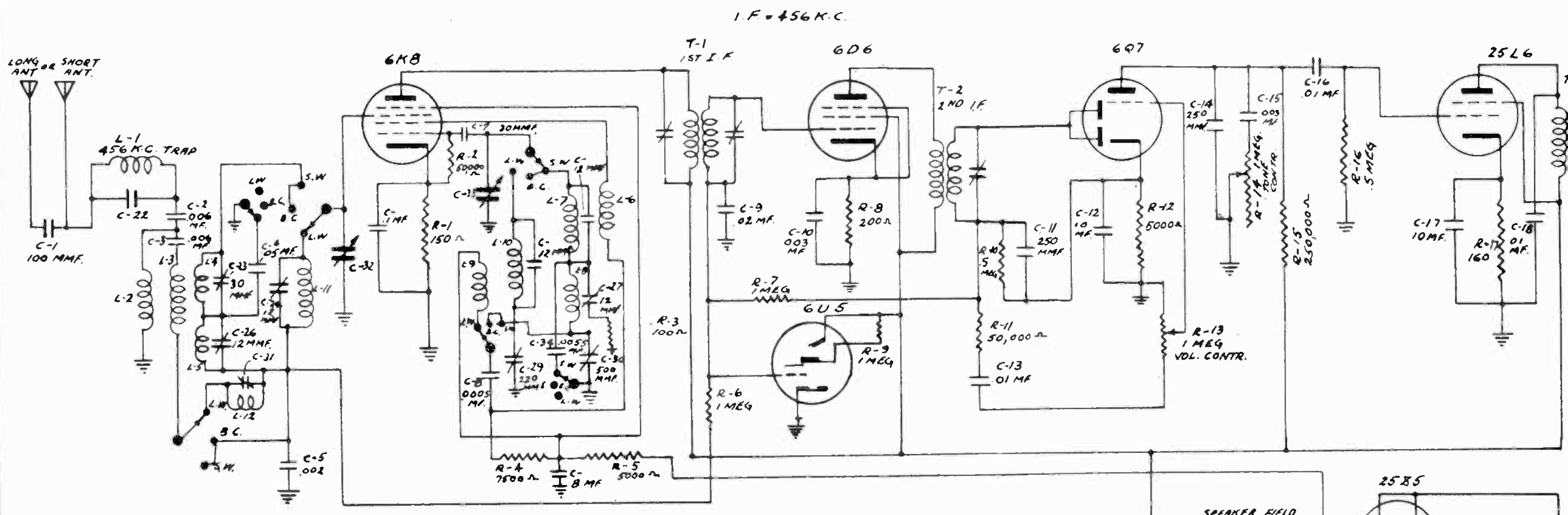
L-1	456 KC TRAP COIL	# 1.198
L-2	CHOKE	# 1.198
L-3, L-4, L-5	2 BAND ANT COIL # 1.217	
L-6, L-7, L-8	2 BAND OSC. COIL # 1.229	
L-9, L-10	POLICE BAND ANT COIL	#1.231
L-11, L-12	POLICE BAND OSC COIL	#1.231
L-13	1000 Ω SPEAKER COIL	
T-1	INPUT I.F. #1.163	
T-2	OUTPUT I.F. #1.164	
T-3	OUTPUT TRANSF. ON SPEAKER	
T-4	POWER TRANSF. 117V. #9.162	
	POWER TRANSF MULTITAP 40 ~ #9.163	

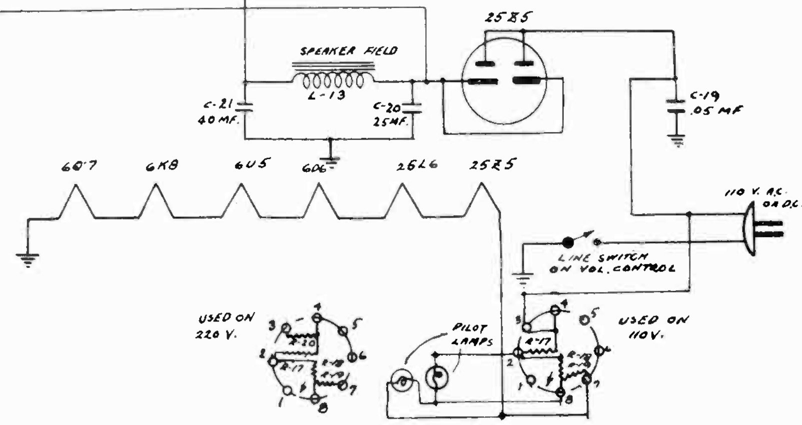
11 TUBE A.C RECEIVER 3 BAND		
USED ON 3119 C-38		
DRAWN BY J.K.	CHECKED BY	

S.W.	22.5 M.C. - 5.8 M.C.	13.3 METERS - 51.8 METERS
P.	6.25 M.C. - 2.2 M.C.	48 METERS - 136.5 METERS
B.C.	1720 K.C. - 543 K.C.	174 METERS - 552 METERS

MODEL 7390
Schematic

GAROD RADIO CORP.





C-1 100 MMF. MICA
C-2 .006 MF. } ON #1.198 WAVE TRAP
C-3 .006 MF. }
C-4 .05 MF. 200V.
C-5 .002 ± 5% MICA
C-6 .1 MF. 200 V.
C-7 30 MMF. MICA
C-8 500 MMF. MICA
C-9 .02 MF. 400V.
C-10 .003 PAPER
C-11 250 MMF. MICA
C-12 10 MF. 25 W.V. ELECTROLYTIC
C-13 .01 MF. 800 V
C-14 250 MMF. MICA
C-15 .003 600V.
C-16 .01 MF. 200V
C-17 10 MF. 25 V
C-18 .01 MF 400 V
C-19 .05 MF 400 V
C-20 25 MF 150 W.V. } #5.339
C-21 40 MF 150 W.V. }
C-22 PART OF WAVETRAP #1.198
C-23 30 MMF TRIMMER
C-24 } DUAL 12 MMF.
C-25 } TRIMMER - OPTIONAL
C-26 } DUAL 12 MMF
C-27 } TRIMMER
C-28 12 MMF. TRIMMER OPTIONAL
C-29 220 MMF. VAR. PADDER
C-30 500 MMF. VAR. PADDER
C-31 TUNES L-12 TO 1200 K.C. FOR L.W. TRAP
C-32 } VARIABLE COND 2 GANG
C-33 } 450 MMF.
C-34 .0055 MF. ± 5% MICA

R-1 150 Ω
R-2 50,000 Ω
R-3 100 Ω
R-4 7500 Ω
R-5 5,000 Ω
R-6 1 MEG
R-7 1 MEG
R-8 200 Ω
R-9 1 MEG (IN 6U5 SOCKET)
R-10 .5 MEG
R-11 50,000 Ω
R-12 5000 Ω
R-13 1 MEG VOL CONTROL
R-14 1 MEG TONE CONTROL #8.140
R-15 250,000 Ω
R-16 .5 MEG
R-17 }
R-18 } IN BALLAST TUBE
R-19 }
R-20 IN BALLAST TUBE ON 220 V.

L-1 456 K.C. TRAP (WITH C-22) #1.198
L-2 6 MH. CHOKE
L-3 }
L-4 } 2 BAND ANT. COIL #1.228
L-5 }
L-6 }
L-7 } 2 BAND OSC. COIL #1.229
L-8 }
L-9 }
L-10 } L.W. OSC. COIL #1.121
L-11 L.W. ANT. COIL #1.141
L-12 TRAP TUNED BY C-31 TO 1200 K.C. #1.142A
L-13 SPEAKER FIELD 450 Ω

T-1 D.T. INPUT I.F. #1.163
T-2 S.T. OUTPUT I.F. #1.200
T-3 OUTPUT TRANS ON SPEAKER

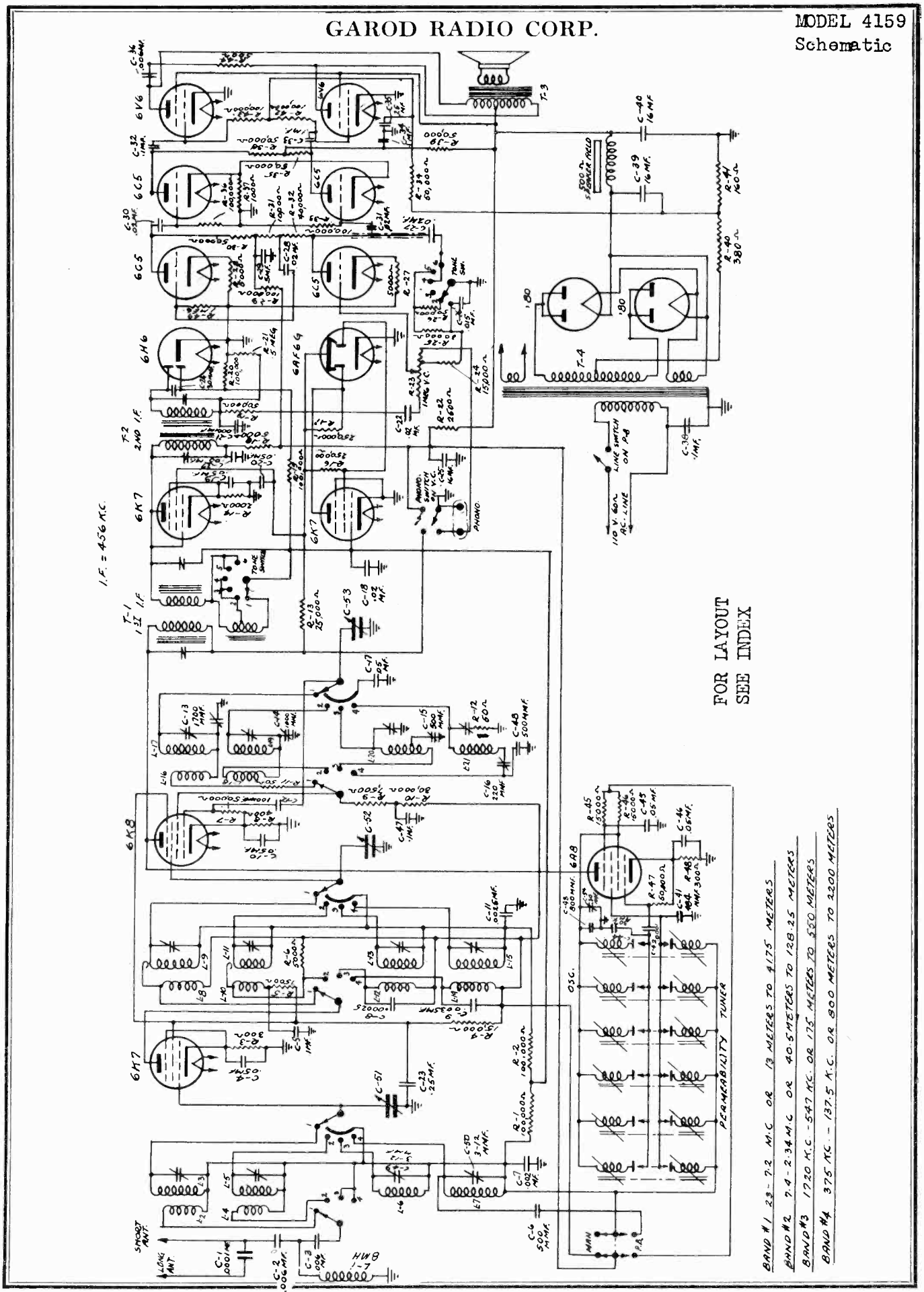
(S.W.) SHORT WAVE - 22 MC - 5.87 M.C. OR 13.6 METER - 51 METERS
(B.C.) BROADCAST 1650 K.C. - 547 K.C. OR 181 METERS TO 550 METERS
(L.W.) LONG WAVE 375 K.C. TO 144 K.C. OR 800 METERS - 2080 METERS

FOR ALIGNMENT
SEE INDEX

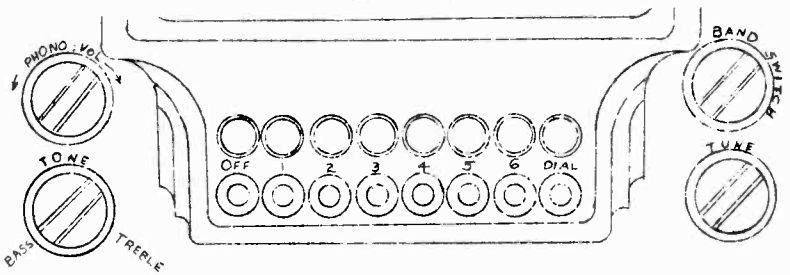
2 BAND AC. & DC. RECEIVER	
USED ON 7390 - C94	SCALE
PART #	
DWN BY QR / CHK'D [illegible] / 11-28-38	

GAROD RADIO CORP.

MODEL 4159
Schematic



PUSH BUTTON TUNING FOR MODELS 1649 & 4159



Line Voltage - 105/125 Volts
Line Frequency - 50/60 Cycles

CAUTION: ***THIS RECEIVER MUST NEVER BE USED ON VOLTAGES AND FREQUENCIES OTHER THAN THOSE GIVEN ABOVE. IF IN DOUBT ABOUT THE POWER IN USE IN YOUR LOCATION CONSULT YOUR LOCAL POWER COMPANY BEFORE PLUGGING IN THE RECEIVER.***

NOTE: *Universal models supplied with tapped transformers may be used on 117, 135, 220 and 250 volts, 40 to 60 cycles alternating current. These may be identified by the cylindrical cap on the top of the power transformer, which covers the taps for the various voltages. To set the transformer for the voltage to be used, pull off the cap and clip the flexible lead to the lug marked for the desired voltage.*

PROCEDURE FOR SETTING STATION BUTTONS

SELECTING THE STATIONS TO BE SET: Make a list of the six favorite stations which you wish to set up for automatic tuning, and arrange them in order of frequency. They should be broadcast stations capable of putting in good signal strength at your locality as shown by the deflection of the tuning eye. It is not advisable to attempt the use of these buttons for tuning weak or distant stations. Next, consult the frequency chart below, in order to determine which button should be used for each station. For convenience in operating, arrange the stations in order of frequency from high to low frequency.

FREQUENCY RANGE OF PUSHBUTTONS

1	-	955 to 1560	Kilocycles
2	-	955 to 1560	"
3	-	685 to 1125	"
4	-	685 to 1125	"
5	-	520 to 840	"
6	-	520 to 840	"

SETTING THE STATION BUTTONS: The push-button frequency adjusting screws are accessable from the front panel. Under each of the tuning buttons you will find a circular pit with a hole in the center. Looking through this hole you should be able to see the slot of a screw. This is the adjusting screw for station setting.

After deciding which station is to be set up on the first button, tune in this station on the dial, using manual tuning. This is for identification only, and does not affect the button tuning. Then press in the button which you desire to set for automatic operation, until it remains depressed; the station which was tuned in will probably disappear and a different station or none at all will be heard.

With a small screw driver slowly turn the setting screw below button 1, until the desired station, the one previously heard, is tuned in. Be sure not to tune in some other station which is broadcasting the same program. Use the tuning eye as a guide for tuning in the station accurately. During this process, you will be able to check back by pressing the dial button and listening to the original station. The method of tuning will be exactly the same as with the dial except that the screw driver is used instead of the tuning knob.

The remaining buttons may be set up in the same manner. Once the adjustments have been made, no further changes will be necessary. The station markers may now be removed from the sheets provided, and inserted in the circular depressions below the corresponding buttons. Blank tabs may be used below buttons on which stations are not set.

ALIGNMENT FOR MODEL 4159

Realignment of this receiver should not be attempted unless all other possible causes of faulty operation have been thoroughly investigated. An accurately calibrated signal generator which will cover the necessary wave-bands and an output meter for indicating the effect of adjustments are required.

It is important to remember that in receivers of this kind which are equipped with automatic volume control it is necessary to use the minimum possible signal from the signal generator; otherwise the A.V.C. action will tend to nullify the variations in output as the trimmers are adjusted.

I.F. Adjustment: The signal generator is set at 456 kc and is connected through a .5 mmfd condenser to the grid of the first detector (6K8). With the band switch set on "Broadcast", the pointer set at 550 kc and the receiver volume control at its maximum position, the I.F. trimmers are adjusted for maximum output. These trimmers may be found on tops of the I.F. transformer shield cans.

Band #1 Adjustment: Turn the dial control knob so that the condenser plates are entirely out of mesh. Set the band switch to band #1. The signal generator should be connected to the short-antenna binding post through the dummy antenna consisting of a 250 mmfd mica condenser and a 400 ohm non-inductive resistor. The oscillator trimmer condenser should be opened to minimum capacity and the signal generator then set to 23 megacycles. The oscillator trimmer is then increased in capacity until maximum response is obtained. Two responses are possible and it is important that the high frequency response (oscillator trimmer low capacity) be used. The signal generator is then set to 21 MC and the variable condenser turned until a response is obtained. The pointer should coincide with the 21 MC mark on the dial. The antenna preselector and first detector trimmers are then adjusted in the order named, for maximum output. The variable condenser should be rocked slightly during this last adjustment. The signal generator is now set at 7.2 mc and the signal tuned in on the dial. The padder condenser for this band is adjusted for maximum reading of the output meter while the generator tuning condenser is rocked slightly to right and left. The high frequency adjustment should then be rechecked.

Band #2: The band selector switch is set in position for operation on short wave band #2. The variable condenser is opened so that the plates are completely unmeshed and the oscillator trimmer is opened to minimum capacity. The signal generator is set to 7.4 mc and the oscillator trimmer condenser is increased in capacity until a response is heard. Two responses are possible and it is important that the higher frequency response (oscillator trimmer low capacity be used. Set the signal generator at 7 mc and turn the tuning control until a response is indicated on the output meter. The pointer should now coincide with the 7 mc marker on the dial. The antenna preselector and first detector trimmers are then adjusted in the order named for maximum output. After high frequency adjustments have been made set the signal generator at 2.5 mc and turn the variable gang condenser until a response is observed. Adjust the padding condenser for this band for maximum gain while rocking the tuning condenser slightly to the right and the left. The higher frequency adjustment should then be rechecked.

Broadcast Band: The dummy antenna for this band should consist of a 250 mmfd condenser only. The signal generator is set at 1720 kc, the band switch set at broadcast position. The variable condenser should be opened so that the plates are entirely out of mesh. The oscillator trimmer is then adjusted for maximum response on that frequency (1720kc). Set the signal generator at 1500 kc and tune the receiver until a response is indicated. The dial pointer should coincide with the 1500 kc mark on the dial. Then adjust the antenna and detector trimmers in the order indicated for maximum output. The signal generator is then set at 600 kc and the receiver tuned until a response is indicated. The padder condenser is then adjusted for maximum gain while the tuning gang condenser is rocked slightly to the left and right. The 1500 kc adjustment should then be rechecked.

Long Wave Band: The band selector switch is set in position for operation on the long wave band. The receiver and generator are both tuned to 300 kc and the oscillator trimmer is adjusted for maximum response. The antenna and first detector trimmers are adjusted in the order named for maximum output.

The signal generator is then set at 160 kc and the signal is tuned in. The long wave padder condenser is adjusted for maximum response while the gang tuning condenser is rocked slightly to the left and right. The 300 kc adjustment should then be rechecked.

GENERAL ELECTRIC CO.

MODEL GM11
Wireless Record Player
Schematic,
Operating Notes

SERVICE DATA

Physical Specifications

Model	GM-11
Height	8 inches
Width	15⅛ inches
Depth	13¼ inches

Electrical Specifications

115–125 volts	60 cycles* 25 watts

*Is also furnished in 50 and 25 cycle models. The operating frequency is shown on the label.

Record Player Oscillator

Frequency (Adjustable)	1400–1600 K.C.
Oscillator tube	Type 12A7

Phonograph Mechanism

Motor	Self-starting, induction
Pickup	Crystal
Impedance (pickup)	80,000 ohms at 1,000 cycles
Record capacity	Manual—10 or 12 inch
Turntable speed	78 rpm.

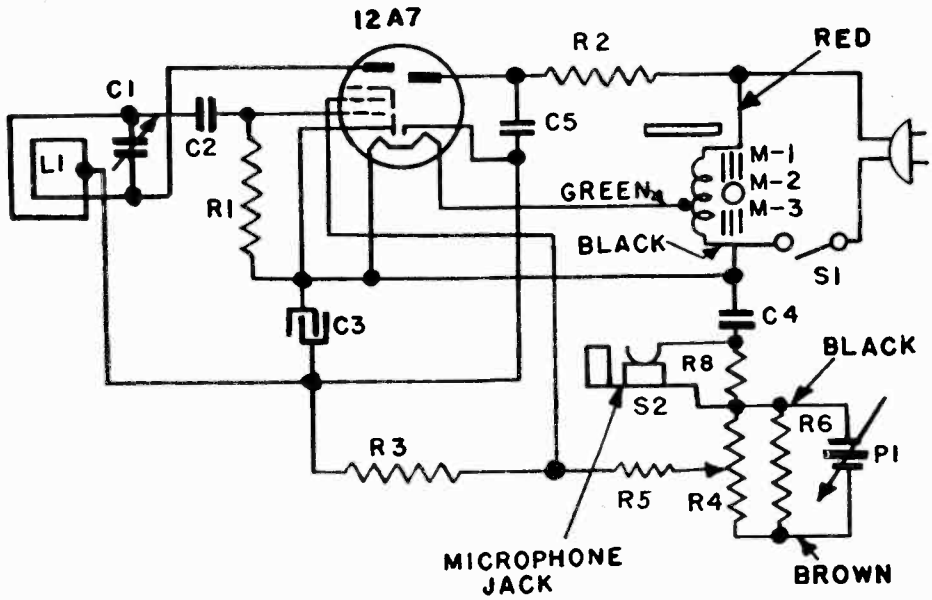
GENERAL INFORMATION

The Model GM-11 Wireless Record Player uses a Type 12A7 tube as combined rectifier and oscillator working directly from the A.C. power supply. The oscillator section of the 12A7 is modulated with audio from the phonograph recordings by means of a crystal pickup and its associated mechanism. The oscillator operates over a range of 1400–1600 kilocycles and the frequency is adjusted by the tuning trimmer (C-1). This is set at the factory to operate at 1500 K.C.

The turntable is driven at 78 revolutions per minute by a constant speed, self-starting induction motor. The motor is properly lubricated at the factory for long operation and should not require attention under normal weather conditions.

Symbol	Description
C1	160–375 mmf., padder
C2	47 mmf., mica capacitor
C3	8 mfd., dry electrolytic
C4	.02 mfd., molded capacitor
C5	.01 mfd., molded capacitor

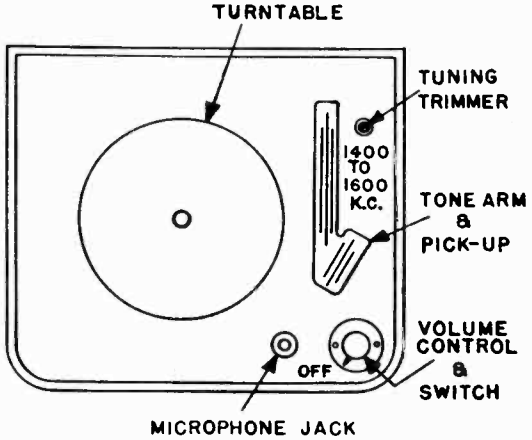
Symbol	Description
R1	470,000 ohm, carbon resistor
R2	15,000 ohm carbon resistor
R3	3.3 megohm carbon resistor
R4	Volume control, 0.5 meg.
R5	33,000 ohm carbon resistor
R6, 8	220,000 ohm carbon resistor
L1	Oscillator coil
M1, 2, 3	Phonograph motor
P1	Crystal pickup



Tuning Trimmer

This adjustment changes the frequency of the Wireless Record Player Signal. It is adjusted at the factory for approximately 1500 kilocycles and has a range of 1400–1600 kilocycles.

If the record player signal interferes with some local station (characterized by a whistle or low frequency beat note) or the receiver does not tune quite high enough to receive the record player signal, it will be necessary to adjust the tuning trimmer described in a previous paragraph. Proceed by tuning the radio to a quiet point above 1400 K.C. on the dial, then, using a small screw driver, turn the tuning trimmer until the record player is tuned to the dial setting of the receiver. Clockwise rotation of the trimmer lowers the frequency; while counterclockwise rotation raises the frequency.



Control Location

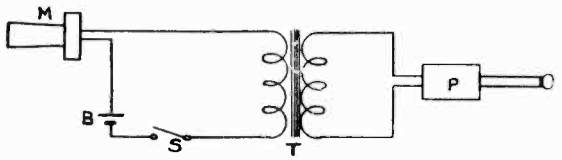
Microphone Connections

A suitable microphone (G-E No. GM-1) may be connected into the circuit of the record player by merely inserting the plug in the microphone jack (location shown in Fig. 1.)

A carbon microphone may be used provided a suitable step-up transformer is used. A suggested circuit is shown in Fig. 2.

Operating Notes

1. If a hum is noted when the pickup case is touched by the hand, merely reverse the power plug in the A.C. outlet.
2. If you are unable to receive the signal from the record player on the radio, it is possible that the oscillator tube in the record player is defective. When replacing, it is advisable to use only a General Electric Type 12A7 tube; otherwise a proper hum balance might not be obtained.
3. A microphonic feedback may be noticed if the record player is located on top or too close to the receiver when the volume is turned up. For this reason it may be desirable and more convenient to operate the record player from a nearby point.

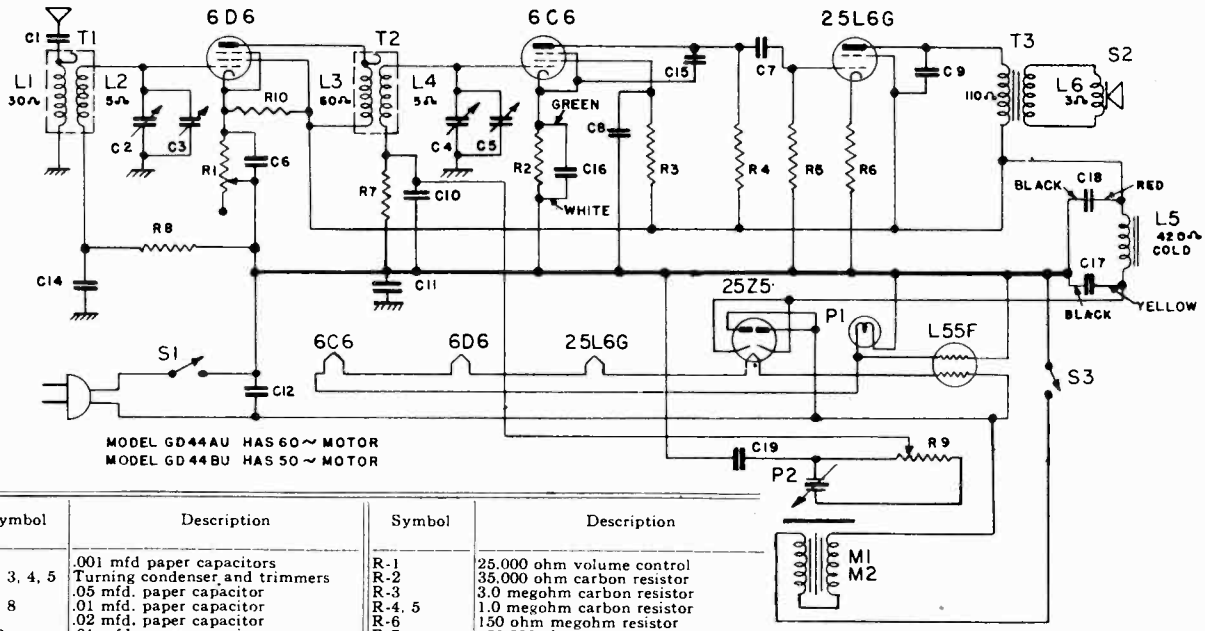


M—Carbon Microphone
B—2-volt Battery
T—Step-up Transformer
P—Telephone Plug

Fig. 2. Microphone Connections

MODELS GD44A, GD44B
GD44AU, GD44BU
Schematic, Voltage
Alignment

GENERAL ELECTRIC CO.



Symbol	Description	Symbol	Description
C-1	.001 mfd paper capacitors	R-1	25,000 ohm volume control
C-2, 3, 4, 5	Turning condenser and trimmers	R-2	35,000 ohm carbon resistor
C-6	.05 mfd. paper capacitor	R-3	3.0 megohm carbon resistor
C-7, 8	.01 mfd. paper capacitor	R-4, 5	1.0 megohm carbon resistor
C-9	.02 mfd. paper capacitor	R-6	150 ohm megohm resistor
C-10	.01 mfd. paper capacitor	R-7	150,000 ohm carbon resistor
C-11	.1 mfd. paper capacitor	R-8	500,000 ohm carbon resistor
C-12	.05 mfd. paper capacitor	R-9	100,000 ohm volume control
C-14	.01 mfd. paper capacitor	R-10	50,000 ohm carbon reistor
C-15	100 mmf. mica capacitor	S-1	Power switch
C-16	5 mfd. dry electrolytic	S-3	Motor switch
C-17	16 mfd. dry electrolytic	T-1	Antenna transformer
C-18	10 mfd. dry electrolytic	T-2	RF transformer
C-19	.01 mfd. paper capacitor	T-3	Output transformer

Tuning Frequency

Band "B" ..... 540–1800 kc.
Alignment Frequency ..... 1500 kc.

Electrical Power Output

Undistorted ..... 1.0 watt
Maximum ..... 2.0 watts

Loud-speaker—Electrodynamic

Outside Cone Diameter ..... 5 inches
Voice Coil Impedance ..... 3.5 ohms at 400 cycles
Field Coil Resistance ..... 420 ohms (cold)

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Volts)
GD-44A	105–125	60	48
GD-44B	105–125	50	48

Models GD-44A and GD-44B are compact four tube AC-DC tuned radio frequency receivers that operate in the broadcast band of frequencies. In addition they have facilities for the reproduction of phonograph recordings. Condensers are used to isolate the power supply voltage from the chassis frame.

Phonograph Mechanism

The record reproducing facilities consist of a high impedance crystal pick-up with its associated balanced tone arm connected across the grid resistor (R-7) of the 6C6 tube. When using the phonograph, the volume control (R-1) should be set at a minimum and control (R-9) used for the desired volume level.

ALIGNMENT

Connect the high side of the signal generator through a 250 mmf. condenser to the antenna lead. The low side of the signal generator output should be connected to the receiver chassis through a .05 mfd. condenser. Connect a suitable output meter across the voice coil leads; then proceed as follows:

1. With gang condenser plates completely closed, the dial pointer should coincide with the horizontal dial line.
2. Tune receiver to the 1500 kc. point on the dial; then align trimmers (C-3 and C-5) on the gang eondenser at 1500 kc. for a maximum output meter reading.

SOCKET VOLTAGES

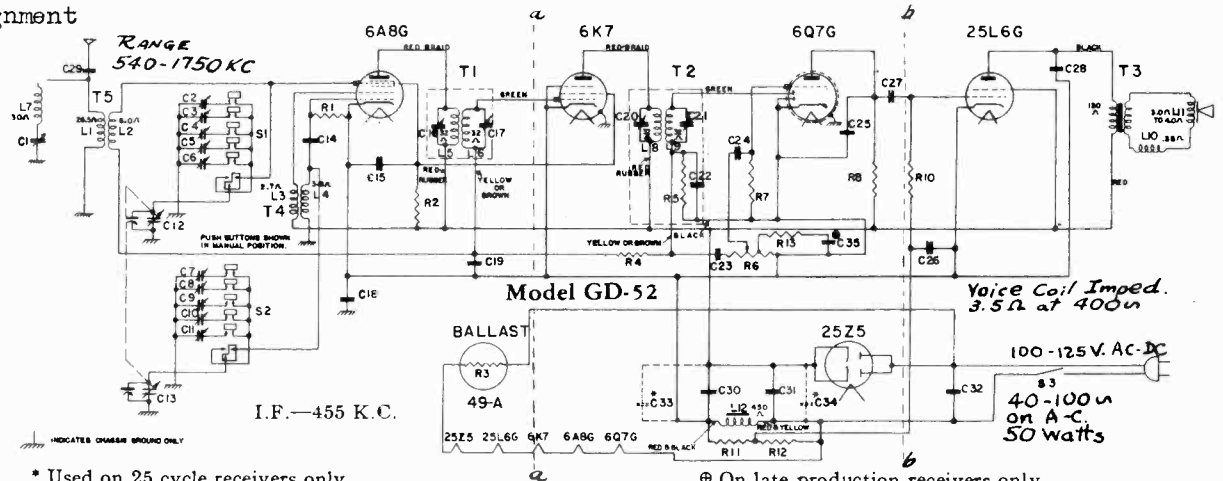
Tube No.	Plate to –B Volts D.C.		Screen to –B Volts D.C.		Cathode to –B Volts D.C.		Cathode Current M.A. D-C		Heater Volts	
	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC
6D6	113	90	113	90	9.0	7.4	0.7	0.6	6.35	6.06
6C6	20 *	16.4 *	45	37	3.1	2.5	0.1	0.08	6.35	6.06
24L6G	108	88	113	90	7.6	6.2	40.5	33.1	25.0	23.5
25Z5	...	...			133	108	43.0	35.0	26.0	24.0

Line voltage 115 AC or DC—No signal input—1000 ohms per voltmeter.
Dial pointer at 540 kc. Volume control at minimum.
* Measured on 250-volt scale.
Note—The B – is not chassis ground.

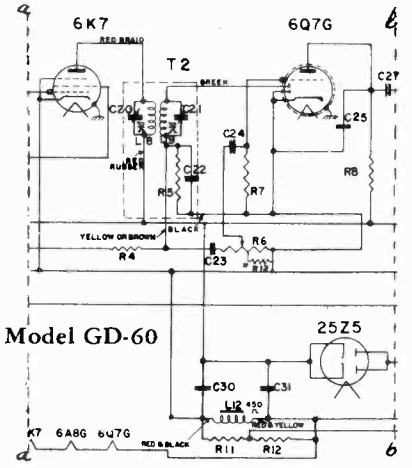
Schematics, Voltage
Socket, Trimmers
Alignment

GENERAL ELECTRIC CO.

MODEL GD52
MODEL GD60



* Used on 25 cycle receivers only.
† On early production receivers C-28 was changed to .03 mfd. capacitor.
⊕ On late production receivers only.



* Used on early production receivers only.
For replacement purposes, use specified volume control and omit resistor, R-13.

NOTE—In some receivers a 150,000 to 390,000 ohm resistor is connected across C-18.

Symbol	Description
C-1	Wave Trap Trimmer
C-2—C-6	R.F. Trimmer Strip
C-7—C-11	Osc. Trimmer Strip
C-12, C-13	Variable Condenser
C-14	Mica Capacitor, 47 Mmf.
C-15	Paper Capacitor, .25 Mfd.
C-16, C-17	1st I.F. Trimmer
C-18	Paper Capacitor, .25 Mfd.
C-19	Paper Capacitor, .05 Mfd.
C-20, C-21	2nd I.F. Trimmers
C-22	Mica Capacitor, 470 Mmf.
C-23, C-24	Paper Capacitor, .002 Mfd.
C-25	Mica Capacitor, 330 Mmf.
C-26	Paper Capacitor, .15 Mfd.
C-27, C-35	Paper Capacitor, .005 Mfd.
†C-28	Paper Capacitor, .01 Mfd.
C-29	Paper Capacitor, .001 Mfd.
C-30	Dry Electrolytic Capacitor, 12 Mfd.
C-31	Dry Electrolytic Capacitor, 20 Mfd.
C-32	Paper Capacitor, .02 Mfd.
*C-33	Dry Electrolytic Capacitor, 35 Mfd.
*C-34	Dry Electrolytic Capacitor, 15 Mfd.
R-1	Carbon Resistor, 47,000 Ohms
R-2	Carbon Resistor, 10,000 Ohms
R-3	Ballast Tube 49-A, 170 Ohms
R-4	Carbon Resistor, 2.2 Megohms
R-5	Carbon Resistor, 470,000 Ohms
R-6	Volume Control, 2.0 Megohms
R-7	Carbon Resistor, 15.0 Megohms
R-8	Carbon Resistor, 220,000 Ohms
R-10	Carbon Resistor, 470,000 Ohms
R-11	Carbon Resistor, 270,000 Ohms
R-12	Carbon Resistor, 680,000 Ohms
R-13	Carbon Resistor, 68,000 Ohms
S-1	Antenna Switch
S-2	Oscillator Switch
S-3	Power Switch
T-1	1st I.F. Transformer
T-2	2nd I.F. Transformer
T-3	Output Transformer
T-4	Oscillator Transformer
T-5	Antenna Transformer
L-10	Hum Buck Coil
L-11	Voice Coil
L-12	Field Coil—450 Ohms (cold)

Tubes

Converter and Oscillator	GE-6A8G
I.F. Amplifier	GE-6K7
Detector, AVC and Amplifier	GE-6Q7G
Power Amplifier	GE-25L6G
Rectifier	GE-25Z5
Ballast Tube	49-A

VOLTAGE CHART

Tube No.	6A8G	6K7	6Q7G	25L6G	25Z5
Plate to −B volts	115	115	55*	110	..
Screen to −B volts	75	75	..	115	..
Cathode to −B volts	0	0	0	0	115
Cathode Current MA	6.6	1.4	0.5	37	47
Filament Volts	6.0	6.0	6.1	24.5	24.0

Line Voltage—120 AC. No signal input
* Measured on 250-volt scale.
On DC, voltages are about 15 per cent lower.

When operating from a DC source of power, it is necessary to insert the power plug with proper polarity; otherwise, the receiver will fail to function. If excessive hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

GENERAL INFORMATION

GD-60, GD-52, is a compact, five-tube AC-DC superheterodyne receiver, employing five General Electric Pre-tested Tubes as described above, in a superheterodyne circuit. It incorporates a simplified trimmer tuned "Touch-Tuning" system, allowing a set up of five stations for automatic tuning. Other features of design include I.F. wave trap, automatic volume control and an improved dustproof speaker.

I.F. Alignment

Connect an output meter across the voice coil. Set the volume control for maximum.

Set test oscillator to 455 and apply signal to the control grid of the 6A8G tube through a .05 mfd. capacitor. Do not remove the grid lead from the 6A8G and keep the test oscillator output as low as possible to give a readable output. Adjust all four I.F. trimmers for maximum output.

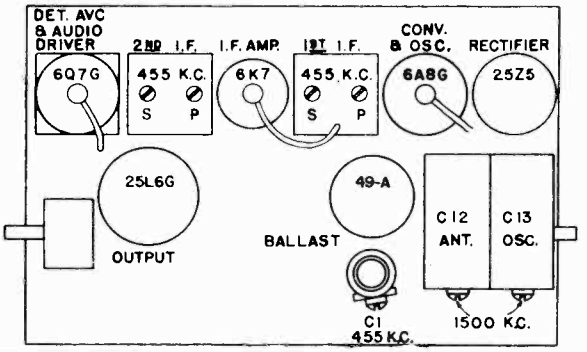
Wave Trap Alignment

Leave the test oscillator set to 455 K.C. and connect one output lead to the receiver chassis and the other through a 250 mmf. capacitor in series with 200 ohms to the receiver antenna lead. Adjust (C-1) for minimum output.

R.F. Alignment

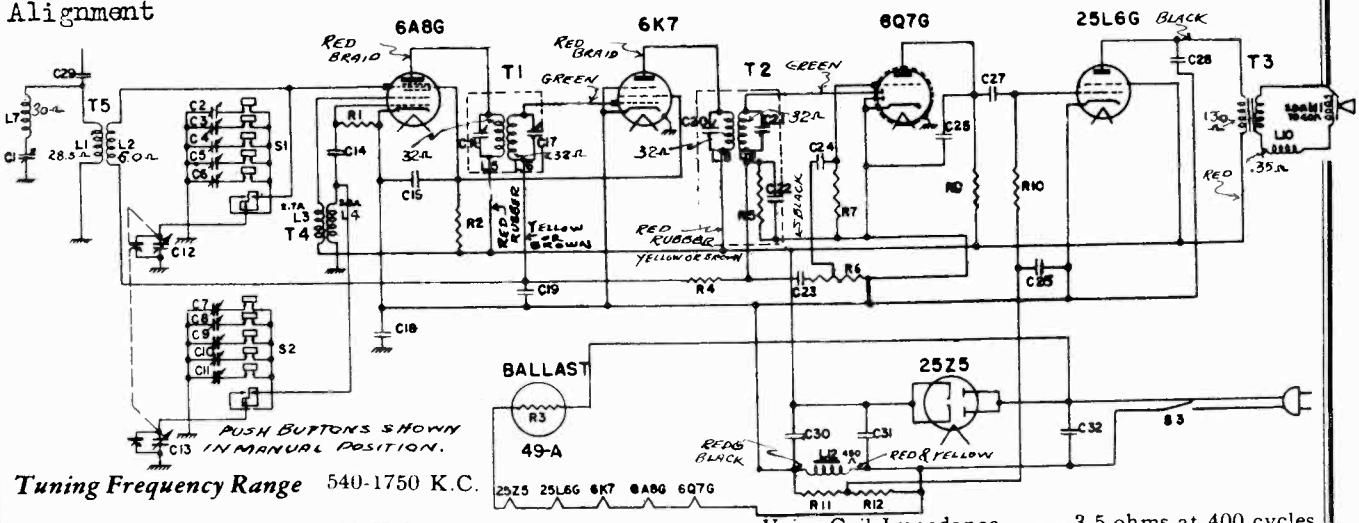
Use the same dummy antenna (250 mmf. and 200 ohms) with 1500 K.C. input, adjust the oscillator trimmer (C-13) and antenna trimmer (C-12) for a maximum output.

Precaution—One side of the power supply is connected to the chassis through a .25 mfd. capacitor. If signal generator is AC operated, connect a .05 mfd. capacitor in the ground side before connecting it to the receiver chassis.



MODEL GD52A
Schematic, Voltage
Socket, Trimmers
Alignment

GENERAL ELECTRIC CO.



Tuning Frequency Range 540-1750 K.C.

Intermediate Frequency 455 K.C.

Voice Coil Impedance.....3.5 ohms at 400 cycles
Field Coil Resistance.....450 ohms (cold)

Symbol	Description
C-1	Wave Trap Trimmer, 45-145 Mmf.
C-2	Selector Trimmer, 100-510 Mmf.
C-3	Selector Trimmer, 75-410 Mmf.
C-4	Selector Trimmer, 50-300 Mmf.
C-5	Selector Trimmer, 50-300 Mmf.
C-6	Selector Trimmer, 20-200 Mmf.
C-7	Selector Trimmer, 50-300 Mmf.
C-8	Selector Trimmer, 50-300 Mmf.
C-9	Selector Trimmer, 20-200 Mmf.
C-10	Selector Trimmer, 20-200 Mmf.
C-11	Selector Trimmer, 10-190 Mmf.
C-12	Tuning Condenser Ant.
C-13	Tuning Condenser Osc.
C-14	Mica Capacitor, 47 Mmf.
C-15	Paper Capacitor, .25 Mfd.
C-16	Trimmer Capacitor, 50-135 Mmf.
C-17	Trimmer Capacitor, 50-135 Mmf.
C-18	Paper Capacitor, .25 Mfd.
C-19	Paper Capacitor, 0.5 Mfd.
C-20	Trimmer Capacitor, 50-135 Mmf.
C-21	Trimmer Capacitor, 50-135 Mmf.
C-22	Mica Capacitor, 470 Mmf.
C-23	Paper Capacitor, .002 Mfd.
C-24	Paper Capacitor, .002 Mfd.
C-25	Mica Capacitor, 330 Mmf.
C-26	Paper Capacitor, .15 Mfd.
C-27	Paper Capacitor, .005 Mfd.
C-28	Paper Capacitor, .03 Mfd.
C-29	Paper Capacitor, .001 Mfd.
C-30	Dry Electrolytic Cap., 12 Mfd.
C-31	Dry Electrolytic Cap., 20 Mfd.
C-32	Paper Capacitor, .02 Mfd.
R-1	Carbon Resistor, 47,000 Ohms
R-2	Carbon Resistor, 10,000 Ohms
R-3	Ballast Tube 49-A, 170 Ohms
R-4	Carbon Resistor, 2.2 Megohms
R-5	Carbon Resistor, 470,000 Ohms
R-6	Volume Control, 2 Megohms
R-7	Carbon Resistor, 15 Megohms
R-8	Carbon Resistor, 220,000 Ohms
R-10	Carbon Resistor, 470,000 Ohms
R-11	Carbon Resistor, 270,000 Ohms
R-12	Carbon Resistor, 68,000 Ohms
R-13	Carbon Resistor, 68,000 Ohms
S-1	Antenna Switch
S-2	Oscillator Switch
S-3	Power Switch combined with R-6
T-1	1st I.F. Transformer
T-2	2nd I.F. Transformer
T-3	Output Transformer
T-4	Oscillator Transformer
T-5	Antenna Transformer
L-10	Hum Buck Coil
L-11	Voice Coil
L-12	Field Coil—450 Ohms (cold)

NOTE—In some receivers a 150,000 to 390,000 ohm resistor is connected across C-18.

Fig. 2. Schematic Diagram

VOLTAGE CHART

Tube No.	6A8G	6K7	6Q7G	25L6G	25Z5
Plate to −B volts	115	115	55*	110	
Screen to −B volts	75	75		115	
Cathode to −B volts	0	0	0	0	115
Cathode Current MA	6.6	1.4	0.5	37	47
Filament Volts	6.0	6.0	6.1	24.5	24.0

Line Voltage—120 AC. No signal input
* Measured on 250-volt scale.
On DC, voltages are about 15 per cent lower.

When operating from a DC source of power, it is necessary to insert the power plug with proper polarity; otherwise, the receiver will fail to function. If excessive hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F.—455 K C. Broadcast—1500
The location of all trimmers is shown in Fig. 1.

I.F. Alignment

Connect an output meter aeross the voice coil. Set the volume control for maximum.

Set test oscillator to 455 and apply signal to the control grid of the 6A8G tube through a .05 mfd. capacitor. Do not remove the grid lead from the 6A8G and keep the test oscillator output as low as possible to give a readable output. Adjust all four I.F. trimmers for maximum output.

Wave Trap Alignment

Leave the test oscillator set to 455 K.C. and connect one output lead to the receiver chassis and the other through a 250 mmf. capacitor in series with 200 ohms to the receiver antenna lead. Adjust (C-1) for minimum output.

R.F. Alignment

Use the same dummy antenna (250 mmf. and 200 ohms) with 1500 K.C. input, adjust the oscillator trimmer (C-13) and antenna trimmer (C-12) for a maximum output.

Precaution—One side of the power supply is connected to the chassis through a .25 mfd. capacitor. If signal generator is AC operated connect a .05 mfd. capacitor in the ground side before connecting it to the receiver chassis.

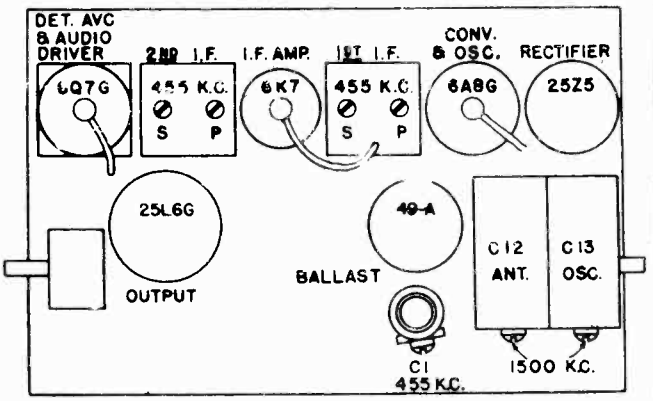
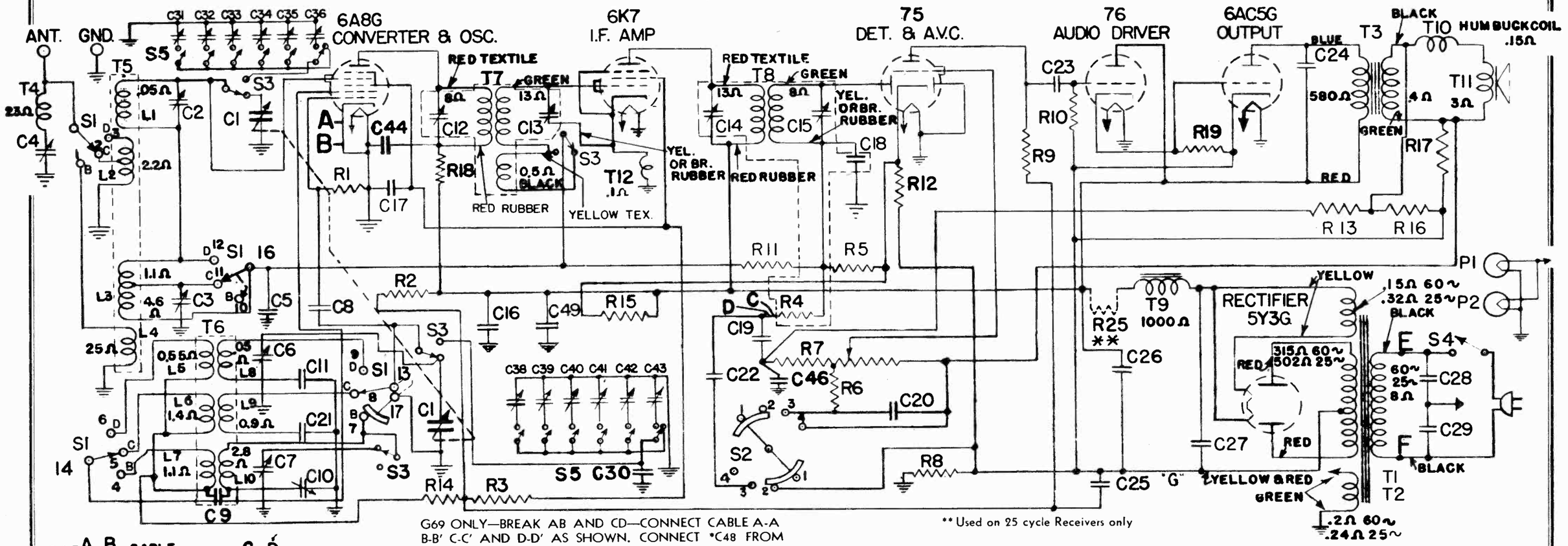


Fig. 1. Trimmer Location

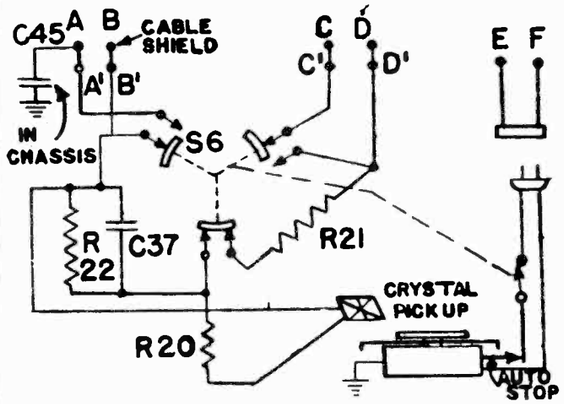
GENERAL ELECTRIC CO.

MODELS G61, G66, G68, G69
Schematic

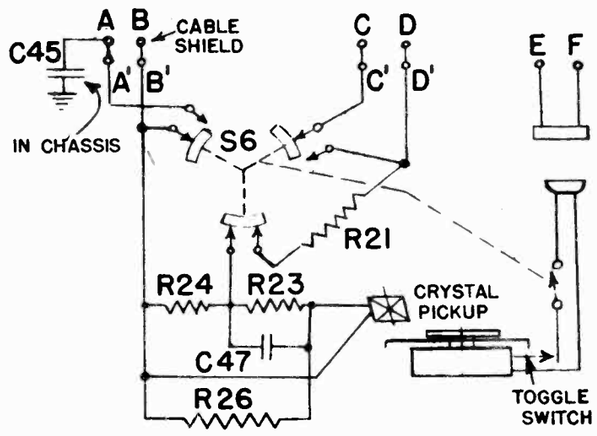


G69 ONLY—BREAK AB AND CD—CONNECT CABLE A-A B-B' C-C' AND D-D' AS SHOWN. CONNECT *C48 FROM POINT G TO GROUND.

** Used on 25 cycle Receivers only



Model G-68



Model G-69

SYMBOL	DESCRIPTION
*C1	450 mmf. tuning condenser
C2, C3, C6, C7	Ant. and Osc. trimmer capacitor
C4	Wave trap trimmer
C5	.1 mfd. paper capacitor
C8	50 mmf. mica capacitor
C9	.005 mfd. paper capacitor
C10	300–650 mmf. padder capacitor
C11	4300 mmf. mica capacitor
C16	.1 mfd. paper capacitor
C17	.05 mfd. paper capacitor
C18	47 mmf. mica capacitor
C19, C20	.003 mfd. paper capacitor
C21	1500 mmf. mica capacitor
C22	.0015 mfd. paper capacitor
C23	.005 mfd. paper capacitor
C24	.02 mfd. paper capacitor
C25, C26, C27	8 mfd., 8 mfd., 12 mfd., dry electrolytic capacitor
C28, C29	.01 mfd. line capacitor
C30	20 mmf. compensating capacitor
C31–C36	Keyboard tuning trimmers
C37	470 mmf. mica capacitor
C38–C43	Keyboard tuning trimmers
C44, C45	.05 mfd. paper capacitor
C46	100 mmf. mica capacitor
C47	820 mmf. mica capacitor
*C48	10 mfd. dry electrolytic capacitor
C49	.1 mfd. paper capacitor
R1	47,000 ohm carbon resistor

SYMBOL	DESCRIPTION
R2	6,800 ohm carbon resistor
R3	22,000 ohm carbon resistor
R4	47,000 ohm carbon resistor
R5	220,000 ohm carbon resistor
R6	180,000 ohm carbon resistor
R7	2 megohm volume control
R8	270 ohm carbon resistor
R9	220,000 ohm carbon resistor
R10	1.0 megohm carbon resistor
R11	2.2 megohm carbon resistor
R12	150 ohm carbon resistor
R13	2.2 megohm carbon resistor
R14	3300 ohm carbon resistor
R15	33,000 ohm carbon resistor
R16	47 ohm carbon resistor
R17	22 ohm carbon resistor
R18	6800 ohm carbon resistor
R19	22,000 ohm carbon resistor
R20, R21	47,000 ohm carbon resistor
R22	100,000 ohm carbon resistor
R23, R24	220,000 ohm carbon resistor
**R25	470 ohm carbon resistor
R26	220,000 ohm carbon resistor
S1	Band change switch
S2	Tone control
S6	Phono-radio switch
T1, T2	Power transformer
T3	Output transformer
T4	Wave trap coil

Fig. 2. Schematic Diagram

Loud-speaker—Electrodynamic

Model	G-61	G-66	G-68	G-69
Outside Cone Diameter	6½ in.	12 in.	12 in.	12 in.
Voice Coil Impedance	3.5 ohms at 400 cycles			
Field Coil Resistance	880 Ohms (cold)			

Phonograph

Model	G-68	G-69
Type Pick-up	Crystal	Crystal
Impedance (pick-up)	80,000 ohms at 1000 cycles	
Record Capacity	Manual	8–10 in., 7–12 in.
Turntable Speed	78 RPM	78 RPM

Electrical Power Output

Undistorted	3.0 watts
Maximum	5.0 watts

Tone Control 4-position

Intermediate Frequency ..... 455 KC

Tuning Frequency Range

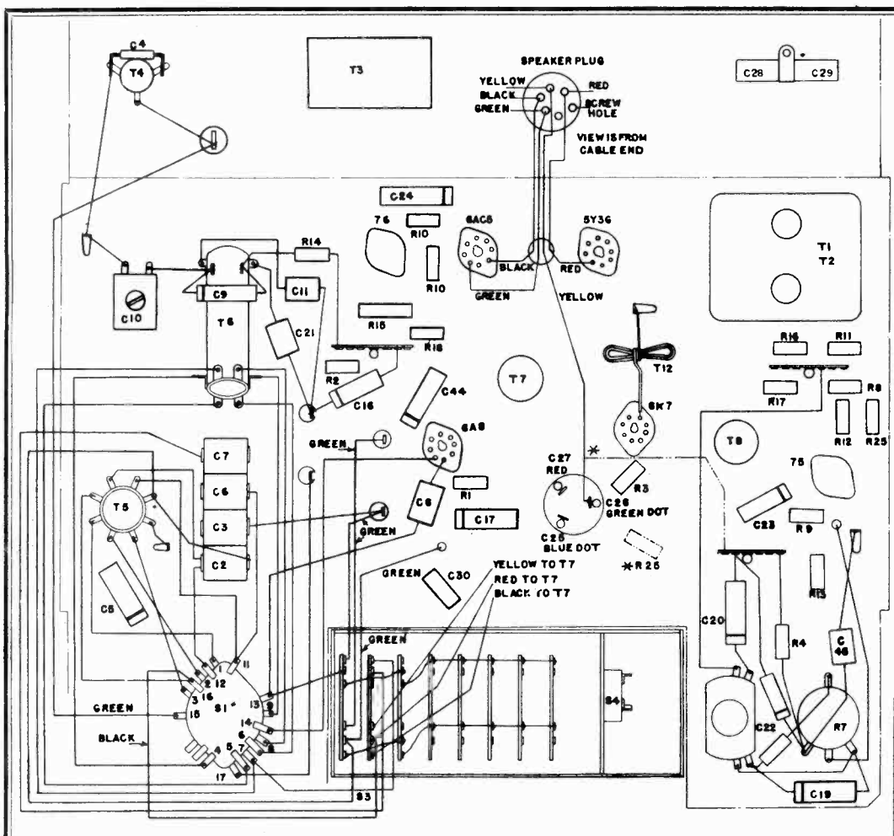
Band "B"	535– 1600 KC
Band "C"	1600– 5700 KC
Band "D"	5700–18000 KC

Models G-68 and G-69

Rating A-6	115–125 volts, 60 cycles, 95 watts
Rating A-5	115–125 volts, 50 cycles, 100 watts
Rating C-2	115–125 volts, 25 cycles, 100 watts

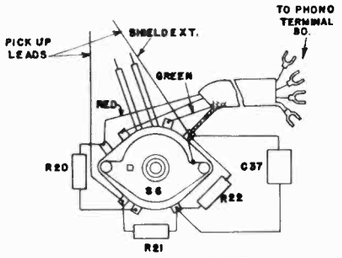
Models G-61 and G-66

Rating A	115–125 volts, 50–60 cycles, 70 watts
Rating C	115–125 volts, 25–60 cycles, 75 watts



*Used on 25-cycle receivers only

Fig. 6. Chassis Parts Layout



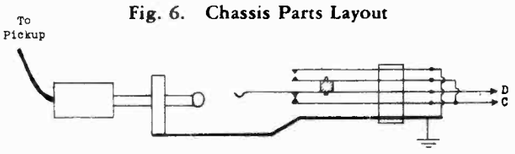
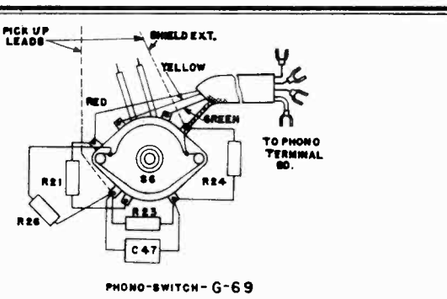


Fig. 1. Phonograph Connections



PHONO-SWITCH - G-69

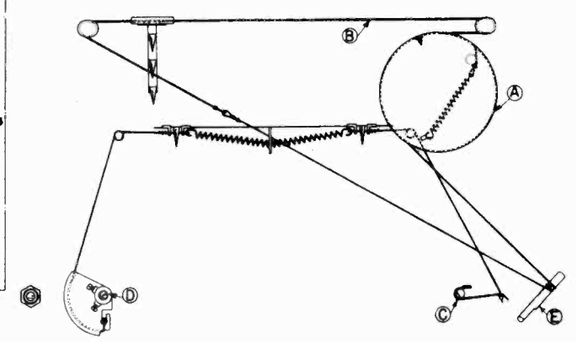


Fig. 5. Dial Mechanism

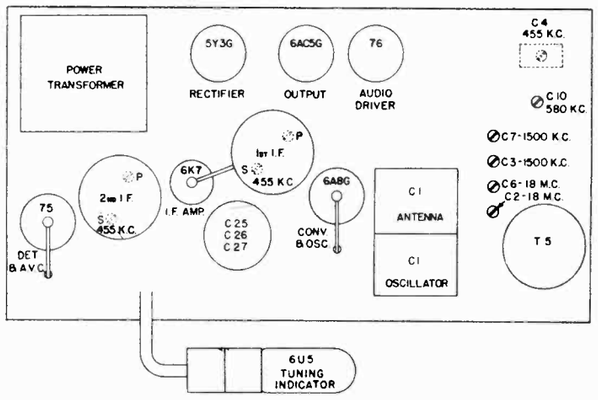


Fig. 4. Trimmer Location

ALIGNMENT PROCEDURE

I. F. ALIGNMENT WITH OSCILLOSCOPE

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	455 K.C. Sweep	I.F. Grid	.05 Mfd. or Larger.	2nd I.F. Sec. (C-15) 2nd I.F. Pri. (C-14)	Gang condenser plates closed—"manual" key depressed—connect audio input of oscilloscope to ground and to the junction of C-19 and R-4 of the 2nd. I.F. transformer. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. The resultant curve is shown in Fig. 3.
2. Band "B"	455 K.C. Sweep	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-13) 1st I.F. Pri. (C-12)	
3. Band "B"	455 K.C. Sweep	Antenna Post	250 Mmf. 200 ohms	Wave Trap Trimmer (C-4)	Adjust trimmer for minimum amplitude.

I. F. ALIGNMENT WITH OUTPUT METER

1. Band "B"	455 K.C. with Modulation	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-15) 2nd I.F. Pri. (C-14)	Gang Condenser plates closed—connect output meter across voice coil—keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.
2. Band "B"	455 K.C. with Modulation	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-13) 1st I.F. Pri. (C-12)	
3. Band "B"	455 K.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Wave Trap Trimmer (C-4)	Adjust trimmer for minimum output.

R. F. ALIGNMENT

1. Band "B"					Close gang plates—adjust pointer to first line at left end of tuning scale.
2. Band "D"	18 M.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Osc. (C-6) Ant. (C-2)	Connect output meter across voice coil—tone control on "Bass" position. The image of any "D" band signal should be heard 930 K.C. below signal input when (C-6) is on proper peak. Example: 15 M.C. image—14.09 M.C. Peak (C-2) while rocking the gang condenser.
3. Band "C"	No adjustments necessary.				
4. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Osc. (C-7) Ant. (C-3)	Peak trimmers for maximum output with a low input signal.
5. Band "B"	580 K.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Osc. Padder (C-10)	Adjust padder for maximum output in vicinity of 580 K.C. while rocking the gang condenser.
6. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Osc. (C-7) Ant. (C-3)	Retrim for maximum output with a low input signal.

SOCKET VOLTAGES

Tube No.	6A8G	6K7	75	76	6AC5G	5Y3G
Plate to Gnd. Volts	Conv. -230 Osc.-180	250	*110	250	230	310/310 RMS
Screen to Gnd. Volts	87	87	.....	.....	.....	
Cathode to Gnd. Volts	0	0	3.0	8.0	4.5	315
Cathode Current MA	11.0	7.3	1.3	6.1	33.5	70
Filament Volts	6.3	6.3	6.3	6.3	6.3	5.2

*Ac line voltage 125—no signal input. Dial pointer set at 550 KC on "B" band.

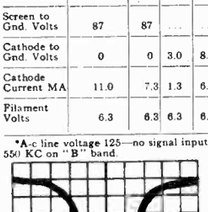


Fig. 3. Over-all I.F. curve taken on G-E Oscilloscope OFM-1

Models G-61, G-66, G-68, and G-69 are three-band AC operated receivers employing six General Electric Pre-tested tubes as described above, in a superheterodyne circuit. They incorporate a simplified trimmer tuned "Touch Tuning" system allowing a set-up of six stations for automatic tuning. Other features of design include IF wave trap, degenerative feedback and an improved dustproof electrodynamic speaker.

In addition to the above features Models G-68 and G-69 have facilities for the reproduction of phonograph recordings. Model G-68 has a manually operated phonograph mechanism, while the Model G-69 is designed to play either 10-inch or 12-inch records on one side, automatically.

Coil System

T-5 and T-6 are the antenna and oscillator transformers respectively for the "B," "C," and "D" bands. All Band Switch terminals are numbered in Fig. 2 and Fig. 6 to facilitate in service by showing common points on the schematic diagram, Fig. 2 and the pictorial wiring diagram, Fig. 6.

The following table shows the coils in use for various positions of the band change switch.

Band Switch Position	Antenna Primary	Antenna Secondary	Oscillator Grid Coil	Oscillator Plate Coil	Remarks
Band "B"	L-4	L-1+L-3	L-10	L-7	
Band "C"	Part of L-2	L-1+Part of L-3	L-9	L-6	Part of L-3 shorted. L-10 shorted
Band "D"	L-2	L-1	L-8	L-5	L-9, L-10 shorted. L-3 shorted
Automatic Tuning	L-4	L-1+L-3	L-10	L-7	C-1 removed. Tuned by fixed trimmers

Loud-speaker

12-inch speaker—To center the voice coil, remove dust cover by softening with acetone. Loosen the two clamping screws and place three 1 in. by 0.010 in. paper or celluloid strips equally spaced around pole piece for clearance—then tighten clamping screws. Remove strips and cement the dust cap back in place with Glyptal cement.

STOCK No.	DESCRIPTION	List Price
	CHASSIS ASSEMBLY	
*RB-028	BOARD—Antenna—ground terminal board	$0.10
*RB-048	BOARD—Terminal board (near T3 tube)	.15
*RB-062	BOARD—Terminal board (near power trans.)	.10
*RB-078	BOARD—Phono-terminal board	.10
RC-606	CAPACITOR—.0015 mfd., 600 V. paper (C-22)	.25
*RC-620	CAPACITOR—.003 mfd., 600 V. paper (C-23)	.25
*RC-648	CAPACITOR—.02 mfd., 600 V. paper (C-24)	.30
*RC-655	CAPACITOR—.05 mfd., 600 V. paper (C-19, C-20)	.30
*RC-662	CAPACITOR—.05 mfd., 600 V. paper (C-17, C-44, C-45)	.30
*RC-694	CAPACITOR—.1 mfd., 600 V. paper (C-5, C-18, C-49)	.30
*RC-306	CAPACITOR—50 mmf., mica (C-8)	.35
RC-216	CAPACITOR—47 mmf., mica (C-1N)	.33
RC-230	CAPACITOR—20 mmf. mica compensator (C-30)	.33
*RC-226	CAPACITOR—140 mmf. mica (C-40)	.33
RC-294	CAPACITOR—470 mmf., mica (C-37)	.33
*RC-310	CAPACITOR—220 mmf., mica (C-47)	.33
RC-346	CAPACITOR—1500 mmf., mica (C-21)	.33
RC-382	CAPACITOR—4300 mmf., mica (C-11)	.33
RC-594	CAPACITOR—8 mfd., 400 V., 8 mfd., 300 V., 12 mfd., 150 V. dry electrolytic (C-25, C-26, C-27)	1.60
RC-603	CAPACITOR—Wave trap trimmer (45-100 mmf.) (C-4)	.15
RC-617	CAPACITOR—100-650 mmf. padder (C-10)	.35
RC-677	CAPACITOR—Antenna and oscillator trimmer (C-2, C-3, C-6, C-7)	.55
RC-728	CONDENSER—3-gang tuning condenser (C-1)	2.95
*RC-755	CAPACITOR—.01-.01 mfd., 200 V. A.C. line capacitor (C-28, C-29)	.40
*RC-863	CORD—Power cord	.85
RC-3105	CAPACITOR—10 mfd., 50 volt dry electrolytic (C-48)	.50
RC-3033	CABLE—Speaker cable	.50
RC-015	GRID CLIP—Control grid clip (large) (Pkg. 5)	.05
RC-016	GRID CLIP—Control grid clip (small) (Pkg. 5)	.10
RC-027	KNOB—Control knobs wrapped (Pkg. 5)	.90
RK-028	KNOB—Control knob (plain) (Pkg. 5)	.30
RL-062	COIL—Antenna coil band B, C, and D (T-5)	1.50
RL-266	COIL—Oscillator coil band B, C, and D (T-6)	1.30
RL-803	COIL—Wave trap coil (T-4)	.60
RL-802	COIL—Neutralizing coil (T-12)	.10
RQ-711	RESISTOR—470 ohm, 1 W. carbon (R-23)	.25
RQ-780	RESISTOR—33,000 ohm, 3 W. carbon (R-15)	.15
*RQ-1218	RESISTOR—22 ohm, ½ W. carbon (R-17) (Pkg. 5)	.70
*RQ-1227	RESISTOR—47 ohm, ½ W. carbon (R-16) (Pkg. 5)	.70
*RQ-1239	RESISTOR—150 ohm, ½ W. carbon (R-13) (Pkg. 5)	.70
*RQ-1245	RESISTOR—270 ohm, ½ W. carbon (R-8) (Pkg. 5)	.70
*RQ-1271	RESISTOR—1,000 ohm, ½ W. carbon (R-14) (Pkg. 5)	.70
*RQ-1279	RESISTOR—6,800 ohm, ½ W. carbon (R-2, R-18) (Pkg. 5)	.70
RP-107	PLUG—Male speaker plug	$0.20
RS-074	SPEAKER—6½-inch speaker	3.75
*RX-030	ASSEMBLY—Speaker mounting assembly	.10
	SPEAKER ASSEMBLY (G-66, G-68, G-69)	
RC-922	CONE—12-inch cone and voice coil assembly	1.10
*RC-991	CLAMP—Cone spider clamp	.03
RD-301	DUST CAP—Speaker cone dust cap (Pkg. 5)	.20
RP-109	PLUG—Male speaker plug	.10
RS-073	SPEAKER—12-inch speaker	5.40
*RX-030	ASSEMBLY—Speaker mounting assembly	.10
	DIAL SCALE MECHANISM	
*RB-155	BRACKET—Band change bracket (C)	.03
RC-8027	CORD—Drive cord assembly (set) (E)	.25
RC-8028	CORD—Tone control cord (Pkg. 5)	.35
RC-8039	CORD—Volume control cord (Pkg. 5)	.35
RD-071	DRUM—Cord and drive drum (A)	.33
RD-072	DIAL—Dial	1.10
RD-203	DRIVE—Vernier drive bracket assembly (E)	.33
RE-026	ESCUTCHEON—Tone scale escutcheon	1.40
*RP-073	POINTER—Volume and tone control pointer (Pkg. 5)	.10
*RP-075	PULLEY—Small idler pulley (Pkg. 5)	.20
*RP-077	POINTER—Dial scale pointer (Pkg. 5)	.90
*RP-084	PULLEY—Tone control pulley (D)	.10
RR-919	REFLECTOR—Lamp reflector	.10
RS-188	SHIELD—Dial shield (cardboard) (Pkg. 10)	.10
*RS-218	SOCKET—Lamp socket assembly	.10
*RS-435	SPRING—Drive drum spring (Pkg. 5)	.10
RS-445	SPRING—Tone and volume control tension spring (Pkg. 5)	.25
RX-048	ASSEMBLY—Tuning condenser mounting assembly	.25
	PHONOGRAPH ASSEMBLY MODEL G-68	
*RA-605	ARM—Pick-up tone arm	2.30
*RC-3000	CRYSTAL—Crystal pick-up	6.00
*RC-8001	CABLE—Radio-phono shielded cable	.35
*RK-018	KNOB—Radio-phono switch knob (Pkg. 5)	.90
*RM-106	MOTOR—Motor complete, 105-125 V., 50 cy.	13.75
*RM-107	MOTOR—Motor complete, 115-125 V., 50 cy.	13.75
*RM-108	MOTOR—Motor complete, 115-125 V., 25 cy.	15.25
*RP-024	PLUG—To contact round female plug	.50
*RP-026	PLUG—Male connector plug	.10
*RS-386	SWITCH—Phono radio switch	1.10
*RS-374	SWITCH—Automatic stop and switch (complete)	1.10
*RS-839	SCREW—Needle screw	.10
*RT-903	TURNTABLE—10-inch turntable (brown velveteen)	1.75
*RX-037	ASSEMBLY—Motor mounting assembly	.20
	PHONOGRAPH ASSEMBLY MODEL G-69	
RB-165	BRACKET—Pick-up locating lever mounting bracket (3)	.30
RC-1982	CAM—Cam and gear assembly (4)	2.80

STOCK No.	DESCRIPTION	List Price
*RQ-1291	RESISTOR—22,000 ohm, ½ W. carbon (R-19) (Pkg. 5)	$0.70
*RQ-1299	RESISTOR—47,000 ohm, ½ W. carbon (R-1, R-4, R-20, R-21) (Pkg. 5)	.70
*RQ-1307	RESISTOR—100,000 ohm, ½ W. carbon (R-22) (Pkg. 5)	.70
*RQ-1313	RESISTOR—180,000 ohm, ½ W. carbon (R-6) (Pkg. 5)	.70
*RT-1318	RESISTOR—220,000 ohm, ½ W. carbon (R-5, R-9, R-23, R-24, R-26) (Pkg. 5)	.70
*RQ-1331	RESISTOR—1 megohm, ½ W. carbon (R-10) (Pkg. 5)	.70
*RQ-1339	RESISTOR—2.2 megohm, ½ W. carbon (R-11, R-15) (Pkg. 5)	.70
*RQ-1491	RESISTOR—22,000 ohm, 1 W., carbon (R-3)	.20
*RS-200	SOCKET—Tube socket (6AC5G) (Pkg. 5)	.75
*RS-204	SOCKET—Five prong octal base socket (Pkg. 5)	.75
*RS-218	SOCKET—Tube socket (76) (Pkg. 5)	.60
RS-227	SOCKET—Octal base tube socket	.15
RS-254	SOCKET—Tube socket (7H) (Pkg. 5)	.90
RS-1054	SWITCH—Band change switch (S-2)	.95
RS-1085	SWITCH—Tone control switch (S-1)	.95
RS-3077	SWITCH—Phono radio switch (G-68, G-69)	1.00
*RT-0711	TRANSFORMER—Power transformer 120 V. 25-60 cy.	7.60
RT-0616	TRANSFORMER—Power transformer 120 V. 50-60 cy.	7.60
RT-261	TRANSFORMER—1st I.F. transformer and shield	1.60
RT-262	TRANSFORMER—2nd I.F. transformer and shield	1.60
RT-434	TRANSFORMER—Output transformer (T-3)	1.70
RV-041	VOLUME CONTROL—2 meg. volume control (R-7)	.70
*RW-101	WASHER—Felt washer (Pkg. of 10)	.45
*RX-021	ASSEMBLY—Chassis mounting assembly	.10
	TOUCH TUNING ASSEMBLY	
RB-813	BUTTON—Molded push button (Pkg. 3)	.35
RC-8036	CARDS—Station letter cards (set)	.25
RC-8053	CARD—"Off" tab card (strip of 10)	.08
RC-8086	CARD—"Manual" tab card (Strip of 10)	.05
RE-029	ESCUTCHEON—Push button escutcheon	.60
RS-393	SWITCH—Push button switch (S-5)	3.80
RS-417	SPRING—Spring for push button (Pkg. 10)	.10
RT-854	TRIMMER STRIP—Oscillator trimmer strip (C-38, C-39, C-40, C-41, C-42, C-43)	1.15
RT-855	TRIMMER STRIP—Antenna trimmer strip (C-31, C-32, C-33, C-34, C-35, C-36)	1.15
RW-021	WINDOWS—Celluloid station windows (Pkg. 25)	.10
	SPEAKER ASSEMBLY (G-61)	
RC-831	CONE—6½-inch cone and voice coil assembly	.80
RD-300	DUST CAP—Speaker cone dust cap (Pkg. 5)	.10
RC-1983	CLUTCH—Trip lever friction clutch assembly (5)	$0.35
RC-1984	COUPLING—Motor coupling complete with turntable drive gear, rubber strips, motor coupling and drive arm (6)	1.80
RC-3001	CRYSTAL—Pick-up crystal cartridge and needle screw	4.25
RF-402	FINGER—Trip lever friction finger assembly (7)	.45
RG-107	GUIDE—Main lever spring guide (11)	.40
RG-500	GOVERNOR—Motor speed governor	3.05
RG-701	GEAR—Long arm and rack gear for front left-hand record post (8)	.60
RG-702	GEAR—Short arm and rack gear for front right-hand record post (9)	.55
RG-703	GEAR—Record post gear (10)	.90
RL-927	LEVER—Index lever assembly (19)	.75
RL-928	LEVER—Index lever tension spring lever (13)	.30
RL-929	LEVER—Locating lever and pawl assembly (14)	.70
RL-930	LEVER—Main lever assembly (15)	1.35
RL-931	LEVER—Pick-up lift cable lever and spring assembly (16)	.55
RL-932	LEVER—Pick-up locating lever assembly (17)	.85
RL-933	LEVER—Record separator elevating lever complete with adjustment screws (18)	.80
RL-934	LEVER—Trip detaining lever (18)	1.25
RL-935	LEVER—Trip lever assembly (20)	1.85
RL-936	LEVER—Trip regulator lever (21)	.85
RM-116	MOTOR—Phono-motor 105-125 V., 25 cy.	20.70
RM-117	MOTOR—Phono-motor 105-125 V., 50 cy.	20.50
RM-118	MOTOR—Phono-motor, 105-125 V., 60 cy.	17.75
RP-400	PAWL—Trip pawl assembly (22)	.80
RP-401	PIN—Record post drive pin (23) (Pkg. 5)	.20
RP-501	PLUG—Pick-up and arm complete	7.45
RR-922	ROLLER—Pick-up lift cable roller and bracket assembly (24)	.55
RS-452	SPRING—Cam pawl tension spring on main gear (Pkg. 5)	.20
RS-453	SPRING—Pick-up locating lever short spring (28) (Pkg. 5)	.40
RS-454	SPRING—Main lever tension spring (29)	.05
RS-455	SPRING—Pick-up locating lever long spring or index lever tension spring (30)	.05
RS-456	SPRING—Pick-up lift cable tension spring (31) (Pkg. 5)	.20
RS-457	SPRING—Record separator pressure spring (32) (Pkg. 5)	.10
RS-458	SPRING—Trip detaining lever or locating lever tension spring (33) (Pkg. 5)	.20
RS-809	SEPARATOR—Record separator knife (25)	.75
RS-810	SHELF—Record post shelf assembly (27)	1.25
RS-811	SPINDLE—Turntable spindle shaft and spring	1.40
RS-812	STRIP—Rubber strips for cable coupling (set)	.40
RS-867	SCREW—Cone pointed set screw for trip lever hub or record post shelf (Pkg. 5)	.30
RS-868	SCREW—Pick-up lift cable screw and nut (Pkg. 5)	.30
RS-869	SCREW—Special screw to adjust friction-clutch tension (Pkg. 5)	.15
RS-870	SCREW—Pick-up needle screw (Pkg. 5)	.60
RS-917	SHAFT—Record separator post shaft (26)	.40
RS-918	SHAFT—Pick-up pivot arm and shaft assembly	.45
RS-3012	SWITCH—Motor toggle switch	.90
RT-907	TURNTABLE—Turntable assembly, less spindle	3.35
RW-111	WASHER—Turntable thrust washers (1 steel, 1 bronze, 1 felt)	.15

* Used on previous receivers.

(Prices subject to change without notice)

GENERAL ELECTRIC CO.

MODEL G69
Automatic Record
Changer Data

AUTOMATIC RECORD CHANGER (G-69)

General Information

Before servicing the automatic record changer, inspect the assembly to see that all levers, parts, gears, springs, etc., are in good order and are correctly assembled.

A bind or jam in the mechanism can usually be relieved by rotating the turntable in the reverse direction.

The changer can be conveniently rotated through its change cycle by pushing the index lever to "Reject" and revolving the turntable by hand. Six turntable revolutions are required for one change cycle.

The turntable, spindle, and pinion gear are assembled by means of a 3/32 inch straight pin. This pin may be removed by gently driving with a standard pin punch.

If the record changer or cabinet is not perfectly level, normal operation is likely to be affected.

Adjustments

A. Main Lever—This lever is basically important in that it interlinks the various individual mechanisms which control needle landing, tripping, record separation, etc. One adjustment is provided for the main lever. Rotate the turntable until the changer is out-of-cycle; and adjust rubber bumper bracket (A) so that the roller clears the nose of the cam plate by 1/16 inch.

B. Friction Clutch.—The motion of the tone arm toward the center of the record is transmitted to the trip pawl "22" by the trip lever "7" through a friction clutch "5." If the motion of the pick-up is abruptly accelerated or becomes irregular due to swinging in the eccentric groove, the trip finger "7" moves the trip pawl "22" into engagement with the pawl on the main gear, and the change cycle is started. Proper adjustment of the friction clutch "5" occurs when movement of the tone arm causes positive movement of the trip pawl "22" without tendency of the clutch to slip. The friction should be just enough to prevent slippage, and is adjustable by means of screw "B." If adjustment is too tight, the needle will repeat grooves; if too loose, tripping will not occur at the end of the record.

C. Pick-up Lift Cable Screw.—During the record change cycle, lever "16" is actuated by the main lever "15" so as to raise the tone arm clear of the record by means of the pick-up lift cable. To adjust pick-up for proper elevation, stop the changer "in-cycle" at the point where pick-up is raised to the maximum height above turntable plate, and has not moved outward; at this point adjust locknuts "C" to obtain 1 inch spacing between needle point and turntable top surface.

D. & E. Needle Landing on Record.—The relation of coupling between the tone arm vertical shaft and lever "20" determines the landing position of the needle on a 10-inch record. Position of eccentric stud "E" governs the landing of the needle on a 12-inch record; this, however, is dependent on the proper 10-inch adjustment.

To adjust for needle landing, place 10-inch record on turntable; push index lever to reject position and return to the 10-inch position; see that pick-up locating lever "17" is tilted fully toward turntable; rotate mechanism through cycle until needle is just ready to land on the record; then see that pin "V" on lever "14" is in contact with "Step T" on lever "17." The correct point of landing is 4-11/16 inches from the nearest side of the turntable spindle; loosen the two screws "D" and adjust horizontal position of tone arm to proper dimension, being careful not to disturb levers "14" and "17." Leave approximately 1/32 inch end play between hub of lever "20" and pick-up base bearing, and tighten the blunt nose screw "D"; run mechanism through several cycles as a check, then tighten cone-pointed screw "D."

After adjusting for needle landing on a 10-inch record, place 12-inch record on turntable; push index lever to reject and return to 12-inch position; rotate mechanism through cycle until needle is just ready to land on the record; the correct point of landing is 5-11/16 inches from nearest side of spindle. If the landing is incorrect, turn stud "E" until the eccentric end adjusts lever "14" to give correct needle landing. The eccentric end of the stud must always be toward the rear of the motor board, otherwise incorrect landing may occur with 10-inch records.

F. & G. Record Separating Knife.—The upper plate (knife) "25" on each of the record posts serves to separate the lower record from the stack and to support the remaining records during the change cycle. It is essential that the spacing between the knife and the rotating record shelf "27" be accurately maintained. The spacing for the 10-inch record is nominally .065 inch, and for the 12-inch record is .075 inch.

To adjust, rotate the knife to the point of minimum vertical separation from the record shelf and turn screw and locknut "F" to give .052—.058 inch separation. Screw "G" must not be depressed during this adjustment. After setting screw "F" adjust screw "G" so that when its tip is depressed flush with top of record shelf, the vertical spacing between the knife, in its lowest rotational position, and the shelf, is .072—.078 inch.

H. Record Support Shelf.—The record shelf revolves during the change cycle to allow the lower record to drop onto the turntable. Both posts are rotated simultaneously by a gear and rack coupled to the main lever "15," and it is necessary that adjustments be such that the record is released from both shelves at the same instant. To adjust, place a 12-inch record on the turntable, rotate mechanism into cycle to the point where tone arm is at maximum distance outward from turntable; lift record upward until it is in contact with both separating knives, then loosen screws "H" and shift record shelves so that the curved inner edges of the shelves are uniformly spaced at least 1/16 inch from record edge. Tighten the blunt nose screw "H," run mechanism through cycle several times to check action, then tighten cone-pointed screw "H."

If record shelves or knives are bent, or not perfectly horizontal improper operation and jamming of mechanism will occur.

J. Tone Arm Rest Support (not shown).—When the changer is out-of-cycle, the front lower edge of the pick-up head should be 5/16 inch above surface of motor board. This may be adjusted by bending the tone arm support bracket, which is associated with the tone arm mounting base, in the required direction.

K. Trip Pawl Stop Pin.—The position of the trip pawl stop pin "K" in relation to the main lever "15" governs the point at which the roller enters the cam. By bending the pin support either toward or away from trip pawl bearing stud, the roller can be made to enter the cam later or earlier, respectively. This adjustment should be made so that the roller definitely clears the cam outer guide as well as the nose of the cam plate.

Lubrication.—Petrolatum or petroleum jelly should be applied to cam, main gear, spindle pinion gear, and gears of record posts.

Light machine oil should be used in the tone arm vertical bearing, record post bearings, and all other bearings of various levers on underside of motor board.

The felt washer between the turntable and spindle bearing should be soaked in light engine oil whenever the turntable is removed, or as required for proper operation.

Do not allow oil or grease to come in contact with rubber mounting of tone arm base, rubber bumper, or flexible coupling of drive motor.

Miscellaneous Service Hints

Incorrect adjustment of a particular mechanism of the changer is generally exhibited in a specific mode of improper operation. The following relations between effects on operation and the usual misadjustments will enable ready adjustment in most cases.

1. For any irregularity of operation, the adjustment of the main lever "15" should be checked first as in "A."
2. Needle does not land properly on both 10- and 12-inch records—Make complete adjustments "D" and "E."
3. Needle does not land properly on 12-inch record but correct on 10-inch—Effect adjustment "E."
4. Failure to trip at end of record—Increase clutch "5" friction by means of screw "B." Also, see that levers "7" and "12" are free to move without touching each other.
5. Pick-up strikes lower record of stack or drags across top record on turntable—Adjust lift cable per adjustment "C."
6. Needle does not track after landing—Friction clutch "5" adjustment "B" may be too tight; bind in tone arm vertical bearing; levers "7" and "12" fouled; or pick-up output cable twisted.
7. Cycle commences before record is complete—Record is defective, or adjustment "B" of friction clutch "5" is too tight.
8. Wow in record reproduction—Record is defective; flexible coupling between motor and changer mechanism not correctly assembled; or instrument is not being operated at normal room temperature (65° F).
9. Record knives strike edge of records—Records warped; record edges are rough; or knife adjustments "F" and "G" are incorrect.
10. Record not released properly—Adjust record shelf assemblies in respect to shaft by means of adjustment "H."
11. Needle lands in 10 inch position on 12 inch record—Increase tension of pick-up locating lever spring "30"

MODELS G61,G66,G68,G69
Phono.Connections,Motor
Data,Assembly of Changer

GENERAL ELECTRIC CO.

PHONOGRAPH MECHANISM (G-68)

Motor Adjustments

The speed of the turntable is controlled by a governor which allows correct adjustment of the turntable rotation to 78 revolutions per minute. The speed may be checked by placing a piece of paper under a record and counting the number of revolutions in a minute while the record is being played. If adjustment is necessary lift up the turntable and the speed regulator setscrew will be found adjacent to the turntable hub of the motor. Clockwise rotation of this setscrew reduces speed.

The motor bearings and gears are properly lubricated for long operation under normal weather conditions. If the motor chatters or runs unevenly, place a few drops of light machine oil on the governor felt.

Trip Mechanism

The trip mechanism is of simple design and consists of a latch bar connected to the motor switch and a trip lever. The latch is held closed by means of a spring between the latch bar and the trip lever. The motor switch is mechanically connected to the latch bar so that when the trip mechanism is released the motor switch is in the "off" position. Be sure this latch bar mechanism works freely without binding.

The trip is actuated by an adjustable arm on the trip lever. When the eccentric groove in the record swings the tone arm back and forth, it pushes the latch out of engagement.

Phonograph Connections (G-61 and G-66)

Fig. 1 shows a simple sketch for connecting a crystal or high impedance magnetic pick-up into the G-61 or G-66 circuit for the reproduction of phonograph recordings. This method uses a two circuit jack and is connected into the receiver by opening the circuit at C-D at the output of the 2nd IF transformer; and connecting the jack terminals as shown. A telephone plug is attached to the pick-up leads; and for phonograph operation, it is merely necessary to insert this plug into the jack. The jack may be mounted on the rear chassis deck and all connecting leads should be well shielded.

When the pick-up is connected as suggested, the regular radio volume and tone controls work for both radio and phonograph reproduction.

NOTE.—A suitable load consisting of a 300,000 ohm resistor should be connected across the pick-up leads when using a crystal type unit.

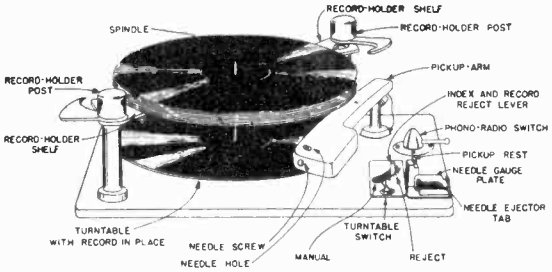
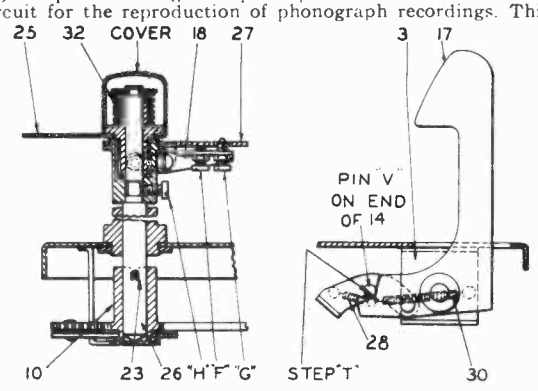
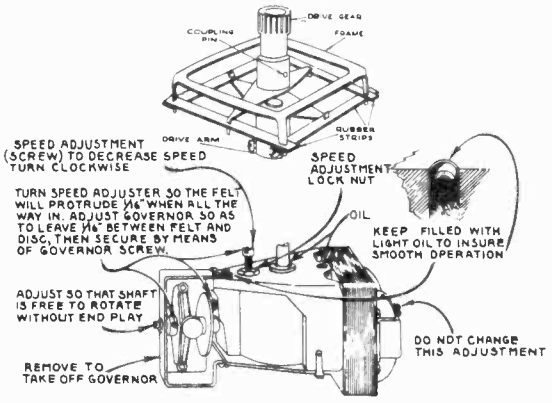


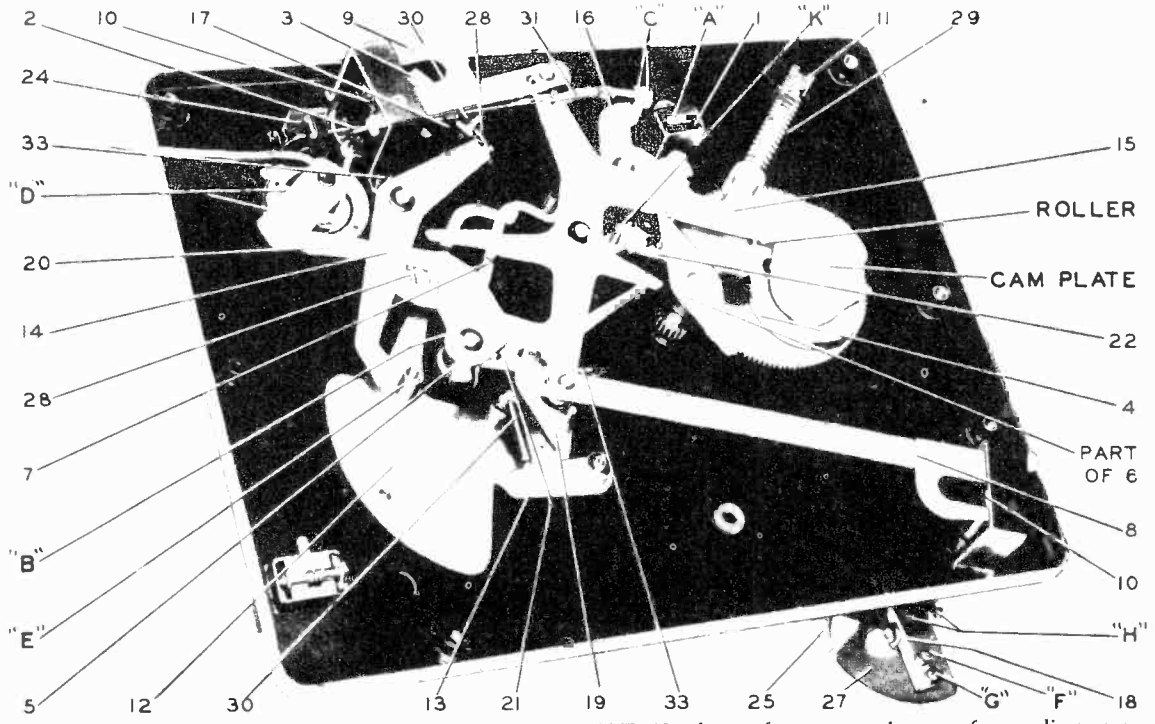
Fig. 7. Top View of Automatic Record Changer



Details of Record Shelf Posts, and Locating Lever Assemblies



Motor Data and Coupling

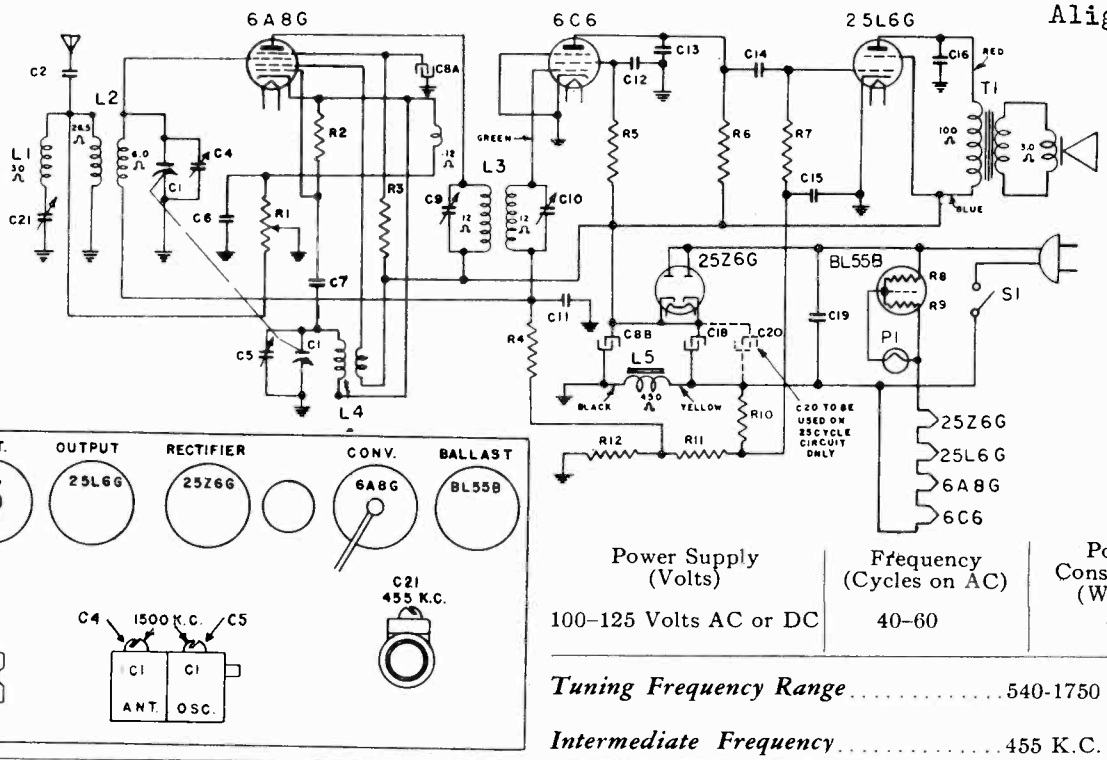


Bottom View of Automatic Record Changer

NOTE: Numbers refer to parts—letters refer to adjustments.

GENERAL ELECTRIC CO.

MODEL GD51
Schematic, Socket, Trimmers, Voltage Alignment



Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
100–125 Volts AC or DC	40–60	45

Tuning Frequency Range ..... 540-1750 K.C.

Intermediate Frequency ..... 455 K.C.

Symbol	Description	Symbol	Description	Symbol	Description
C-1, -4, -5	Tuning Condenser	C-16	.03 Mfd., Paper Capacitor	R-7	680,000 Ohm Carbon Resistor
C-2	.001 Mfd., Paper Capacitor	C-18	15 Mfd., Dry Electrolytic	R-8	162 Ohm Ballast Resistor
C-6	.05 Mfd., Paper Capacitor	C-19	.02 Mfd., Molded Capacitor	R-9	31 Ohm Ballast Resistor
C-7	47 Mmf., Mica Capacitor	C-20	35 Mfd., Dry Electrolytic	R-10	680,000 Ohm Carbon Resistor
C-8a	10 Mfd., Dry Electrolytic	C-21	Wave Trap Trimmer	R-11	150,000 Ohm Carbon Resistor
C-8b	15 Mfd., Dry Electrolytic	R-1	10,000 Ohm Volume Control	R-12	75,000 Ohm Carbon Resistor
C-11	.05 Mfd., Paper Capacitor	R-2	47,000 Ohm Carbon Resistor	L-1	Wave Trap Coil
C-12	.02 Mfd., Paper Capacitor	R-3	22,000 Ohm Carbon Resistor	L-2	Antenna Coil
C-13	100 Mmf., Mica Capacitor	R-4	4.7 Megohm Carbon Resistor	L-3	I.F. Transformer
C-14	.005 Mfd., Paper Capacitor	R-5	3.3 Megohm Carbon Resistor	L-4	Oscillator Coil
C-15	0.1 Mfd., Paper Capacitor	R-6	470,000 Ohm Carbon Resistor	T-1	Output Transformer

VOLTAGE CHART

Tube No.	6A8G	6C6	25L6G	25Z6G
Plate to -B Volts	102	30*	98	....
Screen to -B Volts	65	20*	102	....
Cathode to -B Volts	0–30	0	0	127
Filament Volts	6.2	6.2	24.5	25.0

Line voltage—120 VAC. No Signal Input.
* Measured on 250-volt scale.
On DC, voltages are about 15 per cent lower.

When operating from a DC source of power, it is necessary to insert the power plug with proper polarity; otherwise the receiver will fail to function. If excessive hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

Loud-speaker—Electrodynamic

Outside Cone Diameter ..... 5 inches
Voice Coil Impedance (400 cycles) ... 4.0 ohms
Field Coil Resistance ..... 420 ohms (cold)

Tubes

Converter and Oscillator GE-6A8G
I.F. Detector and Amplifier GE-6C6
Power Amplifier GE-25L6G
Rectifier GE-25Z6G
Ballast Resistor Tube BL-55B
Pilot Lamp ..... Mazda No. 44

Model GD-51 is a compact, five-tube AC-DC superheterodyne receiver employing four General Electric tubes plus a ballast tube, as described above in a superheterodyne circuit. It incorporates a simplified mechanically tuned "Touch Tuning" system allowing a set up of five stations for automatic tuning. Other features of design include I.F. wave trap, automatic overload control and an efficient electrodynamic speaker.

Alignment Frequencies

I.F.—455 K.C. Broadcast—1500 K.C.
The location of all trimmers is shown in Fig. 1.

I.F. Alignment

Connect an output meter across the voice coil. Set the volume control for maximum.

Set test oscillator to 455 and apply signal to the control grid of the 6A8G tube through a .05 mfd. capacitor. Do not remove the grid lead from the 6A8G. Keep the test oscillator output as low as possible to give a readable output. Adjust the two I.F. trimmers (C9 and C10) for maximum output.

Wave Trap Alignment

Leave the test oscillator set to 455 K.C. and connect one output lead to the receiver chassis and the other through a 250 mmf. capacitor in series with 200 ohms to the receiver antenna lead. Adjust (C-21) for minimum output.

R.F. Alignment

Use the same dummy antenna (250 mmf. and 200 ohms) with 1500 K.C. input, adjust the oscillator trimmer (C-5) and antenna trimmer (C-4) for a maximum output.

Precaution—One side of the power supply is connected directly to the chassis. If the signal generator is AC operated, connect a .05 mfd. capacitor in the ground side before connecting it to the receiver chassis.

MODEL GA62
Schematic, Voltage, Socket Trimmers, Alignment

GENERAL ELECTRIC CO.

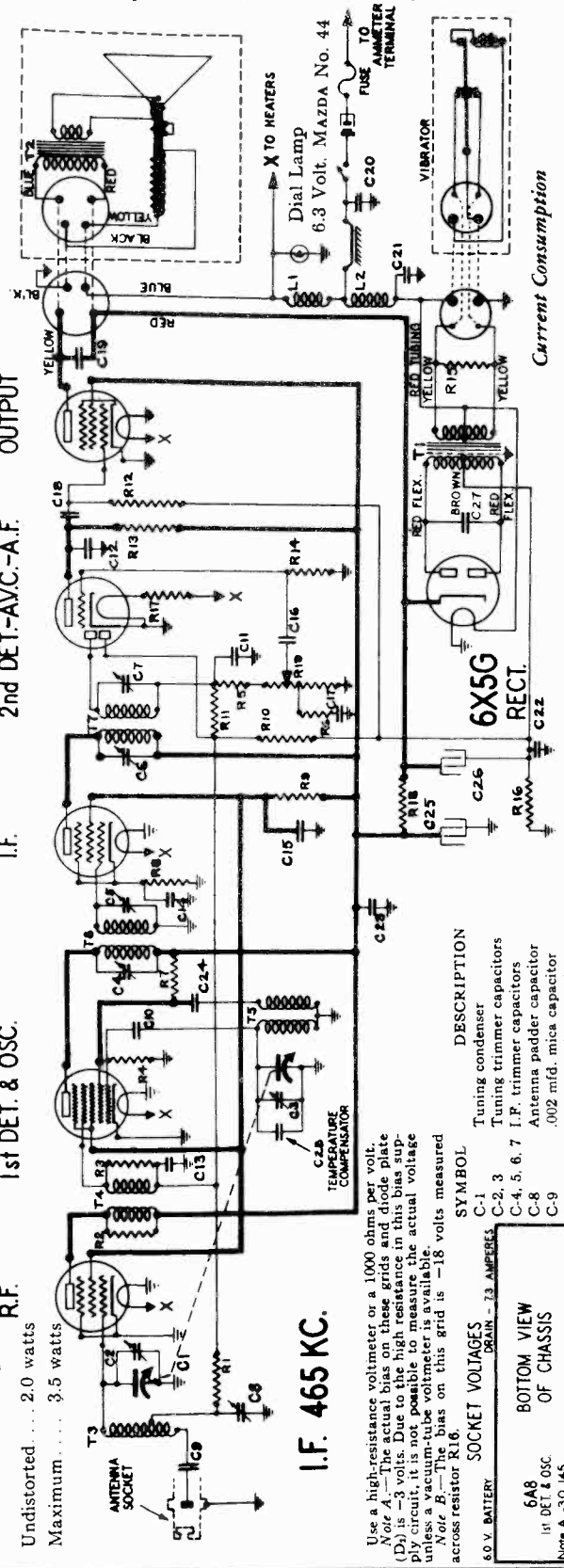
Loud-speaker—Electrodynamic

Speaker Diameter . . . . . 6 inches
Cone Coil Impedance . . . . . 4 ohms at 400 cycles

Tuning Frequency Range . . 540–1540 K.C.

Electrical Power Output
Undistorted . . . 2.0 watts
Maximum . . . . . 3.5 watts

Current Consumption
Storage Battery . . . . . 6.3 volts—7.3 amps



MODEL GA-62

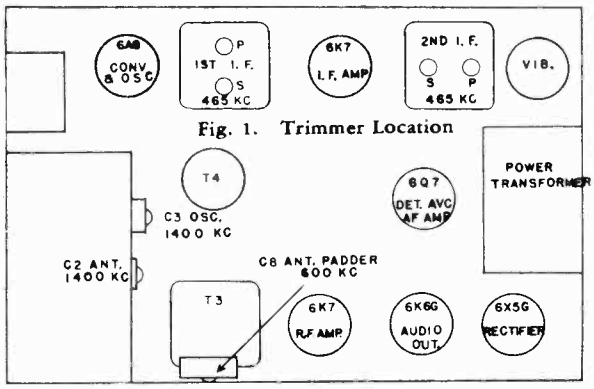


Fig. 1. Trimmer Location

GENERAL INFORMATION

Model GA-62 is a compact, six-tube superheterodyne receiver, employing six General Electric Pre-tested Tubes as described previously. The power supply consists of a non-synchronous type vibrator and full-wave high-vacuum rectifier operating in a conventional rectifier circuit. The receiver incorporates a simplified mechanically adjusted "Touch-Tuning" system, allowing a setup of five stations for automatic tuning. The use of an antenna-matching trimmer results in the maximum transfer of energy from the antenna to the control grid of the 6K7 R.F. tube, providing a high signal-to-noise ratio.

ALIGNMENT

IF ALIGNMENT - Adj. 4 trimmers at 465 KC thru .1 mf cond.

RF ALIGNMENT - Adj. osc. and Ant. trimmers C-3 and C-2 at 1400 KC. thru 100 mmf cond.- PEAK C-8 at 600 KC.

CONVENTIONAL ALIGNMENT - SEE SPECIAL SECTION VOL. V111

Note A.—The actual bias on these grids and diode plate (D₂) is −3 volts. Due to the high resistance in this bias supply circuit, it is not possible to measure the actual voltage unless a vacuum-tube voltmeter is available.

Note B.—The bias on this grid is −18 volts measured across resistor R16.

Use a high-resistance voltmeter or a 1000 ohms per volt.

SOCKET VOLTAGES — DRAIN - 7.3 AMPERES

SYMBOL	DESCRIPTION
C-1	Tuning condenser
C-2, 3	Tuning trimmer capacitors
C-4, 5, 6, 7	I.F. trimmer capacitors
C-8	Antenna padder capacitor
C-9	.002 mfd. mica capacitor
C-10	100 mmf. mica capacitor
C-11	250 mmf. mica capacitor
C-12	1100 mmf. mica capacitor
C-13	.05 mfd. paper capacitor
C-14, 15	.1 mfd. paper capacitor
C-16, 22	.004 mfd. paper capacitor
C-17, 24	.01 mfd. paper capacitor
C-18	.02 mfd. paper capacitor
C-19	.005 mfd. paper capacitor
C-20, 21	.5 mfd. paper capacitor
C-23	.1 mfd. paper capacitor
C-25, 26	8 mfd. dry electrolytic
C-27	.01 mfd. oil-filled capacitor
C-28	Temp. compensator capacitor
L-1	Choke coil (short)
L-2	Choke coil (long)
R-1	470,000 ohms, carbon resistor
R-2	68,000 ohms, carbon resistor
R-3	33,000 ohms, carbon resistor
R-4, 5, 6	47,000 ohms, carbon resistor
R-7	22,000 ohms, carbon resistor
R-8	820 ohms, carbon resistor
R-9	27,000 ohms, carbon resistor
R-10	10 megohms, carbon resistor
R-11	1.5 megohms, carbon resistor
R-12	470,000 ohms, carbon resistor
R-13	220,000 ohms, carbon resistor
R-14	10 megohms, carbon resistor
R-15	220 ohms, wire wound resistor
R-16	360 ohms, wire wound resistor
R-17	3 ohms, wire wound resistor
R-18	1500 ohms, wire wound resistor
R-19	500,000 ohms, volume control
T-1	Power transformer
T-2	Output transformer
T-3	Antenna transformer
T-4	Detector transformer
T-5	Oscillator transformer
T-6	1st I.F. transformer
T-7	2nd I.F. transformer

GENERAL ELECTRIC CO.

MODELS GD62,GD67
Schematic,Voltage,Socket
Trimmers,Alignment

Symbol	Description	Symbol	Description	Symbol	Description
C1 C2. C3	Tuning condenser and trimmers	C23	.1 mfd paper capacitor	R10	220,000 ohm carbon resistor
C4	5-35 mmf. trimmer capacitor	C27	100 mmf mica capacitor	R11	15,000 ohm carbon resistor
C10	30-70 mmf. trimmer capacitor	C28	500 mmf mica capacitor	R12	470 ohm carbon resistor
C12	.1 mfd paper capacitor	C29	250 mmf mica capacitor	R13	1.5 megohm carbon resistor
C13	.001 mfd paper capacitor	C32, C33	50 mfd, 50 mfd, dry electrolytic	R14	68 ohm carbon resistor
C14	.05 mfd paper capacitor	R1	10 megohm carbon resistor	R15	230 ohm w.w. resistor
C15	.1 mfd paper capacitor	R2	47,000 ohm carbon resistor	R16	100,000 ohm carbon resistor
C16	.005 mfd paper capacitor	R3	15,000 ohm carbon resistor	R18, R19	100 ohm w.w. resistor
C17	.002 mfd paper capacitor	R4	2.2 megohm carbon resistor	L1	Wave trap coil
C18	.03 mfd paper capacitor	R5	2.0 megohm volume control	L2	Antenna coil
C19	.25 mfd paper capacitor	R6	470,000 ohm carbon resistor	L3	Oscillator coil
C20	.01 mfd moulded capacitor	R7	180,000 ohm carbon resistor	T2	Output transformer
C21	.005 mfd paper capacitor	R8	220,000 ohm carbon resistor		
C22	.1 mfd paper capacitor	R9	330,000 ohm carbon resistor		

VOLTAGE CHART

Tube No.	6A7	6D6	75	25L6G	25Z6G
Plate to —B Volts	115	115	50*	105	120 V. A.C.
Screen to —B Volts	70	115		115	
Cathode to —B Volts	3.0	3.0	0.5	8.5	115
Filament Volts	6.4	6.4	6.4	23.0	24.0

*Measured on 250-volt scale.
Line Voltage—120 A.C. No signal input.
On DC, voltages are about 15 per cent lower.

When operating from a DC source of power, it is necessary to insert the power plug with proper polarity; otherwise, the receiver will fail to function. If excessive hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

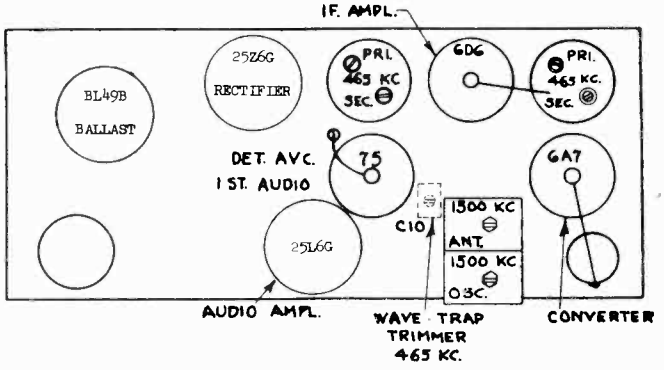


Fig. 1. Trimmer Location

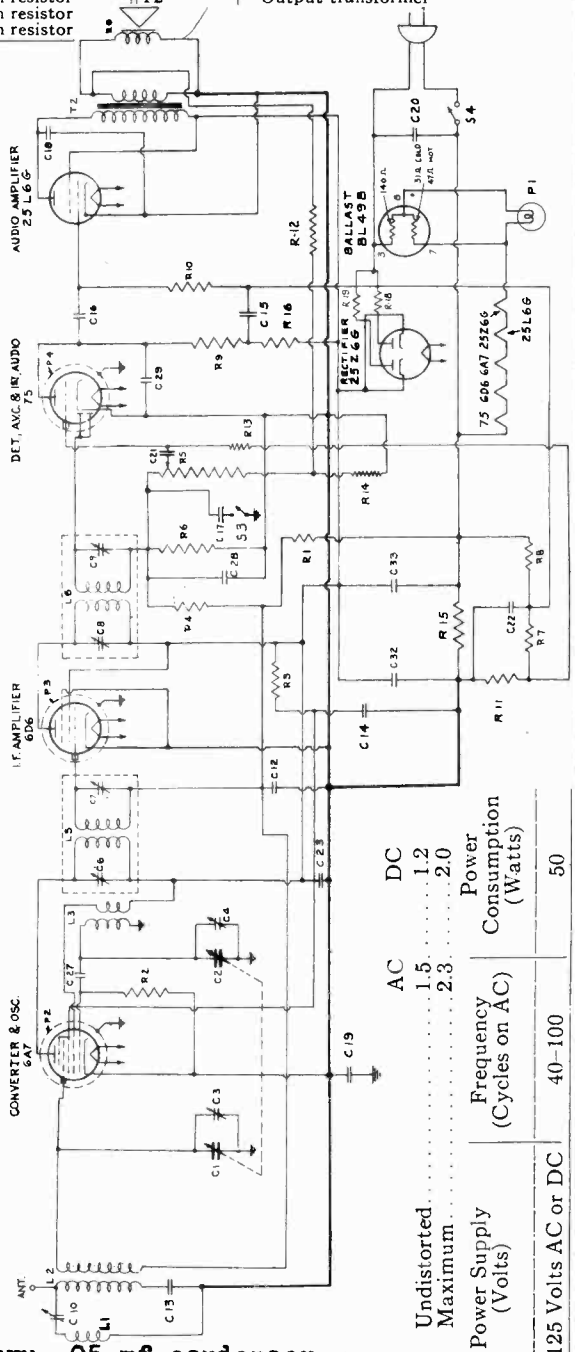
Touch-Tuning Mechanism

The dial mechanism is a very simple arrangement and should not require service. The frequency range of each of the automatic tuning buttons is as follows:

Button No.	Frequency Range (Kilocycles)	Button No.	Frequency Range (Kilocycles)
1	540–590	5	830–1150
2	570–670	6	1020–1400
3	630–780	7	1220–1700
4	710–940	8	1580–1800

Tuning Frequency Range ..... 540–1800 K.C.

Intermediate Frequency ..... 465 K.C.



IF ALIGNMENT - Adj. 4 trimmers at 465 KC thru .05 mf condenser.

WAVE TRAP - Adj. C10 cond. at 465 KC thru 250 mmf and 200 ohms series.

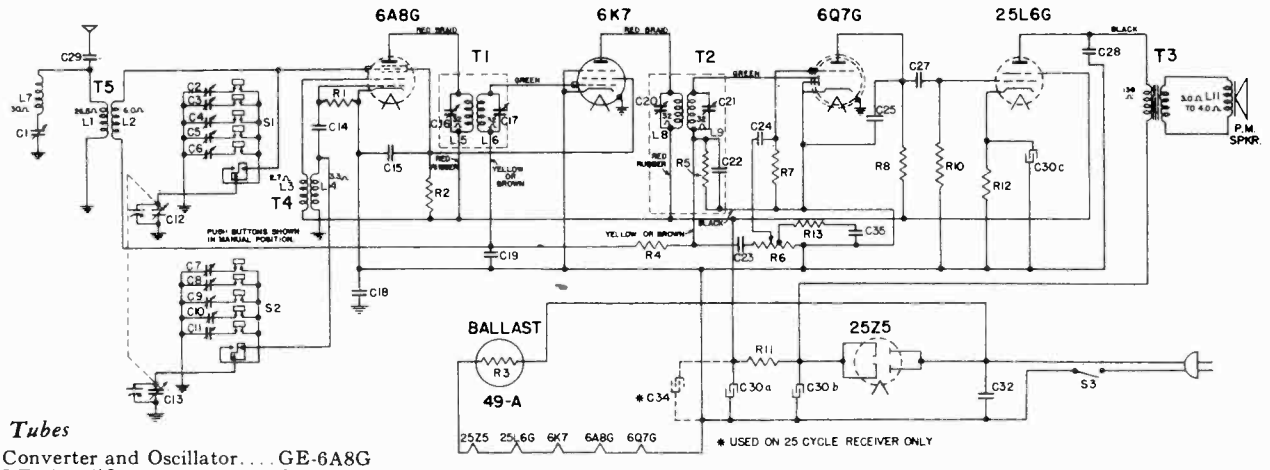
RF ALIGNMENT - Thru a 250 mmf and 200 ohm series :-Adj. C4 cond. osc. trimmer at 1830 KC - Adj. C3 Ant. trimmer at 1500 KC.

Pwr. Supply connection to chassis is thru .25 mf cond. If Sig. gen. is AC, connect .05 mf cond. in grd. side before chassis connection.

FOR CONVENTIONAL ALIGNMENT - SEE SPECIAL SECTION VOLUME VIII.

MODEL GD63
Schematic, Voltage, Socket Trimmers, Alignment

GENERAL ELECTRIC CO.



Tubes

Converter and Oscillator....GE-6A8G
I.F. Amplifier.....CE-6K7
Detector, AVC and Amplifier.....GE-6Q7G
Power Amplifier.....GE-25L6G
Rectifier.....GE-25Z5
Ballast Tube.....49-A

Tuning Frequency Range.....540–1750 K.C.

Intermediate Frequency.....455 K.C.

Symbol	Description
C1	Wave trap trimmer
C2–C6	Antenna trimmer strip
C7–C11	Oscillator trimmer strip
C12 C13	Tuning condenser
C14	47 mmf., mica capacitor
C15	.25 mfd., paper capacitor
C18	.25 mfd., paper capacitor
C19	.05 mfd., paper capacitor
C22	470 mmf., mica capacitor
C23 24	.002 mfd., paper capacitor
C25	330 mmf., mica capacitor
C27	.005 mfd., paper capacitor
C28	.01 mfd., paper capacitor
C29	.001 mfd., paper capacitor
C30a	20 mfd., dry electrolytic
C30b	40 mfd., dry electrolytic
C30c	20 mfd., dry electrolytic
C32	.02 mfd., molded capacitor
C34	15 mfd., dry electrolytic
C35	.005 mfd., paper capacitor
R1	47,000 ohm, carbon resistor
R2	10,000 ohm, carbon resistor
R3	Ballast resistance, 49A
R4	2.2 megohm, carbon resistor
R5	470,000 ohm, carbon resistor
R6	2.2 megohm, volume control
R7	15.0 megohm, carbon resistor
R8	220,000 ohm, carbon resistor
R10	1.0 megohm, carbon resistor
R11	2200 ohm, carbon resistor
R12	180 ohm, carbon resistor
R13	68,000 ohm, carbon resistor
T1	1st I.F. transformer
T2	2nd I.F. transformer
T3	Output transformer
T4	Osc. transformer
T5	Antenna transformer

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F.—455 K.C. Broadcast—1500 K.C.

The location of all trimmers is shown in Fig. 1.

I.F. Alignment

Connect an output meter across the voice coil. Set the volume control for maximum.

Set test oscillator to 455 and apply signal to the control grid of the 6A8G tube through a .05 mfd. capacitor. Do not remove the grid lead from the 6A8G. Keep the test oscillator output as low as possible to give a readable output. Adjust all four I.F. trimmers for maximum output.

Wave Trap Alignment

Leave the test oscillator set to 455 K.C. and connect one output lead to the receiver chassis and the other through a 250 mmf. capacitor in series with 200 ohms to the receiver antenna lead. Adjust (C-1) for minimum output.

R.F. Alignment

Use the same dummy antenna (250 mmf. and 200 ohms) with 1500 K.C. input, adjust the oscillator trimmer (C-13) and antenna trimmer (C-12) for a maximum output.

Precaution—One side of the power supply is connected to the chassis through a .25 mfd. capacitor. If signal generator is AC operated, connect a .05 mfd. capacitor in the ground side before connecting it to the receiver chassis.

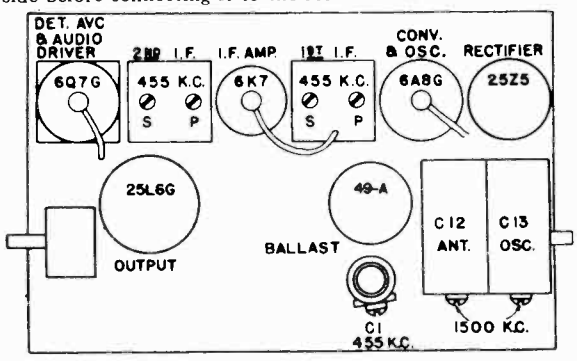


Fig. 1. Trimmer Location

GENERAL INFORMATION

Model GD-63 is a compact, six-tube AC-DC superheterodyne receiver, employing six General Electric Pre-tested Tubes as described above, in a superheterodyne circuit. It incorporates a simplified trimmer tuned "Touch-Tuning" system, allowing a set up of five stations for automatic tuning. Other features of design include I.F. wave trap, automatic volume control and an improved dustproof speaker.

Electrical Specifications

Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
110-125 Volts AC or DC	40–100	50

Electrical Power Output (120—line volts)

	AC	DC
Undistorted	1.2	1.0
Maximum	2.5	2.0

Loud-speaker—Permanent Magnet

Outside Cone Diameter.....5-inch
Voice Coil Impedance.....4.0 ohms at 400 cycles

VOLTAGE CHART

Tube No.	6A8G	6K7	6Q7G	25L6G	25Z5
Plate to −B volts	112	112	55*	130	..
Screen to −B volts	75	75	..	115	..
Cathode to −B volts	0	0	0	7.5	136
Cathode Current MA	6.6	1.4	0.5	40	50
Filament Volts	6.0	6.0	6.1	24.5	24.0

Line Voltage—120 AC. No signal input
* Measured on 250-volt scale.
On DC, voltages are about 15 per cent lower.

When operating from a DC source of power, it is necessary to insert the power plug with proper polarity; otherwise, the receiver will fail to function. If excessive hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

MODELS G64, G65

GENERAL ELECTRIC CO. Schematic, Chassis Wiring

MODELS G-64 AND G-655

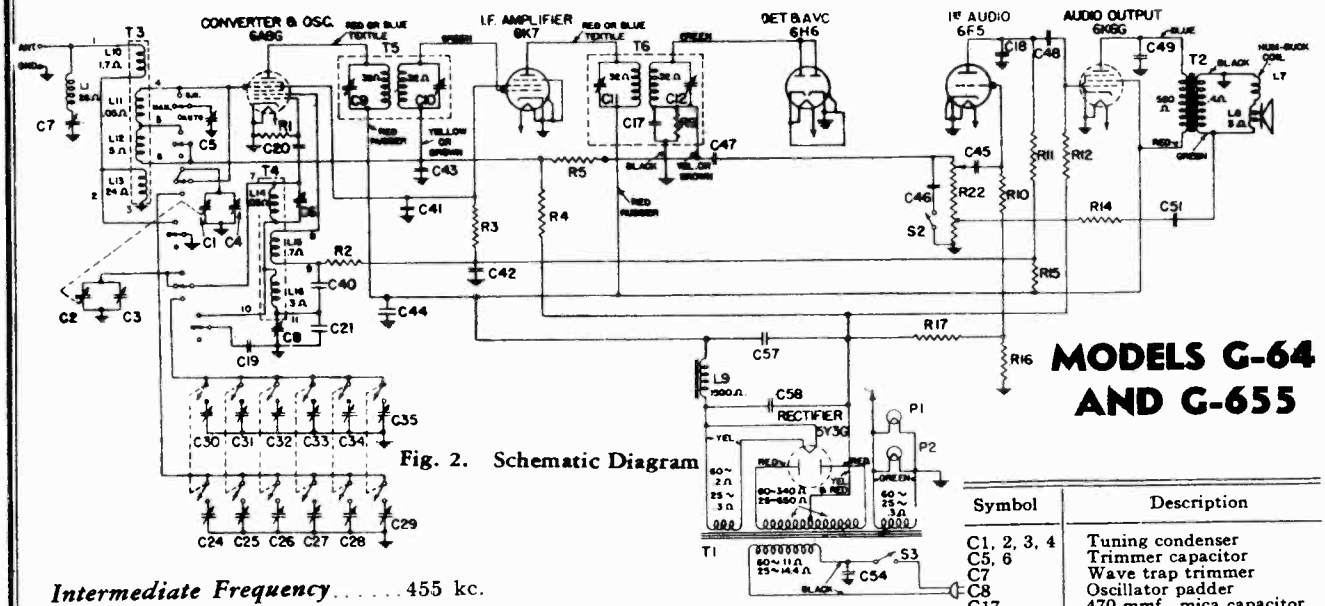


Fig. 2. Schematic Diagram

Intermediate Frequency.....455 kc.

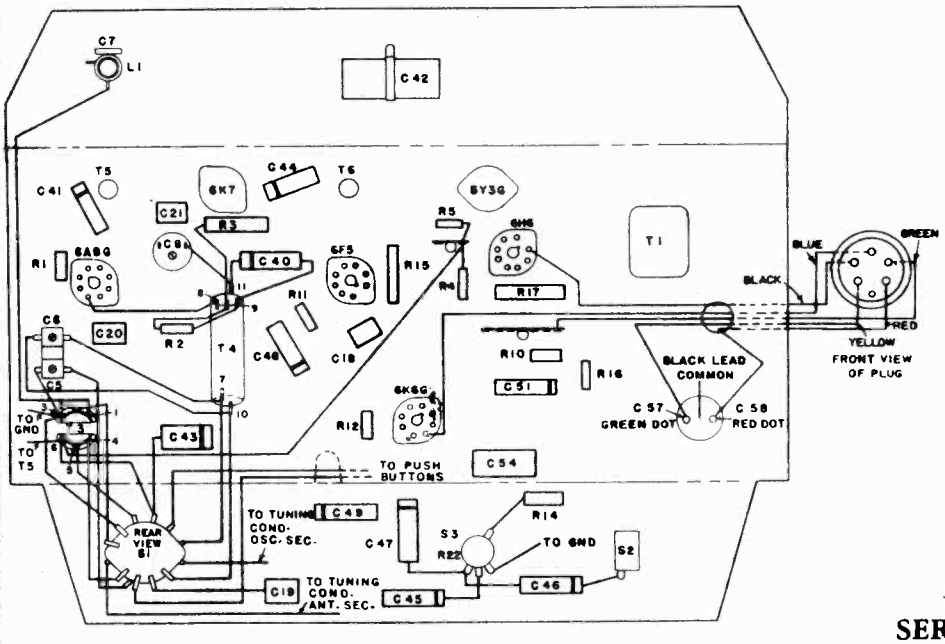


Fig. 3. Chassis Parts Layout

Symbol	Description
C1, 2, 3, 4	Tuning condenser
C5, 6	Trimmer capacitor
C7	Wave trap trimmer
C8	Oscillator padder
C17	470 mmf., mica capacitor
C18	330 mmf., mica capacitor
C19	3900 mmf., mica capacitor
C20	47 mmf., mica capacitor
C21	370 mmf., mica capacitor
C24, 29	Antenna trimmer strip
C30, 35	Oscillator trimmer strip
C40	.001 mfd., paper capacitor
C41	.05 mfd., paper capacitor
C42	0.5 mfd., paper capacitor
C43 44	.05 mfd., paper capacitor
C45	.01 mfd., paper capacitor
C46	.001 mfd., paper capacitor
C47 48	.005 mfd., paper capacitor
C49	.012 mfd., paper capacitor
C51	0.1 mfd., paper capacitor
C54	.01 mfd., molded paper
C57	8 mfd., dry electrolytic
C58	8 mfd., dry electrolytic
R1	47,000 ohm, carbon resistor
R2	4,700 ohm, carbon resistor
R3	18,000 ohm, carbon resistor
R4	10.0 megohm, carbon resistor
R5	1.5 megohm, carbon resistor
R9	470,000 ohm, carbon resistor
R10	2.2 megohm, carbon resistor
R11, 12	330,000 ohm, carbon resistor
R14	33,000 ohm, carbon resistor
R15	3900 ohm, carbon resistor
R16	22 ohm, carbon resistor
R17	330 ohm, carbon resistor
R22	2.0 megohm, volume control
T1	Power transformer
T2	Output transformer
T3	Antenna transformer
T4	Oscillator transformer

SERVICE DATA

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115–125	50–60	65
C	115–125	25–60	70
V	115–125 140–155 190–220 220–250	50–60	70

Tuning Frequency Range

Band "B".....540 to 1750 kc.
Band "D".....5700 to 18,300 kc.

Physical Specifications

Model	G-64	G-655
Height	11 inches	34 inches
Width	18⅞ inches	31 inches
Depth	7 5/16 inches	11½ inches

Tuning Control Drive Ratio. 10 to 1

Electrical Power Output

Undistorted.....2.0 watts
Maximum.....4.0 watts

Tone Control.....2 Point—Bass and Normal

Loud-speaker—Electrodynamic

Model	G-655	G-64
Cone Diameter	12 inches	6.5 inches
Voice Coil Impedance (400 cycles)	3.5 ohms	3.5 ohms

KEYBOARD RADIOS

Models G-64 and G-655

ALIGNMENT PROCEDURE

I.F. ALIGNMENT WITH OSCILLOSCOPE

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	455 K.C. Sweep	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-12) 2nd I.F. Pri. (C-11)	Gang condenser plates wide open—connect audio input of oscilloscope to ground and to the junction of C-47 and R-5. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. The resulting curve with input at converter grid is shown in Fig. 5.
2. Band "B"	455 K.C. Sweep	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-10) 1st I.F. Pri. (C-9)	
3. Band "B"	455 K.C. Sweep	Antenna Post	250 Mmf. 200 Ohms	Wave Trap Trimmer (C-7)	Adjust trimmer for minimum amplitude.

I.F. ALIGNMENT WITH OUTPUT METER

1. Band "B"	455 K.C. with Modulation	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-12) 2nd I.F. Pri. (C-11)	Gang condenser plates wide open—connect output meter across voice coil—keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.
2. Band "B"	455 K.C. with Modulation	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-10) 1st I.F. Pri. (C-9)	
3. Band "B"	455 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Wave Trap Trimmer (C-7)	Adjust trimmer for minimum output.

R.F. ALIGNMENT

1. Band "B"	.....	.....	.....	.....	Close gang condenser plates. Adjust pointer to first line at left end of tuning scale.
2. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. (C-3) Ant. (C-4)	Connect output meter across voice coil—tone control on "bass" position—peak trimmers for maximum output with a low input signal.
3. Band "B"	580 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. Padder (C-8)	Adjust padder for a maximum output meter indication in vicinity of 580 kc. while rocking the gang condenser.
4. Band "B"	Repeat Operation 2				
6. Band "D"	18 M.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. (C-6) Ant. (C-5)	Peak C-5 for maximum output while rocking the gang condenser at the 18 mc. point. The image of any signal on "D" band should be heard 930 kc. below the input signal when proper peak is obtained on oscillator trimmer C-6. Example: 12 mc. image—11.09 mc.

Use a dummy antenna in making all alignments. The grid lead should not be removed from the tube to which the input signal is applied when aligning the I.F. amplifier.

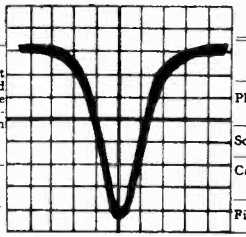


Fig. 5. Over-all I.F. Curve Taken on G-E Oscilloscope OFM-1

A-C line voltage—120.
* Measured on 500-volt scale.

VOLTAGE CHART

Tube No.	6A8G	6K7	6F5	6K6G	5Y3G
Plate to –B volts	Conv.-236 Osc.-186	236	84 *	220	....
Screen to –B volts	95	95	.....	236	....
Cathode to –B volts	0	0	0	0	320
Filament volts	6.5	6.5	6.5	6.5	5.3

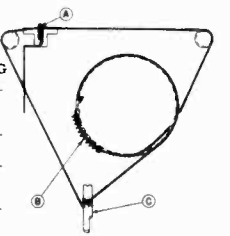


Fig. 6. Dial Drive Mechanism

GENERAL INFORMATION

Coil System

The "B" and "D" band antenna coils are wound on a single coil form (T-3) as shown in Fig. 2. T-4 is the oscillator transformer for both the "B" and "D" bands. All coil terminals are numbered in Fig. 2 and 3 to facilitate in service by showing common points on the schematic diagram, Fig. 2, and the pictorial wiring diagram, Fig. 3.

Phonograph Connections

Fig. 1 shows a simple sketch for connecting a crystal or high impedance magnetic pick-up into the receiver circuit for the reproduction of phonograph recordings. S-1 is either a rotary or toggle triple-pole, double-throw switch. A suitable loading circuit consisting of a resistor or resistor and capacitor network should be used across the pick-up leads when using a crystal type unit. It is very important that the pick-up leads have a shield such as copper braid to prevent hum interference. This lead should be connected to the chassis ground.

The circuit should be opened between the top end of the volume control (R-22) and (C-47), and phonograph connections made as shown. This procedure requires removal of the chassis from the cabinet.

When the pick-up is connected as shown, the regular radio volume and tone controls work for both radio and phonograph reproduction. The parts suggested are:

Symbol	Description	Stock No.
Sp	Phono Switch	RS-366
Rp	330,000 Ohm Resistor	RQ-1319

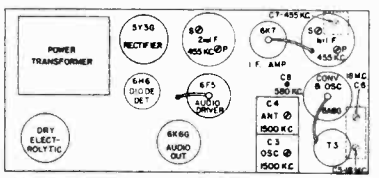


Fig. 4. Trimmer Location

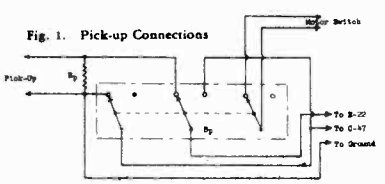


Fig. 1. Pick-up Connections

REPLACEMENT PARTS LIST

MODELS G-64 AND G-655

12-38 (8M)

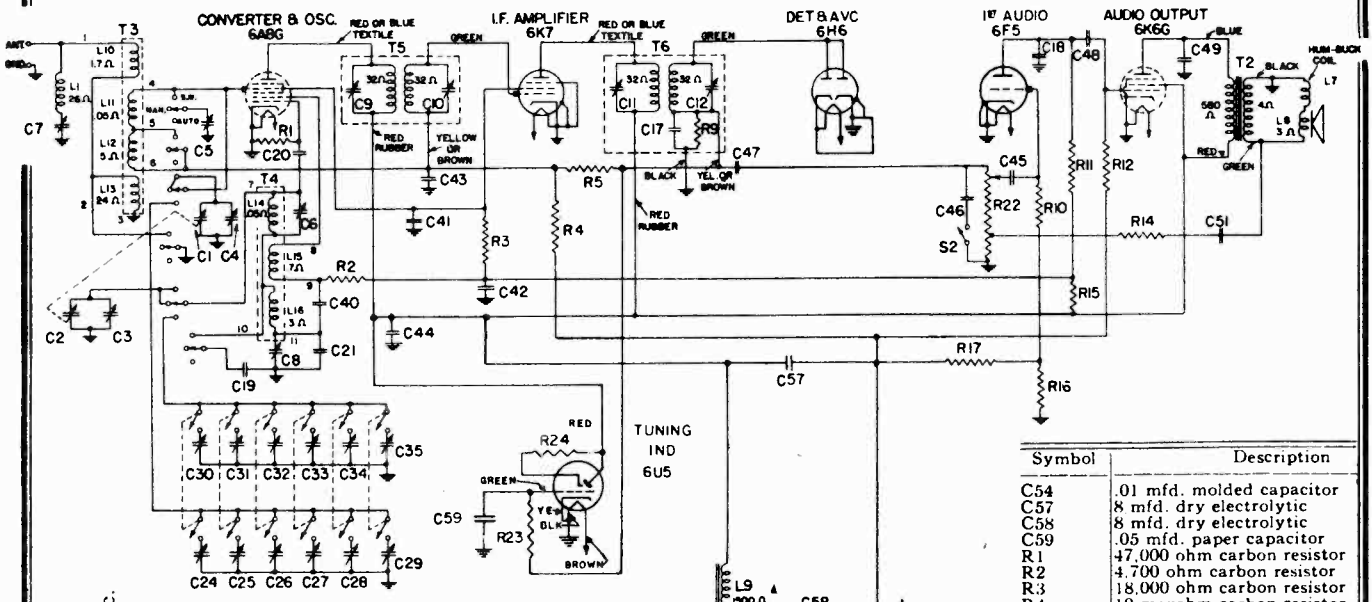
Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
*RB-008	BOARD—Terminal board (2 lug)	$0.10
RB-093	BOARD—Terminal board (6 lug)	.10
*RC-009	CAPACITOR—.001 mfd., 600 V. paper (C-40, 46)	.30
*RC-023	CAPACITOR—.005 mfd., 600 V paper (C-47, 48)	.25
*RC-039	CAPACITOR—.01 mfd., 200 V paper (C-45)	.25
RC-044	CAPACITOR—.012 mfd., 600 V paper (C-	.25
*RC-092	CAPACITOR—.05 mfd., 600 V paper (C-49) 41, 43, 44)	.30
*RC-104	CAPACITOR—0.1 mfd., 600 V paper (C-51)	.30
*RC-196	CAPACITOR—0.5 mfd., 600 V paper (C-42)	.75
RC-216	CAPACITOR—47 mmf., mica (C-20)	.25
*RC-274	CAPACITOR—330 mmf., mica (C-18)	.30
RC-285	CAPACITOR—370 mmf., mica (C-21)	.25
RC-294	CAPACITOR—470 mmf., mica (C-17)	.30
RC-390	CAPACITOR—3900 mmf., mica (C-19)	.35
RC-593	CAPACITOR—8 mfd., 450 V; 8 mfd., 450 V; dry electrolytic (C-57, 58)	1.40
RC-674	CAPACITOR—Wave trap trimmer (C-7)	.15
RC-698	CAPACITOR—Oscillator padder (C-8)	.40
RC-699	CAPACITOR—Trimmer capacitors "D" band (C-5, 6)	.30
RC-727	CONDENSER—Tuning condenser (C-1, 2, 3, 4)	2.25
RC-791	CAPACITOR—.01 mfd., 250 V. AC (C-54)	.30
RC-8103	CABLE—Speaker cable and plug	.50
*RC-863	CORD—Power cord	.65
RG-016	GRID CLIP—Control grid clip	.10
RK-027	KNOB—Winged control knob (Pkg. 5)	.50
RK-028	KNOB—Plain control knob (Pkg. 5)	.30
RL-061	COIL—Antenna coil bands "B & D"	1.15
RL-265	COIL—Oscillator coil bands "B & D"	.75
RL-603	COIL—Wave trap coil (L-1)	.60
*RQ-1219	RESISTOR—22 ohm, ½-W. carbon (R-16) (Pkg. 5)	.70
*RQ-1275	RESISTOR—4,700 ohm, ½-W. carbon (R-2) (Pkg. 5)	.70
*RQ-1295	RESISTOR—33,000 ohm, ½-W. carbon (R-14) (Pkg. 5)	.70
*RQ-1299	RESISTOR—47,000 ohm, ½-W. carbon (R-1) (Pkg. 5)	.70
*RQ-1319	RESISTOR—330,000 ohm, ½-W. carbon (R-11, 12) (Pkg. 5)	.70
*RQ-1323	RESISTOR—470,000 ohm, ½-W. carbon (R-9) (Pkg. 5)	.70
*RQ-1335	RESISTOR—1.5 megohm, ½-W carbon (R-5) (Pkg. 5)	.70
*RQ-1339	RESISTOR—2.2 megohm, ½-W. carbon (R-10) (Pkg. 5)	.70
*RQ-1355	RESISTOR—10 megohm, ½-W. carbon (R-4) Pkg. 5)	.70
*RQ-1447	RESISTOR—330 ohm, 1-W. carbon (R-17)	.20
*RQ-1473	RESISTOR—3900 ohm, 1-W. carbon (R-15)	.20
*RQ-1489	RESISTOR—18,000 ohm, 1-W. carbon (R-3)	.20
*RS-200	SOCKET—Octal base tube socket (Pkg. 5)	.75
*RS-204	SOCKET—Rectifier tube socket (Pkg. 5)	.75
*RS-223	SOCKET—Socket for 6A8G (Pkg. 5)	.80
RS-236	SOCKET—Lamp Socket Assembly	$0.10
RS-390	SWITCH—Tone control switch (S-2)	.35
RS-391	SWITCH—Band change switch (S-1)	.90
RT-0516	TRANSFORMER—Power transformer (50–60 cy.) (T-1)	4.20
RT-0517	TRANSFORMER—Power transformer (25 cy.) (T-1)	7.05
RT-0518	TRANSFORMER—Power transformer—Universal (T-1)	9.00
RT-260	TRANSFORMER—1st IF transformer (complete)	1.15
RT-286	TRANSFORMER—2nd IF transformer (complete)	1.40
RT-438	TRANSFORMER—Output transformer (T-2)	1.70
RV-040	VOLUME CONTROL—2 meg. volume control and power switch (R-22, S-3)	.95
*RW-101	WASHER—Felt washers for control knobs (Pkg. 10)	.45
RX-046	ASSEMBLY—Gang condenser mounting assembly	.20
*RX-015	ASSEMBLY—Chassis mounting assembly	.10
	SPEAKER ASSEMBLY G-64	
RC-931	CONE—6½ inch cone and voice coil assembly	.60
RD-300	DUST CAP—6½ inch cone dust cap (Pkg. 5)	.10
*RP-015	PLUG—Male speaker plug	.20
RS-098	SPEAKER—6½ inch speaker (less output trans.)	4.25
RX-047	ASSEMBLY—Speaker nuts and washers	.05
	SPEAKER ASSEMBLY G-655	
RC-932	CONE—12 inch cone and voice coil assembly	1.10
RD-301	DUST CAP—Speaker dust cap (Pkg. 5)	.10
*RP-015	PLUG—Male speaker plug	.20
RS-096	SPEAKER—12 inch speaker (less output trans.)	6.00
RX-047	ASSEMBLY—Speaker nuts and washers	.05
	TOUCH-TUNING AND DIAL SCALE MECHANISM	
RB-617	BUTTON—Molded push button (Pkg. 5)	.45
RC-8034	CORD—Drive cord (Pkg. 5)	.70
RC-8033	CARD—Station letter card (set)	.45
RD-070	DRUM—Condenser drive drum	.20
RD-090	DIAL—Dial scale	1.25
RD-204	DRIVE—Drive shaft	.15
RE-028	ESCUTCHEON—Dial scale escutcheon	1.60
*RP-075	PULLEY—Pointer drive cord pulley (Pkg. 6)	.20
RP-108	POINTER—Dial scale pointer	.15
RS-392	SWITCH—Touch-tuning switch (less trimmer strips)	2.35
*RS-432	SPRING—Drive cord tension spring (Pkg. 5)	.20
RS-444	SPRING—Spring for molded push button (Pkg. 10)	.10
RT-852	TRIMMER STRIP—Push button trimmer strip; osc. sec.	1.05
RT-853	TRIMMER STRIP—Push button trimmer strip; RF section	1.05
RW-027	WINDOW—Station letter windows (Pkg. 25)	.40

* Used on previous productions.

(Prices subject to change without notice)

MODEL G75

GENERAL ELECTRIC CO. Schematic, Chassis Wiring



Symbol	Description
C54	.01 mfd. molded capacitor
C57	8 mfd. dry electrolytic
C58	8 mfd. dry electrolytic
C59	.05 mfd. paper capacitor
R1	47,000 ohm carbon resistor
R2	4,700 ohm carbon resistor
R3	18,000 ohm carbon resistor
R4	10 megohm carbon resistor
R5	1.5 megohm carbon resistor
R9	470,000 ohm carbon resistor
R10	2.2 megohm carbon resistor
R11, R12	330,000 ohm carbon resistor
R14	33,000 ohm carbon resistor
R15	3,900 ohm carbon resistor
R16	22 ohm carbon resistor
R17	330 ohm carbon resistor
R22	2.0 megohm volume control
R23	2.2 megohm carbon resistor
R24	1.0 megohm carbon resistor
T1	Power transformer
T2	Output transformer
S1	Band switch
S2	Tone control switch
S4	Keyboard tuning switch

Symbol	Description
C1, C4	Tuning condenser and trimmers
C5, C6	Ant. and osc. trimmer capacitor
C7	Wave trap trimmer
C8	Oscillator padder
C17	470 mmf. mica capacitor
C18	330 mmf. mica capacitor
C19	3900 mmf. mica capacitor
C20	47 mmf. mica capacitor
C21	370 mmf. mica capacitor
C24-C29	Antenna trimmer strip
C30-C35	Oscillator trimmer strip
C40	.001 mfd. paper capacitor
C41	.05 mfd. paper capacitor
C42	.05 mfd. paper capacitor
C43, C44	.05 mfd. paper capacitor
C45	.01 mfd. paper capacitor
C46	.001 mfd. paper capacitor
C47, C48	.005 mfd. paper capacitor
C49	.012 mfd. paper capacitor
C51	0.1 mfd. paper capacitor

Fig. 2. Schematic Diagram

Tuning Frequency Range
Band "B" ..... 540 to 1750 kc.
Band "D" ..... 5700 to 18,300 kc.

Intermediate Frequency ..... 455 kc.

Electrical Power Output
Undistorted ..... 2.0 watts
Maximum ..... 3.8 watts

Tone Control ..... 2 Point—
Bass and Normal

Loud-speaker—Electrodynamic
Cone Diameter ..... 12 inches
Voice Coil Impedance
(400 cycles) ..... 3.5 ohms

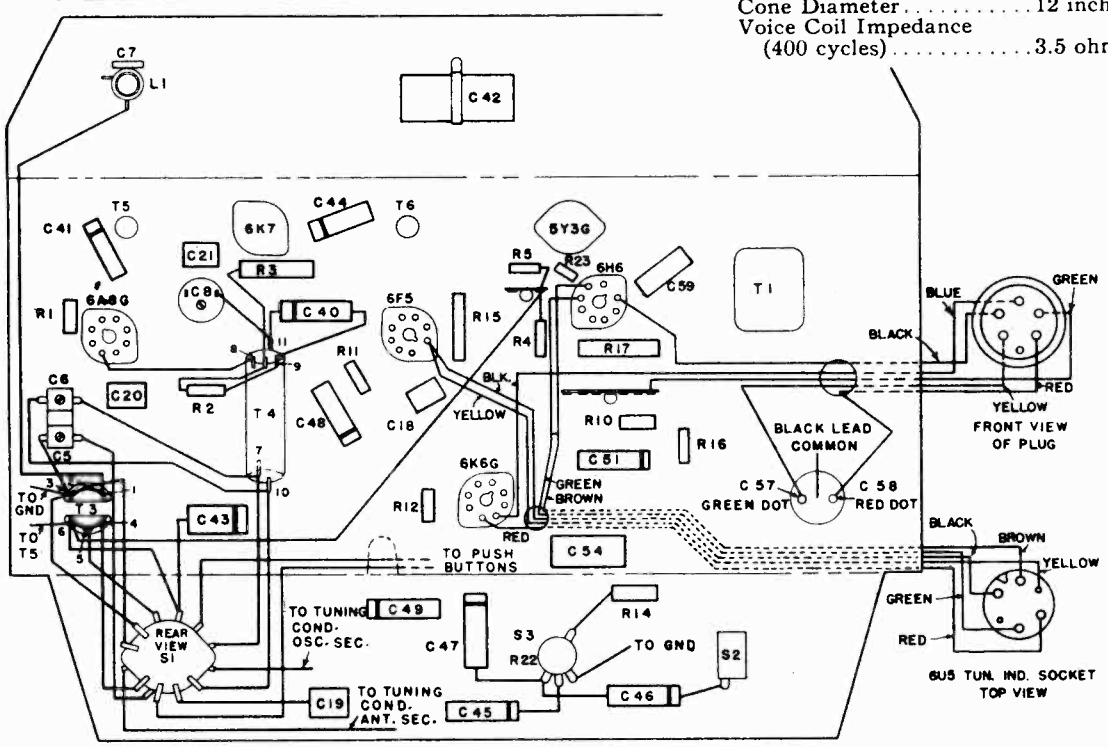


Fig. 3. Chassis Parts Layout

ALIGNMENT PROCEDURE

I.F. ALIGNMENT WITH OSCILLOSCOPE

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	455 K.C. Sweep	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-12) 2nd I.F. Pri. (C-11)	Gang condenser plates wide open—connect audio input of oscilloscope to ground and to the junction of C-47 and R-5. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. The resulting curve with input at converter grid is shown in Fig. 5.
2. Band "B"	455 K.C. Sweep	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-10) 1st I.F. Pri. (C-9)	
3. Band "B"	455 K.C. Sweep	Antenna Post	250 Mmf. 200 Ohms	Wave Trap Trimmer (C-7)	Adjust trimmer for minimum amplitude

I.F. ALIGNMENT WITH OUTPUT METER

1. Band "B"	455 K.C. with Modulation	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-12) 2nd I.F. Pri. (C-11)	Gang condenser plates wide open—connect output meter across voice coil—keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.
2. Band "B"	455 K.C. with Modulation	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-10) 1st I.F. Pri. (C-9)	
3. Band "B"	455 K.C. with Modulation.	Antenna Post	250 Mmf. 200 Ohms	Wave Trap Trimmer (C-7)	Adjust trimmer for minimum output.

R.F. ALIGNMENT

Band "B"	.....	.....	.....	.....	Close gang condenser plates. Adjust pointer to first line at left end of tuning scale.
2. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. (C-3) Ant. (C-4)	Connect output meter across voice coil—tone control on "bass" position—peak trimmers for maximum output with a low input signal.
3. Band "B"	580 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. Padder (C-8)	Adjust padder for a maximum output meter indication in vicinity of 580 kc. while rocking the gang condenser.
4. Band "B"	Repeat Operation 2				
5. Band "D"	18 M.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. (C-6) Ant. (C-5)	Peak C-6 for maximum output while rocking the gang condenser at the 18 mc. point. The image of any signal on "D" band should be heard 930 kc. below the input signal when proper peak is obtained on oscillator trimmer C-6. Example: 12 mc. image—11.09 mc.

Use a dummy antenna in making all alignments. The grid lead should not be removed from the tube to which the input signal is applied when aligning the I.F. amplifier.

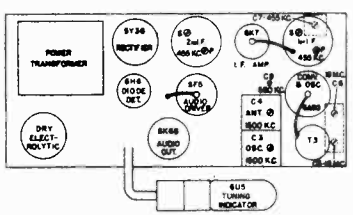


Fig. 4. Trimmer Location

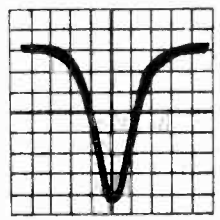


Fig. 5. Over-all I.F. Curve Taken on G-E Oscilloscope OFM-1

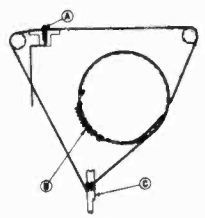


Fig. 6. Dial Drive Mechanism

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115–125	50–60	65
C	115–125	25–60	70
V	115–125 140–155 190–220 220–250	50–60	70

Coil System

The "B" and "D" band antenna coils are wound on a single coil form (T-3) as shown in Fig. 2. T-4 is the oscillator transformer for both the "B" and "D" bands. All coil terminals are numbered in Fig. 2 and 4 to facilitate in service by showing common points on the schematic diagram, Fig. 2, and the pictorial wiring diagram, Fig. 4.

The following table shows the coils in use for the various positions of the wave change switch.

Band Switch Position	Antenna Primary	Antenna Secondary	Oscillator Grid Coil	Plate Coil	
Short Wave	L-10	L-11	L-14	L-15	L-12 Shorted L-16 Shorted
Manual Broadcast	L-10 and L-13	L-11 and L-12	L-14 and L-16	L-15	Tuned by gang condenser C-1 and C-2
Automatic Tuning	L-10 and L-13	L-11 and L-12	L-14 and L-16	L-15	C-1 and C-2 removed tuned by fixed trimmers

Phonograph Connections

Fig. 1 shows a simple sketch for connecting a crystal or high impedance magnetic pick-up into the G-75 circuit for the reproduction of phonograph recordings. S-1 is either a rotary or toggle triple-pole, double-throw switch. A suitable loading circuit consisting of a resistor or resistor and capacitor network should be used across the pick-up leads when using a crystal type unit. It is very important that the pick-up leads have a shield such as copper braid to prevent hum interference. This lead should be connected to the chassis ground.

The circuit should be opened between the top end of the volume control (R-22) and (C-47), and phonograph connections made as shown. This procedure requires removal of the chassis from the cabinet.

When the pick-up is connected as shown, the regular radio volume and tone controls work for both radio and phonograph reproduction. The parts suggested are:

Symbol	Description	Stock No.
Sp	Phono Switch	RS-366
Rp	330,000 Ohm Resistor	RQ-1319

VOLTAGE CHART

Tube No.	6A8G	6K7	6F5	6K6G	5Y3G
Plate to —B volts	Conv.-236 Osc.-186	236	84 *	220	....
Screen to —B volts	95	95	.....	236	
Cathode to —B volts	0	0	0	0	330
Filament volts	6.5	6.5	6.5	6.5	5.3

A-C line voltage—120.
* Measured on 500-volt scale.

PARTS LIST—MODEL G-75

Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
*RB-008	BOARD—Terminal board (2 lug)	$0.10
RB-093	BOARD—Terminal board (6 lug)	.10
*RB-158	BRACKET—Tuning indicator tube bracket	.15
*RC-009	CAPACITOR—.001 mfd., 600 V paper (C-40, 45)	.30
*RC-023	CAPACITOR—.005 mfd., 600 V paper (C-47, 48)	.25
*RC-039	CAPACITOR—.01 mfd., 200 V paper (C-45)	.25
RC-044	CAPACITOR—.012 mfd., 600 V paper (C-49)	.25
*RC-092	CAPACITOR—.05 mfd., 600 V paper (C-41, 42, 44, 50)	.30
*RC-104	CAPACITOR—0.1 mfd., 600 V paper (C-51)	.30
*RC-196	CAPACITOR—.05 mfd., 600 V paper (C-42)	.75
RC-216	CAPACITOR—47 mmf., mica (C-20)	.25
*RC-274	CAPACITOR—330 mmf., mica (C-18)	.30
RC-285	CAPACITOR—370 mmf., mica (C-21)	.25
RC-294	CAPACITOR—470 mmf., mica (C-17)	.30
RC-390	CAPACITOR—3900 mmf., mica (C-19)	.35
RC-593	CAPACITOR—8 mfd., 450 V; 8 mfd., 450 V; dry electrolytic (C-57, 58)	1.40
*RC-630	CAPACITOR—Oscillator padder (C-8)	.40
RC-674	CAPACITOR—Wave trap trimmer (C-7)	.15
RC-675	CAPACITOR—Trimmer capacitors "D" band (C-5, 6)	.30
RC-727	CONDENSER—Tuning condenser (C-1, 2, 3, 4)	2.25
RC-791	CAPACITOR—.01 mfd., 250 V A.C. (C-54)	.30
RC-8098	CABLE—Tuning indicator cable	.50
RC-8099	CABLE—Speaker cable and plug	.50
*RC-863	CORD—Power cord	.65
RG-016	GRID CLIP—Control grid clip (Pkg. 5)	.10
RK-027	KNOB—Winged control knob (Pkg. 5)	.50
RK-028	KNOB—Plain control knob (Pkg. 5)	.30
RL-061	COIL—Antenna coil bands "B" and "D"	1.15
RL-265	COIL—Oscillator coil bands "B" and "D"	1.75
RL-603	COIL—Wave trap coil (L-1)	.60
*RQ-1219	RESISTOR—22 ohm, ½-W. carbon (R-16) (Pkg. 5)	.70
*RQ-1275	RESISTOR—4,700 ohm, ½-W. carbon (R-2) (Pkg. 5)	.70
*RQ-1295	RESISTOR—33,000 ohm, ½-W. carbon (R-14) (Pkg. 5)	.70
*RQ-1299	RESISTOR—47,000 ohm, ½-W. carbon (R-1) (Pkg. 5)	.70
*RQ-1319	RESISTOR—330,000 ohm, ½-W. carbon (R-11, 12) (Pkg. 5)	.70
*RQ-1323	RESISTOR—470,000 ohm, ½-W. carbon (R-9) (Pkg. 5)	.70
*RQ-1331	RESISTOR—1.0 megohm, ½-W. carbon (R-24) (Pkg. 5)	.70
*RQ-1335	RESISTOR—1.5 megohm, ½-W. carbon (R-5) (Pkg. 5)	.70
*RQ-1339	RESISTOR—2.2 megohm, ½-W. carbon (R-10, 23) (Pkg. 5)	.70
*RQ-1355	RESISTOR—10 megohm, ½-W. carbon (R-4) (Pkg. 5)	.70
*RQ-1447	RESISTOR—330 ohm, 1-W. carbon (R-17)	$0.20
*RQ-1473	RESISTOR—3900 ohm, 1-W carbon (R-15)	.20
*RQ-1489	RESISTOR—18,000 ohm, 1-W. carbon (R-3)	.20
*	.00 SOCKET—Octal base tube socket (Pkg. 5)	.75
*RS-204	SOCKET—Rectifier tube socket (Pkg. 5)	.75
*RS-218	SOCKET—Lamp socket assembly	.10
*RS-223	SOCKET—Socket for 6A8G (Pkg. 5)	.80
RS-360	SWITCH—Tone control switch (S-2)	.35
RS-391	SWITCH—Band change switch (S-1)	.90
RT-0712	TRANSFORMER—Power transformer (50–60 cycles) (T-1)	5.30
RT-0713	TRANSFORMER—Power transformer (25 cycles) (T-1)	8.10
RT-0518	TRANSFORMER—Power transformer—Universal (T-1)	9.00
RT-259	TRANSFORMER—2nd I.F. transformer (complete)	1.40
RT-260	TRANSFORMER—1st I.F. transformer (complete)	1.15
RT-438	TRANSFORMER—Output transformer (T-2)	1.70
RV-040	VOLUME CONTROL—2 meg. volume control and power switch (R-22, S-3)	.95
*RW-101	WASHER—Felt washers for control knobs (Pkg. 10)	.45
RX-046	ASSEMBLY—Gang condenser mounting assembly	.20
*RX-015	ASSEMBLY—Chassis mounting assembly	.10
	SPEAKER ASSEMBLY	
RC-932	CONE—12-in. cone and voice coil assembly	1.10
RD-301	DUST CAP—Speaker dust cap (Pkg. 5)	.10
RP-015	PLUG—Male speaker plug	.20
RS-096	SPEAKER—12-in. speaker (less output transformer)	6.00
RX-047	ASSEMBLY—Speaker nuts and washers	.05
	TOUCH-TUNING AND DIAL SCALE MECHANISM	
RB-617	BUTTON—Molded push button (Pkg. 5)	.45
RC-8033	CARD—Station letter card (set)	.20
RC-8034	CORD—Drive cord (Pkg. 5)	.70
RD-070	DRUM—Condenser drive drum	.20
RD-204	DRIVE—Drive shaft	.15
RE-028	ESCUTCHEON—Dial scale escutcheon	1.60
RE-046	ESCUTCHEON—Tuning indicator escutcheon	.25
*RP-075	PULLEY—Pointer drive cord pulley (Pkg. 5)	.20
RP-108	POINTER—Dial scale pointer	.15
RS-392	SWITCH—Touch-tuning switch (less trimmer strips)	2.35
*RS-432	SPRING—Drive cord tension spring (Pkg. 5)	.20
RS-444	SPRING—Spring for molded push button (Pkg. 10)	.10
RT-852	TRIMMER STRIP—Push button trimmer strip; osc. section	1.05
RT-853	TRIMMER STRIP—Push button trimmer strip; R.F. section	1.05
RW-027	WINDOW—Celluloid station letter window (Pkg. 25)	.60

*Used on previous receivers

(Prices subject to change without notice)

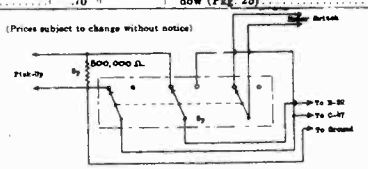


Fig. 1. Pick-up Connections

GENERAL ELECTRIC CO.

MODEL G78
Schematic, Socket, Trimmers
Chassis Wiring, Voltage

SOCKET VOLTAGES

Tube No.	6A8G	6SK7	6SF5	76	6AC5G	5Y3G
Plate to Gnd. Volts	Conv.-210 Osc.-165	215	*100	245	225	310/310 RMS
Screen to Gnd. Volts	100	100	...	...	...	
Cathode to Gnd. Volts	0	0	3.0	8.0	4.7	315
Cathode Current MA	12.0	9.0	0.3	6.0	33.5	71
Filament Volts	6.4	6.4	6.4	6.4	6.4	5.2

A-c line voltage 125—no signal input. Dial pointer set at 550 kc. on "B" band. *Measured on 500-volt scale.

MODEL G-78

Electrical Power Output

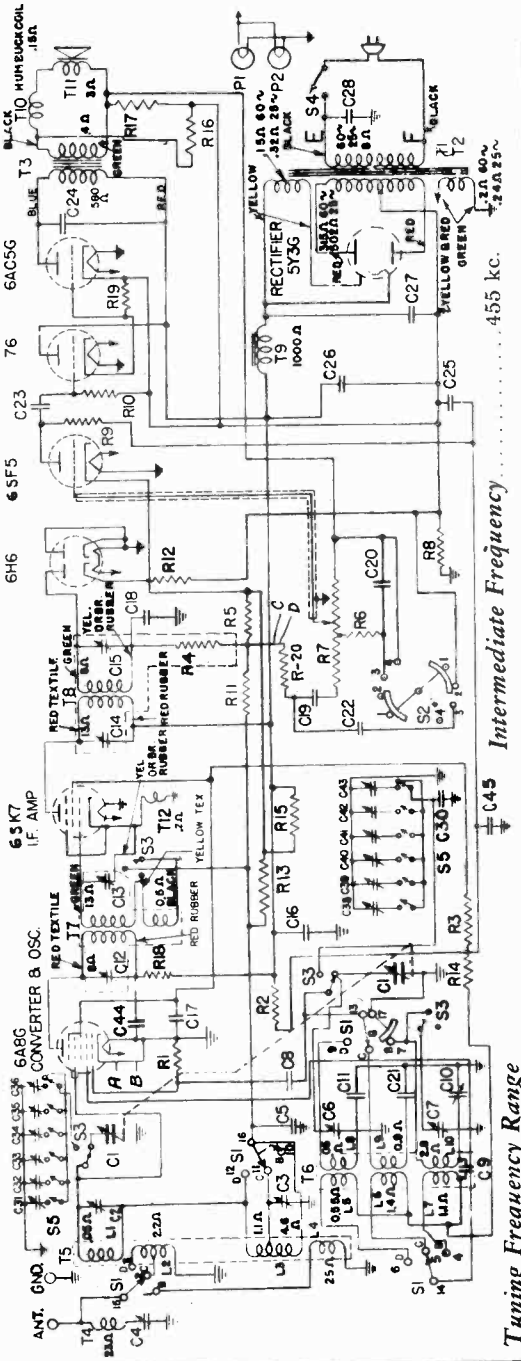
Undistorted ..... 3.0 watts
Maximum ..... 5.0 watts

Tone Control 4-position

Loud-speaker—Electrodynamic

Outside Cone Diameter ..... 12 inches
Voice Coil Impedance (400 Cycles) .. 3.5 ohms
Field Coil Resistance ..... 880 ohms (cold)

Symbol	Description
C1	Tuning condenser
C2, 3	Antenna trimmers
C4	Wave trap trimmer
C5	.1 mfd, paper capacitor
C6, 7	Oscillator trimmer
C8	50 mmf., mica capacitor
C9	.005 mfd., paper capacitor
C10	300–650 mmf., padder
C11	4300 mmf., mica capacitor
C16	.1 mfd., paper capacitor
C17	.05 mfd., paper capacitor
C18	47 mmf., mica capacitor
C19, 20	.003 mfd., paper capacitor
C21	1500 mmf., mica capacitor
C22	.0015 mfd., paper capacitor
C23	.005 mfd., paper capacitor
C24	.015 mfd., paper capacitor
C25	8 mfd., dry electrolytic
C26	8 mfd., dry electrolytic
C27	12 mfd., dry electrolytic
C28	.02 mfd., line capacitor
C30	20 mmf., compensating capacitor
C31-C36	Antenna trimmer strip
C38-C43	Oscillator trimmer strip
C44	.05 mfd., paper capacitor
C45	.1 mfd., paper capacitor
R1	47,000 ohm carbon resistor
R2	6800 ohm carbon resistor
R3	15,000 ohm carbon resistor
R4	47,000 ohm carbon resistor
R5	220,000 ohm carbon resistor
R6	180,000 ohm carbon resistor
R7	2.0 megohm volume control
R8	220 ohm carbon resistor
R9	220,000 ohm carbon resistor
R10	1.0 megohm carbon resistor
R11	2.2 megohm carbon resistor
R12	150 ohm carbon resistor
R13	3.3 megohm carbon resistor
R14	3300 ohm carbon resistor
R15	33,000 ohm carbon resistor
R16	100 ohm carbon resistor
R17	22 ohm carbon resistor
R18	6800 ohm carbon resistor
R19	22,000 ohm carbon resistor
R20	47,000 ohm carbon resistor
T1, T2	Power transformer
T3	Output transformer
T4	Wave trap coil
T5	Antenna coil
T6	Oscillator coil



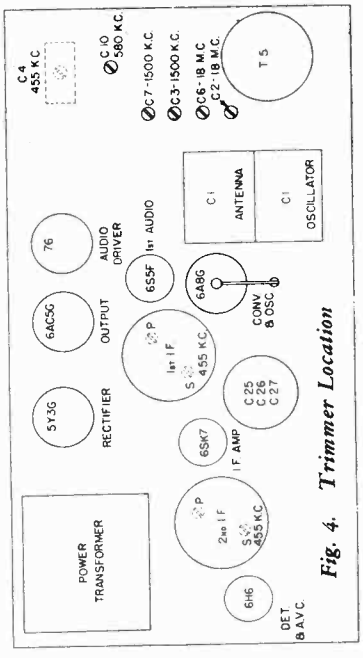


Fig. 4. *Trimmer Location*

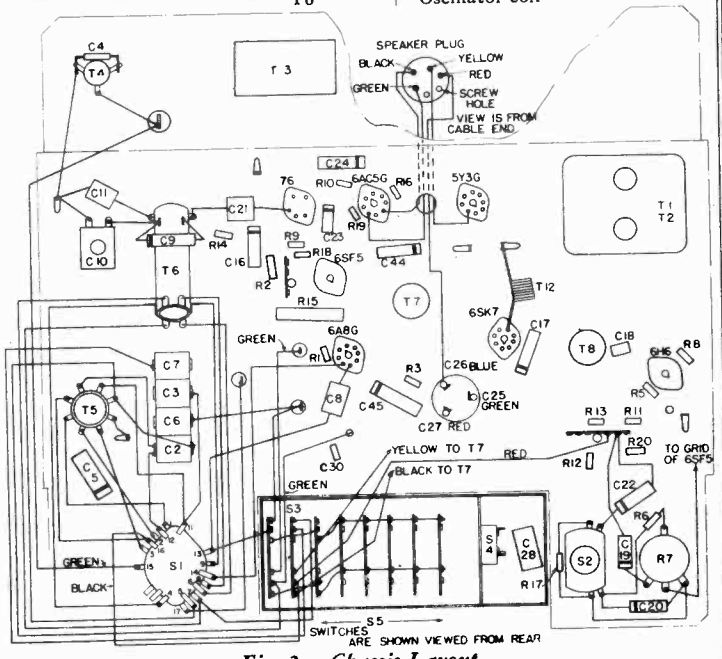


Fig. 3. *Chassis Layout*

SERVICE DATA

Physical Specifications

Model	G-78
Height	39⅞ inches
Width	27¾ inches
Depth	12¾ inches
Tuning Control Drive Ratio	13 to 1

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115–125	50–60	70
C	115–125	25–60	75

GENERAL INFORMATION

Coil System

T-5 and T-6 are the antenna and oscillator transformers respectively for the "B," "C," and "D" bands. All band switch terminals are numbered in Fig. 2 and Fig. 3 to facilitate circuit tracing by showing common points on the schematic diagram, Fig. 2 and the pictorial wiring diagram, Fig. 3.

The following table shows the coils in use for various positions of the band change switch.

Band Switch Position	Antenna Primary	Antenna Secondary	Oscillator Grid Coil	Oscillator Plate Coil	Remarks
Band "B"	L-4	L-1+L-3	L-10	L-7	
Band "C"	Part of L-2	L-1+Part of L-3	L-9	L-6	Part of L-3 shorted. L-10 shorted
Band "D"	L-2	L-1	L-8	L-5	L-9, L-10 shorted. L-3 shorted
Automatic Tuning	L-4	L-1+L-3	L-10	L-7	C-1 removed. Tuned by fixed trimmers

Loud-speaker

12-inch speaker—To center the voice coil, remove dust cover by softening with acetone. Loosen the two clamping screws and place three 1 in. by ¼ in. by 0.010 in. paper or celluloid strips equally spaced around pole piece for clearance—then tighten clamping screws. Remove strips and cement the dust cap back in place with Glyptal cement.

Phonograph Connections

Fig. 1 shows a simple sketch for connecting a crystal or high impedance magnetic pickup into the G-78 circuit for the reproduction of phonograph recordings. Sp is a rotary triple-pole, double-throw switch. A suitable loading circuit consisting of a resistor or resistor and capacitor network should be used across the pickup leads when using a crystal type unit. It is very important that the pickup leads have a shield such as copper braid to prevent hum interference. This lead should be connected to the chassis ground.

The 6A8G cathode circuit should be opened between A-B on the schematic. Also open the circuit between C-D in the diode circuit and make connections of phono switch as indicated in Fig. 1.

When the pickup is connected as suggested, the regular radio volume and tone controls work for both radio and phonograph reproduction. The following are suggested parts:

Symbol	Description	Stock No.
Sp	Triple-pole, double-throw switch	RS-3013
Rp	330,000-ohm carbon resistor	RQ-1319

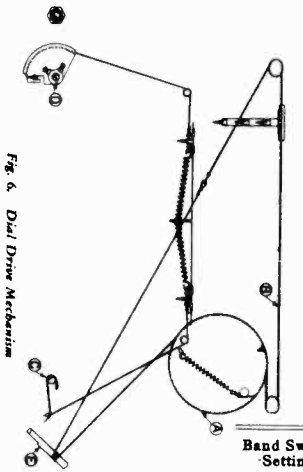


Fig. 6. Dial Drive Mechanism

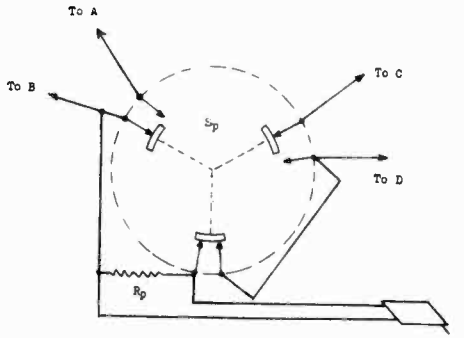


Fig. 1. Pickup Connections

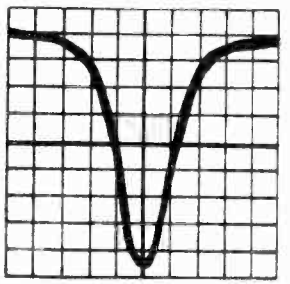


Fig. 5. Over-all I. F. curve taken on G-E oscilloscope OFM-1

Tubes:
Converter and Oscillator-GE-6A8G
IF Amplifier-GE-6SK7
Detector and AVC-GE-6H6
1st Audio-GE-6SF5
Driver --- GE-76
Power Output-GE-6AC5G
Rectifier-GE-5Y3G
Pilot Lamp (2) Mazda No. 44

MODEL G-78

ALIGNMENT PROCEDURE

I. F. ALIGNMENT WITH OSCILLOSCOPE

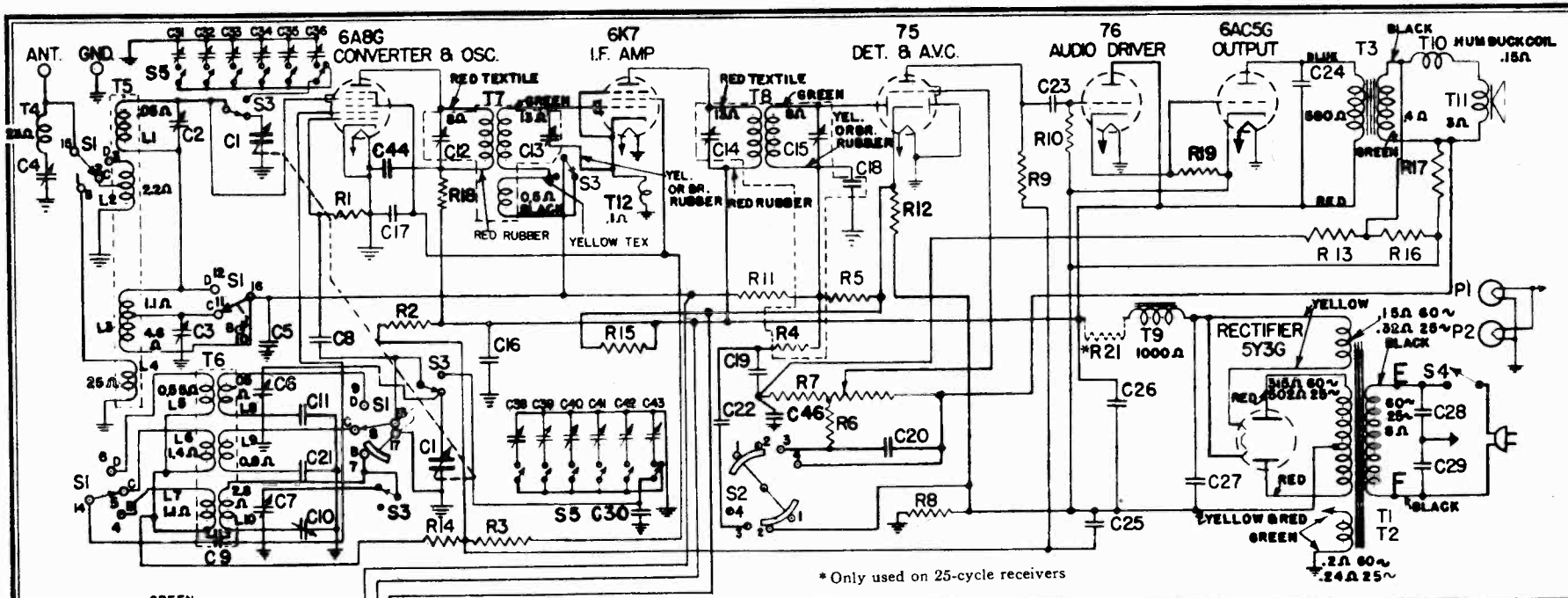
Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	455 K.C. Sweep	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-15) 2nd I.F. Pri. (C-14)	Gang condenser plates closed—"manual" key depressed—connect audio input of oscilloscope to ground and to the junction of C-19 and R-20 of the 2nd I.F. transformer. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. The resultant curve is shown in Fig. 5.
2. Band "B"	455 K.C. Sweep	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-13) 1st I.F. Pri. (C-12)	
3. Band "B"	455 K.C. Sweep	Antenna Post	250 Mmf. 200 ohms	Wave Trap Trimmer (C-4)	Adjust trimmer for minimum amplitude.

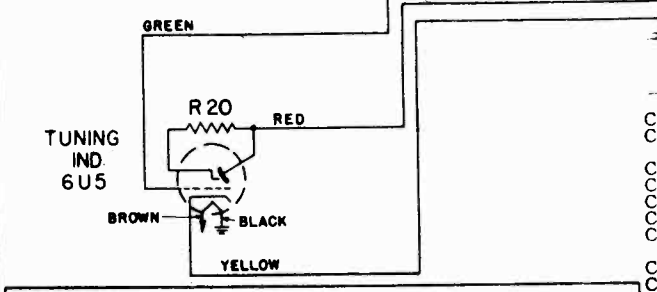
I. F. ALIGNMENT WITH OUTPUT METER

1. Band "B"	455 K.C. with Modulation	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-15) 2nd I.F. Pri. (C-14)	Gang condenser plates closed—connect output meter across voice coil—keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.
2. Band "B"	455 K.C. with Modulation	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-13) 1st I.F. Pri. (C-12)	
3. Band "B"	455 K.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Wave Trap Trimmer (C-4)	Adjust trimmer for minimum output.

R. F. ALIGNMENT

1. Band "B"					Close gang plates—adjust pointer to first line at left end of tuning scale.
2. Band "D"	18 M.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Osc. (C-6) Ant. (C-2)	Connect output meter across voice coil—tone control on "Bass" position. The image of any "D" band signal should be heard 930 K.C. below signal input when (C-6) is on proper peak. Example: 15 M.C. image—14.09 M.C. Peak (C-2) while rocking the gang condenser.
3. Band "C"	No adjustments necessary.				
4. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Osc. (C-7) Ant. (C-3)	Peak trimmers for maximum output with a low input signal.
5. Band "B"	580 K.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Osc. Padder (C-10)	Adjust padder for maximum output in vicinity of 580 K.C. while rocking the gang condenser.
6. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Osc. (3-7) Ant. (C-3)	Retrim for maximum output with a low input signal.





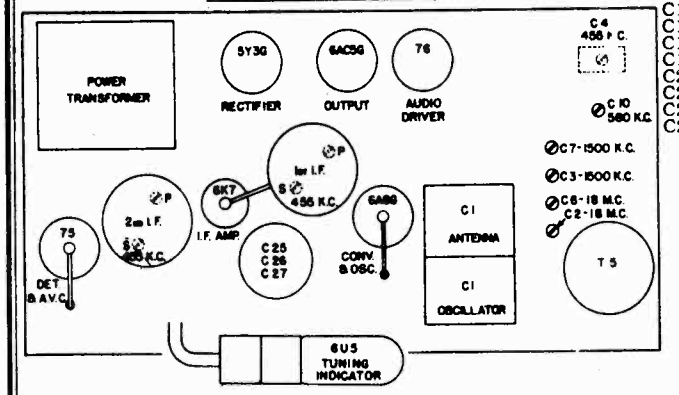


Fig. 1. Trimmer Location

Symbol	Description	Symbol	Description	Symbol	Description
C1	450 mmf. tuning condenser	C25	8 mfd. dry electrolytic	R9	220,000 ohm carbon resistor
C2, C3, C6, C7	Ant. and osc. trimmer capacitors	C26	8 mfd. dry electrolytic	R10	1.0 megohm carbon resistor
		C27	12 mfd. dry electrolytic	R11	2.2 megohm carbon resistor
C4	Wave trap capacitor	C28, C29	.01 mfd. line capacitor	R12	150 ohm carbon resistor
C5	.1 mfd. paper capacitor	C30	20 mmf. compensating capacitor	R13	2.2 megohm carbon resistor
C8	50 mmf. mica capacitor			R14	3300 ohm carbon resistor
C9	.005 mfd. paper capacitor	C31-C36	Automatic tuning trimmers	R15	33,000 ohm carbon resistor
C10	300–650 mmf. padder capacitor	C38-C43	Automatic tuning trimmers	R16	47 ohm carbon resistor
		C44	.05 mfd. paper capacitor	R17	22 ohm carbon resistor
C11	4300 mmf. mica capacitor	C46	100 mmf. mica capacitor	R18	6800 ohm carbon resistor
C16	.1 mfd. paper capacitor	R1	47,000 ohm carbon resistor	R19	22,000 ohm carbon resistor
C17	.05 mfd. paper capacitor	R2	6,800 ohm carbon resistor	R20	1.0 megohm carbon resistor
C18	47 mmf. mica capacitor	R3	22,000 ohm carbon resistor	R21*	470 ohm carbon resistor
C19, C20	.003 mfd. paper capacitor	R4	47,000 ohm carbon resistor	S1	Band change switch
C21	1500 mmf. mica capacitor	R5	220,000 ohm carbon resistor	S2	Tone control switch
C22	.0015 mfd. paper capacitor	R6	180,000 ohm carbon resistor	T1 T2	Power transformer
C23	.005 mfd. paper capacitor	R7	2.0 megohm volume control	T3	Output transformer
C24	.02 mfd. paper capacitor	R8	270 ohm carbon resistor	T4	Wave trap coil

Align the I.F. at 455 K.C. by visual or output meter method.

Align wave trap trimmer C-4 at 455 K.C. by peaking for a minimum output.

Band change switch on "D" band, align C-6 at 18 M.C. Rock the gang condenser when peaking C-2 for maximum output. The image of any signal on the "D" band should be heard 910 K.C. below input signal. Example: 18 M.C. image at 17.09 M.C.

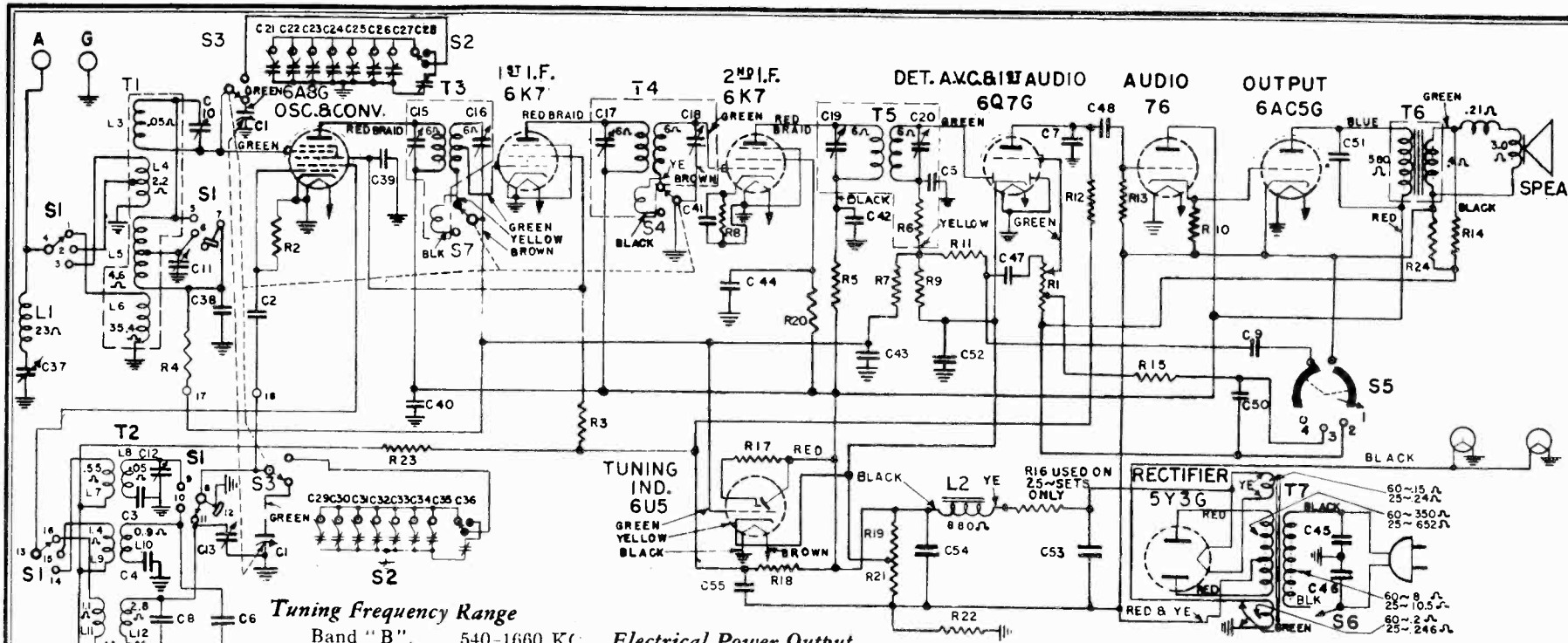
On Broadcast band, align trimmers C-7 and C-3 at 1500 K.C. Align C-10 at 580 K.C. while rocking the gang condenser.

ALIGNMENT

I.F.	"D" Band
455 K.C.	18.0 M.C.

"B" Band

1500 K.C. and 580 K.C.



C1	Tuning Condenser	C44	.05 mfd 400 V. Paper Capacitor	R15	120,000 ohm, Car. Resistor
C2	50 mmf Mica Capacitor	C45	.01 mfd 250 V.—Ac Line Capacitor	R16	470 ohm, 3 watt, Car. Resistor
C3	3900 mmf Mica Capacitor	C46	.01 mfd 250 V.—Ac Line Capacitor	R17	1.0 megohm, Car. Resistor
C4	1200 mmf Mica Capacitor	C47	.003 mfd 600 V. Paper Capacitor	R18	6800 ohm, Car. Resistor
C5	47 mmf Mica Capacitor	C48	.005 mfd 600 V. Paper Capacitor	R19	39,000 ohm, 2 watt, Car. Resistor
C6	6 mmf Mica Capacitor	C49	.005 mfd 600 V. Paper Capacitor	R20	82,000 ohm, Car. Resistor
C7	47 mmf Mica Capacitor	C50	.004 mfd 600 V. Paper Capacitor	R21	150 ohm, Car. Resistor
C8	20 mmf Compensating Capacitor	C51	.02 mfd 600 V. Paper Capacitor	R22	180 ohm, Car. Resistor
C9	.0012 mf 600 V. Paper Capacitor	C52	0.1 mfd 100 V. Paper Capacitor	R23	3300 ohm, Car. Resistor
C10	3-20 mmf "D" Ant. Trimmer	C53	12 mfd 450 V., Dry Electro	R24	22 ohm, Car. Resistor
C11	3-20 mmf "B" Ant. Trimmer	C54	8 mfd 400 V., Dry Electro		
C12	3-20 mmf "D" Osc. Trimmer	C55	8 mfd 200 V., Dry Electro	S1	Band Change Switch
C13	3-30 mmf "B" Osc. Trimmer			S2	Station Selector Switch
C14	300-650 mmf. "B" Padder	L1	Wave Trap Coil	S3	Man.-Auto. Switch
C15	200-400 mmf. 1st I.F. Pri. Trimmer			S4	I.F. Band Expansion Switch on S-3 1st
C16	200-400 mmf 1st I.F. Sec. Trimmer	R1	2 megohm, Volume Control	S5	Tone Control
C17	200-400 mmf 2nd I.F. Pri. Trimmer	R2	47,000 ohm, Car. Resistor	S6	Power Switch on S-3
C18	200-400 mmf 2nd I.F. Sec. Trimmer	R3	15,000 ohm, Car. Resistor	S7	I.F. Band Expansion Switch on S-3 (2nd
C19	200-400 mmf 3rd I.F. Pri. Trimmer	R4	470,000 ohm, Car. Resistor	SPKR	Speaker 12 in.
C20	200-400 mmf 3rd I.F. Sec. Trimmer	R5	1,000 ohm, Car. Resistor		
C21-C28	Antenna Trimmer Strip	R6	47,000 ohm, Car. Resistor	T1	Antenna Transformer
C29-C36	Oscillator Trimmer Strip	R7	2.2 megohm, Car. Resistor	T2	Oscillator Transformer
C37	30-70 mmf Wave Trap Trimmer	R8	1,000 ohm, Car. Resistor	T3	1st I.F. Transformer
C38	.05 mfd 200 V. Paper Capacitor	R9	220,000 ohm, Car. Resistor	T4	2nd I.F. Transformer
C39	.05 mfd 400 V. Paper Capacitor	R10	22,000 ohm, Car. Resistor	T5	3rd I.F. Transformer
C40	0.1 mfd 400 V. Paper Capacitor	R11	82,000 ohm, Car. Resistor	T6	Output Transformer
C41	0.1 mfd 100 V. Paper Capacitor	R12	220,000 ohm, Car. Resistor	T7	50-60 Power Transformer
C42	.05 mfd 400 V. Paper Capacitor	R13	1,000,000 ohm, Car. Resistor	T8	25-60 Power Transformer
C43	.05 mfd 200 V. Paper Capacitor	R14	82 ohm, Car. Resistor		

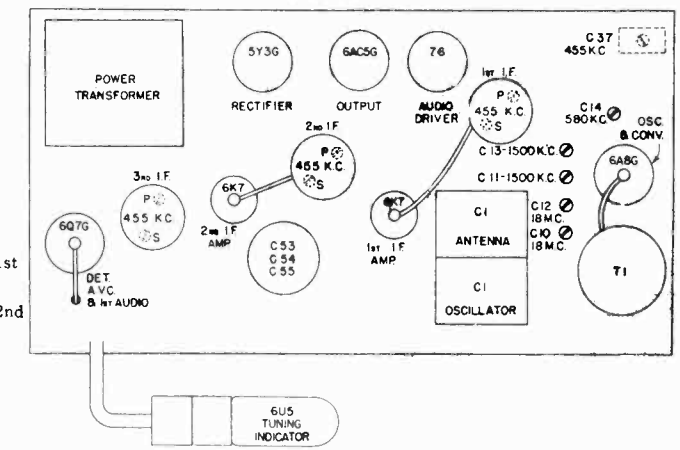


Fig. 6. Chassis Layout and Trimmer Location

Dial Mechanism

MODEL G85

GENERAL ELECTRIC CO.

Chassis Wiring, Coil Data

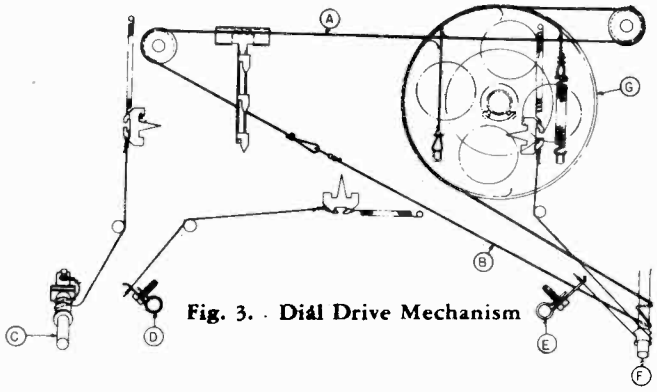


Fig. 3. Dial Drive Mechanism

Band Switch Position	Antenna Primary	Antenna Secondary	Oscillator Grid Coil	Oscillator Plate Coil	Remarks
Band "B"	L-6	L-3 + L-5	L-12	L-11	
Band "C"	Part of L-4	L-3 + L-5	L-10	L-9	Lower portion of L-5 shorted
Band "D"	L-4	L-3	L-8	L-7	L-5 shorted
Automatic Tuning	L-6	L-3 + L-5	L-12	L-11	Condenser C-1 removed. Tuned by fixed trimmers

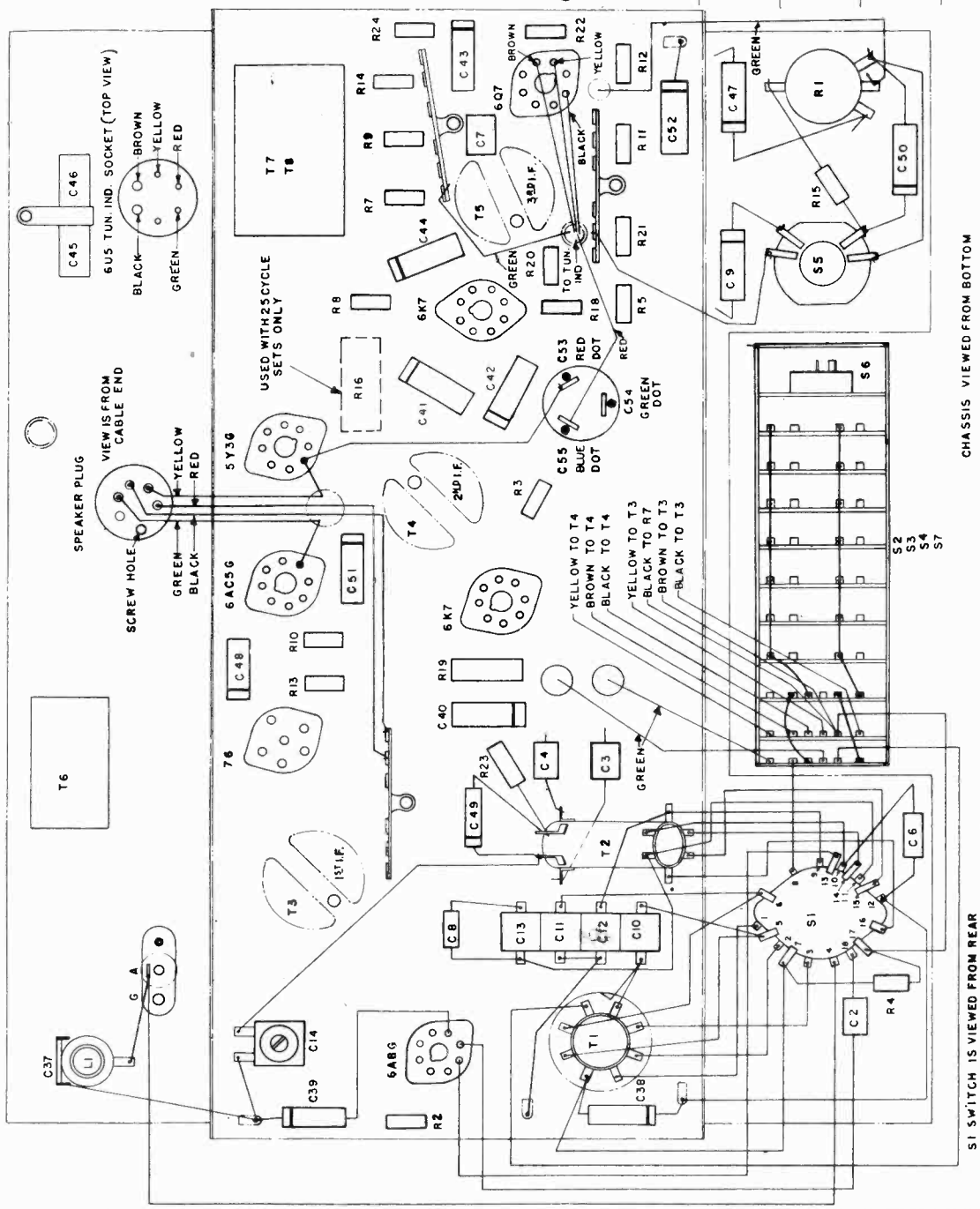


Fig. 4. Chassis Parts Layout

Coil System

The "B," "C" and "D" band antenna coils are wound on a single coil form, T-1 as shown in Fig. 2. T-2 is the oscillator transformer for all three bands. All switch points are numbered in Fig. 2 to facilitate in locating these switch points on the pictorial wiring diagram Fig. 4.

The following table gives the coils in use for the various positions of the wave change switch.

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Volts)
A	115 125	50-60	70
C	115 125	25 60	75

ALIGNMENT PROCEDURE

I.F. Alignment with Oscilloscope

Band Switch Setting	Input Frequency	Point of Input	Dummy Ant.	Trimmer	Remarks
1. Band "B"	455 K.C. Sweep	2nd I.F. Grid	.05 Mfd.	3rd I.F. Sec. (C-20) Pri. (C-19)	Manual key depressed—gang condenser plates closed—connect vertical input of oscilloscope to ground and the junction of R-9 and R-11 on 3rd I.F. transformer. Adjust trimmers for a single symmetrical curve of maximum amplitude. The resulting curve with input at converter grid is shown in Fig. 5.
2. Band "B"	455 K.C. Sweep	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-18) Pri. (C-17)	
3. Band "B"	455 K.C. Sweep	Converter Grid	.05 Mfd.	1st I.F. Sec. (C-16) Pri. (C-15)	
4. Band "B"	455 K.C. Sweep	Antenna Post	250 Mmf. 200 Ohms	Wave trap trimmer (C-37)	Adjust trimmer for minimum amplitude.

I.F. Alignment with Output Meter

1. Band "B"	455 K.C. with Modulation	2nd I.F. Grid	.05 Mfd.	3rd I.F. Sec. (C-20) Pri. (C-19)	Manual key depressed—gang condenser plates closed—connect output meter across voice coil—keep input signal low and volume control at maximum. Adjust all trimmers in order mentioned for maximum output. Do not attempt an overall realignment after stage by stage alignment has been accomplished.
2. Band "B"	455 K.C. with Modulation	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-18) Pri. (C-17)	
3. Band "B"	455 K.C. with Modulation	Converter Grid	.05 Mfd.	1st I.F. Sec. (C-16) Pri. (C-15)	
4. Band "B"	455 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Wave trap trimmer (C-37)	Adjust trimmer for minimum output.

R.F. Alignment

1. Band "B"					Close gang plates—adjust pointer to first line at left end of tuning scale.
2. Band "D"	18 M.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. (C-12) Ant. (C-10)	Connect output meter across voice coil—manual key depressed. The image of any "D" band signal should be heard 930 K.C. below input signal when (C-12) is on proper peak. Example: 15 M.C. image—14.09 K.C. Peak (C-10) while rocking the gang condenser.
3. Band "C"	No adjustment necessary				
4. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. (C-13) Ant. (C-11)	Peak trimmers for maximum output with a low input signal.
5. Band "B"	580 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. padder (C-14)	Adjust padder for maximum output in vicinity of 580 K.C. while rocking the gang condenser.
6. Band "B"	Repeat operation 4				

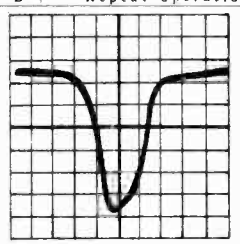


Fig. 5. Overall IF Curve Taken on G-E Oscilloscope OFM-1

Socket voltages taken at 120 volt line—No signal input. —1000 ohms per volt meter—Dial pointer at 550 K.C. on "B" band.

VOLTAGE CHART

Tube No.	Plate to Gnd. Volts D.C.	Screen to Gnd. Volts D.C.	Cathode to Gnd. Volts D.C.	Filament Volts
6A8G	240 Conv. 150 Osc.	97	0	6.4
6K7	240	97	0	6.4
6K7	230	105	5.1	6.4
6Q7G	102		3.0	6.4
76	230		7.5	6.4
6AC5G	230		4.5	6.4
6U5	240		3.0	6.4
5Y3G	306/306 A.C. RMS.		310	5.1

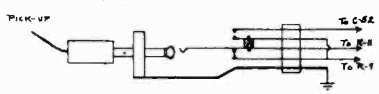


Fig. 1. Phonograph Connections

Phonograph Connections

Fig. 1 shows a simple sketch for connecting a crystal or high impedance magnetic pick-up into the G-85 circuit for the reproduction of phonograph recording. This method uses a two circuit jack and is connected into the receiver by opening the circuit between R-11 and the junction of R-7 and R-9; connecting the jack terminals as shown. A telephone plug is attached to the pick-up leads; and for phonograph operation, it is merely necessary to insert it into the jack. The jack may be mounted on the rear chassis deck and all connecting leads should be properly shielded to prevent interference.

When the pick-up is connected as suggested, the regular radio volume and tone controls work for both radio and phonograph reproduction.

Note—A suitable loading circuit consisting of a 300,000 ohm resistor should be connected across the pick-up leads when using a crystal type unit.

Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
*RB-017	BOARD—Terminal board (1 lug)	$0.10
*RB-026	BOARD—Ant. Grd. terminal board	.10
*RB-062	BOARD—Terminal board (6 lug)	.10
RC-012	CAPACITOR—.0012 mfd., 600 V. paper (C-9)	.25
*RC-023	CAPACITOR—.005 mfd., 600 V. paper (C-48, 49)	.25
*RC-048	CAPACITOR—.02 mfd., 600 V. paper (C-51)	.30
*RC-049	CAPACITOR—.004 mfd., 600 V. paper (C-50)	.35
*RC-055	CAPACITOR—.003 mfd., 600 V. paper (C-47)	.25
*RC-092	CAPACITOR—.05 mfd., 600 V. paper (C-38, 39, 42, 43, 44)	.30
*RC-104	CAPACITOR—.1 mfd., 600 V. paper (C-40, 41, 52)	.30
*RC-206	CAPACITOR—50 mmf., mica (C-2)	.35
RC-218	CAPACITOR—47 mmf., mica (C-5, 7)	.25
RC-220	CAPACITOR—6 mmf., mica (C-6)	.25
RC-230	CAPACITOR—20 mmf., compensating capacitor (C-8)	.35
RC-341	CAPACITOR—1200 mmf., mica (C-4)	.35
RC-390	CAPACITOR—3900 mmf., mica (C-3)	.35
RC-594	CAPACITOR—8 mfd., 400 V.; 8 mfd., 400 V.; 12 mfd., 450 V.; dry electrolytic (C-53, 54, 55)	1.60
RC-674	CAPACITOR—Wave trap trimmer (30-70 mmf.) (C-37)	.15
RC-676	CAPACITOR—300-650 mmf., "B" padder (C-14)	.35
RC-677	CAPACITOR—Antenna and oscillator trimmer (C-10, 11, 12, 13)	.55
RC-728	CONDENSER—2 gang tuning condenser (C-1)	2.95
*RC-754	CAPACITOR—.01-.01 mfd., 250 V. A.C. line capacitor (C-45, 46)	.40
*RC-863	CORD—Power cord	.65
RC-8035	CABLE—Speaker cable and plug	.50
RC-8054	CABLE—Tuning indicator cable and socket	.40
RD-205	DRIVE—Vernier drive bracket assembly	.35
RG-016	GRID CLIP—Control grid clip (pkg. of 5)	.10
RK-027	KNOB—Control knob (winged) (pkg. 5)	.50
RK-028	KNOB—Control knob (plain) (pkg. 5)	.30
RL-062	COIL—Ant. coil assembly	1.50
RL-266	COIL—Oscillator coil and bracket	1.30
RL-603	COIL—Wave trap coil (T-4)	.60
RQ-711	RESISTOR—470 ohm, 3 w. carbon (R-16) (Pkg. of 5)	.25
*RQ-1219	RESISTOR—22 ohm, ½ w. carbon (R-24) (pkg. 5)	.70
*RQ-1233	RESISTOR—82 ohm, ½ w. carbon (R-14) (pkg. 5)	.70
*RQ-1239	RESISTOR—150 ohm, ½ w., carbon (R-21) (pkg. 5)	.70
RQ-1241	RESISTOR—180 ohm ½ w. carbon (R-22) (pkg. 5)	.70
*RQ-1259	RESISTOR—1000 ohm, ½ w. carbon (R-5, 9) (pkg. 5)	.70
*RQ-1271	RESISTOR—3300 ohm, ½ w. carbon (R-23) (pkg. 5)	.70
*RQ-1279	RESISTOR—6800 ohm, ½ w. carbon (R-18) (pkg. 5)	.70
*RQ-1287	RESISTOR—15,000 ohm, ½ w. carbon (R-3) (pkg. 5)	.70
*RQ-1291	RESISTOR—33,000 ohm, ½ w. carbon (R-10) (pkg. 5)	.70
*RQ-1299	RESISTOR—47,000 ohm, ½ w. carbon (R-2, 8) (pkg. 5)	.70
RQ-1305	RESISTOR—82,000 ohm, ½ w. carbon (R-11, 20) (pkg. 5)	.70
*RQ-1309	RESISTOR—120,000 ohm, ½ w. carbon (R-15) (pkg. 5)	.70
*RQ-1315	RESISTOR—220,000 ohm, ½ w. carbon (R-9, 12) (pkg. 5)	.70
*RQ-1323	RESISTOR—470,000 ohm, ½ w. carbon (R-4) (pkg. 5)	.70
*RQ-1331	RESISTOR—1.0 megohm, ½ w. carbon (R-13, 17) (pkg. 5)	.70
*RQ-1339	RESISTOR—2.2 megohm, ½ w. carbon (R-7) (pkg. 5)	$0.70
*RR-281	RESISTOR—39,000 ohm, 2 w. carbon (R-19)	.30
RS-185	SHIELD—6A8G tube shield and base	.15
RS-188	SHIELD—Antenna coil shield	.20
*RS-200	SOCKET—Octal base tube socket (pkg. 5)	.75
*RS-204	SOCKET—Rectifier tube socket (pkg. 5)	.75
*RS-223	SOCKET—Octal base tube socket (pkg. 5)	.80
RS-224	SOCKET—Tube socket (76) (pkg. 5)	.50
RS-227	SOCKET—Octal base tube socket (6A8G)	.15
RS-394	SWITCH—Band change switch (S-1)	.95
RS-395	SWITCH—Tone control switch (S-2)	.55
RT-0711	TRANSPORMER—Power transformer (T-7) 120 V., 25-60 cy.	7.60
RT-0616	TRANSPORMER—Power transformer (T-7) 120 V., 50-60 cy.	4.60
RT-265	TRANSPORMER—3rd I.F. transformer	1.60
RT-266	TRANSPORMER—2nd I.F. transformer and shield	1.80
RT-267	TRANSPORMER—1st I.F. transformer and shield	1.90
RT-438	TRANSPORMER—Output transformer (T-3)	1.70
RV-051	VOLUME CONTROL—2 megohm volume control (R-1)	.80
*RW-101	WASHER—Felt washer for control shafts (pkg. 10)	.45
*RX-021	ASSEMBLY—Chassis mounting assembly	.10
RX-048	ASSEMBLY—Tuning condenser mounting assembly	.25
	SPEAKER ASSEMBLY	
RC-932	CONE—12-inch cone and V.C. assembly	1.10
*RC-991	CLAMP—Cone spider clamp	.05
RD-301	DUST CAP—Speaker cone dust cap (pkg. 5)	.10
RP-109	PLUG—Male speaker plug	.20
RS-073	SPEAKER—12-inch speaker	5.40
*RX-030	ASSEMBLY—Speaker mounting assembly	.10
	DIAL DRIVE MECHANISM	
*RB-152	BRACKET—Tone control indicator bracket (D)	.05
*RB-155	BRACKET—Band change bracket (E)	.05
RB-614	BUSHING—Volume control-drive bushing (C)	.15
RC-1977	CLAMP—Tuning indicator tube clamp and thumbscrews	.10
RC-8048	CORD—Volume indicator cord (pkg. 5)	.50
RC-8049	CORD—Tone indicator cords (pkg 5)	.50
RC-8050	CORD—Band change indicator cord (pkg. 5)	.50
RC-8051	CORD—Dial pointer drive cord (A) (B)	.20
*RD-013	DRUM—Condenser drive drum (G)	.35
RD-074	DIAL—Dial scale	2.70
RE-033	ESCUTCHEON—Dial scale escutcheon	1.65
RP-112	POINTER—Tone, band change and volume indicator pointer	.10
RP-113	POINTER—Dial scale pointer	.30
RP-303	PULLEY—Idler pulley (pkg. 2)	.10
RR-920	REFLECTOR—Lamp reflector assembly	.50
RS-187	SHIELD—Lamp shield (pkg. 10)	.05
*RS-218	SOCKET—Lamp socket assembly	.10
*RS-425	SPRING—Drive drum spring (pkg. 5)	.10
*RS-427	SPRING—Volume, tone, and band change cord spring (pkg. 5)	.20
	TOUCH TUNING ASSEMBLY	
RB-613	BUTTON—Molded push button (pkg. 5)	.35
RC-8036	CARDS—Station letter cards (set)	.25
RC-8052	CARDS—"Manual" tab cards (strip of 10)	.05
RC-8053	CARDS—"Off" tab cards (strip of 10)	.05
RE-032	ESCUTCHEON—Push button escutcheon	.50
RS-444	SPRING—Spring for push button (pkg. 10)	.10
RS-3002	SWITCH—Power switch	2.15
RS-3010	SWITCH—Push button switch (less trimmers)	3.90
RT-856	TRIMMER STRIP—Osc. trimmer strip (C-29, 30, 31, 32, 33, 34, 35, 36)	1.40
RT-857	TRIMMER STRIP—Antenna section trimmer strip (C-21, 22, 23, 24, 25, 26, 27, 28)	1.40
RW-021	WINDOWS—Celluloid station windows (pkg. 25)	.10

*Indicates parts used in previous production receivers.

(Prices subject to change without notice)

GENERAL ELECTRIC CO.

MODEL G86
Schematic, Voltage, Socket Trimmers

Tone Control
.....4 position

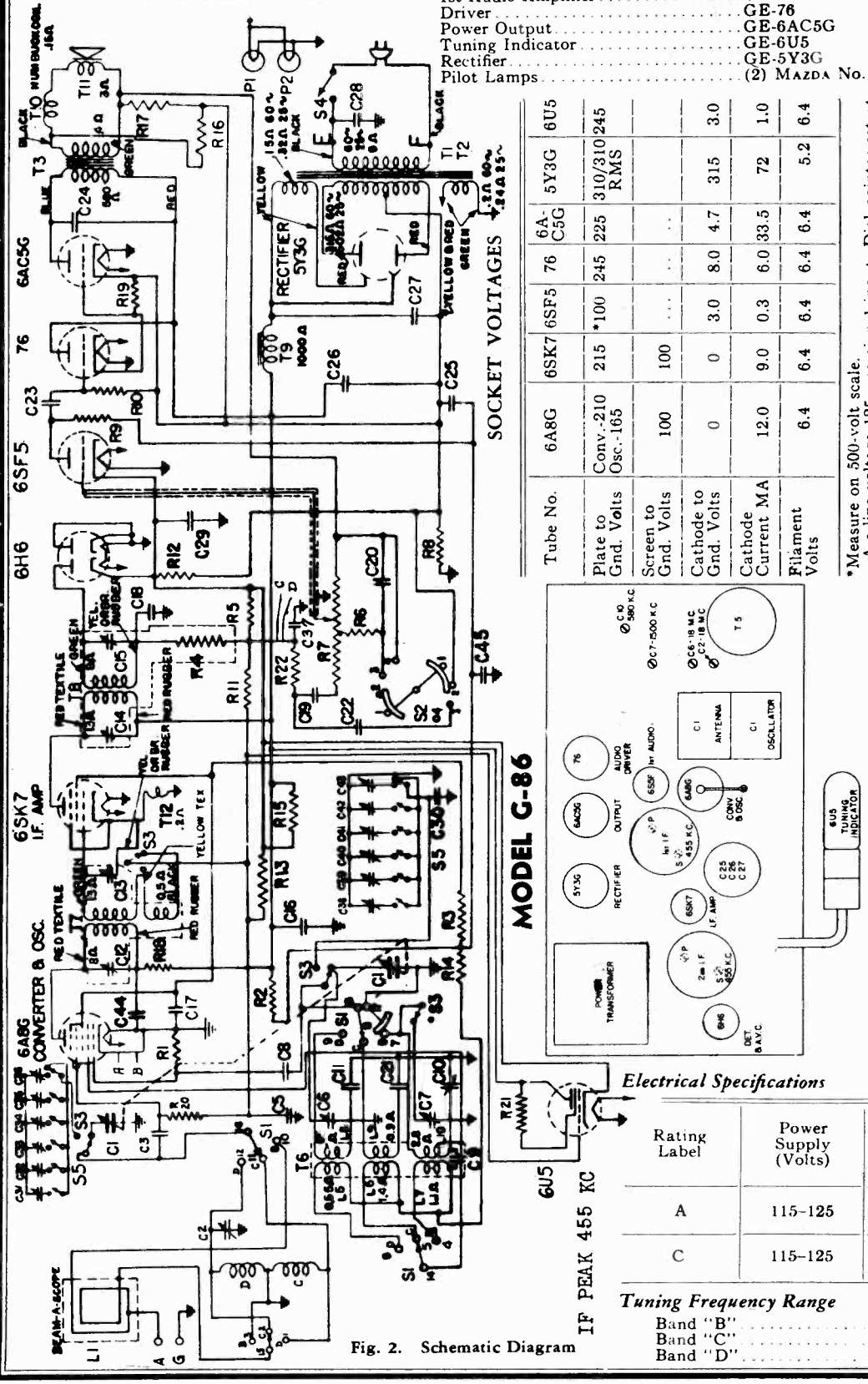
Intermediate Frequency
.....455 K.C.

Electrical Power Output
Undistorted.....3.0 watts
Maximum.....5.0 watts

Tubes

Oscillator and Converter	GE-6A8G
I.F. Amplifier	GE-6SK7
Detector and AVC	GE-6H6
1st Audio Amplifier	GE-6SF5
Driver	GE-76
Power Output	GE-6AC5G
Tuning Indicator	GE-6U5
Rectifier	GE-5Y3G
Pilot Lamps	(2) MAZDA No. 44

Loud-speaker—Electrodynamic
Outside Cone Diameter.....12 inches
Voice Coil Impedance (400 cycles)...3.5 ohms
Field Coil Resistance.....880 ohms (cold)



Tube No.	6A8G	6SK7	6SF5	76	6A-C5G	5Y3G	6U5
Plate to Gnd. Volts	Conv.-210 Osc.-165	215	*100	245	225	310/310 RMS	245
Screen to Gnd. Volts	100	100	....	....	....		
Cathode to Gnd. Volts	0	0	3.0	8.0	4.7	315	3.0
Cathode Current MA	12.0	9.0	0.3	6.0	33.5	72	1.0
Filament Volts	6.4	6.4	6.4	6.4	6.4	5.2	6.4

*Measure on 500-volt scale.
A-c line voltage 125—no signal input. Dial pointer set at 550 K.C. on "B" band.

Fig. 6. Chassis Layout and Trimmer Location

Symbol	Description	Symbol	Description	Symbol	Description	Symbol	Description
C1	450 mmf., tuning condenser	C22	.0015 mfd., paper capacitor	R1	47,000 ohm. carbon resistor	R15	33,000 ohm. carbon resistor
C2	3-20 mmf. ant. trimmer	C23	.005 mfd., paper capacitor	R2	6,800 ohm. carbon resistor	R16	100 ohm. carbon resistor
C3	150 mmf., mica capacitor	C24	.015 mfd., paper capacitor	R3	15,000 ohm. carbon resistor	R17	22 ohm. carbon resistor
C5	.1 mfd., paper capacitor	C25	.8 mfd., dry electrolytic	R4	47,000, carbon resistor	R18	6,800 ohm. carbon resistor
C6, C7	3-20 mmf., osc. trimmer	C26	.8 mfd., dry electrolytic	R5	220,000 ohm. carbon resistor	R19	22,000 ohm. carbon resistor
C8	50 mmf., mica capacitor	C27	12 mfd., dry electrolytic	R6	180,000 ohm. carbon resistor	R20	1.0 megohm. carbon resistor
C9	.005 mfd., paper capacitor	C28	.02 mfd., line capacitor	R7	2.0 megohm. volume control	R21	1.0 megohm. carbon resistor
C10	300-650 mmf. padder capacitor	C29	.1 mfd., paper capacitor	R8	220 ohm. carbon resistor	R22	47,000 ohm. carbon resistor
C11	4300 mmf., mica capacitor	C30	20 mmf., compensating capacitor	R9	220,000 ohm. carbon resistor	T1, T2	Power transformer
C16	.1 mfd., paper capacitor	C31, C38	Antenna trimmer strip	R10	1.0 megohm. carbon resistor	T3	Output transformer
C17	.05 mfd., paper capacitor	C37	47 mmf., mica capacitor	R11	2.2 megohm. carbon resistor	T6	Oscillator transformer
C18, 19, 20	47 mmf., mica capacitor	C38, C43	Oscillator trimmer strip	R12	150 ohm. carbon resistor	L1	Beam-a-scope antenna
C21	.003 mfd., paper capacitor	C44	.05 mfd., paper capacitor	R13	3.3 megohm. carbon resistor		
	1500 mmf., mica capacitor	C45	.1 mfd., paper capacitor	R14	3,300 ohm. carbon resistor		

Fig. 2. Schematic Diagram

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Volts)
A	115-125	50-60	70
C	115-125	25-60	75

Tuning Frequency Range
Band "B".....540-1600 K.C
Band "C".....1600-5700 K.C.
Band "D".....5700-18,000 K C.

MODEL G86
Alignment, Chassis Wiring
"Beam-A-Scope" Data, Dial
Phono. Data

GENERAL ELECTRIC CO.

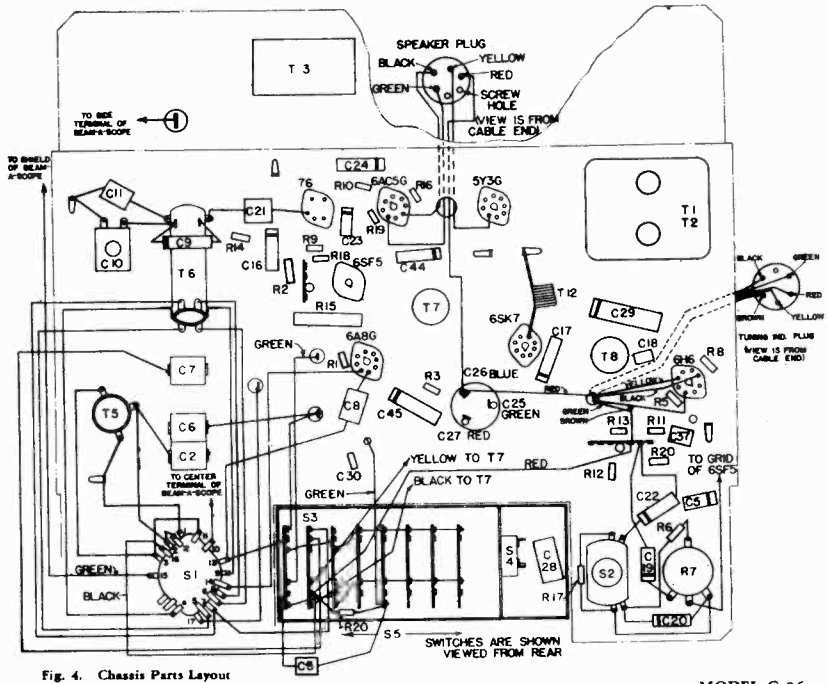


Fig. 4. Chassis Parts Layout

SERVICE DATA

Physical Specifications

Model	G-86
Height	42 inches
Width	29⅝ inches
Depth	14½ inches

Tuning Control Drive Ratio

13:1

GENERAL INFORMATION

The Model G-86 is a three-band A-C operated receiver, employing eight General Electric Pre-tested tubes in a superheterodyne circuit as described above. It incorporates a simplified trimmer tuned "Touch Tuning" system; and the new and exclusive self-contained antenna system, "Beam-a-Scope." Other features of design include I.F. band expansion when using Touch Tuning, degenerative audio feedback, and an improved dustproof electrodynamic speaker.

BEAM-A-SCOPE

The "Beam-a-Scope" is essentially a tuned coil antenna wound on an impregnated frame and shielded by a Paraday screen against electrostatic disturbances. This construction discriminates in favor of the desired signal as against a local man-made noise source in three ways. First, since any noise source is composed of two components—electrostatic and magnetic fields—the "Beam-a-Scope" may be revolved so that a null point is found where no voltage is produced from these two components in the direction where the noise originates. Due to the fact that this null point is very sharp, it is very unusual that any desired station will be in a direct line with the rejected noise signal and thereby have its signal strength reduced appreciably. In the second place, the "Beam-a-Scope" eliminates the external return path to ground present in the case of an unshielded antenna. This reduces or eliminates local man-made noise sources in much the same way as a shielded antenna lead-in does in an ordinary antenna installation. In the third place, the "Beam-a-Scope" discriminates against the electrostatic component of an incoming wave in comparison with the magnetic component, because of the Paraday shield. Since the electrostatic component of a local noise source is a great deal larger than the magnetic component, this rejection property brings about an enormous increase in signal-to-noise ratio.

The above operation is only available on the broadcast band and in this position the Beam-a-Scope is also the first tuned grid circuit. On the "C" and "D" bands, the Beam-a-Scope is connected to operate as a capacity type antenna. When an outside antenna is connected to the receiver, it is tapped in on the grid coil (Beam-a-Scope L-1) when operating on the "B" band. On the "C" and "D" bands the outside antenna is connected through the Beam-a-Scope to the "C" and "D" band primaries of the antenna coil.

Loud-speaker

To center the voice coil, remove the dust cover by softening with acetone. Loosen the two spider clamping screws and place three 1 in. by ¼ in. by 0.010 in. paper or celluloid strips equally spaced around pole piece for clearance; then tighten clamping screws. Remove centering strips and cement the dust cap in place with Glyptal cement.

Coil System

The "C" and "D" band antenna coils are wound on a single coil form as shown in Fig. 2, T-6 is the oscillator transformer for all three bands. All switch points are numbered in Fig. 2 and Fig. 4 to facilitate in service by showing common points on the schematic diagram, Fig. 2, and the pictorial wiring diagram, Fig. 4.

Phonograph Connections

Fig. 1 shows a simple sketch for connecting a crystal or high-impedance magnetic pick-up into the G-86 circuit for the reproduction of phonograph recordings. SP is a rotary triple-pole, double-throw switch. A suitable loading circuit consisting of a resistor or resistor and capacitor network should be used across the pick-up leads when using a crystal type unit. It is very important that the pick-up leads have a shield such as copper braid to prevent hum interference. This lead should be connected to chassis ground.

The 6A8G cathode circuit should be opened between A-B as shown on the schematic. Also open the circuit between C-D in the diode load and make connections to phonograph switch as indicated in Fig. 1.

When the pick-up is connected as suggested, the regular radio volume and tone controls work for both radio and phonograph reproduction. The following are suggested parts:

Symbol	Description	Stock No.
SP	Triple-pole, double-throw switch	RS-3013
RP	330,000-ohm carbon resistor	RQ-1319

ALIGNMENT PROCEDURE

MODEL G-86

I.F. Alignment with Oscilloscope

Band Switch Setting	Input Freq.	Point of Input	Dummy Antenna	Trimmer	Comments
1. Band "B"	455 K.C. Sweep	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-15) 2nd I.F. Pri. (C-14)	Gang condenser plates closed—"manual" key depressed—connect audio input of oscilloscope to ground and to the junction of R-11 and R-4 of the 2nd I.F. transformer. Adjust trimmers in order mentioned for a single symmetrical curve of maximum amplitude. The resultant curve is shown in Fig. 3. When a station key is depressed, this I.F. curve should expand considerably.
2. Band "B"	455 K.C. Sweep	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-13) 1st I.F. Pri. (C-12)	

I.F. Alignment with Output Meter

1. Band "B"	455 K.C. with Modulation	I.F. Grid	.05 Mfd. or Larger	2nd I.F. Sec. (C-15) 2nd I.F. Pri. (C-14)	Gang condenser plates closed—connect output meter across voice coil—keep input signal low and volume control on as far as possible. Adjust all trimmers for maximum output.
2 Band "B"	455 K.C. with Modulation	Converter Grid	.05 Mfd. or Larger	1st I.F. Sec. (C-13) 1st I.F. Pri. (C-12)	

R.F. Alignment

1. Band "B"					Close gang plates—adjust pointer to first line at left end of tuning scale.
2. Band "D"	18 M.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Osc. (C-6) Ant. (C-2)	Connect output meter across voice coil—tone control on "Bass" position. The image of any "D" band signal should be heard 910 K.C. below signal input when (C-6) is on proper peak. Example: 15 M.C. image—14.09 M.C. Peak (C-2) while rocking the gang condenser.
3. Band "C"	No adjustments necessary.				
4. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Osc. (C-7)	Peak oscillator trimmer C-7 for maximum output in vicinity of 1500 K.C. while rocking the gang condenser.
5. Band "B"	580 K.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Osc. Padder (C-10)	Adjust padder for maximum output in vicinity of 580 K.C. while rocking the gang condenser.
6. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 200 ohms	Osc. (C-7)	Retrim for maximum output as described in step No. 4.

Use a "dummy" antenna in making all alignments. The grid lead should not be removed from the tube to which the input signal is applied when aligning the I.F. amplifier.

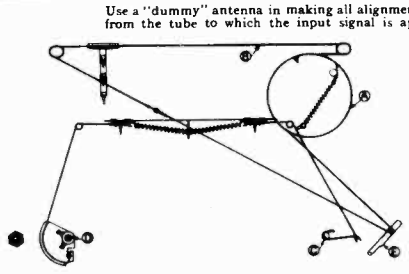


Fig. 3. Dial Drive Mechanism

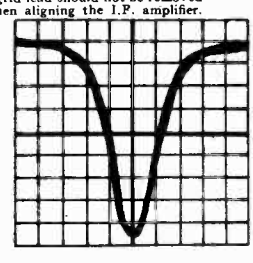


Fig. 5. Over-all I.F. Curve Taken on G-E Oscilloscope OFM-1

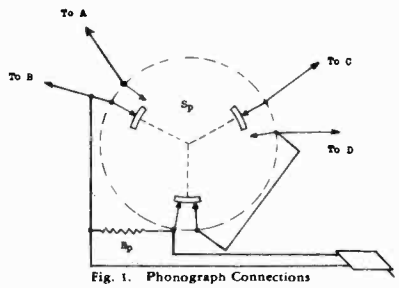


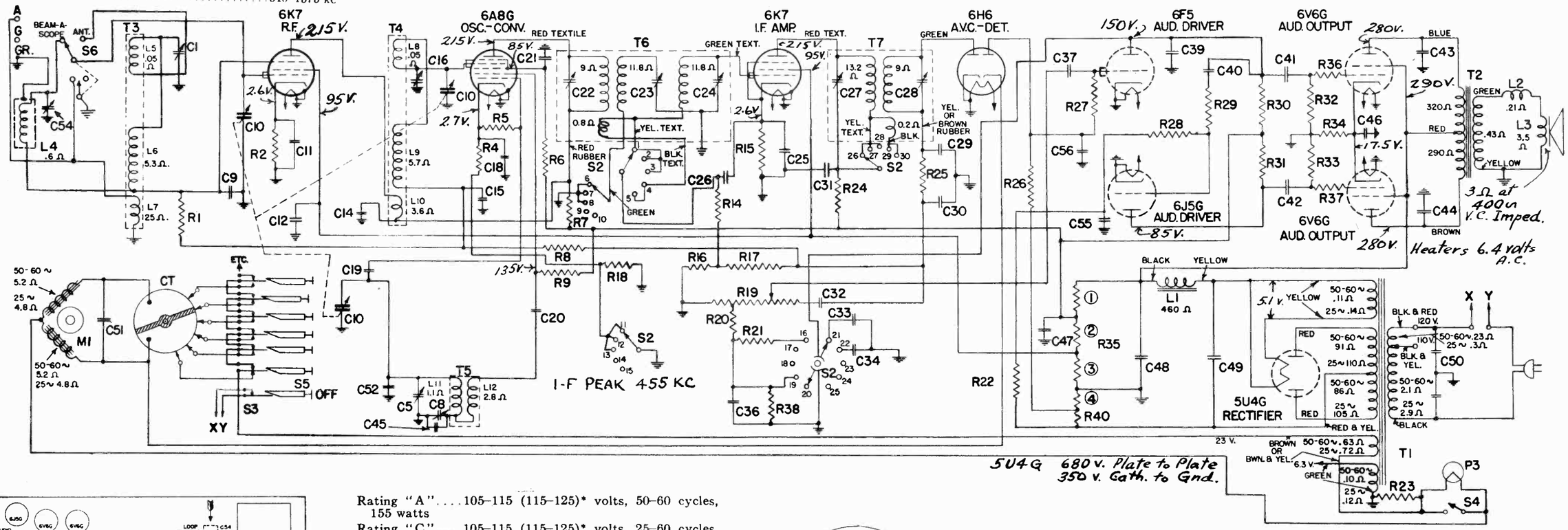
Fig. 1. Phonograph Connections

GENERAL ELECTRIC CO.

MODEL G95, Radioforte
Schematic, Chassis Wiring
Socket, Trimmers, Voltage

Tuning Frequency Range

Band "B" ..... 540–1575 kc



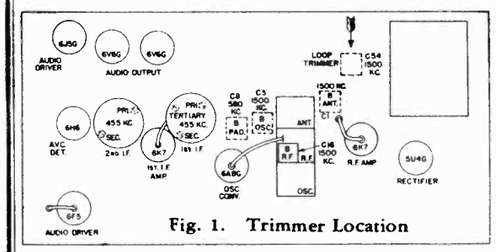
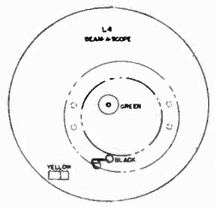


Fig. 1. Trimmer Location

Rating "A" .... 105–115 (115–125)* volts, 50–60 cycles, 155 watts

Rating "C" .... 105–115 (115–125)* volts, 25–60 cycles, 160 watts

* The receivers as shipped from the factory have the power cord connected to the 115–125-volt tap of the transformer (black and red lead). If the normal voltage of the power supply is always below 110 volts, the connection of the power cord should be removed from this lead and soldered to the 105–115-volt tap (black and yellow lead). After changing the connection, tape the soldered joint as well as the exposed end of the unused lead. This change requires removal of the chassis from the cabinet.



SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
R-1	220,000 Ohm Carbon Resistor	R-33	220,000 Ohm Carbon Resistor	C-24	50-135 MMF. 1st I.F. Tert. Trimmer	C-51	60 MFD. 40 V. A.C. Dry Electro.
R-2	330 Ohm Carbon Resistor	R-34	230 Ohm Resistor (W.W.)	C-25	.05 MFD. 200 V. Paper Capacitor	C-52	20 MMF. Compensating Capacitor
R-4	330 Ohm Carbon Resistor	R-35	4 Sections Voltage Divider	C-26	.05 MFD. 200 V. Paper Capacitor	C-54	2-20 MMF. Trimmer Capacitor
R-5	47,000 Ohm Carbon Resistor	(1)	1600 Ohms	C-27	50-135 MFF. 2nd I.F..Pri. Trimmer	C-55	.25 MFD. 200 V. Paper Capacitor
R-6	39,000 Ohm Carbon Resistor	(2)	9000 Ohms	C-28	100-230 MMF. 2nd I.F. Sec. Trimmer	C-56	.25 MFD. 200 V. Paper Capacitor
R-7	1,000 Ohm Carbon Resistor	(3)	9000 Ohms	C-29	150 MMF. Mica Capacitor	T-1	Power Transformer, 50-60 cycles,
R-8	1.8 Megohm Carbon Resistor	(4)	11 Ohms	C-30	150 MMF. Mica Capacitor		cycles
R-9	22,000 Ohm Carbon Resistor	R-36	1,000 Ohm Carbon Resistor	C-31	.05 MFD. 400 V. Paper Capacitor	T-2	Output Transformer
R-14	2.2 Megohm Carbon Resistor	R-37	1,000 Ohm Carbon Resistor	C-32	.02 MFD. 200 V. Paper Capacitor	T-3	Ant. Transformer
R-15	330 Ohm Carbon Resistor	R-38	470,000 Ohm Carbon Resistor	C-33	.0055 MFD. 600 V. Paper Capacitor	T-4	R.F. Transformer
R-16	56,000 Ohm Carbon Resistor	R-40	20 Ohm W.W. Resistor	C-34	.002 MFD. 600 V. Paper Capacitor	T-5	Osc. Transformer
R-17	220,000 Ohm Carbon Resistor	C-1	5–40 MMF. "B" Ant. Trimmer	C-35	.05 MFD. 200 V. Paper Capacitor	T-6	1st I.F. Transformer
R-18	330 Ohm Carbon Resistor	C-5	7–23 MMF. "B" Osc. Trimmer	C-36	.0055 MFD. 600 V. Paper Capacitor	T-7	2nd I.F. Transformer
R-19	2 Megohm, 1 Megohm Tap. Vol. Control	C-8	160–375 MMF. "B" Padder	C-37	.02 MFD. 200 V. Paper Capacitor	L-1	Field Coil 460 Ohms (cold)
R-20	68,000 Ohm Carbon Resistor	C-9	.05 MFD. 200 V. Paper Capacitor	C-39	270 MMF. Mica Capacitor	L-2	Hum Buck Coil
R-21	68,000 Ohm Carbon Resistor	C-10	10–450 MMF. Tuning Capacitor	C-40	.02 MFD. 400 V. Paper Capacitor	L-3	Voice Coil, 3.5 Ohms
R-22	1.2 Megohm Carbon Resistor	C-11	.05 MFD. 200 V. Paper Capacitor	C-41	.05 MFD. 400 V. Paper Capacitor	L-4	Beam-a-Scope
R-23	1,000 Ohm Carbon Resistor	C-12	.05 MFD. 200 V. Paper Capacitor	C-42	.05 MFD. 400 V. Paper Capacitor	CT	Contactor Assembly
R-24	1,000 Ohm Carbon Resistor	C-14	.1 MFD. 400 V. Paper Capacitor	C-43	.0015 MFD. 1500 V. Paper Capacitor	P-3	Tuning Lamp 25 V.—.2 Amps.
R-25	47,000 Ohm Carbon Resistor	C-15	.05 MFD. 200 V. Paper Capacitor	C-44	.0015 MFD. 1500 V. Paper Capacitor	S-2	Tone Control Switch
R-26	470,000 Ohm Carbon Resistor	C-16	5-30 MMF. "B" R.F. Trimmer	C-45	175 MMF. Compensating Capacitor	S-3	Power Supply Switch
R-27	1.5 Megohm Carbon Resistor	C-18	.05 MFD. 200 V. Paper Capacitor	C-46	25 MFD. 25 V. W.V. Dry Electro.	S-4	Tuning Lamp Switch
R-28	82,000 Ohm Carbon Resistor	C-19	50 MMF. Silver Plated Capacitor	C-47	10 MFD. 400 V. W.V. Dry Electro.	S-5	Station Selector Switch
R-29	1.2 Megohm Carbon Resistor	C-20	4,700 MMF. Mica Capacitor	C-48	30 MFD. 450 V. W.V. Wet Electro.	S-6	Beam-a-Scope—Ant. Switch
R-30	68,000 Ohm Carbon Resistor	C-21	.05 MFD. 400 V. Paper Capacitor	C-49	30 MFD. 450 V. W.V. Wet Electro.	M	Tuning Motor 23 V. 50-60 Cycles, 25
R-31	68,000 Ohm Carbon Resistor	C-22	100-230 MMF. 1st I.F. Pri. Trimmer	C-50	.01-.01 MFD. 250 V. A.C. Line Capacitor		Cycles
R-32	220,000 Ohm Carbon Resistor	C-23	50-135 MMF. 1st I.F. Sec. Trimmer				

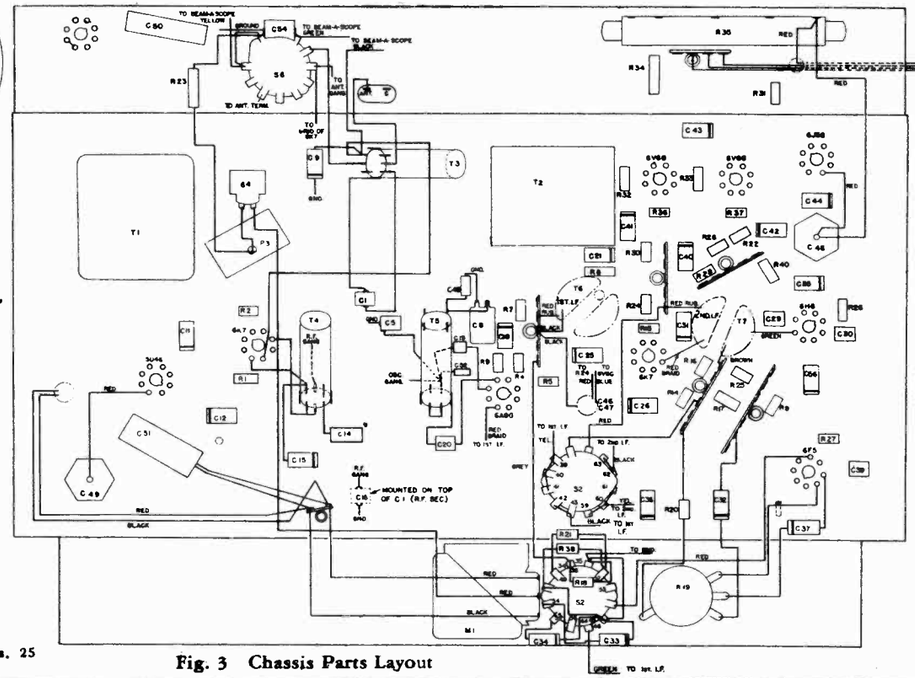


Fig. 3 Chassis Parts Layout

GENERAL ELECTRIC CO.

MODEL G95,Radioforte
Alignment,Phono.,Parts

Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
RS-396	SWITCH—Tone control switch (S-2)	1.35
RS-397	SWITCH—Station set-up lamp switch (S-4)	.20
RS-399	SWITCH—Antenna-Beam-a-Scope switch (S-6)	.85
RS-446	SPRING—Drive cord tension spring (K) (Pkg. of 5)	.25
RS-448	SPRING—Vol. control drive pulley spacer spring (C)	.05
RS-449	SPRING—Tone control drive cord tension spring (H)(Pkg. of 5)	.10
RC-006	CAPACITOR—.0015 mfd., 1500 V. paper (C-43, 44)	.25
*RC-011	CAPACITOR—.002 mfd., 600 V. paper (C-34)	.25
*RC-023	CAPACITOR—.005 mfd., 600 V. paper (C-36)	.25
RC-028	CAPACITOR—.006 mfd., 600 V. paper (C-33)	.30
*RC-048	CAPACITOR—.02 mfd., 600 V. paper (C-32, 37, 40)	.30
*RC-092	CAPACITOR—.05 mfd., 600 V. paper (C-9, 11, 12, 15, 18, 21, 25, 26, 31, 41 42)	.30
*RC-104	CAPACITOR—.1 mfd., 600 V. paper (C-14)	.30
*RC-136	CAPACITOR—.25 mfd., 200 V. paper (C-55, 56)	.30
RC-217	CAPACITOR—50 mmf., mica (silver plated) (C-19)	.35
RC-230	CAPACITOR—20 mmf., compensating capacitor (C-52)	.35
*RC-242	CAPACITOR—150 mmf., mica (C-29-30)	.25
RC-245	CAPACITOR—175 mmf., compensating capacitor (C-45)	.45
RC-263	CAPACITOR—270 mmf., mica (C-39)	.25
RC-393	CAPACITOR—4700 mmf., mica (silvered) (C-20)	.50
*RC-429	CAPACITOR—30 mfd., 450 V. wet electrolytic (C-48, 49)	1.35
RC-596	CAPACITOR—25 mfd., 25 V; 10 mfd., 400 V. dry electrolytic (C-46, 47)	1.10
RC-597	CAPACITOR—60 mfd., 40 V. A.C. motor capacitor (C-51)	1.00
*RC-672	CAPACITOR—5-35 mmf., R.F. trimmer (C-16)	.15
RC-678	CAPACITOR— mmf. "P" padder (C-8)	.30
RQ-1305	RESISTOR—82,000 ohm, ½-W. carbon (R-28) (Pkg. of 5)	$0.70
*RQ-1315	RESISTOR—220,000 ohm, ½-W. carbon (R-1, 17, 32, 33) (Pkg. of 5)	.70
*RQ-1323	RESISTOR—470,000 ohm, ½-W. carbon (R-26, 38) (Pkg. of 5)	.70
*RQ-1333	RESISTOR—1.2 megohm, ½-W. carbon (R-22, 29) (Pkg. of 5)	.70
*RQ-1335	RESISTOR—1.5 megohm, ½-W. carbon (R-27) (Pkg. of 5)	.70
*RQ-1337	RESISTOR—1.8 megohm, ½-W. carbon (R-8) (Pkg. of 5)	.70
*RQ-1339	RESISTOR—2.2 megohm, ½-W. carbon (R-14) (Pkg. of 5)	.70
RQ-1459	RESISTOR—1000 ohm, 1-W. carbon (R-23)	.20
RQ-1497	RESISTOR—39,000 ohm, 1-W. carbon (R-6)	.20
RR-740	RESISTOR—Voltage divider resistor (R-35)	.85
RR-1006	RESISTOR—20 ohm, ½-W. W.W. resistor (R-40) (Pkg. of 5)	.70
RR-1007	RESISTOR—230 ohm. 2-W. resistor (R-34)	.20
RS-509	SPACER—Volume control pulley spacers (Pkg. of 2)	.10
RS-911	SHAFT—Idler drive wheel shaft and collar	.15
RS-914	SHAFT—Tone or volume flexible drive shaft (A)	.35
RS-915	SHAFT—Vol. or tone drive shafts	.10
RT-104	TRANSFORMER—Power transformer, 105-125 V, 25-60 cycles (T-1)	14.75
RT-105	TRANSFORMER—Power transformer, 105-125 V. 50-60 cycles (T-1)	9.00
RT-263	TRANSFORMER—1st I.F. transformer and shield (T-6)	2.30
RC-679	CAPACITOR—2-20 mmf., trimmer (C-54)	$0.20
RC-681	CAPACITOR—7-23 mmf., "B" osc. trimmer (C-5)	.90
RC-683	CAPACITOR—5-40 mmf., ant. trimmer (C-1)	.35
RC-729	CONDENSER—3-gang tuning condenser (C-10)	5.80
*RC-755	CAPACITOR—.01-.01 mfd., line capacitor (C-50)	.40
*RC-863	CORD—Power cord	.65
RC-1980	COUPLER—Volume or tone control coupling unit (B)	.20
RC-8035	CABLE—Speaker cable and plug	.50
RC-8044	CABLE—Condenser drive cable (J) (Pkg. of 5)	.65
RC-8083	CABLE—Tone control drive cable (G)	.25
RC-8084	CABLE—Vol. control drive cable	.20
RG-016	GRID CLIP—Control grid clip (for metal tubes) (Pkg. of 5)	.10
RL-063	COIL—Ant. coil Band "B," "C," and "D" (T-3)	1.25
RL-142	COIL—R.F. coil Band "B," "C," and "D" (T-4)	1.15
RL-267	COIL—Osc. Coil Band "B," "C," and "D"	1.25
RL-500	BEAM-A-SCOPE—Beam-a-Scope Antenna (complete)	9.15
RM-112	MOTOR—Tuning motor, 50-60 cycles	4.00
RM-113	MOTOR—Tuning motor, 25 cycles	5.35
*RP-048	DRIVE PULLEY—Condenser drive pulley (F)	.35
*RP-076	PULLEY—Vol. control driven pulleys or tone control drive pulleys (D)	.15
RP-300	PULLEY—Rubber cone drive pulley (motor)	.25
RP-301	PULLEY—Drive cord idler pulley (Pkg. of 2)	.10
RP-305	PULLEY—Tone control driven pulley (I)	.30
RP-306	PULLEY—Volume control drive pulley (E)	.20
*RQ-1247	RESISTOR—330 ohm, ½-W. carbon (R-2, 4, 15, 18) (Pkg. of 5)	.70
*RQ-1259	RESISTOR—1000 ohm, ½-W. carbon (R-7 24, 36, 37) (Pkg. of 5)	.70
*RQ-1291	RESISTOR—22,000 ohm, ½-W. carbon (R-9) (Pkg. of 5)	.70
*RQ-1299	RESISTOR—47,000 ohm, ½-W. carbon (R-5, 25) (Pkg. of 5)	.70
*RQ-1301	RESISTOR—56,000 ohm, ½-W. carbon (R-16) (Pkg. of 5)	.70
*RQ-1303	RESISTOR—68,000 ohm, ½-W. carbon (R-20, 21, 30, 31) (Pkg. of 5)	.70
RT-264	TRANSFORMER—2nd I.F. transformer and shield (T-7)	$1.80
RT-439	TRANSFORMER—Output transformer (T-2)	3.20
RV-045	VOLUME CONTROL—2 meg. vol. control (R-19)	.75
*RW-101	WASHERS—Felt washers for knobs (Pkg. of 10)	.45
*RB-008	BOARD—Terminal board (2 lug)	$0.10
*RB-023	BOARD—Terminal board (4 lug)	.10
*RB-049	BOARD—Ant.-Gnd. terminal board	.10
*RB-062	BOARD—Terminal board (6 terminals)	.10
*RB-066	BOARD—Terminal board (4 lugs)	.10
*RB-070	BOARD—Terminal board (3 lugs)	.10
RB-094	BOARD—Terminal board (7 lugs)	.10
RB-160	BRACKET—Reduction drive wheel bracket	.20
RB-161	BRACKET—Manual and motor drive bracket	.40
RB-162	BRACKET—Tuning condenser mtg. bracket (front)	.45
RB-700	BRAKE—Drive wheel friction brake (complete)	.20
*RS-174	SHIELD—Grid shield cap (Pkg. of 5)	.25
*RS-200	SOCKET—8-prong octal base socket (Pkg. of 5)	.75
*RS-204	SOCKET—5-prong octal tube socket (Pkg. of 5)	.75
RS-226	SOCKET—Octal base (on rear deck of chassis)	.15
RS-227	SOCKET—Tube socket (low loss octal base)	.15
RS-228	SOCKET—Station set-up lamp socket	.20
RS-229	SOCKET—Tube socket (6A8G)	.35
RW-900	WHEEL—Idler drive wheel	.45
RW-904	WHEEL—Vol. control wheel	.65
RW-905	WHEEL—Tone control wheel	.65
*RX-027	ASSEMBLY—Chassis mounting assembly	.15
RX-049	ASSEMBLY—Condenser mounting assembly	.15
	SPEAKER ASSEMBLY	
RC-936	CONE—12-inch cone and voice coil assembly	1.10
RC-991	CLAMP—Cone spider clamp	.05
RD-301	DUST CAP—Speaker cone dust cap (Pkg. of 5)	.10
RP-109	PLUG—Male speaker plug	.20
RS-075	SPEAKER—12-inch speaker	5.50
*RX-030	ASSEMBLY—Speaker mounting assembly	.10
	PUSH-BUTTON MECHANISM	
RC-8045	CARDS—Station letter cards (set)	.60
RC-8046	CABLE—Power cable and plug to push button assembly	.50
RC-8047	CABLE—Station selector button cable	.95
RK-203	KEY—Station key (Pkg. of 5)	.30
RS-444	SPRING—Station button springs (Pkg. of 10)	.10
RS-864	SCREWS—Keyboard assembly thumb screws (Pkg. of 10)	.40
RS-3008	SWITCH—Button "On-Off" switch	.50
RT-906	TAB—"Off" tab for station button (Strip of 10)	.05
RW-025	WINDOW—Celluloid station window (Pkg. of 25)	.15
RX-051	ASSEMBLY—Keyboard Touch Tuning Assembly switch	7.40
	STATION SELECTOR ASSEMBLY (BEHIND TUNING CONDENSER)	
RB-701	BAND—Contactor band	.10
RC-1978	CONTACT—Thumbscrew contact (complete) (Pkg. of 5)	.45
RD-080	DIAL—Dial scale for contactor drum	.15
RI-108	INSULATOR—Contactor band insulator (Pkg. of 5)	.15
RS-447	SPRING—Contactor band tension spring (Pkg. of 5)	.15
RW-901	WHEEL—Contactor wheel (CT) (complete)	2.00

(Prices subject to change without notice)

*Used on previous receivers.

I.F. Alignment with Oscilloscope

Step No.	Input Frequency	Tone Control Position	Point of Input	Trimmer	Comments
1. Band B	455 K.C. and 30 K.C. Sweep	Normal	I.F. 6K7 Grid	2nd I.F. Sec. 2nd I.F. Pri.	Condenser gang at minimum capacity—vertical input to ground and junction at R-25, R-12, and R-17. Adjust trimmers in order mentioned for a single curve of maximum amplitude. The resulting curve on the "normal" position is shown in Fig. 2A. The expanded curve taken with tone control at "Treble I" is shown in Fig. 2B.
2. Band B	455 K.C. and 30 K.C. Sweep	Treble I	Converter 6A8 Grid	1st I.F. Sec. 1st I.F. Pri.	
3. Band B	455 K.C. and 30 K.C. Sweep	Normal	Converter 6A8 Grid	1st I.F. Tertiary	
4. Band B	455 K.C. and 30 K.C. Sweep	Normal	Converter 6A8 Grid	All IF Trimmers	

I.F. Alignment with Output Meter

Step No.	Input Frequency	Tone Control Position	Point of Input	Trimmer	Comments
1. Band B	455 K.C. modulated	Normal	I.F. 6K7 Grid	2nd I.F. Sec. 2nd I.F. Pri.	Condenser gang at minimum capacity-output meter connected across voice coil-volume control at maximum-input as low as practical. Adjust all trimmers in order listed for maximum output. Do not attempt an alignment in the expanded position.
2. Band B	455 K.C. modulated	Normal	Converter 6A8 Grid	1st I.F. Sec. 1st I.F. Pri. 1st I.F. Tertiary	
3. Band B	455 K.C. modulated	Normal	Converter 6A8 Grid	All I.F. trimmers	

R.F. Alignment

Step No.	Input Frequency	Tone Control Position	Point of Input	Trimmer	Comments
1. Band B					Adjust tuning mechanism so that pointer coincides with first line at left hand end of dial scale when condenser plates are fully meshed.
2. Band B	1500K.C. modulated	Bass	Antenna post	Osc. (C-5) R.F. (C-16) Ant. (C-1)	Connect output meter across voice coil-antenna switch turned to counter-clockwise position. Adjust trimmers in order listed for maximum output.
3. Band B	580 K.C. modulated	Bass	Antenna post	Osc. Padder- (C-8)	Adjust padder for maximum output in vicinity of 580 K.C. while rocking gang condenser.
4. Band B	Repeat Step 2				
5. Band B	1500 K.C. modulated	Bass	Antenna post	Beam-a-Scope (C-54)	Turn antenna switch to clockwise position, align Beam-a-Scope trimmer for maximum output.

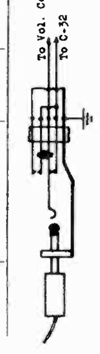
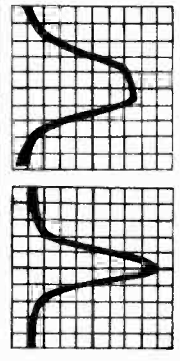


Fig. 11. Phonograph Connections



(a) Sharp position (b) Expanded position

Fig. 2. I.F. curves taken on G-E oscilloscope OFM-1

Phonograph Connections

Fig. 11 shows a simple sketch for connecting a crystal or high impedance magnetic pick-up into the Radioforté circuit for the reproduction of phonograph recording. This method uses a two circuit jack and is connected into the receiver by opening the circuit between G-32 and the volume control (R-19) and connecting the jack terminals as shown. A telephone plug is attached to the pick-up leads; and for phonograph operation, it is merely necessary to insert it into the jack. The jack may be mounted on the rear chassis deck and all connecting leads should be properly shielded to prevent pick-up.

When the pick-up is connected as suggested, the regular radio volume and tone controls work for both radio and phonograph reproduction.

NOTE—In most cases a suitable loading circuit composed of a resistor or resistor and capacitor network should be used across the pick-up leads when using a crystal type unit.

MODEL G95,Radioforte
Tuner and Remote Cont.
Schematics,Data

GENERAL ELECTRIC CO.

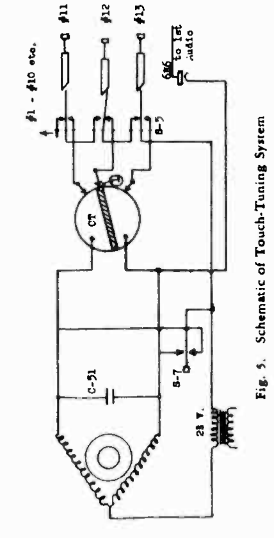


Fig. 5. Schematic of Touch-Tuning System

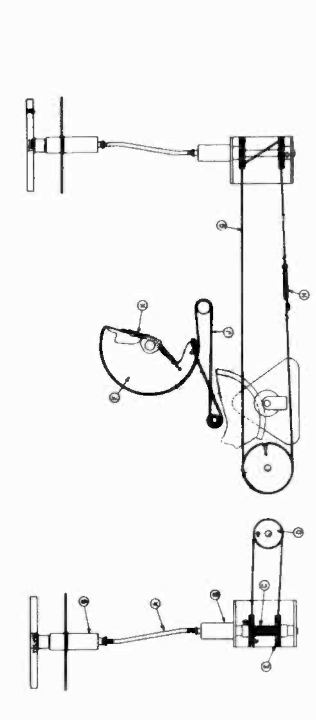


Fig. 8. Drive Mechanism

TOUCH-TUNING

The General Electric "Touch-Tuning" system consists of three essential units: the keyboard assembly of fourteen keys, used for touch-tuning control; the motor and drive mechanism; and the split contact segment with its adjustable station buttons, allowing a set up of thirteen different stations to be tuned automatically.

Thirteen keys are used for the selection of pre-set stations while the No. 14 key is used to turn power "Off." Pressing-in any key will lock the key in a semi-depressed position and release any other that may be in the circuit, thus the selection of any station by a station key will release the "Off" key, turning the set power on.

The tuning motor is operated as a 23-volt split phase induction motor using capacitor C-51 as the phase shifting device. The 23 volts is supplied directly from the receiver power transformer.

Fig. 5 shows a simplified schematic of the control circuit and the following cycle of operation may be traced very easily. When a key is depressed, it completes the 23-volt circuit through the button making contact with the contact segment (CT) and energizes one winding of the motor. The other winding on the motor is energized through the condenser C-51. The rotation of the motor is dependent upon whichever half of the contact segment (CT) that the station button first energizes. When voltage is applied to the motor, the rotor is pulled further into motor field, and engages its rubber cone hub with the dial drive wheel which in turn rotates the gang condenser and contact segment (CT). This operation continues until the insulated segment (I) breaks the station button circuit to the contact segment and removes voltage from the motor. The inertia in the tuning system drives the insulated segment past the station button and makes contact with the other half of the contact segment. This energizes the other winding of the motor and causes the motor to reverse. The brake on the dial drive wheel does not allow the tuning system to store up enough inertia to go past this insulated strip on the reversal of the motor and thus allows the station button to come to rest on the narrow insulated segment, thus stopping the tuning operation to this pre-set position.

Silent Tuning

During period of motor operation, either for automatic station selection or for scanning, silent tuning is incorporated. This is accomplished by a circuit which gives both instantaneous cut-off of the audio amplifier and time delay in restoring the response. By reference to the schematic Fig. 4, it will be observed that one half of the 6H6 diode is used to rectify the 23.0 volts AC available from the motor and the resulting DC voltage is used to bias the audio amplifier tube to cut-off. Note that the charging time of the bias circuit is only determined by the diode resistance which is very small. The time required for the audio amplifier (6F5) to return to normal bias however, is determined by the product of R-26 and C-56 and is therefore controllable.

Drive Wheel Brake Adjustment

A friction brake has been incorporated on the drive wheel circumference (D) to accomplish accurate stopping of the motor-driven tuning system. When the button passes into the insulated segment it will easily over-ride the insulated segment on the contactor drum, since this segment is very narrow. If this condition continues an oscillatory motion or "Hunting" is set up and the motor will not come to rest as long as the station key is pressed. The brake, located at the left side of dial scale, should be adjusted on normal line voltage so that the motor only has to make one or two reversals.

This adjustment should be made under an average operating line voltage and allowance made for changes in voltage over the 24-hour period.

Stopping Accuracy

The exact location at which the drive mechanism will come to rest may be made more accurate by slightly lowering the insulated segment (X) on the contactor wheel as shown in Fig. 7. Merely loosen the two screws (Y) and lower the yoke (Z).

The proper adjustment is made at the factory and should not require alteration provided the contactor drum is kept well lubricated.

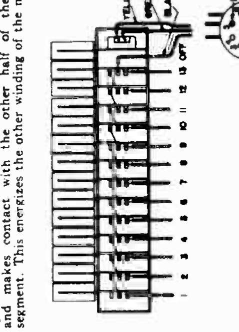


Fig. 6. Keyboard Wiring Diagram

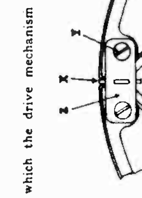


Fig. 7

Lubrication

For smooth and noiseless operation of the tuning system, it is absolutely necessary to keep it well lubricated.

Contactor drum—use thin film of petroleum jelly.

Dial Pointer Guide Rods—use thin film of petroleum jelly.

Motor bearings—These are oilless type and do not require lubrication.

REMOTE CONTROL

The GM-8 Remote Control is merely another station keyboard assembly that is wired in parallel with the regular station keys. In addition, a remotely controlled motor is used to either raise or lower the volume at the receiver. By referring to Fig. 10, the details of the operation of this device may be readily understood. Leads No. 2 to No. 7 are the automatic tuning button control leads that parallel any six of the regular receiver station keys. Lead No. 1 supplies twenty-three volts to the remote keyboard assembly while leads No. 8 and No. 9 are the phase reversing leads to the volume control motor.

When the remote control is attached to a receiver, then the semi-depressed positions of the receiver push button keys may or may not indicate which station is tuned in. This will then depend upon whether the receiver was last operated from the remote control or from the station keys of the receiver itself. For this reason, the key assembly of the remote control has not been equipped with a latch bar.

All keys of the remote control key assembly are wired in series to avoid possibility of two keys completing the circuit to the motor at the same time.

The remote volume control motor uses a phase shifting resistor in place of a condenser as used on the tuning motor when operating from a 50 or 60 cycle power supply. When operation is desired from 25 cycles replace the 30 ohm, 10-watt resistor across the volume control motor terminals with a 60 microfarad motor capacitor (RC-597).

The mechanical installation of the volume control motor is shown in Fig. 9. For full installation instructions refer to service notes RGMS-8.

Remote Control Notes

1. If key assembly on remote control unit is too high in the case, it is possible that one or all of the keys may be slightly depressed at all times so as to cause faulty operation of the system. To remedy, lower the complete assembly by loosening the two set screws on the inside of the case and then lower assembly—tighten set screws.

2. The tension of the friction clutch on the remote control motor is adjusted at the factory and should not require resetting. If it is set too tight, the volume control may be damaged when "VOL DEC." key is held in a depressed position after the volume control is turned to the minimum position. If this slip clutch is too loose the control will fail to turn.

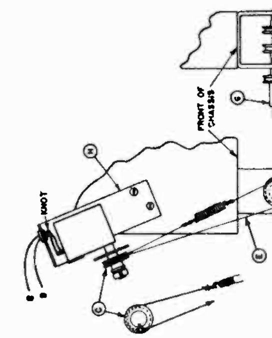


Fig. 9. Volume Control Motor Mounting

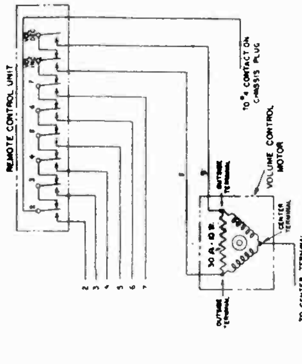
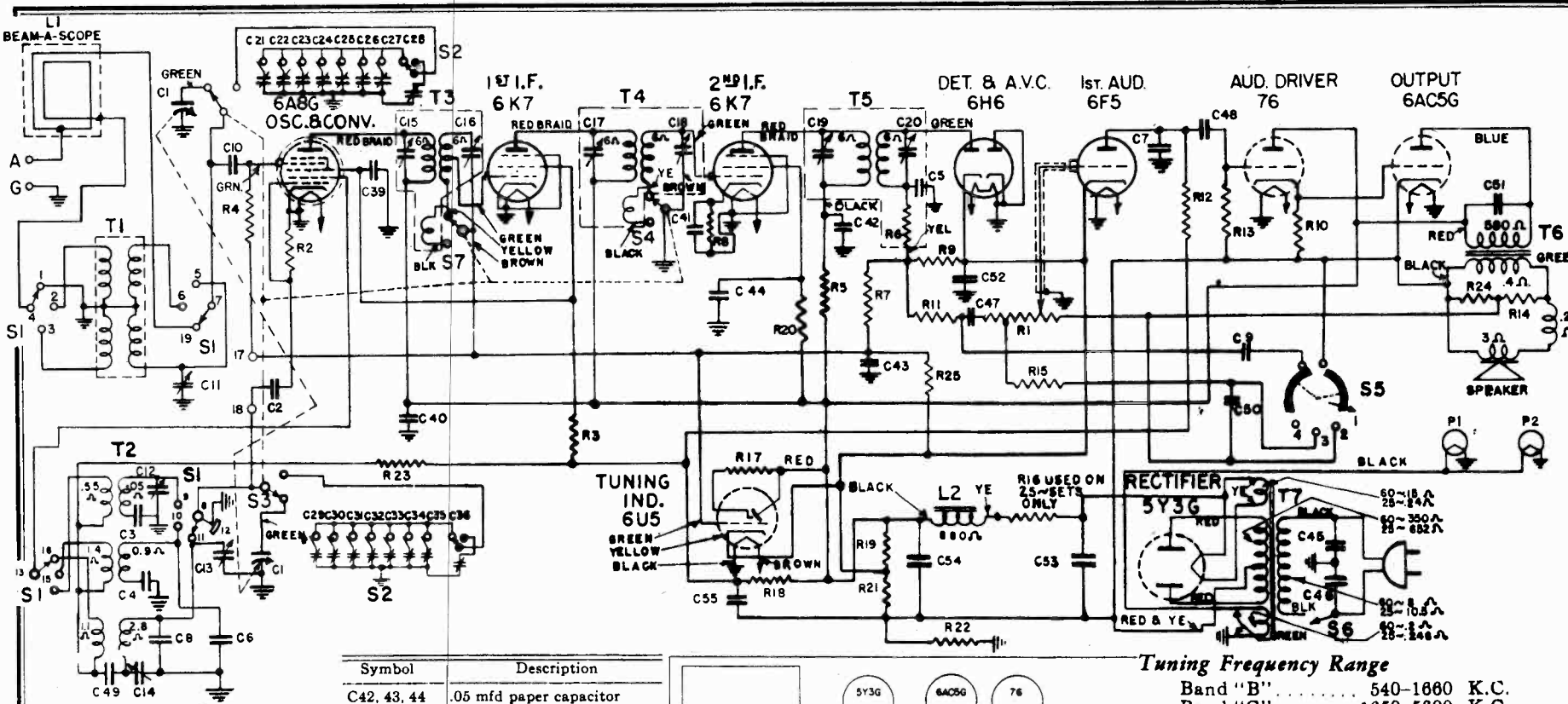


Fig. 10. Remote Control Schematic



Symbol	Description
C1	Tuning Capacitor
C2	50 mmf mica capacitor
C3	3900 mmf mica capacitor
C4	1200 mmf mica capacitor
C5	47 mmf mica capacitor
C6	6 mmf mica capacitor
C7	47 mmf mica capacitor
C8	20 mmf regulating capacitor
C9	.0012 mfd paper capacitor
C10	150 mmf mica capacitor
C11-C13	Trimmer capacitors
C14	"B" band padder
C21-C28	Antenna trimmer strip
C29-C36	Oscillator trimmer strip
C39	.05 mfd paper capacitor
C40, 41	0.1 mfd paper capacitor
R23	3300 ohm carbon resistor
R24	12 ohm carbon resistor
R25	1.0 megohm carbon resistor
S1	Band change switch
S2, S3	Station selector switch
S5	Tone control switch
T1	Antenna transformer
T2	Oscillator transformer
T3	1st I.F. transformer
T4	2nd I.F. transformer
T5	3rd I.F. transformer
T6	Output transformer
T7 T8	Power transformer

Symbol	Description
C42, 43, 44	.05 mfd paper capacitor
C45, 46	.01 mfd line capacitor
C47	.003 mfd paper capacitor
C48, 49	.005 mfd paper capacitor
C50	.004 mfd paper capacitor
C51	.02 mfd paper capacitor
C52	0.1 mfd paper capacitor
C53	12 mfd 450 V dry electrolytic
C54	8 mfd 400 V dry electrolytic
C55	8 mfd 400 V dry electrolytic
R1	2 megohm volume control
R2	47,000 ohm carbon resistor
R3	15,000 ohm carbon resistor
R4	1.5 megohm carbon resistor
R5	1,000 ohm carbon resistor
R6	47,000 ohm carbon resistor
R7	2.2 megohm carbon resistor
R8	1,000 ohm carbon resistor
R9	220,000 ohm carbon resistor
R10	22,000 ohm carbon resistor
R11	82,000 ohm carbon resistor
R12	220,000 ohm carbon resistor
R13	1.0 megohm carbon resistor
R14	82 ohm carbon resistor
R15	120,000 ohm carbon resistor
R16	470 ohm carbon resistor
R17	1.0 megohm carbon resistor
R18	6,800 ohm carbon resistor
R19	39,000 ohm carbon resistor
R20	82,000 ohm carbon resistor
R21	150 ohm carbon resistor
R22	180 ohm carbon resistor

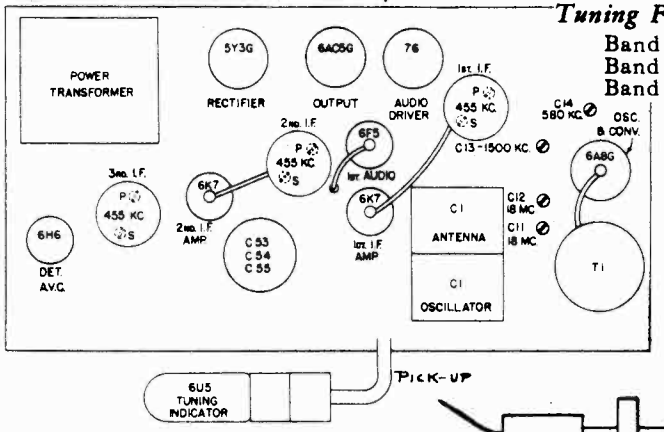


Fig. 6. Chassis Layout and Trimmer Location

Tuning Frequency Range

Band "B" ..... 540–1660 K.C.
Band "C" ..... 1650–5600 K.C.
Band "D" ..... 5500–18,200 K.C.

IF PEAK 455 KC

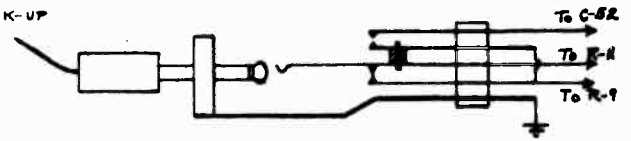


Fig. 1. Phonograph Connections

MODEL G99
Voltage, Chassis Wiring
Dial Mechanism

GENERAL ELECTRIC CO.

VOLTAGE CHART

Tube No.	Plate to Ground Volts, D.C.	Screen to Ground Volts, D.C.	Cathode to Ground Volts, D.C.	Filament Volts
6A8G	240 Conv. 150 Osc.	97	0	6.4
6K7	240	97	0	6.4
6K7	230	105	5.1	6.4
6F5	102	....	3.0	6.4
76	230	....	7.5	6.4
6AC5G	230	....	4.5	6.4
6U5	240	....	3.0	6.4
5Y3G	306/306 A.C. RMS.	. . .	310 V	5.1

Socket voltages taken at 120-volt line—no signal input—1000 ohms per volt meter—Dial pointer at 550 K.C. on "B" band.

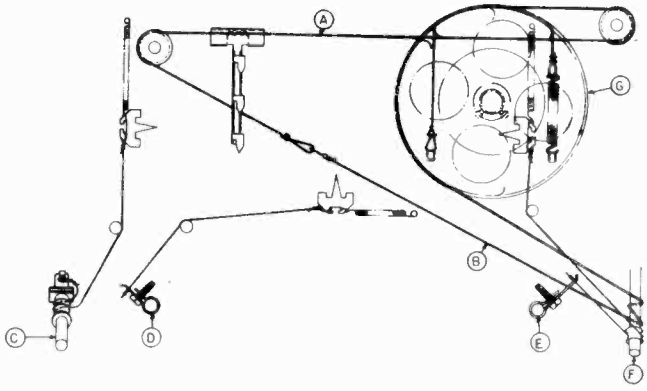


Fig. 3. Dial Drive Mechanism

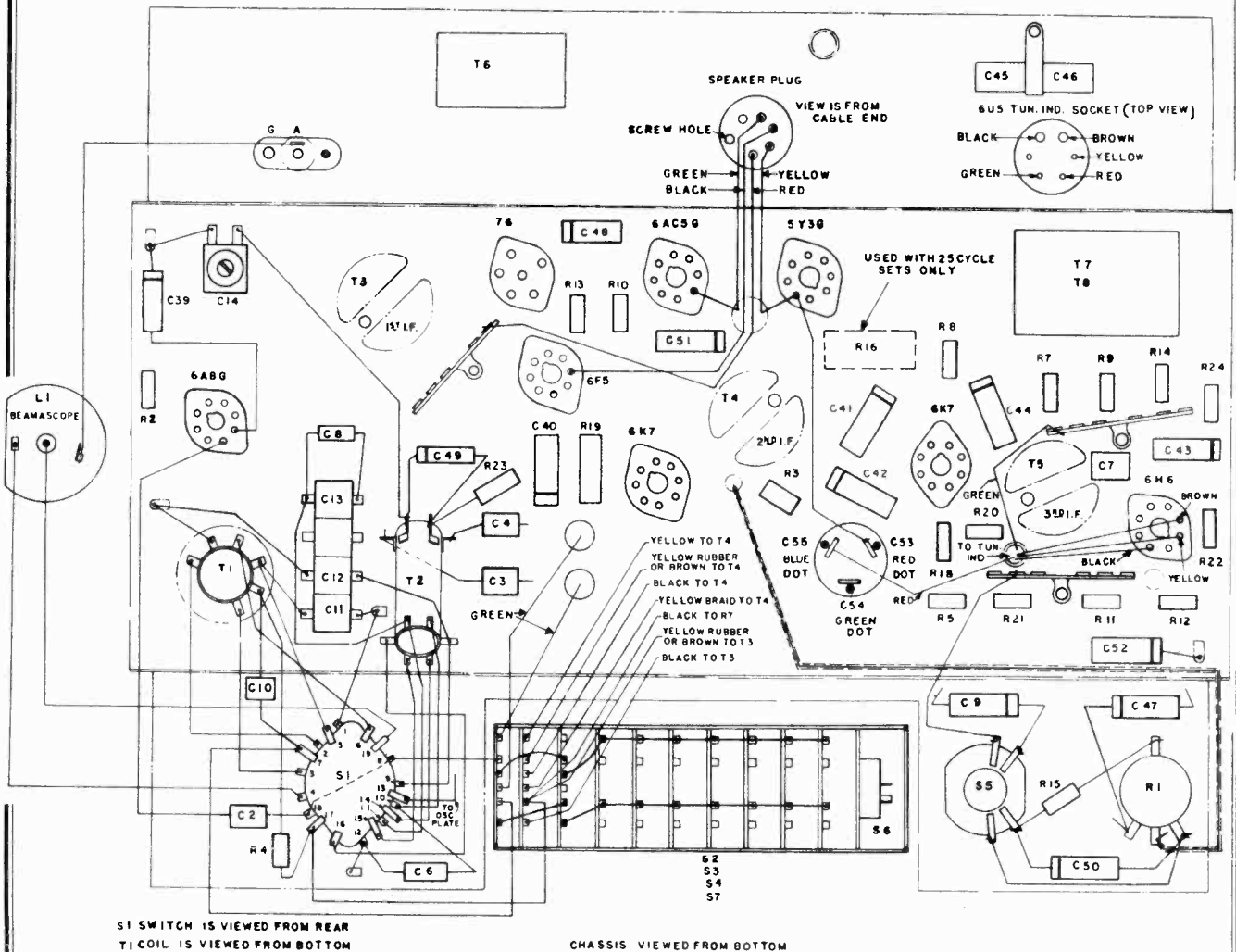


Fig. 4. Chassis Parts Layout

ALIGNMENT PROCEDURE

I.F. Alignment with Oscilloscope

Band Switch Setting	Input Frequency	Point of Input	Dummy Ant.	Trimmer	Remarks
1. Band "B"	455 K.C. Sweep	2nd I.F. Grid	.05 Mfd.	3rd I.F. Sec. (C-20) Pri. (C-19)	Manual key depressed—gang condenser plates closed—connect vertical input of oscilloscope to ground and the junction of R-9 and R-11 on 3rd I.F. transformer. Adjust trimmers for a single symmetrical curve of maximum amplitude. The resulting curve with input at converter grid is shown in Fig. 5. When a station key is pressed this I.F. curve should expand considerably.
2. Band "B"	455 K.C. Sweep	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-18) Pri. (C-17)	
3. Band "B"	455 K.C. Sweep	Converter Grid	.05 Mfd.	1st I.F. Sec. (C-16) Pri. (C-15)	

I.F. Alignment with Output Meter

1. Band "B"	455 K.C. with Modulation	2nd I.F. Grid	.05 Mfd.	3rd I.F. Sec. (C-20) Pri. (C-19)	Manual key depressed—gang condenser plates closed—connect output meter across voice coil—keep input signal low and volume control at maximum. Adjust all trimmers in order mentioned for maximum output. Do not attempt an over-all realignment after stage by stage alignment has been accomplished.
2. Band "B"	455 K.C. with Modulation	1st I.F. Grid	.05 Mfd.	2nd I.F. Sec. (C-18) Pri. (C-17)	
3. Band "B"	455 K.C. with Modulation	Converter Grid	.05 Mfd.	1st I.F. Sec. (C-16) Pri. (C-15)	

R.F. Alignment

1. Band "B"					Close gang plates—adjust pointer to first line at left end of tuning scale.
2. Band "D"	18 M.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. (C-12) Ant. (C-11)	Connect output meter across voice coil—manual key depressed. The image of any "D" band signal should be heard 930 K.C. below input signal when (C-12) is on proper peak. Example: 15 M.C. image—14.09 K.C. Peak (C-11) while rocking the gang condenser.
3. Band "C"	No adjustment necessary.				
4. Band "B"	1500 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Osc. (C-13)	Peak oscillator trimmer (C-13) for maximum output in vicinity of 1500 K.C. while rocking the gang condenser.
5. Band "B"	580 K.C. with Modulation	Antenna Post	250 Mmf. 200 Ohms	Padder (C-14)	Adjust padder for maximum output in vicinity of 580 K.C. while rocking the gang condenser.
6. Band "B"	Repeat Operation 4				

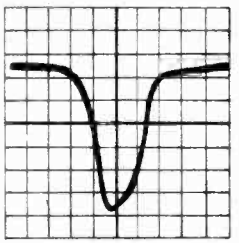


Fig. 5. Over-all IF Curve Taken on G-E Oscilloscope OFM-1

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Volts)
A	115-125	50-60	70
C	115-125	25-60	75

Electrical Power Output

Undistorted ..... 3.0 watts
Maximum ..... 5.0 watts

Tone Control

..... 4-position

Loud-speaker—Electrodynamic

Outside Cone Diameter ..... 12 inches
Voice Coil Impedance ..... 3.5 ohms at 400 cycles
Field Coil Resistance ..... 880 ohms (cold)

REPLACEMENT PARTS LIST

MODEL G-99

Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
*RB-017	BOARD—Terminal board (1 lug)	$0.10
*RB-026	BOARD—Ant. grid terminal board	.10
*RB-062	BOARD—Terminal board (near power trans.)	.10
RC-012	CAPACITOR—.0012 mfd., 600 V. paper (C-9)	.25
*RC-023	CAPACITOR—.005 mfd., 600 V. paper (C-48, 49)	$0.25
*RC-048	CAPACITOR—.02 mfd., 600 V. paper (C-51)	.30
*RC-049	CAPACITOR—.004 mfd., 600 V. paper (C-50)	.35
*RC-055	CAPACITOR—.003 mfd., 600 V. paper (C-47)	.25
*RC-092	CAPACITOR—.05 mfd., 600 V. paper (C-39, 42, 43, 44)	
*RC-104	CAPACITOR—.1 mfd., 600 V. paper (C-40, 41, 52)	$0.30
*RC-206	CAPACITOR—50 mmf., mica (C-2)	.30
RC-216	CAPACITOR—47 mmf., mica (C-5, 7)	.35
RC-220	CAPACITOR—6 mmf., mica (C-6)	.25
RC-230	CAPACITOR—20 mmf., compensating capacitor (C-8)	.35
RC-242	CAPACITOR—150 mmf., mica (C-10)	.25
RC-341	CAPACITOR—1200 mmf., mica (C-4)	.35
RC-390	CAPACITOR—3900 mmf., mica (C-3)	.35
RC-594	CAPACITOR—8 mfd., 400 V., 8 mfd., 400 V., 12 mfd., 450 V.; dry electrolytic (C-53, 54, 55)	1.60
RC-676	CAPACITOR—300-650 mmf., "B" padder (C-14)	.35
RC-692	CAPACITOR—Antenna and oscillator trimmer (C-11, 12, 13)	.30
RC-728	CONDENSER—2-gang tuning condenser (C-1)	2.95
*RC-754	CAPACITOR—.01-.01 mfd., 250 V. A.C. line capacitor (C-45, 46)	.40
*RC-863	CORD—Power cord	.65
RC-8035	CABLE—Speaker cable and plug	.50
RC-8054	CABLE—Tuning indicator cable and socket	.40
RD-205	DRIVE—Vernier drive bracket assembly	.35
RG-016	GRID CLIP—Control grid clip (Pkg. of 5)	.10
RK-027	KNOB—Control knob (winged) (Pkg. of 5)	.50
RK-028	KNOB—Control knob (plain) (Pkg. of 5)	.30
RL-062	COIL—Ant. coil assembly	1.50
RL-266	COIL—Oscillator coil and bracket	1.30
RL-501	BEAM-A-SCOPE—Beam-a-Scope antenna (L-1)	9.25
RQ-711	RESISTOR—470 ohms, 3 W. carbon (R-16)	.25
RQ-1213	RESISTOR—12 ohm, ½ W. carbon (R-24) (Pkg. of 5)	.70
*RQ-1233	RESISTOR—82 ohm, ½ W. carbon (R-14) (Pkg. of 5)	.70
*RQ-1239	RESISTOR—150 ohm, ½ W. carbon (R-21) (Pkg. of 5)	.70
RQ-1241	RESISTOR—180 ohm, ½ W. carbon (R-22) (Pkg. of 5)	.70
*RQ-1259	RESISTOR—1000 ohm, ½ W. carbon (R-5, 8) (Pkg. of 5)	.70
*RQ-1271	RESISTOR—3300 ohm, ½ W. carbon (R-23) (Pkg. of 5)	.70
*RQ-1279	RESISTOR—6800 ohm, ½ W. carbon (R-18) (Pkg. of 5)	.70
*RQ-1287	RESISTOR—15,000 ohm, ½ W. carbon (R-3) (Pkg. of 5)	.70
*RQ-1291	RESISTOR—22,000 ohm, ½ W. carbon (R-10) (Pkg. of 5)	.70
*RQ-1299	RESISTOR—47,000 ohm, ½ W. carbon (R-2, 6) (Pkg. of 5)	.70
RQ-1305	RESISTOR—82,000 ohm, ½ W. carbon (R-11, 20) (Pkg. of 5)	.70
*RQ-1309	RESISTOR—120,000 ohm, ½ W. carbon (R-15) (Pkg. of 5)	.70
*RQ-1315	RESISTOR—220,000 ohm, ½ W. carbon (R-9, 12) (Pkg. of 5)	.70
*RQ-1331	RESISTOR—1.0 megohm, ½ W. carbon (R-13, 17, 25) (Pkg. of 5)	.70
*RQ-1335	RESISTOR—1.5 megohm, ½ W. carbon (R-4) (Pkg. of 5)	.70
*RQ-1339	RESISTOR—2.2 megohm, ½ W. carbon (R-7) (Pkg. of 5)	.70
*RR-281	RESISTOR—39,000 ohm, 2 W. carbon (R-19)	.30
RS-185	SHIELD—6A8G tube shield and base	.15
*RS-200	SOCKET—Octal base tube socket (Pkg. of 5)	.75
*RS-204	SOCKET—Rectifier tube socket (Pkg. of 5)	.75
*RS-223	SOCKET—Octal base tube socket (Pkg. of 5)	.80
RS-224	SOCKET—Tube socket (76) (Pkg. of 5)	.50
RS-227	SOCKET—Octal base tube socket (6A8G)	$0.15
RS-305	SWITCH—Tone control switch (S-2)	.55
RS-3011	SWITCH—Band change switch (S-1)	.95
RT-0711	TRANSFORMER—Power transformer (T-7) 120 V. 25-60 cy.	7.60
RT-0616	TRANSFORMER—Power transformer (T-7) 120 V. 50-60 cy.	4.60
RT-265	TRANSFORMER—3rd I.F. transformer	1.60
RT-266	TRANSFORMER—2nd I.F. transformer and shield	1.80
RT-267	TRANSFORMER—1st I.F. transformer and shield	1.90
RT-438	TRANSFORMER—Output transformer (T-3)	1.70
RV-051	VOLUME CONTROL—2 megohm volume control (R-1)	.80
*RW-101	WASHER—Felt washer for control shafts (Pkg. of 10)	.45
*RX-021	ASSEMBLY—Chassis mounting assembly	.10
RX-048	ASSEMBLY—Tuning condenser mounting assembly	.25
	SPEAKER ASSEMBLY	
RC-932	CONE—12-inch cone and V. C. assembly	1.10
*RC-991	CLAMP—Cone spider clamp	.05
RD-301	DUST CAP—Speaker cone dust cap (Pkg. of 5)	.10
RP-109	PLUG—Male speaker plug	.20
RS-073	SPEAKER—12-inch speaker	5.40
*RX-030	ASSEMBLY—Speaker mounting assembly	.10
	DIAL DRIVE MECHANISM	
*RB-152	BRACKET—Tone control indicator bracket (D)	.05
*RB-155	BRACKET—Band change bracket (E)	.05
RB-614	BUSHING—Volume control drive bushing (C)	.15
RC-1977	CLAMP—Tuning indicator tube clamp and thumbscrews	.10
RC-8048	CORD—Volume indicator cord (Pkg. of 5)	.50
RC-8049	CORD—Tone indicator cord (Pkg. of 5)	.50
RC-8050	CORD—Band change indicator cord (Pkg. of 5)	.50
RC-8051	CORD—Dial pointer drive cord (A) (B)	.20
*RD-013	DRUM—Condenser drive drum (G)	.35
RD-074	DIAL—Dial scale	2.70
RE-033	ESCUTCHEON—Dial scale escutcheon	1.65
RP-112	POINTER—Tone, band change or volume indicator pointer	.10
RP-113	POINTER—Dial scale pointer	.30
RP-303	PULLEY—Idler pulley (Pkg. of 2)	.10
RR-920	REFLECTOR—Lamp reflector assembly	.50
RS-187	SHIELD—Lamp shield (Pkg. of 10)	.05
*RS-218	SOCKET—Lamp socket assembly	.10
*RS-425	SPRING—Drive drum spring (Pkg. of 5)	.10
*RS-427	SPRING—Volume, tone or band change cord spring (Pkg. of 5)	.20
	TOUCH TUNING ASSEMBLY	
RB-613	BUTTON—Molded push button (Pkg. of 5)	.35
RC-8036	CARDS—Station letter cards (set)	.25
RC-8052	CARDS—"Manual" tab cards (strip of 10)	.05
RC-8053	CARDS—"Off" tab cards (strip of 10)	.05
RE-032	ESCUTCHEON—Push button escutcheon	.50
RS-444	SPRING—Spring for push button (Pkg. of 10)	.10
RS-3009	SWITCH—Power switch	1.00
RS-3010	SWITCH—Push button switch (less trimmers)	3.90
RT-856	TRIMMER STRIP—Osc. trimmer strip (C-29, 30, 31, 32, 33, 34, 35, 36)	1.40
RT-857	TRIMMER STRIP—Antenna section trimmer strip (C-21, 22, 23, 24, 25, 26, 27, 28)	1.40
RW-021	WINDOWS—Celluloid station windows (Pkg. of 25)	.10

* Used on previous receivers.

(Prices subject to change without notice)

Phonograph Connections

Fig. 1 shows a simple sketch for connecting a crystal or high impedance magnetic pick-up into the G-99 circuit for the reproduction of phonograph recordings. This method uses a two circuit jack and is connected into the receiver by opening the circuit between R-11 and the junction of R-7 and R-9; connecting the jack terminals as shown. A telephone plug is attached to the pick-up leads; and for phonograph operation, it is merely necessary to insert it into the jack. The jack may be mounted on the rear chassis deck and all connecting leads should be properly shielded to prevent interference.

When the pick-up is connected as suggested, the regular radio volume and tone controls work for both radio and phonograph reproduction.

NOTE—A suitable loading circuit consisting of a 300,000 ohm resistor should be connected across the pick-up leads when using a crystal type unit.

Antenna and Ground

Since this receiver operates at a relatively high radio frequency, it is very essential to construct a good antenna and ground system in order to obtain maximum results.

For distances up to within thirty miles from the transmitter, a simple horizontal di-pole as shown in Fig. 1 should give excellent results. It should be located free from all obstructions and placed as high from the earth as possible. Make sure it is run approximately at right angles to the direction of the transmitter: i.e., if the transmitter is located due west, run the horizontal doublet in a north and south direction. The horizontal flat top has an effective antenna length of 10-feet, 8-inches and consists of #12 or #14 bare copper wire (preferably stranded), cut in the middle and the two halves insulated by glass insulators. A twisted lead-in wire is then soldered to each side of the doublet as shown, and the other two ends of the transmission line are connected to the #1 and #2 terminals on the receiver chassis. The lead-in transmission line may be of any length up to 100 feet and should consist of low loss antenna lead-in wire. A good ground connection to a water pipe is connected to the terminal marked "G".

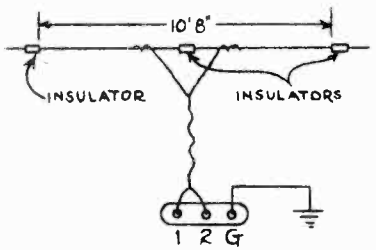


Fig. 1

Somewhat better results may be obtained by constructing the antenna shown in Fig. 2. This varies somewhat from the di-pole antenna and is more efficient due to the fact that the transmission line has very little loss.

The antenna proper consists of a 10-foot, 8-inch length of 1-inch diameter copper pipe supported at the middle by a pole located as high above ground as possible. The transmission line is made up of two #12 or #14 copper wires, spaced about 2-inches apart and transposed every two or three feet. The antenna end of the transmission line is soldered 13-1/2 inches each side of the center of the copper pipe and should form a triangle, 27 inches on all sides. As in the previous installation, the horizontal flat-top should run approximately at right angles to the direction of the transmitter.

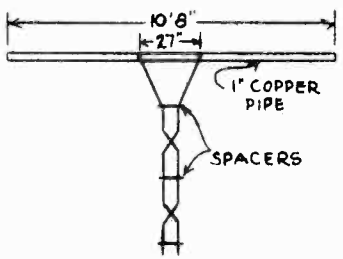


Fig. 2

For greater distances, somewhat better results may be obtained by using a reflector in conjunction with the antenna described and shown in Fig. 2. A suggested system is to use a 1-inch diameter copper pipe similar to the antenna, running parallel to the regular antenna and located farthest from the direction of the received signal. Fig. 3 shows a diagram looking from top and dimensions should be followed very carefully. By experimenting, however, with the distance between reflector and antenna, improvement in the individual installation may be noted.

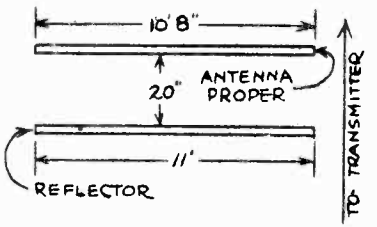


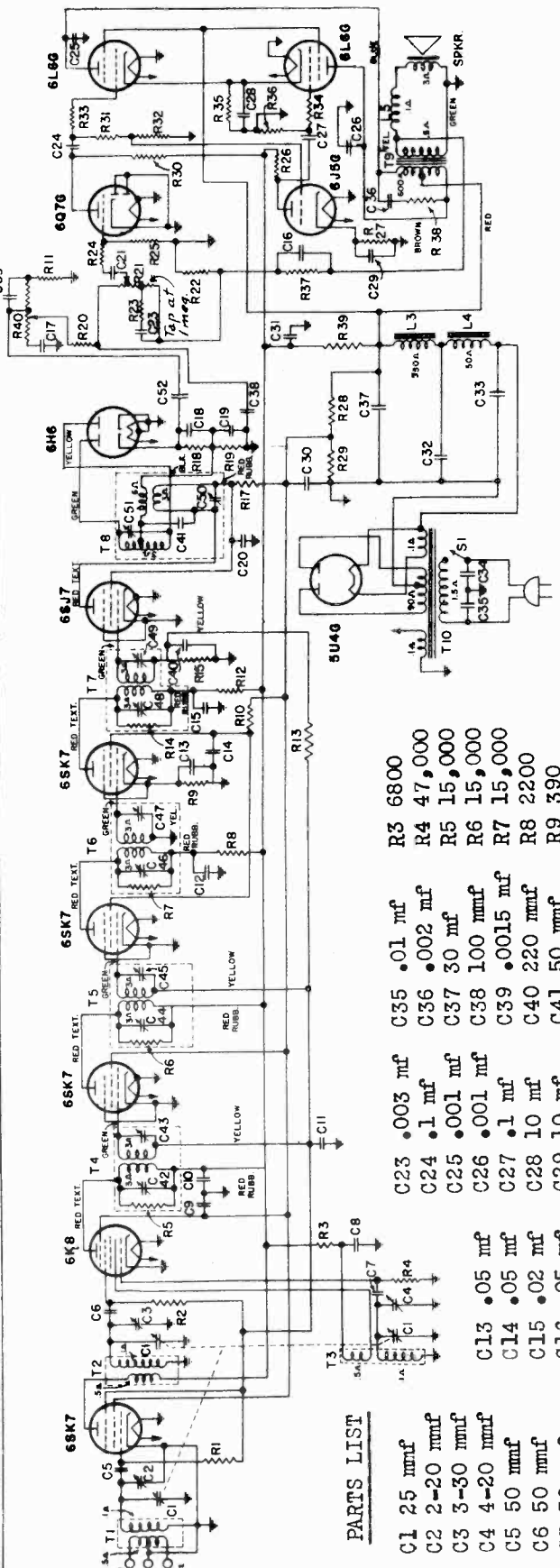
Fig. 3

Note - The reflector is a floating copper bar and there are no external connections. Connect and install the regular antenna as shown in Fig. 2.

Model	GM-125
Height	36-1/4 inches
Width	39-3/8 inches
Depth	17-1/8 inches
Tuning Control Drive Ratio	1:1
Electrical Specifications	
Volts	115-125
Frequency	50/60 Cycles
Watts Consumption	160
Tuning Frequency Range	37-44 M.C.
Intermediate Frequency	
Mid-frequency	3.0 M.C.
Band Width	300 K.C.
Electrical Power Output	
Undistorted	12.0 Watts
Maximum	15.0 Watts
Loudspeaker - Electrodynamic	
Cone - Outside Diameter	10 inches
Voice Coil Impedance (400 cycles)	3.5 Ohms
Field Resistance	450 Ohms (cold)

GENERAL ELECTRIC CO.

MODEL GM125
Schematic, Voltage



IF FREQUENCY
Mid-frequency ..... 3 MC
Band Width .... 300 KC

PARTS LIST

C1 25 mmf
C2 2-20 mmf
C3 3-30 mmf
C4 4-20 mmf
C5 50 mmf
C6 50 mmf
C7 50 mmf
C8 220 mmf
C9 .05 mf
C10 .05 mf
C11 .05 mf
C12 .02 mf
C13 .05 mf
C14 .05 mf
C15 .02 mf
C16 .05 mf
C17 68 mmf
C18 22 mmf
C19 22 mmf
C20 .05 mf
C21 .01 mf
C23 .003 mf
C24 .1 mf
C25 .001 mf
C26 .001 mf
C27 .1 mf
C28 10 mf
C29 10 mf
C30 8 mf
C31 8 mf
C32 30 mf
C33 30 mf
C34 .01 mf
C35 .01 mf
C36 .002 mf
C37 30 mf
C38 100 mmf
C39 .0015 mf
C40 220 mmf
C41 50 mmf
C42 to C51
14-50 mmf
C52 .02 mf
R1 470,000
R2 470,000
R3 6800
R4 47,000
R5 15,000
R6 15,000
R7 15,000
R8 2200
R9 390
R10 2200
R11 270,000
R12 2200
R13 2.2 meg.
R14 15,000
R15 330,000
R17 2200
R18 100,000
R19 100,000
R20 470,000
R21 2 meg.
R22 15
R23 180,000
R24 47,000
R25 15 meg.
R26 68,000
R27 1500
R28 5600
R29 5600
R30 220,000
R31 120,000
R32 8200
R33 1000
R34 1000
R35 180
R36 120,000
R37 47
R38 10,000
R39 2000
R40 2 meg.

Tube	Application	Plate to Gnd Volts	Screen to Gnd Volts	Cathode to Gnd Volts	Cathode Cur.MA	Filament Volts
6SK7	RF	240	90	0	7.5	6.4
6K8	Conv.	238	90	0	8.0	6.4
	Osc.	188				
6SK7	1st IF	238	90	0	8.1	6.4
6SK7	2nd IF	230	83	0	6.1	6.4
6SK7	3rd IF	225	83	2.9	6.1	6.4
6SJ7	4th IF	65	65	0	7.2	6.4
6Q7G	1st Audio	65	--	0	---	6.4
6J5G	Inverter	48	--	1.7	2.0	6.4
(2) 6L6G	Output	267	285	21	112	6.4
5U4G	Rectifier	350/350 V. A.C. RMS	---	---	180	50

Line Voltage - 120 No signal input. Pilot Light-Mazda 44

MODEL GM125
Socket, Trimmers
Alignment

GENERAL ELECTRIC CO.

TUBE AND TRIMMER LOCATION

CIRCUIT ALIGNMENT

IF Amplifier

Due to the good stability of components and the wide band characteristics of this amplifier, alignment should be unnecessary under normal operating conditions. Should it become imperative that an IF alignment is desirable, it will be necessary to use a cathode ray oscilloscope in conjunction with a 3.0 megacycle signal generator with a superimposed 300 K.C. sweep frequency. This generator may be built up by constructing an oscillator with the tank condenser semi-fixed and variable, the variable portion being designed to be rotated by a motor and of proper capacity to give ±300 K.C. variation of the 3.0 megacycle mid-frequency. Connect the vertical plates of the oscilloscope across the resistor R-15 of the 4th IF stage and align transformers T-7, T-6, T-5 and T-4 in a progressive step by step method.

Frequency Demodulator

With the same oscillator and sweep signal as used above, connect the vertical oscilloscope plates across the resistors, R-18 and R-19, then align the transformer T-8 for a cross-over curve as shown in Fig. 4. Proper alignment of trimmer C-51 is indicated when the curve crosses about mid-way in a vertical plane. Proper alignment of C-50 is indicated when the sides of the curve near cross-over are nearest to a straight line.

Fig. 4

Note - Keep signal input high enough so that noise limiter is functioning. This point is indicated when an increase in signal input no longer changes the size of the curve.

RF Alignment

Make sure the dial division on the low frequency end of the drum dial coincides with the escutcheon mark when the gang condenser is completely closed; then, proceed as follows:

1. Connect a high resistance 0-10 V D.C. voltmeter across R-15.
2. Apply a 42.8 megacycle unmodulated signal to the antenna terminal board.
3. Set dial scale so it is tuned to 42.8 megacycle and peak oscillator trimmer C-4 for maximum voltage reading on the meter.
4. Peak the antenna (C-2) and RF (C-3) trimmers for maximum voltage output on meter.

Note - The proper location of the trimmers is shown on a following page.

MODEL GD400

GENERAL ELECTRIC CO. Schematic, Socket, Trimmers Alignment

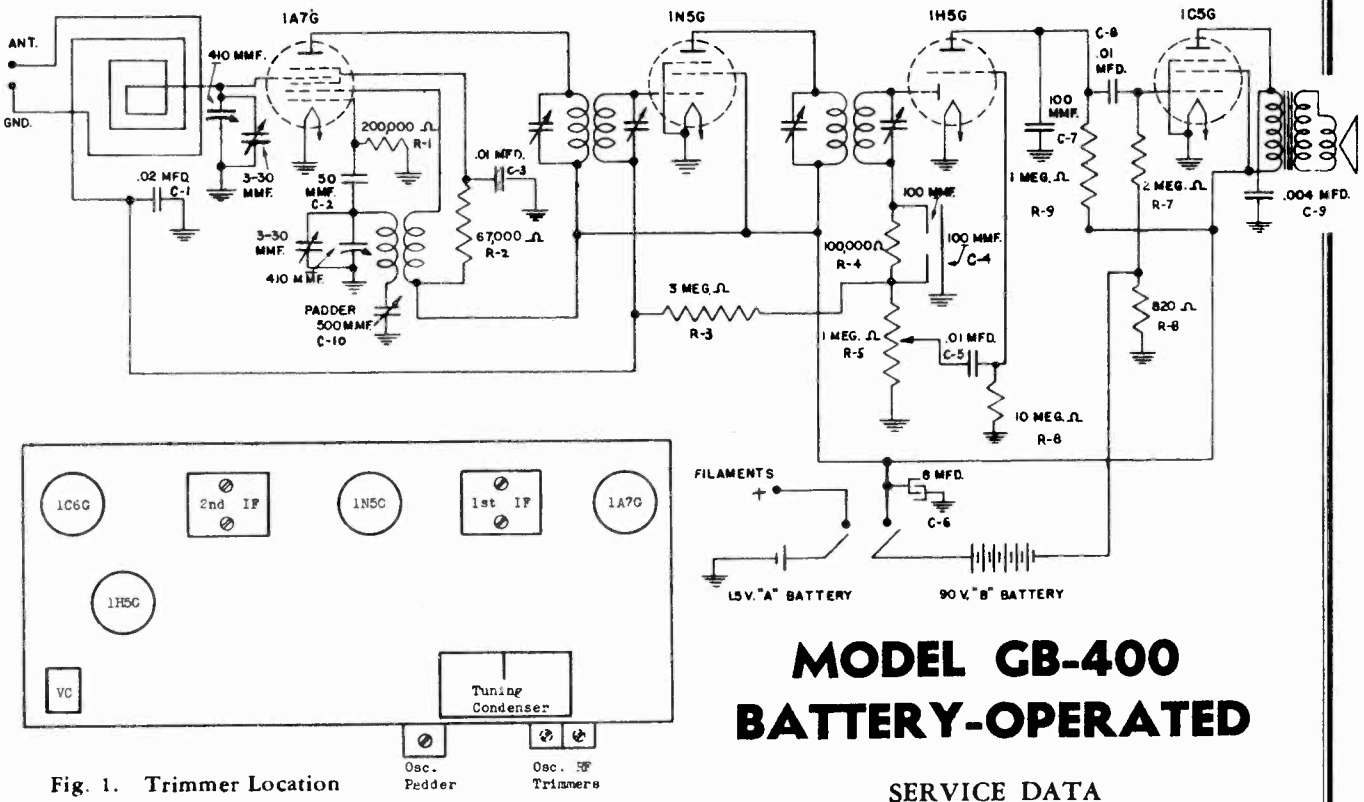


Fig. 1. Trimmer Location

MODEL GB-400 BATTERY-OPERATED

ALIGNMENT PROCEDURE

Alignment Frequencies

IF—455 kc. Broadcast—1500 kc. and 600 kc.

NOTE—Do not rest the chassis on any of its sides when attempting to align; place in either an inverted or upright position.

IF Alignment

To align the IF, it will be necessary to remove the chassis from the cabinet. Connect an output meter across the voice coil. Set the volume control for maximum.

Adjust the test oscillator to 455 kc. and apply the signal to the control grid of the 1A7G tube through a .05 mfd. capacitor. Do not remove the grid lead from the 1A7G tube. Keep the test oscillator output as low as possible to give a readable output. Adjust all four IF trimmers for maximum output.

RF Alignment

The following alignment should be made with the receiver fastened in the case. Turn the receiver to its inverted position and make trimmer and padder alignments through the holes provided in the bottom of the case.

Connect the ground lead of the signal generator to the receiver chassis and the other lead to the receiver antenna terminal (located underneath cabinet). A dummy antenna consisting of a 250 mmf. capacitor in series with 200 ohms should be connected in the antenna lead of the signal generator. Apply a 600 kc. modulated signal and adjust the oscillator padder for a maximum output while rocking the gang condenser in vicinity of 600 kc. mark on the dial.

Using the same dummy antenna with a 1500 kc. signal generator input, adjust the oscillator trimmer for a maximum output. Now remove signal generator leads, tune in a station at approximately the 1500 kc. point on dial and then peak the RF trimmer for a maximum signal.

SERVICE DATA

Physical Specifications

Model	GB-400
Height	9⅜ inches
Width	13 inches
Depth	8¼ inches

Tuning Control Drive Ratio 1:1

Batteries Required

1—1½-volt "A" battery (Eveready No. 741 or equivalent).

2—45-volt "B" batteries (Eveready No. 762 or equivalent).

Tuning Frequency Range ..... 540–1600 kc.

Alignment Frequency

IF	455 kc.
RF	600 and 1500 kc.

Loud-speaker—Permanent Magnet

Over-all diameter	5 inch
Cone Coil Impedance (400 cycles)	3.0 ohms

Tubes

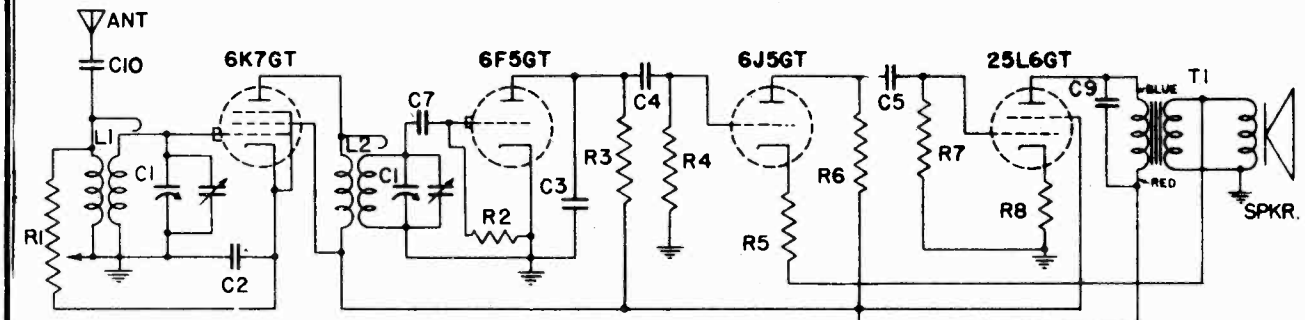
Converter and Oscillator	GE-1A7G
IF Amplifier	GE-1N5G
Detector and 1st Audio	GE-1H5G
Power Amplifier	GE-1C5G

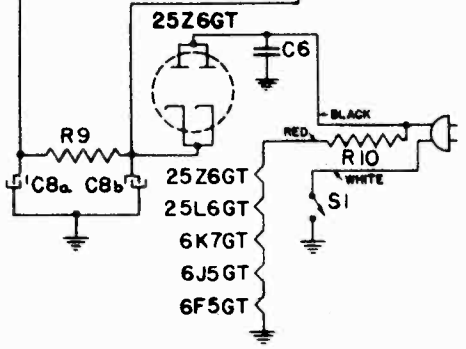
GENERAL INFORMATION

The Model GB-400 is a compact and portable battery-operated receiver that employs four tubes in a superheterodyne circuit. Features of design include self-contained "A" and "B" battery supply, an efficient loop antenna built inside of the cabinet, and an efficient P.M. speaker.

MODEL GD 500 — Voltage, Alignment
Schematic, Socket, Trimmers

GENERAL ELECTRIC CO.





Symbol	Description
C-1	Tuning Condenser
C-2	.05 mfd., Paper Capacitor
C-3	.001 mfd., Paper Capacitor
C-4, -5	.005 mfd., Paper Capacitor
C-6, -7	.01 mfd., Paper Capacitor
C-8a	15 mfd., Dry Electrolytic
C-8b	30 mfd., Dry Electrolytic
C-9	.02 mfd., Paper Capacitor
C-10	.002 mfd., Paper Capacitor
R-1	30,000 ohm, Volume Control
R-2	15 megohm, Carbon Resistor
R-3, -4	470,000 ohm, Carbon Resistor
R-5	3,300 ohm, Carbon Resistor
R-6	100,000 ohm, Carbon Resistor
R-7	470,000 ohm, Carbon Resistor
R-8	150 ohm, Carbon Resistor
R-9	4,700 ohm, Carbon Resistor
R-10	162 ohm, Power Cord Resistor
L-1	Antenna Coil
L-2	RF Coil
T-1	Output Transformer

Tubes

RF Amplifier	GE-6K7GT
Detector	GE-6F5GT
1st Audio	GE-6J5GT
Power Output	GE-25L6GT
Rectifier	GE-25Z6GT

MODEL GD-500
TRF RECEIVER

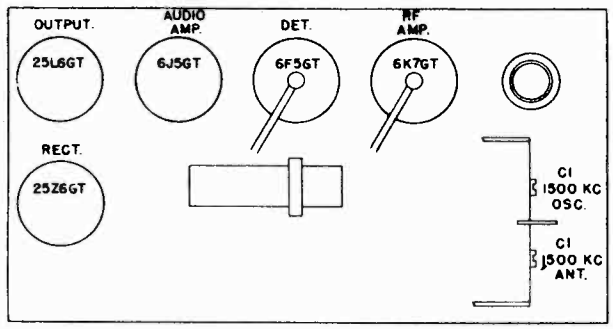


Fig. 1. Trimmer Location

VOLTAGE CHART

Tube No.	6K7GT	6J5GT	6F5GT	25L6GT	25Z6GT
Plate to −B Volts	88	30 *	35 *	132	120 AC
Screen to −B Volts	88	...	....	88	....
Cathode to −B Volts	0	1.3	0	5.5	140
Filament Volts	6.4	6.3	6.2	25.0	25.0

Voltage measured when volume control is set to maximum.
Line Voltage—120 AC. No signal input.
* Measured on 500-volt scale.
On DC. voltages should read approximately 10% lower.

Electrical Specifications

Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
110–120 AC or DC	25–60	45

Tuning Frequency Range

Band "B" ..... 540–1750 KC
Alignment Frequency ..... 1500 KC

Electrical Power Output

Undistorted ..... 1.4 watts
Maximum ..... 2.0 watts

Loudspeaker—Permanent Magnet

Outside Cone Diameter ..... 4½ inches
Voice Coil Impedance (400 cycles) ..... 3.5 ohms

GENERAL INFORMATION

Model GD-500 is a compact five-tube AC-DC tuned radio frequency receiver that tunes the broadcast band of frequencies. One side of the power line is connected directly to the chassis ground, therefore, caution should be exercised in servicing.

When operating from a DC source of power, it is necessary to insert the power plug with proper polarity; otherwise, the receiver will fail to function. If any hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

ALIGNMENT

Connect the high side of the signal generator through a 250 mmf. condenser to the antenna lead. The low side of the signal generator output should be connected to the receiver chassis through a .05 mfd. condenser. Connect a suitable output meter across the voice coil leads; then proceed as follows:

1. With gang condenser plates completely closed, the tuning mark should be over the last mark on the dial.
2. Tune receiver to the 1500 KC point on the dial; then align trimmers on the gang condenser at 1500 KC for a maximum output meter reading.

Precaution—One side of the power supply is connected to the chassis. Do not connect chassis to any external ground.

MODEL G95, Radioforte
Schematic, Chassis Wiring
Socket, Trimmers, Voltage

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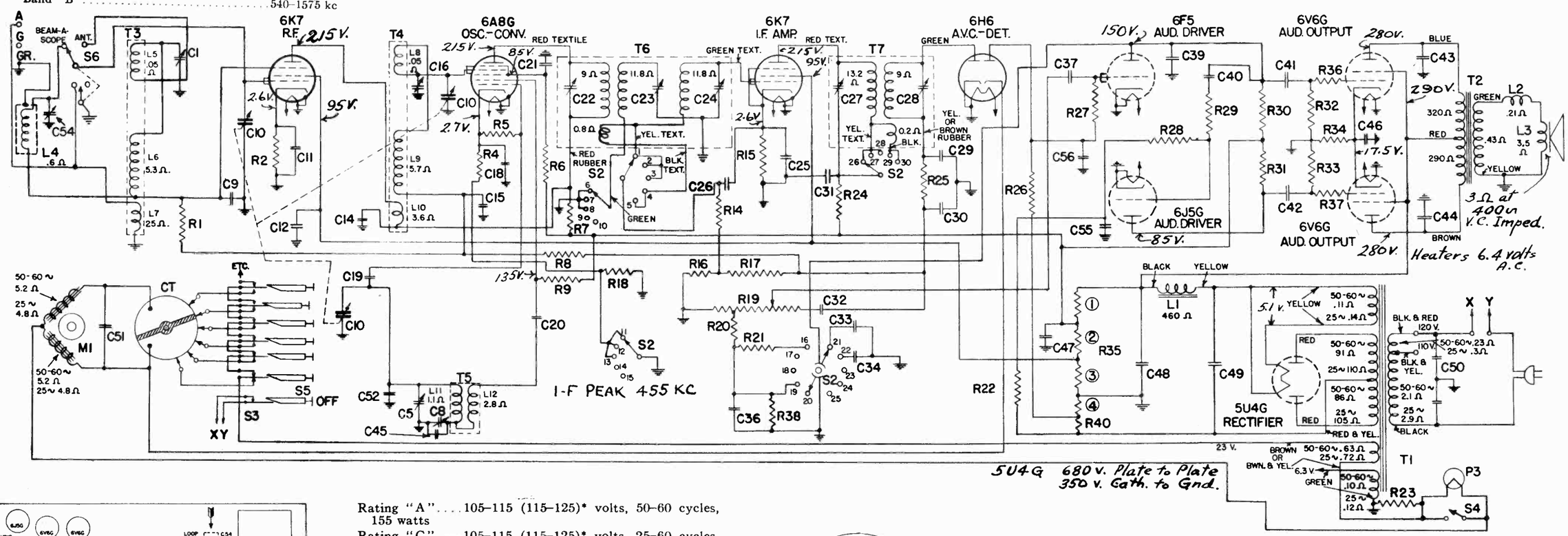
Tuning Frequency Range

Band "B" ..... 540–1575 kc



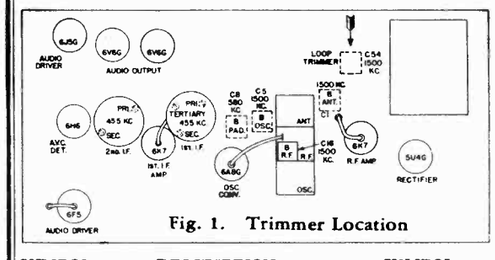
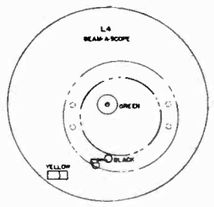


Fig. 1. Trimmer Location

Rating "A" .... 105–115 (115–125)* volts, 50–60 cycles, 155 watts

Rating "C" .... 105–115 (115–125)* volts, 25–60 cycles, 160 watts

* The receivers as shipped from the factory have the power cord connected to the 115–125-volt tap of the transformer (black and red lead). If the normal voltage of the power supply is always below 110 volts, the connection of the power cord should be removed from this lead and soldered to the 105–115-volt tap (black and yellow lead). After changing the connection, tape the soldered joint as well as the exposed end of the unused lead. This change requires removal of the chassis from the cabinet.



SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
R-1	220,000 Ohm Carbon Resistor	R-33	220,000 Ohm Carbon Resistor	C-24	50-135 MMF. 1st I.F. Tert. Trimmer	C-51	60 MFD. 40 V. A.C. Dry Electro.
R-2	330 Ohm Carbon Resistor	R-34	230 Ohm Resistor (W.W.)	C-25	.05 MFD. 200 V. Paper Capacitor	C-52	20 MMF. Compensating Capacitor
R-4	330 Ohm Carbon Resistor	R-35	4 Sections Voltage Divider	C-26	.05 MFD. 200 V. Paper Capacitor	C-54	2-20 MMF. Trimmer Capacitor
R-5	47,000 Ohm Carbon Resistor	(1)	1600 Ohms	C-27	50-135 MFF. 2nd I.F. Tri. Trimmer	C-55	.25 MFD. 200 V. Paper Capacitor
R-6	39,000 Ohm Carbon Resistor	(2)	9000 Ohms	C-28	100-230 MMF. 2nd I.F. Sec. Trimmer	C-56	.25 MFD. 200 V. Paper Capacitor
R-7	1,000 Ohm Carbon Resistor	(3)	9000 Ohms	C-29	150 MMF. Mica Capacitor	T-1	Power Transformer, 50-60 cycles, cycles
R-8	1.8 Megohm Carbon Resistor	(4)	11 Ohms	C-30	150 MMF. Mica Capacitor		
R-9	22,000 Ohm Carbon Resistor	R-36	1,000 Ohm Carbon Resistor	C-31	.05 MFD. 400 V. Paper Capacitor	T-2	Output Transformer
R-14	2.2 Megohm Carbon Resistor	R-37	1,000 Ohm Carbon Resistor	C-32	.02 MFD. 200 V. Paper Capacitor	T-3	Ant. Transformer
R-15	330 Ohm Carbon Resistor	R-38	470,000 Ohm Carbon Resistor	C-33	.0055 MFD. 600 V. Paper Capacitor	T-4	R.F. Transformer
R-16	56,000 Ohm Carbon Resistor	R-40	20 Ohm W.W. Resistor	C-34	.002 MFD. 600 V. Paper Capacitor	T-5	Osc. Transformer
R-17	220,000 Ohm Carbon Resistor	C-1	5-40 MMF. "B" Ant. Trimmer	C-35	.05 MFD. 200 V. Paper Capacitor	T-6	1st I.F. Transformer
R-18	330 Ohm Carbon Resistor	C-5	7-23 MMF. "B" Osc. Trimmer	C-36	.0055 MFD. 600 V. Paper Capacitor	T-7	2nd I.F. Transformer
R-19	2 Megohm, 1 Megohm Tap. Vol. Control	C-8	160-375 MMF. "B" Padder	C-37	.02 MFD. 200 V. Paper Capacitor	L-1	Field Coil 460 Ohms (cold)
R-20	68,000 Ohm Carbon Resistor	C-9	.05 MFD. 200 V. Paper Capacitor	C-39	270 MMF. Mica Capacitor	L-2	Hum Buck Coil
R-21	68,000 Ohm Carbon Resistor	C-10	10-450 MMF. Tuning Capacitor	C-40	.02 MFD. 400 V. Paper Capacitor	L-3	Voice Coil, 3.5 Ohms
R-22	1.2 Megohm Carbon Resistor	C-11	.05 MFD. 200 V. Paper Capacitor	C-41	.05 MFD. 400 V. Paper Capacitor	L-4	Beam-a-Scope
R-23	1,000 Ohm Carbon Resistor	C-12	.05 MFD. 200 V. Paper Capacitor	C-42	.05 MFD. 400 V. Paper Capacitor	CT	Contactor Assembly
R-24	1,000 Ohm Carbon Resistor	C-14	.1 MFD. 400 V. Paper Capacitor	C-43	.0015 MFD. 1500 V. Paper Capacitor	P-3	Tuning Lamp 25 V.—.2 Amps.
R-25	47,000 Ohm Carbon Resistor	C-15	.05 MFD. 200 V. Paper Capacitor	C-44	.0015 MFD. 1500 V. Paper Capacitor	S-2	Tone Control Switch
R-26	470,000 Ohm Carbon Resistor	C-16	5-30 MMF. "B" R.F. Trimmer	C-45	175 MMF. Compensating Capacitor	S-3	Power Supply Switch
R-27	1.5 Megohm Carbon Resistor	C-18	.05 MFD. 200 V. Paper Capacitor	C-46	25 MFD. 25 V. W.V. Dry Electro.	S-4	Tuning Lamp Switch
R-28	82,000 Ohm Carbon Resistor	C-19	50 MMF. Silver Plated Capacitor	C-47	10 MFD. 400 V. W.V. Dry Electro.	S-5	Station Selector Switch
R-29	1.2 Megohm Carbon Resistor	C-20	4,700 MMF. Mica Capacitor	C-48	30 MFD. 450 V. W.V. Wet Electro.	S-6	Beam-a-Scope—Ant. Switch
R-30	68,000 Ohm Carbon Resistor	C-21	.05 MFD. 400 V. Paper Capacitor	C-49	30 MFD. 450 V. W.V. Wet Electro.	M	Tuning Motor 23 V. 50-60 Cycles, 25 Cycles
R-31	68,000 Ohm Carbon Resistor	C-22	100-230 MMF. 1st I.F. Pri. Trimmer	C-50	.01-.01 MFD. 250 V. A.C. Line Capacitor		
R-32	220,000 Ohm Carbon Resistor	C-23	50-135 MMF. 1st I.F. Sec. Trimmer				

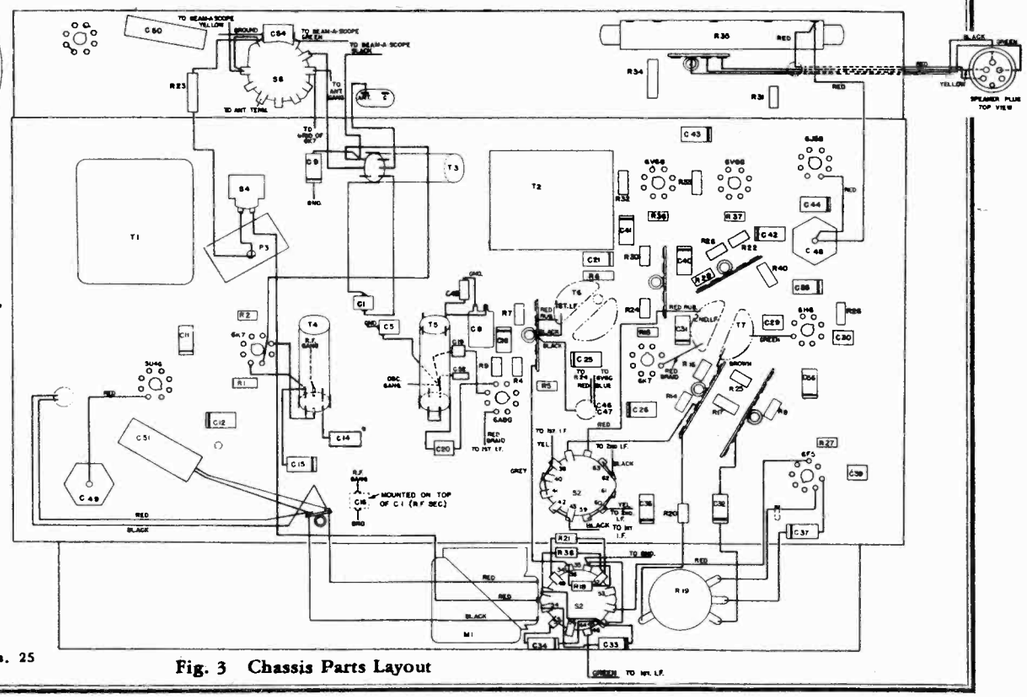


Fig. 3 Chassis Parts Layout

GENERAL ELECTRIC CO.

Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
RS-396	SWITCH—Tone control switch (S-2)	1.35
RS-397	SWITCH—Station set-up lamp switch (S-4)	.20
RS-399	SWITCH—Antenna-Beam-a-Scope switch (S-6)	.85
RS-446	SPRING—Drive cord tension spring (K) (Pkg. of 5)	.25
RS-448	SPRING—Vol. control drive pulley spacer spring (C)	.05
RS-449	SPRING—Tone control drive cord tension spring (H) (Pkg. of 5)	.10
RC-006	CAPACITOR—.0015 mfd., 1500 V. paper (C-43, 44)	.25
*RC-011	CAPACITOR—.002 mfd., 600 V. paper (C-34)	.25
*RC-023	CAPACITOR—.005 mfd., 600 V. paper (C-36)	.25
RC-028	CAPACITOR—.006 mfd., 600 V. paper (C-33)	.30
*RC-048	CAPACITOR—.02 mfd., 600 V. paper (C-32, 37, 40)	.30
*RC-092	CAPACITOR—.05 mfd., 600 V. paper (C-9, 11, 12, 15, 18, 21, 25, 26, 31, 41 42)	.30
*RC-104	CAPACITOR—1 mfd., 600 V. paper (C-14)	.30
*RC-136	CAPACITOR—25 mfd., 200 V. paper (C-55, 56)	.30
RC-217	CAPACITOR—50 mmf., mica (silver plated) (C-19)	.35
RC-230	CAPACITOR—20 mmf., compensating capacitor (C-52)	.35
*RC-242	CAPACITOR—150 mmf., mica (C-29-30)	.25
RC-245	CAPACITOR—175 mmf., compensating capacitor (C-45)	.45
RC-263	CAPACITOR—270 mmf., mica (C-39)	.25
RC-393	CAPACITOR—4700 mmf., mica (silvered) (C-20)	.50
*RC-429	CAPACITOR—30 mfd., 450 V. wet electrolytic (C-48, 49)	1.35
RC-596	CAPACITOR—25 mfd., 25 V; 10 mfd., 400 V. dry electrolytic (C-46, 47)	1.10
RC-597	CAPACITOR—60 mfd., 40 V. A.C. motor capacitor (C-51)	1.00
*RC-672	CAPACITOR—3-35 mmf., R.F. trimmer (C-18)	.15
RC-678	CAPACITOR— mmf. "P" padder (C-8)	.30
RQ-1305	RESISTOR—2,000 ohm, ½-W. carbon (R-28) (Pkg. of 5)	$0.70
*RQ-1315	RESISTOR—220,000 ohm, ½-W. carbon (R-1, 17, 32, 33) (Pkg. of 5)	.70
*RQ-1323	RESISTOR—470,000 ohm, ½-W. carbon (R-26, 38) (Pkg. of 5)	.70
*RQ-1333	RESISTOR—1.2 megohm, ½-W. carbon (R-22, 29) (Pkg. of 5)	.70
*RQ-1335	RESISTOR—1.5 megohm, ½-W. carbon (R-27) (Pkg. of 5)	.70
*RQ-1337	RESISTOR—1.8 megohm, ½-W. carbon (R-8) (Pkg. of 5)	.70
*RQ-1339	RESISTOR—2.2 megohm, ½-W. carbon (R-14) (Pkg. of 5)	.70
RQ-1459	RESISTOR—1000 ohm, 1-W carbon (R-23)	.20
RQ-1497	RESISTOR—39,000 ohm, 1-W. carbon (R-6)	.20
RR-740	RESISTOR—Voltage divider resistor (R-35)	.85
RR-1006	RESISTOR—20 ohm, ½-W. W.W. resistor (R-40) (Pkg. of 5)	.70
RR-1007	RESISTOR—230 ohm, 2-W. resistor (R-34).	.20

Stock No.	Description	List Price
RS-509	SPACER—Volume control pulley spacers (Pkg. of 2)	.10
RS-911	SHAFT—Idler drive wheel shaft and collar	.15
RS-914	SHAFT—Tone or volume flexible drive shaft (A)	.35
RS-915	SHAFT—Vol. or tone drive shafts	.10
RT-104	TRANSFORMER—Power transformer, 105-125 V. 25-60 cycles (T-1)	14.75
RT-105	TRANSFORMER—Power transformer, 105-125 V. 50-60 cycles (T-1)	9.00
RT-263	TRANSFORMER—1st I.F. transformer and shield (T-6)	2.30
RC-679	CAPACITOR—2-20 mmf., trimmer (C-54)	$0.20
RC-681	CAPACITOR—7-23 mmf., "B" osc. trimmer (C-5)	.90
RC-683	CAPACITOR—5-40 mmf., ant. trimmer (C-10)	.35
RC-729	CONDENSER—3-gang tuning condenser (C-10)	5.60
*RC-755	CAPACITOR—.01-.01 mfd., line capacitor (C-50)	.40
*RC-863	CORD—Power cord	.65
RC-1980	COUPLER—Volume or tone control coupling unit (B)	.20
RC-8035	CABLE—Speaker cable and plug	.50
RC-8044	CABLE—Condenser drive cable (J) (Pkg. of 5)	.65
RC-8083	CABLE—Tone control drive cable (G)	.25
RC-8084	CABLE—Vol. control drive cable	.20
RG-016	GRID CLIP—Control grid clip (for metal tubes) (Pkg. of 5)	.10
RL-063	COIL—Ant. coil Band "B," "C," and "D" (T-3)	1.25
RL-142	COIL—R.F. coil Band "B," "C," and "D" (T-4)	1.15
RL-267	COIL—Osc. Coil Band "B," "C," and "D"	1.25
RL-500	BEAM-A-SCOPE—Beam-a-Scope Antenna (complete)	9.15
RM-112	MOTOR—Tuning motor, 50-60 cycles	4.00
RM-113	MOTOR—Tuning motor, 25 cycles	5.35
*RP-048	DRIVE PULLEY—Condenser drive pulley (P)	.35
*RP-076	PULLEY—Vol. control driven pulleys or tone control drive pulleys (D)	.15
RP-300	PULLEY—Rubber cone drive pulley (motor)	.25
RP-301	PULLEY—Drive cord idler pulley (Pkg. of 2)	.10
RP-305	PULLEY—Tone control driven pulley (I)	.30
RP-306	PULLEY—Volume control drive pulley (E)	.20
*RQ-1247	RESISTOR—330 ohm, ½-W. carbon (R-2, 4, 15, 18) (Pkg. of 5)	.70
*RQ-1259	RESISTOR—1000 ohm, ½-W. carbon (R-7 24, 36, 37) (Pkg. of 5)	.70
*RQ-1291	RESISTOR—22,000 ohm, ½-W. carbon (R-9) (Pkg. of 5)	.70
*RQ-1299	RESISTOR—47,000 ohm, ½-W. carbon (R-5, 25) (Pkg. of 5)	.70
*RQ-1301	RESISTOR—56,000 ohm, ½-W. carbon (R-16) (Pkg. of 5)	.70
*RQ-1303	RESISTOR—68,000 ohm, ½-W. carbon (R-20, 21, 30, 31) (Pkg. of 5)	.70
RT-264	TRANSFORMER—2nd I.F. transformer and shield (T-7)	$1.60
RT-439	TRANSFORMER—Output transformer (T-2)	3.20
RV-045	VOLUME CONTROL—2 meg. vol. control (R-19)	.75
*RW-101	WASHERS—Felt washers for knobs (Pkg. of 10)	.45

Stock No.	Description	List Price
*RB-008	BOARD—Terminal board (2 lug)	$0.10
*RB-023	BOARD—Terminal board (4 lug)	.10
*RB-049	BOARD—Ant.-Gnd. terminal board	.10
*RB-062	BOARD—Terminal board (6 terminals)	.10
*RB-066	BOARD—Terminal board (4 lugs)	.10
*RB-070	BOARD—Terminal board (3 lugs)	.10
RB-094	BOARD—Terminal board (7 lugs)	.10
RB-160	BRACKET—Reduction drive wheel bracket	.20
RB-161	BRACKET—Manual and motor drive bracket	.40
RB-162	BRACKET—Tuning condenser mtg. bracket (front)	.45
RB-700	BRAKE—Drive wheel friction brake (complete)	.20
*RS-174	SHIELD—Grid shield cap (Pkg. of 5)	.25
*RS-200	SOCKET—8-prong octal base socket (Pkg. of 5)	.75
*RS-204	SOCKET—5-prong octal tube socket (Pkg. of 5)	.75
RS-226	SOCKET—Octal base (on rear deck of chassis)	.15
RS-227	SOCKET—Tube socket (low loss octal base)	.15
RS-228	SOCKET—Station et-up lamp socket	.20
RS-229	SOCKET—Tube socket (6A8G)	.35
RW-900	WHEEL—Idler drive wheel	.45
RW-904	WHEEL—Vol. control wheel	.65
RW-905	WHEEL—Tone control wheel	.65
*RX-027	ASSEMBLY—Chassis mounting assembly	.15
RX-049	ASSEMBLY—Condenser mounting assembly	.15
	SPEAKER ASSEMBLY	
RC-936	CONE—12-inch cone and voice coil assembly	1.10
RC-991	CLAMP—Cone spider clamp	.05
RD-301	DUST CAP—Speaker cone dust cap (Pkg. of 5)	.10
RP-109	PLUG—Male speaker plug	.20
RS-075	SPEAKER—12-inch speaker	5.50
*RX-030	ASSEMBLY—Speaker mounting assembly	.10
	PUSH-BUTTON MECHANISM	
RC-8045	CARDS—Station letter cards (set)	.60
RC-8046	CABLE—Power cable and plug to push button assembly	.50
RC-8047	CABLE—Station selector button cable	.95
RK-203	KEY—Station key (Pkg. of 5)	.30
RS-444	SPRING—Station button springs (Pkg. of 10)	.10
RS-864	SCREWS—Keyboard assembly thumb screws (Pkg. of 10)	.40
RS-3008	SWITCH—Button "On-Off" switch	.50
RT-906	TAB—"Off" tab for station button (Strip of 10)	.05
RW-025	WINDOW—Celluloid station window (Pkg. of 25)	.15
RX-051	ASSEMBLY—Keyboard Touch Tuning Assembly switch	7.40
	STATION SELECTOR ASSEMBLY (BEHIND TUNING CONDENSER)	
RB-701	BAND—Contactor band	.10
RC-1978	CONTACT—Thumbscrew contact (complete) (Pkg. of 5)	.45
RD-080	DIAL—Dial scale for contactor drum	.15
RI-108	INSULATOR—Contactor band insulator (Pkg. of 5)	.15
RS-447	SPRING—Contactor band tension spring (Pkg. of 5)	.15
RW-901	WHEEL—Contactor wheel (CT) (complete)	2.00

(Prices subject to change without notice)

*Used on previous receivers.

I.F. Alignment with Oscilloscope

Step No.	Input Frequency	Tone Control Position	Point of Input	Trimmer	Comments
1.	Band B 455 K.C. and 30 K.C. Sweep	Normal	I.F. 6K7 Grid	2nd I.F. Sec. 2nd I.F. Pri.	Condenser gang at minimum capacity—vertical input to ground and junction at R-23, R-12, and R-17. Adjust trimmers in order mentioned for a single-peaked response curve. Keep input as low as practical. The resulting curve on the "normal" position is shown in Fig. 2A. The expanded curve is taken with tone control at "treble I" is shown in Fig. 2B.
2.	Band B 455 K.C. and 30 K.C. Sweep	Treble I	Converter 6A8 Grid	1st I.F. Sec. 1st I.F. Pri.	
3.	Band B 455 K.C. and 30 K.C. Sweep	Normal	Converter 6A8 Grid	1st I.F. Tertiary	
4.	Band B 455 K.C. and 30 K.C. Sweep	Normal	Converter 6A8 Grid	All IF Trimmers	

I.F. Alignment with Output Meter

Step No.	Input Frequency	Tone Control Position	Point of Input	Trimmer	Comments
1.	Band B 455 K.C. modulated	Normal	I.F. 8K7 Grid	2nd I.F. Sec. 2nd I.F. Pri.	Condenser gang at minimum capacity—output meter connected across voice coil—input control adjusted for maximum input as low as practical. Adjust all trimmers in order listed for maximum output. Do not attempt an alignment in the expanded position.
2.	Band B 455 K.C. modulated	Normal	Converter 6A8 Grid	1st I.F. Sec. 1st I.F. Pri. 1st I.F. Tertiary	
3.	Band B 455 K.C. modulated	Normal	Converter 6A8 Grid	All I.F. trimmers	

R.F. Alignment

Step No.	Input Frequency	Tone Control Position	Point of Input	Trimmer	Comments
1.	Band B		Antenna post		Adjust tuning mechanism so that pointer coincides with first line at left hand end of dial scale when condenser plates are fully meshed.
2.	Band B 1500K.C. modulated	Bass	Antenna post	Osc. (C-5) R.F. (C-18) Ant. (C-1)	Connect output meter across voice coil—input control set at minimum clockwise position. Adjust trimmer in order listed for maximum output.
3.	Band B 580 K.C. modulated	Bass	Antenna post	Osc. Padder. (C-8)	Adjust padder for maximum output in vicinity of 580 K.C. while rocking gang condenser.
4.	Band B Repeat Step 2				
5.	Band B 1500 K.C. modulated	Bass	Antenna post	Beam-a-Scope (C-54)	Turn antenna switch to clockwise position, align Beam-a-Scope trimmer for maximum output.

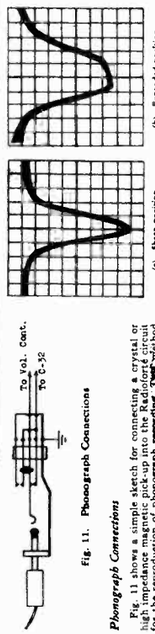


Fig. 11. Phonograph Connections

Phonograph Connections

Fig. 11 shows a simple sketch for connecting a crystal or high impedance magnetic phonograph pickup. The method for the reproduction of phonograph records. This method uses a two circuit jack and is connected into the receiver by opening the circuit between C-52 and the volume control (R-19) and connecting the pick-up leads to the jack. A telephone plug is attached to the pick-up leads, and for phonograph operation, it is merely necessary to insert it into the jack. Shielded wire should be used for all connections and all connecting leads should be properly shielded to prevent pick-up.

When the pick-up is connected as suggested, the regular radio volume and tone controls work for both radio and phonograph reproduction.

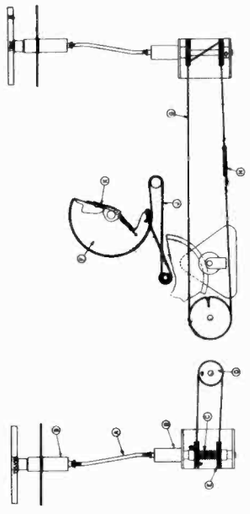


Fig. 8. Drive Mechanism

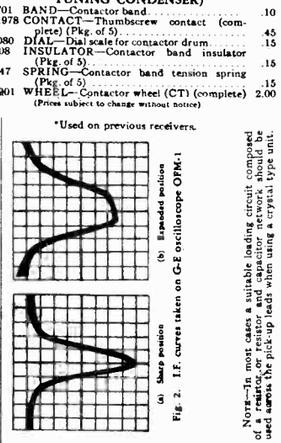


Fig. 2. I.F. curves taken on G-E oscilloscope OFM-1

NOTE—In most cases a suitable loading circuit composed of a resistor or resistor and capacitor network should be used across the pick-up leads when using a crystal type unit.

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All keys of the remote control key assembly are wired in series to avoid possibility of two keys completing the circuit to the motor at the same time.

The remote control motor uses a phase shifting resistor in place of a condenser as used on the tuning motor when operating from a 50 or 60 cycle power supply. When operation is desired from 25 cycles replace the 30 ohm, 10-watt resistor across the volume control motor terminals with a 60 ohm, 10-watt resistor and a 16 MF, 50 V. condenser.

The mechanical installation of the volume control motor is shown in Fig. 9. For full installation instructions refer to service notes RGMS-8.

Remote Control Notes

1. If key assembly on remote control unit is too high in the case, it is possible that one or all of the keys may be slightly depressed at all times so as to cause faulty operation of the system. To remedy, lower the complete assembly by means of the two screws, one on each side inside of the case and then lower assembly—tighten set screws.

2. The tension of the friction clutch on the remote control motor is adjusted at the factory and should not require resetting. If it is set too tight, the volume control may be damaged when "VOL DEC." key is held in a depressed position. If this slip clutch is too loose the control will fail to turn.

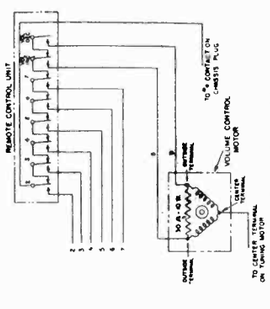


Fig. 10. Remote Control Schematic

Lubrication

For smooth and noiseless operation of the tuning system, it is absolutely necessary to keep it well lubricated.

Contactor drum—use thin film of petroleum jelly.

Dial Pointer Guide Rods—use thin film of petroleum jelly.

Motor bearings—These are oilless type and do not require lubrication.

REMOTE CONTROL

The GM-8 Remote Control is merely another station keyboard assembly that is wired in parallel with the regular station keys. In addition, a remotely controlled motor is used to either raise or lower the volume at the receiver. By means of the "VOL INC." key, the volume can be increased as may be readily understood. Leads No. 2 to No. 7 are the automatic tuning button control leads that parallel any six of the regular receiver station keys. Lead No. 1 supplies the common ground connection. The remaining two control leads No. 8 and No. 9 are the phase reversing leads to the volume control motor.

When the remote control is attached to a receiver, then the semi-depressed positions of the receiver push button keys result. When a key on the remote control is depressed, however, this depends upon whether the receiver was last operated from the remote control or from the station keys of the receiver itself. For this reason, the key assembly of the remote control has not been equipped with a latch bar.

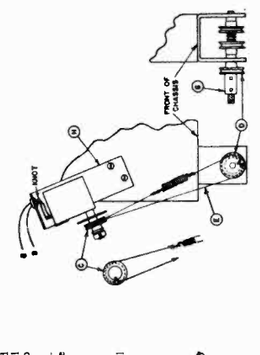


Fig. 9. Volume Control Motor Mounting

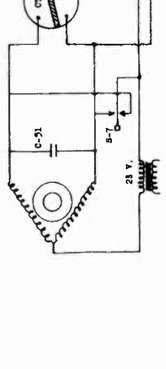


Fig. 5. Schematic of Touch-Tuning System

TOUCH-TUNING

The General Electric "Touch-Tuning" system consists of three essential units: the keyboard assembly of fourteen keys, used for station selection; the motor which drives the contactor segment with its adjustable stop and the split contactor segment with its adjustable station buttons, allowing a set up of thirteen different stations to be tuned automatically.

Thirteen keys are used for the selection of pre-set stations while the No. 14 key is used to turn power "On" or "Off". As each station key is depressed, it locks in the depressed position and will release any other that may be in the circuit, thus the selection of any station by a station key will release the "Off" key, turning the set power on.

The tuning motor is operated as a 23-volt split phase induction motor using C-51 as the phase splitting device. The 23 volts is supplied directly from the receiver power transformer.

Fig. 5 shows a simplified schematic of the control circuit and the following cycle of operation may be traced very easily. When a station key is depressed, it completes a circuit through the button making contact with the contact segment (CT) and energizes one winding of the motor. The other winding on the motor is energized through the condenser, C-51. The motor starts and through a gear reduction, the worm half of the contact segment (CT) that the station button first energizes. When voltage is applied to the motor, the rotor is pulled further into motor field and engages the worm and contactor segment drive wheel. This rotates its rubber cone hub with the dial drive wheel and causes the contactor segment to rotate. This operation continues until the insulated segment (i) breaks the station button circuit to the contact segment and removes voltage from the motor. The inertia in the tuning system drives the contactor segment a few degrees further and makes contact with the other half of the contact segment. This energizes the other winding of the motor and causes the motor to reverse. The brake on the dial drive wheel then comes into operation and stops the motor. The contactor is set to go past this insulated strip on the reversal of the motor and thus allows the station button to come to rest on the narrow insulated segment, thus stopping the tuning operation to this pre-set position.

Silent Tuning

During period of motor operation, either for automatic station selection or manual tuning, the receiver is inoperative. This is accomplished by a circuit which gives both instantaneous cut-off of the audio amplifier and time delay in restoring the response. By reference to the schematic Fig. 4, it will be noted that the 23.0 volts AC available from the motor and the resulting DC voltage is used to bias the audio amplifier tube to cut-off. Note that the charging time of the bias circuit is controlled by the time constant of R-28 and C-56 (6P5) to return to normal bias however, is determined by the product of R-28 and C-56 and is therefore controllable.

Drive Wheel Brake Adjustment

A friction brake has been incorporated on the drive wheel circumference (D) to accomplish accurate stopping of the motor-driven tuning system. When the button passes into the insulated segment, it will easily over-ride the insulated segment and come to rest on the contact segment which is narrow. If this condition continues an oscillatory motion or "Hunting" is set up and the motor will not come to rest as long as the station key is pressed. The brake, located at the left end of dial scale, should be adjusted for proper line voltage so that the motor only has to make one or two reversals.

This adjustment should be made under an average operating line voltage and allowance made for changes in voltage over the 24-hour period.

Stopping Accuracy

The exact location at which the drive mechanism will come to rest may be made more accurate by slightly lowering the insulated segment (X) on the contactor wheel as shown in Fig. 7. Loosen the set screw (Y) and lower the yoke (Z).

The proper adjustment is made at the factory and should not require resetting. An adjustment provided the contactor drum is kept well lubricated.

Fig. 6. Keyboard Wiring Diagram

Fig. 7

MODELS GD520, GD521

GENERAL ELECTRIC CO. Schematic, Socket, Trimmers Voltage, Alignment

Tuning Frequency Range

Band "B" . . . . . 535 to 1730 kc

Electrical Power Output

Undistorted . . . . . 1.1 watts
Maximum . . . . . 2.0 watts

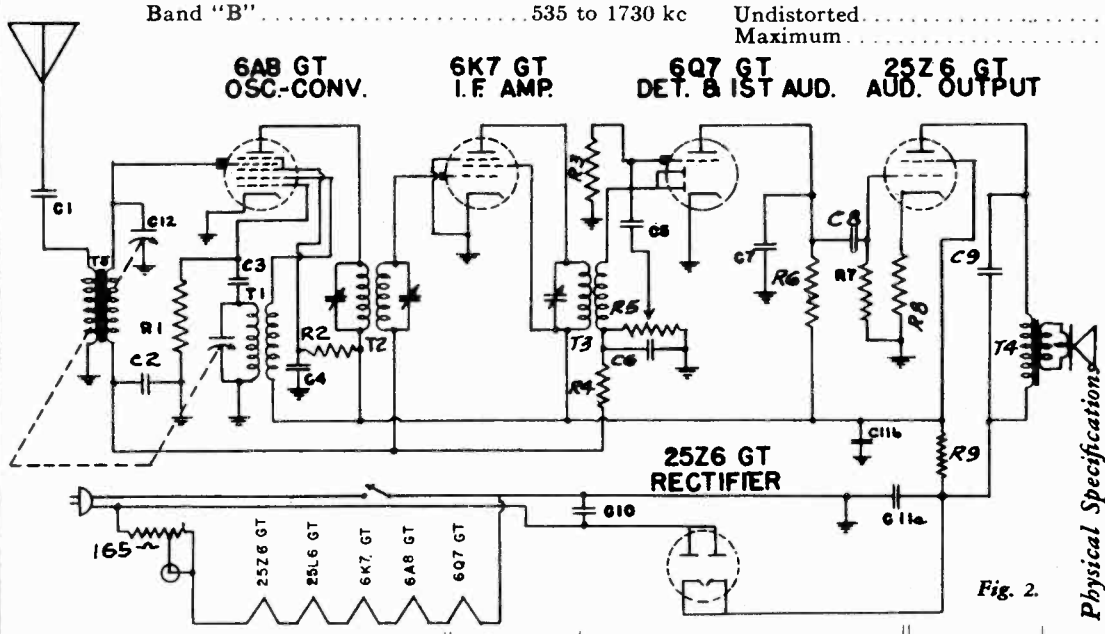


Fig. 2.

Physical Specifications
Height . . . . . 5 3/4 inches
Width . . . . . 7 5/8 inches
Depth . . . . . 4 1/16 inches

Tuning Control Drive Ratio . . . . . 3 to 1

Loud-speaker—Permanent Magnet
Outside Cone Diameter . . . . . 3 1/2 inches
Voice Coil Impedance (400 cycles) . . 3.0 ohms

Symbol	Description	Symbol	Description	Symbol	Description
C1	.005 mfd. paper capacitor	C10	.05 mfd. paper capacitor	R6	250,000 ohm, carbon resistor
C2	.02 mfd. paper capacitor	C11a	25 mfd. dry electrolytic	R7	500,000 ohm, carbon resistor
C3	50 mmf. mica capacitor	C11b	20 mfd. dry electrolytic	R8	180 ohm, carbon resistor
C4	.01 mfd. paper capacitor	C12	Tuning condenser	R9	2000 ohm, carbon resistor
C5	.01 mfd. paper capacitor	R1	50,000 ohm, carbon resistor	T1	Oscillator transformer
C6	250 mmf. mica capacitor	R2	40,000 ohm, carbon resistor	T2	1st I.F. transformer
C7	250 mmf. mica capacitor	R3	5 megohm, carbon resistor	T3	2nd I.F. transformer
C8	.01 mfd. paper capacitor	R4	2 megohm, carbon resistor	T4	Output transformer
C9	.03 mfd. paper capacitor	R5	500,000 ohm, volume control	T5	Antenna transformer

Power Supply	Frequency	Power Consumption
105–125 Volts AC or DC	60 Cycles	45 Watts

MODELS GD-520 AND GD-521

GENERAL INFORMATION

Models GD-520 and GD-521 are compact five-tube AC-DC superheterodyne receivers, employing five General Electric Pre-tested Tubes. One side of the power line is connected directly to the chassis ground in either receiver; therefore, caution should be exercised in servicing.

When operating from a D-c source of power, it is necessary to insert the power plug with proper polarity; otherwise, the receiver will fail to function. If any hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

Alignment Frequencies

I.F.—456 kc. . . . . Broadcast—1500 kc

The location of all trimmers is shown in Fig. 1.

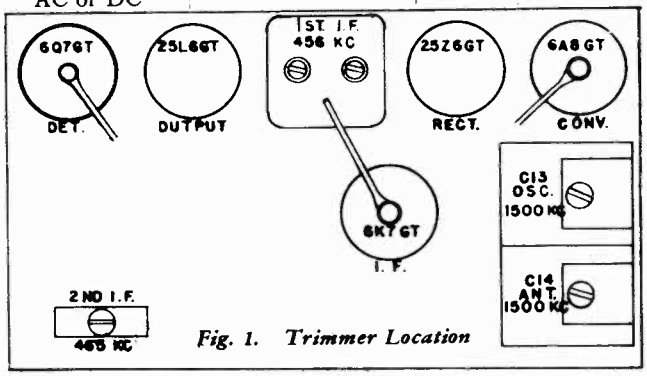


Fig. 1. *Trimmer Location*

I.F. Alignment

Connect an output meter across the voice coil. Set the volume control for maximum.

Set test oscillator to 456 kc and apply signals to the control grid of the 6A8GT tube through a .05 mfd. capacitor. Do not remove the grid lead from the 6A8GT. Keep the test oscillator output as low as possible to give a readable output. Adjust all three I.F. trimmers for maximum output.

R.F. Alignment

Set test oscillator to 1500 kc and connect one output lead to the receiver chassis† and the other through a 250 mmf. capacitor in series with 200 ohms to the receiver antenna lead. Adjust the oscillator trimmer (C-13) and the antenna trimmer (C-14) for a maximum output.

†**Precaution.** One side of the power supply is connected to the chassis. Do not connect chassis to any external ground. If signal generator is A-c operated, connect a .05 mfd. capacitor in the ground side before connecting it to the receiver chassis.

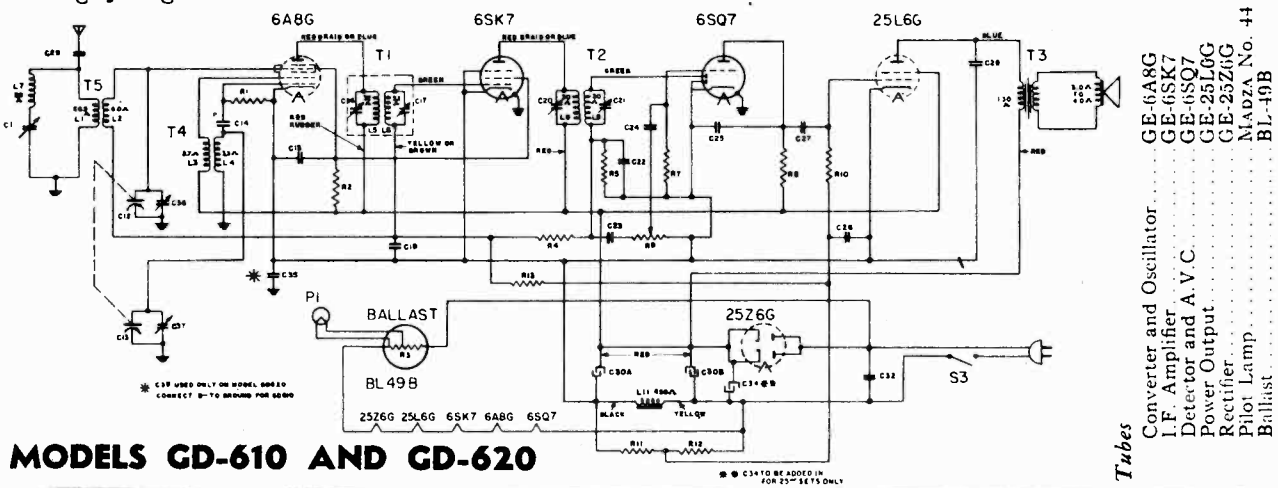
VOLTAGE CHART

Tube No.	6A8GT	6K7GT	6Q7GT	25L6GT	25Z6GT
Plate to −B Volts	92	92	32*	125	120 AC
Screen to −B Volts	37	92	....	92	....
Cathode to −B Volts	0	0	0	5.9	133
Filament Volts	6.4	6.3	6.2	25.0	25.0

Voltage measured when volume control is set to minimum.
Line Voltage—120 AC. No signal input.
* Measured on 500-volt scale.
On DC, voltages should read approximately 10% lower.

MODELS GD610, GD620
Schematic, Socket, Trimmers
Voltage, Alignment

GENERAL ELECTRIC CO.



Tubes
Converter and Oscillator GE-6A8G
I.F. Amplifier GE-6SK7
Detector and A.V.C. GE-6SQ7
Power Output GE-25L6G
Rectifier GE-25Z6G
Pilot Lamp . . . . MAZDA No. 44
Ballast BL-49B

MODELS GD-610 AND GD-620

Symbol	Description	Symbol	Description	Symbol	Description
C1	Wave trap trimmer	C29	.001 mfd., paper capacitor	R7	15 megohm, carbon resistor
C12, 13	Tuning condenser	C30a	10 mfd., dry electrolytic	R8	220,000 ohm, carbon resistor
C14	47 mmf., mica capacitor	C30b	30 mfd., dry electrolytic	R10	470,000 ohm, carbon resistor
C15	.25 mfd., paper capacitor	C32	.02 mfd., paper capacitor	R11	270,000 ohm, carbon resistor
C19	.05 mfd., paper capacitor	**C34	.35 mfd., dry electrolytic	R12	680,000 ohm, carbon resistor
C22	470 mmf., mica capacitor	*C35	.2 mfd., paper capacitor	R13	15 megohm, carbon resistor
C23	.002 mfd., paper capacitor	R1	47,000 ohm, carbon resistor	T1	1st I.F. transformer
C24	.002 mfd., paper capacitor	R2	10,000 ohm, carbon resistor	T2	2nd I.F. transformer
C25	330 mmf., mica capacitor	R3	Ballast resistance, BL49B	T3	Output transformer
C26	.15 mfd., paper capacitor	R4	2.2 megohm, carbon resistor	T4	Oscillator transformer
C27	.005 mfd., paper capacitor	R5	470,000 ohm, carbon resistor	T5	Antenna transformer
C28	.03 mfd., paper capacitor	R6	2.0 megohm, volume control		

SERVICE DATA

Specifications

Model	GD-610	GD-620
Height	8¼ inches	8¼ inches
Width	12⅜ inches	12⅜ inches
Depth	5¾ inches	5¾ inches

Tuning Control Drive Ratio 1:1

VOLTAGE CHART

Tube No.	6A8G	6SK7	6SQ7	25L6G	25Z6G
Plate to —B volts	112	112	50*	102	....
Screen to —B volts	75	75	..	112	..
Cathode to —B volts	0	0	0	0	134
Filament Volts	6.4	6.4	6.4	24.5	24.5

Line Voltage—120 V. AC. Volume control at maximum.
* Measured on 250 volt scale.
On DC, voltages are about 15 per cent lower.

When operating from a DC source of power, it is necessary to insert the power plug with proper polarity; otherwise the receiver will fail to function. If excessive hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F.—455 K.C. Broadcast—1500 K.C.
The location of all trimmers is shown in Fig. 1.

I.F. Alignment

Connect an output meter across the voice coil. Set the volume control for maximum.

Set test oscillator to 455 K.C. and apply signal to the control grid of the 6A8G tube through a .05 mfd. capacitor. Do not remove the grid lead from the 6A8G. Keep the test oscillator output as low as possible to give a readable output. Adjust all four I.F. trimmers for maximum output.

Wave Trap Alignment

Leave the test oscillator set to 455 K.C. and connect one output lead to the receiver chassis and the other through a 250 mmf. capacitor in series with 200 ohms to the receiver antenna lead. Adjust (C-1) for minimum output.

R.F. Alignment

Use the same dummy antenna (250 mmf. and 200 ohms) with 1500 K.C. input, adjust the oscillator trimmer (C-37) and antenna trimmer (C-36) for a maximum output.

Precaution—On the Model GD-610 one side of the power supply is connected to the chassis. If signal generator is AC operated, connect a .05 mfd. capacitor in the ground side before connecting it to the receiver chassis.

Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
100-125 Volts AC or DC	40–60	50

Tuning Frequency Range . . . . . 540–1750 K.C.

Intermediate Frequency . . . . . 455 K.C.

Electrical Power Output (120-line Volts)

	A-C	D-C
Undistorted	1.0	0.9
Maximum	1.8	1.5

Loud-speaker—Electrodynamic

Outside Cone Diameter . . . . . 5 inches
Voice Coil Impedance (400 cycles) . . . . . 4.0 ohms
Field Coil Resistance . . . . . 420 ohms

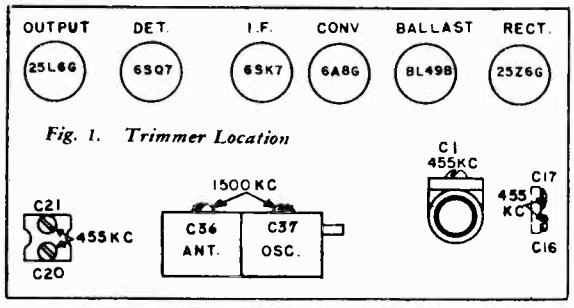


Fig. 1. Trimmer Location

Production Change

On a number of receivers, substitute electrolytic capacitor RC-5113 is used for C30b with both sections tied in parallel and RC5114 is used for C30a.

GENERAL INFORMATION

The models GD-610 and GD-620 are compact six tube AC-DC superheterodyne receivers employing five General Electric tubes plus a ballast tube, described above in a superheterodyne circuit. Features of design include I.F. wave trap, automatic volume control, and an efficient electrodynamic speaker. Model GD-620 is fully approved by Underwriters Laboratories.

GENERAL ELECTRIC CO.

MODEL GD600
MODEL GD630
Schematics

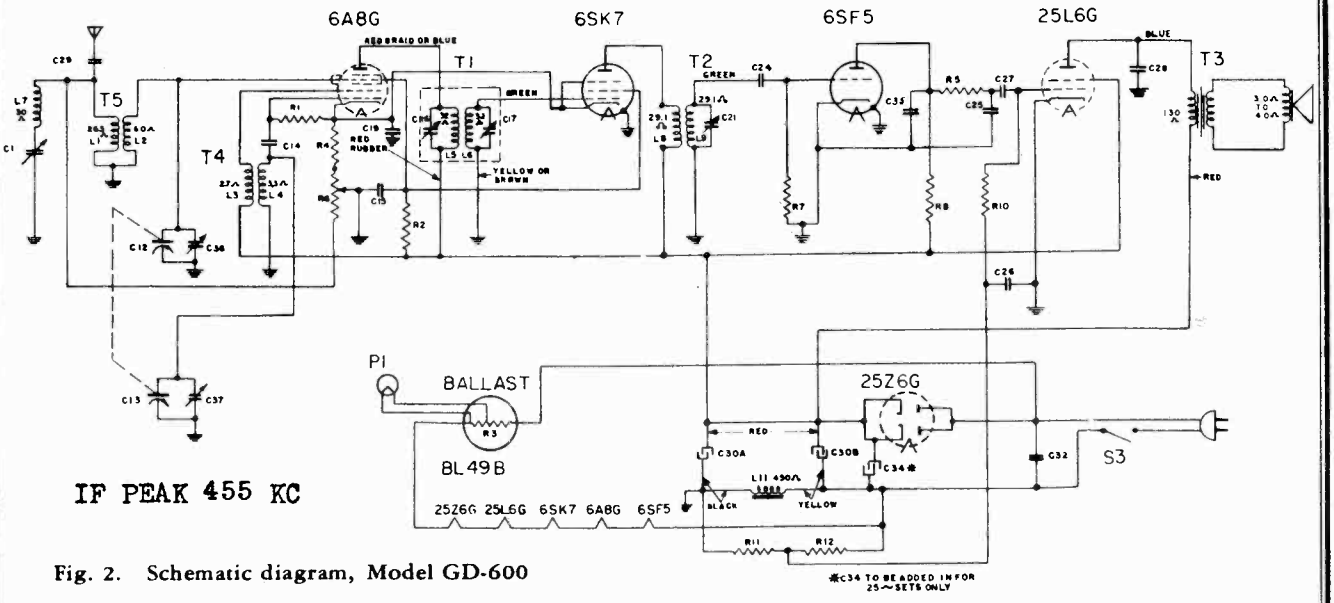


Fig. 2. Schematic diagram, Model GD-600

Symbol	Description	Symbol	Description	Symbol	Description
C1	Wave trap trimmer	C30a	10 mfd., dry electrolytic	R6	10,000 ohm volume control
C12, 13	Tuning condenser	C30b	30 mfd., dry electrolytic	R7	15 megohm carbon resistor
C14	47 mmf., mica capacitor	C32	.02 mfd., line capacitor	R8, 10	470,000 ohm carbon resistor
C15	.25 mfd., paper capacitor	C34	35 mfd., dry electrolytic (for 25 v sets only)	R11	270,000 ohm carbon resistor
C19	.05 mfd., paper capacitor			R12	680,000 ohm carbon resistor
C24	.002 mfd., paper capacitor	C35	150 mmf., mica capacitor	T1	1st I.F. transformer
C25	330 mmf., mica capacitor	R1	47,000 ohm carbon resistor	T2	2nd I.F. transformer
C26	.15 mfd., paper capacitor	R2	10,000 ohm carbon resistor	T3	Output transformer
C27	.005 mfd., paper capacitor	R3	Ballast resistor	T4	Oscillator transformer
C28	.03 mfd., paper capacitor	R4	330 ohm carbon resistor	T5	Antenna transformer
C29	.001 mfd., paper capacitor	R5	10,000 ohm carbon resistor		

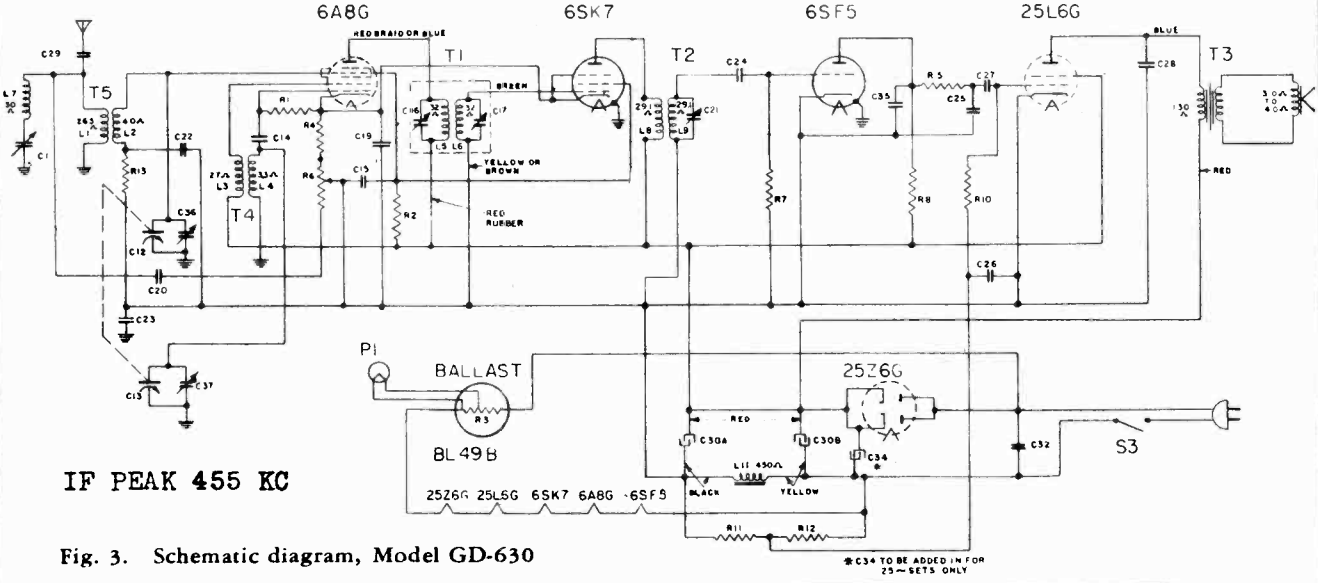


Fig. 3. Schematic diagram, Model GD-630

Symbol	Description	Symbol	Description	Symbol	Description
C1	Wave trap trimmer	C28	.03 mfd., paper capacitor	R5	10,000 ohm carbon resistor
C12, 13	Tuning condenser	C29	.001 mfd., paper capacitor	R6	10,000 ohm volume control
C14	47 mmf., mica capacitor	C30a	10 mfd., dry electrolytic	R7	15 megohm carbon resistor
C15	.25 mfd., paper capacitor	C30b	30 mfd., dry electrolytic	R8, 10	470,000 ohm carbon resistor
C19	.05 mfd., paper capacitor	C32	.02 mfd., line capacitor	R11	270,000 ohm carbon resistor
C20	.05 mfd., paper capacitor	C34	35 mfd. dry electrolytic (used on 25-cycle sets only)	R12	680,000 ohm carbon resistor
C22	.05 mfd., paper capacitor			R13	470,000 ohm carbon resistor
C23	.20 mfd., paper capacitor	C35	150 mmf., mica capacitor	T1	1st I.F. transformer
C24	.002 mfd., paper capacitor	R1	47,000 ohm carbon resistor	T2	2nd I.F. transformer
C25	330 mmf., mica capacitor	R2	10,000 ohm carbon resistor	T3	Output transformer
C26	.15 mfd. paper capacitor	R3	Ballast resistor	T4	Oscillator transformer
C27	.005 mfd., paper capacitor	R4	330 ohm carbon resistor	T5	Antenna transformer

MODEL GD600
MODEL GD630
Socket, Trimmers
Voltage, Alignment

GENERAL ELECTRIC CO.

MODELS GD-600 AND GD-630

SERVICE DATA

Specifications

	GD-600	GD-630
Model		
Height	8¼ inches	8¼ inches
Width	12⅜ inches	12⅜ inches
Depth	5¾ inches	5¾ inches

Tuning Control Drive Ratio 1:1

Electrical Specifications

Power Supply (Volts)	Frequency (Cycles on AC)	Power Consumption (Watts)
100–125 Volts AC or DC	40–60	50

Tuning Frequency Range ..... 540–1750 kc.

Intermediate Frequency ..... 455 kc.

Electrical Power Output (120-line Volts)

	AC	DC
Undistorted	1.0	0.9
Maximum	1.8	1.5

Loud-speaker—Electrodynamic

Outside Cone Diameter ..... 5 inches
Voice Coil Impedance (400 cycles) ..... 4.0 ohms
Field Coil Resistance ..... 420 ohms

Tubes

Converter and Oscillator GE-6A8G
I.F. Amplifier GE-6SK7
Detector GE-6SF5
Power Output GE-25L6G
Rectifier GE-25Z6G
Pilot Lamp ..... Mazda No. 44
Ballast BL49-B

Production Change

On a number of receivers, substitute electrolytic RC-5113 is used for C30b with both sections tied in parallel and RC-5114 is used for C30a.

GENERAL INFORMATION

The models GD-600 and GD-630 are compact six-tube AC-DC superheterodyne receivers employing five General Electric tubes plus a ballast tube, as described above in a superheterodyne circuit. Features of design include I.F. wave trap, automatic overload control and an efficient electrodynamic speaker. Model GD-630 is fully approved by Underwriters' Laboratories.

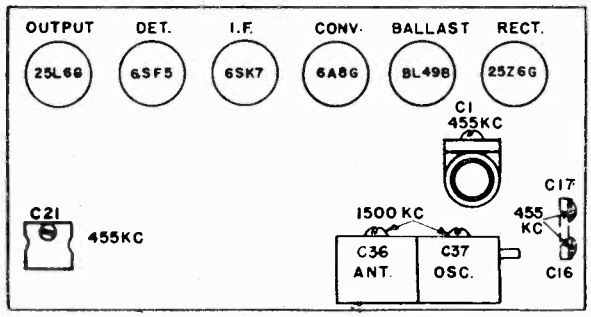


Fig. 1. Trimmer Location

VOLTAGE CHART

Tube No.	6A8G	6SK7	6SF5	25L6G	25Z6G
Plate to −B volts	112	112	35*	102	..
Screen to −B volts	75	75	..	112	..
Cathode to −B volts	3.4	3.4	0	0	134
Filament volts	.6.4	6.4	6.4	24	24

Line Voltage—120 V. AC. No signal input—Vol. control at max.
* Measured on 250-volt scale.
On DC, voltages are about 15 per cent lower.

When operating from a DC source of power, it is necessary to insert the power plug with proper polarity; otherwise the receiver will fail to function. If excessive hum is noticed when the receiver is used on AC, reverse the power plug in the receptacle.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F.—455 K.C. Broadcast—1500 K.C.
The location of all trimmers is shown in Fig. 1.

I.F. Alignment

Connect an output meter across the voice coil. Set the volume control for maximum.

Set test oscillator to 455 K.C. and apply signal to the control grid of the 6A8G tube through a .05 mfd. capacitor. Do not remove the grid lead from the 6A8G. Keep the test oscillator output as low as possible to give a readable output. Adjust all I.F. trimmers for maximum output.

Wave Trap Alignment

Leave the test oscillator set to 455 K.C. and connect one output lead to the receiver chassis and the other through a 250 mmf. capacitor in series with 200 ohms to the receiver antenna lead. Adjust (C-1) for minimum output.

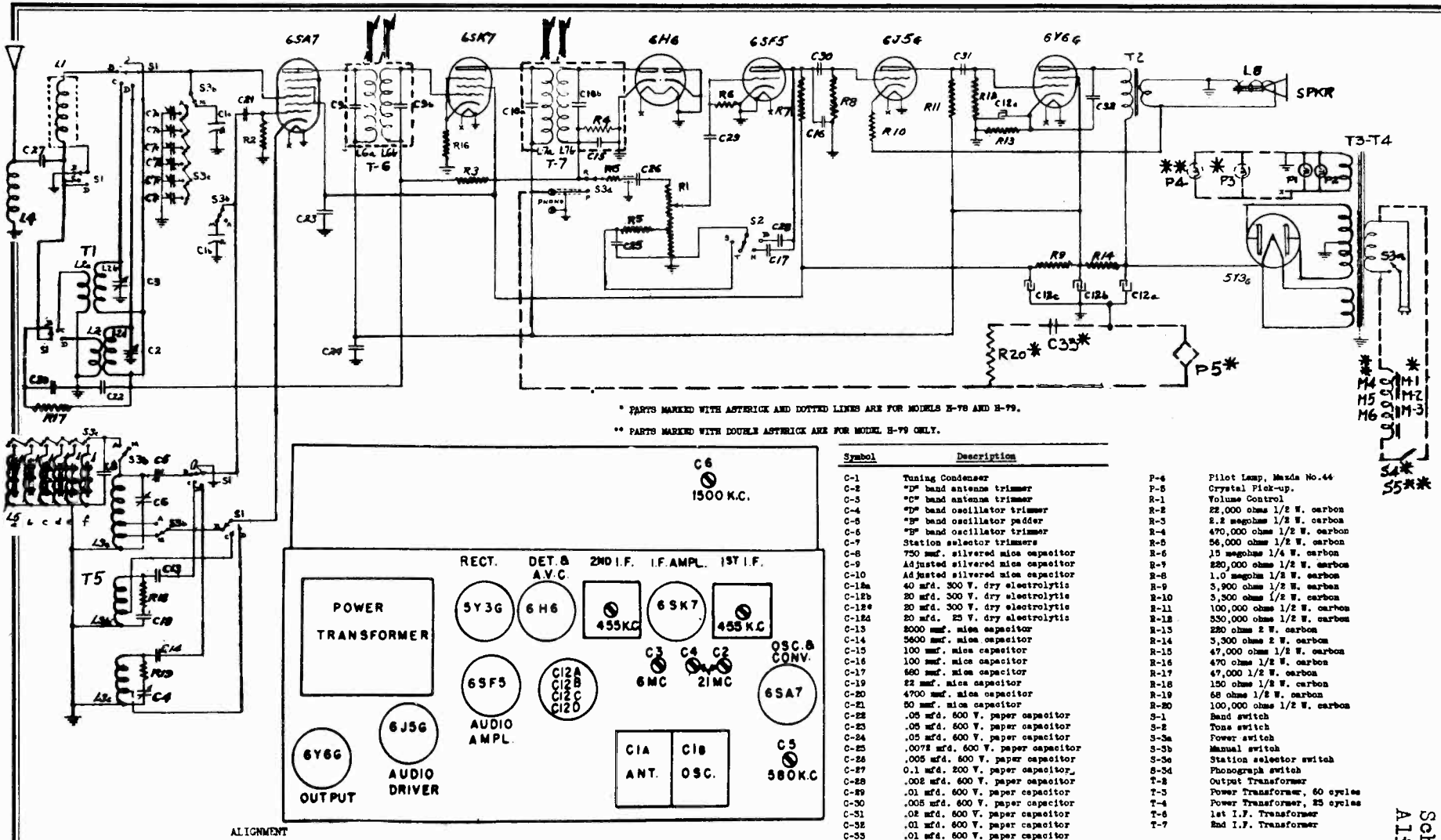
R. F. Alignment

Use the same dummy antenna (250 mmf. and 200 ohms) with 1500 K.C. input, adjust the oscillator trimmer (C-37) and antenna trimmer (C-36) for a maximum output.

Precaution—On the Model GD-600, one side of the power supply is connected to the chassis. If signal generator is AC operated, connect a .05 mfd. capacitor in the ground side before connecting it to the receiver chassis.

GENERAL ELECTRIC CO.

MODELS H73, H77, H79
Preliminary
Schematic, Socket
Alignment, Trimmers



* PARTS MARKED WITH ASTERICK AND DOTTED LINES ARE FOR MODELS H-78 AND H-79.

** PARTS MARKED WITH DOUBLE ASTERICK ARE FOR MODEL H-79 ONLY.

ALIGNMENT

Symbol	Description
C-1	Tuning Condenser
C-2	"D" band antenna trimmer
C-3	"C" band antenna trimmer
C-4	"D" band oscillator trimmer
C-5	"B" band oscillator padder
C-6	"B" band oscillator trimmer
C-7	Station selector trimmers
C-8	750 mmf. silvered mica capacitor
C-9	Adjusted silvered mica capacitor
C-10	Adjusted silvered mica capacitor
C-12a	40 mfd. 300 V. dry electrolytic
C-12b	20 mfd. 300 V. dry electrolytic
C-12c	20 mfd. 300 V. dry electrolytic
C-12d	20 mfd. 25 V. dry electrolytic
C-13	2000 mmf. mica capacitor
C-14	5600 mmf. mica capacitor
C-15	100 mmf. mica capacitor
C-16	100 mmf. mica capacitor
C-17	680 mmf. mica capacitor
C-19	22 mmf. mica capacitor
C-20	4700 mmf. mica capacitor
C-21	50 mmf. mica capacitor
C-22	.05 mfd. 600 V. paper capacitor
C-23	.05 mfd. 600 V. paper capacitor
C-24	.05 mfd. 600 V. paper capacitor
C-25	.007# mfd. 600 V. paper capacitor
C-26	.005 mfd. 600 V. paper capacitor
C-27	0.1 mfd. 200 V. paper capacitor
C-28	.002 mfd. 600 V. paper capacitor
C-29	.01 mfd. 600 V. paper capacitor
C-30	.005 mfd. 600 V. paper capacitor
C-31	.02 mfd. 600 V. paper capacitor
C-32	.01 mfd. 600 V. paper capacitor
C-33	.01 mfd. 600 V. paper capacitor
L-1	Beam-a-scope
L-2	antenna coil
L-3	oscillator coil
L-4	antenna choke
L-5	station selector inductances
M-1	Phono motor, 60 cycles
M-2	Phono Motor, 50 cycles
M-3	Phono motor, 25 cycles
M-4	Phono motor, 60 cycles
M-5	Phono motor, 50 cycles
M-6	Phono motor, 25 cycles
P-1	Pilot Lamp, Mazda No.44
P-2	Pilot Lamp, Mazda No.44
P-3	Pilot Lamp, Mazda No.44
P-4	Pilot Lamp, Mazda No.44
P-5	Crystal Pick-up.
R-1	Volume Control
R-2	22,000 ohms 1/2 W. carbon
R-3	2.2 megohms 1/2 W. carbon
R-4	470,000 ohms 1/2 W. carbon
R-5	56,000 ohms 1/2 W. carbon
R-6	.15 megohms 1/4 W. carbon
R-7	220,000 ohms 1/2 W. carbon
R-8	1.0 megohm 1/2 W. carbon
R-9	3,900 ohms 1/2 W. carbon
R-10	3,500 ohms 1/2 W. carbon
R-11	100,000 ohms 1/2 W. carbon
R-12	330,000 ohms 1/2 W. carbon
R-13	220 ohms 2 W. carbon
R-14	3,300 ohms 2 W. carbon
R-15	47,000 ohms 1/2 W. carbon
R-16	470 ohms 1/2 W. carbon
R-17	47,000 1/2 W. carbon
R-18	150 ohms 1/2 W. carbon
R-19	68 ohms 1/2 W. carbon
R-20	100,000 ohms 1/2 W. carbon
S-1	Band switch
S-2	Tone switch
S-3a	Power switch
S-3b	Manual switch
S-3c	Station selector switch
S-3d	Phonograph switch
T-2	Output Transformer
T-3	Power Transformer, 60 cycles
T-4	Power Transformer, 25 cycles
T-6	1st I.F. Transformer
T-7	2nd I.F. Transformer

Set dial pointer to first line at left end of scale with gang condenser plates completely closed.

1. Turn band switch to "B" band and, using non-metallic screwdriver, align I.F. at 455 K.C. by visual or output meter method. I.F. transformers are double, permeability tuned with adjusting shafts at top and bottom of shield cans.

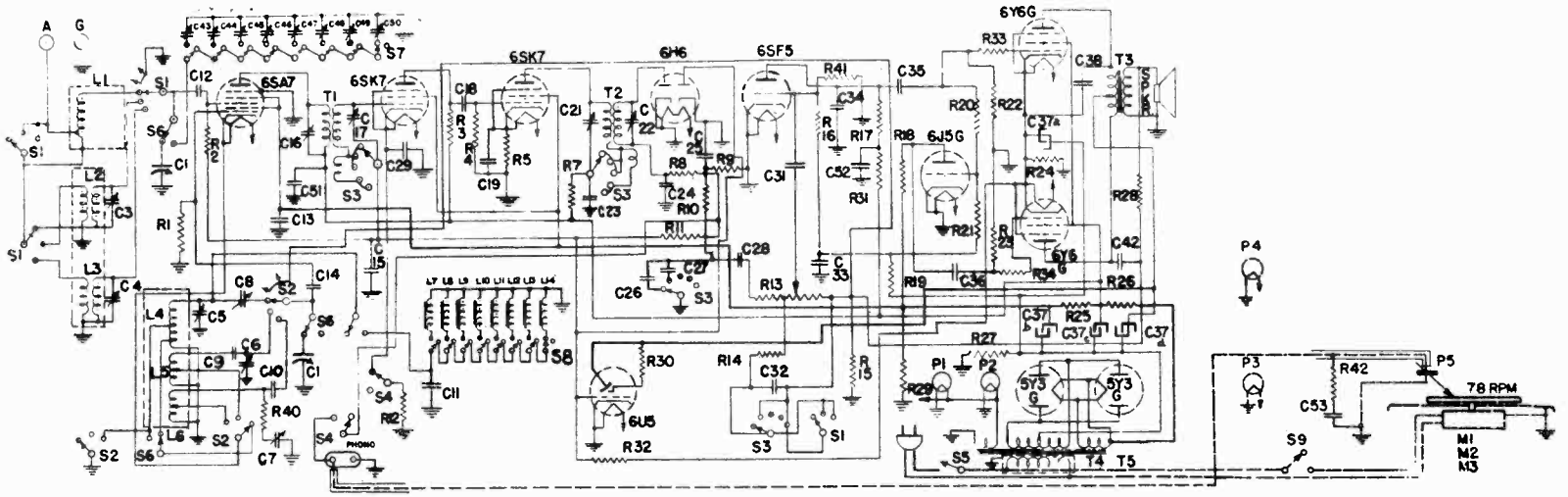
2. On "B" band, set dial pointer to 580 K.C. mark and tune in 580 K.C. signal with (C5). Then peak (C6) on 1500 K.C. while rocking gang condenser. Re-peak (C5) on 580 K.C. and end by re-peaking (C6) on 1500 K.C.

3. On "C" band, tune gang condenser to 6MC signal and peak with (C3) for maximum output.

4. On "D" band, align (C4) at 21 MC. Peak (C2) for maximum output by rocking gang condenser. The image of the 21 MC signal should be heard at approximately 20 MC.

MODELS H116, H118
Preliminary
Schematic, Socket
Alignment, Trimmers

GENERAL ELECTRIC CO.



Symbol	Description
C-1	Tuning Capacitor
C-3	"C" Band Antenna Trimmer
C-4	"D" Band Antenna Trimmer
C-5	"B" Band Oscillator Trimmer
C-6	"C" Band Oscillator Trimmer
C-7	"D" Band Oscillator Trimmer
C-8	"B" Band Padder
C-9	1600 mmf. mica Capacitor
C-10	4300 mmf. Mica Capacitor
C-11	750 mmf. Silvered Mica Capacitor
C-12	150 mmf. Mica Capacitor
C-13	0.1 mfd. 600 V. Paper Capacitor
C-14	47 mmf. mica Capacitor
C-15	0.1 mfd. 200 V. Paper capacitor
C-18	47 mmf. mica Capacitor
C-19	.05 mfd. 200 V. Paper Capacitor
C-23	.05 mfd. 600 V. Paper Capacitor
C-24	100 mmf. Mica Capacitor

Symbol	Description
C-25	47 mmf. Mica Capacitor
C-26	.001 mfd. 600 V. Paper Capacitor
C-27	470 mmf. Mica Capacitor
C-28	.01 mfd. 600 V. Paper Capacitor
C-29	.05 mfd. 200 V. Paper Capacitor
C-31	.01 mfd. 600 V. Paper Capacitor
C-32	.005 mfd. 600 V. Paper Capacitor
C-33	0.1 mfd. 200 V. Paper Capacitor
C-34	47 mmf. Mica Capacitor
C-35	.05 mfd. 600 V. Paper Capacitor
C-36	.05 mfd. 600 V. Paper Capacitor
C-37a	20 mfd. 25 V. Dry Electrolytic
C-37b	20 mfd. 300 V. Dry Electrolytic
C-37c	20 mfd. 300 V. Dry Electrolytic
C-37d	40 mfd. 350 V. Dry Electrolytic
C-38	.02 mfd. 1500 V. Paper Capacitor
C-42	.01 mfd. 1000 V. Paper Capacitor
C-51	0.1 mfd. 600 V. Paper Capacitor
C-52	.25 mfd. 600 V. Paper Capacitor

Symbol	Description
C-53	.01 mfd. 600 V. Paper Capacitor
R-1	22,000 ohms, 1/2-W. Carbon Resistor
R-2	1.0 megohm, 1/2-W. Carbon Resistor
R-3	6800 ohms, 1/2-W. Carbon Resistor
R-4	47,000 ohms, 1/2-W. Carbon Resistor
R-5	330 ohms, 1/2-W. Carbon Resistor
R-7	1000 ohms, 1/2-W. Carbon Resistor
R-8	47,000 ohms, 1/2-W. Carbon Resistor
R-9	220,000 ohms, 1/2-W. Carbon Resistor
R-10	47,000 ohms, 1/2-W. Carbon Resistor
R-11	2.2 megohms, 1/2-W. Carbon Resistor
R-12	470 ohms, 1/2-W. Carbon Resistor
R-13	2 megohm Volume Control
R-14	100,000 ohms, 1/2-W. Carbon Resistor
R-15	15 ohms, 1/2-W. Carbon Resistor
R-16	4.7 megohms, 1/2-W. Carbon Resistor
R-17	150,000 ohms, 1/2-W. Carbon Resistor
R-18	47,000 ohms, 1/2-W. Carbon Resistor
R-19	1.0 megohms, 1/2-W. Carbon Resistor

Symbol	Description
R-20	3.3 megohms, 1/2-W. Carbon Resistor
R-21	270,000 ohms, 1/2-W. Carbon Resistor
R-22	220,000 ohms, 1/2-W. Carbon Resistor
R-23	220,000 ohms, 1/2-W. Carbon Resistor
R-24	100 ohms, 3.4 W. Wire Wound
R-25	2400 ohms, 2 W. Carbon Resistor
R-26	2200 ohms, 2.6 W. Wire Wound
R-27	12 ohms, 1/2-W. Carbon Resistor
R-28	68 ohms, 1/2-W. Carbon Resistor
R-29	47,000 ohms, 1/2-W. Carbon Resistor
R-30	1.0 megohm, 1/2-W. Carbon Resistor
R-31	47,000 ohms, 1/2-W. Carbon Resistor
R-32	5.6 megohms, 1/2-W. Carbon Resistor
R-33	1000 ohms, 1/2-W. Carbon Resistor
R-34	1000 ohms, 1/2-W. Carbon Resistor
R-40	33 ohms, 1/2-W. Carbon Resistor
R-41	4.7 megohms, 1/2-W. Carbon Resistor
R-42	100,000 ohms, 1/2-W. Carbon Resistor
PI-4	Pilot Lights, Mazda #44

ALIGNMENT

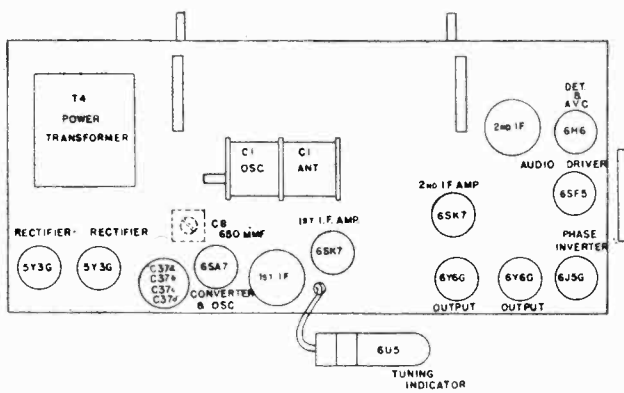
Set dial pointer to first line at left end of scale with gang condenser plates completely closed.

1. Turn band switch to "B" band and, using non-metallic screwdriver, align I.F's at 455 KC by visual or output meter method. I.F. transformers are double, permeability tuned with adjusting shafts at top and bottom of shield cans.

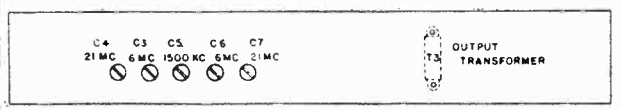
2. On "B" band, set dial pointer to 580 KC mark and tune in 580 KC signal with (C-8). Then peak (C-5) on 1500 KC while rocking gang condenser. Re-peak (C-8) on 580 MC and end by re-peaking (C-5) on 1500 KC.

3. On "C" band, set pointer to 6MC mark and align (C-6) to 6MC. Peak (C-3) for maximum output.

4. On "D" band, align (C-7) at 21 MC. Peak (C-4) for maximum output by rocking gang condenser. The image of the 21 MC signal should be heard at approximately 20 MC.

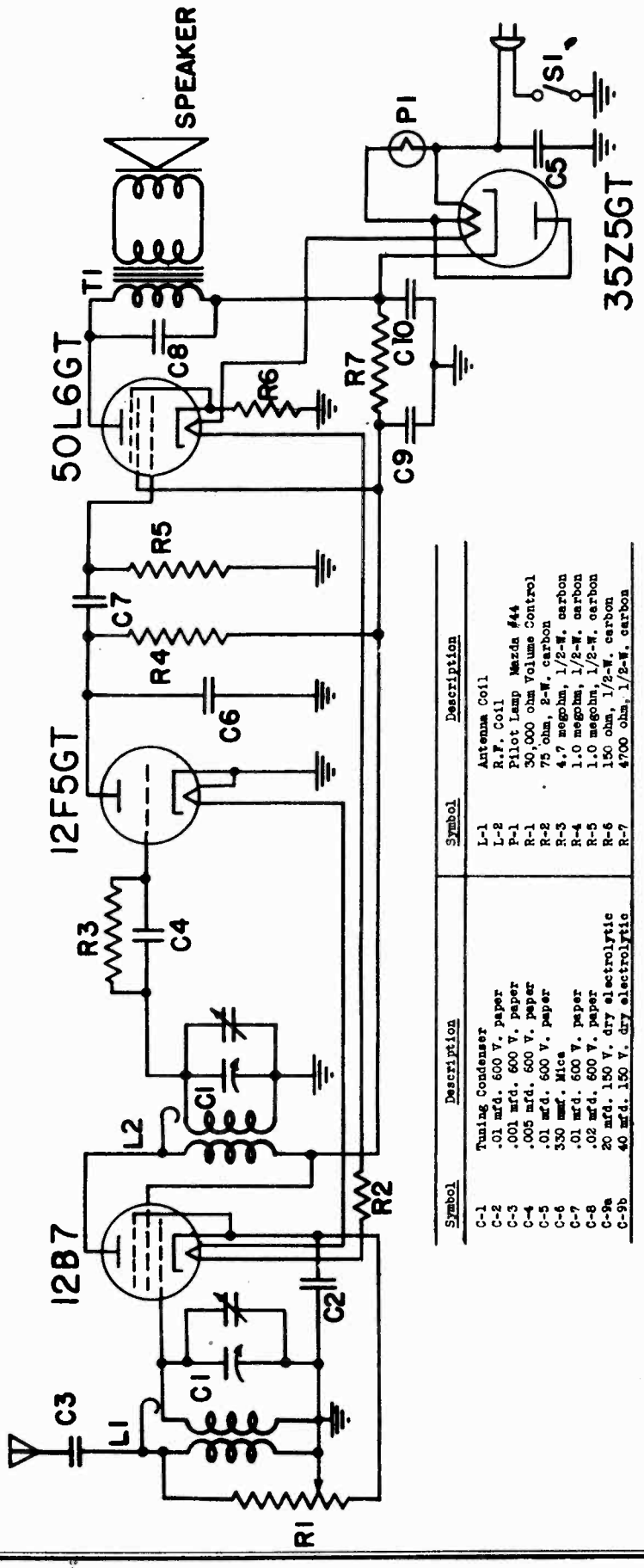


PARTS AND CONNECTORS SHOWN WITH DASH LINES ARE FOR H-118 ONLY.



GENERAL ELECTRIC CO.

MODEL H400, Preliminary Schematic, Socket Alignment, Trimmers



Symbol	Description
C-1	Tuning Condenser
C-2	.01 mfd. 600 V. paper
C-3	.001 mfd. 600 V. paper
C-4	.005 mfd. 600 V. paper
C-5	.01 mfd. 600 V. paper
C-6	330 mmf. Mica
C-7	.01 mfd. 600 V. paper
C-8	.02 mfd. 600 V. paper
C-9a	20 mfd. 150 V. dry electrolytic
C-9b	40 mfd. 150 V. dry electrolytic

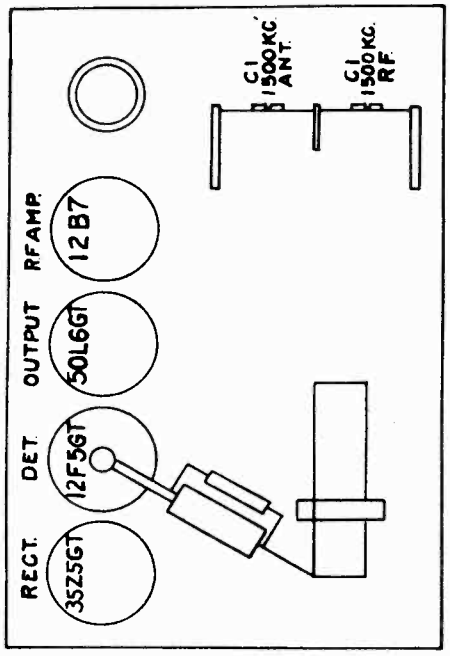
Symbol	Description
L-1	Antenna Coil
L-2	R.F. Coil
P-1	Pilot Lamp Mazda #44
R-1	30,000 ohm Volume Control
R-2	75 ohm, 2-W. carbon
R-3	4.7 megohm, 1/2-W. carbon
R-4	1.0 megohm, 1/2-W. carbon
R-5	1.0 megohm, 1/2-W. carbon
R-6	150 ohm, 1/2-W. carbon
R-7	4700 ohm, 1/2-W. carbon

ALIGNMENT

Connect the high side of the signal generator through a 100 mmf. capacitor to the terminal to which the antenna lead is soldered. The low side of the signal generator output should be connected to the receiver chassis through a .05 mfd. condenser. Connect a suitable output meter across the voice coil leads; then proceed as follows:

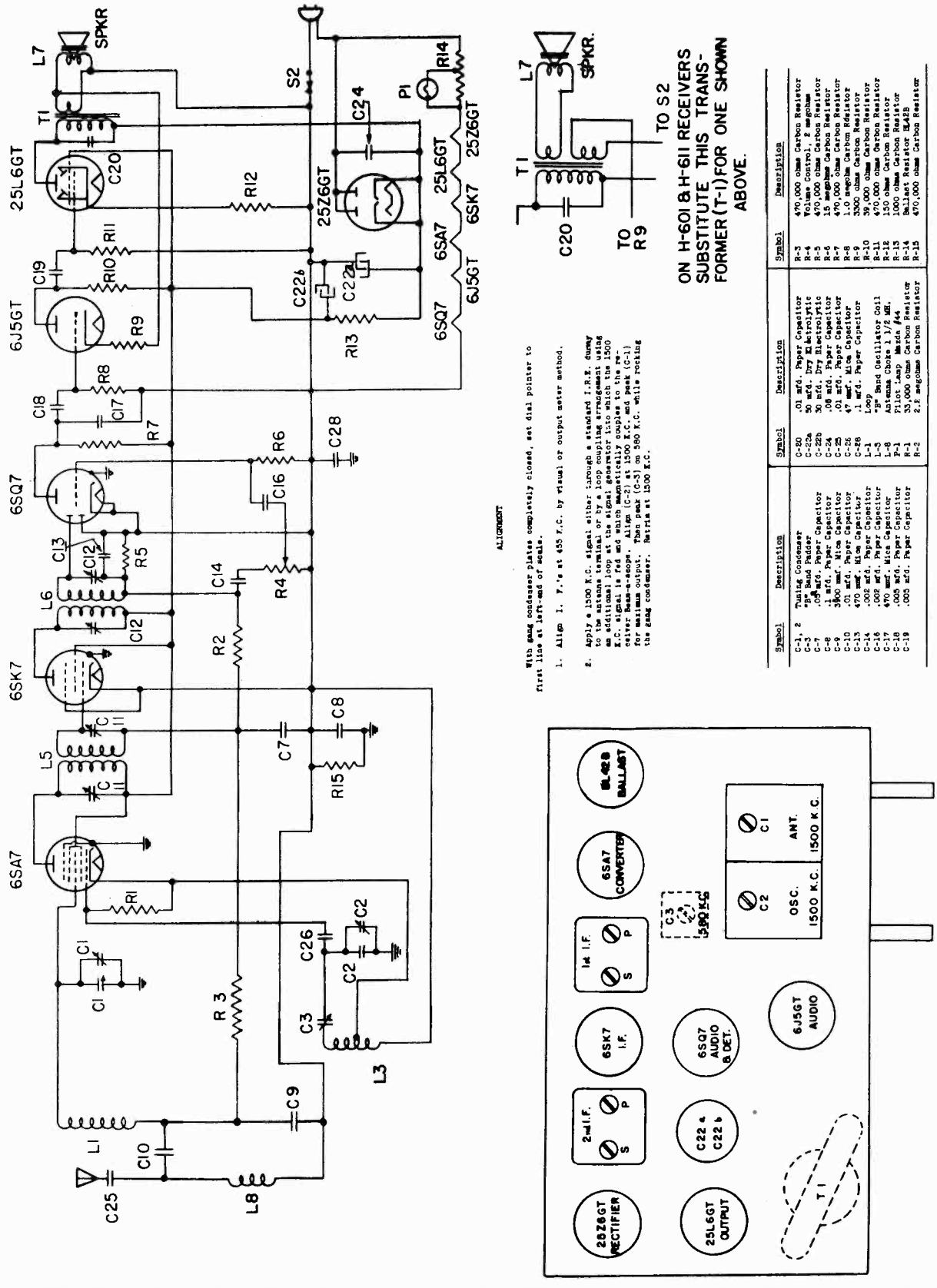
1. With gang condenser plates completely closed, the tuning mark should be over the last mark on the dial.
2. Set volume control to about 3/4 maximum.
3. Rotate gang to minimum capacity and tune trimmers on the gang condenser to 1750 K.C. signal. Re-tune gang to 1500 K.C. signal and peak trimmers by alternate adjustment.

Precaution--one side of the power supply is connected to the chassis. Do not connect the chassis to any external ground.



MODELS H600,H601,H610
H611, Preliminary
Schematic,Socket
Alignment,Trimmers

GENERAL ELECTRIC CO.



Symbol	Description
C-1, 2	Tuning Condenser
C-3	Trimmer Padder
C-4	.05 mfd. Paper Capacitor
C-7	.1 mfd. Paper Capacitor
C-8	3300 mmf. Mica Capacitor
C-9	.01 mfd. Paper Capacitor
C-10	470 mmf. Mica Capacitor
C-13	.002 mfd. Paper Capacitor
C-14	.002 mfd. Paper Capacitor
C-16	470 mmf. Mica Capacitor
C-17	.005 mfd. Paper Capacitor
C-18	.005 mfd. Paper Capacitor
C-19	.05 mfd. Paper Capacitor

Symbol	Description
C-20	.01 mfd. Paper Capacitor
C-22a	50 mfd. Dry Electrolytic
C-22b	30 mfd. Dry Electrolytic
C-22c	8 mfd. Dry Electrolytic
C-24	.08 mfd. Paper Capacitor
C-25	.01 mfd. Paper Capacitor
C-26	47 mmf. Mica Capacitor
C-28	.1 mfd. Paper Capacitor
L-1	Loop
L-3	"B" Band Oscillator Coil
L-8	Antenna Choke 1 1/2 MH.
P-1	Pilot Lamp Mazda #44
R-1	33,000 ohms Carbon Resistor
R-2	2.2 megohms Carbon Resistor

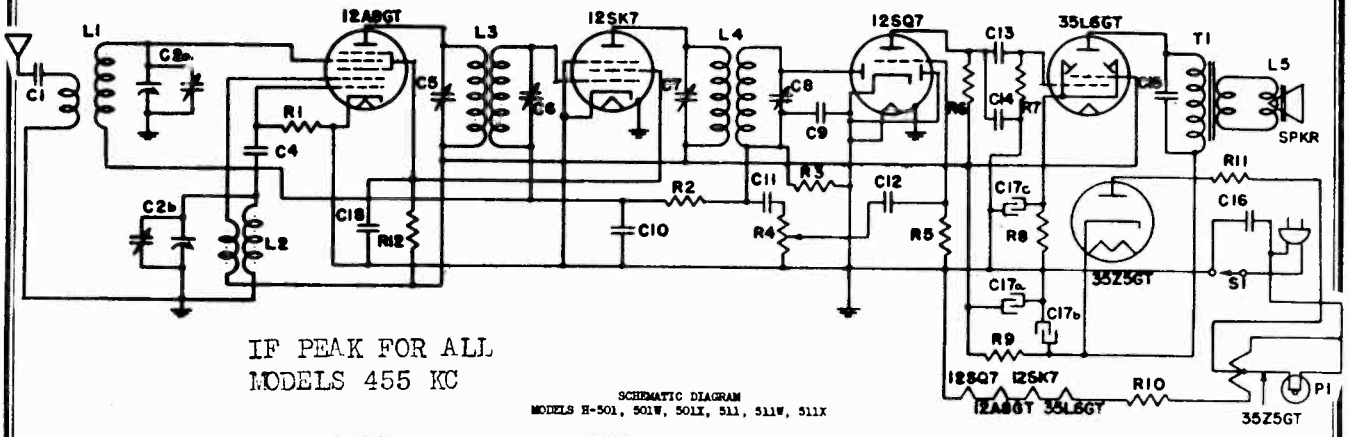
Symbol	Description
R-3	470,000 ohms Carbon Resistor
R-4	Volume Control, 2 megohms
R-5	470,000 ohms Carbon Resistor
R-6	15 megohms Carbon Resistor
R-7	470,000 ohms Carbon Resistor
R-8	1.0 megohm Carbon Resistor
R-9	3300 ohms Carbon Resistor
R-10	39,000 ohms Carbon Resistor
R-11	470,000 ohms Carbon Resistor
R-12	150 ohms Carbon Resistor
R-13	1000 ohms Carbon Resistor
R-14	Ballast Resistor BL428
R-15	470,000 ohms Carbon Resistor

MODELS H520,H520W,H520X
MODELS H521,H521W,H521X
Schematics Preliminary

GENERAL ELECTRIC CO.

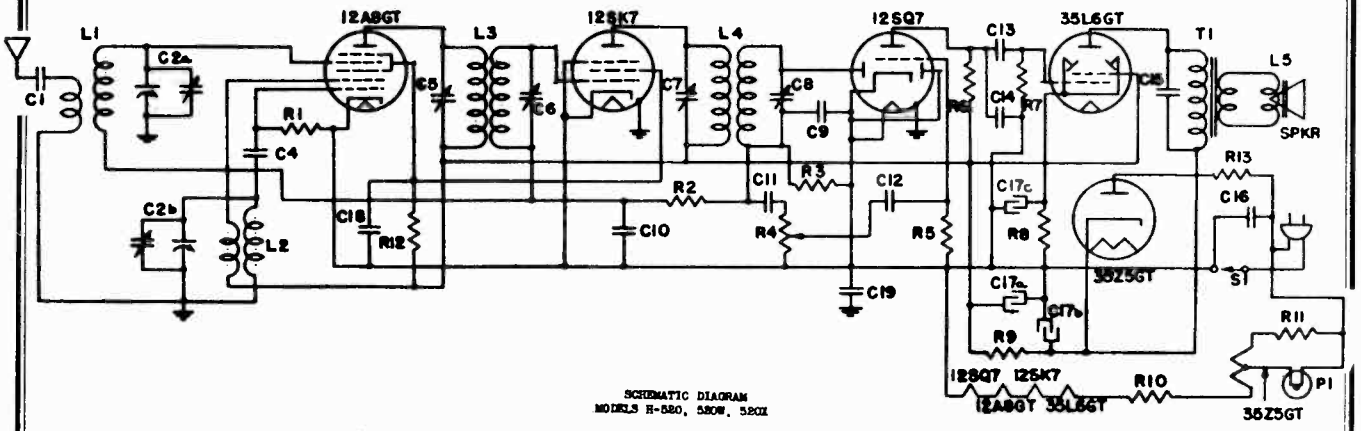
MODELS H500,H500W,H500X
H510,H510W,H510X
MODELS H501,H501W,H501X
H511,H511W,H511X

MODELS H-500, 500W, 500X, 510, 510W, 510X

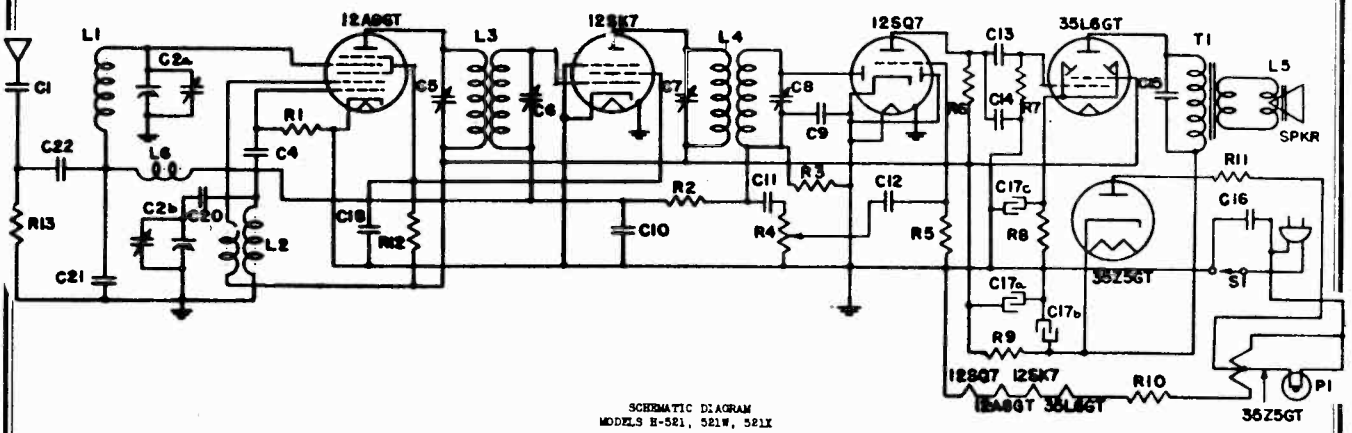


IF PEAK FOR ALL
MODELS 455 KC

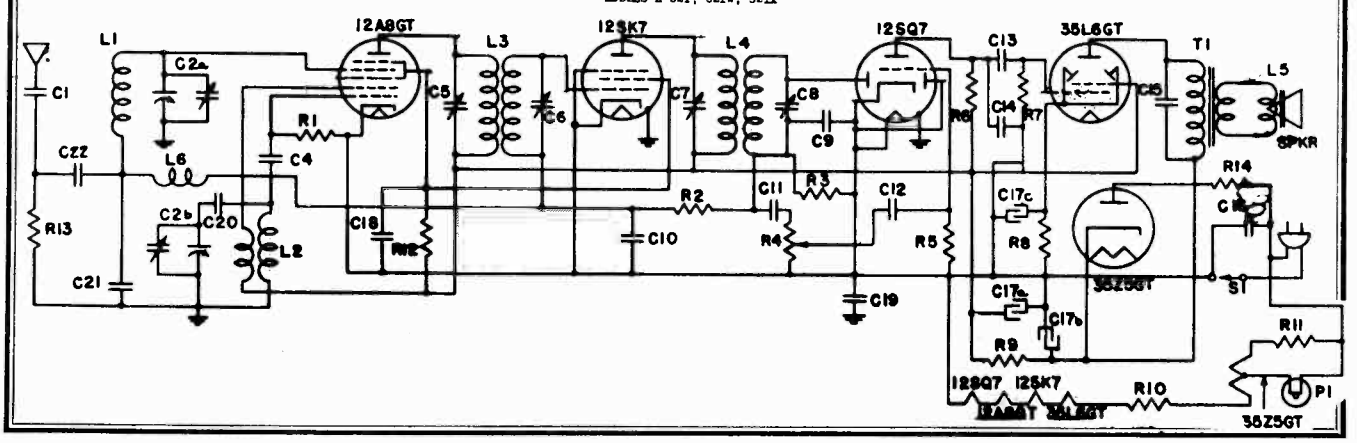
SCHEMATIC DIAGRAM
MODELS H-501, 501W, 501X, 511, 511W, 511X



SCHEMATIC DIAGRAM
MODELS H-520, 520W, 520X



SCHEMATIC DIAGRAM
MODELS H-521, 521W, 521X



MODELS H500,H500W,H500X
H510,H510W,H510X
MODELS H501,H501W,H501X
H511,H511W,H511X

GENERAL ELECTRIC CO.

MODELS H520,H520W,H520X
MODELS H521,H521W,H521X
Alignment,Socket,Parts
Trimmers Preliminary

PRELIMINARY
REPLACEMENT PARTS LIST
MODELS H-500, 501, 510, 511, 520, 521
(W & X MODELS INC.)

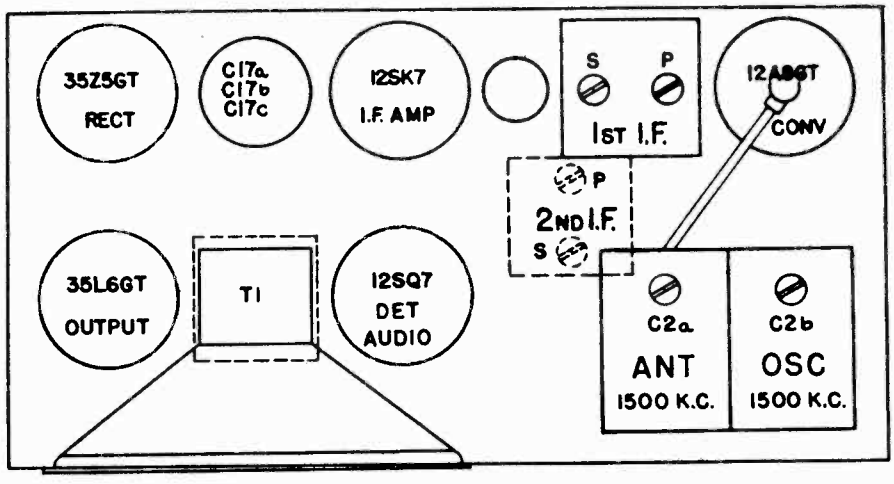
Stock No.		Description	List Price
*RB-008	BOARD	- Terminal board (2 lug)	.10
*RB-013	BOARD	- Terminal board (2 lug) for models H-500, 501, 510, 511	.10
*RB-070	BOARD	- Terminal board (3 lug) for models H-520 and H-521	.10
RB-179	BRACKET	- Bracket for beam-a-scope frame for models H-520 and H-521	
RB-914	BACK COVER	- Cabinet back for models H-500, 501, 510, 511 (W and X models included)	
RB-915	BACK COVER	- Plastic cabinet back for models H-520 and H-521	
RB-916	BACK COVER	- Plastic cabinet back for models H-520W and H-521W	
RB-917	BACK COVER	- Plastic cabinet back for models H-520X and H-521X	
RC-016	CAPACITOR	- .008 mfd. 600 V. paper (C-1,11,18)	.25
*RC-023	CAPACITOR	- .005 mfd. 600 V. paper (C-13)	.25
*RC-059	CAPACITOR	- .01 mfd. 600 V. paper (C-15)	.25
*RC-092	CAPACITOR	- .05 mfd. 200 V. paper (C-10,18)	.25
*RC-098	CAPACITOR	- .05 mfd. 600 V. paper (C-16)	.30
*RC-130	CAPACITOR	- .2 mfd. 400 V. paper for models H-501, H-511, H-521 (C-19)	.30
*RC-816	CAPACITOR	- 47 mmf. mica (C-4)	.25
*RC-874	CAPACITOR	- 330 mmf. mica (C-14)	.30
*RC-894	CAPACITOR	- 470 mmf. mica (C-9)	.30
*RC-348	CAPACITOR	- 1600 mmf. mica for models H-520, 521	.35
*RC-390	CAPACITOR	- 3900 mmf. mica for models H-520 and H-521 C-21	.35
*RC-863	CORD	- Power Cord	.65
RC-1990	CLAMP	- Antenna coil clamp for models H-500, 501, 510, 511	
RC-5136	CAPACITOR	- 50 mfd. 150 V; 40 mfd. 150 V; 20 mfd. 25 V; dry electrolytic (C-17a, 17b, 17c)	
RC-7012	CONDENSER	- Tuning condenser for models H-510, 511, 520, 521 (C-2a, 2b)	
RC-7015	CONDENSER	- Tuning condenser for models H-500 and H-501 (C-2a, 2b)	
RC-8608	CARDS	- Station letter cards for models H-510, 511, 520, 521	
RC-9015	CORE ASSEMBLY	- Core assembly for all models	
RD-111	DIAL	- Dial scale for models H-500, 501, 510, 511	
RD-118	DIAL	- Dial scale for models H-520 and H-521	
RD-410	DRUM	- Tuning condenser drive drum assembly for models in brown	
RD-411	DRUM	- Tuning condenser drive drum assembly for all models in white and onyx	
*RG-016	GRID CLIP	- Tube control grid clip (Pkg. 5)	.10
RE-007	HANK	- Antenna hank for models H-500,501,510,511	
RK-048	KNOB	- Control knob for all white models	
RK-051	KNOB	- Control knob for all models except white	
RK-206	KEY	- Station selector key for models H-510,511, 520,521	
RK-207	KEY	- Station selector key for models H-510W, H-511W, H-520W, H-521W	
RK-208	KEY	- Station selector key for models H-510X, H-511X, H-520X, H-521X	
RL-085	COIL	- Antenna coil for models H-500,501,510,511 (L-1)	
RL-290	COIL	- Oscillator coil for models H-500,501,510,511 (L-2)	
RL-291	COIL	- Oscillator coil for models H-520 and H-521 (L-2)	
RL-346	CHOKE	- RF choke for models H-520 and H-521 (L-6)	
RL-510	LOOP	- Beam-a-scope assembly for models H-520 and H-521 (L-1)	
RP-154	PIN	- Key pin for models H-510,511,520,521	
*RQ-1215	RESISTOR	- 15 ohms, 1/2-W. carbon (Pkg. 5)	.70
*RQ-1219	RESISTOR	- 22 ohms, 1/2-W. carbon (R-11)(Pkg. 5) Models H-501,511,521	.70
*RQ-1239	RESISTOR	- 150 ohms, 1/2-W. carbon (R-6)(Pkg. 5)	.70
*RQ-1261	RESISTOR	- 1200 ohms, 1/2-W. carbon (R-9)(Pkg. 5)	.70
*RQ-1281	RESISTOR	- 8200 ohms, 1/2-W. carbon (R-12)(Pkg. 5)	.70
*RQ-1285	RESISTOR	- 10,000 ohms, 1/2-W. carbon (R-13)(Pkg. 5) Models H-520 and H-521	.70
*RQ-1299	RESISTOR	- 47,000 ohms, 1/2-W. carbon (R-1)(Pkg. 5)	.70
*RQ-1323	RESISTOR	- 470,000 ohms, 1/2-W. carbon (R-3,6,7)(Pkg.5)	.70
*RQ-1339	RESISTOR	- 2.2 megohms, 1/2-W. carbon (R-2)(Pkg. 5)	.70
*RQ-1365	RESISTOR	- 15 megohms, 1/4 W. carbon (R-5)(Pkg. 5)	.70
RR-381	RESISTOR	- 100 ohms, 3.4 W. Wire Wound (R-10)	
*RS-258	SOCKET	- Octal tube socket	.15
RS-256	SOCKET	- Electrolytic mounting socket for models H-501,511,521	
RS-257	SOCKET	- Electrolytic mounting socket for models H-500,510,520	
RS-258	SOCKET	- Pilot lamp socket	
RS-961	SPACER	- Speaker cabinet spacer	
RS-1016	SPEAKER	- 4-inch speaker for models H-501,511,521 (L-5)	
RS-1017	SPEAKER	- 4-inch speaker for models H-500,510,520 (L-5)	
RT-321	TRANSFORMER	- 1st IF transformer (L-3) for models H-520 and H-521 (W and X models included)	
RT-322	TRANSFORMER	- 2nd IF transformer (L-4)	
RT-325	TRANSFORMER	- 1st IF transformer for models H-500,H-501,H-510, H-511 (W and X models included)	
RT-465	TRANSFORMER	- Output transformer (T-1)	
RV-090	VOLUME CONTROL	- 2 meg. volume control (R-4)	
RW-039	WINDOW	- Celluloid station letter window for models H-510, 511,520,521	
RZ-152	CABINET	- Cabinet for models H-510,511,520,521	
RZ-153	CABINET	- Cabinet for models H-510W,H-511W, H-520W,H-521W	
RZ-154	CABINET	- Cabinet for models H-510X,H-511X,H-520X,H-521X	
RZ-155	CABINET	- Cabinet for models H-500,H-501	
RZ-156	CABINET	- Cabinet for models H-500W, H-501W	
RZ-157	CABINET	- Cabinet for models H-500X, H-501X	

*Used on previous receivers (Prices subject to change without notice)

ALIGNMENT FOR
MODELS
H-500,H-501,H-510,H-511
H-520,H-521
(W and X Models incl.)

I-F ALIGNMENT:

Apply a 455-kc signal to the grid of the 12SK7 and align the 2nd i-f transformer by visual or output meter method. Repeat the procedure,applying the 455-kc signal to the grid of the 12A8GT and aligning the 1st i-f transformer.



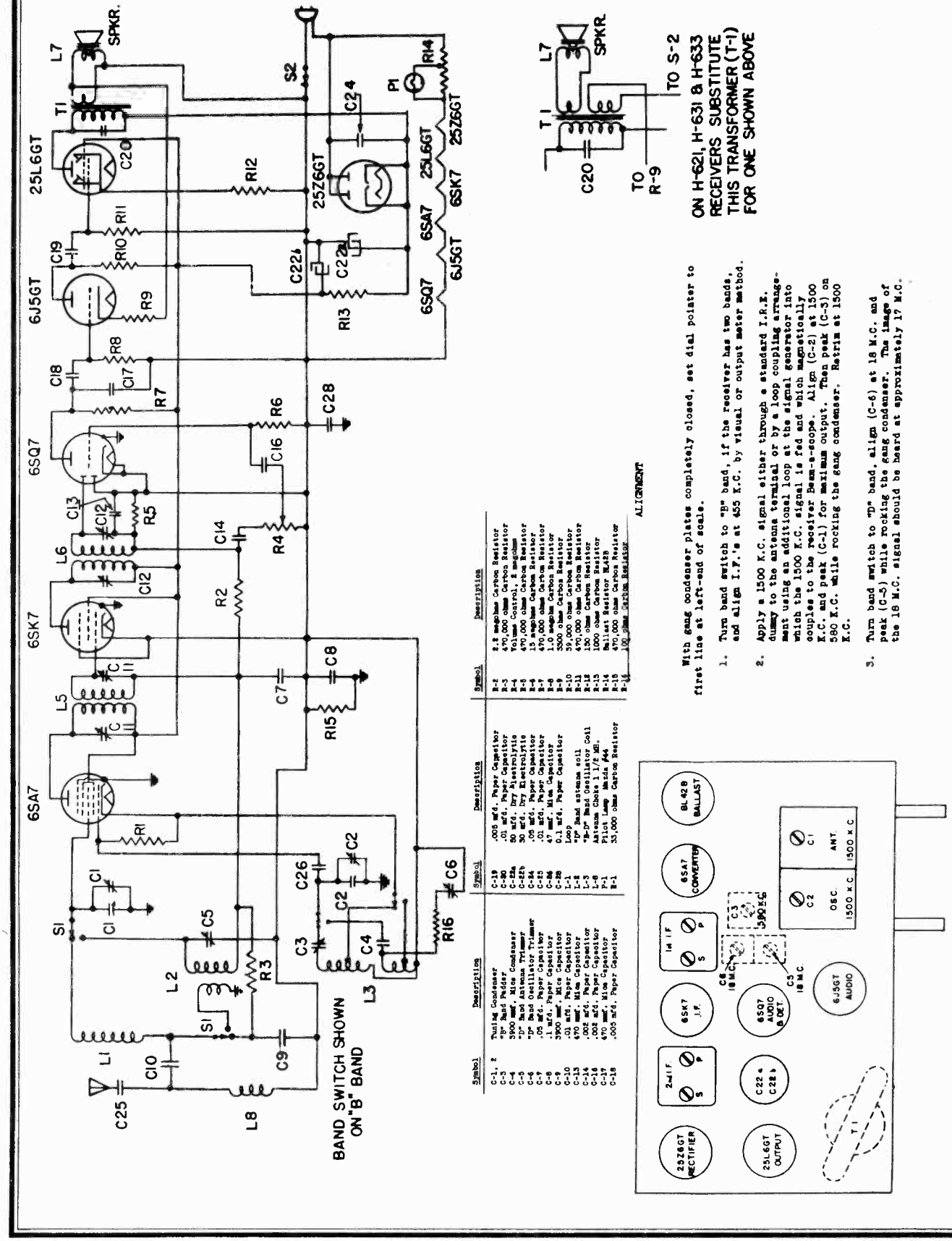
R-F ALIGNMENT:

On Models H500,H501,H510 and H511 (W and X models incl.) apply a 1500-kc signal through a 100 mmf mica condenser to the antenna terminal. Align C-2b. Peak C-2a for maximum output.

On Models H-520 and H-521 (W and X models incl.), apply a 1500-kc signal either through a standard I.R.E. dummy to the antenna terminal or by a loop coupling arrangement using an additional loop at the signal generator into which the 1500-kc signal is fed and which magnetically couples to the receiver Beam-a-scope. Align C-2b. Peak C-2a for maximum output.

GENERAL ELECTRIC CO.

MODELS H620, H621, H630
H631, H632, H633
Schematic, Socket, Trimmers
Alignment Preliminary

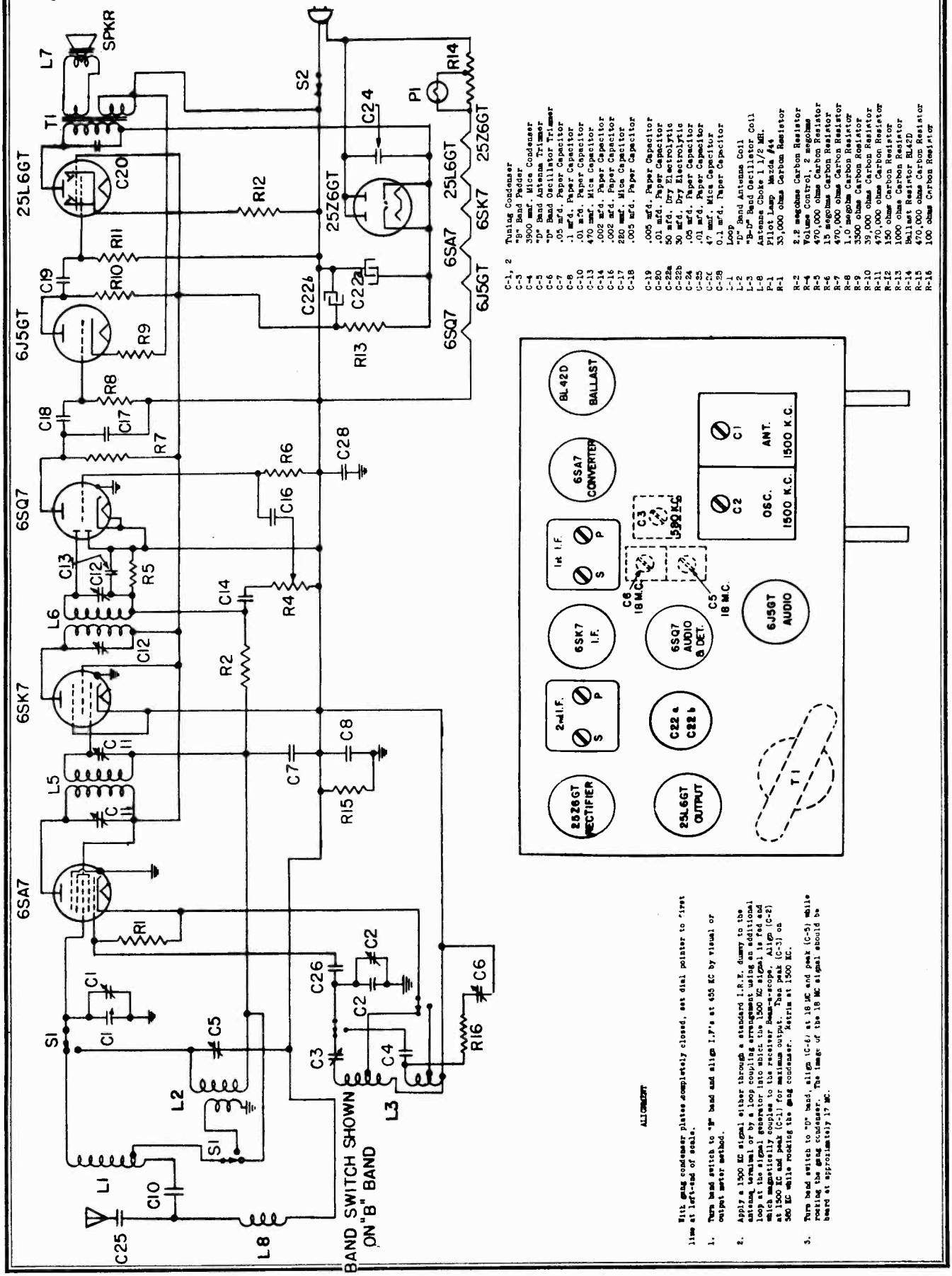


Symbol	Description
C-1, 2	Tuning Condenser
C-3	"B" Band Padder
C-4	5900 mmf. Mica Condenser
C-5	"B" Band Antenna Trimmer
C-6	"D" Band Antenna Trimmer
C-7	.05 mfd. Paper Capacitor
C-8	.1 mfd. Paper Capacitor
C-9	3900 mmf. Mica Capacitor
C-10	.01 mfd. Paper Capacitor
C-13	470 mmf. Mica Capacitor
C-14	.002 mfd. Paper Capacitor
C-16	.003 mfd. Paper Capacitor
C-17	470 mmf. Mica Capacitor
C-18	.005 mfd. Paper Capacitor
C-19	.005 mfd. Paper Capacitor
C-20	.01 mfd. Paper Capacitor
C-22a	50 mfd. Dry Electrolytic
C-22b	50 mfd. Dry Electrolytic
C-24	.01 mfd. Paper Capacitor
C-25	.05 mfd. Paper Capacitor
C-26	47 mmf. Mica Capacitor
C-28	0.1 mfd. Paper Capacitor
L-1	Loop
L-8	"D" Band antenna coil
L-5	"B-D" Band Oscillator Coil
L-6	Antenna Choke 1 1/2 MH.
P-1	Pilot Lamp Mazda #44
R-1	33,000 ohm Carbon Resistor

Symbol	Description
R-2	2.2 megohm Carbon Resistor
R-3	470,000 ohm Carbon Resistor
R-4	Volume Control, 2 megohms
R-5	470,000 ohm Carbon Resistor
R-6	15 megohm Carbon Resistor
R-7	4700 ohm Carbon Resistor
R-8	1.0 megohm Carbon Resistor
R-9	3300 ohm Carbon Resistor
R-10	39,000 ohm Carbon Resistor
R-11	470,000 ohm Carbon Resistor
R-12	150 ohm Carbon Resistor
R-13	1000 ohm Carbon Resistor
R-14	Ballast Resistor BL42B
R-15	470,000 ohm Carbon Resistor
R-16	100 ohm Carbon Resistor

MODEL H625 Preliminary
Schematic, Socket
Alignment, Trimmers

GENERAL ELECTRIC CO.



C-1, 2	Tuning Condenser
C-3	"B" Band Padder
C-4	3900 mmf. Mica Condenser
C-5	"D" Band Antenna Trimmer
C-6	"D" Band Oscillator Trimmer
C-7	.05 mfd. Paper Capacitor
C-8	.1 mfd. Paper Capacitor
C-10	.01 mfd. Paper Capacitor
C-13	470 mmf. Mica Capacitor
C-14	.002 mfd. Paper Capacitor
C-16	.002 mfd. Paper Capacitor
C-17	220 mmf. Mica Capacitor
C-18	.005 mfd. Paper Capacitor
C-19	.005 mfd. Paper Capacitor
C-20	.01 mfd. Paper Capacitor
C-22a	50 mfd. Dry Electrolytic
C-22b	30 mfd. Dry Electrolytic
C-24	.05 mfd. Paper Capacitor
C-25	.01 mfd. Paper Capacitor
C-26	47 mmf. Mica Capacitor
C-28	0.1 mfd. Paper Capacitor
L-1	Loop
L-2	"D" Band Antenna Coil
L-3	"B-D" Band Oscillator Coil
L-8	Antenna Choke 1 1/2 MH.
P-1	Pilot Lamp Mazda #44
R-1	33,000 ohms Carbon Resistor
R-2	2.2 megohms Carbon Resistor
R-4	Volume Control, 2 megohms
R-5	470,000 ohms Carbon Resistor
R-6	1.5 megohms Carbon Resistor
R-7	470,000 ohms Carbon Resistor
R-8	1.0 megohm Carbon Resistor
R-9	3300 ohms Carbon Resistor
R-10	39,000 ohms Carbon Resistor
R-11	470,000 ohms Carbon Resistor
R-12	150 ohms Carbon Resistor
R-13	1000 ohms Carbon Resistor
R-14	Ballast Resistor BL42D
R-15	470,000 ohms Carbon Resistor
R-16	100 ohms Carbon Resistor

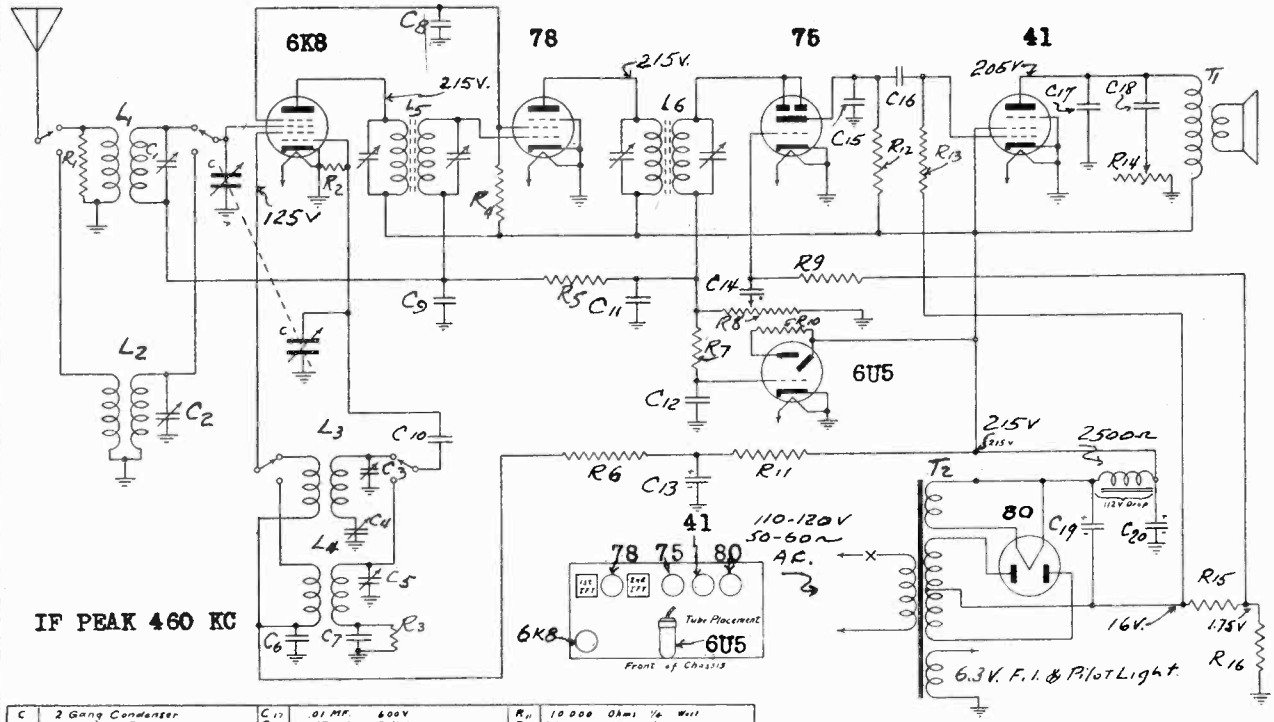
ALIGNMENT

With gang condenser plates completely closed, set dial pointer to "first line at left-end of scale.

1. Turn band switch to "B" band and align I.F.'s at 455 KC by visual or output meter method.
2. Apply a 1500 KC signal either through a standard I.R.E. dummy to the antenna terminal or by a loop coupling arrangement using an additional loop at the signal generator into which the 1500 KC signal is fed and which magnetically couples to the receiver Beam-a-scope. Align (C-2) at 1500 KC and peak (C-1) for maximum output. Then peak (C-3) on 590 KC while rocking the gang condenser. Refer to at 1500 KC.
3. Turn band switch to "D" band, align (C-6) at 18 MC and peak (C-5) while rocking the gang condenser. The image of the 18 MC signal should be heard at approximately 17 MC.

GILFILLAN BROS., INC.

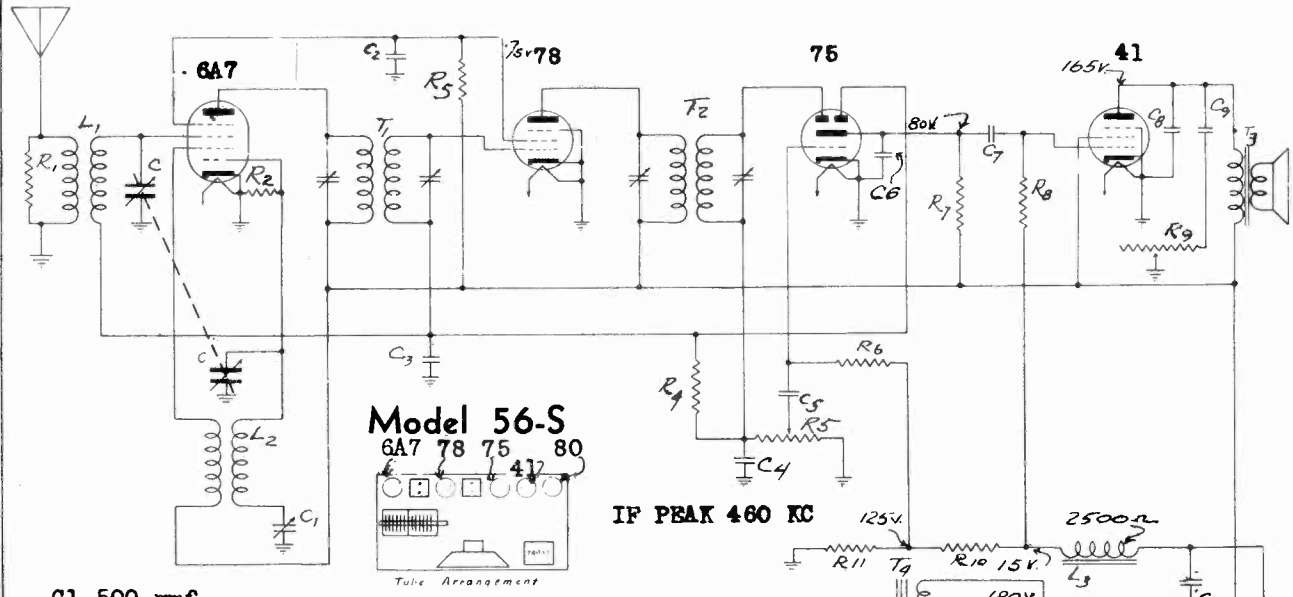
MODEL 56S
MODEL 66S
Schematics
Socket, Voltage



C	2 Gang Condenser	C12	.01 MF.	600V	R11	10 000	Ohms 1/2 Watt
C1	3-30 MMF. Trimmer	C13	.03 MF.	800V	R12	250 000	" " "
C2	3-30 MMF. "	C14	12 MF.	375V Elec	R13	1 Meg	" " "
C3	3-30 MMF. "	C15	16 MF.	250V "	R14	50 000	Tone Control
C4	500 MMF. Padder	C16			R15	350	- 2 Watts
C5	3-30 MMF. Trimmer				R16	30	- 1/4 "
C6	.05 MF. 400V	R1	25000	Ohms 1/2 Watt			
C7	Mica	R2	100000	" " "	L1 L2	Antenna Coil B.C. & S.W.	
C8	.25 MF. 400V	R3	30000	" " "	L3	Oscillator Coil B.C.	
C9	.05 MF. 200V	R4	50000	" " "	L4	" S.W.	
C10	.50 MMF. Mica	R5	2Meg	- 1/4 "	L5	1st I.F. Trans.	
C11	250 MMF. Mica	R6	10000	" " "	L6	2nd I.F. Trans.	
C12	.02 MF. 200V	R7	2 Meg	" " "			
C13	16 MF. 250V Elec.	R8	50000	- Vol Control	T1	Output Trans.	
C14	.01 MF. 400V	R9	2Meg	- 1/4 Watt	T2	Power Trans.	
C15	.001 MF. 600V	R10	1 Meg	" " "			
C16	.01 MF. 600V						

Power consumption:-
40 watts at 115 volts
60 cycles on primary,
All voltages to ground
with a 1000 ohm per
volt meter.

Gilfillan Bros. Inc.
MODEL 66-S
1938



C1 500 mmf
C2 .05 mf
C3 .05 mf
C4 250 mmf
C5 .01 mf
C6 .001 mf
C7 .01 mf
C8 .006 mf
C9 .03 mf
C10 8x8 mf
R1 25000
R2 100,000
R3 50,000
R4 2 meg
R5 500,000
R6 2 meg.
R7 250,000
R8 1 meg.
R9 50,000
R10 350
R11 30

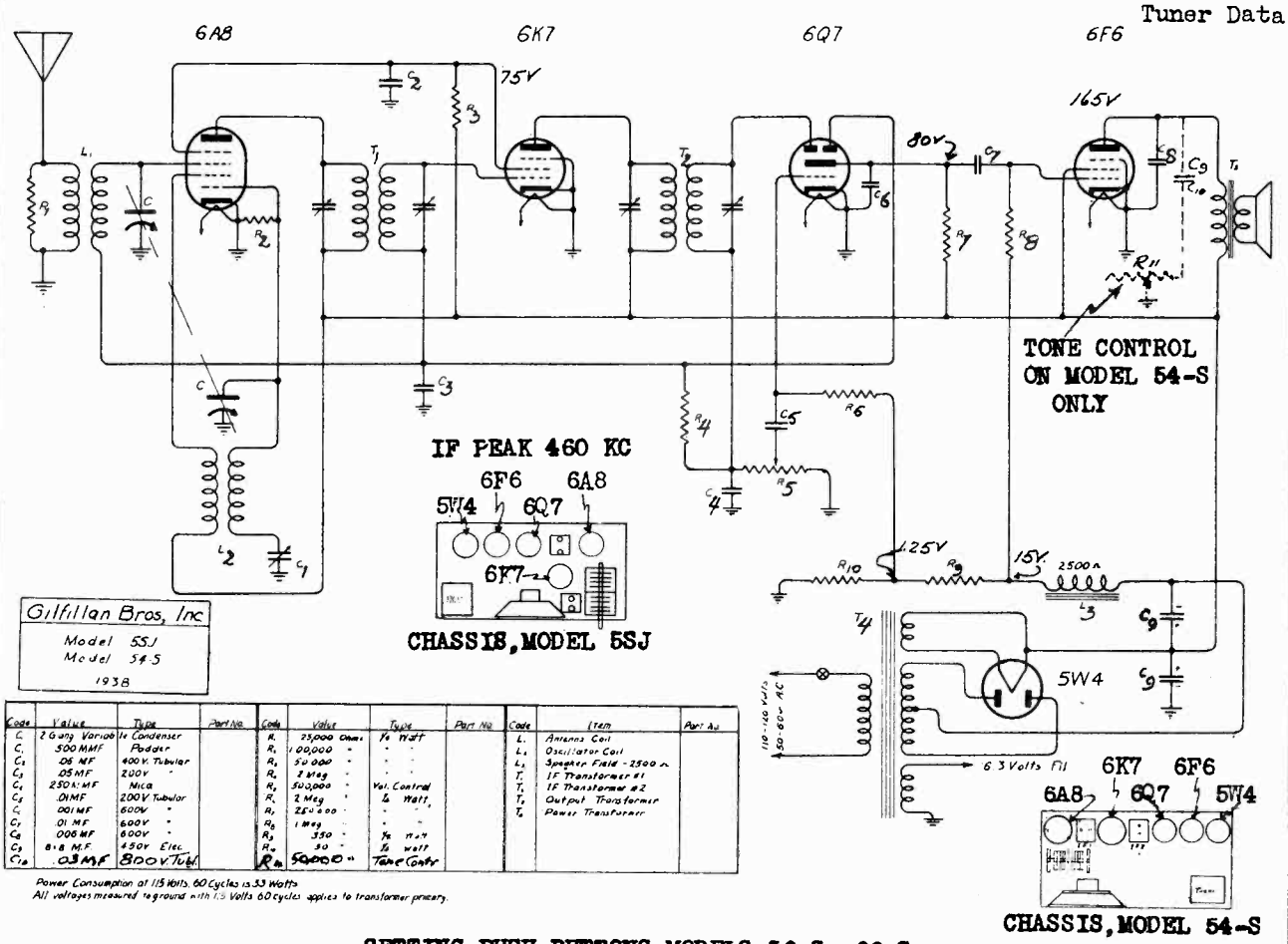
Power consumption at 115 Volts, 60 cycles - 37 watts
All voltages measured to ground with 115 volts, 60 cycles applied to transformer primary using 1000 ohms per volt meter.

Gilfillan Bros. Inc.
Model 56-S
1938

MODELS 5SJ,54S
Schematic,Socket

GILFILLAN BROS., INC.

MODEL 56S
MODEL 66S
Tuner Data



Gilfillan Bros, Inc
Model 5SJ
Model 54S
1938

Code	Value	Type	Part No
C	2 Gang Variable	Condenser	
C_1	500 MMF	Padder	
C_2	.06 MF	400 V. Tubular	
C_3	.05 MF	200 V	
C_4	250 MMF	Mica	
C_5	.01 MF	200 V Tubular	
C_6	.001 MF	600 V	
C_7	.01 MF	600 V	
C_8	.006 MF	600 V	
C_9	8-8 MF	450 V Elec.	
C_{10}	.03 MF	800 V Tub.	

Code	Value	Type	Part No
R_1	25,000 Ohms	½ Watt	
R_2	100,000 "	" "	
R_3	50,000 "	" "	
R_4	2 Meg "	" "	
R_5	500,000 "	Vol. Control	
R_6	2 Meg "	½ Watt	
R_7	250,000 "	" "	
R_8	1 Meg "	" "	
R_9	350 "	½ Watt	
R_{10}	50 "	½ Watt	
R_{11}	50000 "	Tone Contr.	

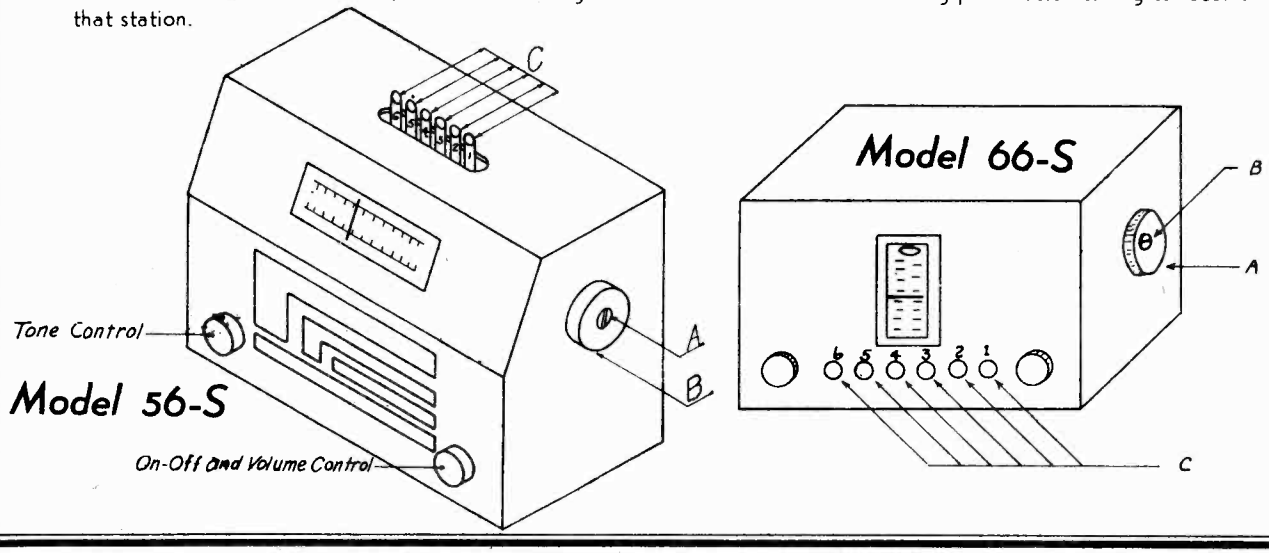
Code	Item	Part No
L_1	Antenna Coil	
L_2	Oscillator Coil	
L_3	Speaker Field - 2500 n	
T_1	IF Transformer #1	
T_2	IF Transformer #2	
T_3	Output Transformer	
T_4	Power Transformer	

Power Consumption at 115 Volts 60 Cycles is 53 Watts
All voltages measured to ground with 115 Volts 60 cycles applied to transformer primary.

SETTING PUSH BUTTONS MODELS 56-S, 66-S.

To set push button station selector proceed as follows:

1. Release mechanism by turning screw "B" in center of manual control knob "A" approximately three turns to the left.
2. Manually tune the radio set by means of turning knob "A" until the pointer is at the bottom end of the dial scale (so that it is pointed at 170). Starting from this point tune the desired station you want to hear (on No. 1 button)
3. Press button marked 1 all the way in, then release. Tune the next station desired manually, then press button No. 2 all the way in, then proceed progressively until all six buttons have been tuned.
4. Turn screw "B" in center of manual control "A" to right until tight, locking the selector mechanism. Any of the stations selected can now be received by depressing its corresponding push button. **BE SURE SELECTOR BUTTON IS PUSHED ALL THE WAY IN,** both when setting selector to a station and when using push button tuning to receive that station.



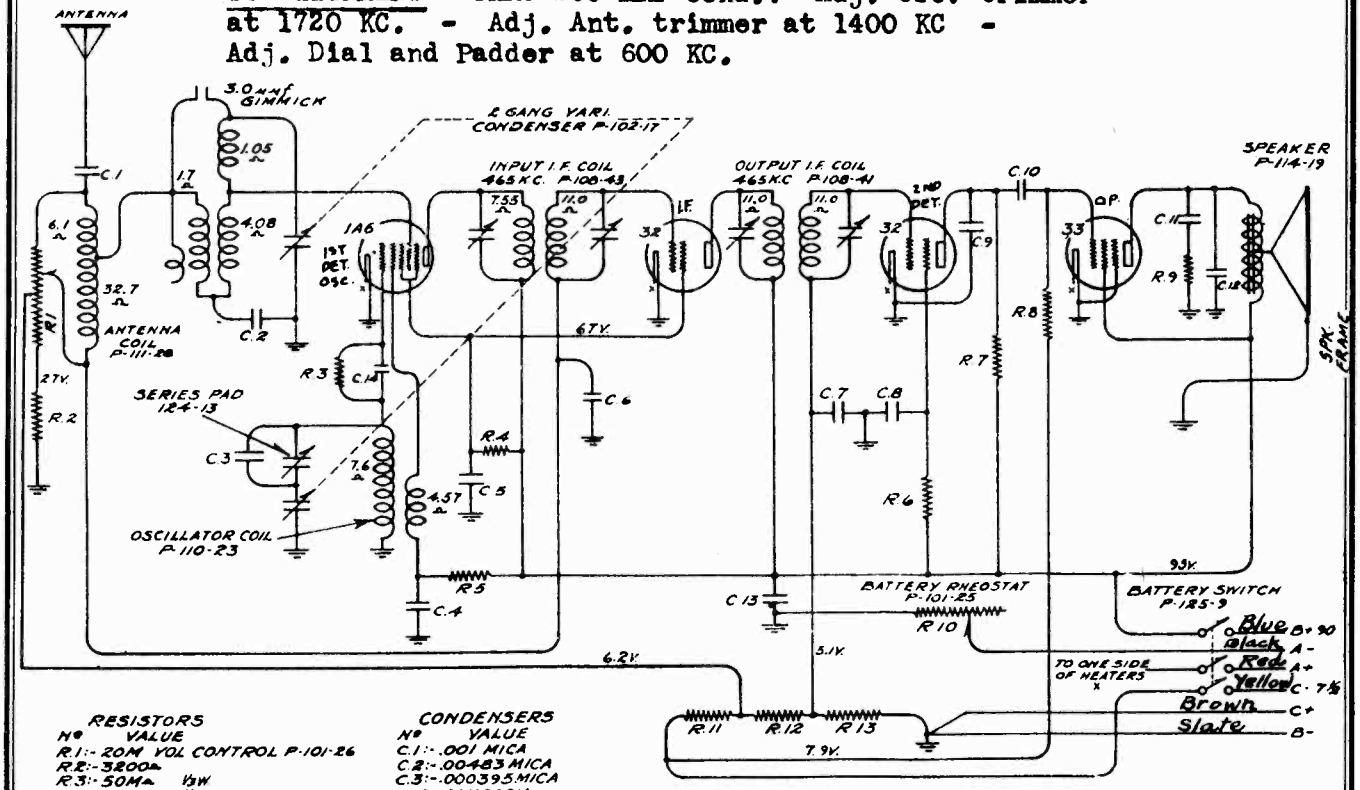
Socket, Trimmers
Alignment

MODEL 404

GOODYEAR TIRE & RUBBER CO., INC. Schematic, Voltage

IF ALIGNMENT - Adj. trimmers at 465 KC thru .1 mf cond.-

BC ALIGNMENT - THRU 200 mmf cond.:- Adj. Osc. trimmer at 1720 KC. - Adj. Ant. trimmer at 1400 KC - Adj. Dial and Padder at 600 KC.



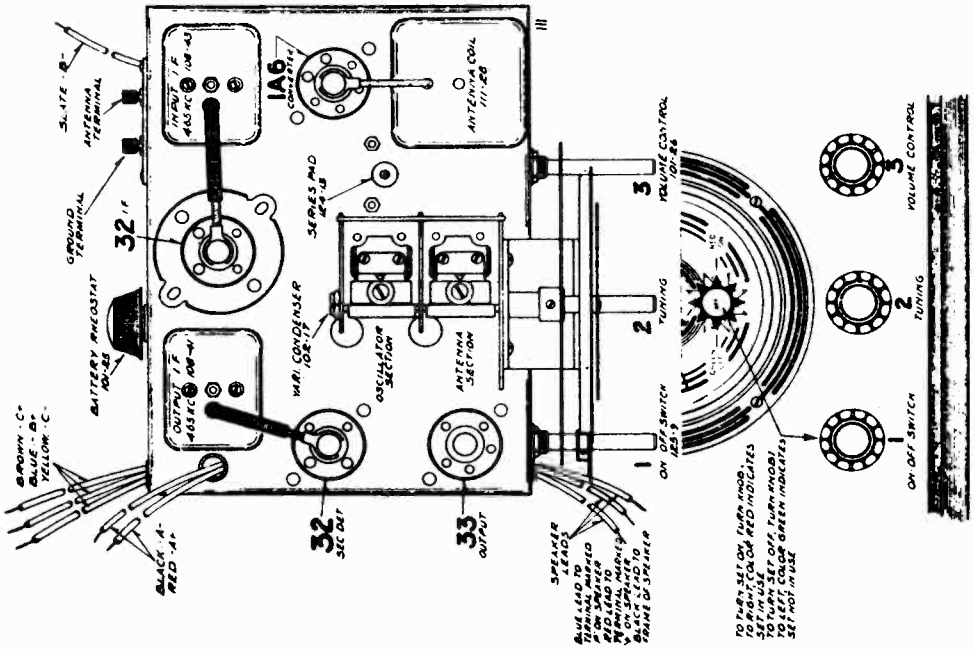
RESISTORS	
No	VALUE
R.1	- 20M VOL CONTROL P-101-26
R.2	- 3200Ω
R.3	- 50MΩ ½W
R.4	- 11MΩ ½W
R.5	- 10MΩ ½W
R.6	- 3 MEGΩ ½W
R.7	- 750MΩ ½W
R.8	- 500MΩ ½W
R.9	- 35MΩ ½W
R.10	- 4Ω BAT. RHEOSTAT P-101-25
R.11	- 1300Ω
R.12	- 1920Ω
R.13	- 9800Ω ½W

CONDENSERS	
No	VALUE
C.1	- .001 MICA
C.2	- .00483 MICA
C.3	- .000395 MICA
C.4	- .01 X 200V.
C.5	- .05 X 200V
C.6	- .25 X 200V.
C.7	- .05 X 200V
C.8	- .01 X 200V.
C.9	- .00025 MICA
C.10	- .01 X 400V
C.11	- .01 X 400V
C.12	- .0005 MICA
C.13	- .25 X 200V
C.14	- .00025 MICA

- NOTE -
R. 2, R.11, R.12 ARE IN ONE UNIT. P-106-21
C.4, C.5 ARE IN ONE UNIT P-118-11
C.6, C.13 " " " " P-118-5
C.7, C.8 " " " " P-118-11
NUMBERS PREFIXED BY LETTER 'P' ARE PART Nos
ALL VOLTAGES INDICATED ARE WITH NEW BATTERIES.
VOLUME CONTROL ON FULL

IF PEAK 465 KC

Serial No. 5D115200A and up



BATTERIES NEEDED

The following batteries are needed.

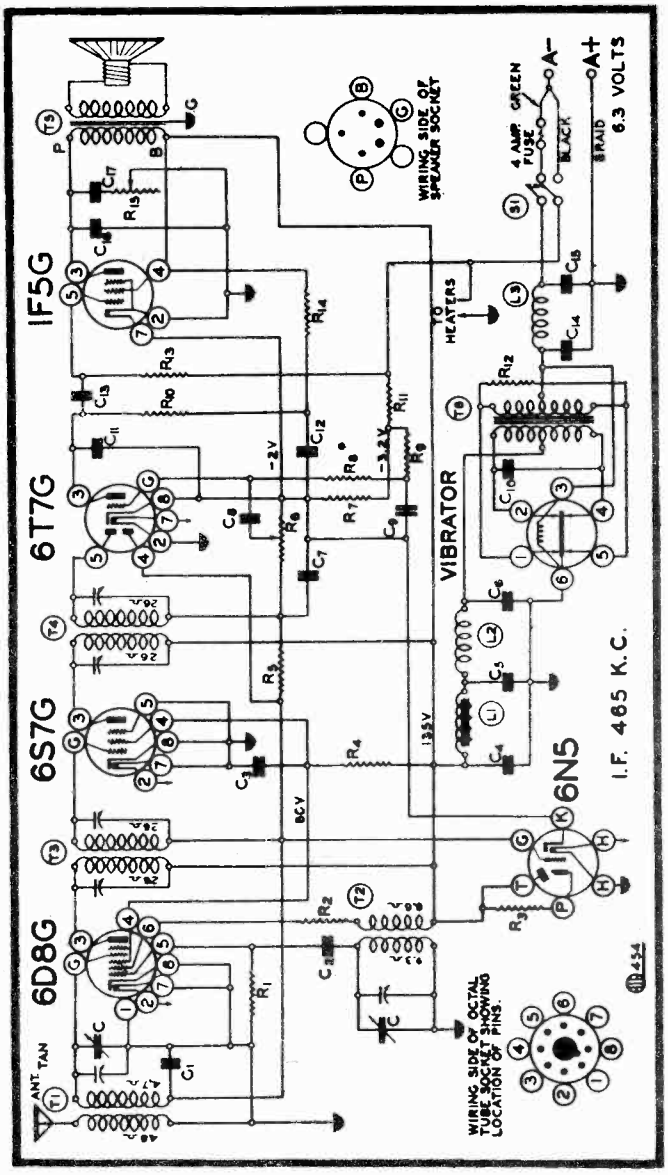
2.....45 volt "B" Batteries.
1.....7½ Volt "C" Battery.
1.....3 Volt Dry "A" Battery or 2 Volt Storage Battery.

MODEL 504
Schematic, Voltage
Socket, Trimmers
Alignment

GOODYEAR TIRE & RUBBER CO., INC.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AERIAL AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

All voltages are to be measured with 6.3 volts input to receiver. Resistances of coils and transformer windings are indicated in ohms on schematic circuit diagram.



Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

ALIGNING I.F. TRANSFORMERS: (465 K. C.):

Part No. 108-85 Output I.F. Transformer.

Part No. 108-84 Input I.F. Transformer.

These I.F. Transformers have two adjustments, both of which are accessible from the top of chassis (see fig. 1, top view).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments.
   (a) Connect external oscillator set at 465 kilocycles, in series with .1 mfd. condenser, to the control grid cap of the type 6S7G tube, and adjust the output I.F. transformer (No. 108-85) to resonance.
   (b) Move oscillator output clip from grid of 6S7G to grid cap of 6D8G and adjust input I.F. transformer (No. 108-84) to resonance.
   (c) With oscillator still connected to 6D8G readjust output I.F. transformer (108-85) if necessary.

R. F. ALIGNMENT: (535-1720 K.C.)

1. With gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 200 mmf. condenser to tan antenna and black ground leads and make the following adjustments:
   (a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer (rear of gang condenser).
   (b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick-up oscillator signal and adjust antenna trimmer to resonance (front section of gang condenser)
   (c) Check sensitivity at 600 and 1000 kilocycles.

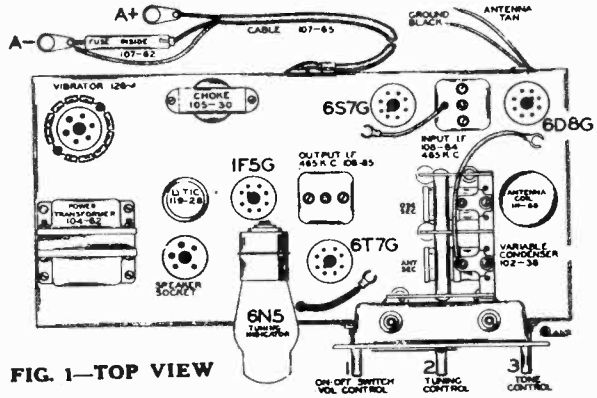


FIG. 1—TOP VIEW

504 SERIES A

535-1720 Kilocycles
Battery Operated

No.	Part No.	Description
		RESISTORS
R1	130-76	30M ohm - 1/3 w.
R2	130-23	2M ohm - 1/3 w.
R3	130-186	250M ohm - 1/10 w. - in tuning indicator
R4	130-123	15M ohm - 1/3 w.
R5	130-121	3.2 megohm - 1/3 w.
R6	101-56	1 megohm volume control
R7	106-36	10 ohms - resistor strip
R8	130-19	1 megohm - 1/3 w.
R9	130-19	1 megohm - 1/3 w.
R10	130-100	150M ohm - 1/3 w.
R11	106-36	25 ohms - resistor strip
R12	130-84	200 ohms - 1/3 w.
R13	130-19	1 megohms - 1/3 w.
R14	130-20	100M ohm - 1/3 w.
R15	101-72	300M ohm - tone control R7 and R11 in same unit
		CONDENSERS
C	102-38	2 gang variable
C1	100-9	.05 x 200 v.
C2	129-39	.00005 Mica
C3	100-33	.1 x 200 v.
C4	119-28	5.0 mfd. - 200 w. v. lytic
C5	119-28	5.0 mfd. - 200 w. v. lytic
C6	100-33	.1 x 200 v.
C7	129-5	.0001 Mica
C8	100-11	.01 x 400 v.
C9	100-11	.01 x 400 v.
C10	100-34	.005 x 1200 v.
C11	129-12	.0025 Mica
C12	100-33	.1 x 200 v.
C13	100-11	.01 x 400 v.
C14	100-40	.5 x 200 v.
C15	100-40	.5 x 200 v.
C16	100-37	.003 x 600 v.
C17	100-11	.01 x 400 v. C4 and C5 in same unit
		PARTS
T1	111-66	Antenna coil complete
T2	110-45	Oscillator coil complete
T3	108-84	Input I.F. coil complete - 465 kc.
T4	108-85	Output I.F. coil complete - 465 kc.
T5	114-63	P.M. Speaker
T6	104-62	Power Transformer
L1	105-30	Filter Choke
L2	123-3	R. F. "B" Choke
L3	105-19	"A" Choke
S1		Switch on volume control
	126-4	Vibrator

GOODYEAR TIRE & RUBBER CO., INC.

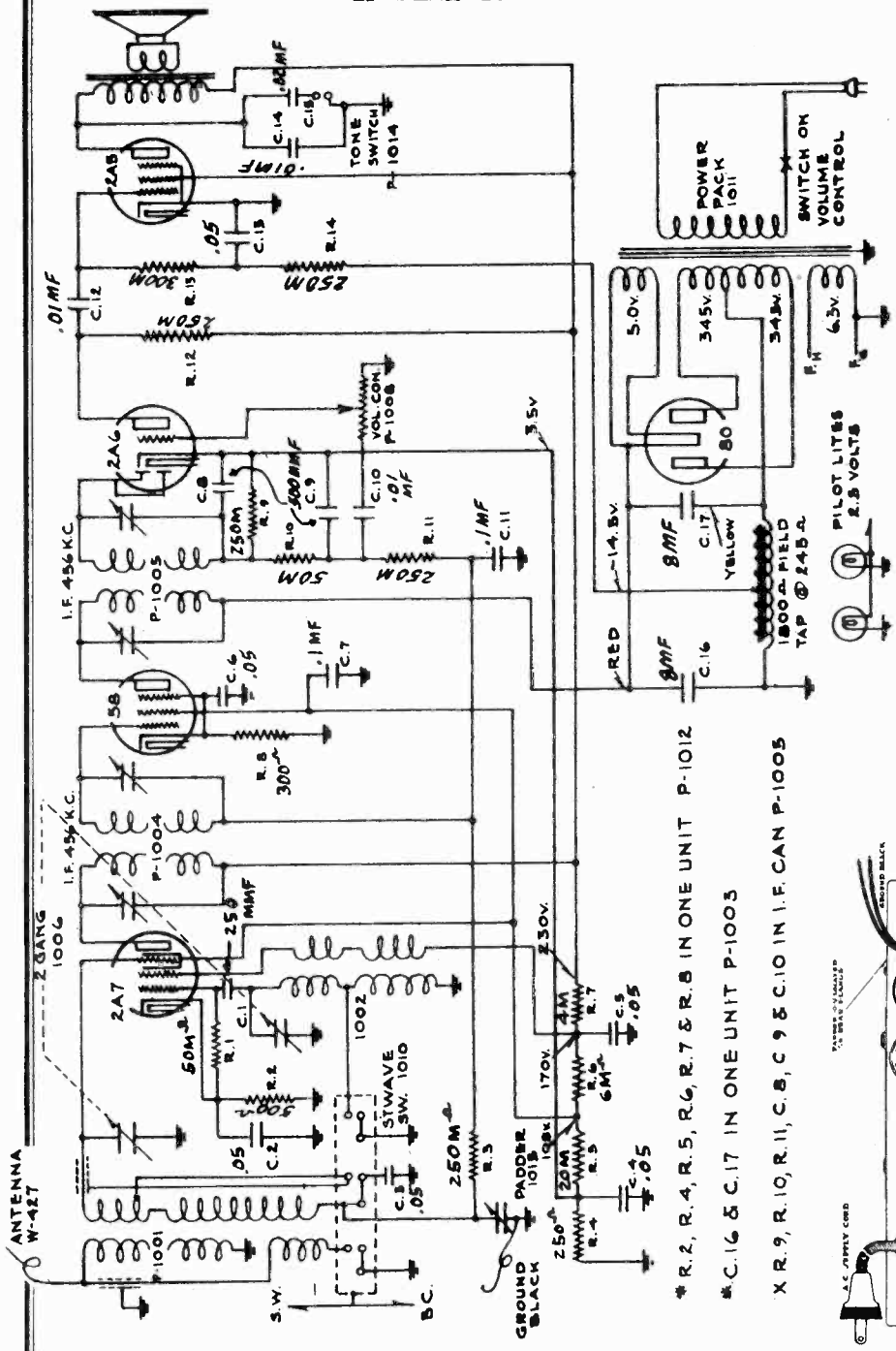
MODEL 550
Schematic, Voltage
Socket, Trimmers
Alignment

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

NUMBERS PREFIXED BY LETTER 'P' ARE PART NUMBERS.
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND. VOLUME CONTROL ON FULL.
VOLTAGES WITH 119V. A.C. LINE

33248

IF PEAK 456 KC



* R.2, R.4, R.5, R.6, R.7 & R.8 IN ONE UNIT P-1012

*C.16 & C.17 IN ONE UNIT P-1003

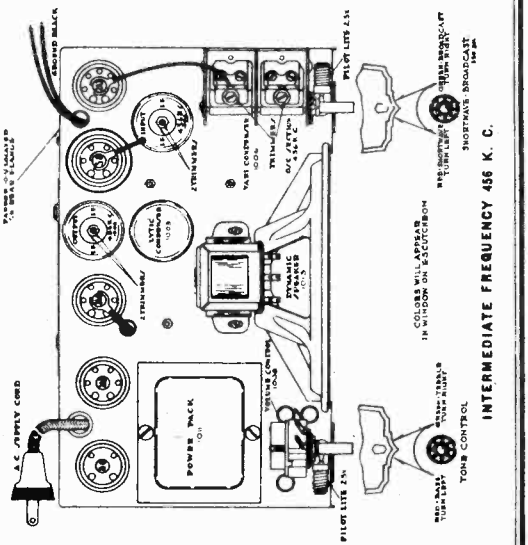
X R.9, R.10, R.11, C.8, C.9 & C.10 IN I.F. CAN P-1005

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

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

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

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

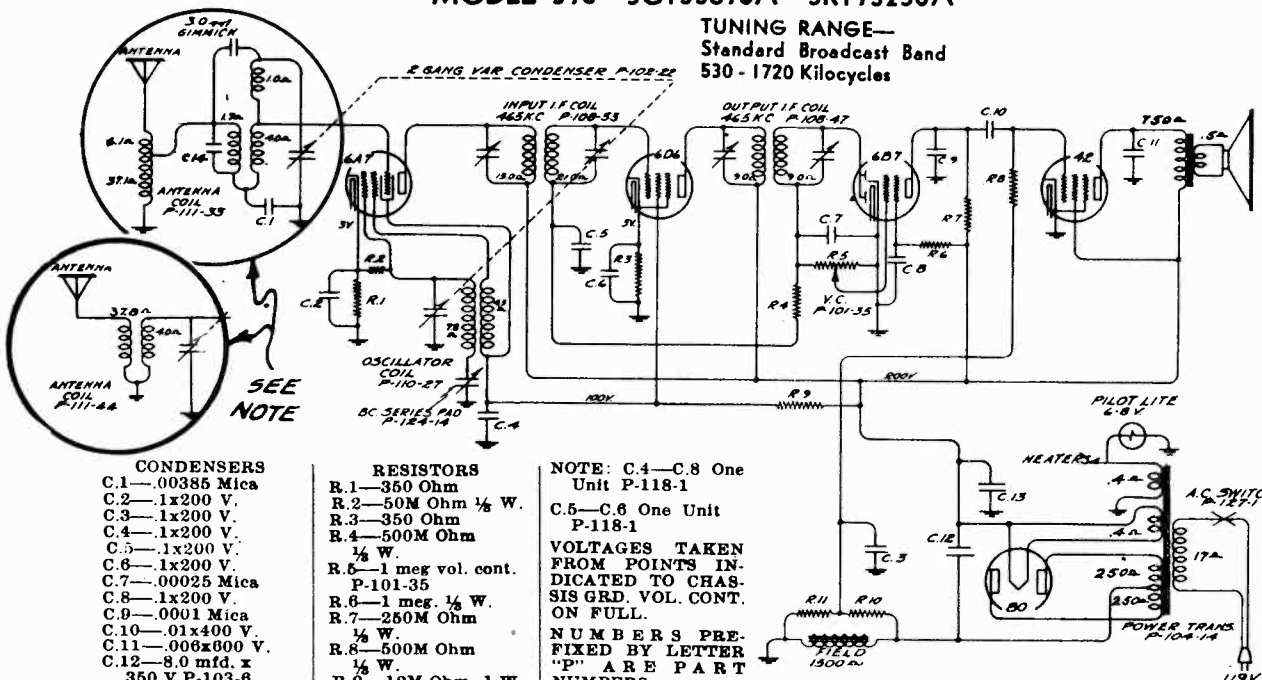


MODEL 578, Series A
Schematic, Voltage

GOODYEAR TIRE & RUBBER CO., INC.

Socket, Trimmers
Alignment

MODEL 578—5G133670A—5K173250A



CONDENSERS

C.1—.00385 Mica
C.2—.1x200 V.
C.3—.1x200 V.
C.4—.1x200 V.
C.5—.1x200 V.
C.6—.1x200 V.
C.7—.00025 Mica
C.8—.1x200 V.
C.9—.0001 Mica
C.10—.01x400 V.
C.11—.006x600 V.
C.12—8.0 mfd. x 350 V P-103-6
C.13—8.0 mfd. x 300 V P-103-7
C.14—110 mfd. Either external Mica Cond. or cap. winding in coil.

RESISTORS

R.1—350 Ohm
R.2—50M Ohm ⅛ W.
R.3—350 Ohm
R.4—500M Ohm ⅛ W.
R.5—1 meg vol. cont. P-101-35
R.6—1 meg. ⅛ W.
R.7—250M Ohm ⅛ W.
R.8—500M Ohm ⅛ W.
R.9—12M Ohm 1 W.
R.10—800M Ohm ⅓ W.
R.11—201M Ohm ⅛ W.

NOTE: C.4—C.8 One Unit P-118-1

C.5—C.6 One Unit P-118-1

VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GRD. VOL. CONT. ON FULL.

NUMBERS PREFIXED BY LETTER "P" ARE PART NUMBERS.

I. F. FREQUENCY: 465 K.C.

NOTE:—

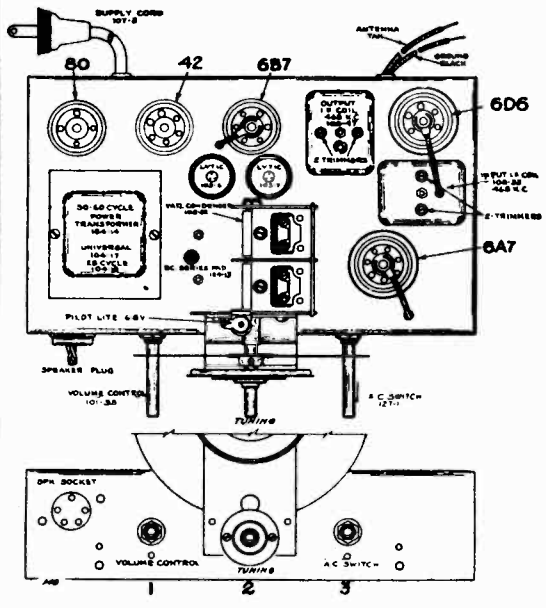
Beginning with 5K173250A, Antenna Coil No. 111-44 replaced No. 111-33, and capacities C1—.00385 mfd. and C14—.00011 mfd. were eliminated. Note: On early models C14 was a capacity winding on the primary of the No. 111-33 Antenna Coil.

See revised diagram

Tubes

The Tube complement of this chassis is as follows:

1 Type 6A7—pentagrid electron coupled oscillator and first detector.
1 Type 6D6—remote cut-off pentode as I.F. amplifier.
1 Type 6B7—duplex diode pentode as diode detector, A.V.C. and A.F.
1 Type 42—pentode output tube.
1 Type 80—high vacuum rectifier.



Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram

All voltages are measured with 119 volts on the primary of the power transformer.

ALIGNING INSTRUCTIONS

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

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

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

Aligning I. F. Transformers

1. With volume control full on, the extreme right of its rotation, and with variable condenser at its minimum capacity position, plates entirely out of mesh, adjust the I.F. transformers (two adjustments at the top of parts number 108-53 and 108-47)

(a) Connect external oscillator which has been adjusted to 465 kilocycles in series with I.F. dummy antenna, to the control grid cap of the type 6D6 tube and chassis ground. Adjust output I.F. transformer, part number 108-47, to resonance.

(b) Move generator output clip from grid of 6D6 to grid cap of 6A7 tube and align input I.F. transformer, part number 108-53.

(c) With generator connected to grid of type 6A7 tube, readjust output I.F. transformer, part number 108-47, to resonance.

R. F. Alignment—
(530 - 1720 Kilocycles)

1. With gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with broadcast dummy antenna to tan antenna and black ground leads and make the following adjustments:

(a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer, (rear of gang condenser).

(b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance, (front section of gang condenser).

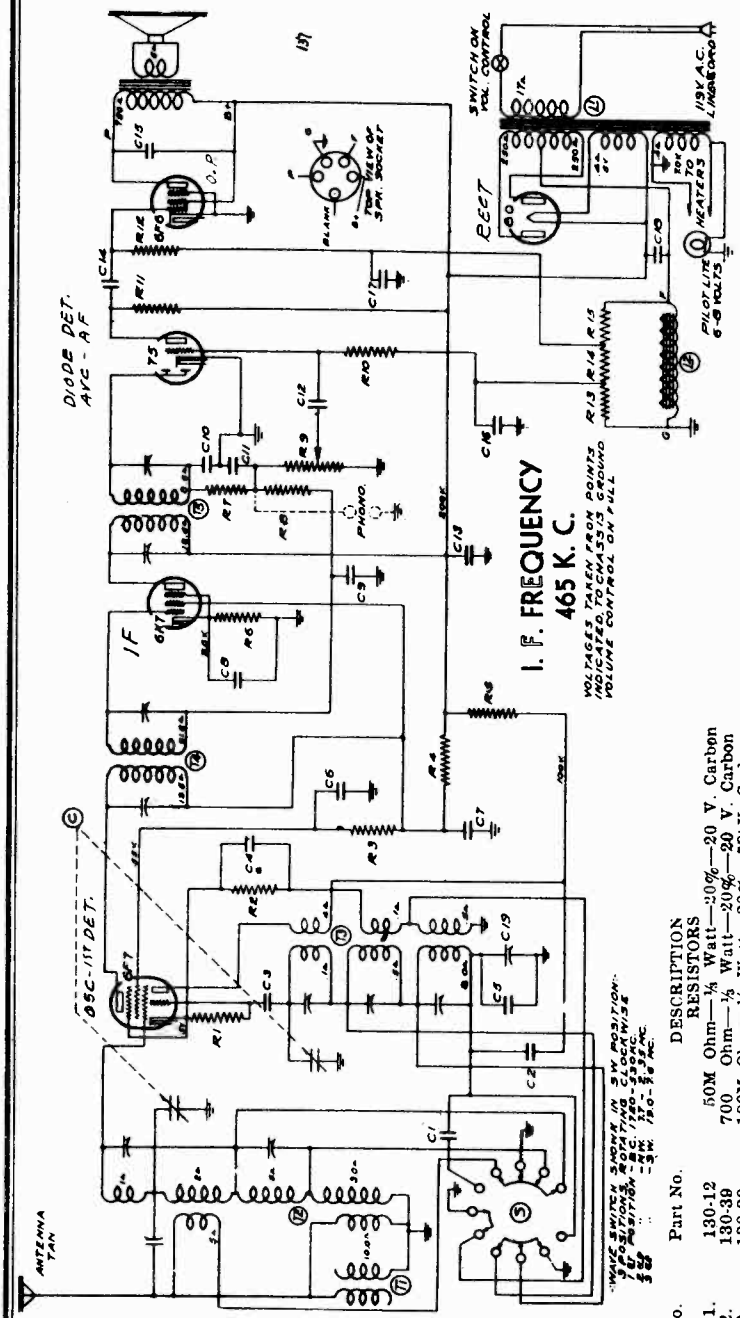
(c) Re-set external oscillator to 600 kilocycles and adjust series pad to resonance, rotate condenser and move dial pointer to 600 kilocycles by gently rocking condenser to and fro. Pick up oscillator signal while adjusting series pad to resonance, maximum deflection on an output meter. This adjustment is accessible from the top of the chassis and is located between variable condenser and power transformer.

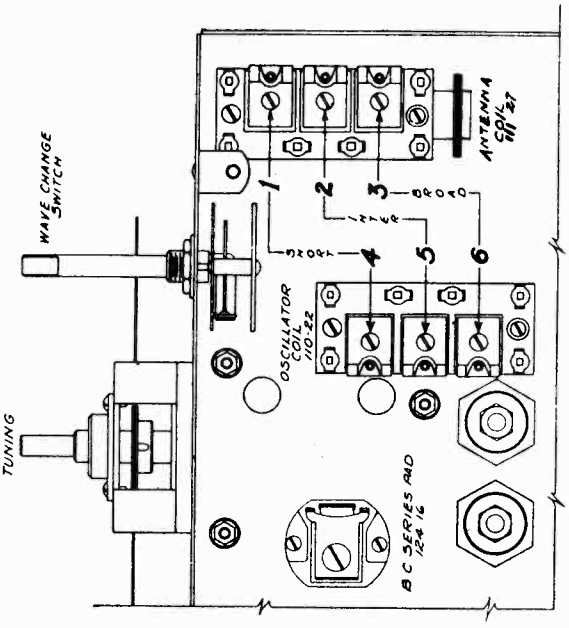
25 Cycle Chassis differ only from 60 cycle chassis in that part number 104-18 transformer is used in place of 50/60 cycle transformer, part number 104-14.

GOODYEAR TIRE & RUBBER CO., INC.

MODEL 585
Schematic, Voltage
Socket, Trimmers
Alignment

		MISCELLANEOUS
T1.	105-10	Antenna Choke Coil
T2.	111-27	Antenna Coil
T3.	110-22	Oscillator Coil
T4.	108-38A	Input I.F. Transformer
T5.	108-40	Output I.F. Transformer
C	102-12	Two Gang Variable Cond.
S	125-6	Wave Change Switch
L1.	104-14A	Power Transformer 50/60 Cycle
L1.	104-18	Power Transformer 25 Cycle
L2.	114-11	Speaker—Field Resistance 1350 Ohms
L1.	104-17	Power Trans. Universal 50/60 Cycle
L1.	104-41	Power Trans. Universal 25 Cycle.





TUNING RANGE—

Standard Broadcast Band
530-1720 Kilocycles.

Intermediate Band
2350-7700 Kilocycles.

Short Wave Band
7.8-19.0 Megacycles.

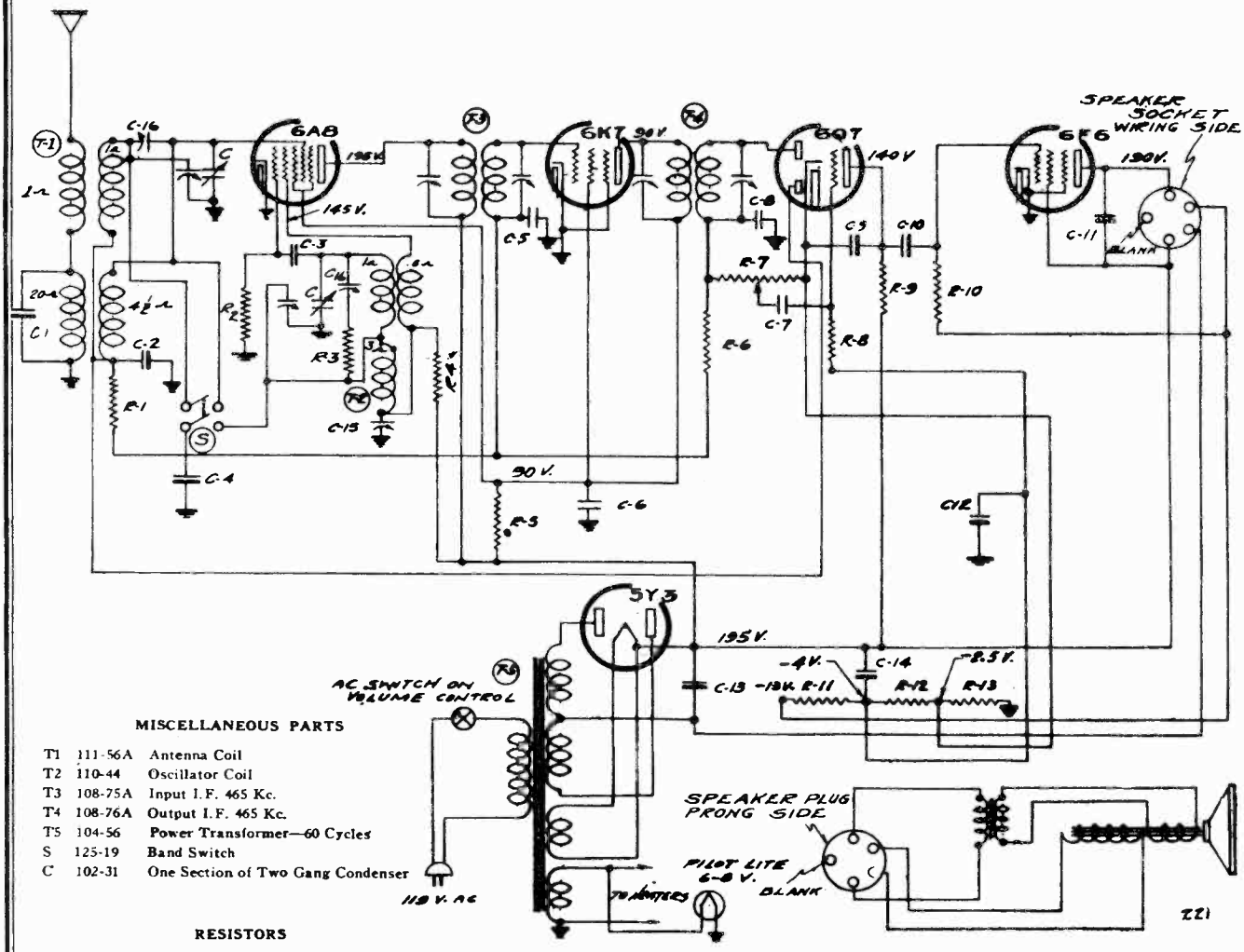
FOR ALIGNMENT SEE MODEL 585 Run No. 2 Vol. IX page 2.

No.	Part No.	DESCRIPTION
		RESISTORS
R1.	130-12	50M Ohm—½ Watt—20%—20 V. Carbon
R2.	130-39	700 Ohm—½ Watt—20%—20 V. Carbon
R3.	130-20	100M Ohm—½ Watt—20%—50 V. Carbon
R4.	130-44	25M Ohm—½ Watt—20%—150 V. Carbon
R5.	130-42	20M Ohm—½ Watt—20%—100 V. Carbon
R6.	130-32	250 Ohm—½ Watt—30%—10 V. Wire Wound
R7.	130-12	50M Ohm—½ Watt—20%—20 V. Carbon
R8.	130-3	500M Ohm—½ Watt—20%—100 V. Carbon
R9.	101-18	500M Ohm Volume Control
R10.	130-19	1 meg Ohm—½ Watt—20%—100 V. Carbon
R11.	130-11	250M Ohm—½ Watt—10%—100 V. Carbon
R12.	130-11	250M Ohm—½ Watt—10%—100 V. Carbon
R13.	130-48	15M Ohm—½ Watt—10%—20 V. Carbon
R14.	130-47	180M Ohm—½ Watt—10%—100 V. Carbon
R15.	130-46	800M Ohm—½ Watt—10%—100 V. Carbon
		CONDENSERS
C1.	129-23	.002 Mica—MW—5%
C2.	100-20	.1 x 120 V.—25%
C3.	129-5	.0001 Mica—MT—20%
C4.	100-20	.1 x 200 V.—25%
C5.	129-24	.00038—MT—5%
C6.	118-1	.1 x 200 V.—Dual Plus 50%; Minus 10%
C7.	118-1	.1 x 200 V.—Dual Plus 50%; Minus 10%
C8.	118-1	.1 x 200 V.—Dual Plus 50%; Minus 10%
C9.	118-1	.1 x 200 V.—Dual Plus 50%; Minus 10%
C10.	129-51	.000125—Mica MT—20%
C11.	129-51	.000125—Mica MT—20%
C12.	100-22	.05 x 200 V.—25%
C13.	103-7	.8 mfd. x 300 V. Electrolytic
C14.	100-11	.01 x 400 V.—25%
C15.	100-19	.000 x 600 V.—25%
C16.	118-1	.1 x 200 V.—Dual Plus 50%; Minus 10%
C17.	118-1	.1 x 200 V.—Dual Plus 50%; Minus 10%
C18.	103-6	.8 mfd. x 350 V. Electrolytic
C19.	124-5	B. C. Series Pad J-3-S.

MODEL 587
Schematic

GOODYEAR TIRE & RUBBER CO., INC.

Voltage
Socket, Trimmers
Alignment



MISCELLANEOUS PARTS

T1	111-56A	Antenna Coil
T2	110-44	Oscillator Coil
T3	108-75A	Input I.F. 465 Kc.
T4	108-76A	Output I.F. 465 Kc.
T5	104-56	Power Transformer—60 Cycles
S	125-19	Band Switch
C	102-31	One Section of Two Gang Condenser

RESISTORS

No.	Part No.		Description
R1	130-111	100M	Ohms 1/10W—20%—50V Carbon
R2	130-12	50M	Ohms 1/3 W—20%—20V Carbon
R3	130-112	100	Ohms 1/10W—20%—10V Carbon
R4	130-22	5M	Ohms 1/3 W—20%—10V Carbon
R5	130-77	10M	Ohms 1 W—20%—100V Carbon
R6	130-110	1 meg	Ohm 1/10W—10%—100V Carbon
R7	101-49	1 meg	Ohm Volume Control
R8	130-113	2 meg	Ohm 1/10W—20%—100V Carbon
R9	130-20	100M	Ohms 1/3W—20%— 50V Carbon
R10	130-100	150M	Ohms 1/3W—20%— 50V Carbon
R11	106-26	220	Ohms
R12	106-26	33	Ohms
R13	106-26	52	Ohms

NOTE: R11, R12, and R13 in one unit—106-26

CONDENSERS

C1	129-63	.0004 Mica—W—10%
C2	100-26	.02 x 400 Volt—25%
C3	129-62	.00003 Mica—0—10%
C4	129-61	.0017 Mica—W—2½%
C5	100-9	.05 x 200 Volt—25%
C6	100-6	.25 x 200 Volt—25%
C7	100-11	.01 x 400 Volt—25%
C8	129-12	.00025 Mica—0—20%
C9	129-12	.00025 Mica—0—20%
C10	100-11	.01 x 400 Volt—25%
C11	100-19	.006 x 600 Volt—25%
C12	100-6	.25 x 200 Volt—25%
C13	103-6	8 mfd. x 350 Volt Electrolytic
C14	103-7	8 mfd. x 300 Volt Electrolytic
C15	124-29	Adjustable condenser 390 mmf. working capacity
C16	124-30	Adjustable Dual Condenser

I. F. FREQUENCY
465 K. C.

MODEL 587
CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII

ALIGNMENT FREQUENCIES
I.F. 465 KC.
S.W.OSC. TRIMMER 6.6 M.C.
B.C.OSC. TRIMMER 1720 KC.
B.C.ANT. TRIMMER 1550 KC.
B.C.SERIES PAD 600 KC.
S.W.ANT. TRIMMER 6M.C.

TUNING RANGE—
Standard Broadcast Band
535-1720 Kilocycles.
Short Wave Band
2280-6000 Kilocycles

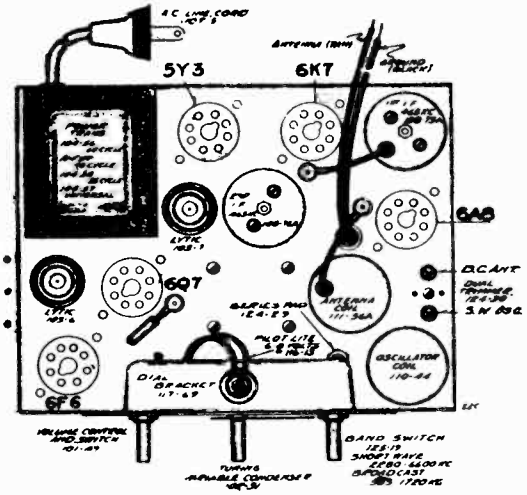


FIG. 1—TOP VIEW

Socket, Trimmers
Alignment

MODEL 601, Runs 1, 2
Schematic, Voltage

GOODYEAR TIRE & RUBBER CO., INC.

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-83 Output I.F. Transformer
Part No. 108-82 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

(a) Connect external oscillator set at 465 kilocycles, in series with .1 mfd. condenser, to the control grid cap of the type 78 tube, and adjust the output I.F. transformer (No. 108-83) to resonance.

(b) Move oscillator output clip from grid of 78 grid cap of 6A7 and adjust input I.F. transformer (No. 108-82) to resonance.

(c) With oscillator still connected to 6A7, readjust output I.F. transformer (108-83) if necessary.

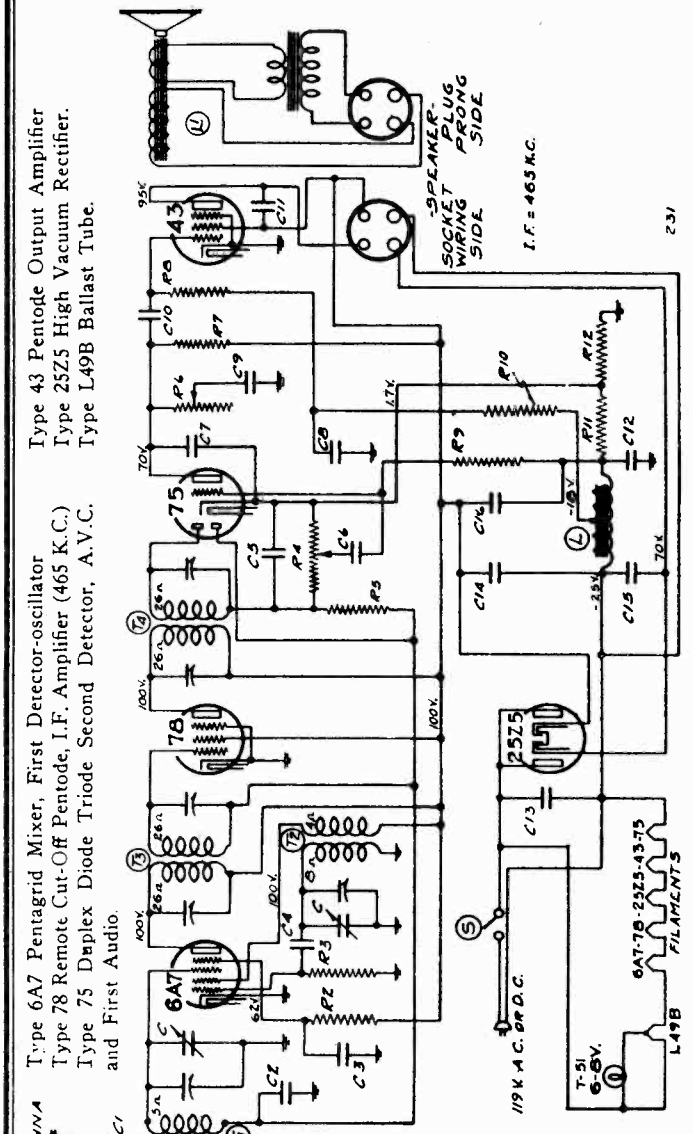
R.F. ALIGNMENT: (535-1720 K.C.)

1. Unsolder the antenna wire from its terminal on the antenna coil and with gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 50 mmf. condenser to the antenna terminal on the antenna coil and chassis ground and make the following adjustments:

(a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer (rear of gang condenser).

(b) Re-set external oscillator to 1550 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance (front section of gang condenser).

(c) Check sensitivity at 600 and 1000 kilocycles.



MODEL 601—SERIES A

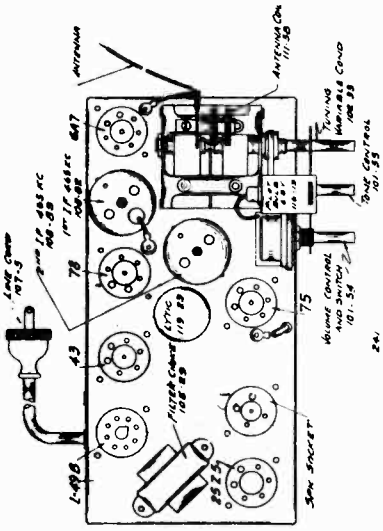


FIG. 2—TOP VIEW

RESISTORS

No.	Part No.	Description
R1	130-12	50M Ohm—½W—20%—20V—Carbon
R2	130-21	20M Ohm—½W—20%—20V—Carbon
R3	130-12	50M Ohm—½W—20%—20V—Carbon
R4	101-54	1 meg Ohm—Volume Control—100V—Carlon
R5	130-119	3 meg Ohm—½W—20%—100V—Carlon
R6	101-55	1 meg Ohm—Tone Control
R7	130-120	100M Ohm—½W—20%—50V—Carbon
R8	130-5	300M Ohm—½W—20%—100V—Carbon
R9	130-38	2 meg Ohm—½W—20%—100V—Carbon
R10	130-9	200M Ohm—½W—20%—20V—Carbon
R11	106-28	35 Ohm—Muter Strip
R12	106-28	50 Ohm—Muter Strip

NOTE: R11 and R12 in one unit—No. 106-28.

CONDENSERS

C1	100-29	.002 x600 Volt—25%
C2	100-22	.05 x200 Volt—25%
C3	100-22	.05 x200 Volt—25%
C4	129-12	.00025 Mica—MT—20%
C5	129-12	.00025 Mica—MT—20%
C6	100-11	.01 x400 Volt—20%
C7	129-2	.0005 Mica—MT—20%
C8	100-20	.1 x200 Volt—25%
C9	100-11	.01 x400 Volt—25%
C10	100-11	.01 x400 Volt—25%
C11	100-25	.002 x600 Volt—25%
C12	100-6	.25 x200 Volt—20%
C13	100-39	.1 x400 Volt—20%
C14	119-25	16 mfd.x160 Volt—Working Voltage
C15	119-25	5 mfd.x100 Volt—Working Voltage
C16	119-25	8 mfd.x100 Volt—Working Voltage

NOTE: C14, C15, and C16 in one unit—No. 119-25

C	102-33	One section of two gang condenser
T1	111-57	Antenna Coil
T2	110-46	Oscillator Coil
T3	106-82	Input I.F. Coil—465 Kc.
T4	108-83	Output I.F. Coil—465 Kc.
L	105-29	Filter Choke (Resistance 600 Ohms)
L1	114-43	Five Inch Speaker (Field resistance 3000 Ohms)
S	101-54	On and off switch on Volume Control

TUNING RANGE—
Standard Broadcast Band
535-1720 Kilocycles

MODEL 601—SERIES B is the same as Series A, except for the following changes:-
1 - The C15 condenser was eliminated.
2 - The C14 condenser was replaced by a C15 (Part #119-29) 30 mfd. capacity, and the C16 was replaced by a C14 (Part #119-29) 5 mfd. capacity.

MODEL 602, Runs 1,2
Schematic, Voltage

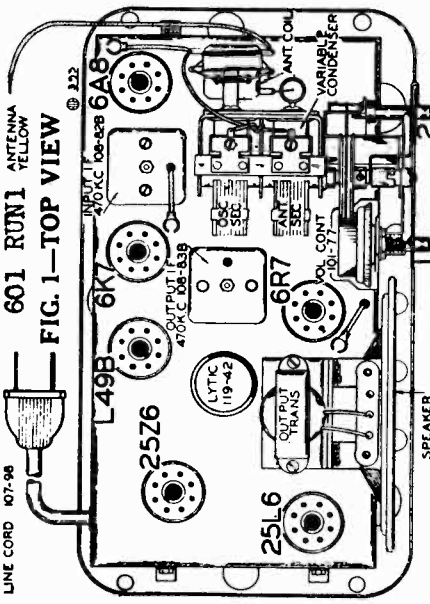
GOODYEAR TIRE & RUBBER CO., INC.

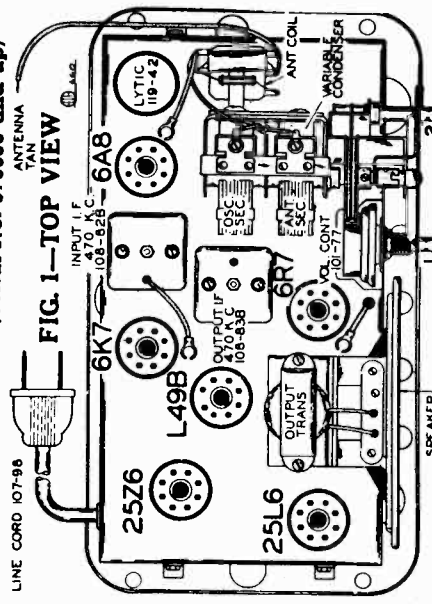
Socket, Trimmers
Alignment

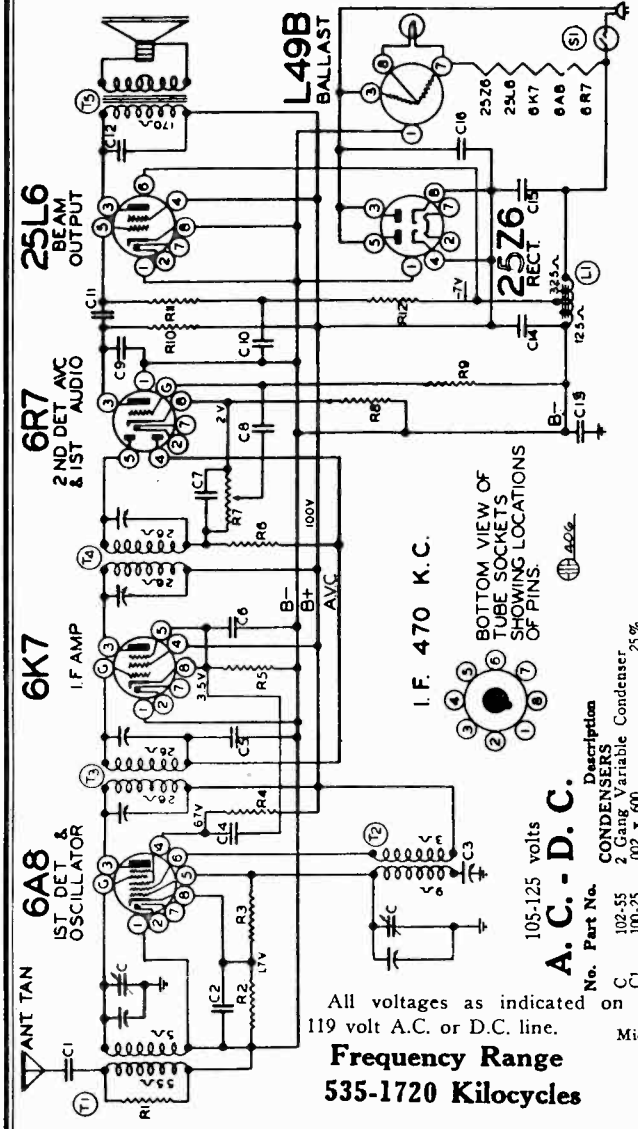
(a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer to resonance. This adjustment is on the top of rear section of variable gang condenser. (See Fig. 1).

(b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance. (Top of front section of gang condenser).

(c) Check sensitivity at 600 and 1000 kilocycles.







All voltages as indicated on diagram are measured with 119 volt A.C. or D.C. line.

Frequency Range
535-1720 Kilocycles

No.	Part No.	Description
		CONDENSERS
C	102-55	2 Gang Variable Condenser 25%
C1	100-25	.002 × 600 25%
C2	100-22	.05 × 200
C3	129-75	.0001386 Compression Type Condenser 1%
C4	100-22	.05 × 200 25%
C5	100-9	.05 × 200 25%
C6	100-20	.1 × 200 25%
C7	129-21	.0002 Mica 20%
C8	100-11	.01 × 400 25%
C9	129-2	.0005 Mica 20%
C10	100-75	.22 × 200 10%
C11	100-10	.05 × 200 10%
C12	100-67	.025 × 400 25%
C13	100-53	.25 × 400 20%
C14	119-42	5 mfd. lytic 100 w. v.
C15	119-42	20 mfd. lytic 100 w. v.
C16	100-39	.1 × 400 20%
		RESISTORS
R1	130-17	10M ohm — 1/3 w. 20%
R2	130-97	200 ohm — 1/3 w. 10%
R3	130-12	50M ohm — 1/3 w. 20%
R4	130-149	15M ohm — 1/3 w. 20%
R5	130-54	500 ohm — 1/3 w. 20%
R6	130-4	3 megohm — 1/3 w.
R7	101-77	Volume Control (1 meg) 10%
R8	130-193	3M ohm — 1/3 w. 10%
R9	130-19	1 megohm — 1/3 w. 20%
R10	130-94	50M ohm — 1/3 w. 10%
R11	130-103	100M ohm — 1/3 w. 10%
R12	130-194	35M ohm — 1/3 w. 10%
		PARTS
T1	111-79	Antenna Coil Complete
T2	110-62	Oscillator Coil Complete
T3	108-82B	Input I. F. Complete
T4	108-83B	Output I. F. Complete
T5	114-88	5" Dynamic Speaker
L1		Speaker field 450 ohm— total tapped 125 ohm
S1		Switch on volume control

Mica condensers are coded with an additional dot indicating tolerance:

Tolerance percent	Color of Dot
2½%	White
5%	Green
10%	Blue
15%	Yellow
20%	Red
More Than 20%	None

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

ALIGNING I.F. TRANSFORMERS: (470 K.C.):

Part No. 108-83B Output I.F. Transformer

Part No. 108-82B Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see Fig. 1).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

(a) Connect external oscillator set at 470 kilocycles, in series with .1 mfd. condenser, to the control grid cap of the type 6K7G tube, and adjust the output I.F. transformer (No. 108-83B) to resonance.

(b) Move oscillator output clip from grid of 6K7G to grid of 6A8G and adjust input I.F. transformer (No. 108-82B) to resonance.

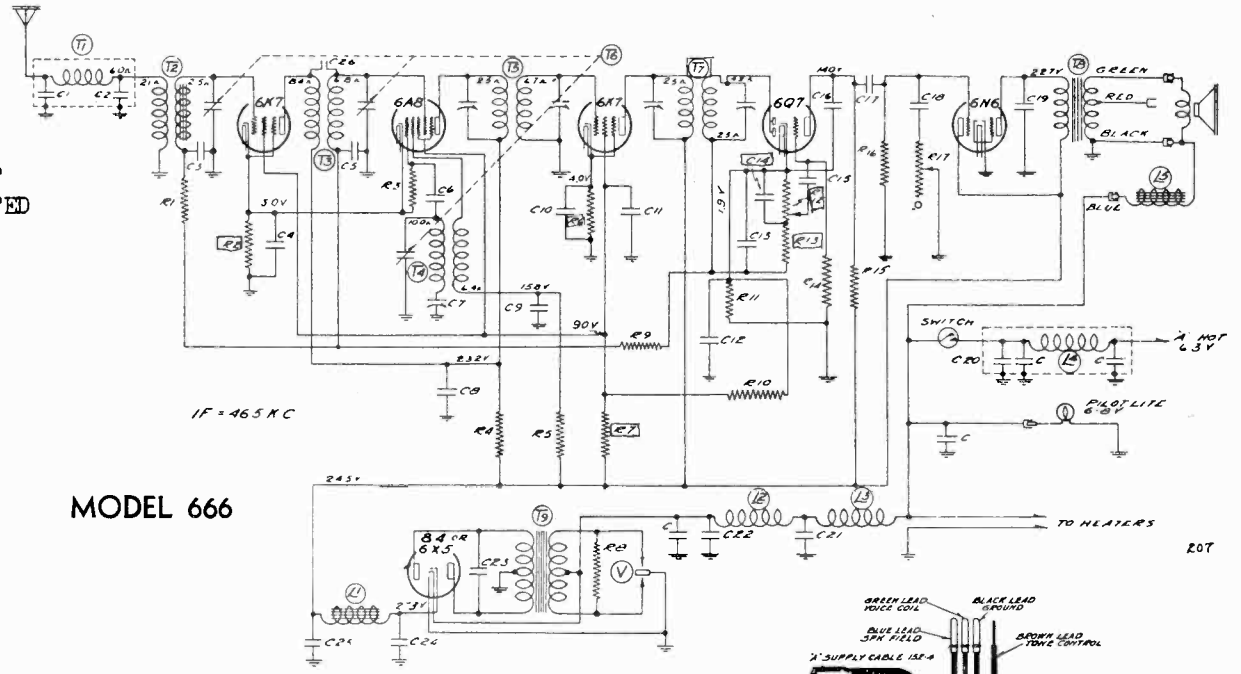
(c) With oscillator still connected to 6A8G, readjust output I.F. transformer (108-83B) if necessary.

R.F. ALIGNMENT: (535-1720 K.C.)

1. Unsolder the antenna wire from its terminal on the antenna coil and with gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 50 mmf. condenser to the antenna terminal on the antenna coil and chassis ground and make the following adjustments:

NOTE:- IN RUN 2 CERTAIN PARTS HAVE BEEN SUBSTITUTED WHICH DIFFER FROM THOSE OF THE FIRST RUN. THESE CHANGES ARE INDICATED BY THE BOXED NUMBERS ON THE SCHEMATIC AND IN THE PARTS LIST BELOW.

R2	130-79	400 Ohm - ½ Watt - 10% - 10 Volt - Carbon IRC
R6	130-101	600 Ohm - ½ Watt - 10% - 10 Volt - Carbon
R7	130-116	15M Ohm - 1.5 Watt - 10% - 100 Volt - Carbon
R12	101-41	500M Ohm - Volume Control and Switch
R13	130-94	50M Ohm - ½ Watt - 10% -10 Volt - Carbon
C.14	129-60	.00015 Mica - MT - "O" 2110%
T7	108-70	Output I.F. Coil—465 Kc.



No.	Part No.	Description
		RESISTORS
R1	130-20	100M Ohm - ½ Watt 20% - 50 Volt - Carbon
*R2	130-99	300 Ohm - ½ Watt - 20% - 10 Volt - Carbon
R3	130-94	50M Ohm - ½ Watt - 10% - 10 Volt - Carbon
R4	130-98	1500 Ohm - ½ Watt 20% - 25 Volt - Carbon
R5	130-42	20M Ohm - ½ Watt - 20% - 100 Volt - Carbon
*R6	130-70	500 Ohm - ½ Watt - 10% - 10 Volt - Carbon
*R7	130-95	12M Ohm - 1.2 Watt - 10% - 100 Volt - Carbon
R8	130-97	200 Ohm - ½ Watt - 10% - 10 Volt - Carbon
R9	130-3	500M Ohm - ½ Watt 20% - 100 Volt - Carbon
R10	130-108	40M Ohm - ½ Watt - 10% - 100 Volt - Carbon
R11	130-107	800 Ohm - ½ Watt - 10% - 10 Volt - Carbon
*R12	101-42	50M Ohm - Volume Control and Switch
*R13	130-22	5M Ohm - ½ Watt - 20% -10 Volt - Carbon
R14	130-68	1 Meg Ohm - ½ Watt - 10% - 20 Volt - Carbon
R15	130-9	200M Ohm - ½ Watt - 20% - 20 Volt - Carbon
R16	130-3	500M Ohm - ½ Watt - 20% - 100 Volt - Carbon
R17	101-45	1 Meg Ohm - Tone Control

		CONDENSERS
C		Spark Plate
C1	129-3	.00002 Mica - "O" - 20%
C2	129-49	.00009 Mica - "O" - 5%
C3	116-18	.05 x 200 Volt
C4	116-18	.25 x 200 Volt
C5	116-17	.05 x 200 Volt
C6	129-21	.0002 Mica - MT - "O" - 20%
C7	124-17	Single Padder J-4-S
C8	116-17	.1 x 400 Volt
C9	116-18	.1 x 400 Volt
C10	116-17	.1 x 200 Volt
C11	116-17	.1 x 200 Volt
C12	116-16	.05 x 200 Volt
C13	129-5	.0001 Mica - MT - "O" - 20%
*C14	129-2	.0005 Mica - MT - "O" - 20%
C15	116-18	.02 x 200 Volt
C16	129-5	.0001 Mica - MT - "O" - 20%
C17	116-16	.05 x 400 Volt
C18	100-37	.003 x 600 Volt - 10%
C19	116-16	.01 x 800 Volt
C20	100-35	.5 x 200 Volt - 50% - 10%
C21	100-35	.5 x 200 Volt - 50% - 10%
C22	100-35	.5 x 200 Volt - 50% - 10%
C23	100-36	.01 x 1400 Volt - 10%
C24	119-21	8.0 mfd. Lytic Cond. 350 Working Volts
C25	119-21	4.0 mfd. Lytic Cond. 350 Working Volts
C26		5.0 mmf. Gimmick

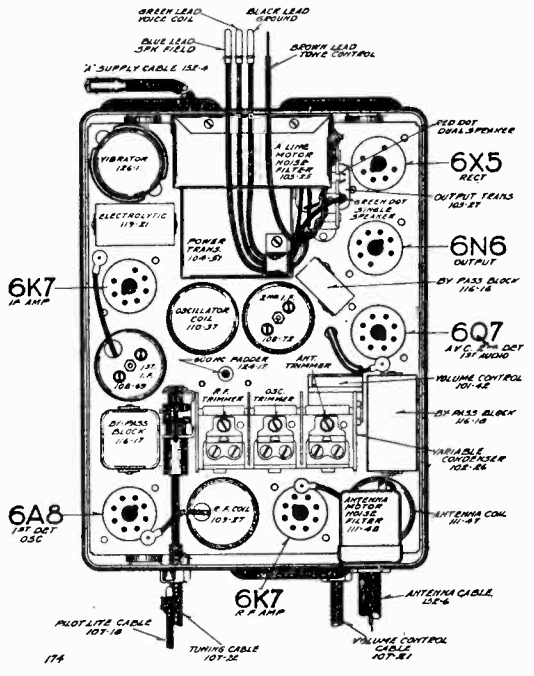
		PARTS
T1	111-48	Antenna Filter Coil Assembly
T2	111-47	Antenna Coil Assembly
T3	109-27	R.F. Coil Assembly
T4	110-37	Oscillator Coil Assembly
T5	108-69	Input I.F. Coil—465 Kc.
T6	102-26	Three Gang Variable Condenser
*T7	108-72	Output I.F. Coil—465 Kc.
T8	105-27	Output Transformer
T9	104-51	Power Transformer
L1	105-23	Filter Choke
L2	105-19	"A" Choke
L3	105-24	"A" Choke
L4	105-26	"A" Choke
L5	114-34	5¼" Speaker (Field Resistance—4 Ohms)
V	126-1	Vibrator

C3, C4, C9, C15, in one unit—part No. 116-18.

C5, C8, C10, C11, in one unit—part No. 116-17.

C12, C17, C19, in one unit—part No. 116-16.

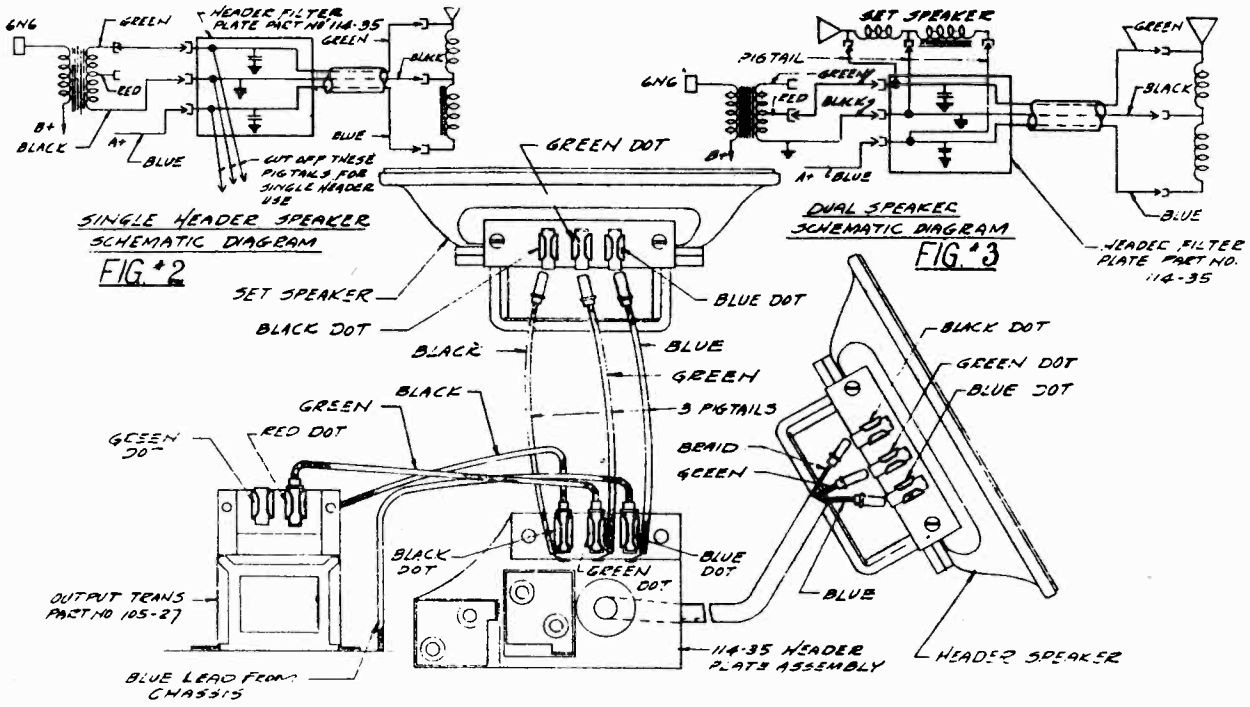
C24, C25, in one unit—part No. 119-21.



MODEL 666, Runs 1,2 — Alignment

Speaker Connections

GOODYEAR TIRE & RUBBER CO., INC.



NO SPARK PLUG SUPPRESSORS ARE REQUIRED

DESCRIPTION:

Model No. 666 is a six-tube superheterodyne receiver having a tuning range of 530 K.C. to 1550 K.C., operates from a 6.0 volt storage battery and uses the automotive type 6.3 volt tubes. The "B" supply is obtained from a vibrator with a tube rectifier.

The I.F. frequency used is 465 K.C., the R.F. end of the receiver consisting of a high gain iron core antenna coil which gives high signal to noise ratio and an R.F. stage especially designed to give high image rejection and high I.F. attenuation. The I.F. transformers are designed to give high gain and selectivity and yet to have a broad nose for ease of tuning and hi-fidelity response. They are of the air core type and wound with solid wire to give *minimum* drift and variation of gain due to climatic changes.

The receiver is so designed that it may be used as either a single or two unit installation. Taps are provided on the output transformer to a pin jack terminal board, a red dot distinguishing dual speaker tap and green dot for single speaker operation.

For complete details see illustration and Header speaker data chart.

Dash kits for the remote control head are available for 1936 cars drilled for dash plates.

This receiver has been carefully designed to facilitate servicing, the top and bottom covers are both removable and are fastened in place by spring clips, self tapping screws and trimount buttons.

All adjustments are accessible and any part replaceable without removing the chassis from the case.

TUBE COMPLEMENT

1—Type No. 6K7—Remote Cut-off Pentode as an R.F. Amplifier
1—Type No. 6A8—Pentagrid Converter (composite first detector and oscillator)
1—Type No. 6K7—Remote Cut-off Pentode as an I.F. Amplifier (465 K.C.)
1—Type No. 6Q7—Duplex Diode Triode Second Detector, A.V.C. and First Audio
1—Type No. 6N6—Twin Triode Output Amplifier
1—Type No. 6X5—High Vacuum Rectifier

The tube complement consists of the latest "Metal-Glass" tubes which are interchangeable with metal tubes.

Cars with floating power must have the motor bonded to the bulkhead and again to the frame to provide a direct path for the high frequency interference developed in the ignition system. ⅝" copper braid will be necessary, SMALL DIAMETER WIRE WILL NOT DO. Bond flexible shaft leads, such as free wheeling, choke wires, etc., which pick up motor noise and reradiate it into the car. Free wheeling cables should be grounded at the point at which they go through the fire wall of the car. In extreme cases it has been found necessary to ground the steering column.

I.F. ALIGNMENT

1. With variable condenser in its minimum capacity position (plates entirely out of mesh) and with volume control full on, connect test oscillator set at 465 K.C. in series with I.F. dummy antenna, to grid of 6K7 I.F. tube.
2. Adjust trimmer condensers of output I.F. transformer No. 108-72 to resonance with oscillator.
3. Move test oscillator connection to grid of 6A8 tube and adjust trimmer condensers of input I.F. transformer No. 108-69 to resonance with oscillator. See top view for location of these transformers. There are two adjustments on each and they are accessible from the top of the transformer shield and should be adjusted with an insulated screw driver.

BROADCAST ALIGNMENT

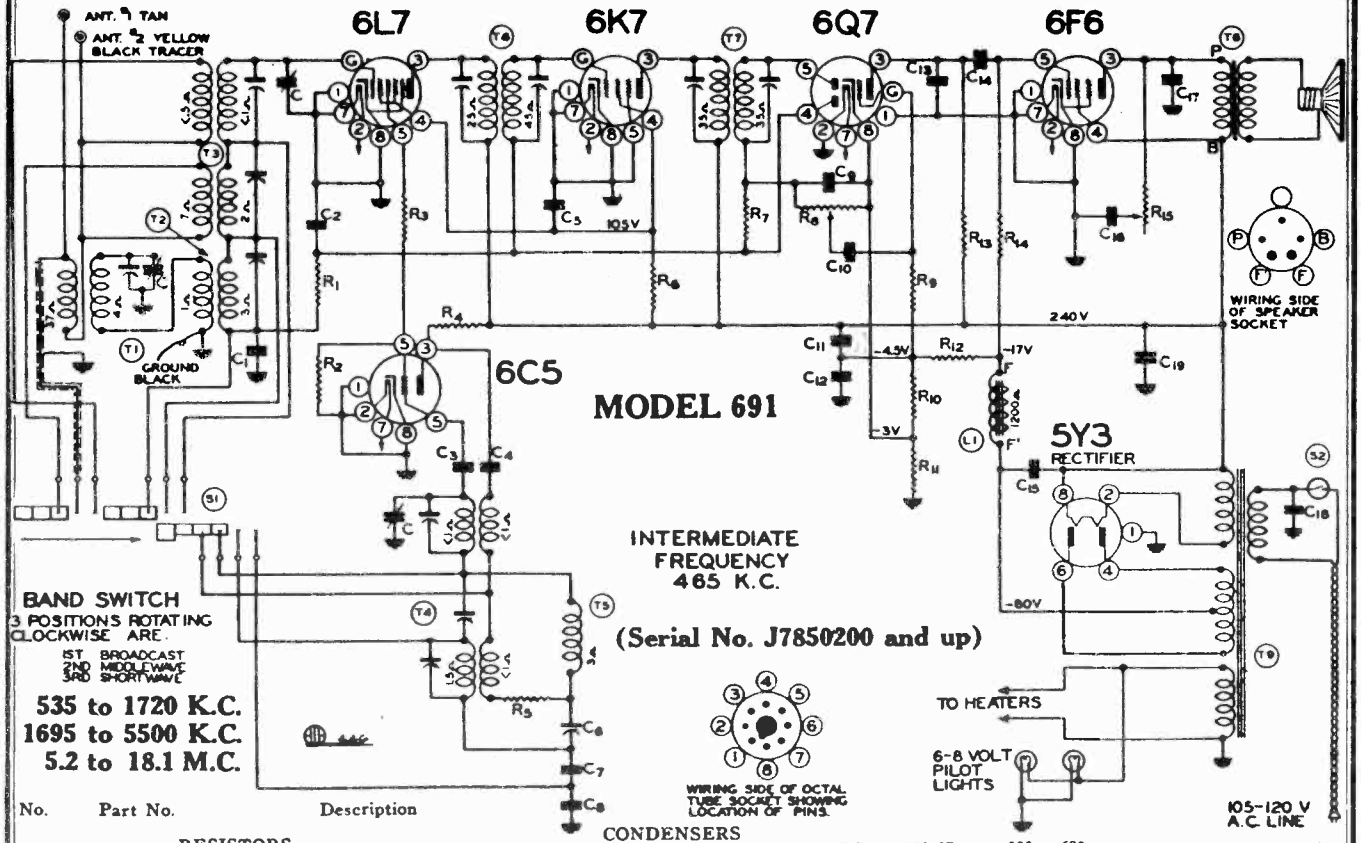
1. With variable condenser in its minimum capacity position, connect test oscillator set at 1550 K.C. in series with broadcast dummy to the antenna lead of receiver.
2. Adjust oscillator trimmer of variable condenser to resonance. (This adjustment is on the middle section of the three-gang condenser—see top view).
3. Shift test oscillator to 1400 K.C. and pick up signal by rotating condenser and adjust R.F. and antenna trimmers to resonance (see top view).
4. Re-set test oscillator to 600 K.C. and rotate variable condenser to 600 KC. Adjust series pad rocking gang condenser to and fro at the same time adjusting series pad for maximum gain. This adjustment is accessible from the top of chassis (see top view.
5. Go back and check 1400 K.C. If adjustment is made here, check 600 K.C. again.
6. Check for sensitivity at 1000 K.C. by setting test oscillator to this frequency and picking up the signal by rotating variable condenser. Under no circumstances bend plates of variable condenser sections to correct tracking.

Make certain that the instrument panel has a ground connection to the frame of the car.

NOTE—Where ignition coils are mounted in motor compartments a .5 mfd cond (148-1 or 148-3) connected between primary coil terminal and receiver mounting bolt will often reduce motor noise.

GOODYEAR TIRE & RUBBER CO., INC.

MODEL 691
Schematic, Voltage
Sockot, Trimmers



No.	Part No.	Description
		RESISTORS
R1	130-103	100M ohm - 1/3 w.
R2	130-12	50M ohm - 1/3 w.
R3	130-105	150 ohm - 1/3 w.
R4	130-77	10M ohm - 1 watt
R5	130-27	50 ohm - 1/3 w.
R6	130-34	19M ohm - 1 watt
R7	130-4	3 meg - 1/3 w.
R8	101-93	1 meg volume control
R9	130-4	3 meg - 1/3 w.
R10	106-26	32 ohm - resistor strip
R11	106-26	52 ohm - resistor strip
R12	106-26	220 ohm - resistor strip
R13	130-103	100M ohm - 1/3 w.
R14	130-102	500M ohm - 1/3 w.
R15	101-92	50M ohm - tone control
		R10, R11 and R12 in same unit
		CONDENSERS
C	102-60	3 gang variable
C1	100-22	.05 x 200
C2	100-26	.02 x 400
C3	129-39	.00005 Mica
C4	100-37	.003 x 600
C5	100-1	.1 x 400
C6	124-40	.000715 W.C. Series Pad
C7	129-55	.0034 Mica
C8	129-54	.003 Mica
C9	129-5	.0001 Mica
C10	100-26	.02 x 400
C11	119-45	8 mfd. - 400 w. v. lytic
C12	100-20	.1 x 200
C13	129-2	.0005 Mica
C14	100-11	.01 x 400
C15	119-45	8 mfd. 400 w. v. lytic
C16	100-65	.015 x 600
C17	100-37	.003 x 600
C18	100-61	.02 x 600
C19	100-11	.01 x 400
		C11 and C15 in same unit
		PARTS
T1	111-51	Preselector Coil
T2	111-49	B. C. Antenna Coil Complete
T3	111-50	S.W. M.W. Antenna Coil complete
T4	110-39	S.W. M.W. Oscillator Coil complete
T5	110-38	B.C. Oscillator Coil complete
T6	108-109	Input I.F. Coil complete 465 kc.
T7	108-110	Output I.F. Coil complete 465 kc.
T8	114-85B	6" dynamic Speaker
T9	104-106	Power Transformer
L1		Speaker field 1200 ohm
S1	125-40	Wave band switch
S2		Off-On Switch on Volume Control

Mica condensers are coded with an additional dot indicating tolerance:

Tolerance percent	Color of Dot
2½ %	White
5%	Green
10%	Blue
15%	Yellow
20%	Red
More Than 20%	None

The power consumption of this receiver is 75 watts.

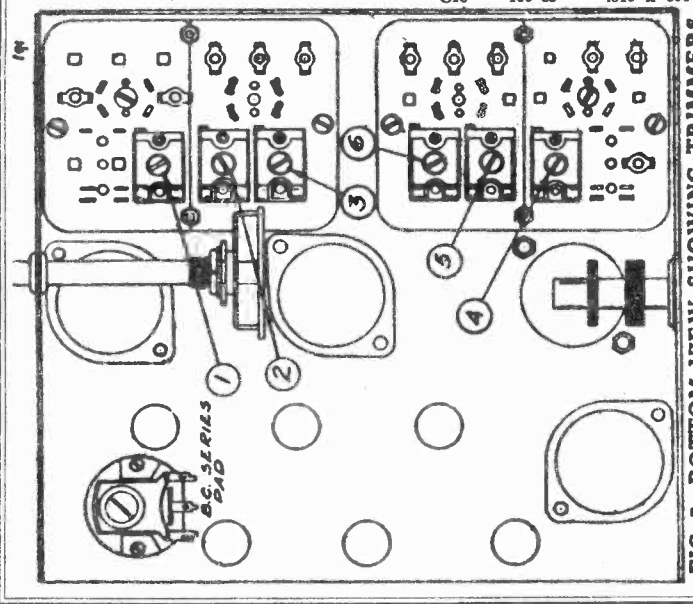
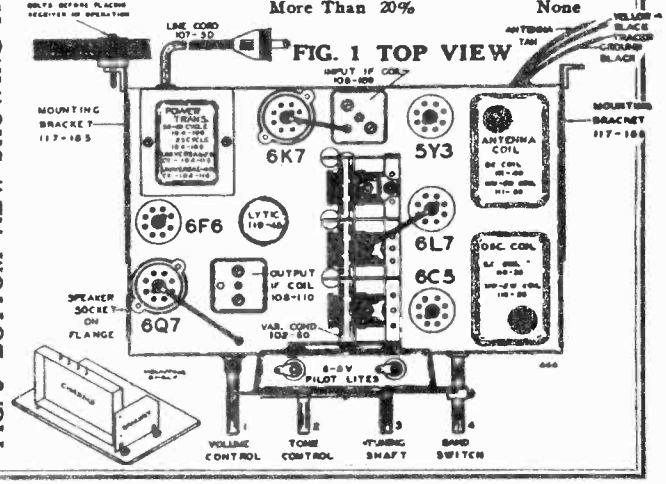


FIG. 3—BOTTOM VIEW SHOWING TRIMMERS



MODEL 691 (Serial No. J7850200 and up)

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AERIAL AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

All voltages are to be measured with 115 volts on the primary of the power transformer.

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

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

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

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

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-110 Output I.F. Transformer
Part No. 108-109 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-110) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap of 6L7 and adjust input I.F. transformer (No. 108-109) to re-

BROADCAST BAND ALIGNMENT:
535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance (adjustment number 1; see bottom view of coil assembly. Fig. 3.)
   (b) Re-set external oscillator to 1550 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer (Adjustment number 4) to resonance; also adjust preselector trimmer which is mounted on the top of the rear section of the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of this adjustment.)
   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3.)
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1000 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**

SHORT WAVE BAND ALIGNMENT:
5.2 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator (Adjustment number 3) and short wave antenna (Adjustment number 6) to resonance.
   (b) Re-set external oscillator to 6 megacycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 18.1 megacycles and 5.2 megacycles for band coverage.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. An example of this is an image of a fundamental 17 megacycle signal appears near 16.1 megacycles.

MIDDLE WAVE BAND ALIGNMENT:
1695 to 5500 Kilocycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5000 kilocycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments.
   (a) Move dial pointer to 5000 kilocycles and adjust middle wave oscillator (Adjustment number 2) and middle wave antenna (Adjustment number 5) to resonance.
   (b) Re-set external oscillator to 1800 kilocycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 5500 kilocycles and 1695 kilocycles for band coverage.
   (d) Recheck broadcast band alignment.

MODEL 787

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on diagram are measured with 119 volts on the primary of the power transformer.

Resistances of coil windings are indicated in ohms on the schematic circuit diagram.

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1," "Dummy 2," and "Dummy 3."

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

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

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

ALIGNING I.F. TRANSFORMERS; (465 K.C.):

Part No. 108-73 Output I.F. Transformer.
Part No. 108-74 Input I.F. Transformer.

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on (the extreme right of its rotation), the band changing switch in the broadcast position (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1," to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-73) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap to 6L7 and adjust input I.F. transformer (No. 108-74) to resonance.
   (c) With oscillator still connected to 6L7, readjust output I.F. transformer (108-73) if necessary.

BROADCAST BAND ALIGNMENT:
535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance (adjustment number 1; see bottom view of coil assembly, Fig. 3).
   (b) Re-set external oscillator to 1550 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer (Adjustment number 4) to resonance; also adjust preselector trimmer which is mounted on the top of the rear section of the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of this adjustment.)
   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3.)
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1000 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**

SHORT WAVE BAND ALIGNMENT:
5.2 to 18.3 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator (Adjustment number 3) and short wave antenna (Adjustment number 6) to resonance.
   (b) Re-set external oscillator to 6 megacycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 18.1 megacycles and 5.3 megacycles for band coverage.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. An example of this is an image of a fundamental 18.3 megacycle signal appears near 17.4 megacycles.

MIDDLE WAVE BAND ALIGNMENT:
1695 to 5500 Kilocycles

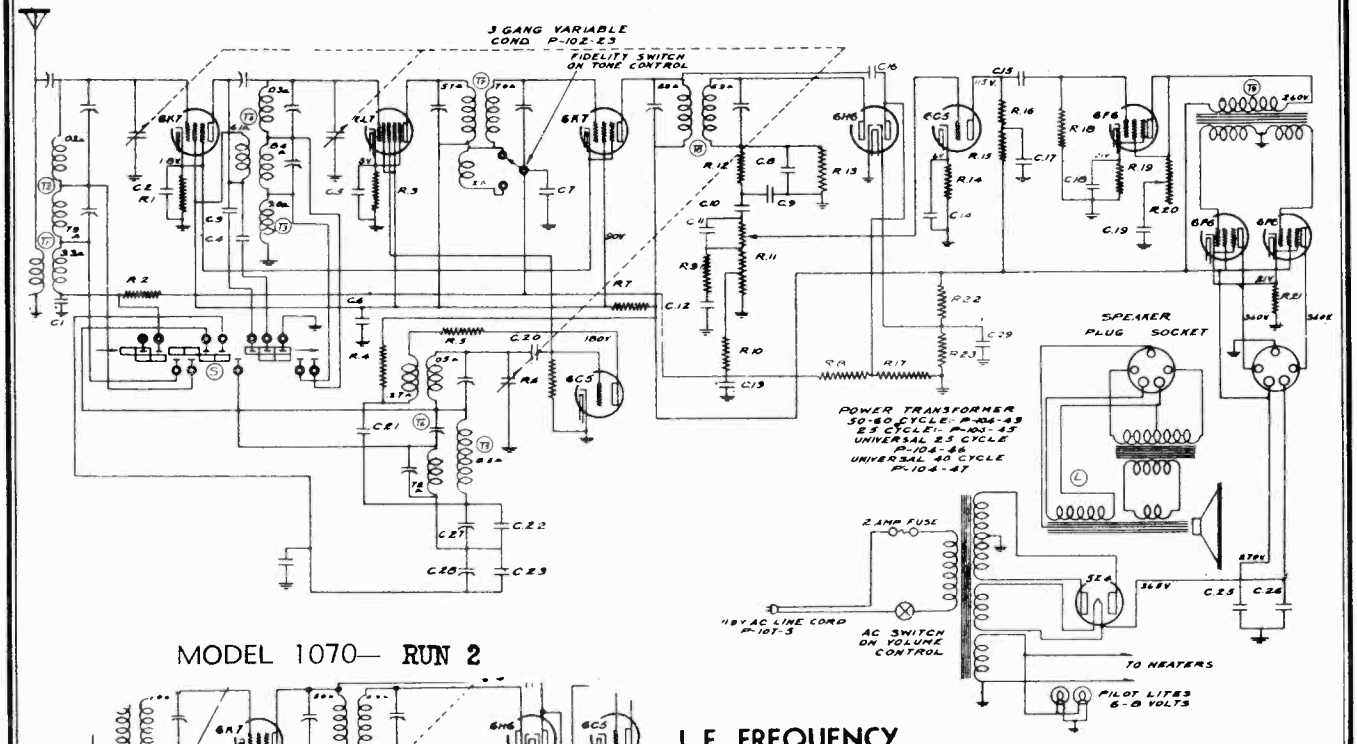
1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5000 kilocycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 5000 kilocycles and adjust middle wave oscillator (Adjustment number 2) and middle wave antenna (Adjustment number 5) to resonance.
   (b) Re-set external oscillator to 1800 kilocycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 5400 kilocycles and 1700 kilocycles for band coverage.

Schematic, Socket Trimmers, Changes

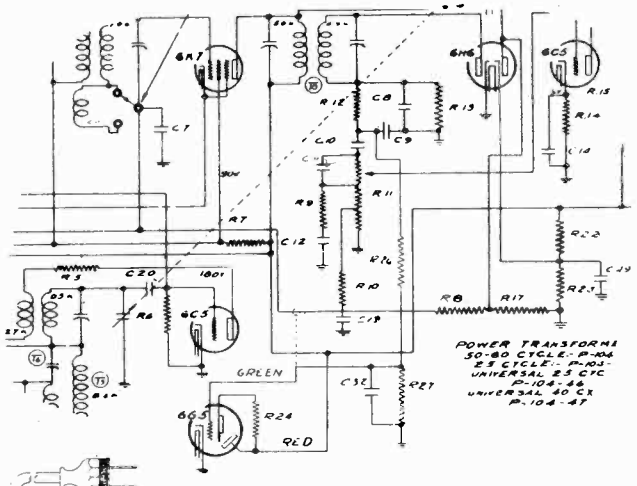
MODEL 1070, Runs 1,2

GOODYEAR TIRE & RUBBER CO., INC.

MODEL 1070— RUN 1

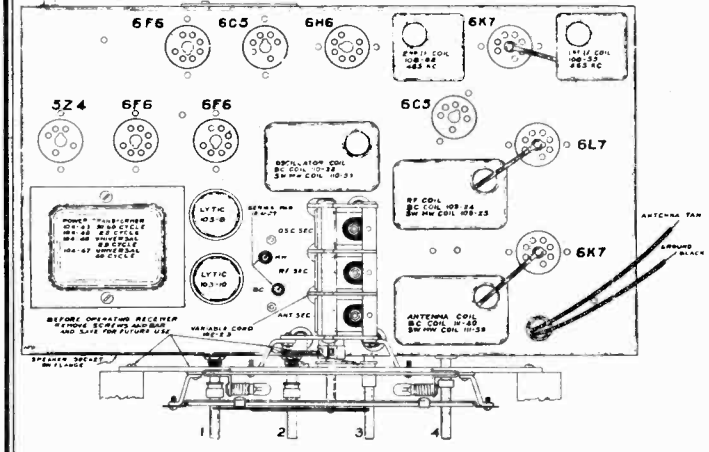


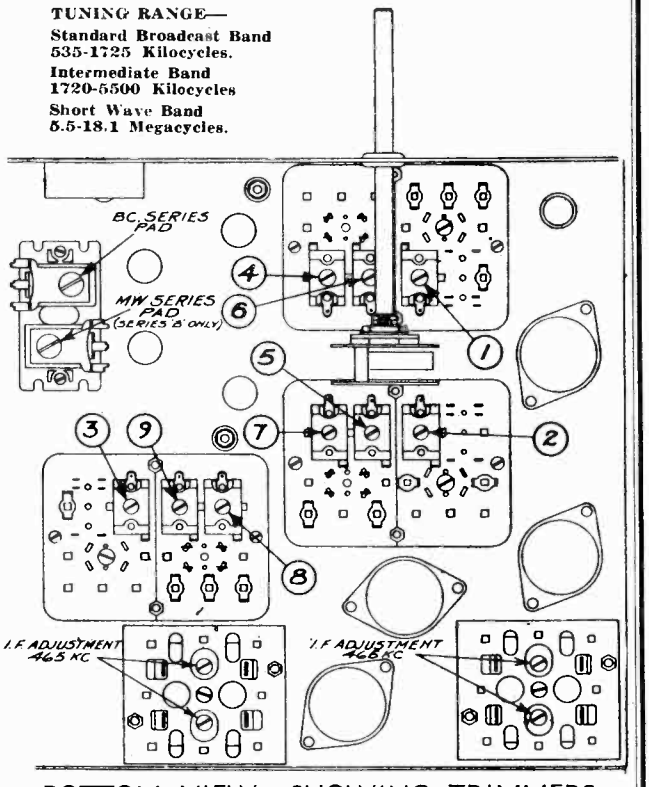
MODEL 1070— RUN 2



I. F. FREQUENCY
465 K. C.

TUNING RANGE—
Standard Broadcast Band
535-1725 Kilocycles.
Intermediate Band
1720-5500 Kilocycles
Short Wave Band
5.5-18.1 Megacycles.





BOTTOM VIEW—SHOWING TRIMMERS

10-Tube A. C. All Wave

3-Band High Fidelity Superheterodyne Receiver with Cathode Ray Tuning Indicator

MODEL 1070 - RUN 2

NOTE:—Operation of Cathode-Ray Tuning Indicator

Due to unsatisfactory indication of the cathode-ray tuning indicator on weak signals in some territories, a change was made in the circuit to correct this condition and still allow the tube to operate correctly on a strong signal.

Referring to the circuit diagram, resistors R26, R27 and condenser C32 were added and connected to the green wire from the cathode-ray tuning indicator as shown.

The dotted line on the circuit diagram indicates the manner in which the green wire for the cathode-ray tuning indicator cable was formerly connected, before resistors R26, R27 and condenser C32 were added.

1—Type 6G5 Cathode ray tuning indicator.

Form 1006 2M 8-36

MODEL 1070 - RUN 1

DESCRIPTION

The tube complement of this chassis is as follows:

1—Type 6K7 Remote cut-off pentode R.F. amplifier
1—Type 6L7 Pentode first detector
1—Type 6C5 Oscillator
1—Type 6K7 Remote cut-off pentode I.F. amplifier (465 K.C.)
1—Type 6H6 Duplex diode second detector and A.V.C.
1—Type 6C5 First audio amplifier
1—Type 6F6 Pentode driver stage
2—Type 6F6 Class AB Output pentodes in push-pull
1—Type 524 High vacuum rectifier

Transformers are available and chassis are sometimes equipped with universal transformers for operation on 40 and 60 cycles and with primary taps for 108, 125, 150, 220 and 250 volts (see instructions) and also sometimes equipped with 25 cycle transformers with 105-115 volt or 220 volt primaries, not universals.

SERVICE NOTES

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagrams of series A.

IN ORDER TO PREVENT SIGNAL FROM ACTING UPON AVC AND AFFECTING ACCURACY OF VOLTAGE MEASUREMENTS, AERIAL AND GROUND LEADS SHOULD BE SHORT CIRCUITED WHILE MAKING MEASUREMENTS.

All voltages are to be measured with 119 volts on the primary of the power transformer.

Resistances of coils and transformer windings are indicated in ohms on schematic circuit diagrams.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

Excessive hum, stuttering, low volume and a reduction in all D.C. voltages is usually caused by a shorted electrolytic condenser, open by-pass condensers frequently cause oscillation and distorted tone.

This chassis is protected against damage from faulty tubes or abnormal line conditions by a fuse in the primary circuit.

If when set is turned on pilot lights do not light, look for a blown fuse.

This fuse is made accessible for replacement by removing fuse cover located on back flange of chassis, replace only with a 2 ampere fuse. If replacement fuse blows out, check tubes, (particularly 5Z4 rectifier) circuit, repair or replace defective tubes or parts.

NEVER ATTEMPT TO REPLACE FUSE WITHOUT FIRST DISCONNECTING POWER.

NEVER REPLACE WITH FUSE OTHER THAN 2 AMPERE RATING.

NOTE: Chassis with serial numbers from 5K194500 to 5K195497 have the fuse mounted on the under-side of the chassis, it is necessary to remove the chassis from the cabinet to replace the fuse.

ALIGNING INSTRUCTIONS
Dummy Antennas

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

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

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

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

Resonance Indicator:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or by means of an adapter between the plate and cathode terminals of the 5 prong speaker socket. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

CAUTION:

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

ALIGNING I.F. TRANSFORMERS (465 K.C.)

Part No. 108-62 Output I.F. Transformer
Part No. 108-65 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the underside of chassis (see bottom view).

1. With volume control full on, (the extreme right of its rotation), the wave changing switch in the broadcast position, (extreme left of its rotation), the tone control on "Bi" part of the sharp position (as much right rotation as possible without operating the Hi Fidelity switch), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6K7 tube, located between the two I.F. transformers, and adjust the output I.F. transformer to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap to 6L7 and adjust input I.F. transformer to resonance.
   (c) With oscillator still connected to 6L7, re-adjust output I.F transformer.

ALIGNMENT PROCEDURE

The following adjustments to be made after the I.F.'s have been aligned as explained above.

BROADCAST BAND ALIGNMENT:

1. With wave changing switch in the broadcast position, extreme left of its rotation, and with external oscillator set at 600 kilocycles and connected in series with "Dummy 2" to the tan antenna and black ground lead, make the following adjustments:
   (a) Adjust broadcast series pad to resonance with oscillator. Keep set in tune with oscillator by slowly rocking to and fro the variable condenser until maximum output is obtained. Note: This adjustment is accessible from the top of the chassis and is located between the variable condenser and the electrolytic condenser. See top view.
   (b) Re-set external oscillator to 1400 K.C., move dial/pointer to 1400 K.C. and adjust oscillator (adjustment number 3), R.F. (adjustment number 2) and antenna (adjustment number 1) to resonance. See bottom view for location of these adjustments.
   (c) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

NOTE: IT IS EXTREMELY NECESSARY IN MAKING ALL OF THESE ADJUSTMENTS THAT THE FUNDAMENTAL OSCILLATOR SIGNAL BE TUNED IN AND NOT THE IMAGE FREQUENCY WHICH WILL FALL BELOW THE FUNDAMENTAL.

SHORT WAVE BAND ALIGNMENT:

1. With wave changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator (adjustment number 8), short wave R.F. (adjustment number 7) and short wave antenna (adjustment number 6) to resonance.
   (b) Re-set external oscillator to 6 megacycles and pick up signal by rotating variable condenser and check for sensitivity.

INTERMEDIATE BAND ALIGNMENT:

1. With wave changing switch in the intermediate wave position, center of its rotation, and with external oscillator set at 1800 K.C. and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Rotate variable condenser to approximately 1800 K.C., tune in oscillator signal and adjust M.W. series pad (see top view) to resonance. Slowly rock condenser to and fro while making this adjustment to be sure maximum output is obtained.
   (b) Set external oscillator at 5 M.C., rotate condenser, pick up signal and adjust intermediate wave R.F. (adjustment number 5), intermediate wave antenna (adjustment number 4) and intermediate wave oscillator (adjustment number 9) to resonance.
   (c) Re-check broadcast alignment and if it is found necessary to re-adjust either R.F. or antenna trimmers, repeat the 17 M.C. short wave and 5 M.C. intermediate wave adjustments.

REPAIR PARTS LIST—MODEL 1070—RUN 1
REPAIRS PARTS LIST—MODEL 1070—RUN 2

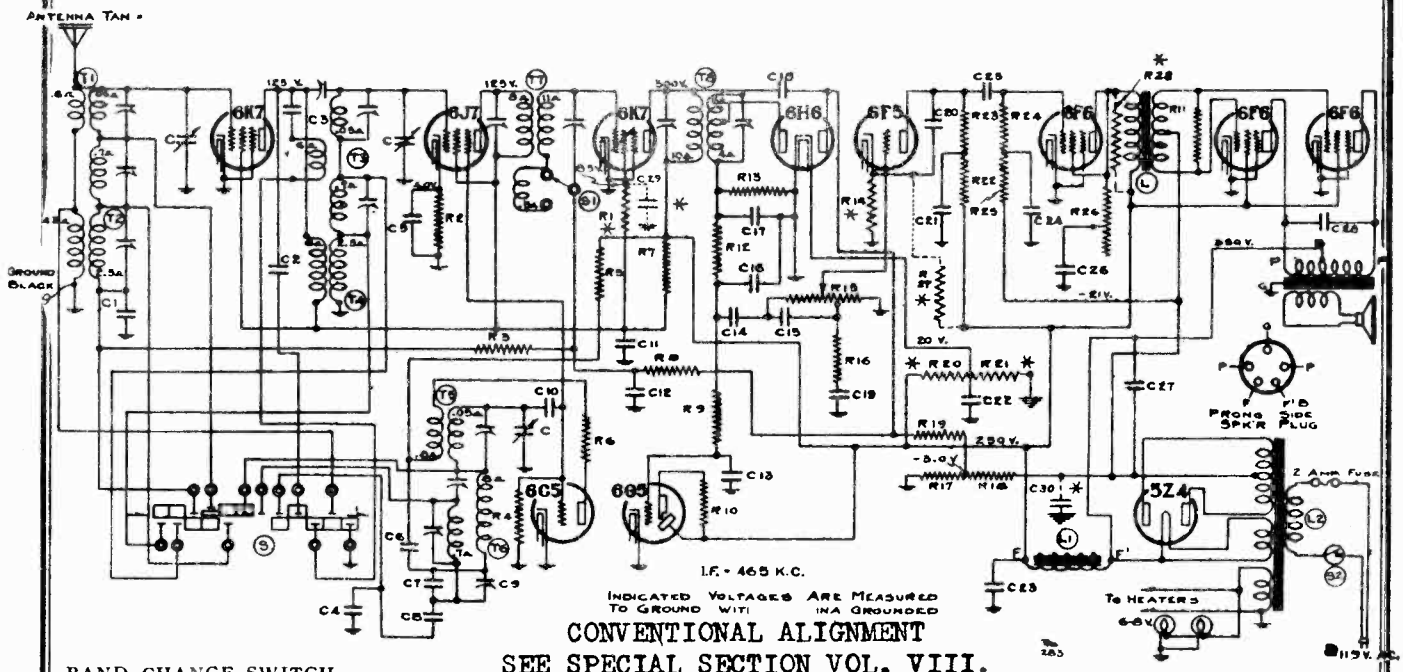
Part No.	DESCRIPTION	Circuit Diagram Reference	List Price Each
	CONDENSERS		
100-1	.1 x 400 Volt Tubular	C17, C19	$0.25
100-6	.25 x 200 Volt Tubular with Bracket	C2	.35
100-7	.006 x 600 Volt Tubular	C29	.25
100-9	.05 x 200 Volt Tubular	C1, C7, C10	.25
100-11	.01 x 400 Volt Tubular	C32	.25
100-13	.05 x 400 Volt Tubular	C15, C21	.25
100-90	.1 x 200 Volt Tubular	C5	.25
100-93	.05 x 200 Volt Tubular	C12, C13	.25
100-94	.25 x 400 Volt Tubular	C6	.35
100-32	.0005 x 1000 Volt Condenser	C31	.25
103-8	14 Mfd. x 400 Volt Electrolytic	C25	1.35
103-10	30 Mfd. x 450 Volt Electrolytic	C26	1.35
119-10	Dual 80 Mfd. x 25 Volt Electrolytic	C14, C18	1.25
119-23	25 mfd. x 25 Volt Electrolytic	C30	.75
122-2	.0005 Mica - Type MT - 10%	C11	.25
122-3	.00002 Mica - Type MT - 20%	C16	.25
122-91	.0002 Mica - Type MT - 20%	C4	.25
122-23	.0014 Mica - Type MW - 5%	C23	.25
122-25	.00094 Mica - Type MT - 5%	C22	.25
122-29	.0035 Mica - Type MW - 2½%	C24	.50
122-30	.0014 Mica - Type MT - 20%	C3	.25
122-36	.00006 Mica - Type MT - 10%	C8, C9	.25
122-52	.000016 Mica - Type MT - 10%	C20	.25
	RESISTORS		
108-56	Metal Clad Resistor	R19, R21	.50
130-8	500M Ohm - ½ Watt - 20% - 100 Volt Carbon	R8, R17, R18	.20
130-9	200M Ohm - ½ Watt - 20% - 30 Volt Carbon	R22	.20
130-11	250M Ohm - ½ Watt - 20% - 60 Volt Carbon	R11	.20
130-30	100M Ohm - ½ Watt - 20% - 60 Volt Carb R2, R12, R13, R16		.20
130-31	20M Ohm - ½ Watt - 20% - 30 Volt Carbon	R23, R25	.20
130-32	5M Ohm - ½ Watt - 20% - 10 Volt Carbon	R9	.20
130-38	10M Ohm - ½ Watt - 20% - 60 Volt Carbon	R14	.20
130-40	1½M Ohm - 1 Watt - 20% - 150 Volt Carbon	R4	.20
130-53	50M Ohm - ½ Watt - 20% - 10 Volt Carbon	R6	.20
130-51	150 Ohm Watt—20%	R5	.20
130-54	500 Ohm - ½ Watt - 20% - 10 Volt Carbon	R3	.20
130-90	100 Ohm - ½ Watt - 20% - 10 Volt Carbon	R1	.20
130-95	2M Ohm - ½ Watt - 20% - 10 Volt Carbon	R10	.20
130-98	10M Ohm - 1 Watt - Wire Wound	R7	.40
130-110	1 Megohm—1/10 Watt—10%—100 Volt Carbon	R24	.20
130-126	3 Megohm—1/10 Watt—20%—100 Volt Carbon	R26	.20
130-127	4 Megohm—1/10 Watt—20%—100 Volt Carbon	R27	.20
	COILS		
108-55	Input I.F. Coil Assembly Complete—Less Can	T7	2.90
108-63	Output I.F. Coil Assembly Complete—Less Can	T8	1.50
108-94	Broadcast R.F. Coil Assembly Complete—Less Can	T3	.50
108-58	Mid-Wave & Short Wave R.F. Coil Assembly Complete—Less Can	T4	1.50
110-82	Broadcast Oscillator Coil Assembly Complete—Less Can	T5	.50
110-83	Mid-Wave & Short Wave Oscillator Coil Assembly Complete—Less Can	T6	1.00
111-89	Mid-Wave & Short Wave Antenna Coil Assembly Complete—	T2	1.00
111-40	Broadcast Antenna Coil Assembly Complete—Less Can	T1	.75
	TRANSFORMERS		
104-43	50/60 Cycle Power Transformer		6.00
104-45	25 Cycle Power Transformer		7.00
104-46	Universal - 25 Cycle Primary		6.00
104-47	Universal - 40 Cycle Primary		7.00
104-50	50/60 Cycle - Special 1385 Volt Power Transformer		7.00
	SOCKETS		
121-4	Five Prong Socket - "Speaker"		.10
121-13	Seven Prong Socket - "6K7"		.15
121-14	Seven Prong Socket - "6F6"		.15
121-16	Five Prong Socket - "5Z4"		.10
121-17	Six Prong Socket - "6C5"		.15
121-18	Seven Prong Socket - "6L7"		.15
121-19	Seven Prong Socket - "6H6"		.15
	SPEAKER		
114-29	Twelve Inch Dynamic (Field 1580 Ohm)	L	10.00
	MISCELLANEOUS		
101-36	Volume Control and Switch (1 Meg. Ohm)	R11	1.35
101-40	Tone Control and Fidelity Switch (5M Ohm)	R20	1.25
103-23	Three Gang Variable Condenser		5.00
107-5	Line Cord and Plug		.30
115-35	Antenna, Oscillator & R. F. Shield		.15
115-36	I.F. Shield		.15
108-17	Audio Transformer	T9	1.85
134-27	J-2-6-D Bertea Dust Pad	C27, C28	.60
135-15	Wave Changing Switch	S	.90
113-47	Fuse Clip Assembly		.15
128-51	Wood Knob with Spring		.15
131-34	2 Amp. Fuse - Type MAG		.10
	CATHODE-RAY TUNING INDICATOR PARTS		
107-23	Cable and Socket Assembly		$0.75
113-158	Metal Oval Escutcheon		.25
117-57	Holder and Clamp		.35
130-110	1 Meg. Ohm—1/10 Watt—10%—100 Volt Carbon		.10
	ASSEMBLIES		
113-133	Belt Take-up Assembly—Including:		.85
	1—No. 117-18 Take-up Arm		
	1—No. 117-91 Take-up Pulley		
	1—No. 117-94A Stud for Above		
	1—No. 117-92A Stud		
	1—No. 131-26 Spring Washer		
	2—No. 184-9 Horse Shoe Washer		
113-134	Switch Assembly—Including:		.65
	2—No. 117-16 Band Indicator Arm		
	1—No. 117-15 Link		
	1—No. 117-14 Elbow		
	1—No. 117-13 Link		
	3—No. 105-5 Rivets		
	2—No. 131-30 Spring Washer		
	1—No. 117-93A Threaded Stud		
	1—No. 117-94A Stud		
	Red Cellulose		
113-135	Volume Indicator Assembly—Including:		.75
	1—No. 113-132 Pointer Disc		
	1—No. 117-96 Bushing		
	1—No. 130-8A Spring Clip		
	1—No. 130-7 Coil Spring		
	No. 130-9 Fish Line		
	1—No. 117-92 Pulley		
	1—No. 184-8 Set Screw		
	Red Cellulose		
	1—No. 184-9 Horse Shoe Washer		
113-136	Tone Indicator Assembly—Including:		.75
	1—No. 113-132 Pointer Disc		
	1—No. 117-96 Bushing		
	1—No. 130-8A Spring Clip		
	1—No. 130-7 Coil Spring		
	No. 130-9 Fish Line		
	1—No. 117-92 Pulley		
	1—No. 184-8 Red Cellulose		
113-137	Dial Plate Assembly—Including:		1.35
	1—No. 117-17 Dial Plate		
	2—No. 117-11 Dial Bracket		
	4—No. 105-4 Rivets		
	2—No. 117-28A Volume & Tone Indicator Studs		
	1—No. 117-19 Bushing for Tuning Shaft		
	No. 184-9 Horse Shoe Washer		
113-138	Switch Arm Assembly—Including:		.85
	1—No. 117-12 Switch Arm		
	1—No. 117-95 Bushing		
	2—No. 183-18 Set Screw		
	DIAL PARTS ONLY		
113-117A	Tuning Shaft		.05
113-118	Metal Oval Escutcheon Only		1.35
113-119	Dial Pointer with No. 183-8 Screw		.20
113-120	Band Spread Pointer Disc		.10
113-122	Oval Glass Crystal Only		.25
113-124	Glass Dial Scale		1.35
113-126	Drive Belt		.20
113-126	Pilot Light Socket		.10
113-127	Pilot Light Socket		.10
113-129	Oval Glass Retaining Ring		.20
107-14	6-8 Volt, T-46 Pilot Light		.10
117-92A	Drive Belt Pulley		.10
117-99	Background Plate (Specify If Blue or Brown Desired)		.35
117-80	Reflector Plate		.25
130-4	Drive Belt Take-up Coil Spring		.04
131-33	Glass Retaining Clips		.025

DIAL PARTS LIST

Trimmers, Alignment

MODELS 1170, 1171
Schematic, Socket

GOODYEAR TIRE & RUBBER CO., INC.



CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII.

BAND CHANGE SWITCH
THREE POSITIONS, ROTATING CLOCKWISE ARE:
1st BROADCAST: 535-1720 K.C.
2nd MIDDLE WAVE: 1690-5300 K.C.
3rd SHORT WAVE: 5.2-18.1 M.C.

TUNING RANGE—

Standard Broadcast Band
535-1720 Kilocycles.

Middle Wave Band
1690-5300 Kilocycles

Short Wave Band
5.2-18.1 Megacycles.

Part No.	Description
	RESISTORS
*R1 130-76	30M Ohm—½ Watt—20%—Carbon
R2 130-129	2500 Ohm—½ Watt—10%—Carbon
R3 130-20	100M Ohm—½ Watt—20%—Carbon
R4 130-12	50M Ohm—½ Watt—20%—Carbon
R5 130-77	10M Ohm—1 Watt—20%—Carbon
R6 130-60	100 Ohm—½ Watt—20%—Carbon
R7 130-88	10M Ohm—2 Watt—20%—Wire Wound
R8 130-19	1 meg Ohm—½ Watt—20%—Carbon
R9 130-4	3 meg Ohm—½ Watt—20%—Carbon
R10 130-110	1 meg Ohm—1/10 Watt—10%—Carbon
R11 130-21	20M Ohm—½ Watt—20%—Carbon
R12 130-20	100M Ohm—½ Watt—20%—Carbon
R13 130-20	100M Ohm—½ Watt—20%—Carbon
*R14 130-70	500 Ohm—½ Watt—10%—Carbon
R15 101-47	1 meg Ohm—Volume Control
R16 130-22	5M Ohm—½ Watt—20%—Carbon
R17 106-31	30 Ohm—Muter
R18 106-31	175 Ohm—Muter
R19 130-3	500M Ohm—½ Watt—20%—Carbon
*R20 130-130	100M Ohm—½ Watt—10%—Carbon
*R21 130-82	10M Ohm—½ Watt—10%—Carbon
R22 130-20	100M Ohm—½ Watt—20%—Carbon
R23 130-20	100M Ohm—½ Watt—20%—Carbon
R24 130-45	250M Ohm—½ Watt—20%—Carbon
R25 130-45	250M Ohm—½ Watt—20%—Carbon
R26 101-40	5000 Ohm Tone Control
*R27 130-130	100M Ohm—½ Watt—10%—Carbon
*R28 130-131	20M Ohm—½ Watt—10%—Carbon

NOTE: R17 and R18 in one Unit—No. 106-31.

		CONDENSERS
C1	100-9	.05 x 200 Volt—25%
C2	129-59	.0003 Mica—5%—MT—0
C3	129-39	.00005 Mica—20%—MT—0
C4	129-69	.0023 Mica—2½%—MT—0
C5	100-9	.05 x 200 Volt—25%
C6	100-13	.05 x 400 Volt—25%
C7	129-57	.0005 Mica—5%—MT—0
C8	129-55	.0034 Mica—2½%—MT—0
C9	124-34	200 mmf. Working cap. adjustable Pad
C10	129-31	.000025 Mica—15%—MT—0
C11	100-41	.25 x 400 Volt—20%
C12	100-9	.05 x 200 Volt—25%
C13	100-11	.01 x 400 Volt—25%
C14	100-22	.05 x 200 Volt—25%
C15	129-12	.00025 Mica—20%—MT—0
C16	129-60	.00015 Mica—20%—MT—0
C17	129-60	.00015 Mica—20%—MT—0
C18	129-3	.00002 Mica—20%—MT—0
C19	100-9	.05 x 200 Volt—25%
C20	129-5	.0001 Mica—20%—MT—0
C21	100-20	.1 x 200 Volt—25%
C22	100-19	.006 x 600 Volt—25%
C23	103-8	14 mfd.—400 Volt—Electrolytic
C24	100-20	.1 x 200 Volt—25%
C25	100-13	.05 x 400 Volt—25%
C26	100-45	.1 x 600 Volt—25%
C27	103-10	30 mfd. x 450 Volt—Electrolytic
C28	100-32	.0005 x 1000 Volts—20%
*C29	100-11	.01 x 400 Volts—25%
*C30	100-20	.1 x 200 Volt—25%

		PARTS
C	102-35	One section of three gang condenser
T1	111-54	MW and SW Antenna Coil Assem.
T2	111-55	Broadcast Antenna Coil Assem.
T3	109-29	MW and SW R.F. Coil Assem.
T4	109-30	Broadcast R.F. Coil
T5	110-42	MW and SW Osc. Coil Assem.
T6	110-43	Broadcast Osc. Coil Assem.
T7	108-64	Input I.F. Coil—465 Kc.
T8	108-63	Output I.F. Coil—465 Kc.
L	105-33	Audio Transformer
L1	114-47C	Speaker (Field Resist. 1225 ohm) Hot
L2	104-72	Power Transformer (50-60 Cycle)
S	125-18	Band Switch
S1	101-40	Fidelity Switch on Tone Control
S2	101-47	On-Off Switch on Volume Control

NOTE: Resistors and Condensers which are prefixed with an asterisk (*) on the circuit diagram and parts list were added or the values changed during production to meet certain conditions.

Resistors R1, R27, R28, and Condensers C29, C30 were added to correct certain variances of tube characteristics. Resistors R14, R20, R21 the values were changed. In some chassis the values of these resistors are as follows:

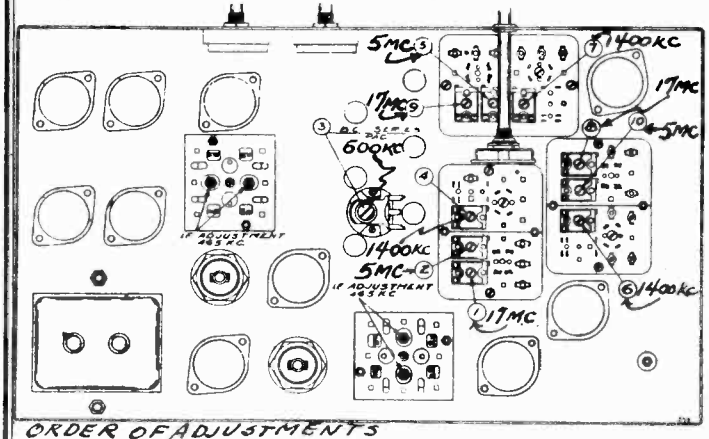
R14—2500 Ohm—½ Watt
R20—200M Ohm..½ Watt
R21—20M Ohm—½ Watt

Present values of these resistors are:

R14—500 Ohm—½ Watt
R20—100M Ohm—½ Watt
R21—10M Ohm—½ Watt

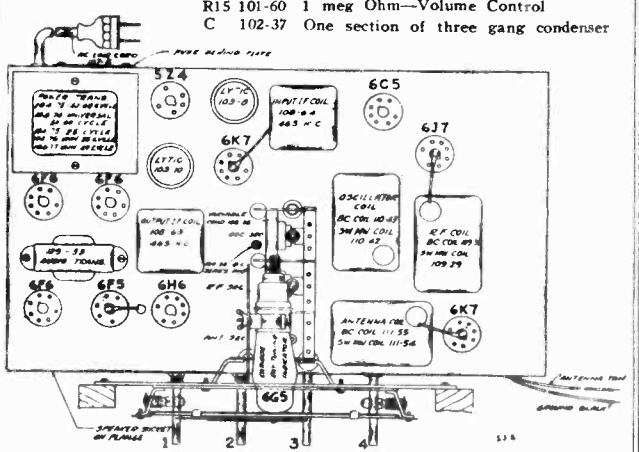
MODEL 1171 USES THESE PART NUMBERS:-

R15 101-60 1 meg Ohm—Volume Control
C 102-37 One section of three gang condenser



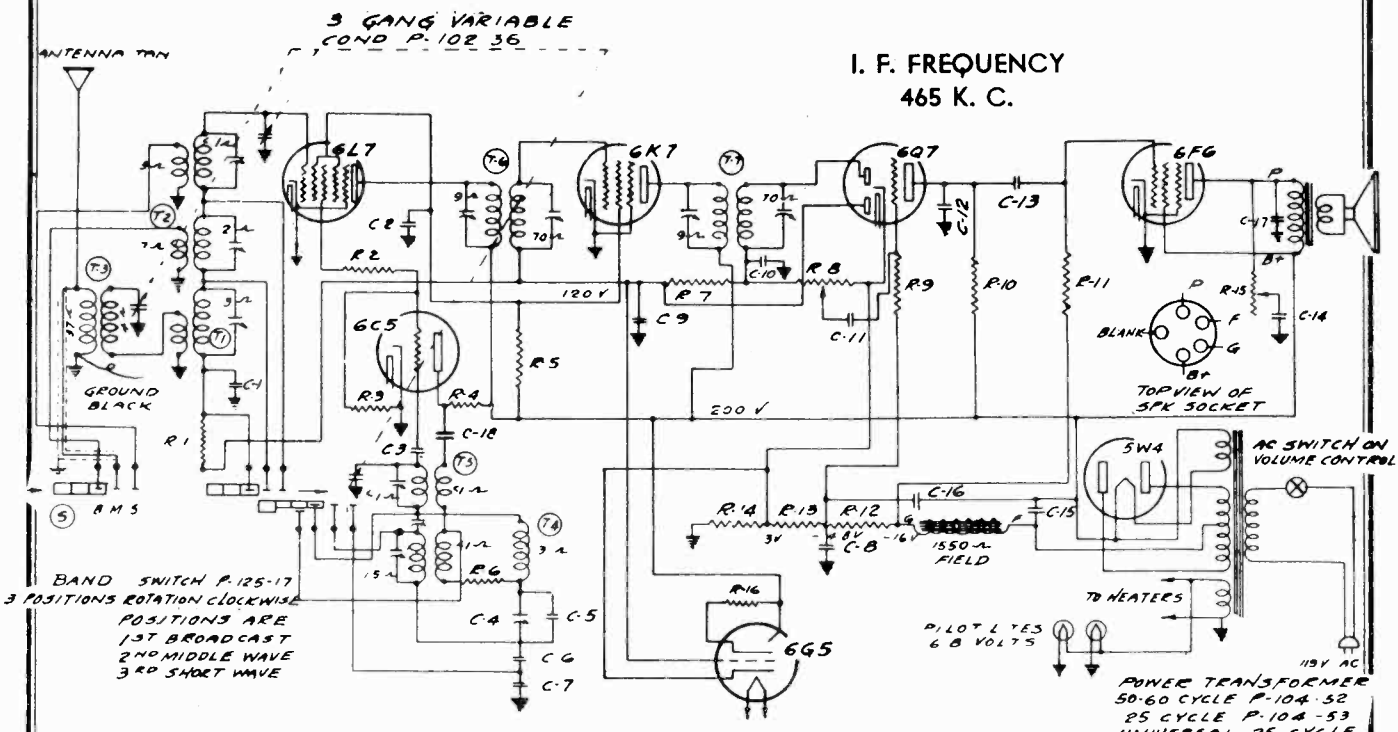
ORDER OF ADJUSTMENTS
I.F., B.C., S.W., MIDDLE BAND

FIG. 1—BOTTOM VIEW SHOWING TRIMMERS



MODEL 787
Schematic, Voltage
Socket, Trimmers

GOODYEAR TIRE & RUBBER CO., INC.



RESISTORS

No.	Part No.	Description
R1	130-20	100M Ohm—½ Watt—20%— 50 Volt Carbon
R2	130-105	150 Ohm—½ Watt—20%— 10 Volt Carbon
R3	130-12	50M Ohm—½ Watt—20%— 10 Volt Carbon
R4	130-104	9M Ohm— 1 Watt—20%—100 Volt Carbon
R5	130-34	19M Ohm— 1 Watt—20%—100 Volt Carbon
R6	130-27	50 Ohm—½ Watt—20%— 3 Volt Carbon
R7	130-19	1 Meg Ohm—½ Watt—20%—100 Volt Carbon
R8	101-46	1 Meg Ohm—Volume Control
R9	130-4	3 Meg Ohm—½ Watt—20%—100 Volt Carbon
R10	130-103	100M Ohm—½ Watt—20%— 50 Volt Carbon
R11	130-102	500M Ohm—½ Watt—10%— 50 Volt Carbon
R12		220 Ohm
R13	106-26	32 Ohm
R14		52 Ohm
R15	101-53	50M Ohm—Tone Control
R16	130-110	1 Meg Ohm—1/10 Watt—10%—100 Volt Carbon

CONDENSERS

C1	100-22	.05x200 Volt—25%
C2	100-1	.1x400 Volt—+50%—10%
C3	129-39	.00005 Mica (MT-O)—20%
C4	124-28	Series Pad (80-225)
C5	129-65	.00055 Mica (MT-O)—5%
C6	129-55	.0034 Mica (MW-W)—2½%
C7	129-54	.003 Mica (MW-W)—2½%
C8	100-20	.1x200 Volt—25%
C9	100-22	.05x200 Volt—25%
C10	129-12	.00025 Mica (MT-O)—20%
C11	100-11	.01x400 Volt—25%
C12	129-2	.0005 Mica (MT-O)—20%
C13	100-11	.01x400 Volt —25%
C14	100-27	.025x600 Volt—25%
C15	103-6	8 Mfd. x 350 Volt Electrolytic
C16	103-7	8 Mfd. x 300 Volt Electrolytic
C17	100-25	.002x600 Volt—20%
C18	100-37	.003x600 Volt—10%

PARTS

T1	111-49	Broadcast Antenna Coil
T2	111-50	S.W.-M.W. Antenna Coil
T3	111-51	B.C.-Pre-Selector Coil Assem.
T4	110-38	B.C. Oscillator Coil
T5	110-39	S.W.-M.W. Oscillator Coil
T6	108-71	Input I.F. - 465 K.C.
T7	108-73	Output I.F. - 465 K.C.
S	125-17	Wave Change Switch

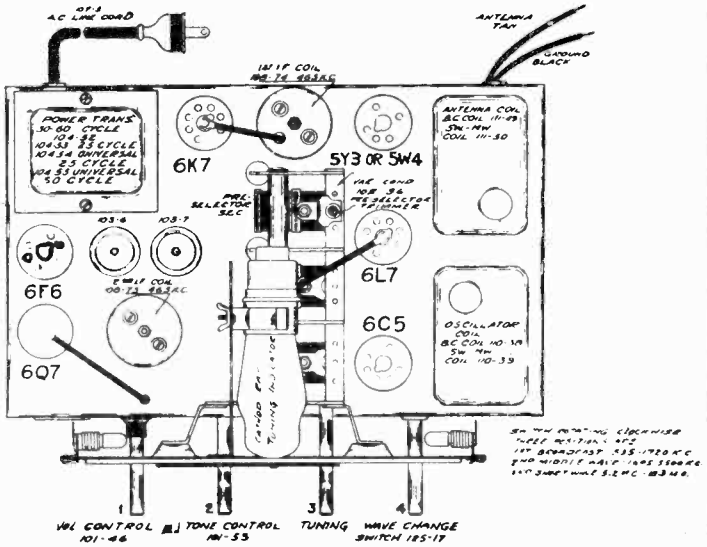
TUNING RANGE—

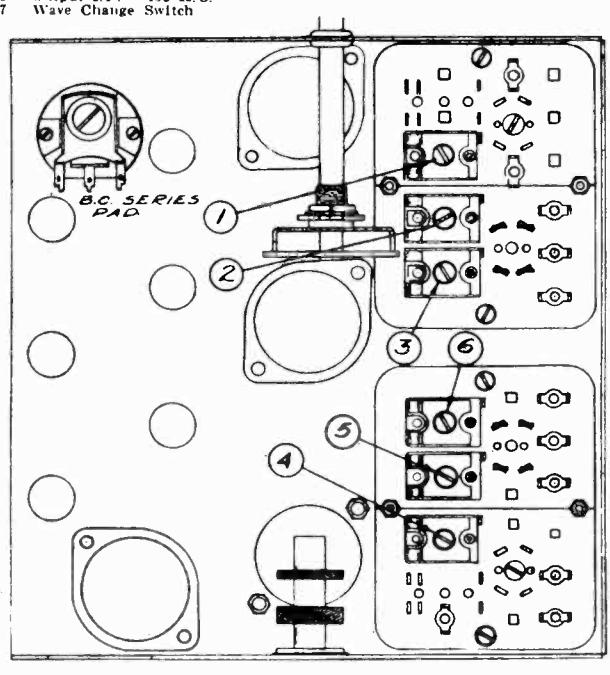
Standard Broadcast Band 535-1720 Kilocycles.

Middle Wave Band 1695-5500 Kilocycles.

Short Wave Band 5.2-18.3 Megacycles.

FOR ALIGNMENT
SEE INDEX

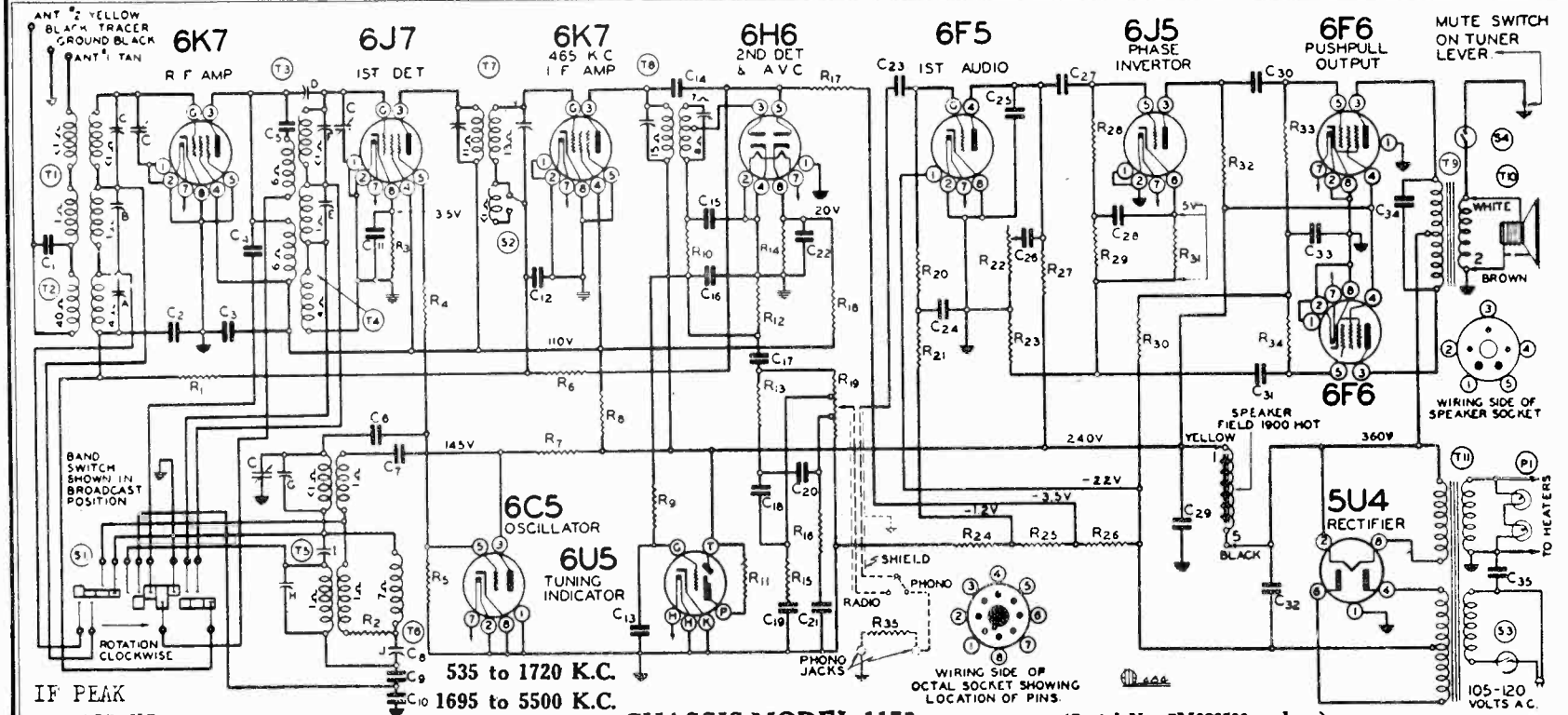




BOTTOM VIEW (Showing Trimmers)

GOODYEAR TIRE & RUBBER CO., INC.

MODEL 1175
Schematic
Voltage



FREQUENCY RANGE 5.35 to 18.1 M.C. CHASSIS MODEL 1175

(Serial No. 7M920500 and up)

RESISTORS

Code	Part No.	Description
R1	130-20	100M ohm - 1/3 w. - 20%
R2	130-166	150 ohm - 1/3 w. - 10%
R3	130-129	2500 ohm - 1/3 w. - 10%
R4	130-60	100 ohm - 1/3 w. - 20%
R5	130-12	50M ohm - 1/3 w. - 20%
R6	130-19	1 megohm - 1/3 w. - 20%
R7	130-133	15M ohm - 1/2 w. - 20%
R8	106-46	2900 ohm - resistor strip
R9	130-4	3 megohm - 1/3 w. - 20%
R10	130-201	25M ohm - 1/10 w. - 20%
R11	130-110	1 megohm - in tuning indicator socket 1/10 w. - 20%
R12	130-186	250M ohm - 1/10 w. - 20%
R13	130-12	50M ohm - 1/3 w. - 20%
R14	106-46	600 ohm - Resistor Strip
R15	130-22	5M ohm - 1/3 w. - 20%
R16	130-85	3M ohm - 1/3 w. - 20%
R17	130-3	500M ohm - 1/3 w. - 20%
R18	106-46	2500 ohm - resistor strip
R19	101-102	1 megohm - volume control
R20	130-37	750M ohm - 1/3 w. - 20%
R21	130-45	250M ohm - 1/3 w. - 20%
R22	101-103	300M ohm - Tone control
R23	130-103	100M ohm - 1/3 w. - 10%
R24	106-47	Resistor Strip - 11 ohm
R25	106-47	22 ohm - Resistor strip
R26	106-47	170 ohm - Resistor strip
R27	130-45	250M ohm - 1/3 w. - 20%
R28	130-37	750M ohm - 1/3 w. - 20%
R29	130-45	250M ohm - 1/3 w. - 20%
R30	130-103	100M ohm - 1/3 w. - 10%
R31	130-82	10M ohm - 1/3 w. - 10%
R32	130-103	100M ohm - 1/3 w. - 10%
R33	130-45	250M ohm - 1/3 w. - 20%
R34	130-45	250M ohm - 1/3 w. - 20%
R8, R14 and R18 in same unit		
R24, R25 and R26 in same unit		
R10 and R12 in output I.F. Can		

CONDENSERS

C	102-66	3 gang variable Condenser
C1	129-40	.0001 - 10% Mica
C2	100-22	.05 x 200 v. - 25%
C3	100-53	.25 x 400 v. - 20%
C4	129-34	.0002 - 5% Mica
C5	129-38	.00005 - 10% Mica
C6	129-38	.00005 - 10% Mica
C7	100-25	.002 x 600 v. - 25%
C8	124-35	.00074 Series Pad
C9	129-92	.0033 - 2-1/2% Compression type condenser
C10	129-90	.0023 - 2-1/2% Compression type condenser
C11	100-33	.1 x 200 v. - 50 - 10%
C12	100-22	.05 x 200 v. - 25%
C13	100-78	.01 x 200 v. - 25%
C14	129-3	.00002 - 20% Mica
C15	129-39	.00005 - 20% Ceramicon
C16	129-38	.00005 - 10% Mica
C17	100-9	.05 x 200 v. - 25%
C18	129-3	.00002 - 20% Mica
C19	100-22	.05 x 200 v. - 25%
C20	129-38	.00005 - 10% Mica
C21	100-19	.006 - 600 v. - 25%
C22	100-78	.01 x 200 v. - 25%
C23	100-11	.01 x 400 v. - 25%
C24	100-9	.05 x 200 v. - 25%
C25	129-40	.0001 - 10% Mica
C26	100-12	.003 x 600 v. - 25%
C27	100-26	.02 x 400 v. - 25%
C28	100-33	.1 x 200 v. - 50 - 10%
C29	103-10	30 mfd. - 450 w.v. lytic
C30	100-13	.05 x 400 v. - 25%
C31	100-80	.05 x 400 v. - 25%
C32	103-10	30 mfd. - 450 w.v. lytic
C33	100-33	.1 x 200 v. - 50 - 10%
C34	100-32	.0005 - 1000 v. - 20%
C35	100-61	.02 x 600 v. - 20% Bakelite

PARTS

T1	111-90	SW - MW - Antenna Coil
T2	111-68	BC - Antenna Coil
T3	109-32B	SW - MW - R.F. Coil
T4	109-33	BC - R.F. Coil
T5	110-53B	SW - MW Oscillator Coil
T6	110-52B	BC - Oscillator Coil
T7	108-113	Input I.F. 465 kc.
T8	108-114	Output I.F. 465 kc.
T9	105-56	Output Transformer
T10	114-107	12" Dynamic Speaker
T11	104-117	Power Transformer 50/60 cycle
S1	125-44	Band Switch
S2		Hi Fi Switch on tone control
S3		Off-on switch on volume control
S4	125-14	Mute Switch
P1	107-94	6-8 v. Pilot lights

Mica condensers are coded with an additional dot indicating tolerance:

Tolerance percent	Color of Dot
2½%	White
5%	Green
10%	Blue
15%	Yellow
20%	Red
More Than 20%	None

For conventional types of antennas connect the tan wire to the antenna lead and the yellow with black tracer and the black wire together to the ground lead.

When a doublet antenna is used connect the tan wire and the yellow with black tracer wire to the doublet antenna and the solid black wire to the ground lead. (See Fig. 1—Top View).

Receivers of this model which are to be used on voltages or frequencies other than 105-115 volts, 60 cycles are so marked. The power consumption of this receiver is 125 watts.

All voltages are to be measured with 115 volts on the primary of the power transformer.

MODEL 1175
Socket, Trimmers
Tuner Data

GOODYEAR TIRE & RUBBER CO., INC.

MODEL 1175

(Serial No. 7M920500 and up)

The tube complement of this chassis consists of the following metal and octal base glass tubes which are interchangeable with metal tubes:

1—Type 6K7 Remote cut-off pentode R.F. amplifier
1—Type 6J7 Pentode first detector
1—Type 6C5 Oscillator
1—Type 6K7 Remote cut-off pentode I.F. amplifier
1—Type 6H6 Duplex diode second detector and A.V.C.
1—Type 6F5 First audio amplifier
1—Type 6J5 Phase Inverter stage
2—Type 6F6 Output pentodes in push-pull
1—Type 5U4 High vacuum rectifier
1—Type 6U5 Cathode-Ray Tuning Indicator.

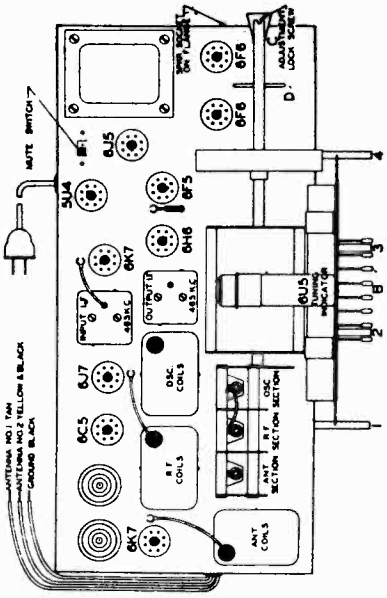


FIG. 1—TOP VIEW

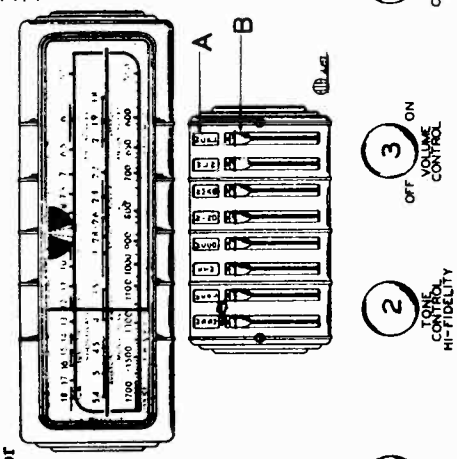


FIG. 2—FRONT VIEW

FIG. 3—BOTTOM VIEW SHOWING TRIMMERS

PROCEDURE FOR SETTING THE AUTOMATIC TUNER LEVERS:

IMPORTANT—READ CAREFULLY BEFORE SETTING THE AUTOMATIC LEVERS:

A mute feature has been incorporated in the automatic tuning mechanism of the Model 1175. The function of this feature is to permit SILENT TUNING from one station to another by means of the automatic tuning levers. When any one of the levers are pressed down, the speaker is automatically disconnected from the radio and NO SIGNAL is heard until the lever is RELEASED.

To facilitate an accurate adjustment of the levers it is desirable to hear the station being tuned in while the lever is being adjusted; therefore a MUTE SWITCH is provided to manually connect or disconnect the silent tuning feature.

Referring to the top view of the radio (Fig. 1 in this manual), THE POSITION OF THE SWITCH (located on the top of the radio chassis alongside the power transformer), IS IMPORTANT.

Set the switch as follows:

WHILE SETTING THE AUTOMATIC LEVERS:
Switch should be snapped to the right (white dot not visible).

AFTER AUTOMATIC LEVERS HAVE BEEN SET:
Switch should be snapped to the left (white dot showing).

There are eight levers on the dial by means of which eight stations may be selected, (See "B", Fig. 2).

Make a list of local stations you tune in regularly; any number up to and including 8.

Punch out from the set of station call letter tabs supplied, the call letters of the stations you have selected.

Above each automatic tuner lever an opening in the escutcheon is provided for inserting the call letter tabs, (See "A" Fig. 2). Any order of grouping may be used, however, it is recommended that the left hand four automatic levers be used for high frequency stations (1750 to 1000 K.C.) and the right hand four automatic levers for low frequency stations (1000 to 540 K.C.).

Insert the call letter tabs in the rectangular openings in the escutcheon above each of the automatic tuner levers. One of the small celluloid tabs supplied should be snapped into place over each of the station call letter tabs.

Press DOWN ALL THE WAY any one of the automatic tuner levers. Holding it down FIRMLY, tune in by means of the tuning knob No. 4 the station indicated on the station call letter tab above this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position), noting the width of the shadow indicated on the screen of the cathode-ray tuning eye. Minimum width on the eye indicates the ideal tuning position (resonance). The station will then be clearest and accurately tuned in. Release the lever.

Press down another automatic tuner lever. Holding it down FIRMLY, carefully tune in the station indicated on the call letter tab above this lever. Release this lever.

Follow this procedure until you have selected all of your favorite stations.

Rotate the tuning knob No. 4 to the right (clockwise) as far as it will turn. Now remove from the right side of the cabinet the metal button, and, with a screw driver inserted through the hole, tighten the locking adjustment screw "C". It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT. If a screw driver is not available, the locking screw can be tightened by reaching in from the back of the cabinet, and, by means of the pin "D" (see Fig. 1), rotate the locking screw shaft to the right (clockwise) until thoroughly tight.

This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Locking screw "C" is loose when radio is shipped from factory).

If you should desire to change any station you selected to another, loosen the locking screw "C" four or five complete turns; select the new station as explained. (Note: If the dial mechanism works hard when setting up a new station for one of the automatic tuner levers, it is due to the locking screw being too tight. Loosen the locking screw "C" until the dial mechanism works freely with the tuner lever pressed down.)

BE SURE TO RETIGHTEN THE LOCKING SCREW; otherwise the stations you have selected will not stay adjusted to the levers.

Snap mute switch to silent tuning position (white dot showing)

GOODYEAR TIRE & RUBBER CO., INC.

MODEL 1175
Alignment
MODEL 01029
Tuner Alignment

MODEL 1175

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1," "Dummy 2," and "Dummy 3."

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

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

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

ALIGNING I.F. TRANSFORMERS (465 K.C.)

Part No. 108-114 Output I.F. Transformer
Part No. 108-113 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view Fig. 1).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), the tone control on "Hi" part of the sharp position (as much right rotation as possible without operating the Hi Fidelity switch), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1," to the control grid cap of the type 6K7 I.F. tube and adjust the output I.F. transformer 108-114 to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap to 6J7 and adjust input I.F. transformer (108-113) to resonance.
   (c) With oscillator still connected to 6J7, re-adjust output I.F. transformer if necessary.

BROADCAST BAND ALIGNMENT:
535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with external oscillator set at 1720 Kilocycles and connected in series with "Dummy 2" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 1720 Kilocycles and adjust broadcast oscillator trimmer (adjustment I) to resonance. See bottom view, Fig. 3.
   (b) Re-set external oscillator to 1400 Kilocycles, move dial pointer to 1400 Kilocycles and adjust broadcast antenna trimmer, (adjustment A) and broadcast R.F. trimmer (adjustment D) to resonance.
   (c) With external oscillator set at 600 K.C. adjust broadcast series pad (adjustment J) to resonance with oscillator. Keep set in tune with oscillator by slowly rocking to and fro the variable condenser until maximum output is obtained.
   (d) Repeat adjustments (a) and (c) until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1000 Kilocycles. UNDER NO CIRCUMSTANCES BEND PLATES OF VARIABLE CONDENSER TO CORRECT TRACKING.

SHORT WAVE BAND ALIGNMENT:
5.35 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 Megacycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 17 Megacycles and adjust short wave oscillator (adjustment G), short wave R.F. (adjustment F) and short wave antenna (adjustment C) to resonance.
   (b) Re-set external oscillator to 6 Megacycles and pick up signal by rotating variable condenser and check for sensitivity.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. As an example of this a fundamental 17 megacycle signal can be tuned in not only at 17 on the dial, but also at approximately 16.1 megacycles.

MIDDLE WAVE ALIGNMENT:
1695 to 5500 Kilocycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5 Megacycles connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Rotate condenser, pick up signal and adjust middle wave oscillator (adjustment H), middle wave R.F. (adjustment E) middle wave antenna (adjustment B) to resonance.
   (b) Re-check broadcast alignment and if it is found necessary; re-adjust either R.F. or antenna trimmers. Repeat the 17 megacycles short wave and 5 megacycles middle wave adjustments.

MODEL 01029 CHASSIS 860

(Serial No. 7L807400 and up)

PROCEDURE FOR SETTING THE AUTOMATIC TUNER LEVERS:

There are eight levers on the dial by means of which eight stations may be selected, (See "B", Fig. 2).

Make a list of local stations you tune in regularly; any number up to and including 8.

Punch out from the set of station call letter tabs supplied, the call letters of the stations you have selected.

Above each automatic tuner lever an opening in the escutcheon is provided for inserting the call letter tabs, (See "A" Fig. 2). Any order of grouping may be used, however, it is recommended that the left hand four automatic levers be used for high frequency stations (1750 to 1000 K.C.) and the right hand four automatic levers for low frequency stations (1000 to 540 K.C.).

Insert the call letter tabs in the rectangular openings in the escutcheon above each of the automatic tuner levers. One of the small celluloid tabs supplied should be snapped into place over each of the station call letter tabs.

Press DOWN ALL THE WAY any one of the automatic tuner levers. Holding it down FIRMLY, tune in by means of the tuning knob (No. 4) the station indicated on the station call letter tab above this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position) noting the width of the shadow indicated on the screen of the cathode-ray tuning eye. Minimum widtn on the eye indicates the ideal tuning position (resonance). The station will then be clearest and accurately tuned in. Release the lever.

Press down another automatic tuner lever. Holding it down FIRMLY, carefully tune in the station indicated on the call letter tab above this lever. Release this lever.

Follow this procedure until you have selected all of your favorite stations.

Rotate the tuning knob (No. 4) to the right (clockwise) as far as it will turn. Now remove from the right side of the cabinet the metal button, and, with a screw driver inserted through the hole, tighten the locking adjustment screw "C". It is VERY IMPORTANT that this locking screw is turned until it is ABSOLUTELY TIGHT. If a screw driver is not available, the locking screw can be tightened by reaching in from the back of the cabinet, and, by means of the pin "D" (see Fig. 1), rotate the locking screw shaft to the right (clockwise) until thoroughly tight.

This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Locking screw "C" is loose when radio is shipped from factory).

If you should desire to change any station you selected to another, loosen the locking screw "C" four or five complete turns; select the new station as explained. (Note: If the dial mechanism works hard when setting up a new station for one of the automatic tuner levers, it is due to the locking screw being too tight. Loosen the locking screw "C" until the dial mechanism works freely with the tuner lever pressed down.)

BE SURE TO RETIGHTEN the LOCKING SCREW; otherwise the stations you have selected will not stay adjusted to the levers.

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

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

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

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

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-106E Output I.F. Transformer
Part No. 108-105D Input I.F. Transformer

These I. F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view, Fig. 1).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-106E) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6K7 to grid cap of 6A8G and adjust input I.F. transformer (No. 108-105D) to resonance.

BROADCAST BAND ALIGNMENT:
540 to 1750 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to tan antenna lead and black ground lead, make following adjustments:
   (a) Set external oscillator to 1750 K.C. and adjust broadcast oscillator trimmer to resonance (adjustment E'; see top view, Fig. 1).
   (b) Re-set external oscillator to 1400 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer (Adjustment A') to resonance; also adjust preselector trimmer which is mounted on the top of the rear section of the three gang variable tuning condenser to resonance. (See top view of chassis, Fig. 1, for location of this adjustment.)
   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad (Adjustment F') to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained.
   (d) Repeat adjustments "a" and "c" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1000 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**

SHORT WAVE BAND ALIGNMENT:
5.5 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator (Adjustment G') and short wave antenna (Adjustment C') to resonance.
   (b) Re-set external oscillator to 6 megacycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-set external oscillator and check set at 18.1 megacycles and 5.5 megacycles for band coverage.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental. An example of this is an image of a fundamental 17 megacycle signal appears near 16.1 megacycles.

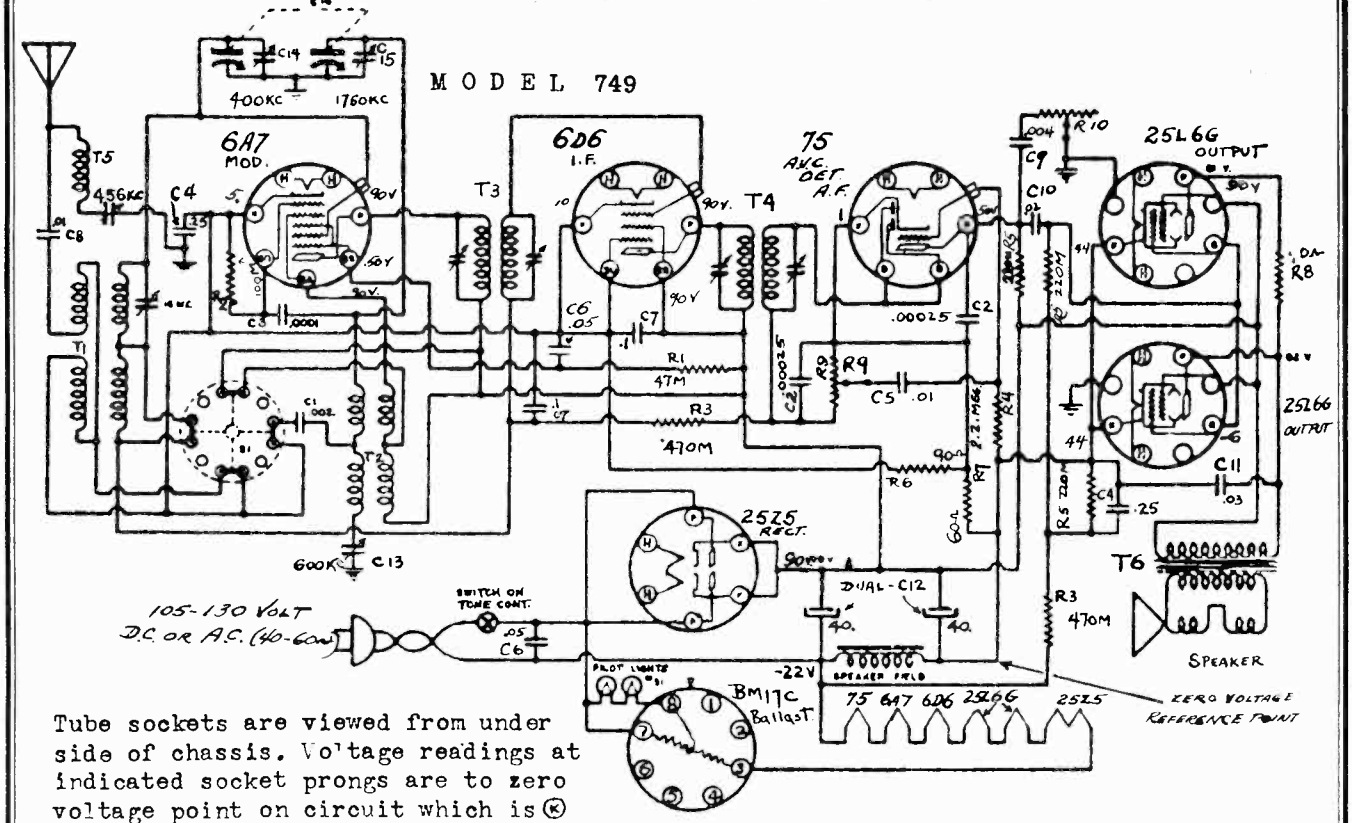
MIDDLE WAVE BAND ALIGNMENT:
1720 to 5000 Kilocycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5000 kilocycles and connected in series with "Dummy 3" to the tan antenna and black ground lead, make the following adjustments:
   (a) Move dial pointer to 5000 kilocycles and adjust middle wave oscillator (Adjustment D') and middle wave antenna (Adjustment B') to resonance.
   (b) Re-set external oscillator to 1900 kilocycles and pick up signal by rotating variable condenser and check sensitivity.
   (c) Re-check broadcast band alignment.

MODEL 749
Schematic, Voltage

GOODYEAR TIRE & RUBBER CO., INC.

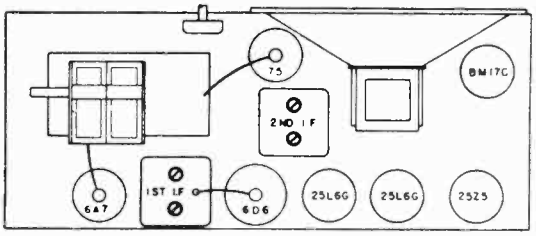
Socket, Trimmers
Tuner



Tube sockets are viewed from under side of chassis. Voltage readings at indicated socket prongs are to zero voltage point on circuit which is Ⓚ on 25L6G tube. Voltages must be measured with no signal. Alignment is to be made at the frequencies shown on the trimmer cordensers.

Figures at cathodes are cathode currents in milliamperes. Capacity values are in microfarads.

Wave trap adjustment at 456 KC. Input is made to provide maximum reduction of signal. Where no voltage reading is shown at socket prongs, it indicates zero voltage or very low reading.



LOCATION OF PARTS ON TOP OF CHASSIS

IF PEAK 456 KC

SETTING PUSH-BUTTONS

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

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

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

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

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

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

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

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

To receive all other stations in the regular manner, push in the Station Selector Knob and turn it to the frequency of the station desired.

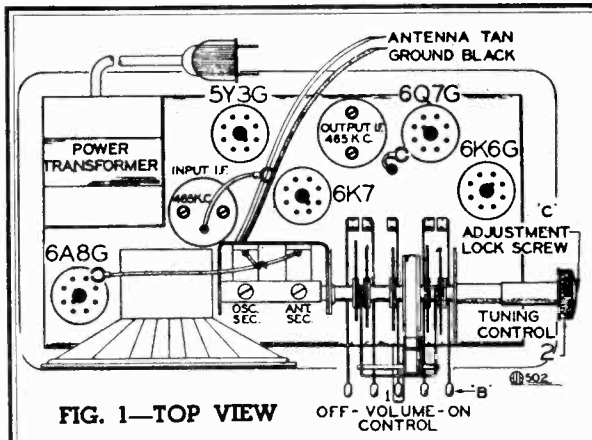
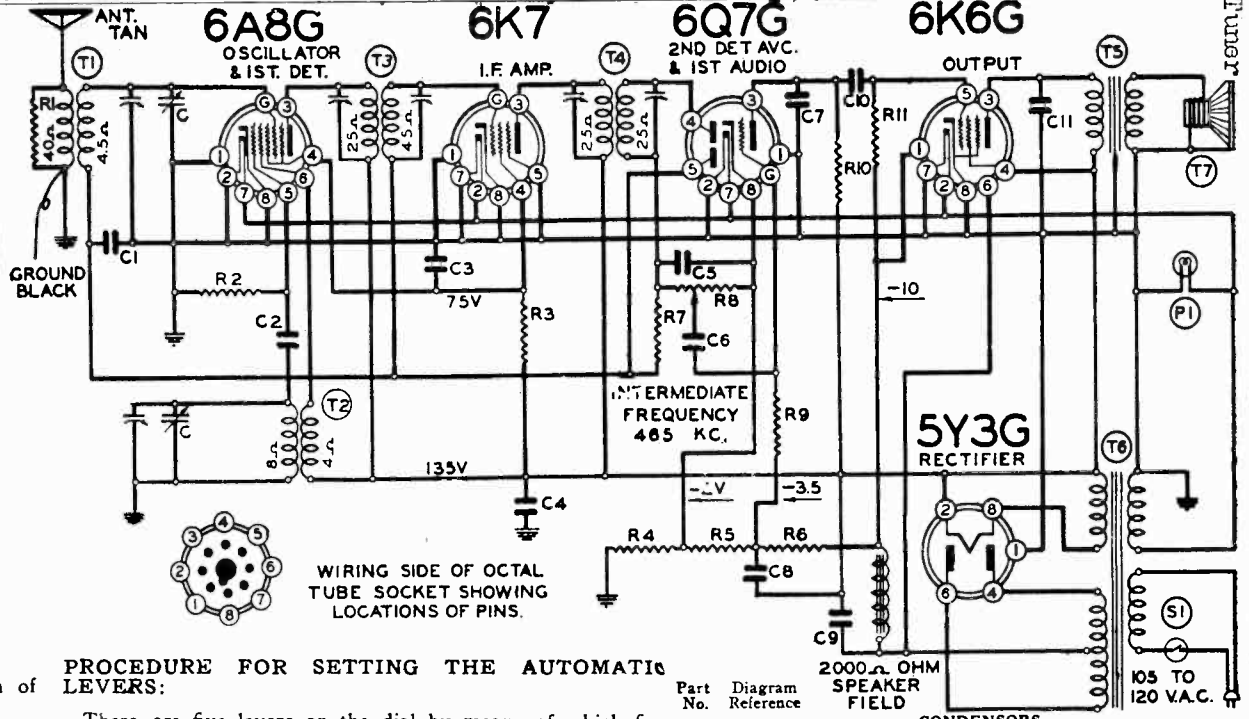


FIG. 1—TOP VIEW



WIRING SIDE OF OCTAL TUBE SOCKET SHOWING LOCATIONS OF PINS.

Mica condensers are coded with an additional dot indicating tolerance.

Color of Dot	Tolerance percent
White	2½%
Green	5%
Blue	10%
Yellow	15%
Red	20%
None	More Than 20%

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No.108-95B Output I.F. Transformer
Part No. 108-96 Input I. F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see Fig. 1).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with .1 mfd. condensor, to the control grid cap of the type 6K7 tube, and adjust the output I.F. transformer (No. 108-95B) to resonance.
   (b) Move oscillator output clip from grid of 6K7 to grid of 6A8G and adjust input I.F. transformer (No. 108-96) to resonance.
   (c) With oscillator still connected to 6A8G, readjust output I.F. transformer (108-95B) if necessary.

1. R.F. ALIGNMENT: (535-1720 K.C.)

1. With the gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 100 mmf. condensor to the antenna lead and chassis ground and make the following adjustments:
   (a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer to resonance. This adjustment is on the top of rear section of variable gang condenser. (See Fig. 1).
   (b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance. (Top of front section of gang condenser).
   (c) Check sensitivity at 600 and 1000 kilocycles.

PROCEDURE FOR SETTING THE AUTOMATIC LEVERS:

There are five levers on the dial by means of which five stations may be selected,

Press DOWN ALL THE WAY any one of the automatic tuner levers. Holding it down FIRMLY, tune in by means of the tuning knob (No. 2) the station indicated on the station call letter tab above this lever. Turn the tuning knob very slowly back and forth (while still holding lever in downward position) until the signal is clearest. The station will then be accurately tuned in. Release the lever.

Press down another automatic tuner lever. Holding it down FIRMLY, carefully tune in the station indicated on the call letter tab above this lever. Release this lever.

Follow this procedure until you have selected all of your favorite stations.

Now hold tuning knob securely with left hand to prevent it from turning, or Rotate the tuning knob (No. 2) to the right (clockwise) as far as it will turn, and with a coin (half dollar), tighter the special locking screw ("C") in the center of the tuning knob, (See Fig. 1).

This screw will lock in place all the stations you have selected on the automatic tuner levers. (Note: Locking screw "C" is loose when radio is shipped from factory).

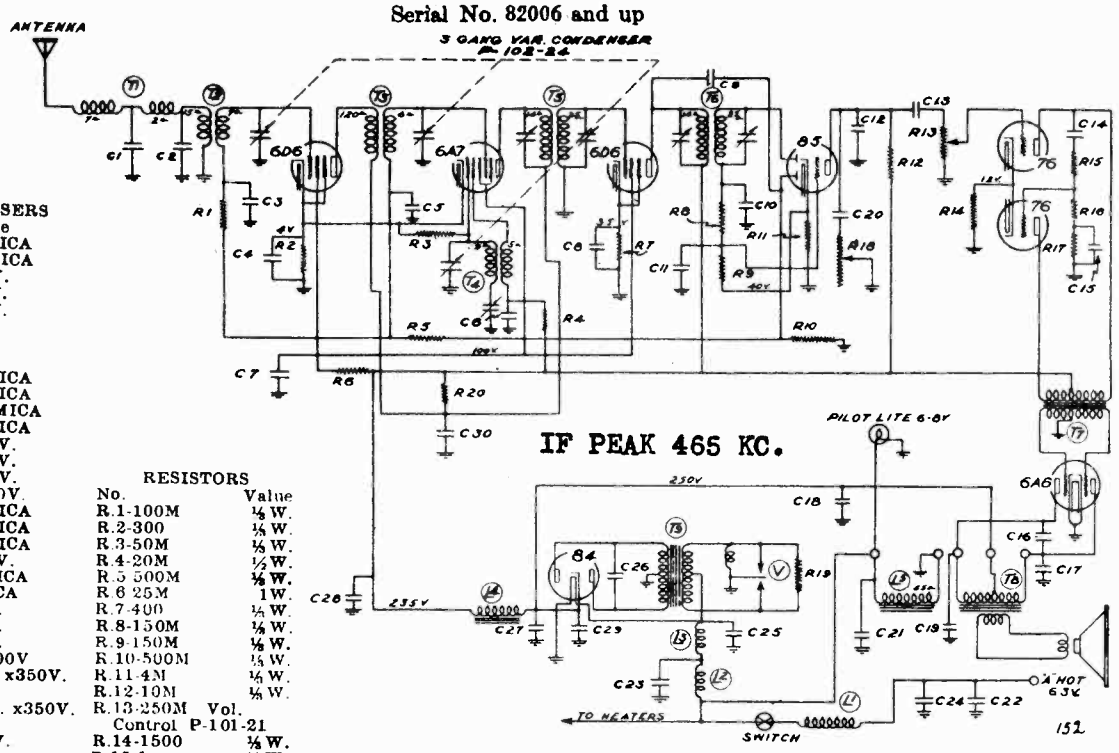
If you should desire to change any station you selected to another, hold the tuning knob No. 2 securely and with a coin loosen the locking screw "C" one or two turns; select the new station as explained. **Be sure to retighten the locking screw,** otherwise the stations you have selected will not stay adjusted to the levers.

Part No.	Diagram Reference	
		CONDENSORS
100-1	C3	.1 x 400 volt Tubular Condenser
100-9	C1	.05 x 200 volt Tubular Condenser
100-11	C6, C10	.01 x 400 volt Tubular Condenser
100-13	C4	.05 x 400 volt Tubular Condenser
100-19	C11	.006 x 600 volt Tubular Condenser
119-47D	C8, C9	Dual 5MFD x 250 W. V. Filter Condenser
129-2	C7	.0005 Mica Type Condenser — 20%
129-5	C5	.0001 Mica Type Condenser — 20%
129-12	C2	.00025 Mica Type Condenser — 20%
		RESISTORS
106-35	R4, R5, R6	65 Ohm, 45 Ohm, 220 Ohm Metal Clad
130-9	R10	200M Ohm — 1/3 Watt Resistor — 20%
130-12	R2	50M Ohm — 1/3 Watt Resistor — 20%
130-21	R1	20M Ohm — 1/3 Watt Resistor — 20%
130-118	R11	600M Ohm — 1/3 Watt Resistor — 20%
130-149	R3	15M Ohm — 1/3 Watt Resistor — 20%
130-170	R7, R9	3 Megohm — 1/3 Watt Resistor — 25%
		COILS
108-95B	T4	Output I.F. Coil Assembly Complete with can
108-96	T3	Input I.F. Coil Assembly Complete with can
110-73	T2	Oscillator Coil Assembly Complete
111-92	T1	Antenna Coil Assembly Complete
		SOCKETS
121-93		Eight Prong Octal Socket for "6K6"
121-93		Eight Prong Octal Socket for "6Q7"
121-93		Eight Prong Octal Socket for "6A8"
121-93		Eight Prong Octal Socket for "5Y3"
121-94		Seven Prong Octal Socket for "6K7"
		TRANSFORMERS
104-129	T6	50/60 Cycle Transformer 105-115 volt Primary
104-130		25/60 Cycle Transformer 105-115 volt Primary
		SPEAKER
114-111	T7	Five Inch Dynamic Speaker (Field 2000 Ohms)
105-55c	T5	Output Transformer for Speaker (Mounted on Chass
		MISCELLANEOUS
101-107	R8, S1	Volume Control and Switch (500M Ohms)
102-67	C	Two Gang Variable Condenser

MODEL 01018, Runs 1,2
Chassis 880
Schematic, Voltage
Socket, Trimmers
Alignment

GOODYEAR TIRE & RUBBER CO., INC.

Serial No. 82006 and up



CONDENSERS

No.	Value
C.1-.00009 MICA	
C.2-.00002 MICA	
C.3-.01x400V.	
C.4-.25x200V.	
C.5-.05x200V.	
C.6-.1x200V.	
C.7-.1x200V.	
C.8-.1x200V.	
C.9-.00002 MICA	
C.10-.0001 MICA	
C.11-.00005 MICA	
C.12-.0001 MICA	
C.13-.02x400V.	
C.14-.02x400V.	
C.15-.01x400V.	
C.16-.006x600V.	
C.17-.0005 MICA	
C.18-.0005 MICA	
C.19-.0005 MICA	
C.20-.05x400V.	
C.21-.0005 MICA	
C.22-.002 MICA	
C.23-.5x120V.	
C.24-.5x120V.	
C.25-.5x120V.	
C.26-.015x1400V	
C.27-8.0 mfd. x350V. P-119-16	
C.28-12.0 mfd. x350V. P-119-16	
C.29-.01x400V.	
C.30-.1x400V.	
117-2 Dash Mounting Bracket	
117-1 Bracket Steering Column	
Dash Mounting Assembly	

RESISTORS

No.	Value
R.1-100M	⅛ W.
R.2-300	⅛ W.
R.3-50M	⅛ W.
R.4-20M	½ W.
R.5 500M	⅛ W.
R.6 25M	1W.
R.7-400	⅛ W.
R.8-150M	⅛ W.
R.9-150M	⅛ W.
R.10-500M	⅛ W.
R.11-4M	⅛ W.
R.12-10M	⅛ W.
R.13-250M Vol. Control P-101-21	
R.14-1500	⅛ W.
R.15-1 meg	⅛ W.
R.16-91M	⅛ W.
R.17-75M	⅛ W.
R.18-100M Tone Control P-101-39	
R.19-200	⅛ W.
R.20-1500	⅛ W.

PARTS

No.	Part No.
T1-Antenna Filter	P-111-43
T2-Antenna Coil	P-111-42
T3-R.F. Coil	P-109-20
T4-Oscillator Coil	P-110-34
T5-Input I.F. Coil	P-108-56
T6-Output I.F. Coil	P-108-57
T7-Audio Trans.	P-105-13
T8-Output Trans.	
T9-Power Trans.	P-104-21
L1-"A" Choke	P-105-18
L2-"A" Choke	P-105-18
L3-"A" Choke	P-105-19
L4-Filter Choke	P-105-11
L5-Speaker Field	
V-Vibrator	142-4

DUMMY ANTENNAS:

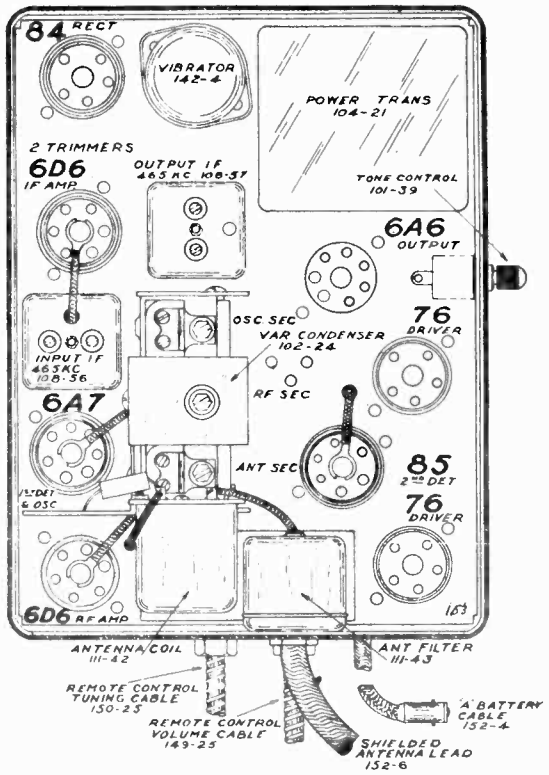
The dummy antennas referred to in the following instructions are:
"I.F. Dummy" —A .1 mfd. condenser connected in series with the test oscillator output lead.
"Broadcast Dummy"—A 200 mmfd. condenser connected in series with the output lead of the test oscillator.

I.F. ALIGNMENT:

1. With variable condenser in its minimum capacity position (plates entirely out of mesh) and with volume control full on, connect test oscillator set at 465 K.C., in series with I.F. dummy antenna, to the grid cap of the type 6A7 tube.
2. Adjust trimmer condensers of both input (108-56) and output (108-57) I.F. transformers to resonance with oscillator. See top view for location of these transformers. There are two adjustments on each and they are accessible from the top of the transformer shield and should be adjusted with an insulated screw driver.

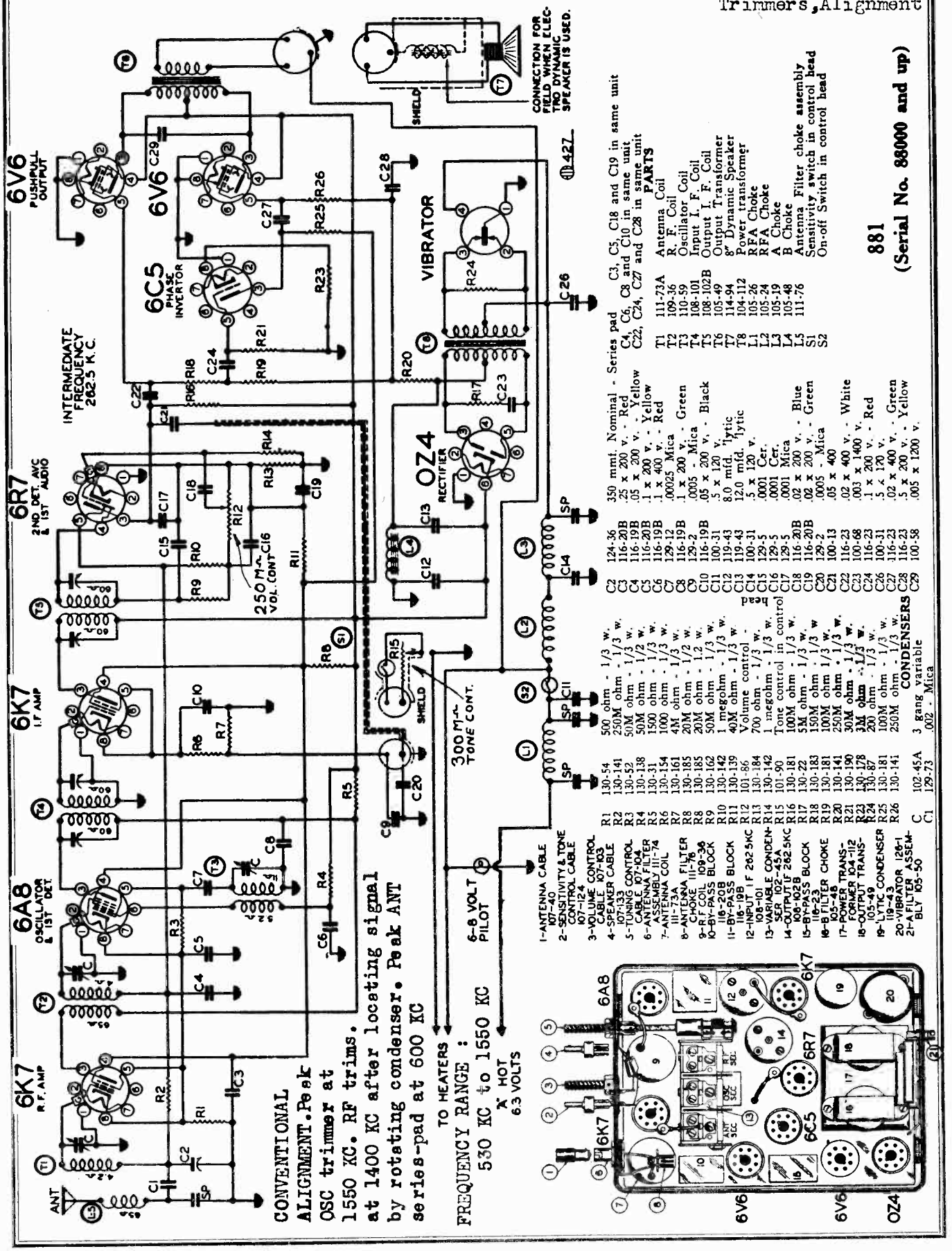
BROADCAST ALIGNMENT:

1. With variable condenser in its minimum capacity position, connect test oscillator set at 1550 K.C. and in series with broadcast dummy, to the antenna lead of receiver.
2. Adjust oscillator trimmer of variable condenser to resonance (this adjustment is on the end section of the three gang condenser—see top view).
3. Shift test oscillator to 1400 K.C. and pick up signal by rotating condenser and adjust R.F. (center) and antenna (front) trimmers to resonance, see top view.
4. Re-set external oscillator to 600 K.C. and adjust series pad to resonance, rotate condenser and move dial pointer to 600 K.C. by gently rocking condenser to and fro. Pick up oscillator signal while adjusting series pad to resonance. This adjustment is accessible from the bottom of the chassis.
   (a) Check for sensitivity at 1000, 800 and 600 K.C. by setting test oscillator to these frequencies and picking up the signal by rotating variable condenser. Under no circumstances bend plates of oscillator section, bend R.F. and antenna plates only if absolutely necessary.



GOODYEAR TIRE & RUBBER CO., INC.

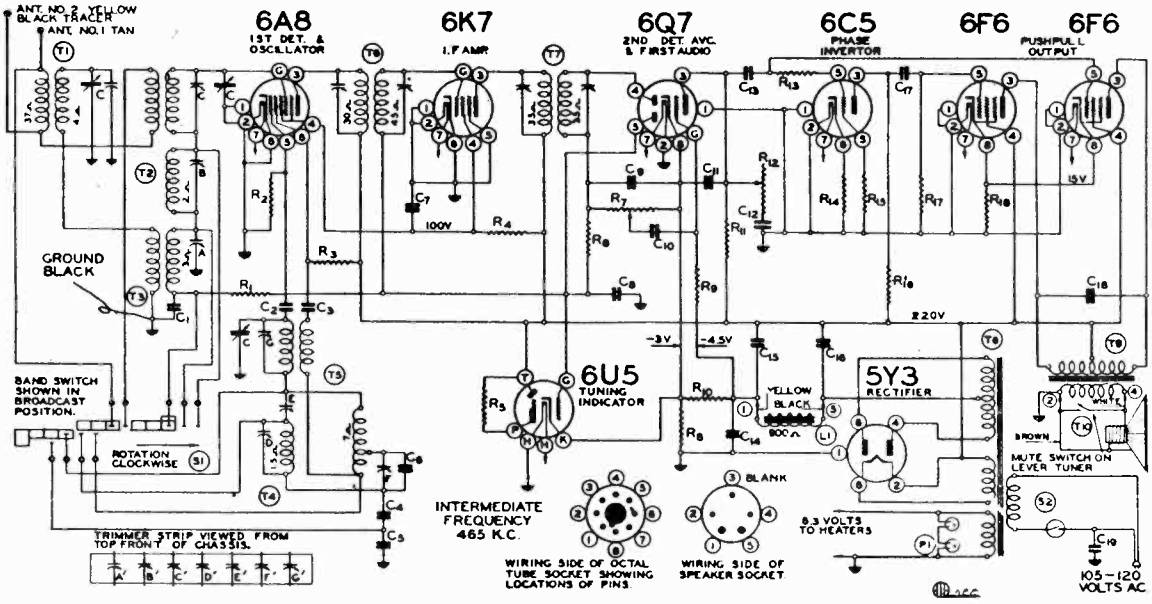
MODEL 01020
Chassis 881
Schematic, Socket
Trimmers, Alignment



MODEL 01029
Chassis 860
Schematic, Voltage

Socket, Trimmers

GOODYEAR TIRE & RUBBER CO., INC.



Code No.	Part No.	Description
		RESISTORS
R1	130-103	100M ohm - 1/3 w. 10%
R2	130-12	50M ohm - 1/3 w. 20%
R3	130-123	15M ohm - 1/2 w. 10%
R4	130-196	30M ohm - 1 w. 10%
R5	130-110	1 megohm - 1/10 w. 20% In tuning indicator socket
R6	130-4	3 megohm -1/3 w. 20%
R7	101-97	1 megohm volume control
R8	130-198	40 ohm - 1/2 w. 10%
R9	130-4	3 megohm - 1/3 w. 20%
R10	130-197	20 ohm - 1/3 w. 10%
R11	130-103	100M ohm - 1/3 w. 10%
R12	101-98	300M ohm - tone control
R13	130-163	400M ohm - 1/3 w. 10%
R14	130-22	5M ohm - 1/3 w. 20%
R15	130-103	100M ohm - 1/3 w. 10%
R16	130-12	50M ohm - 1/3 w. 20%
R17	130-102	500M ohm - 1/3 w. 10%
R18	130-195	250 ohm - 1.2 w. 10%
		CONDENSERS
C	102-62	3 gang variable
C1	100-22	.05 x 200 v. - 25%
C2	129-67	.00004 Mica 10%
C3	100-25	.002 x 600 v. 25%
C4	129-83	.0027 Mica 2-1/2%
C5	129-84	.003 Mica 2-1/2%
C6	129-88	.0006 Mica 5%
C7	100-1	.1 x 400 v. - 50 - 10%
C8	100-26	.02 x 400 v. 25%
C9	129-5	.0001 Mica 20%
C10	100-26	.02 x 400 v. 25%
C11	129-2	.0005 Mica 20%
C12	100-57	.006 x 600 v. - 10 - 20%
C13	100-26	.02 x 400 v. 25%
C14	100-20	.1 x 200 v. 25%
C15	103-14	16 mfd. Regulating Lytic - 275 w.v.
C16	103-6	8 mfd. Lytic - 350 w.v.
C17	100-26	.02 x 400 v. 25%
C18	100-37	.003 x 600 v. 10%
C19	100-61	.02 x 600 v. 20% Bakelite
		PARTS
T1	111-88	B.C. Pre-selector complete
T2	111-87	S.W.M.W. Antenna Coil - complete
T3	111-86	B.C. Antenna Coil Complete
T4	110-69	M.W. Osc. Coil Complete
T5	110-70	S.W.B.C. Osc. Coil Complete
T6	108-105D	Input I.F. Coil - complete 465 kc.
T7	108-106E	Output I.F. Coil - complete 465 kc.
T8	104-87B	Power Transformer
T9	105-54	Output Transformer
T10	114-99	10" Dynamic speaker
L1		900 ohm speaker field
S1	125-42	Wave change switch
S2		Off-on switch on tone control
P1	107-94	6-8 volt pilot light

For conventional types of antennas connect the yellow wire to the antenna lead and the yellow with black tracer and the black wire together to the ground lead.

When a doublet antenna is used connect the yellow wire and the yellow with black tracer wire to the doublet antenna and the solid black wire to the ground lead. (See Fig. 1-Top View)

FOR ALIGNMENT AND TUNER DATA, SEE INDEX

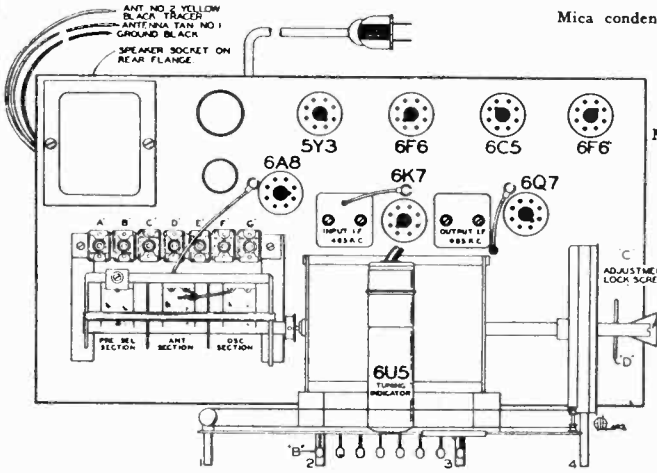


FIG. 1—TOP VIEW

Mica condensers are coded with an additional dot indicating tolerance:

Tolerance percent	Color of Dot
2½%	White
5%	Green
10%	Blue
15%	Yellow
20%	Red
More Than 20%	None

FREQUENCY RANGE
540 to 1750 K.C.
1730 to 5800 K.C.
5.5 to 18.1 M.C.

CHASSIS MODEL 860

(Serial No. 7L897400 and up)

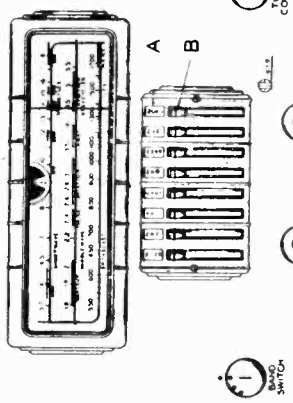
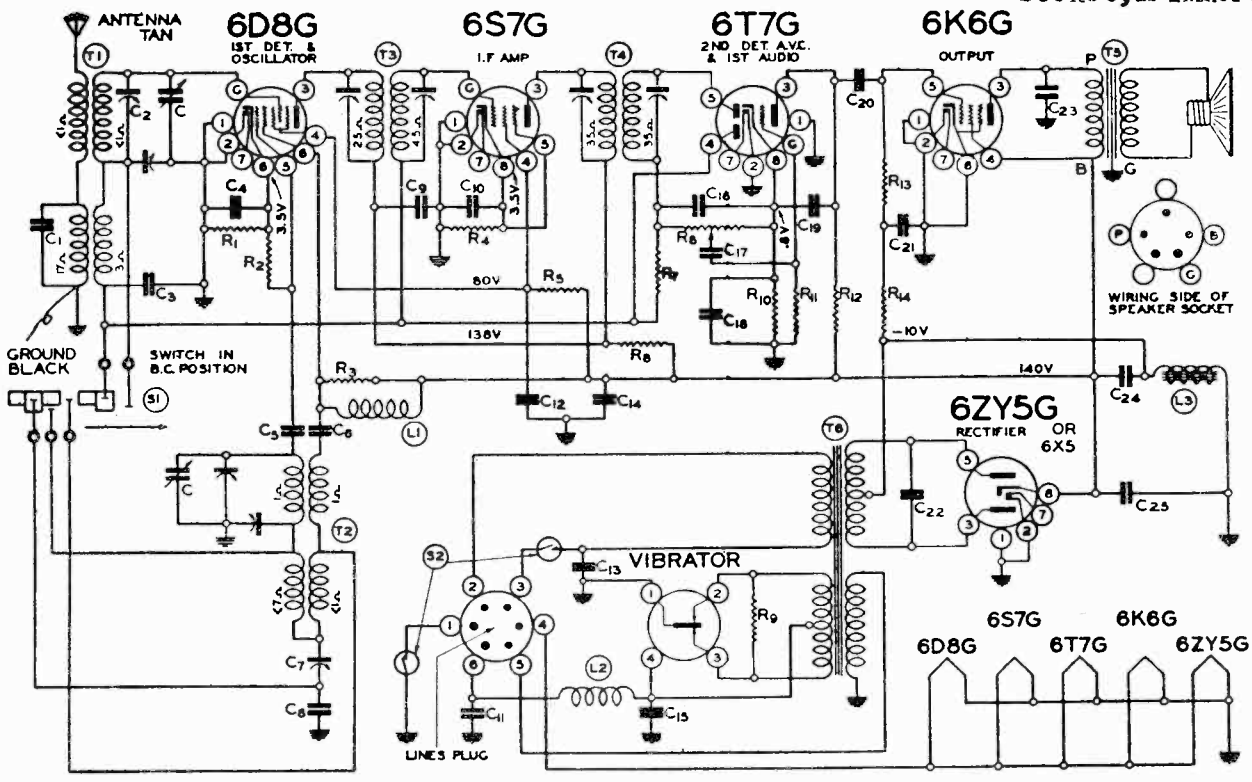


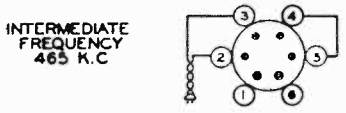
FIG. 2—FRONT VIEW

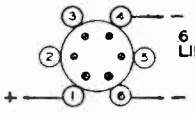
3-Band All-Wave A.C. Superheterodyne Receiver

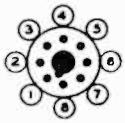
GOODYEAR TIRE & RUBBER CO., INC.

MODEL 01554
Chassis 505
Schematic, Voltage
Socket, Trimmers









447

505 SERIES "A"

(Serial No. 7J851300 and up)

FOR ALIGNMENT SEE INDEX

R1	130-70	500 ohm - 1/3 w.
R2	130-12	50M ohm - 1/3 w.
R3	130-12	50M ohm - 1/3 w.
R4	130-92	1000 ohm - 1/3 w.
R5	130-149	15M ohm - 1/3 w.
R6	130-192	2M ohm - 1/3 w.
R7	130-170	3 megohm - 1/3 w.
R8	101-91	1 meg volume control
R9	130-84	200 ohm - 1/3 w.
R10	130-192	2M ohm - 1/3 w.
R11	130-19	1 meg - 1/3 w.
R12	130-100	150M ohm - 1/3 w.
R13	130-3	500M ohm - 1/3 w.
R14	130-11	250M ohm - 1/3 w.
C	102-43	2 gang variable
C1	129-5	.0001 Mica
C2	124-39B	Adj. condenser
C3	100-22	.05 x 200
C4	100-20	.1 x 200
C5	129-39	.00005 Mica
C6	100-25	.002 x 600
C7	124-38	Series Pad
C8	129-54	.003 Mica
C9	100-6	.25 x 200
C10	100-20	.1 x 200
C11	100-40	.5 x 200
C12	100-20	.1 x 200
C13	129-82	.003 Mica
C14	129-12	.00025 Mica
C15	100-40	.5 x 200
C16	129-5	.0001 Mica
C17	100-11	.01 x 400
C18	119-22	10 mfd. lytic 25 wv.
C19	129-12	.00025 Mica
C20	100-11	.01 x 400
C21	100-20	.1 x 200
C22	100-73	.008 x 1200
C23	100-37	.003 x 600
C24	119-24B	5 mfd. lytic
C25	119-24B	5 mfd. lytic

T1	111-83	Antenna Coil
T2	110-66B	Oscillator Coil
T3	108-105B	Input I.F.
T4	108-106B	Output I.F.
T5	114-95	or
	114-96	Speaker
T6	104-114	Power Transformer
L1	123-4	"B" Choke
L2	105-19	"A" Choke
S1	125-39	Wave band switch
S2		Off-On Switch on Volume Control
L3	105-52	300 ohm 4.5 henry filter choke

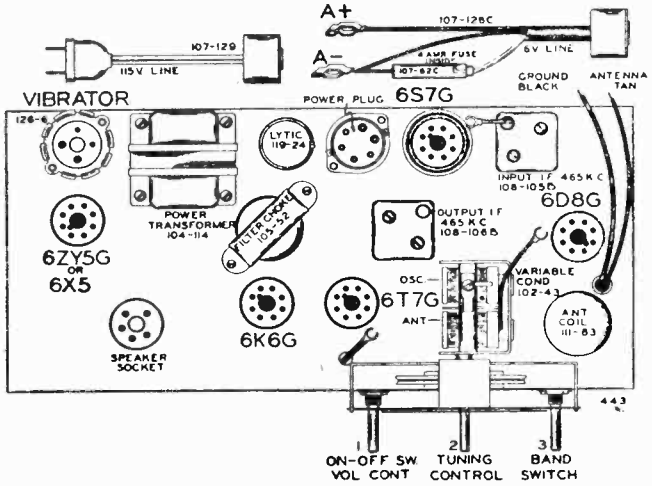


FIG. 1—TOP VIEW

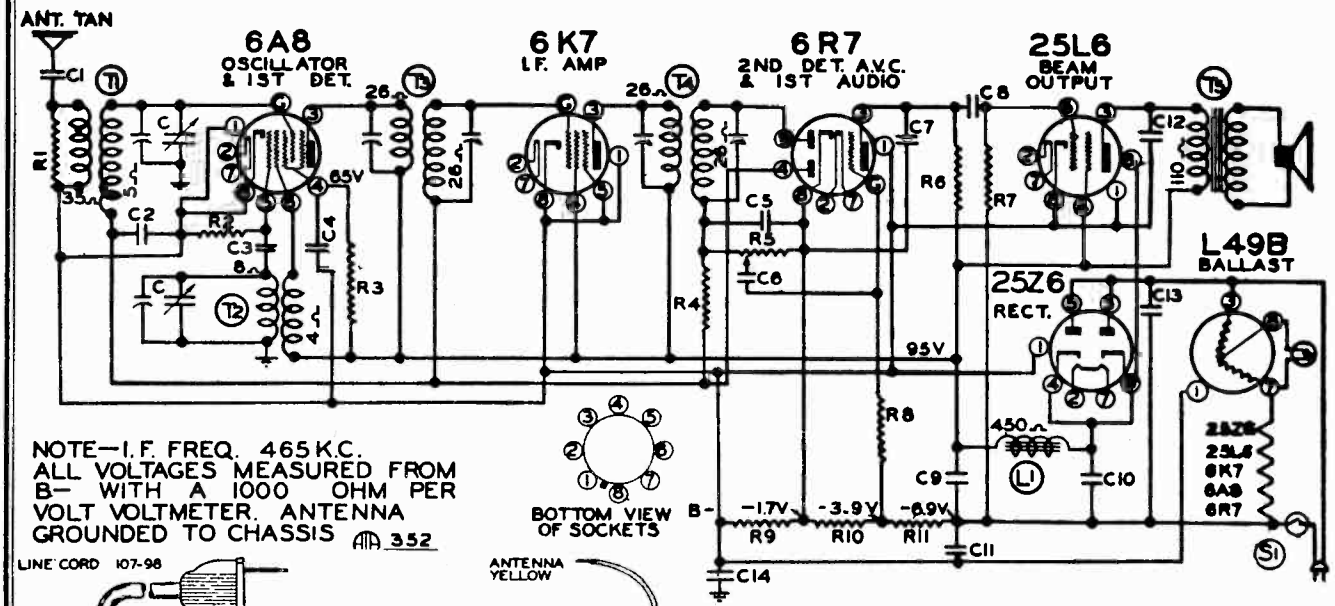
BAND DIAL SCALE FREQUENCY RANGE

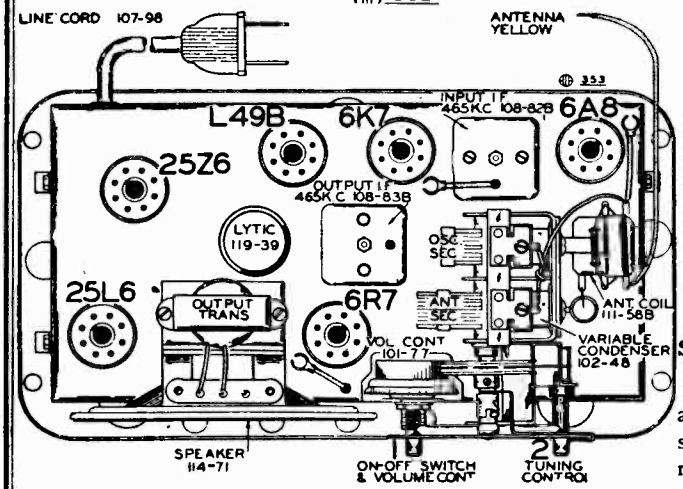
Broadcast..... Upper..... 535 to 1720 K.C. (Kilocycles)
Short Wave.. Lower..... 5.5 to 18.1 M.C. (Megacycles)

MODEL 010211, Ch. 602E
MODEL 010222
Ch. 602I

GOODYEAR TIRE & RUBBER CO., INC.

Schematic, Voltage
Socket, Trimmers
Alignment





ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-83B Output I.F. Transformer

Part No. 108-82B Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see Fig. 1).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

   (a) Connect external oscillator set at 465 kilocycles, in series with .1 mfd. condenser, to the control grid cap of the type 6K7G tube, and adjust the output I.F. transformer (No. 108-83B) to resonance.

   (b) Move oscillator output clip from grid of 6K7G to grid of 6A8G and adjust input I.F. transformer (No. 108-82B) to resonance.

   (c) With oscillator still connected to 6A8G, readjust output I.F. transformer (108-83B) if necessary.

R.F. ALIGNMENT: (535-1720 K.C.)

1. With gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 200 mmf. condenser to the antenna lead and chassis ground and make the following adjustments:

   (a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer to resonance. This adjustment is on the top of rear section of variable gang condenser. (See Fig. 1).

   (b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance. (Top of front section of gang condenser).

   (c) Check sensitivity at 600 and 1000 kilocycles.

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt.

All voltages as indicated on diagram are measured with 119 volt A.C. or D.C. line.

RESISTORS

No.	Part No.	Description	
R1	130-17	10M ohm - 1/3 w.	20%
R2	130-12	50M ohm - 1/3 w.	20%
R3	130-149	15M ohm - 1/3 w.	20%
R4	130-4	3 meg ohm - 1/3 w.	20%
R5	101-77	Volume Control (1 Meg)	
R6	130-12	50M ohm - 1/3 w.	20%
R7	130-20	100M ohm - 1/3 w.	20%
R8	130-19	1 megohm - 1/3 w.	20%
R9	106-38	30 ohm	
R10	106-38	40 ohm	
R11	106-38	55 ohm	
		R9, R10, and R11 in one unit	

CONDENSERS

C	102-48	2 gang variable	
C1	100-25	.002 x 600	25%
C2	100-9	.05 x 200	25%
C3	129-12	.00025 Mica	20%
C4	100-22	.05 x 200	25%
C5	129-5	.0001 Mica	20%
C6	100-11	.01 x 400	25%
C7	129-2	.0005 Mica	20%
C8	100-22	.05 x 200	25%
C9	119-39	20 mfd. lytic - 100 w.v.	
C10	119-39	15 mfd. lytic - 100 w.v.	
C11	100-20	.1 x 200	25%
C12	100-13	.05 x 400	25%
C13	100-39	.1 x 400	20%
C14	100-53	.25x400	20%

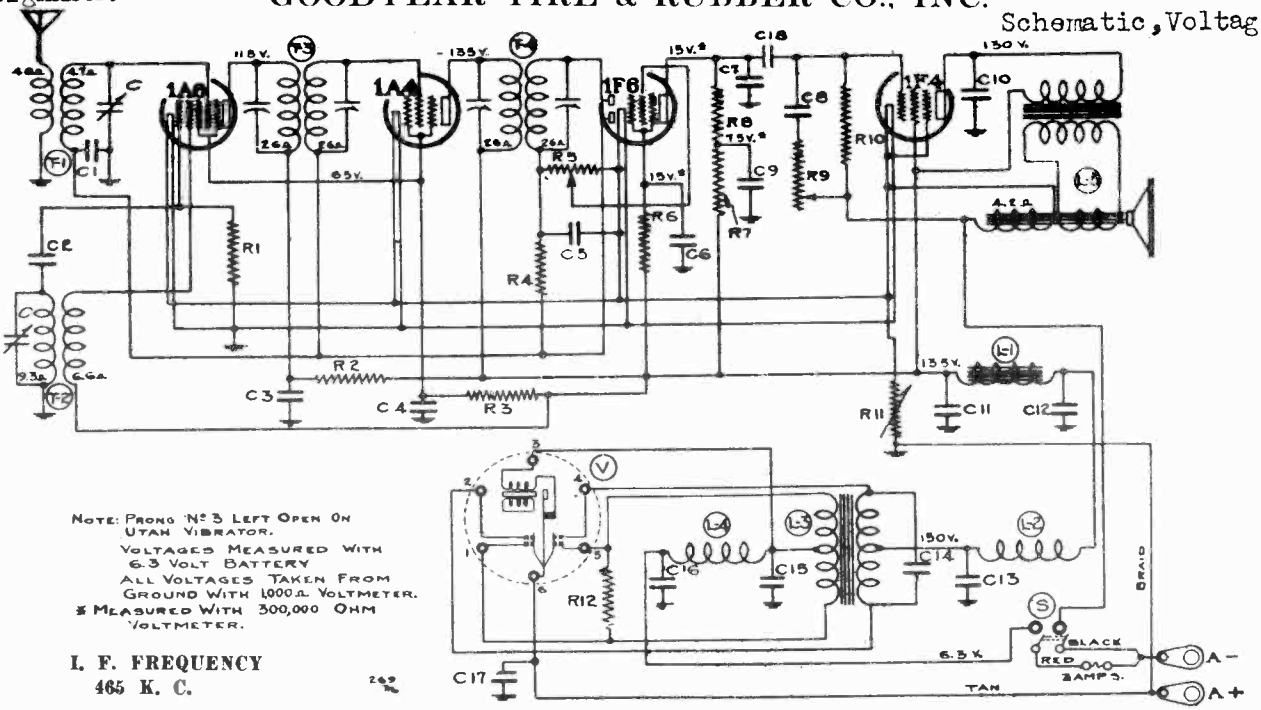
PARTS

T1	111-58B	Antenna Coil Complete
T2	110-46	Oscillator Coil Complete
T3	108-82B	Input I. F. Complete
T4	108-83B	Output I. F. Complete
T5	114-71	Dynamic Speaker
L1		450 ohm speaker field
S1		Switch on Volume Control

Socket, Trimmers Alignment

GOODYEAR TIRE & RUBBER CO., INC.

MODEL 010219, Run 1
Chassis 415-A
Schematic, Voltage



NOTE: PRONG No 3 LEFT OPEN ON UTAH VIBRATOR.
VOLTAGES MEASURED WITH 6.3 VOLT BATTERY
ALL VOLTAGES TAKEN FROM GROUND WITH 1000Δ VOLTMETER.
‡ MEASURED WITH 300,000 OHM VOLTMETER.

I. F. FREQUENCY
465 K. C.

No.	Part No.	Description
		CONDENSERS
C1	100-10	.05 x 200 Volts
C2	129-12	.00025 Mica
C3	100-33	.1 x 200 Volts
C4	100-33	.1 x 200 Volts
C5	129-12	.00025 Mica
C6	100-33	.1 x 200 Volts
C7	129-5	.0001 Mica
C8	100-25	.002 x 600 Volts
C9	100-9	.05 x 200 Volts
C10	100-7	.005 x 600 Volts
C11	119-28	5 mfd. x 200 Working Voltage
C12	119-28	5 mfd. x 200 Working Voltage
C13	100-33	.1 x 200 Volts
C14	100-34	.005 x 1200 Volts
C15	100-40	.5 mfd. x 200 Working Voltage
C16	100-40	.5 mfd. x 200 Working Voltage
C17	100-35	.5 x 200 Volts
C18	100-11	.01 x 400 Volts
NOTE: C11 & C12 in one unit—No. 119-28		
		RESISTORS
R1	130-94	50M Ohm—1/3 Watt
R2	130-17	10M Ohm—1/3 Watt
R3	130-123	15M Ohm—1/2 Watt
R4	130-121	3.2 megohm—1/3 Watt
R5	101-56	1 meg ohm—Volume Control
R6	130-19	1 meg ohm—1/3 Watt
R7	130-20	100M Ohm—1/3 Watt
R8	130-11	250M Ohm—1/3 Watt
R9	101-59	1 meg ohm—Tone Control
R10	130-37	750M Ohm—1/3 Watt
R11	101-44	4.75 Ohm—Filament Rheostat
R12	130-124	200 Ohm—1/2 Watt

		MISCELLANEOUS PARTS
C	102-38	One Section of Two Gang
T1	111-66	Antenna Coil
T2	110-45	Oscillator Coil
T3	108-84	Input I.F.—465 Kc.
T4	108-85	Output I.F.—465 Kc.
L1	105-30	Filter Choke
L2	123-3	R.F. Choke Coil
L3	104-62	Power Transformer
L4	105-19	"A" Choke
L5	114-50	6" Spkr. (Field Res. 4.2 Ohms)
S	101-56	On Volume Control
V	126-4	Vibrator Unit

NOTE: R11, Part No. 101-44 Variable Filament Rheostat is adjusted at the factory to keep the filament voltage of the tubes at 2 volts.

TUBES:

The tube complement of this chassis consists of the following tubes:

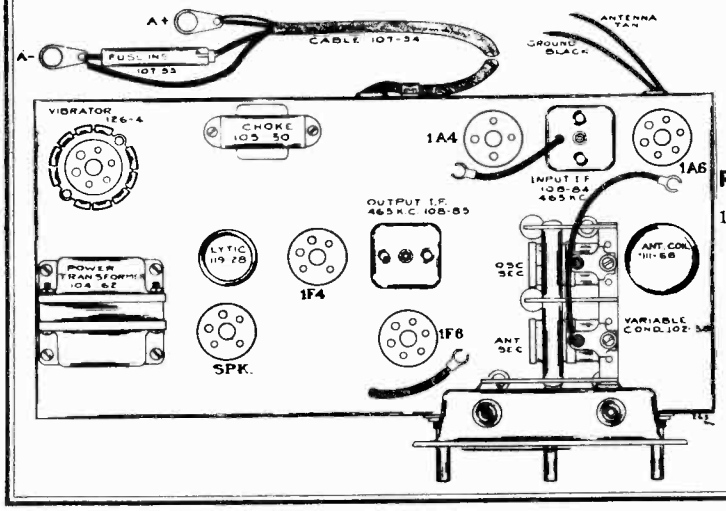
The type and function of each tube is as follows:

1—Type 1A6 Pentagrid Mixer, First Detector-oscillator.

1—Type 1A4 Super Control R. F. Tetrode I. F. Amplifier (465 K.C.)

1—Type 1F6 Duplex Diode Pentode, Second Detector, A.V.C. and First Audio.

1—Type 1F4 Pentode Output Amplifier.



ALIGNING I.F. TRANSFORMERS: (465 K. C.):

Part No. 108-85 Output I.F. Transformer.
Part No. 108-84 Input I.F. Transformer.

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view)

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:

   (a) Connect external oscillator set at 465 kilocycles, in series with .1 mfd. condenser, to the control grid cap of the type 1A4 tube, and adjust the output I.F. transformer (No. 108-85) to resonance.

   (b) Move oscillator output clip from grid of 1A4 to grid cap of 1A6 and adjust input I.F. transformer (No. 108-84) to resonance.

   (c) With oscillator still connected to 1A6, readjust output I.F. transformer (108-85) if necessary.

R.F. ALIGNMENT: (535-1720 K.C.)

1. With gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 200 mmf. condenser to tan antenna and black ground leads and make the following adjustments:

   (a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer (rear of gang condenser).

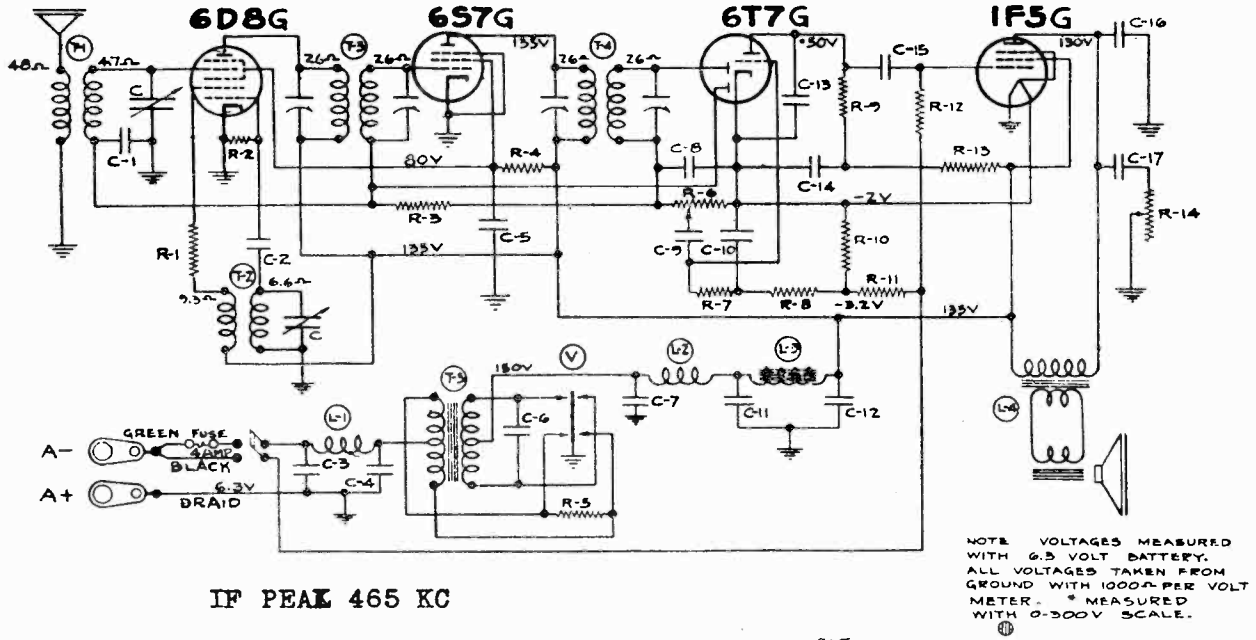
   (b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance (front section of gang condenser).

   (c) Check sensitivity at 600 and 1000 kilocycles.

MODEL 010219, Run 2
Chassis 415-B
Schematic, Voltage

GOODYEAR TIRE & RUBBER CO., INC.

Socket, Trimmers
Alignment

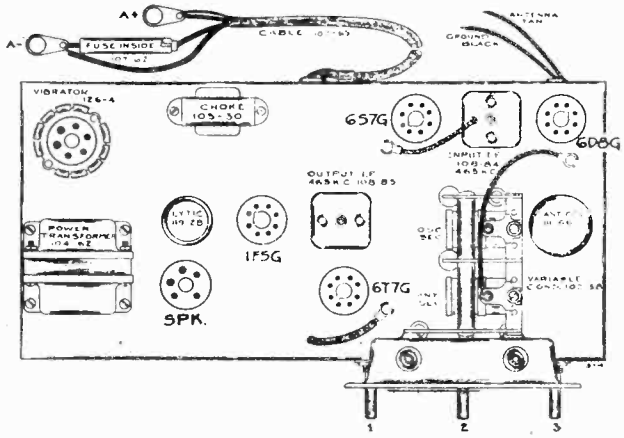


NOTE VOLTAGES MEASURED WITH 6.3 VOLT BATTERY. ALL VOLTAGES TAKEN FROM GROUND WITH 1000Ω PER VOLT METER. * MEASURED WITH 0-300V SCALE.

IF PEAK 465 KC

305

No.	Part No.	DESCRIPTION
		RESISTORS
R1	130-23	2M-1/3
R2	130-76	30M-1/3
R3	130-121	3.2 meg-1/3
R4	130-123	15M-1/2
R5	130-84	200-1/3
R6	101-56	1 meg-Volume Control
R7	130-19	1 meg-1/3
R8	130-19	1 meg-1/3
R9	130-100	150M-1/3
R10	106-36	10 Ohm Muter
R11	106-36	25 Ohm Muter
R12	130-19	1 meg-1/3
R13	130-20	100M-1/3
R14	101-72	300M-Tone control
		CONDENSERS
C1	100-9	.05-200 v.
C2	129-39	.00005-Mica
C3	100-40	.5-200 v.
C4	100-40	.5-200 v.
C5	100-33	.1-200 v.
C6	100-34	.005-1200 v.
C7	100-33	.1-200 v.
C8	129-5	.0001-Mica
C9	100-11	.01-400 v.
C10	100-11	.01-400 v.
C11	119-28	5. Electrolytic-200 wv.
C12	119-28	5. Electrolytic-200 wv.
C13	129-12	.00025-Mica
C14	100-33	.1-200 v.
C15	100-11	.01-400 v.
C16	100-37	.003-600 v.
C17	100-11	.01-400 v.
		PARTS
T1	111-66	Antenna Coil
T2	110-45	Oscillator Coil
T3	108-84	Input I. F. Coil
T4	108-85	Output I. F. Coil
T5	104-62	Power Transformer
L1	105-19	"A" Choke
L2	123-3	RF "B" Choke
L3	105-30	Filter Choke
L4	114-63	Speaker (P. M. Dynamic)
V	126-4	Vibrator
C	102-38	Variable Condenser



The type and function of each tube is as follows:

1—Type 6D8G Pentagrid Mixer, First Detector-oscillator.

1—Type 6S7G Remote Cut-off Pentode I. F. Amplifier (465 K.C.)

1—Type 6T7G Duplex Diode Triode, Second Detector, A.V.C. and First Audio.

1—Type 1F5G Pentode Output Amplifier.

RESONANCE INDICATOR:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the plate and screen terminals of the type 1F5G output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

ALIGNING I.F. TRANSFORMERS: (465 K. C.):

Part No. 108-85 Output I.F. Transformer.
Part No. 108-84 Input I.F. Transformer.

These I.F. Transformers have two adjustments, both of which are accessible from the top of chassis (see fig. 1, top view page 2).

1. With volume control full on (the extreme right of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments.

   (a) Connect external oscillator set at 465 kilocycles, in series with .1 mfd. condenser, to the control grid cap of the type 6S7G tube, and adjust the output I.F. transformer (No. 108-85) to resonance.

   (b) Move oscillator output clip from grid of 6S7G to grid cap of 6D8G and adjust input I.F. transformer (No. 108-84) to resonance.

   (c) With oscillator still connected to 6D8G readjust output I.F. transformer (108-85) if necessary.

R. F. ALIGNMENT: (535-1720 K.C.)

1. With gang condenser in its minimum capacity position, plates entirely out of mesh, connect an external oscillator in series with a 200 mmf. condenser to tan antenna and black ground leads and make the following adjustments:

   (a) With external oscillator set at 1720 kilocycles, adjust oscillator trimmer (rear of gang condenser).

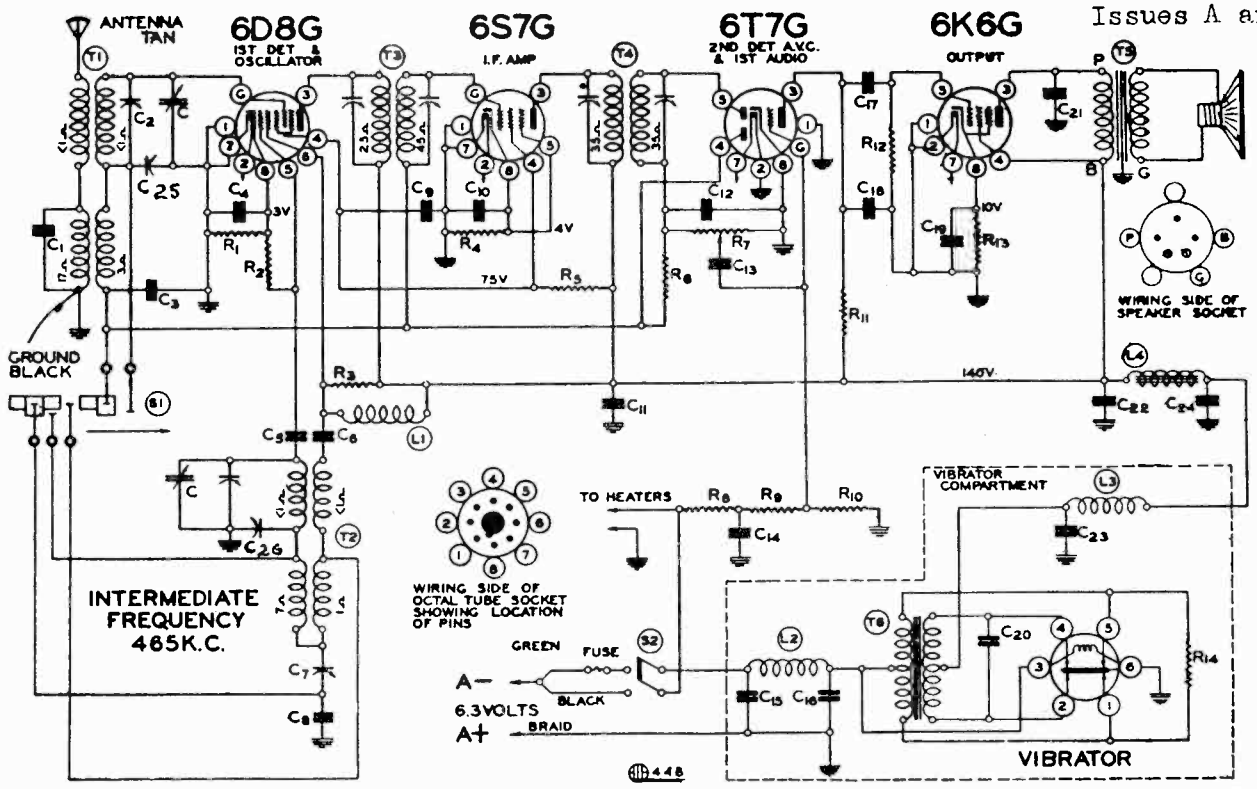
   (b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick-up oscillator signal and adjust antenna trimmer to resonance (front section of gang condenser).

   (c) Check sensitivity at 600 and 1000 kilocycles.

Schematic, Voltage
Socket, Trimmers

GOODYEAR TIRE & RUBBER CO., INC.

MODEL 010219
Runs 3,4
Chassis 489
Series A
Issues A and B



RESISTORS

R1	130-54	500 ohm - 1/3 w.
R2	130-12	50M ohm - 1/3 w.
R3	130-12	50M ohm - 1/3 w.
R4	130-26	1000 ohm - 1/3 w.
R5	130-149	15M ohm - 1/3 w.
R6	130-4	3 megohm - 1/3 w.
R7	101-91	1 meg volume control
R8	130-191	1.5 megohm - 1/3 w.
R9	130-4	3 megohm - 1/3 w.
R11	130-9	200M ohm - 1/3 w.
R12	130-3	500M ohm - 1/3 w.
R13	130-153	700 ohm - 1/3 w.
R14	130-84	200 ohm - 1/3 w.
R10	130-191	1.5 meg - 1/3 w.

CONDENSERS

C	102-43	2 gang variable
C1	129-5	.0001 Mica
C2	124-39B	Adj. Cond. 2-25 mmf.
C3	100-22	.05 x 200
C4	100-20	.1 x 200
C5	129-39	.00005 Mica
C6	100-25	.002 x 600
C7	124-38	Series pad 600 mmf. W. C.
C8	129-54	.003 Mica
C9	100-20	.1 x 200
C10	100-20	.1 x 200
C11	100-11	.01 x 400
C12	129-5	.0001 Mica
C13	100-11	.01 x 400
C14	100-11	.01 x 400
C15	100-40	.5 x 200
C16	100-40	.5 x 200
C17	100-26	.02 x 400
C18	129-2	.0005 Mica
C19	119-22	10.0 mfd. 25 v. lytic
C20	100-34	.005 x 1200
C21	100-19	.006 x 600
C22	119-28B	5.0 mfd. lytic
C23	100-20	.1 x 200
C24	119-28B	5.0 mfd. lytic

C22 - C24 in same unit

C25	124-30B	Adjustable Trimmer, 2-20 mmf.
C26	124-30B	Adjustable Trimmer, 2-20 mmf.

C25 and C26 in same unit

(Serial No. 7J852300 and up)
ISSUE B (Serial No. 8C136800 and up)

PARTS

T1	111-83	Antenna coil complete
T2	110-66B	Oscillator coil complete
T3	108-105B	Input I.F. complete 465 kc.
T4	108-106B	Output I.F. complete 465 kc.
T5	114-96	6" speaker (P.M.)
T6	104-62E	Power Transformer
L1	123-4	R. F. "B" Choke
L2	105-19	A Choke
L3	123-3	R. F. "B" Choke
L4	105-30E	"B" Filter Choke (400 ohms)
S1	125-39	Wave Band Switch
S2		Switch on volume control

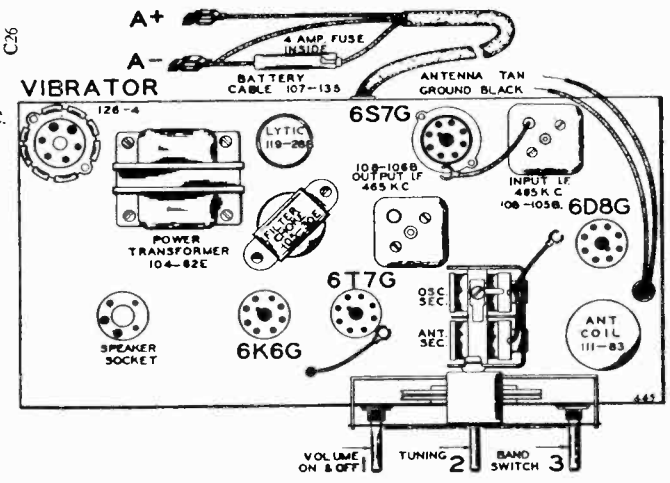


FIG. 1—TOP VIEW

FREQUENCY RANGE

BAND	DIAL SCALE	
Broadcast	Upper	535 to 1720 K.C. (Kilocycles)
Short Wave	Lower	5.5 to 18.1 M.C. (Megacycles)

MODEL 010219
Runs 3,4
Chassis 489
Series A
Issues A and B
Socket, Trimmers
Alignment

GOODYEAR TIRE & RUBBER CO., INC.

MODEL 01554
Trimmers
Alignment

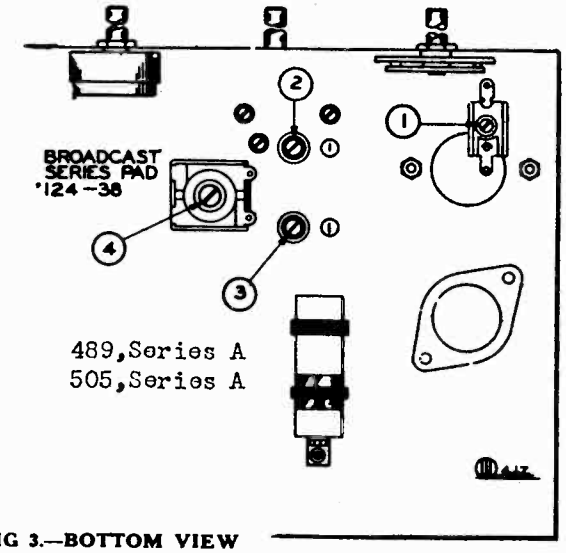


FIG 3.—BOTTOM VIEW

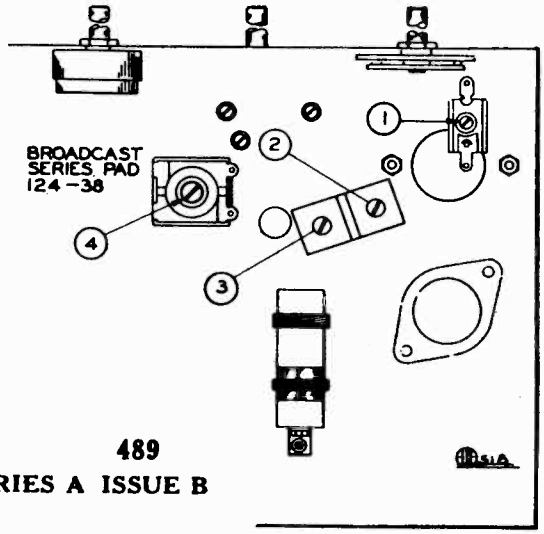


FIG 3.—BOTTOM VIEW

(Serial No. 8C136800 and up)

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

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

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

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

ALIGNING I.F. TRANSFORMERS: (465 K. C.):

Part No. 108-106B Output I.F. Transformer
Part No. 108-105B Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser in its minimum capacity position, plates entirely out of mesh, make the following adjustments:

   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6S7G tube, and adjust the output I.F. transformer (No. 108-106B) to resonance.

   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6S7G to grid cap of 6D8G and adjust input I.F. transformer (No. 108-105B) to resonance.

SHORT WAVE BAND ALIGNMENT:
5.5 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 17 megacycles and connected in series with "Dummy 3" to the antenna and ground leads, make the following adjustments:

   (a) Move dial pointer to 17 megacycles and adjust short wave oscillator trimmer to resonance.

   This adjustment is the trimmer mounted on the top of rear section of the variable gang condenser (see Fig. 1, top view).

   (b) Adjust short wave antenna trimmer (Adjustment Number 1), to resonance (see Fig. 3, bottom view).

BROADCAST BAND ALIGNMENT:
535 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to antenna and ground leads make following adjustments:

   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance. (Adjustment number 3, see bottom view of chassis, Fig. 3).

   (b) Re-set external oscillator to 1400 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast antenna trimmer (adjustment number 2), to resonance.

   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad (adjustment number 4), to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3).

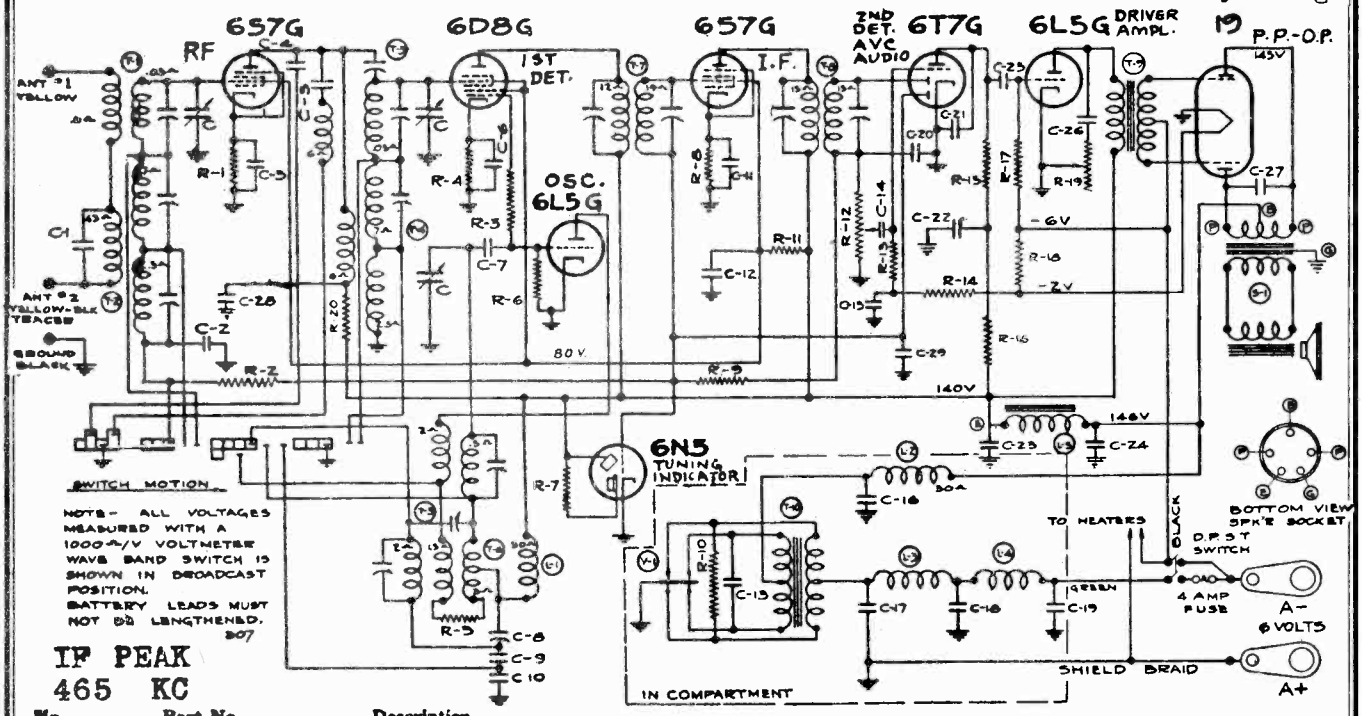
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

   (e) Check for tracking and sensitivity at 1400, 1000, and 600 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**

Socket, Trimmers

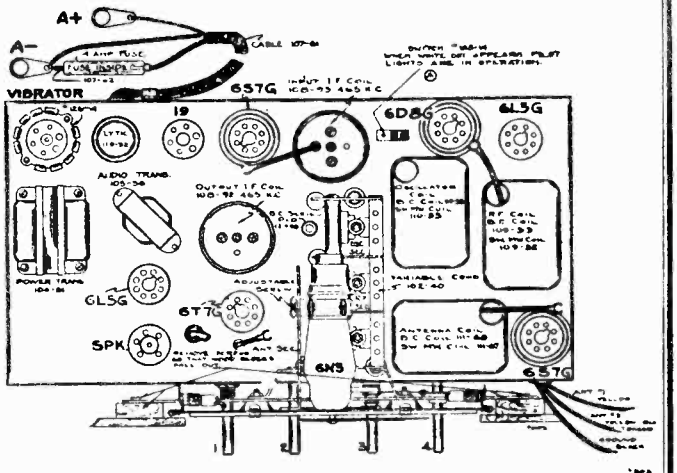
MODEL 010221
Chassis 804
Schematic, Voltage

GOODYEAR TIRE & RUBBER CO., INC.



IF PEAK 465 KC

No.	Part No.	Description
		CONDENSERS
C	102-40	Variable Condenser
C1	129-5	.0001 Mica—MO—O—20%
C2	100-9	.05 x 200 v.—25%
C3	100-9	.05 x 200 v.—25%
C4	129-72	.0004 Mica—MT—W—5%
C5	129-38	.00005 Mica—MO—O—10%
C6	100-9	.05 x 200 v.—25%
C7	129-38	.00005 Mica—MO—O—10%
C8	124-35	J.S. Series Pad
C9	129-70	.004 Mica MW—J—2½%
C10	129-71	.002—Mica MW—W—2½%
C11	100-20	.1 x 200v.—25%
C12	100-20	.1 x 200v.—25%
C13	100-34	.005 x 1200 v.—10%
C14	100-11	.01 x 400 v.—25%
C15	100-11	.01 x 400 v.—25%
C16	100-14	.1 x 200 v.—25%
C17	100-56	.5 x 200 v.—50%—10%
C18	100-56	.5 x 200 v.—50%—10%
C19	100-25	.002 x 600 v.—25%
C20	129-5	.0001 Mica MO—O—20%
C21	129-2	.0005 Mica MT—O—20%
C22	100-20	.1 x 200 v.—25%
C23	119-32	4. mfd. 200 w. v. Lytic
C24	119-32	8. mfd. 200 w. v. Lytic
C25	100-11	.01 x 400 v.—25%
C26	100-26	.02 x 400 v.—25%
C27	100-25	.002 x 600 v.—25%
C28	100-50	.25 x 200 v.—20%
C29	100-22	.05 x 200 v.—25%
		RESISTORS
R1	130-140	1200 ohm 1/3 w.—20%
R2	130-20	100M 1/3 w.—20%
R3	130-27	50 1/3 w.—20%
R4	130-54	500 ohm 1/3 w.—20%
R5	130-27	50 1/3 w.—20%
R6	130-2	75 M 1/3 w.—20%
R7		½ meg (in m. e. socket)
R8	130-140	1200 ohm 1/3 w.—20%
R9	130-38	2 meg 1/3 w.—20%
R10	130-84	200 ohm 1/3 w.—20%
R11	130-157	12M ½ w.—10%
R12	101-66	500M Volume Control
R13	130-19	1 meg 1/3 w.—20%
R14	130-19	1 meg 1/3 w.—20%
R15	130-20	100M 1/3 w.—20%
R16	130-20	100M 1/3 w.—20%
R17	130-4	3 meg 1/3 w.—20%
R18	130-158	16 ohm 1 w.—Insulated
R19	101-67	100M Tone Control
R20	130-85	3 M 1/3 w.—20%
		PARTS
T1	111-67	S.W. M.W. Ant. Coil
T2	111-68	B.C. Antenna Coil
T3	109-32	S.W. M. W. R.F. Coil
T4	109-33	B.C. R.F. Coil
T5	110-53	S.W. M.W. Osc. Coil
T6	110-55	B.C. Osc. Coil
T7	108-93	Input I.F. Coil
T8	108-92	Output I.F. Coil
T9	105-36	Audio Input Transformer
T10	104-81	Power Transformer
S1	114	P.M. Dynamic Spkr. 8"
L-1	123-3	Osc. "B" Choke
L-2	123-3	R.F. "B" Choke
L-3	105-19	"A" Choke
L-4	105-19	"A" Choke
L-5	105-30	"B" Filter Choke
V-1	126-4	Vibrator



Vol. Control On-Off Switch | Tone Control | Tuning Control | Band Switch

MODEL 010221
Chassis 804
Trimmers, Alignment

GOODYEAR TIRE & RUBBER CO., INC.

SERVICE NOTES:

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

In order to prevent signal from acting upon A.V.C. and affecting accuracy of voltage measurements, aerial and ground leads should be short circuited while making measurements.

All voltages are to be measured with 6.3 volts input to receiver. Resistances of coils and transformer windings are indicated in ohms on the schematic circuit diagram.

To check for open by-pass condensers, shunt each condenser with another condenser of the same capacity and voltage rating, which is known to be good, until the defective unit is located.

RESONANCE INDICATOR:

Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the two plate terminals of the type 19 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

DUMMY ANTENNAS:

The following dummy antennas are used in aligning and are referred to in the following alignment instructions as "Dummy 1", "Dummy 2", and "Dummy 3".

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

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

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

ALIGNING I.F. TRANSFORMERS: (465 K.C.):

Part No. 108-92 Output I.F. Transformer
Part No. 108-93 Input I.F. Transformer

These I.F. transformers have two adjustments, both of which are accessible from the top of chassis (see top view).

1. With volume control full on, (the extreme right of its rotation), the band changing switch in the broadcast position, (extreme left of its rotation), and with the variable condenser set to approximately 1400 kilocycles, make the following adjustments:
   (a) Connect external oscillator set at 465 kilocycles, in series with "Dummy 1", to the control grid cap of the type 6S7G tube, and adjust the output I.F. transformer (No. 108-92) to resonance.
   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 6S7G to grid cap to 6D8G and adjust input I.F. transformer (No. 108-93) to resonance.

SHORT WAVE BAND ALIGNMENT:

5.35 to 18.1 Megacycles

1. With band changing switch in the short wave position, extreme right of its rotation, and with external oscillator set at 18 megacycles and connected in series with "Dummy 3" to the antenna and ground posts, make the following adjustments:
   (a) Move dial pointer to 18 megacycles and adjust short wave oscillator trimmer (adjustment number 1) to resonance.
   (b) Re-set external oscillator to 17 megacycles and pick up signal by rotating variable condenser and adjust short wave R.F. trimmer (adjustment number 8), and short wave antenna trimmer (adjustment number 9), to resonance.
   (c) Re-set external oscillator and check set at 18.1 megacycles and 6 megacycles for band coverage and sensitivity.

NOTE: It is extremely necessary in making all of these adjustments that the fundamental oscillator signal be tuned in and not the image frequency which will fall below the fundamental on the receiver dial. As an example of this a fundamental 18.3 megacycle signal can be tuned in not only at 18.3 on the dial but also at approximately 17.4 megacycles.

MIDDLE WAVE BAND ALIGNMENT:

1690 to 5500 Kilocycles

1. With band changing switch in the middle wave position, center of its rotation, and with external oscillator set at 5.5 megacycles and connected in series with "Dummy 3" to the antenna and ground posts make the following adjustments:
   (a) Move dial pointer to 5.5 megacycles and adjust middle wave oscillator trimmer (adjustment number 2) to resonance.
   (b) Re-set external oscillator to 5 megacycles and pick up signal by rotating variable condenser and adjust middle wave R.F. trimmer (adjustment number 10), and middle wave antenna trimmer (adjustment number 5), to resonance.
   (c) Re-set external oscillator and check sensitivity at 1700 kilocycles.

BROADCAST BAND ALIGNMENT:

540 to 1720 Kilocycles

1. With band changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with "Dummy 2" to antenna and ground posts, make following adjustments:
   (a) Set external oscillator to 1720 K.C. and adjust broadcast oscillator trimmer to resonance. (Adjustment number 4; see bottom view of coil assembly, Fig. 3)
   (b) Re-set external oscillator to 1400 K.C., rotate variable gang condenser and pick up signal. Adjust broadcast R.F. trimmer (adjustment number 6) and broadcast antenna trimmer (adjustment number 7) to resonance.
   (c) Re-set external oscillator to 600 K.C., and adjust broadcast series pad (adjustment number 3), to resonance by rotating condenser to approximately 600 K.C., rocking it slowly to and fro until by adjusting series pad maximum output is attained. This adjustment is located on the bottom of the chassis directly under the variable gang condenser. (See bottom view of chassis, Fig. 3).
   (d) Repeat adjustments "a" and "b" until sensitivity is at its maximum.
   (e) Check for tracking and sensitivity at 1400, 1000, and 600 kilocycles. **Under no circumstances bend plates of variable condenser sections to correct tracking.**

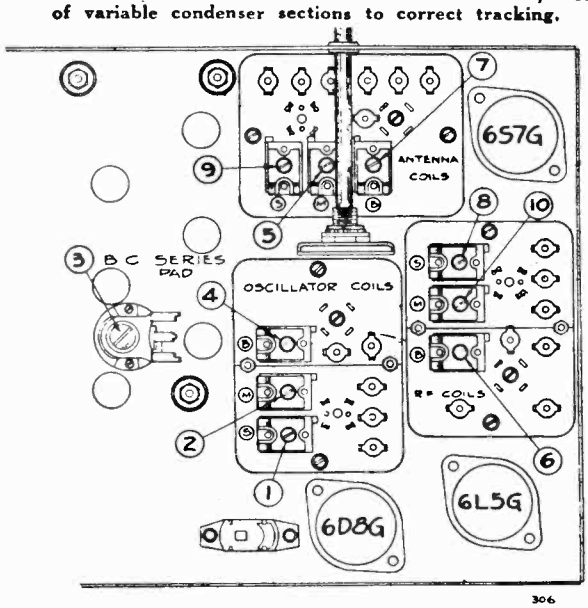
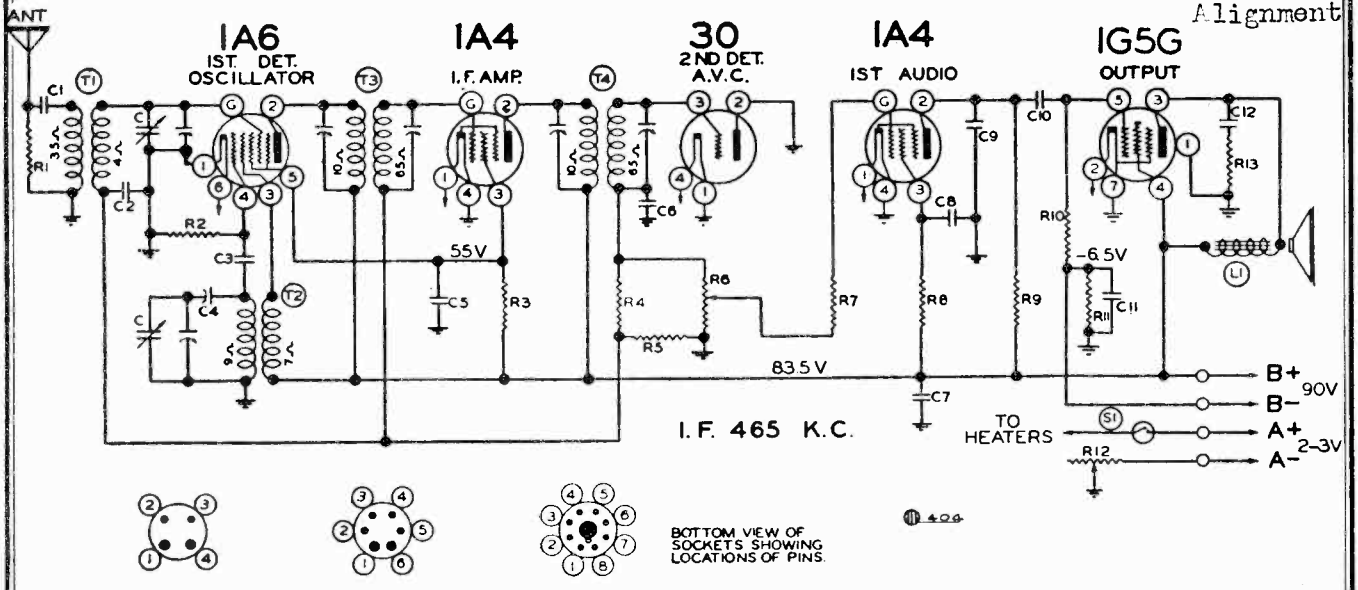


FIG. 3.—BOTTOM VIEW SHOWING TRIMMERS

GOODYEAR TIRE & RUBBER CO., INC.

MODEL 010220 Run 2
Chassis 523B
Schematic, Voltage
Socket, Trimmers
Alignment



BOTTOM VIEW OF SOCKETS SHOWING LOCATIONS OF PINS.

No.	Part No.	Description		No.	Part No.	Description	
		CONDENSERS		C11	119-22	10.0 mfd. x 25 w. v.	
C	102-56	2 Gang Variable Condenser		C12	100-11	.01 x 400 v.	25%
C1	100-11	.01 x 400 v.	25%			**RESISTORS**	
C2	100-22	.05 x 200 v.	25%	R1	130-17	10M ohm - 1/3 w.	20%
C3	129-12	.00025 Mica	20%	R2	130-52	50M ohm - 1/3 w.	20%
C4	124-14	Series Pad		R3	130-17	10M ohm - 1/3 w.	20%
C5	100-9	.05 x 200 v.	25%	R4	130-38	2 megohm - 1/3 w.	20%
C6	129-5	.0001 Mica	20%	R5	130-38	2 megohm - 1/3 w.	20%
C7	100-48	.25 x 200 v.	20%	R6	101-69	1 megohm Volume Control	
C8	100-9	.05 x 200 v.	25%	R7	130-52	50M ohm - 1/3 w.	20%
C9	129-2	.0005 Mica	20%	R8	130-19	1 megohm - 1/3 w.	20%
C10	100-11	.01 x 400 v.	25%	R9	130-9	200M ohm - 1/3 w.	20%
				R10	130-19	1 megohm - 1/3 w.	20%
				R11	130-93	450 ohm - 1/3 w.	10%
				R12	101-44	475 ohm Rheostat	
				R13	130-52	50M ohm - 1/3 w.	20%
						PARTS	
				T1	111-46	Antenna Coil Complete	
				T2	110-36	Oscillator Coil Complete	
				T3	108-67	Input I.F. Coil Complete	
				T4	108-68	Output I.F.Complete	
				L1	114-76	6" P. M. Speaker	
				L1	114-19	Speaker - 6" Magnetic	
				S1		Switch on Volume Control	

ALIGNING I.F. TRANSFORMERS: (465 K.C.)

1. With volume control full on and with variable condenser at its minimum capacity position, plates entirely out of mesh, and wth external oscillator set at 465 K.C. connected in series with a .1 mfd. condenser, to the grid of the 1A6 tube (cap at top of tube), adjust I.F. transformers, parts number 108-67 and 108-68, to resonance. Both of these transformers have two (2) adjustments each, they are accessible from the tops of the cans (for location see top view).

   Use as a resonance indicator an output meter connected across the outside terminals of the speaker or by means of an adapter to the plate and screen of the type 1G5G output tube. Maximum deflection of the volt meter indicates resonance.

   Use only enough signal to get a readily readable output.

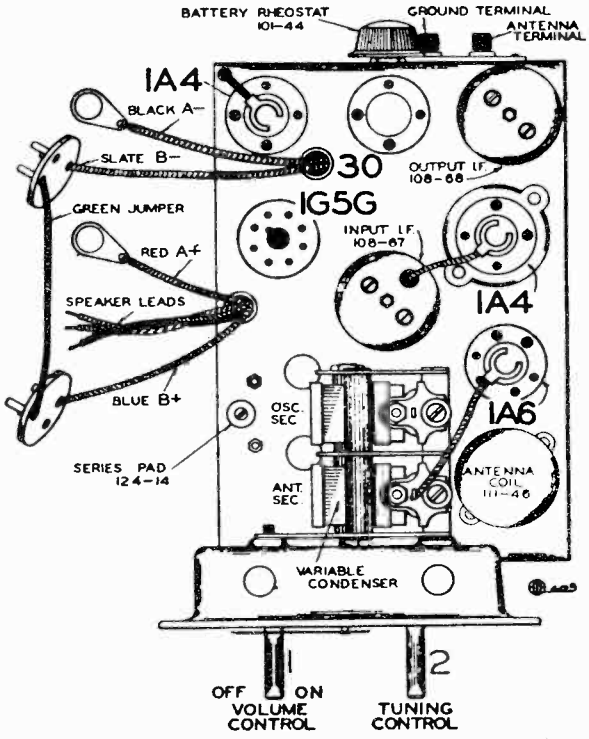
   A low range output meter or the low scale of a multi-range meter should be used.

BROADCAST BAND ALIGNMENT:

1. Set external oscillator to 1720 K.C. and connect it in series with a 200 mmfd. condenser to the antenna and ground posts.
   (a) With variable condenser in its minimum capacity position, plates entirely out of mesh, adjust oscillator trimmer (rear section of variable condenser) to resonance.
   (b) Re-set external oscillator to 1400 K.C. Rotate variable condenser, pick up signal and adjust antenna trimmer (front section of variable condenser) to resonance.
   (c) Re -set external oscillator to 600 K.C., move dial pointer to 600 K.C., and adjust series pad, part number 124-14 (see top view), to resonance. While making this adjustment, slowly rock variable condenser to and fro until maximum output is obtained.
   (d) Check for sensitivity at 1400, 1000, 600 K.C. DO NOT BEND PLATES.

FOR BEST OPERATION THIS RECEIVER MUST HAVE AN OUTSIDE AERIAL NOT OVER FIFTY FEET LONG INCLUDING THE LEAD IN.

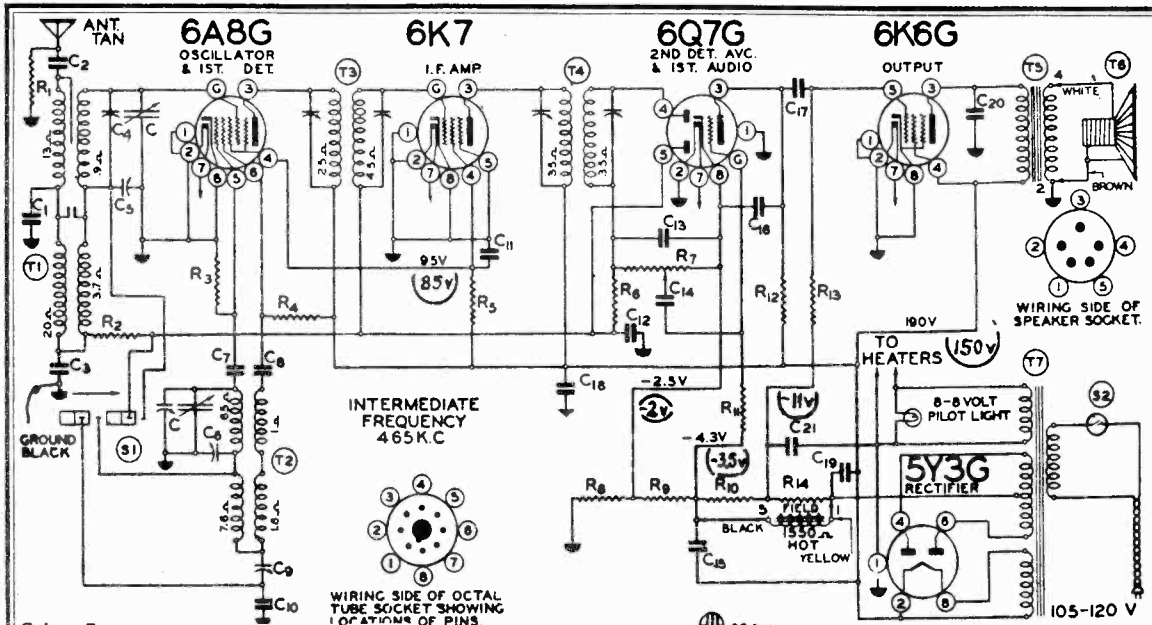
Frequency Range 535-1720 Kilocycles



MODEL 01030
Runs 1,2
Chassis 582
Series A,B

GOODYEAR TIRE & RUBBER CO., INC.

Schematic, Voltage, Socket, Trimmers Alignment



Voltages in Circles are for Series "A"

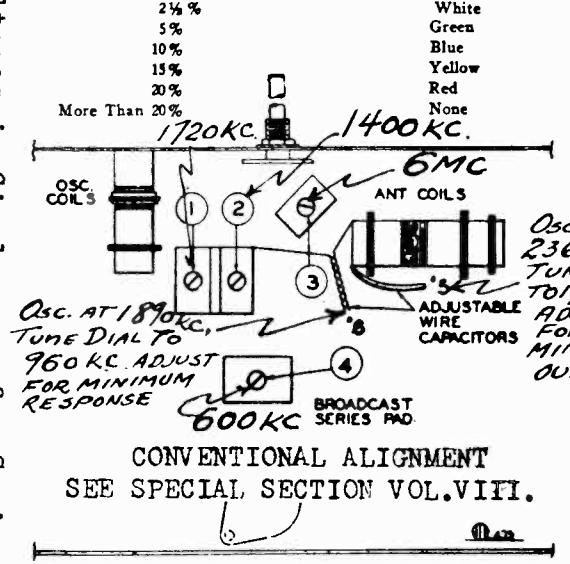


FIG. 3.—BOTTOM VIEW SHOWING TRIMMERS

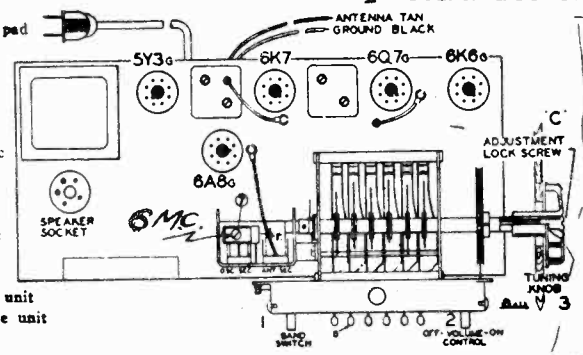


FIG. 1—TOP VIEW

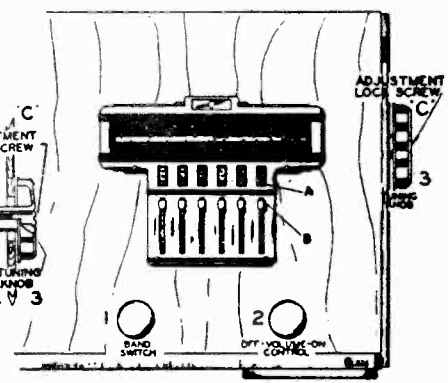


FIG. 2—FRONT VIEW

Code No.	Part No.	Description
		RESISTORS
R1	130-17	10M ohm - 1/3 w. 20%
R2	130-20	100M ohm - 1/3 w. 20%
R3	130-12	50M ohm - 1/3 w. 20%
R4	130-17	10M ohm - 1/3 w. 20%
R5	130-42	20M ohm - ½ w. 20%
R6	130-4	3 megohm - 1/3 w. 20%
R7	101-100	1 megohm - Volume Control
R8	130-204	55 ohm - 1/3 w. 10%
R9	130-203	40 ohm - 1/3 w. 10%
R10	130-205	100M ohm - ⅓ w. 10%
R11	130-4	3 megohm - 1/3 w. 20%
R12	130-9	200M ohm - 1/3 w. 20%
R13	130-102	500M ohm - 1/3 w. 10%
R14	130-46	800M ohm - 1/3 w. 10%
		CONDENSERS
C	102-63	2 Gang Variable
C1	129-86	.000038 Mica 5%
C2	129-87	.000105 Mica 10%
C3	100-77	.00304 x 600 v. 5%
C4	124-39C	2-25 mmf. Adjustable Condenser
C5	124-30B	2-20 mmf. Dual Adjustable Condenser
C6	124-30B	2-20 mmf. Dual Adjustable Condenser
C7	129-5	.0001 Mica 20%
C8	100-12	.003 x 600 25%
C9	124-44	450 wkg. cap. - Series pad
C10	129-85	.0014 - 2½ % Mica
C11	100-79	.25 x 400 v. 50 - 10%
C12	100-9	.05 x 200 v. 25%
C13	129-5	.0001 Mica 20%
C14	100-11	.01 x 400 v. 25%
C15	119-48	8 mfd. x 350 w. v. lytic
C16	129-2	.0005 Mica 20%
C17	100-16	.01 x 400 v. 10%
C18	100-13	.05 - 400 v. 25%
C19	119-48	4 mfd. x 350 w. v. lytic
C20	100-19	.006 x 600 v. 25%
C21	100-4	.1 x 200 v. 10%

C5 and C6 in same unit
C15 and C19 in same unit

		PARTS
T1	111-89	Antenna Coil Complete
T2	110-71	Oscillator Coil Complete
T3	108-105E	Input I.F. 465 kc. Complete
T4	108-106F	Output I.F. 465 kc. Complete
T5	105-57	Output Transformer
T6	114-110	6" Dynamic speaker (1550 Ohm Field)
T7	104-124	Power Transformer
S1	125-43	Wave band switch
S2		Switch on volume control

Voltages taken from different points of circuit to chassis are measured with volume control full on, all tubes in their sockets and speaker connected, with a volt meter having a resistance of 1000 ohms per volt. These voltages are clearly indicated on the circuit diagram.

All voltages are to be measured with 115 volts on the primary of the power transformer.

MODEL 582

535 to 1720 K.C.

2000 to 7000 K.C.

FOR TUNER DATA, SEE INDEX

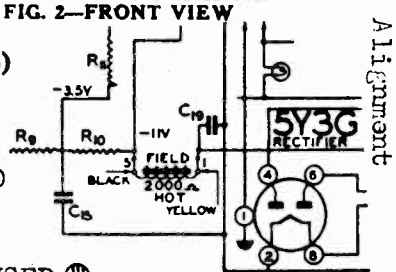
SERIES "A" (Serial No. 7L894500 and up)

R5	130-149	15M ohm - 1/3 w. 20%
R8	106-45	65 ohm 10%
R9	106-45	45 ohm 10%
R10	106-45	220 ohm 10%

R_{14} Grid Bias Res. NOT USED

C15	119-47	5.0 mfd. 250 w. v. lytic
C19	119-47	5.0 mfd. 250 w. v. lytic
C20	100-12	.003 x 600 v. 25%

C_{21} Bias-Filter Cond. NOT USED

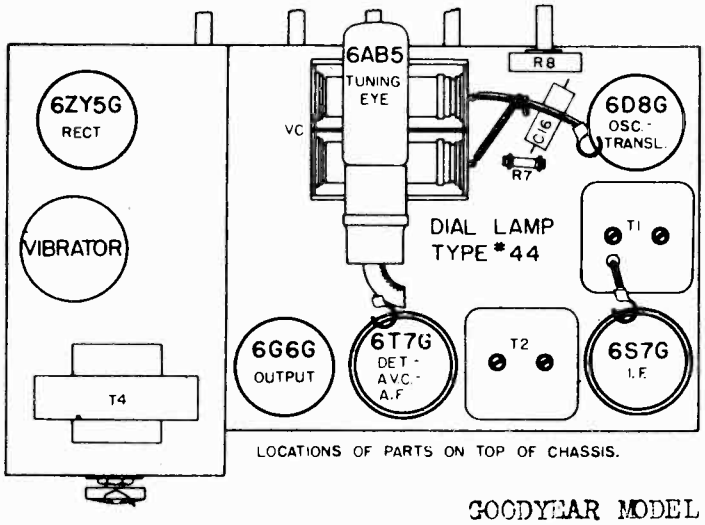


MODEL 015130
Socket, Trimmers

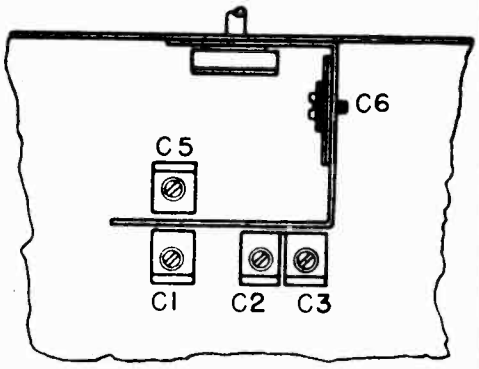
GOODYEAR TIRE & RUBBER CO., INC.

MODEL 015040
Schematic, Voltage
Socket, Trimmers
Alignment

WHERE NO VOLTAGE READING IS SHOWN AT SOCKET PRONG, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING.
ALIGNMENT IS TO BE MADE AT THE FREQUENCIES SHOWN AT THE TRIMMER CONDENSERS.
CAPACITY VALUES ARE IN MICROFARADS.



LOCATIONS OF PARTS ON TOP OF CHASSIS.

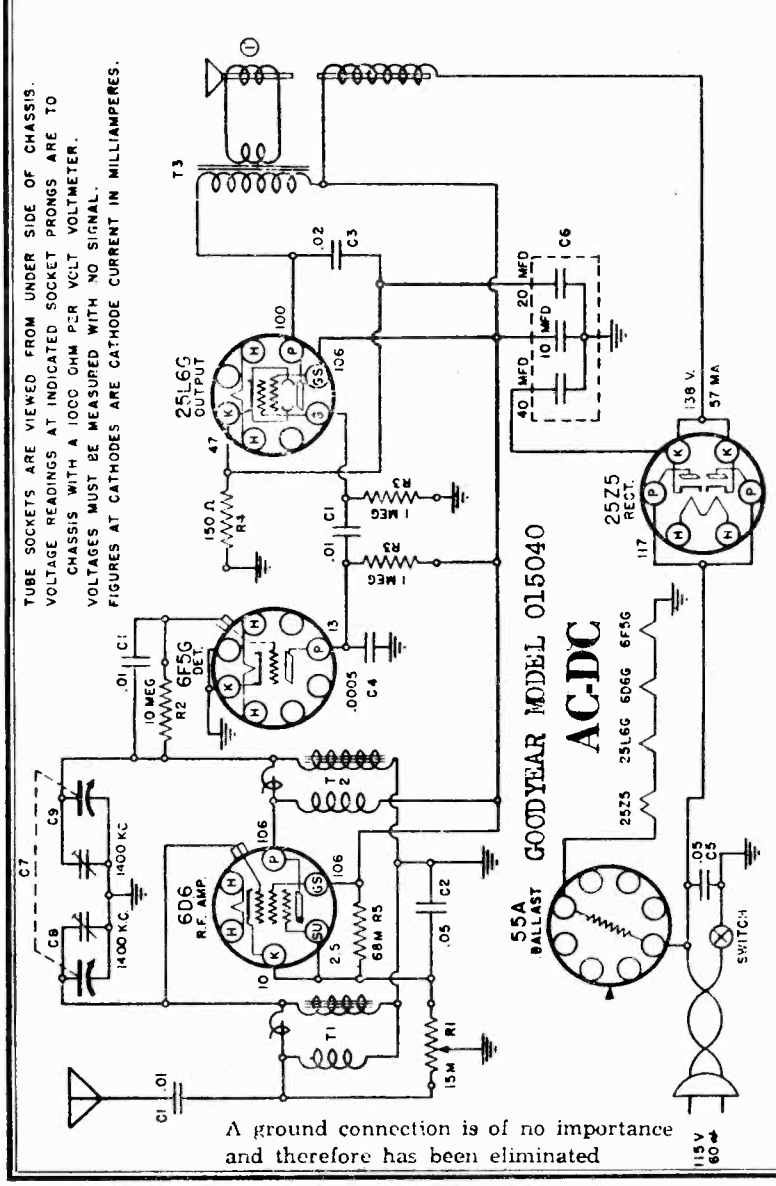


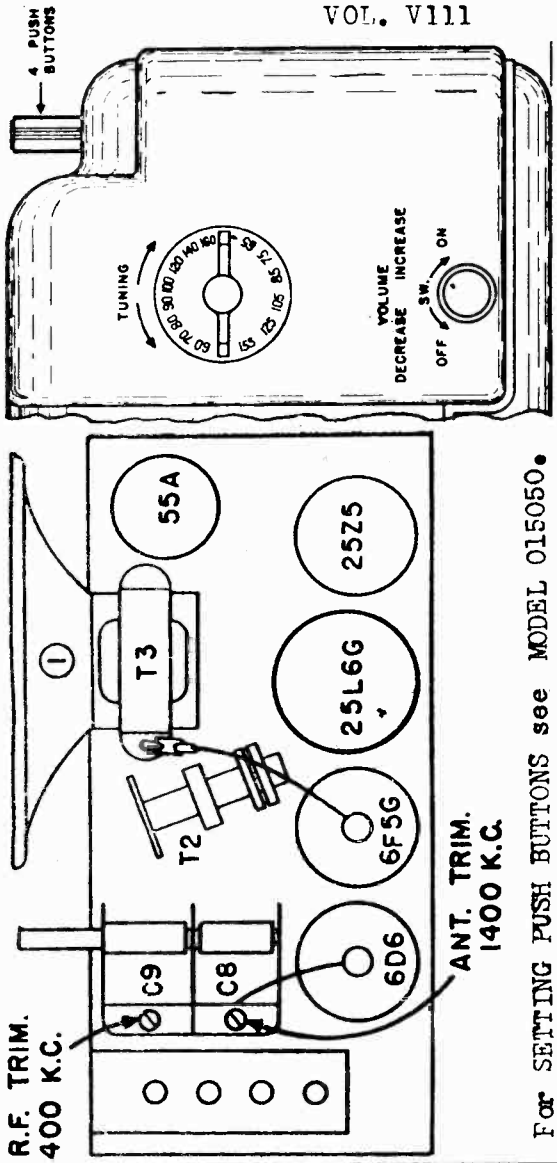
LOCATIONS OF TRIMMERS UNDER CHASSIS

GOODYEAR MODEL 015130.

CONVENTIONAL ALIGNMENT SEE SPECIAL SECTION VOL. V111

TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS.
VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO CHASSIS WITH A 1000 OHM PER VOLT VOLTMETER.
VOLTAGES MUST BE MEASURED WITH NO SIGNAL.
FIGURES AT CATHODES ARE CATHODE CURRENT IN MILLIAMPERES.

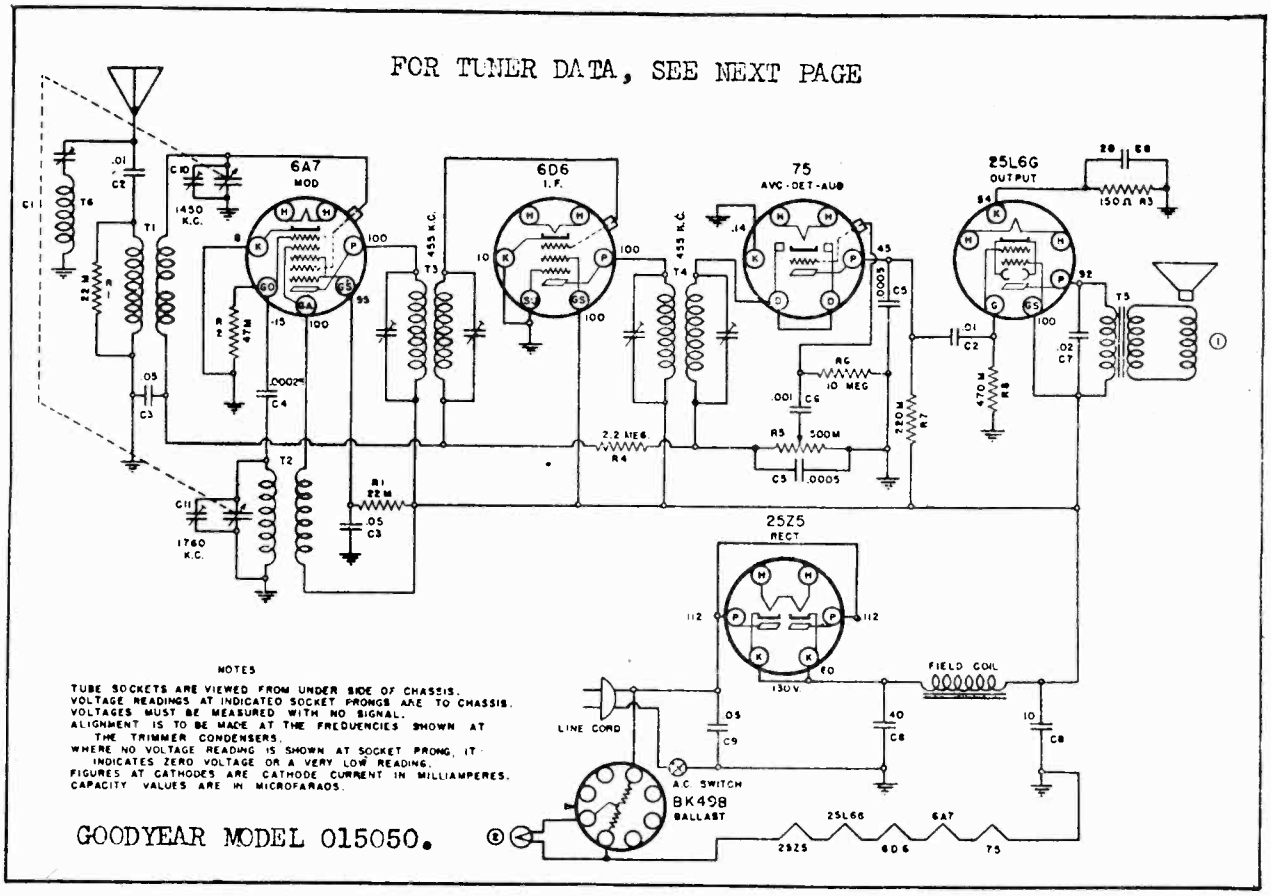




For SETTING PUSH BUTTONS see MODEL 015050.

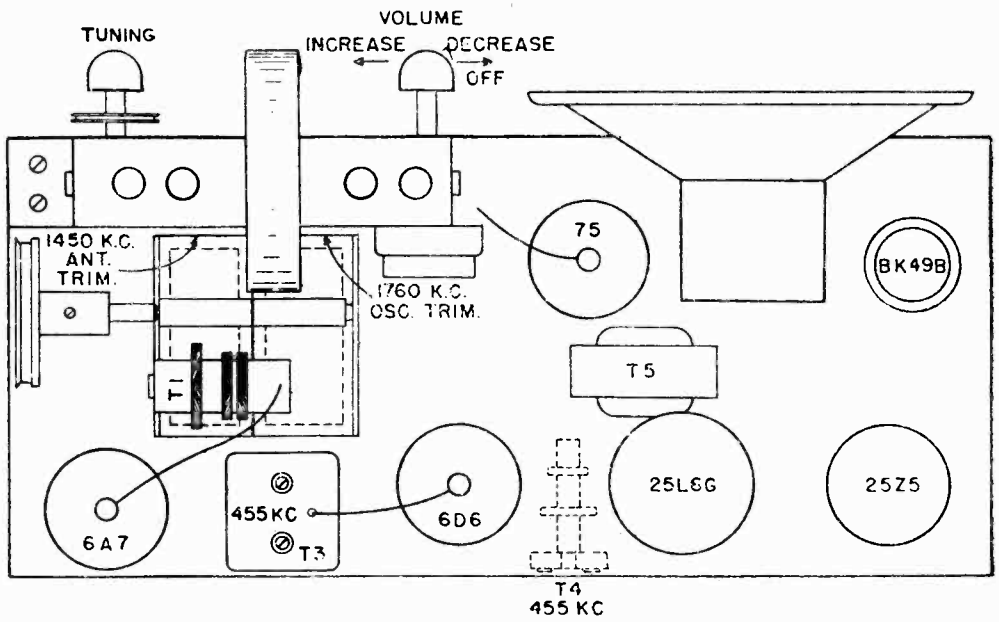
MODEL 015050
Schematic, Voltage
Socket, Trimmers
Alignment

GOODYEAR TIRE & RUBBER CO., INC.



GOODYEAR MODEL 015050.

FOR CONVENTIONAL ALIGNMENT
SEE SPECIAL SECTION VOL. VIII



IF PEAK 455 KC

POWER SUPPLY

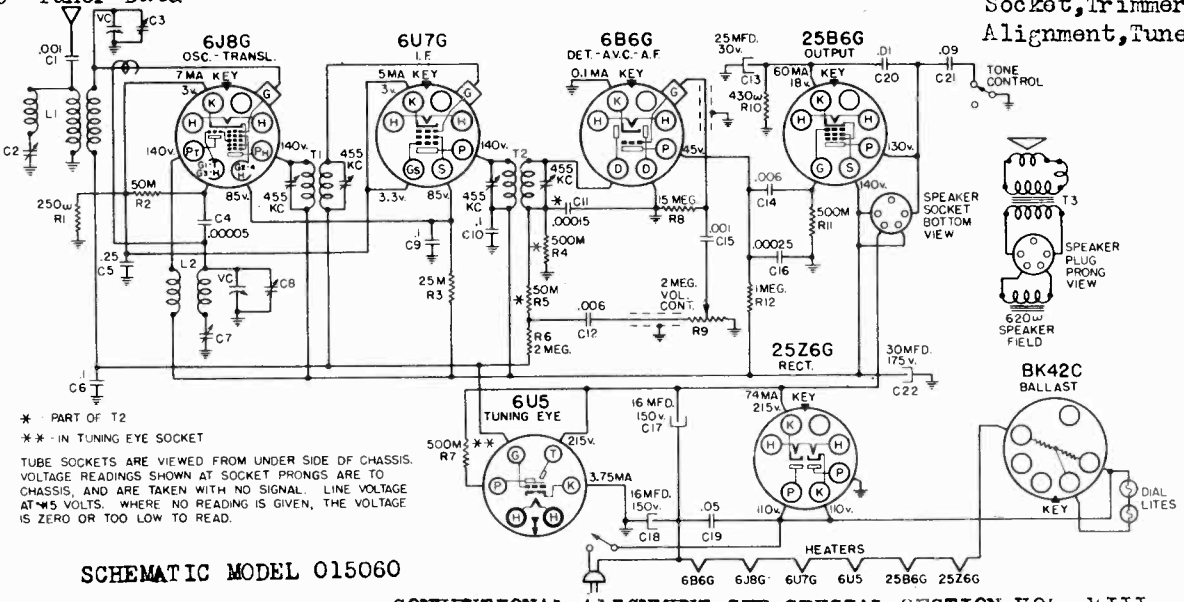
The receiver is designed for operation from 105-130 volt Alternating Current (A.C.) supply or a 105-130 volt Direct Current (D.C.) supply. Never connect the receiver to any supply having a higher voltage than that specified on the sticker. If you are not sure of the power supply voltage at your home, your Power Company will furnish the information.

When using a D.C. supply allow sufficient time for tubes to warm up (approximately 1½ minutes), and if at that time the receiver does not operate, remove the line cord plug from the socket and reverse. Replace plug in the reverse position and allow tubes to warm up, at which time the receiver will operate.

MODELS 015040,015050
015100,015110,015120
015130 Tuner Data

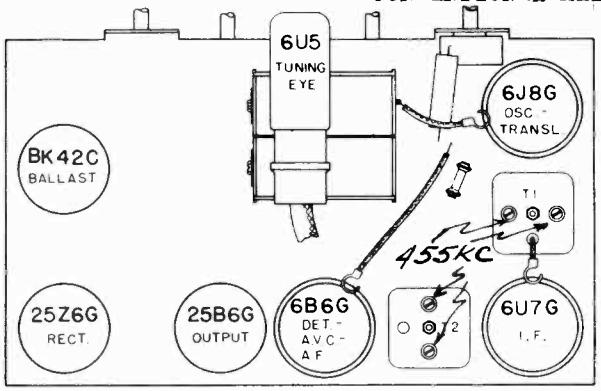
GOODYEAR TIRE & RUBBER CO., INC.

MODEL 015060
Schematic,Voltage
Socket,Trimmers
Alignment,Tuner

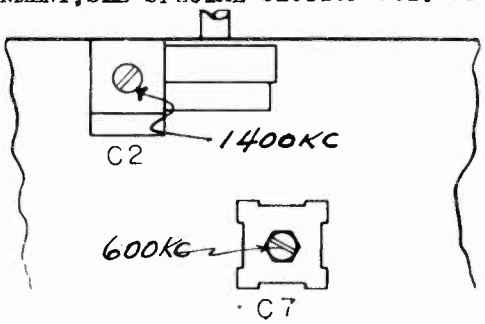


SCHEMATIC MODEL 015060

CONVENTIONAL ALIGNMENT, SEE SPECIAL SECTION VOL. VIII



LOCATION OF PARTS ON TOP OF CHASSIS



GOODYEAR MODEL 015060.
LOCATION OF TRIMMERS
UNDER CHASSIS

PUSH BUTTON TUNING FOR MODELS 015040, 015050, 015100, 015110

SETTING PUSH-BUTTONS

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

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

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

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

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

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

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

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

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

PUSH BUTTON TUNING FOR MODELS 015060, 015120, 015130

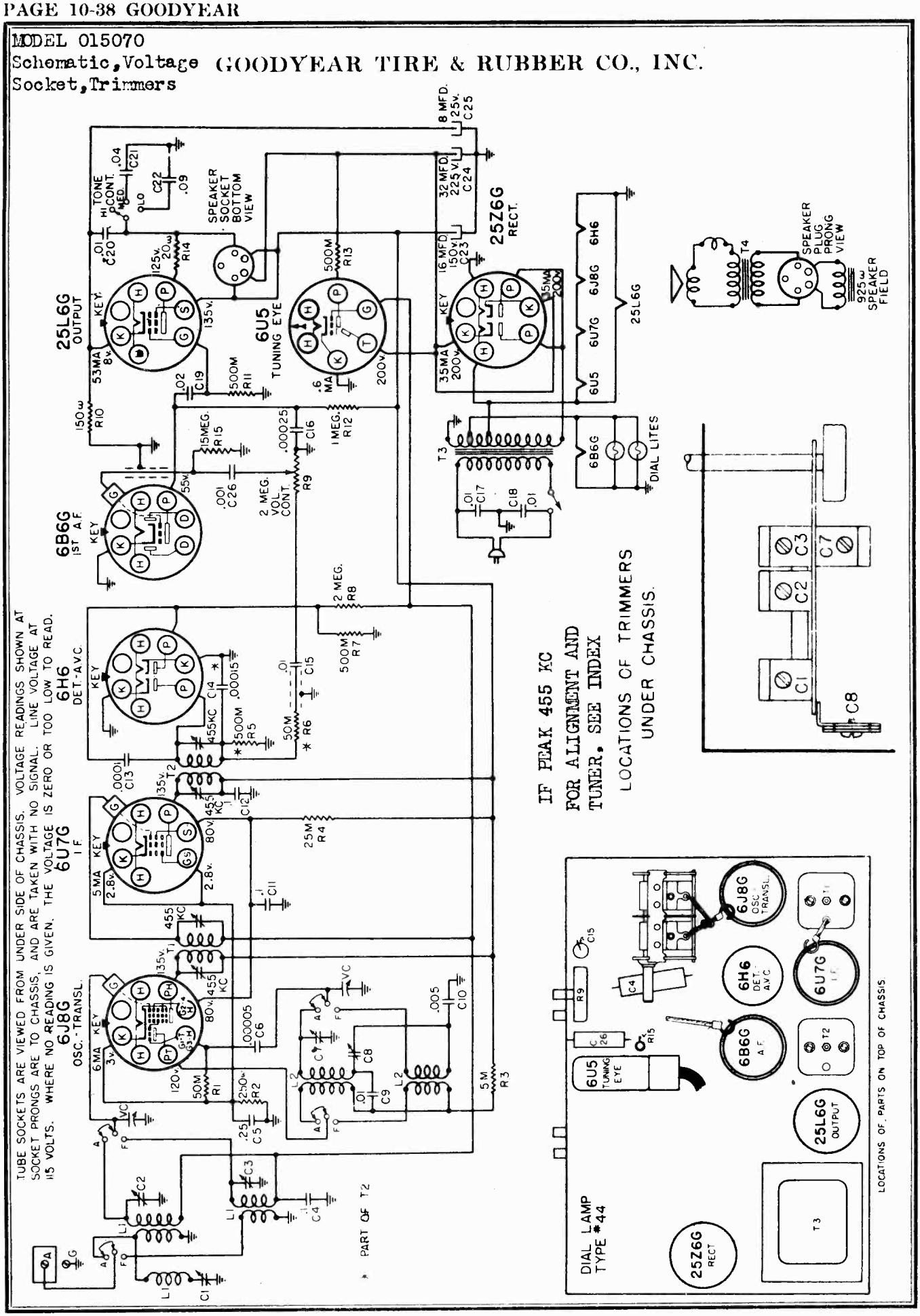
SETTING UP:

Unscrew (turn counter-clockwise) the push button two or three turns. (Use a token or screwdriver in the button slot to unscrew it, if necessary.) Push the button all the way in. Hold it in firmly and at the same time tune in your desired station. With your station tuned in, lock the adjustment by securely tightening (turn clockwise) the push button knob, using token or screwdriver. Hold the button in while tightening it. Unless the button is tightened securely, the adjustments may slip. Punch out the station's call letters from the sheet supplied and insert the call letters in the recess in the button. Then cover the call letters with one of the clear celluloid discs supplied.

Proceed in the same manner for the remaining buttons. If a change in selection of stations is desired, the old call letters can be removed with a pin inserted in the slot under the call letters.

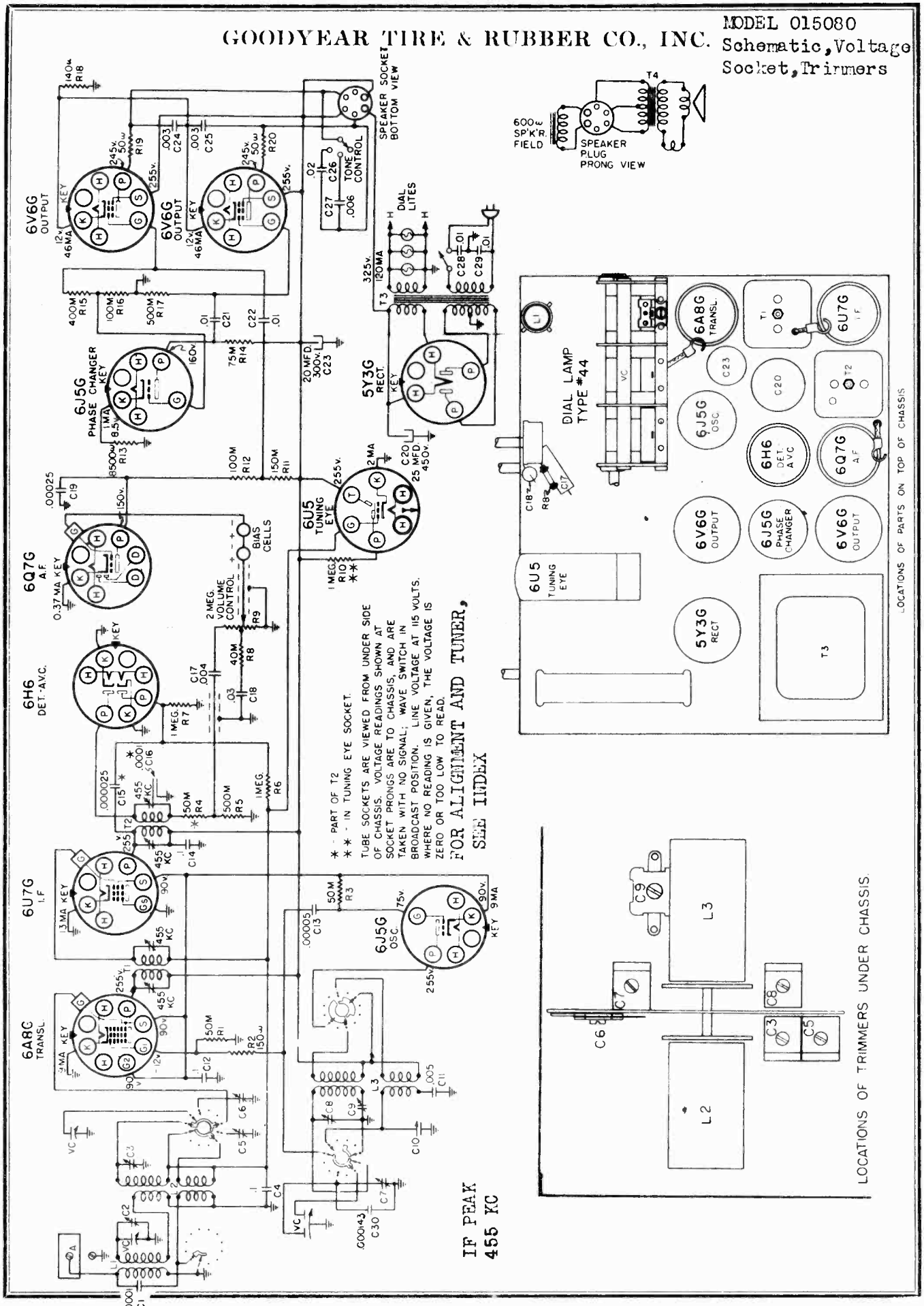
MODEL 015070
Schematic, Voltage Socket, Trimmers

GOODYEAR TIRE & RUBBER CO., INC.



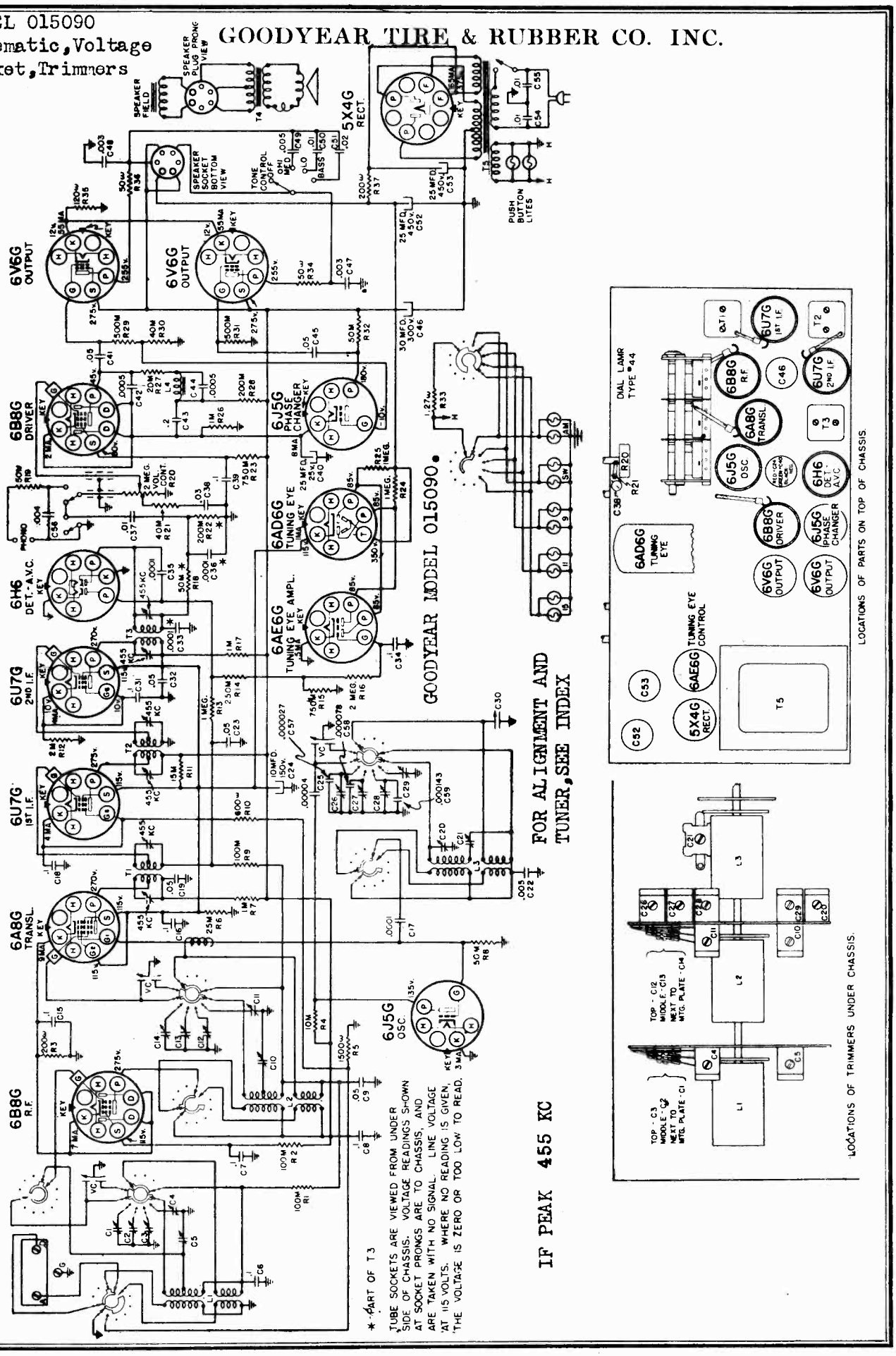
GOODYEAR TIRE & RUBBER CO., INC.

MODEL 015080
Schematic, Voltage
Socket, Trimmers



MODEL 015090
Schematic, Voltage
Socket, Trimmers

GOODYEAR TIRE & RUBBER CO. INC.



GOODYEAR TIRE & RUBBER CO., INC.

MODEL 015070
MODEL 015080
MODEL 015120
MODEL 015130
Alignment

GOODYEAR MODEL 015120

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection . . . . . Across loud speaker voice coil
Output meter reading to indicate 50 milliwatts . . . . . 0.37 volts
Generator ground lead connection . . . . . Receiver chassis
Dummy antenna value to be in series with generator output . . . . . See chart below
Connection of generator output lead . . . . . See chart below
Generator modulation . . . . . 30%, 400 cycles
Position of Volume Control . . . . . Fully clockwise
Position of Tone Control . . . . . HI
Position of Dial Pointer with variable fully closed . . . . . Horizontal

WAVE BAND SWITCH POSITION	POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMERS ADJUSTED (IN ORDER SHOWN)	TRIMMER FUNCTION
"AM"	Closed	455 kc	.1 mfd.	1C70 Grid	T2, T1	IF Output IF Input
"AM"	600 kc	455 kc*	.0002 mfd.	Ant. Term.	C1*	Wave Trap
"AM"	1400 kc	1400 kc	.0002 mfd.	Ant. Term.	C6, C2	Osc.,Transl.
"AM"	600 kc(rock)	600 kc	.0002 mfd.	Ant. Term.	C7	Padder
"SW"	16 mc(rock)	16 mc	400 ohms	Ant. Term.	C4	Transl.

IMPORTANT ALIGNMENT NOTES

* The generator should be adjusted for high output. The trimmer should be adjusted for minimum output meter reading instead of the usual maximum reading. If the frequency of an interfering station around 455 kc is known, the generator should be adjusted to the frequency of that station instead of to 455 kc.

Where indicated by the word, "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.

PUSH BUTTON TUNING

FOR SETTING UP PUSH BUTTONS
SEE GOODYEAR MODEL 015060

GOODYEAR MODEL 015130

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection . . . . . Across Loud speaker voice coil
Output meter reading to indicate 50 milliwatts . . . . . 0.32 volts
Generator ground lead connection . . . . . Receiver chassis
Dummy antenna value to be in series with generator output . . . . . See chart below
Connection of generator output lead . . . . . See chart below
Generator modulation . . . . . 30%, 400 cycles
Position of Volume Control . . . . . Fully clockwise
Position of Tone Control . . . . . HI
Position of Dial Pointer with variable fully closed . . . . . Horizontal. To be along first heavy line below 550 kc

WAVE BAND SWITCH POSITION	POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMERS ADJUSTED (IN ORDER SHOWN)	TRIMMER FUNCTION
"AM"	Closed	455 kc	.1 mfd.	6D6G Grid	T2, T1	IF Output IF Input
"AM"	900 kc	455 kc*	.0002 mfd.	Ant. Term.	C1*	Wave Trap
"AM"	1500 kc	1500 kc	.0002 mfd.	Ant. Term.	C5, C2	Os.,Transl.
"AM"	600 kc(rock)	600 kc	.0002 mfd.	Ant. Term.	C6	Padder
"SW"	15 mc(rock)	15 mc	400 ohms	Ant. Term.	C3	Transl.

IMPORTANT ALIGNMENT NOTES

* The generator should be adjusted for high output. The trimmer should be adjusted for minimum output meter reading instead of the usual maximum reading. If the frequency of an interfering station around 455 kc is known, the generator should be adjusted to the frequency of that station instead of to 455 kc.

Where indicated by the word, "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.

GOODYEAR MODEL 015070

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection . . . . . Across loud speaker voice coil
Output meter reading to indicate 500 milliwatts . . . . . 1.22 volts
Generator ground lead connection . . . . . Receiver chassis
Dummy antenna value to be in series with generator output . . . . . See chart below
Connection of generator output lead . . . . . See chart below
Generator modulation . . . . . 30%, 400 cycles
Position of Volume Control . . . . . Fully clockwise
Position of Tone Control . . . . . HI
Position of Dial Pointer with variable fully closed . . . . . Center of first mark to left of 550 kc calibration mark.

WAVE BAND SWITCH POSITION	POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMERS ADJUSTED (IN ORDER SHOWN)	TRIMMER FUNCTION
"AM"	Closed	455 kc	.1 mfd.	6J8G Grid	T2, T1	IF Output IF Input
"AM"	600 kc	455 kc*	.0002 mfd.	Ant. Term.	C1*	Wave Trap
"AM"	Fully open	1720 kc	.0002 mfd.	Ant. Term.	C7	Oscillator
"AM"	1400 kc	1400 kc	.0002 mfd.	Ant. Term.	C2	Translator
"AM"	600 kc (rock)	600 kc	.0002 mfd.	Ant. Term.	C8	Padder
"SW"	15 mc (rock)	15 mc	400 ohms	Ant. Term.	C3	Translator

IMPORTANT ALIGNMENT NOTES

* The generator should be adjusted for high output. The trimmer should be adjusted for minimum output meter reading instead of the usual maximum reading. If the frequency of an interfering station around 455 kc is known, the generator should be adjusted to the frequency of that station instead of to 455 kc.

Where indicated by the word, "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.

GOODYEAR MODEL 015080

ALIGNMENT PROCEDURE

PRELIMINARY.

Output meter connection . . . . . Across loud speaker voice coil
Output meter reading to indicate 500 milliwatts . . . . . 0.98 volts
Generator ground lead connection . . . . . Receiver chassis
Dummy antenna value to be in series with generator output . . . . . See chart below
Connection of generator output lead . . . . . See chart below
Generator modulation . . . . . 30%, 400 cycles
Position of Volume Control . . . . . Fully clockwise
Position of Tone Control . . . . . HI
Position of Dial Pointer with variable fully closed . . . . . Center of block to left of 550 kc calibration mark.

WAVE BAND SWITCH POSITION	POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMERS ADJUSTED (IN ORDER SHOWN)	TRIMMER FUNCTION
"AM"	Closed	455 kc	.1 mfd.	6A8G Grid	T2, T1	IF Output IF Input
"SW"	15 mc(rock)	15 mc	400 ohms	Ant. Term.	C5	Translator
"OMC"	9.55 mc	9.55 mc	400 ohms	Ant. Term.	C7* C6	Oscillator Translator
"AM"	1400 kc	1400 kc	.0002 mfd.	Ant. Term.	C8,C3,C2	Osc.,Trans,Ant.
"AM"	900 kc(rock)	900 kc	.0002 mfd.	Ant. Term.	C9	Padder

IMPORTANT ALIGNMENT NOTES

The alignment must be done in the order given.

*Two peaks can be had, one with the trimmer screwed further out than the other. The correct adjustment is with the trimmer screwed further out. The other peak is the image.

Where indicated by the word, "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.

MODELS 015080 and 015090

PUSH BUTTON TUNING

SETTING UP:

Leave the radio turned on for about 15 minutes before adjusting the push buttons. This "warming up" period will insure permanent and accurate settings.

1. Make a list of the stations that you want to set up for push button tuning. It is helpful to arrange the stations in the order of their frequency (kilocycles); that is, the station of lowest frequency will be #1, the station of next higher frequency #2, etc. The top left push button can be used for station #1, the lower left one for station #2, the next upper one for station #3, etc. If you wish, short wave stations that can be tuned in on a SPREAD BAND scale can be set up for push button tuning. The stations selected must give strong and reliable reception.

2. Remove the four screws that hold the plate through which the push buttons protrude, and remove the plate. (This plate is called the "escutcheon".)

3. Push the tuning knob in and turn it so that the dial pointer comes to the left end of the dial. Engage the small screw driver, supplied, with the slotted shaft that is between the tuning knob and the push buttons. Unlock the mechanism by pushing the shaft in and unscrewing it (turn counter-clockwise) about four turns. Then remove the screw driver.

4. Push the button that you wish to use for your #1 station, all the way in and hold it in firmly. Push the tuning knob in and turn it until your #1 station is tuned in exactly, as indicated by the tuning eye. Be as exact as possible in tuning your station since this will determine how accurately your station will be tuned whenever you use the push button. Then let go of the push button before turning the tuning knob again. If properly done, the tuning eye indication will not change when you let go of the push button.

5. Push in your #2 button. Hold it in firmly and tune in your #2 station accurately. Then let go of the push button; then the tuning knob. Proceed in the same manner for the other stations on your list.

CAUTION: Use the small screw driver supplied for performing the next operation. Use of a larger screw driver than the one supplied will result in too much force being applied. The locking mechanism must not be turned too far to the right. Otherwise it may be impossible to obtain proper operation of the push buttons and the mechanism is liable to be permanently damaged.

6. After the last station has been set up, lock the mechanism by pushing the slotted shaft in and securely tightening it (turn clockwise), using the small screw driver, supplied. (Pushing the slotted shaft in will release the last push button. The dial pointer will move to the right end of the dial as the slotted shaft is turned.) Then remove the screw driver. If the slotted shaft remains pushed in when the screw driver is removed, turning it back and forth very slightly will release it.

After locking the mechanism, test the setting of each button by pushing it in. Then see if the station can be tuned still more accurately by using the tuning knob. Increased accuracy of tuning with the knob will be indicated by a narrower shadow of the tuning eye. If you find any stations that have not been correctly set up, unlock the mechanism, as described in Step 3, and readjust the setting. Be sure to lock the mechanism again before tuning any stations.

7. Punch out the call letters of your desired stations from the call letter sheets supplied. Insert the call letters in the recesses in the front of the push buttons. Cover the call letters with the clear celluloid tabs supplied. Replace the escutcheon.

8. You may change your choice of stations at any time by unlocking the mechanism as described in Step 3 and adjusting the button to the new station, as described in Step 4. Then relock the mechanism as described in Step 6. The call letters of the new station should be inserted in the proper push button.

OPERATION:

Push the button, indicated for your desired station, all the way in. Your station then will be tuned in. If you have selected short wave stations for push button tuning, be sure the band switch is turned to the proper band. The button will remain part way in, indicating what station is tuned in, until you push another button or until you push the tuning knob.

GOODYEAR 015070

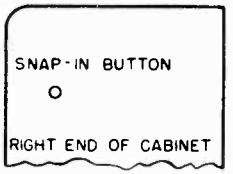


FIG. 1

KEY FOR LOCKING AND UNLOCKING PUSH-BUTTON MECHANISM.

FIG. 2

SETTING UP:

Leave the radio turned on for about 15 minutes before adjusting the push buttons. This "warming up" period will insure permanent and accurate settings.

1. Make a list of the stations that you want to set up for push button tuning. It is advisable, but not necessary, to arrange the stations in the order of their frequency (kilocycles); that is, the station of lowest frequency will be #1, the station of next higher frequency #2, etc. The top left push button can be used for station #1, the lower left one for station #2, the next upper one for station #3, etc. If you wish, short wave stations can be set up for approximate push button tuning and then tuned accurately with the tuning knob. The stations selected must give strong and reliable reception.

2. Remove the four screws that hold the plate through which the push buttons protrude, and remove the plate. (This plate is called the "escutcheon".) If your radio is a table model (not a console), remove the snap-in button at the right side of the cabinet. See Fig. 1.

3. Push the tuning knob in and turn it so that the dial pointer comes to the right end of the dial. If your radio is a table model, a key, illustrated in Fig. 2, will be found in the Instruction Leaflet envelope. Insert this key in the hole in the side of the cabinet from which the snap-in button was removed and engage the key with the slot at the end of the push button locking mechanism. Unscrew (turn counter-clockwise) the key a few turns, unlocking the mechanism. (A screw driver can be used for unlocking the mechanism instead of the key supplied.)

If yours is a console model, the mechanism can be unlocked by reaching in from the back of the cabinet and unscrewing (turning counter-clockwise) the wing nut, at the end of the mechanism, a few turns. (This can be done by hand.)

4. Push the button that you wish to use for your #1 station, all the way in and hold it in firmly. Push the tuning knob in and turn it until your #1 station is tuned in exactly. Then let go of the push button, making sure not to turn the tuning knob until you have let go of the button. (Turning the knob while the button is pushed in would spoil the accuracy of the adjustment.) Be as exact as possible in tuning your station since this will determine how accurately your station will be tuned whenever you use the push button.

5. Push in your #2 button. Hold it in firmly and tune in your #2 station accurately. Then let go of the push button and then the tuning knob. Proceed in the same manner for the other stations on your list.

6. When all of the stations have been set up, push the tuning knob in and turn it so that the dial pointer comes to the left end of the dial. Then lock the mechanism by tightening (turning clockwise) the wing nut for console models or by using the key for table models. If yours is a table model, replace the snap-in button in the side of the cabinet.

7. Punch out the call letters of your desired stations from the call letter sheets supplied. Insert the call letters in the celluloid holders at the back of the escutcheon. Be sure to insert the call letters so that they are opposite their respective push buttons. Then replace the escutcheon.

8. You may change your choice of stations at any time by unlocking the mechanism as described in Step 3 and adjusting the button to the new station, as described in Step 4. Then relock the mechanism as described in Step 6. The call letters of the new station should be inserted in the call letter holder in their proper position.

MODEL 015090
Alignment
MODEL 015120
Socket, Trimmers

GOODYEAR TIRE & RUBBER CO., INC.

ALIGNMENT GOODYEAR MODEL 015090

Output meter connection ..... Across loud speaker voice coil
Output meter reading to indicate 500 milliwatts.....1.06 volts*
Generator ground lead connection .....Receiver chassis
Dummy antenna value to be in series with generator output, See chart below
Connection of generator output lead..... See chart below
Generator modulation..... 30%, 400 cycles
Position of volume control..... Fully clockwise
Position of tone control..... HI
Position of dial pointer(variable closed) .... Center of block to left of 550 kc calibration mark.

WAVE BAND SWITCH POSITION	POSITION OF VARIABLE	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMERS ADJUSTED (IN ORDER SHOWN)	TRIMMER FUNCTION
"AM"	Closed	455 kc	.1 mfd.	6A8G Grid	T3, T2, T1	IF Output, IF Interstage, IF Input.
"SW"	18 mc	18 mc	400 ohms	Ant. Term.	C39*	Oscillator
"SW"	15 mc (rock)	15 mc	400 ohms	Ant. Term.	C11, C4	Translator, RF
"9"	9.55 mc	9.55 mc	400 ohms	Ant. Term.	C28* C12 C3	Oscillator Translator RF
"11"	11.7 mc	11.7 mc	400 ohms	Ant. Term.	C27* C13 C3	Oscillator Translator RF
"15"	14.9 mc	14.9 mc	400 ohms	Ant. Term.	C38* C14 C1	Oscillator Translator RF
"AM"	1400 kc	1400 kc	.0002 mfd.	Ant. Term.	C30 C10 C5	Oscillator Translator RF
"AM"	600 kc (rock)	600 kc	.0002 mfd.	Ant. Term.	C31	Padder

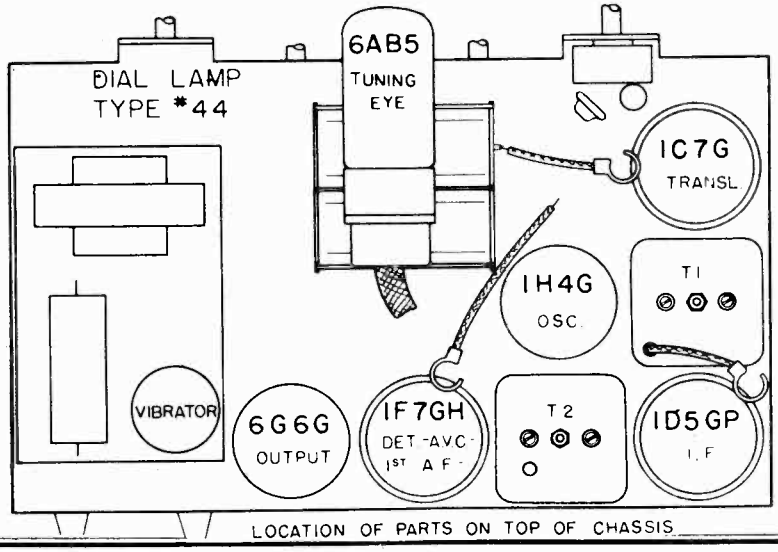
IMPORTANT ALIGNMENT NOTES

The alignment must be done in the order given.

*Two peaks can be had, one with the trimmer screwed further out than the other. The correct adjustment is with the trimmer screwed further out. The other peak is the image.

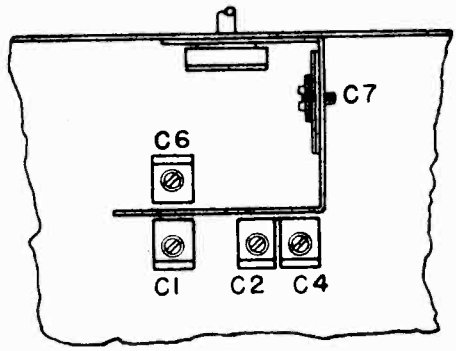
Where indicated by the word, "Rock", the variable should be rocked back and forth a degree or two while making the adjustment.

The alignment procedure should be repeated stage by stage, in the original order, for greatest accuracy. Always keep the output from the test oscillator at its lowest possible value to make the AVC action of the receiver ineffective.



LOCATION OF PARTS ON TOP OF CHASSIS

MODEL 015120



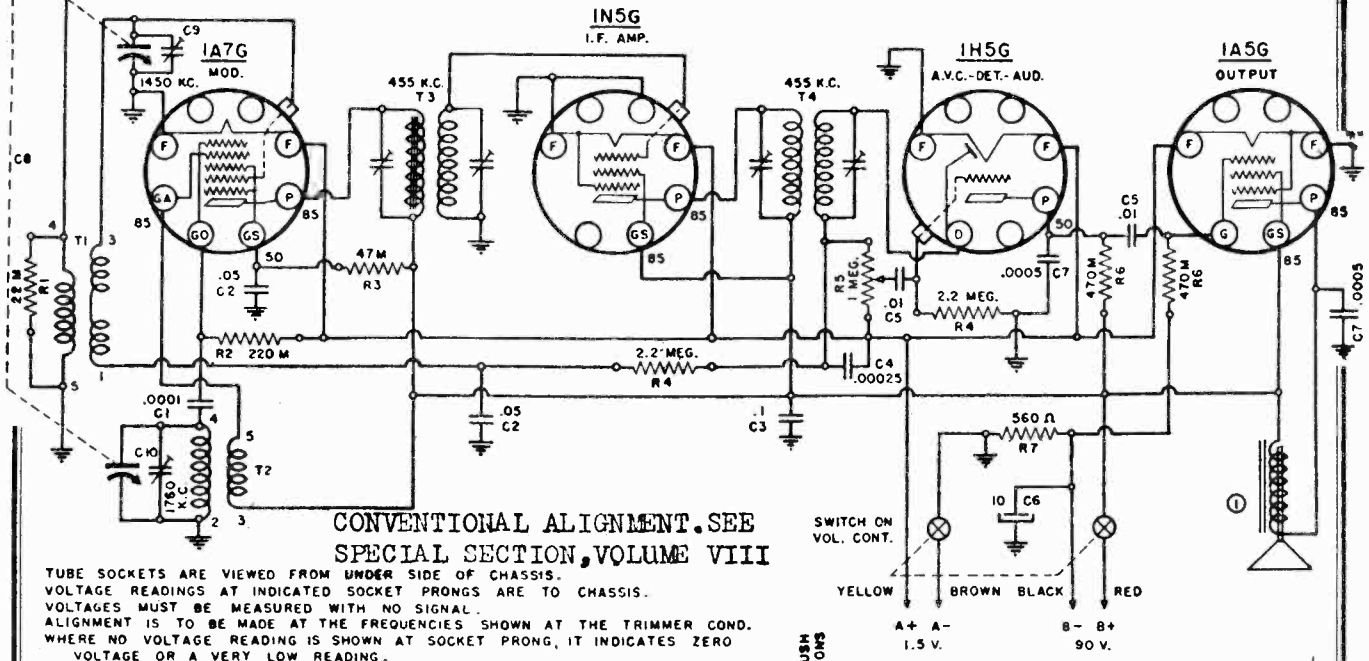
LOCATIONS OF TRIMMERS UNDER CHASSIS

MODEL 015100
Schematic, Voltage

GOODYEAR TIRE & RUBBER CO., INC.

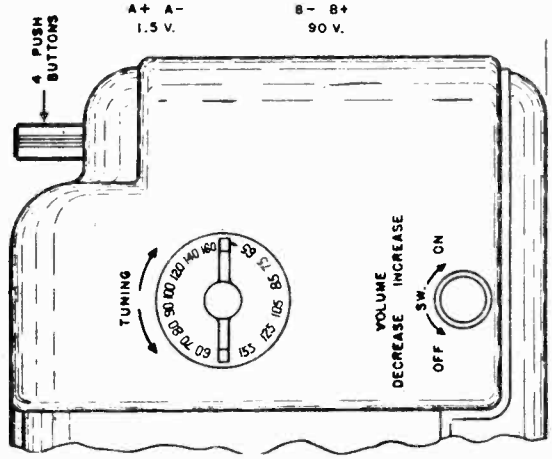
Socket, Trimmers
Alignment

FOR SETTING UP PUSH BUTTONS - SEE GOODYEAR MODEL 015050



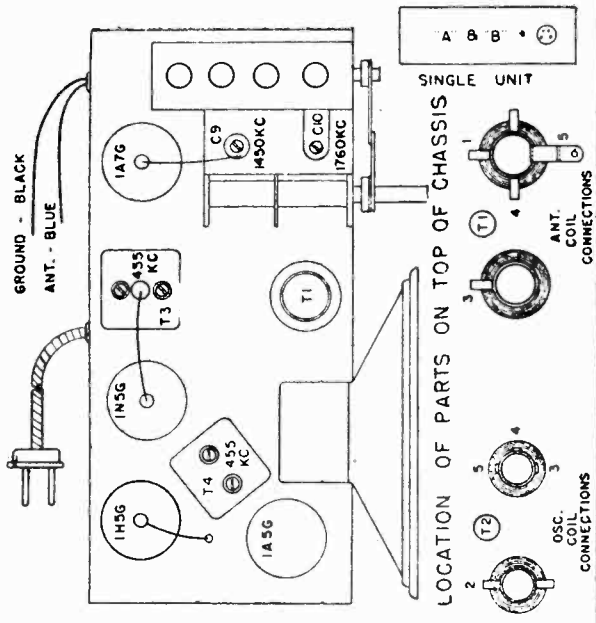
CONVENTIONAL ALIGNMENT. SEE SPECIAL SECTION, VOLUME VIII

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



Schematic Location	Part No.	Description	Price Each
	10141463	Booklet—Call Letter	.25
	101419422	Booklet—Instruction	.25
	1011242184	Cabinet—Molded, Ivory	4.70
	1011242184	Cabinet—Molded, Walnut	2.65
	1011323130	Cable—Battery	.62
	101373509	Clips—Grid Doz.	.15
C1		Condenser—.0001 mfd. Mica	.25
C2		Condenser—.05 mfd. 200 V. Tub.	.25
C3		Condenser—.1 mfd. 200 V. Tub.	.25
C4		Condenser—.00025 mfd. Mica	.25
C5		Condenser—.01 mfd. 400 V. Tub.	.25
C6	1012118235	Condenser—Elec. 10 mfd. 35 Volts	.50
C7		Condenser—.0005 mfd. Mica	.25
C8	1012019134	Condenser—Variable C9 and C10	.80
R5	1012524126	Control—Volume 1 meg ohm	.90
	101374710	Grommet—Rubber ⅜" Doz.	.20
	101374700	Grommet—Rubber ¼" Doz.	.20
	1014067367	Knob—Tuning, Ivory or Cream & Tan	.38
	1014052116	Knob—Volume, Ivory or Cream & Tan	.15
	1012752129	Knob—(Push Button) & Stem, Ivory or Cream and Tan	.15
	1012739251	Lever—Driven	.15
	1012739252	Lever—Driver	.10
	1012739253	Link—Connecting	.05
	10137862	Lockwasher—⅜" Doz.	.05
	1013756102	Nut—Hex ⅜" Doz.	.15
	1013783118	Panel—Back	.20
R1		Resistor—22 M ohm 1/3 W	.20
R2		Resistor—220 M ohm 1/3 W	.20
R3		Resistor—47 M ohm 1/3 W	.20
R4		Resistor—2.2 meg ohm 1/3 W	.20
R6		Resistor—470 M ohm 1/3 W	.20
R7		Resistor—560 ohm 1/3 W	.20
	10127654	Rivets—Shoulder Doz.	.10
	1012774117	Screws—Set 8/32 hex hd. cup. pt. Doz.	.20
	101386855	Socket—8 Prong	.10
1	10151179260	Speaker—5" Permanic	2.40
	1012770109	Spring	.05
T1	1011810258	Transformer—Antenna	.75
T2	1011810257	Transformer—Oscillator	.75
T3	1015510251	Transformer—1st I.F.	1.50
T4	1015710259	Transformer—2nd I.F.	1.25
	1013722112	Tri-points—Back panel Doz.	.15
	101289956	Tuner	1.30

ALL PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE



MODEL 015110
Schematic, Voltage
Socket, Trimmers
Alignment

GOODYEAR TIRE & RUBBER CO., INC.

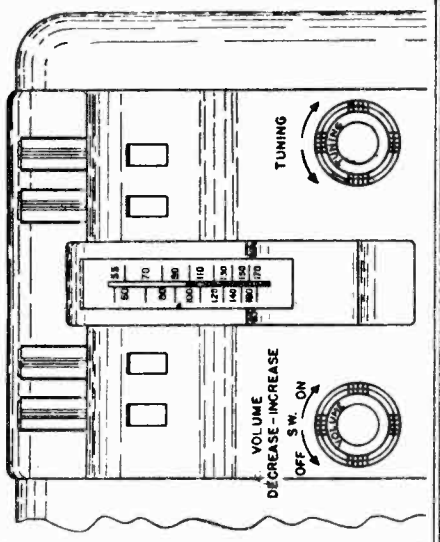
Schematic Location	Part No.	Description	Selling Price Each
	1011323128	Cable—Battery	.45
	101373509	Caps—Grid Small ..... Doz.	.10
	1012739257	Drum & Lever Assem.	.40
	1014052127	Knob—Tuning, Ivory or Cream & Tan	.15
	1014052132	Knob—Volume, Ivory or Cream & Tan	.15
	101318901	Lamp—Pilot No. 40	.15
	1012739248	Lever—Driver	.05
	1012739247	Link—Connecting	.05
L3	1011633218	Choke—Filament	.20
L2	1011610246	Choke—R.F. (B)	.20
L1	1011633217	Choke—Vibrator	.20
	101373516	Clamps—Battery	.20
C1	1012216127	Condenser—Buffer .004 mfd. 1000V	.25
C2		Condenser—.05 mfd. 400V Tub.	.25
C3		Condenser—.004 mfd. 400V Tub.	.25
C4		Condenser—.001 mfd. 400V Tub.	.25
C5		Condenser—.5 mfd. 200V Tub.	.25
C6		Condenser—.25 mfd. 200V Tub.	.25
C7		Condenser—.1 mfd. 200V Tub.	.25
C8		Condenser—.05 mfd. 200V Tub.	.25
C9		Condenser—.0005 mfd. Mica	.25
C10		Condenser—.00025 mfd. Mica	.25
C11		Condenser—.0001 mfd. Mica	.25
C12	1012118236	Condenser—Electrolytic 40x16 mfd. 200V	1.00
C13	1012019132	Condenser—Variable C14 & C15	2.05
	1012524124	Control—Volume 500M ohm	.75
1		1015179256 Speaker—5" P.M. with	5.00
T5	*	Output Transformer	
	1012770110	Spring—Drive	.05
	1012670111	Spring—Ribbon	.05
	1012770105	Spring—String	.05
T1	1011810239	Transformer—Antenna	.45
T2	1011810240	Transformer—Oscillator	.30
T3	1015510253	Transformer—1st I.F.	1.25
T4	1015710252	Transformer—2nd I.F.	.80
T6	1016580160	Transformer—Power, Virb.	1.75
	1013722112	Tripoints—Back Panel ..... Doz.	.15
	1013722103	Tripoints—Ribbon ..... Doz.	.15
	10127957	Tuner—4 Button	1.20
2	1016234103	Vibrator	4.00
	10128866	Washers—"C" ..... Doz.	.10

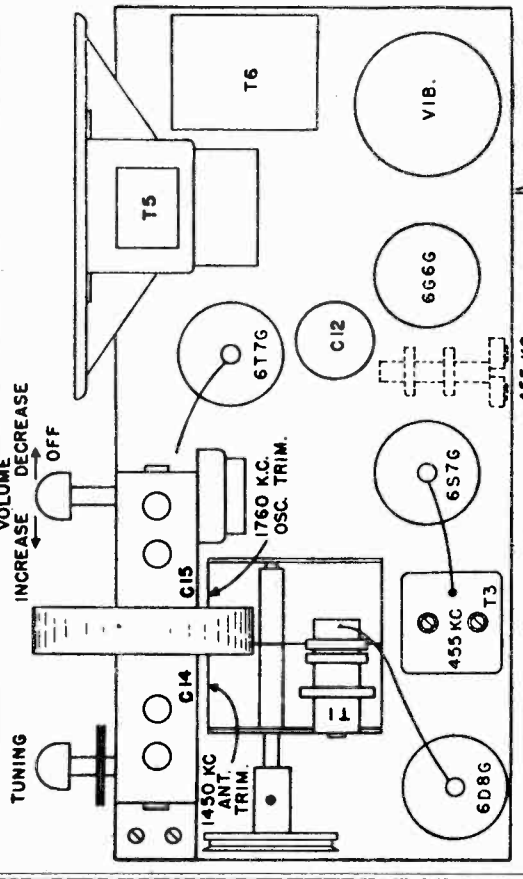
*When ordering Speaker output transformer refer to number stamped on speaker frame.

	1012752131	Push Button & Stems, Cream & Tan or Ivory	.15
R1		Resistors—10 meg ohm 1/3W	.20
R2		Resistors—1 meg ohm 1/3W	.20
R3		Resistors—220M ohm 1/3W	.20
R4		Resistors—47M ohm 1/3W	.20
R5		Resistors—22M ohm 1/3W	.20
R6		Resistors—15M ohm 1/3W	.20
R7		Resistors—100 ohm 1/3W	.20
R8		Resistors—1500 ohm 1/2W	.20
R9		Resistors—220 ohm 1/2W	.20

	10146844	Ribbon—Eyelet Assem. (Pointer)	.15
	101276504	Rivets—Shoulder ..... Doz.	.10
	10127845	Roller & Shaft Assem.	.35
	10126673394	Scale-Dial	.15
	10127741117	Screws—Set 8/32x3/8 hex. hd. cup pt. ..... Doz.	.10
	10128846	Shaft Assem.—Drive	.35
	101497717	Shield—Tube	.10
	101386852	Socket—6 Prong	.10
	101386855	Socket—8 Point	.10
	10138875	Socket—Pilot Light	.10

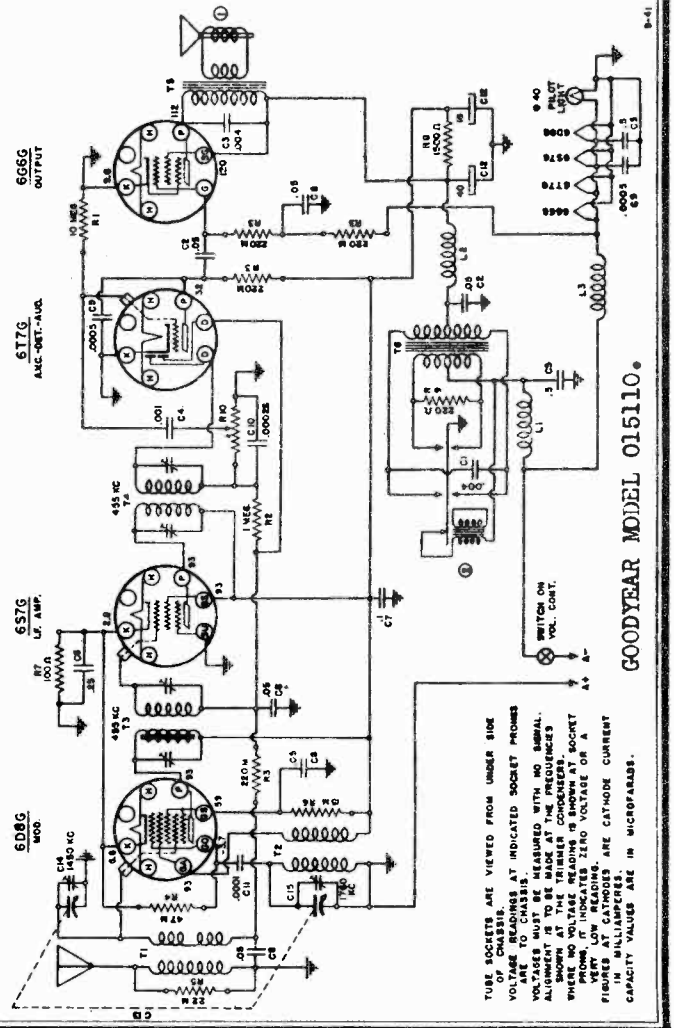
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE





CONVENTIONAL ALIGNMENT • SEE SPECIAL SECTION, VOLUME VIII

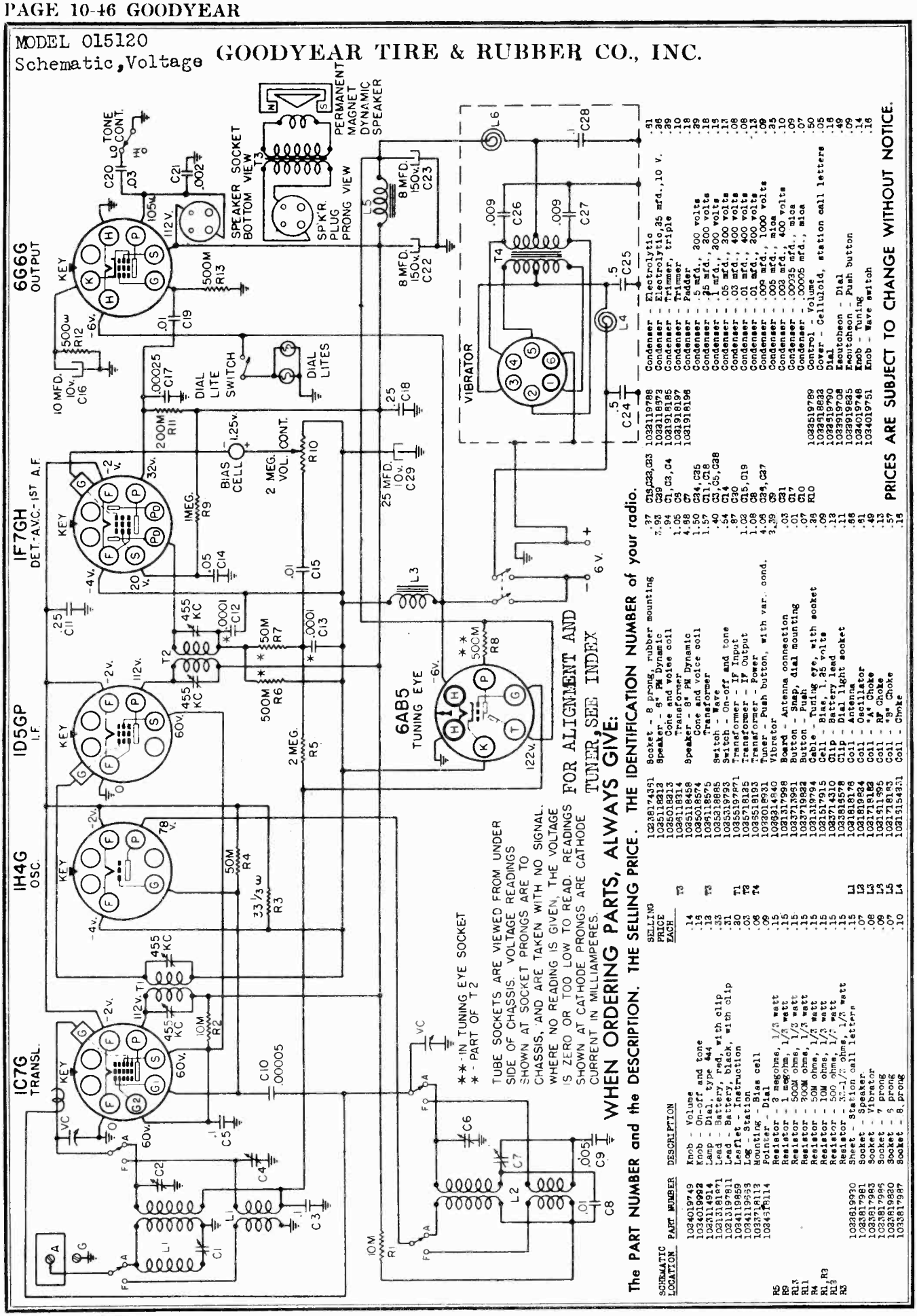
FOR SETTING UP PUSH BUTTONS - SEE GOODYEAR MODEL 015050



GOODYEAR MODEL 015110 •

MODEL 015120
Schematic, Voltage

GOODYEAR TIRE & RUBBER CO., INC.



** - IN TUNING EYE SOCKET
* - PART OF T2

TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS. VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO CHASSIS, AND ARE TAKEN WITH NO SIGNAL. WHERE NO READING IS GIVEN, THE VOLTAGE IS ZERO OR TOO LOW TO READ. READINGS SHOWN AT CATHODE PRONGS ARE CATHODE CURRENT IN MILLIAMPERES.

FOR ALIGNMENT AND TUNER, SEE INDEX

WHEN ORDERING PARTS, ALWAYS GIVE:

The PART NUMBER and the DESCRIPTION. THE SELLING PRICE. THE IDENTIFICATION NUMBER of your radio.

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION		SELLING PRICE EACH
	1034019749	Knob - Volume		.14
	1034019992	Knob - On-off and tone		.15
	1032114914	Lamp - Dial, type 44		.13
	1031318187	Lead - Battery, red, with clip		.33
	1031319781	Lead - Battery, black, with clip		.31
	1034119859	Leaflet - Instruction		.30
	1034119833	Log - Station		.05
	1033718113	Mounting - Bias cell		.06
	1034519114	Pointer - Dial		.09
R5		Resistor - 2 megohms, 1/3 watt		.15
R9		Resistor - 1 megohm, 1/3 watt		.15
R1,R		Resistor - 500M ohms, 1/3 watt		.15
R11		Resistor - 200M ohms, 1/3 watt		.15
R4		Resistor - 50M ohms, 1/3 watt		.15
R1, R3		Resistor - 10M ohms, 1/3 watt		.15
R13		Resistor - 500 ohms, 1/3 watt		.15
R3		Resistor - 33-1/3 ohms, 1/3 watt		.15
	1033819930	Sheet - Station call letters		.15
	1033817981	Socket - Speaker	L1	.07
	1033817983	Socket - Vibrator	L3	.08
	1033817985	Socket - 7 prong	L4	.09
	1033819820	Socket - 5 prong	L5	.07
	1033817987	Socket - 8 prong	L4	.10
	1033174351	Socket - 8 prong, rubber mounting		.37
	1035118213	Speaker - 6" PM Dynamic		.93
	1035018313	Cone and voice coil		.94
	1036118314	Transformer		1.05
	1036118458	Speaker - 8" PM Dynamic		4.88
	1035018574	Cone and voice coil		1.50
	1039118575	Transformer		1.57
	1035218885	Switch - Wave		.40
	1035319793	Switch - On-off and tone		.54
T1	1035519791	Transformer - IF Input		.87
T2	1035718125	Transformer - IF Output		1.03
T4	1035518193	Transformer - Power		1.08
	1033018931	Tuner - Push button, with var. cond.		4.08
	1038314840	Vibrator		3.39
	1031317998	Board - Antenna connection		.03
	1033719951	Button - Snap, dial mounting		.01
	1033719822	Button - Push		.07
	1031319794	Cable - Tuning eye, with socket		.36
	1031517915	Cell - Blue, 1.25 volts		.09
	1033714310	Clip - Battery lead		.13
	1033815578	Clip - Dial light socket		.11
L1	1031818178	Coil - Antenna		.86
L3	1031819824	Coil - Oscillator		.81
L4	1031718183	Coil - "A" Choke		.49
L5	1031311995	Coil - RF Choke		.13
L4	1031718183	Coil - "B" Choke		.57
	1031154311	Coil - Choke		.15
	1032119788	Condenser - Electrolytic		.91
	1033118373	Condenser - Electrolytic, 35 mfd., 10 v.		.86
	1031918185	Condenser - Trimmer, triple		.89
	1031918197	Condenser - Trimmer		.10
	1031918198	Condenser - Padder		.18
		Condenser - .5 mfd., 200 volts		.89
		Condenser - .25 mfd., 200 volts		.18
		Condenser - .1 mfd., 200 volts		.15
		Condenser - .05 mfd., 200 volts		.13
		Condenser - .03 mfd., 400 volts		.08
		Condenser - .01 mfd., 400 volts		.08
		Condenser - .01 mfd., 200 volts		.13
		Condenser - .009 mfd., 1000 volts		.09
		Condenser - .005 mfd., mica		.35
		Condenser - .003 mfd., 400 volts		.10
		Condenser - .00035 mfd., mica		.09
		Condenser - .00005 mfd., mica		.07
	1033519789	Control - Volume		.50
	1032918832	Cover - Celluloid, station call letters		.05
	1032919790	Dial		.16
	1033919708	Escutcheon - Dial		.49
	1033919685	Escutcheon - Push button		.09
	1034019748	Knob - Tuning		.14
	1034019751	Knob - Wave switch		.16

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.

MODEL 100502
Double Eagle
Above Serial 42,000
Schematic, Changes, Tuner

GOODYEAR TIRE & RUBBER CO., INC.

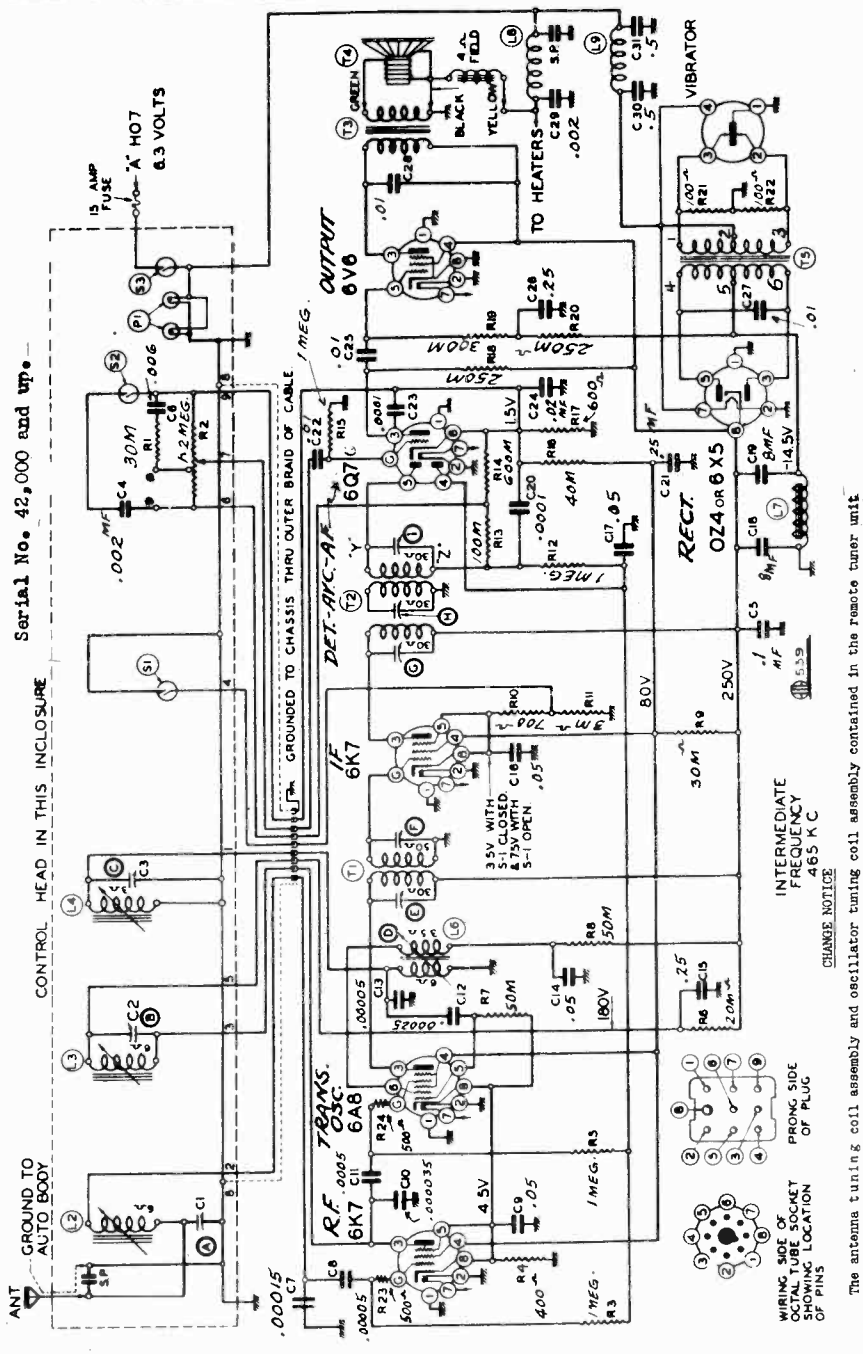
DIAGRAM FOR GOODYEAR CHASSIS 100502

SETTING THE AUTOMATIC TUNER LEVERS TO STATIONS:

When setting up stations for the tuner levers it is important that the lever is pressed all the way down and held firmly in this position until the station is carefully selected by means of the manual tuning control.

This same procedure is followed until all the levers have been set up for stations, then the locking screw should be turned until it is absolutely tight. This is extremely important inasmuch as if the locking screw is not tight the cams on the cam shaft will slip and the stations will not stay adjusted to the tuner lever settings.

To reset one or more tuner levers to other stations it is only necessary to loosen the locking screw sufficiently to permit the mechanism to turn freely when the lever is pressed down as explained above and select the new station for the particular lever, however, make sure to re-tighten the locking screw again to lock the cams back in place.



POWER TRANS COLOR CODE
1-YELLOW
2-YELLOW
(DOUBLE CONDUCTOR) 6-BLUE
3-YELLOW
4-BLUE
5- RED
6-BLUE

FOR EARLY SCHEMATIC OF COILS, SEE NEXT PAGE

CHANGE NOTICE

The antenna tuning coil assembly and oscillator tuning coil assembly contained in the remote tuner unit on all models, starting with serial No. 42,000, were revised slightly from the coils used on radios serial numbered from 30,000 to 40,500.

The two groups of coils are interchangeable, however, it is recommended that in cases where replacement of a coil is necessary, that the early type coils be used on radios serial numbered from 30,000 to 40,500 and the later type coils on radios serial numbered from 42,000 up, it is apparent that L1 and L5 have been eliminated in the later type coils.

The part numbers of the coils were changed and following is a list giving the part number for both groups of coils.

SERIAL NO. 30,000 to 40,500

Schematic Location	Part Number	Description	Selling Price Each
L1, L2	1001811196	Antenna tuning coil assembly complete with antenna trimmer assembly, antenna choke coil, iron slug and shield can	2.60
L4, L5	1001811077	Oscillator tuning coil assembly, complete with trimmer assembly, series oscillator coil, iron slug and shield can	2.60
		SERIAL NO. 42,000 AND UP	
L2	1001811100	Antenna tuning coil assembly, complete with antenna trimmer assembly, iron slug and shield can	2.60
L4	1001811084	Oscillator tuning coil assembly, complete with trimmer assembly, iron slug and shield can	2.60

POWER SUPPLY:
"A" . . 6 volt, Automobile storage battery.
"B" . . . . . Vibrator-Rectifier

"A" Drain . . . . . 7.5 amperes
"B" Drain . . . . . 57 ma

ALIGNMENT FREQUENCIES:

Oscillator . Antenna & Shunt Oscillator	
Trimmer	R.F. Trimmer
1580 kc	1400 kc
Trimmer	600 kc

LOUD SPEAKER:
Type . . . . . Dynamic
Size . . . . . 8"
Approximate Field Resistance . . 4 ohms

POWER OUTPUT:
Type . . . . . Beam Tube
Undistorted . . . . . 4 watts
Maximum . . . . . 7 watts

FREQUENCY RANGE:
Broadcast . . . . . 535-1560 kc

Model 100502
Double Eagle
Early Schematic of
Coils

GOODYEAR TIRE & RUBBER CO., INC.

ALIGNMENT PROCEDURE

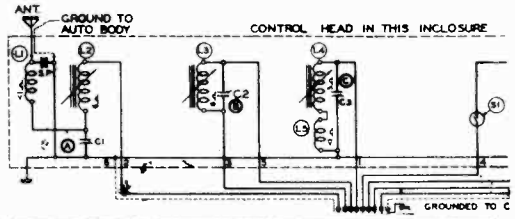
Early, Late
Alignment, Socket,
Trimmers

WIRING DIAGRAM FOR GOODYEAR WINGS 100502

Serial No. 30,000 to 40,500

Preliminary:

Output meter connections.....Across voice coil leads
Output meter readings to indicate 1 watt output.....1.78 volts
Average sensitivity in microvolts for 1 watt output.....3 micro volts
Dummy antenna value to be in series with generator output See chart below
Connection of generator output lead.....See chart below
Connection of generator ground lead.....To chassis
Generator modulation.....30%, 400 cycles
Position of volume control.....Fully clockwise
Position of tone control.....Snapped to "Hi"
Position of local-distance switch..... Snapped to Distance position



Dial setting of remote tuner unit	Generator Frequency	Dummy Antenna	Generator Connection	Trimmers Adjusted (in order shown)	Trimmer Function	Adjustment	Approximate Microvolts
1400 K.C.	465 K.C.	.5 mfd.	Grid of 6K7 I.F. tube	G, H See note "A" below	Output I.F.	Adjust to maximum output	20,000
1400 K.C.	465 K.C.	.5 mfd.	Grid of 6K7 I.F. tube	I See "B" below	Output I.F.	Adjust to maximum output	20,000
1400 K.C.	465 K.C.	.5 mfd.	Grid of 6A8 Converter Tube	E,F	Input I.F.	Adjust to maximum output	512
1560 K.C.	1560 K.C.	.000175 mfd.	Antenna Lead	C. See Fig. 11	Oscillator	Adjust to resonance	512
1400 K.C.	1400 K.C.	.000175 mfd.	Antenna Lead	A, B See Fig. 11	Antenna and R.F.	Adjust to maximum output	3
600 K.C.	600 K.C.	.000175 mfd.	Antenna Lead	D See Fig. 10	Shunt oscillator Series adjustment	Adjust to maximum output Rock dial See note "C"	1.5

IMPORTANT ALIGNMENT NOTES

A- To align the output I.F. transformer without using a cathode ray oscillograph, a 10M ohm resistor must be shunted across one winding of the output I.F. coil assembly while adjustment to trimmers G and H are being made.

Connect the resistor as indicated by points "Y" and "Z" on the circuit diagram as follows:

Locate the wires coming from the bottom of the output I.F. coil assembly on the underside of the radio chassis.

The white lead with green tracer which is connected to diode plate terminal No. 5 on the 6Q7 tube socket is one point and the white lead with brown tracer which is connected to the end terminal of the terminal strip is the other point.

B- Disconnect the 10M ohm resistor before adjusting trimmer "I". If a cathode ray oscillograph is used it will not be necessary to connect a 10M ohm resistor across a portion of the I.F. coil as explained.

C- When adjusting the shunt oscillator trimmer "D", which is mounted on the base of the radio receiver unit (See Fig. #10), the dial on the remote tuner unit should be rotated slightly to and fro at the same time adjusting trimmer "D" for maximum gain.

It is advisable to repeat the entire alignment procedure to insure greater accuracy.

Always keep the output from the test generator (oscillator) at its lowest possible value. As the sensitivity is increased by alignment, the generator output should be reduced correspondingly.

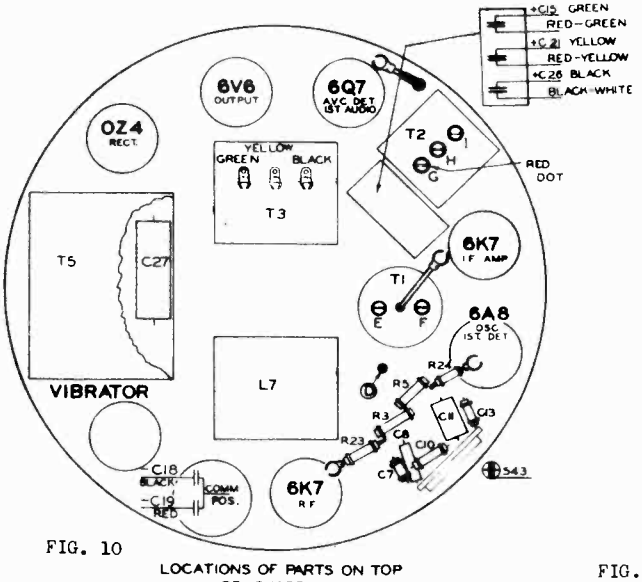


FIG. 10
LOCATIONS OF PARTS ON TOP OF CHASSIS

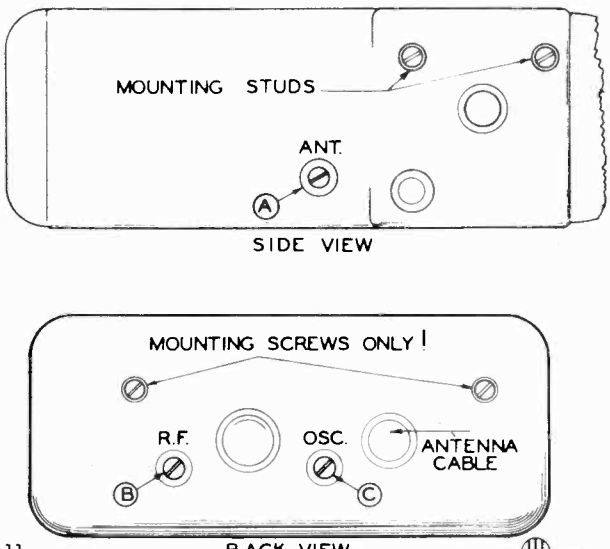
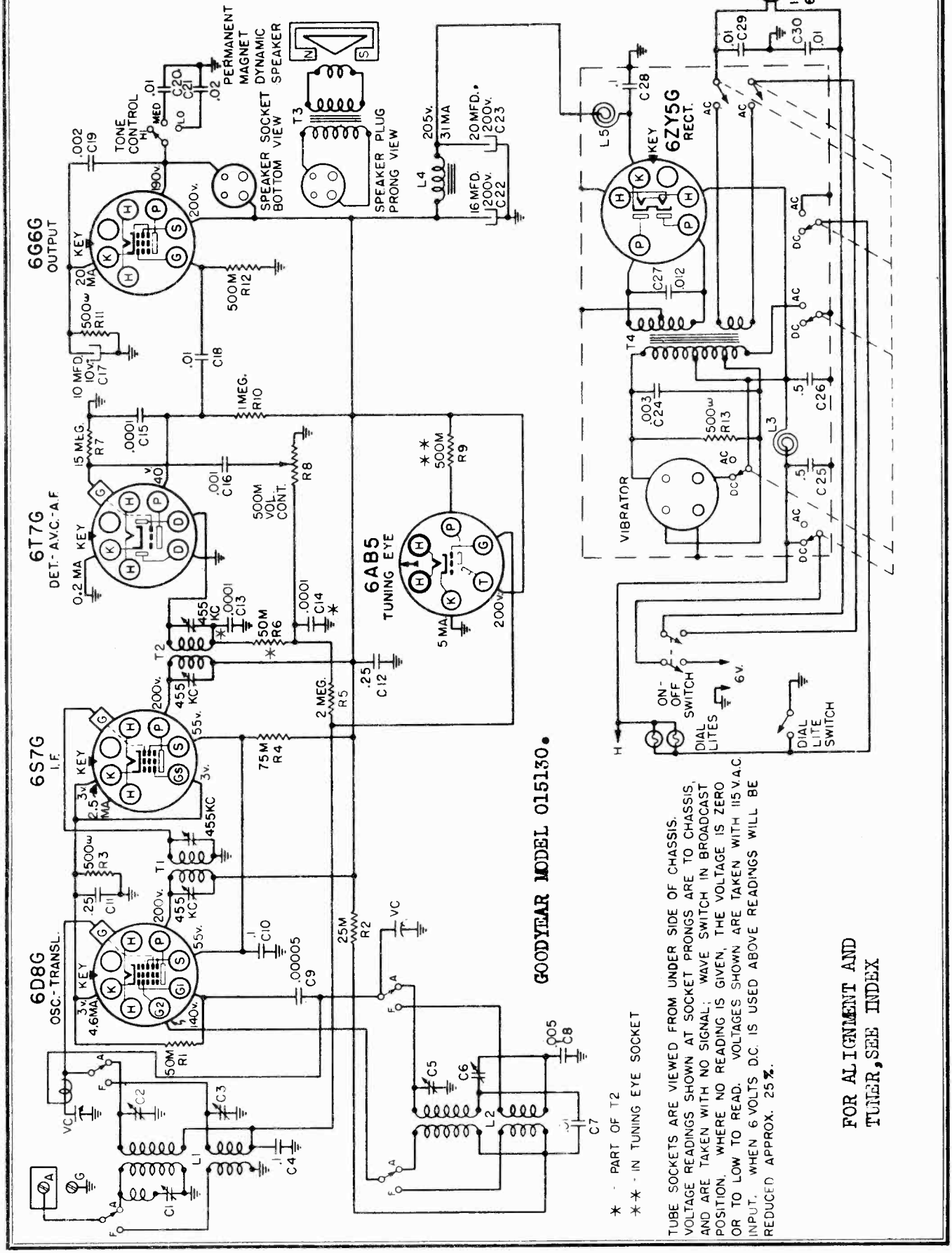


FIG. 11

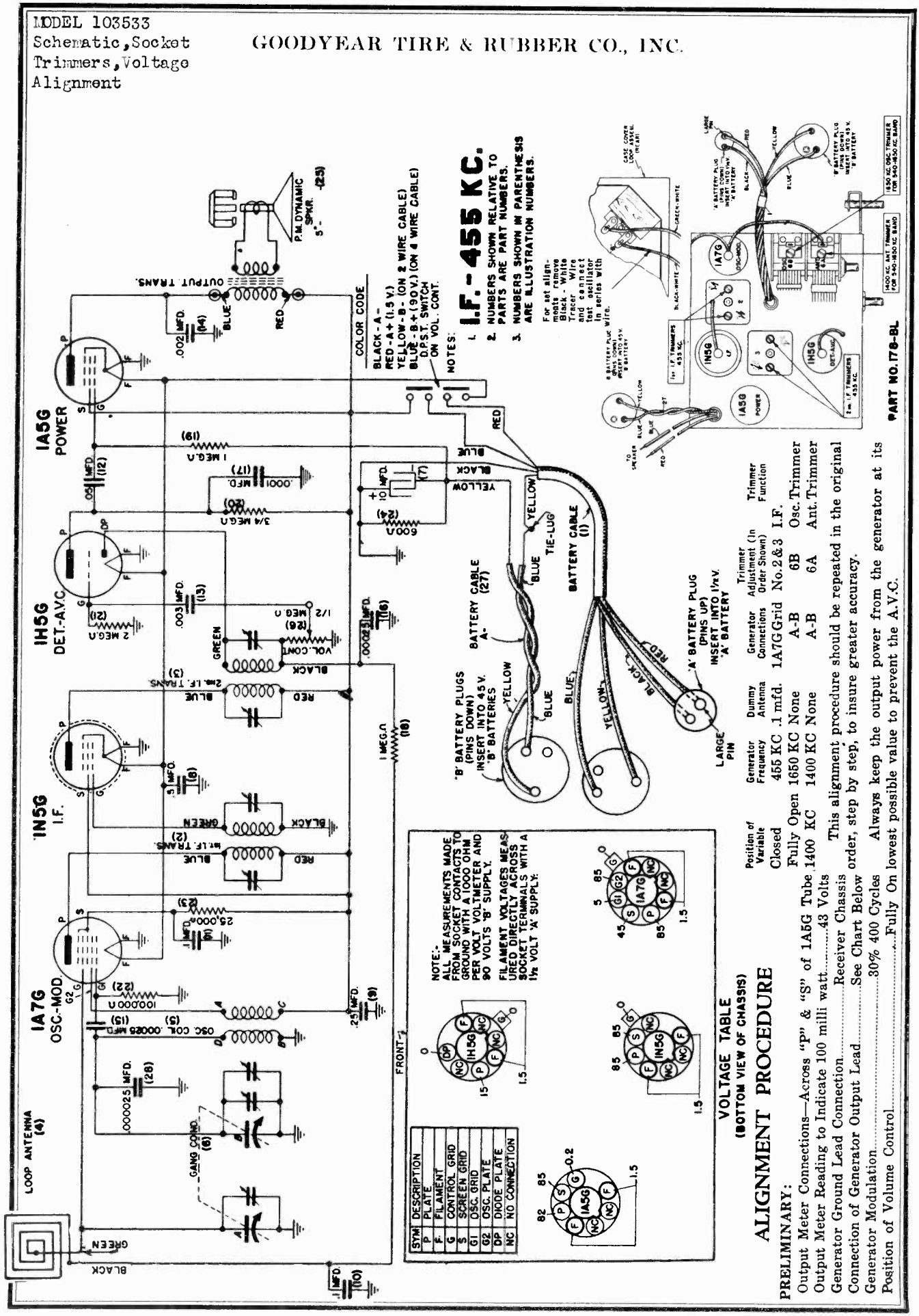
MODEL 015130

GOODYEAR TIRE & RUBBER CO., INC. Schematic, Voltage



MODEL 103533
Schematic, Socket
Trimmers, Voltage
Alignment

GOODYEAR TIRE & RUBBER CO., INC.



ALIGNMENT PROCEDURE

	Generator Frequency	Dummy Antenna	Generator Connections	Trimmer Adjustment (In Order Shown)	Trimmer Function
	455 KC	.1 mfd.	1A7G Grid	No. 2 & 3	I.F.
	1650 KC	None	A-B	6B	Osc. Trimmer
	1400 KC	None	A-B	6A	Ant. Trimmer

	Position of Variable
	Closed
	Fully Open
	1400 KC

PRELIMINARY:

Output Meter Connections—Across "P" & "S" of 1A5G Tube
Output Meter Reading to Indicate 100 milli watt.....43 Volts
Generator Ground Lead Connection.....Receiver Chassis
Connection of Generator Output Lead.....See Chart Below
Generator Modulation.....30% 400 Cycles
Position of Volume Control.....Fully On lowest possible value to prevent the A.V.C.

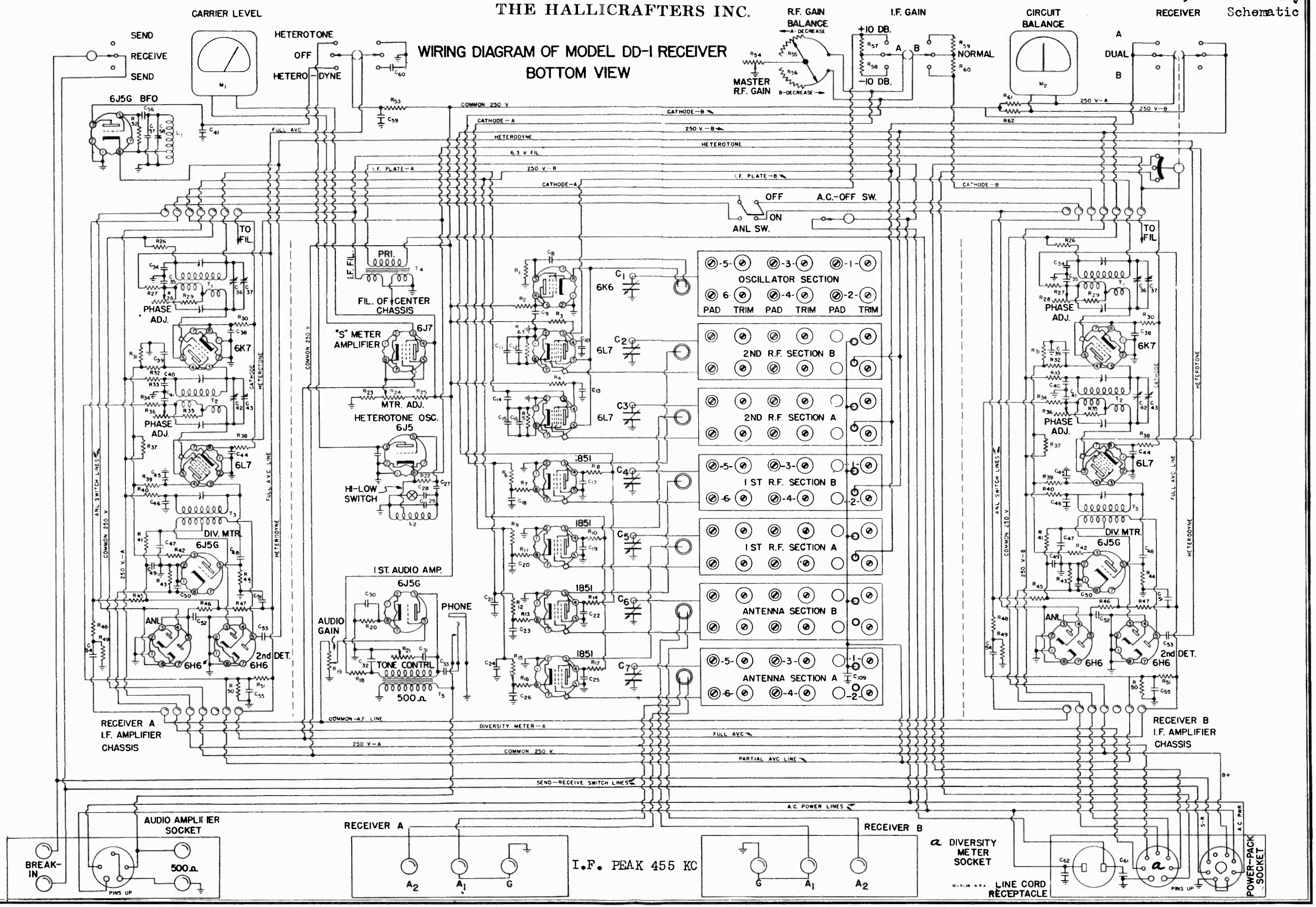
This alignment procedure should be repeated in the original order, step by step, to insure greater accuracy.

Always keep the output power from the generator at its lowest possible value to prevent the A.V.C.

MODEL DD-1, Dual Diversity RECEIVER Schematic

THE HALLICRAFTERS INC.

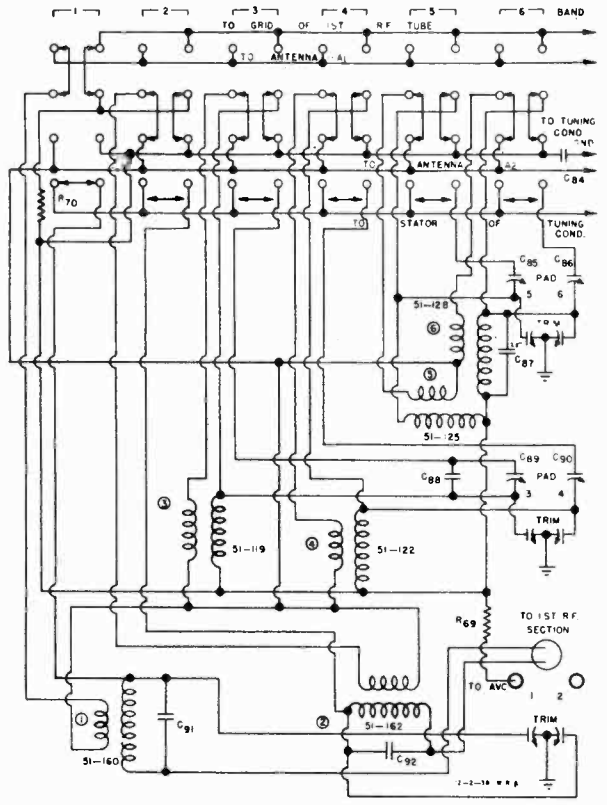
WIRING DIAGRAM OF MODEL DD-1 RECEIVER
BOTTOM VIEW



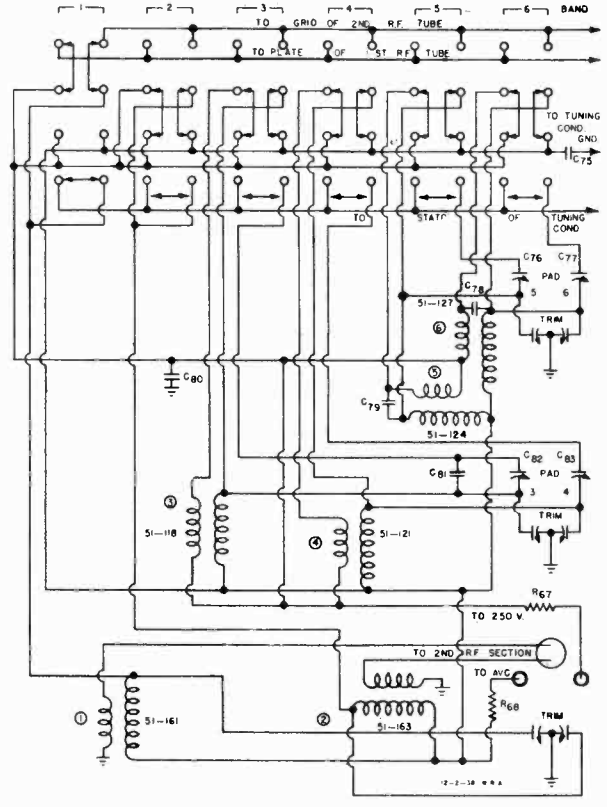
THE HALLICRAFTERS INC.

MODEL DD-1
Dual Diversity
Detailed Schematics

ANTENNA SECTION

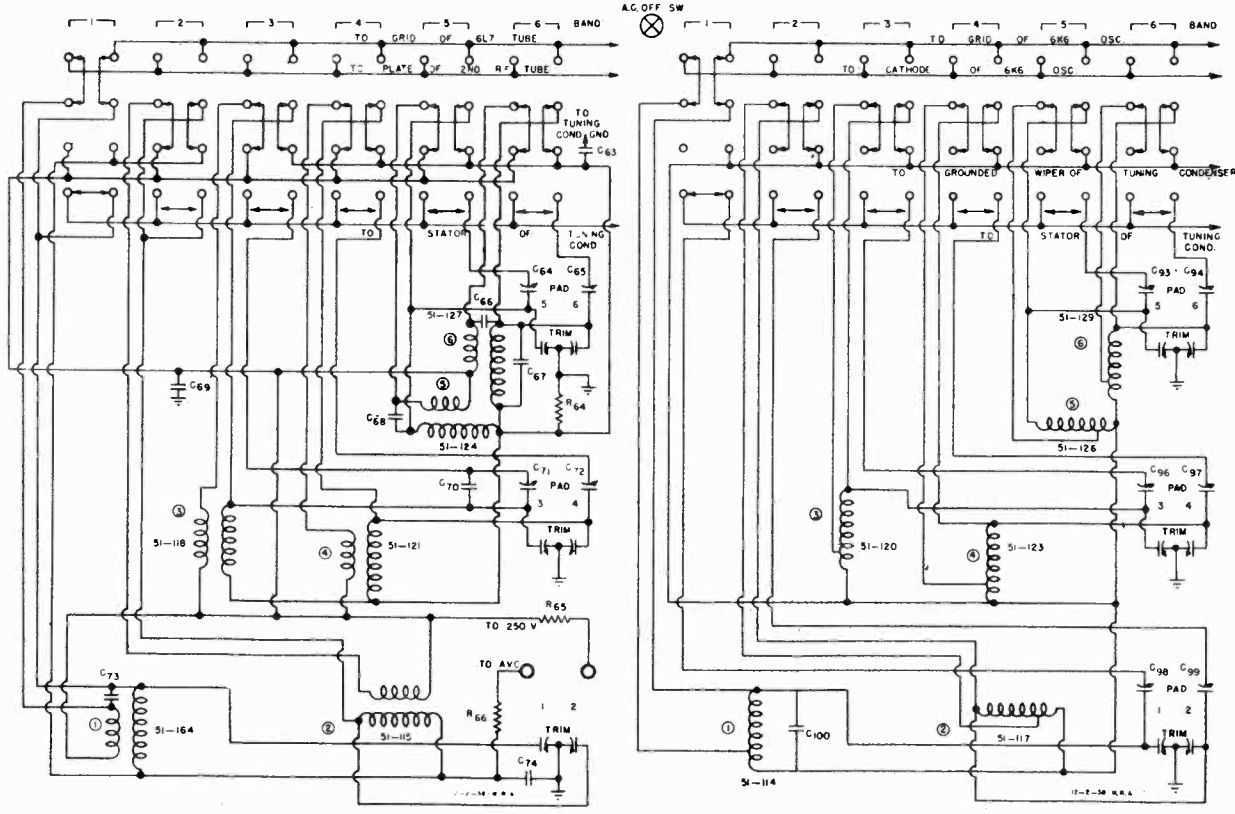


1ST R.F. SECTION



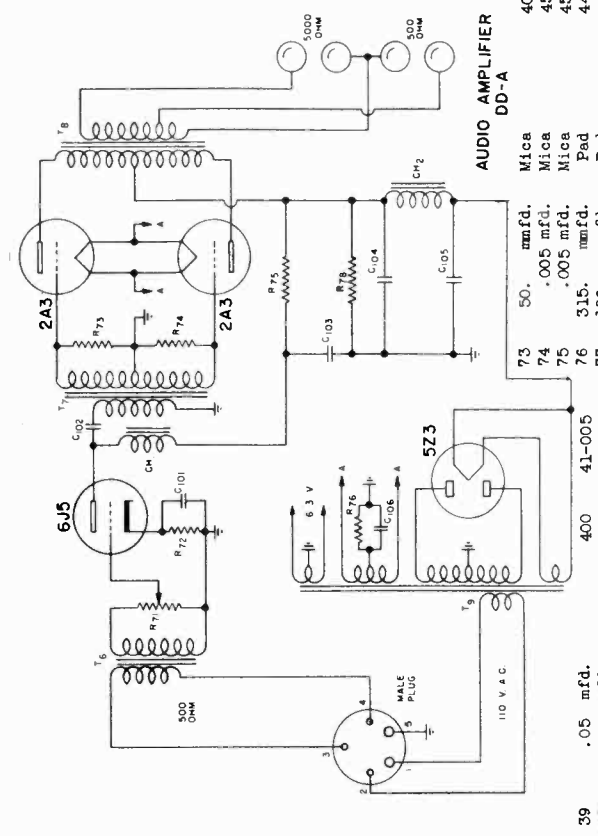
2ND R.F. SECTION

OSCILLATOR SECTION



MODEL DD-1,Dual Diversity
A-F Schematic
Parts List

THE HALLICRAFTERS INC.



RESISTOR PARTS LIST MODEL DD-1

NO.	VALUE OHMS	WATTAGE	PARTS NO.
R1	50,000	1/3	20-084
2	3,500	2	22-126
3	30,000	1	22-075
4	30,000	1	22-075
5	600	1/3	22-128
6	120	1/3	22-127
7	35	1/3	20-115
8	60,000	1/3	22-056
9	120	1/3	22-127
10	60,000	1/3	22-056
11	35	1/3	20-115
12	120	1/3	20-116
13	35	1/3	20-115
14	60,000	1/3	22-056
15	120	1/3	22-127
16	35	1/3	20-115
17	60,000	1/3	22-056
18	5,000	1	22-051
19	500,000	Audio Gain	25-038
20	4,000	1/3	22-050
21	100,000	Tone Control	25-037
22	50,000	1/3	20-084
23	400	1/3	22-023
24	500	1/3	22-026
25	50,000	1	22-081
26	1,000	1/3	20-033
27	1,000	1/3	20-033
28	15,000	1/3	22-068
29	30,000	1/3	22-077
30	300	1/3	22-020
31	20,000	1	20-072
32	1,000	1/3	20-033
33	1,000	1/3	20-033
34	25,000	1/3	20-033
35	15,000	1/3	22-074
36	15,000	1/3	22-068
37	15,000	2	22-129
38	300	1/3	22-020
39	1,000	1/3	20-033
40	1,000	1/3	20-033
41	20,000	1/3	20-072
42	5,000	1/3	22-053
43	10,000	1/3	20-063
44	1,000,000	1/3	20-108
45	100,000	1/3	20-093
46	1,000,000	1/3	20-108
47	500,000	1/3	22-098
48	100,000	1/3	20-093
49	250,000	1/3	20-099
50	750,000	1/3	22-104
51	500,000	1/3	22-098
52	50,000	1/3	20-084
53	20,000	1	20-070
54	2,500	Mas. R.F. Gain	25-122
55	1,000	Bal. Control	25-035
56	1,000	Bal. Control	
57	600	1/3	22-125
58	600	1/3	22-125
59	600	1/3	22-125
60	600	1/3	22-125
61	200	1/3	22-014
62	200	1/3	22-014
63	600	1/3	22-125
64	100,000	1/3	20-093
65	1,000	1/3	20-033
66	100,000	1/3	20-093
67	1,000	1/3	20-033
68	100,000	1/3	20-093
69	100,000	1/3	20-093
70	100,000	1/3	20-093
71	250,000	A.F. Gain Con.	25-038
72	1,000	1	22-030
73	100,000	1/2	22-091
74	100,000	1/2	22-091
75	10,000	2	24-042
76	750	10	26-000
77	10,000	20	26-002
78	30,000	20	26-001

CONDENSER PARTS LIST MODEL DD-1

NO.	CAPACITY	TYPE	VOLTAGE	PART NO.
C1		Main		48-023
2	440 mmfd.			
3	per section	Tunive		
4	" "			48-024
5	" "	Gang		
6	" "			
7	" "			
8	100 mmfd.	Mica	600	40-011
9	.01 mfd.		600	45-002
10	.05 mfd.		400	41-005
11	.01 mfd.	Mica	200	41-004
12	.01 mfd.		400	43-022
13	.05 mfd.		400	41-005
14	.05 mfd.	Mica	200	41-004
15	.01 mfd.		400	41-005
16	.05 mfd.	Mica	200	41-004
17	.05 mfd.		400	41-005
18	.01 mfd.	Mica	400	43-022
19	.05 mfd.		400	41-005
20	.01 mfd.	Mica	400	45-022
21	.01 mfd.		200	41-012
22	.05 mfd.	Mica	400	41-005
23	.01 mfd.		400	41-022
24	.05 mfd.	Mica	200	41-012
25	.05 mfd.		400	41-005
26	.01 mfd.	Mica	400	43-022
27	.01 mfd.		400	41-001
28	.01 mfd.	Mica		41-022
29	.01 mfd.	Mica	25	42-025
30	20. mfd.		200	41-002
31	.02 mfd.	Elec.	250	42-007
32	10. mfd.		400	41-003
33	.02 mfd.		600	45-007
34	.05 mfd.		400	41-001
35	.01 mfd.			48-012
36	25. mfd.	Air		48-027
37	1. mmfd.	Air		48-027
38	.05 mfd.			

NO.	PARTS NO.
60	22-125
61	22-014
62	22-014
63	22-125
64	20-093
65	20-033
66	20-093
67	20-033
68	20-093
69	20-093
70	20-093
71	25-038
72	22-030
73	22-091
74	22-091
75	24-042
76	26-000
77	26-002
78	26-001

NO.	PARTS NO.
1	40-023
2	45-011
3	45-011
4	44-028
5	40-022
6	40-021
7	40-013
8	45-021
9	44-029
10	45-011
11	44-028
12	40-024
13	40-011
14	44-029
15	40-024
16	40-024
17	44-030
18	44-031
19	44-032
20	40-025
21	42-003
22	45-008
23	41-013
24	42-022
25	42-022
26	42-022
27	42-023
28	42-019
29	42-019
30	41-006

ALIGNMENT & SERVICING INSTRUCTIONS
FOR
SKYRIDER DIVERSITY RECEIVER
MODEL DD1

SWITCHING ARRANGEMENT

For speed, ease and accuracy in aligning the Duel Diversity receiver, it is recommended that the output of the signal generator be terminated in a switching box in which you have installed a double throw single pole switch. From this switching box enclosed in a shielded cable which will serve as ground, run two leads one of which is connected appropriately to section "A" and the other to Section "B". Operation of the switch will readily allow you to switch the signal generator to either receiver section being aligned for a quick comparative check.

INTERMEDIATE FREQUENCY ALIGNMENT

Have controls set as follows:-
Have I.F. gain switch in NORMAL position.
Receiver switch to "A" side.
Set rejector control to 3 KC marking.
Balance control in center position.
All other gain controls adjusted for maximum gain.

IN ALIGNING "A" SECTION:-

Connect signal generator to the grid of the "A" section 6L7 converter (see diagram for location.) Adjust the signal generator for 455 KC output. Adjust I.F. transformers in the "A" receiver until they are peaked for maximum gain.

In Aligning "B" Section:-

Connect the signal generator as indicated above to the 6L7 converter tube in the "B" receiver and duplicate the adjustments done to the I.F. transformers of section "A". The receiver switch will necessarily be switched to the "B" side.

REJECTOR ADJUSTMENT

Before aligning the I.F. Rejector Circuit, the variable rejector condensers found below the chassis and driven by the long flexible copper cable, should be set as follows: With the rejector pointer set at ± 3 KC, check the first rejector condenser (closest to front panel in each I.F. section). It should have its rotor plates about 80% in mesh. The second rejector condenser (farthest from front panel) should have its plates about 20% in mesh. The same relationship should also exist between the condensers in the other I.F. section. When turning the rejector control from ± 3 KC toward ± 18 KC, the plates on the first rejector condenser should unmesh at the same time the plates on the second rejector condenser are meshing.

To correctly adjust the rejector circuit it is necessary to have two signals available which are accurately removed from the 455 KC fundamental by 3 KC on each side. The most satisfactory way to accomplish this is to use two crystals, one for 452 KC output and the other for 458 KC output. In the event, however, that crystals of those frequencies are not available, a satisfactory substitute can be used which consists of the following procedure: Put the BFO switch in the heterodyne position. Feed 455 KC from the signal generator into either 6L7 converter. Remove modulation from the signal being delivered by the generator. Obtain zero beat on the B.F.O. by operating the pitch control knob. Tune the generator slowly away from the 455 KC setting until a beat note of 3000 cycles (+ or - of 455 KC) is heard. Remember the pitch of that note. It will be necessary in adjusting the signal generator to a frequency 3000 cycles on the other side of 455 KC. A little practice will enable you to reset to each side of 455 KC by the 3 KC difference quite accurately and when signals of 452 and 458 KC are then available by this method, these signals should be used to properly peak the rejection circuit. This method is recommended only when a closely calibrated signal generator or a crystal controlled signal generator are not available.

Begin with receiver B. Set signal generator to 458 KC output. Adjust the 2nd Rejector Control (shown in the top chassis view) for minimum response. There should be two points of minimum output. If there is only one minimum point, rotate the adjusting nut on this control approximately 1/4 turn from the minimum, and very, very carefully adjust the 1st rejector control until a minimum occurs. After this has been accomplished, adjust the 2nd rejector control for minimum response. Now adjust the first phasing control (screw driver shaft nearest front panel), for minimum response. Readjust the 2nd rejector control carefully for minimum response. Repeat with "A" side without changing setting of the signal generator, connecting the signal generator to the "A" side 6L7, and switching the receiver to the "A" side. Readjust signal generator to 452 KC. Make similar adjustments on Rejector Controls 3 and 4 and the rear phasing control. Switch over to the "B" receiver and repeat these adjustments on the "B" side.

Now retune signal generator to 455 KC (still connected to "B" side). Carefully repeat each of the I. F. transformer trimming condensers. Switch signal generator output to 6L7 in "A" side and repeat the above operation.

NOTE: The gain of each receiver should be approximately the same, variation between receiver sections should not exceed 25% as shown on output meter readings. If gain-balance is far off, interchanging the 6L7 I.F. amplifier tubes sometimes improves it.

R. F. ALIGNMENT

Adjust receiver to Band 1, set "A". Have all gain controls at maximum, balance control in center position.

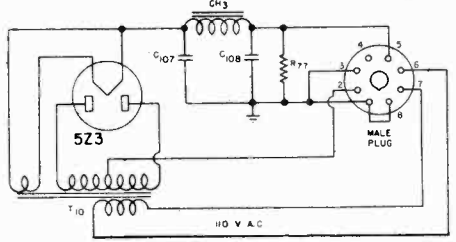
Now connect signal generator to antenna post of "A" receiver section through a 400 ohm resistor. Be sure shorting strap from A2 to G remains connected. During all adjustments the grounded side of the generator should be connected to the ground post on the receiver.

Set band spread dial to "0" and leave it there during entire alignment. Adjust generator to 1400 KC. Set dial on receiver to that frequency. Align oscillator, 2nd R. F., 1st R. F. and antenna trimmers in the order named for maximum gain. Switch over to Receiver "B" and repeat the above operations with the exception of the oscillator section which does not require readjustment this time. Set generator and receiver to 600 KC. Adjust oscillator padder for maximum response. Retrim oscillator at 1400 KC. Repeat the above procedure on the remaining bands, except that on bands 3-4-5-6 the R. F. padders should also be adjusted for maximum response at the low frequency ends of each band.

Care should be exercised in avoiding alignment on the image frequency. In every case, the image will be heard approximately 1 megacycle lower in frequency when adjusting the main tuning dial.

The greatest caution should be taken when adjusting the No. 6 hand oscillator padder because only a slight change causes a large variation in frequency and may throw the oscillator frequency completely out of the band. The relative sensitivities of receivers "A" and "B" should not vary more than 50%. A frequent cause of unbalance between receivers is defective 1851 tubes or R. F. coils.

POWER PACK
DD-P



MODEL DD-1, Dual Diversity
Socket, Trimmers
Alignment, Part 2

THE HALLICRAFTERS INC.

BEAT FREQUENCY OSCILLATOR ADJUSTMENTS

Place the B.F.O. Key in the Heterodyne position.

With 455 KC signal from generator feeding into the "A" 6L7 converter and receiver "A" functioning, and the chassis standing on its left end (looking at set from the front) adjust the padding condenser inside the B.F.O. Shield can until zero beat is reached. The B.F.O. shield can is located directly behind the pitch control. Prior to making this adjustment assure yourself that the PITCH CONTROL condenser is at 50% capacity pointer on control positioned vertically). When properly adjusted, rotation of the pitch control condenser will show two beat note signals 180 degrees apart.

S METER ADJUSTMENT

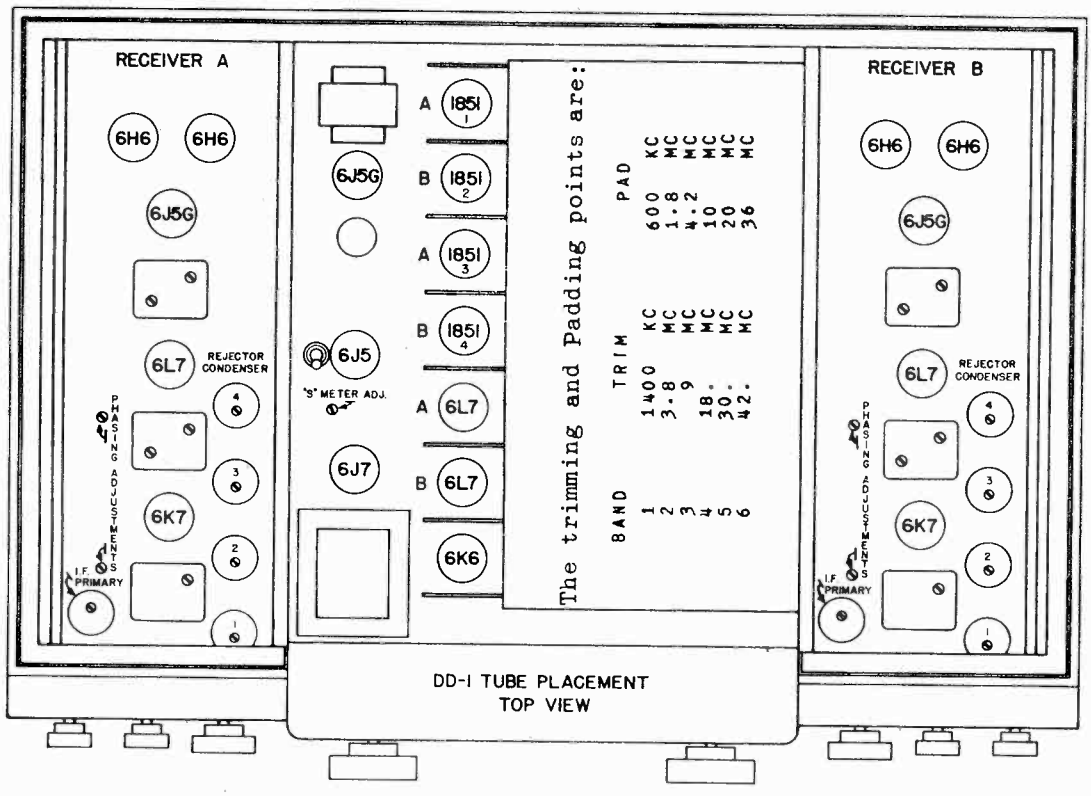
Push in No. 6 Band Button. With gain controls at maximum, adjust the zero reset control on all meters for zero.

NOTES:

If overload occurs on the broadcast band it might be advisable to shorten the length of the receiving antennas. If this recommendation is of little help check for a short to ground in the A.V.C. circuit.

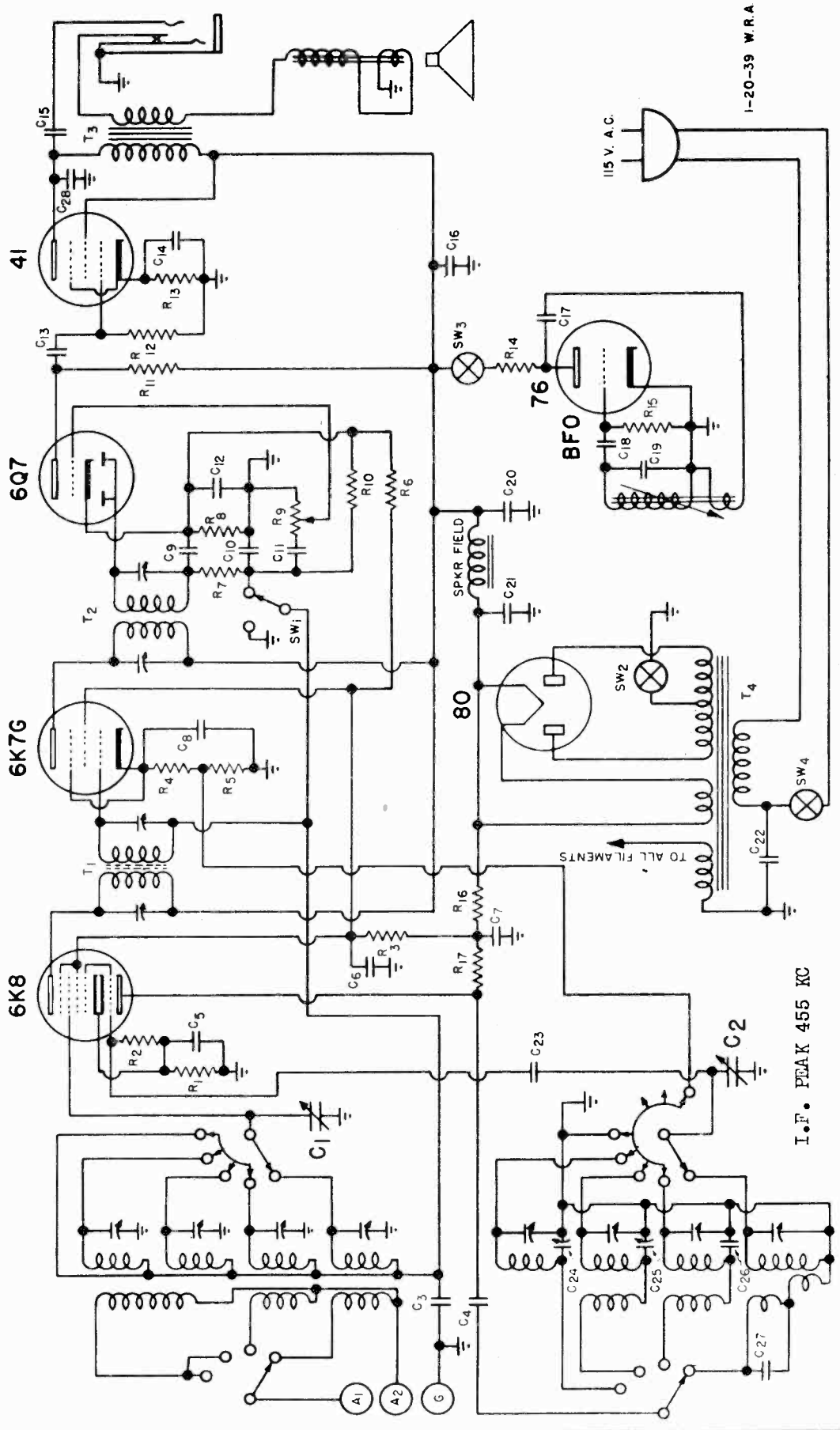
Should the occasion of examining the coil units arise, exercise extreme care in moving the heavy leads attached to the switch terminals. Excessive movement of one of these leads may cause the contacting portion of the switch to be thrown out of alignment and provide improper contact.

If it becomes difficult to properly heterodyne a strong signal when listening to C. W. reception, reduce the overall gain with the master gain control till a satisfactory note is obtained.



MODEL S-19R, Sky Buddy
Schematic

THE HALLICRAFTERS INC.



MODEL S-19R, Sky Buddy
Socket, Trimmers, Parts

THE HALLICRAFTERS INC.

Sky Buddy — Model S19-R

The model S19-R Sky Buddy is a 6 tube 4 band superheterodyne receiver covering the following frequencies:

Band 1 - 540 KC to 1700 KC
2 - 1.7 MC to 5.5 MC
3 - 5.5 MC to 17.0 MC
4 - 16.0 MC to 46.0 MC

S19R CONDENSER PARTS LIST

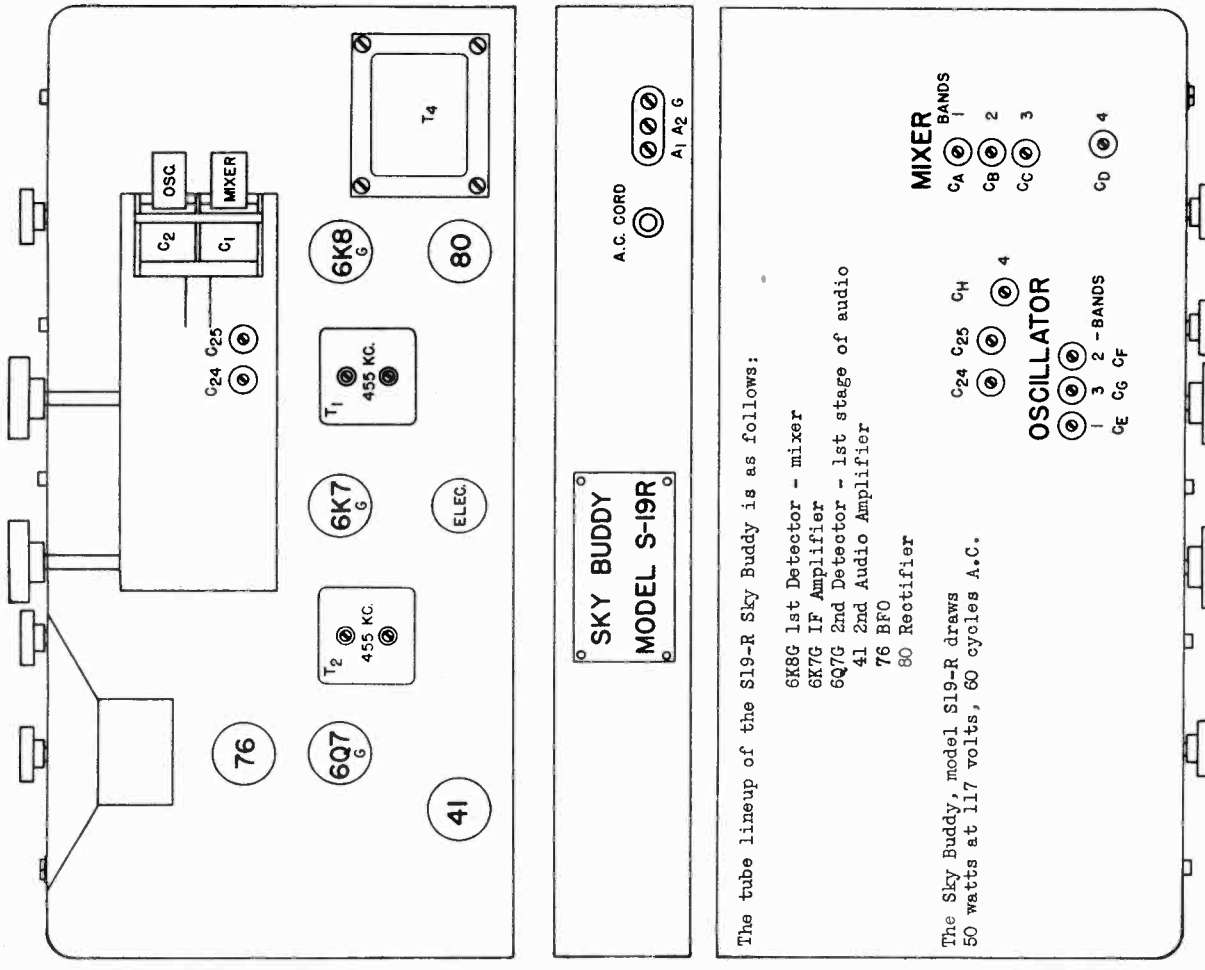
NO.	CAPACITY	TYPE	VOLTAGE
C1	.000375 mfd.	Maintaining	
2	"	"	
3	.05	"	200
4	.01	"	400
5	.05	"	200
6	.05	"	200
7	10	"	300
8	.05	"	200
9	.0001	Mica	
10	.0001	"	
11	.02	"	200
12	.1	"	200
13	.02	"	200
14	10	"	25
15	.01	"	600
16	.1	"	400
17	.01	"	400
18	.0001	Mica	
19	.0005	"	
20	10	"	300
21	10	"	350
22	.01	"	600
23	.0001	Ceramic	
24	.000375	Pad	
25	.001	"	
26	.0043	"	
27	.0001	Mica	
28	.01	"	600

S19R RESISTOR PARTS LIST

NO.	OHMS	WATTAGE
R1	300	1/3
2	50000	"
3	10000	1
4	500	1/3
5	3500	"
6	25000	1
7	50000	1/3
8	300	"
9	1000000	Variable
10	500000	1/3
11	250000	"
12	1000000	"
13	600	1/2
14	50000	1/3
15	50000	"
16	3000	1/2
17	10000	1/2

SWITCHES

SW	
1	A.V.C. on - off
2	Send - Receive
3	BFO on - off



The tube lineup of the S19-R Sky Buddy is as follows:

6K8G 1st Detector - mixer
6K7G IF Amplifier
6Q7G 2nd Detector - 1st stage of audio
41 2nd Audio Amplifier
76 BFO
80 Rectifier

The Sky Buddy, model S19-R draws 50 watts at 117 volts, 60 cycles A.C.

ANTENNA

For successful operation of the receiver throughout its tuning range very satisfactory results can be obtained with an inverted "L" type antenna 75 feet long overall. When this type of antenna is used the jumper should remain connected between A2 and G.

If the operator should wish to obtain the maximum in performance from the receiver on any one frequency, it is suggested that a half wave doublet antenna cut for that frequency be installed.

The formula for calculating the overall length of this antenna is:

$$\text{Length in feet} = \frac{463}{\text{Frequency in megacycles}}$$

The antenna is cut in the center and connected to a twisted pair transmission line having a characteristic impedance of 75 ohms. The other end of this line is connected to the A1 and A2 antenna posts.

This antenna will not perform well at harmonic frequencies but should be better than the inverted "L" on the frequency for which it has been designed. Performance on the #4 band, even with a suitable antenna, is subject to varying conditions of the time of the day and year.

A ground is usually not necessary for satisfactory performance of the model S19-R Sky Buddy receiver. If a ground does prove helpful it is connected to the "G" post of the antenna terminal strip.

"BANDSPREAD"

In no other similar receiver but the S19-R Sky Buddy can be found such extremely smooth and satisfactory electrical bandspread action. The stator plates are an integral part of the main condenser and the separate rotor sections are driven by a gearless mechanism through the separate bandspread knob.

The controls along the bottom edge of the receiver are:

SEND-RECEIVE SWITCH which, when in the "send" position, removes plate voltage from the tubes.

The BAND SWITCH allows selection of any one of the four ranges covered by the receiver. The newly incorporated 10 meter band will prove to be most interesting when conditions are favorable for reception on that range.

The B.F.O. "ON-OFF" SWITCH allows optional use of the Beat Frequency Oscillator and is used when the operator is copying code signals. It will be of additional help in locating weak fone signals by first locating their carrier. Once located, the B.F.O. may then be turned off to eliminate the whistle.

The PITCH-CONTROL Knob allows the operator to vary the pitch of the beat note when the BFO switch is in the "on" position. Selection of the pitch of the beat note most pleasing to the operator will be of help in copying through interference. The A.V.C. "OFF" and "ON" Switch is for optional use of automatic volume control. Should the strength of the telephone signal be so strong as to block the receiver the A.V.C. switch should be "on". For maximum sensitivity leave the AVC switch "off" and manually adjust the gain of the receiver with the audio gain control.

The receiver is turned on and off with this control and additionally provides variation of the volume delivered by the receiver to suit the requirements of the listener.

A Headphone Jack is mounted on the panel to the right of the Pitch Control Knob. When headphones are used, inserting the phone plug in the jack automatically disconnects the speaker.

ALIGNMENT PROCEDURE FOR SKY BUDDY MODEL S19-R

I. F. ALIGNMENT

Have the controls set as follows:

Audio gain control at maximum

A.V.C. switch "on".

Range switch on Band #2.

Set main dial to minimum capacity 5.5 M.C. position

Remove 6K8 grid cap and connect signal generator to this tube.

Set signal generator for 455 KC output.

Adjust trimmers on transformers T1, T2 for maximum output.

For adjustment of the B.F.O., place the BFO switch in the "on" position. Remove the knob from the pitch control shaft. You will see a small adjustment screw in the center of this shaft. On the under-chassis side of this shaft you will see a set screw which should be loosened in order to allow adjustment of the screw in the center of the pitch control shaft. Adjust to zero beat. Tighten the set screw and replace the knob. Should the BFO still fail to operate check the .0005 condenser in the BFO circuit, or the 76 BFO tube.

R. F. ALIGNMENT

Connect the generator to the A1 terminal on the antenna terminal strip found on the rear apron of the chassis through a 400 ohm resistor. Leave the jumper connected between A2 and G. The trim and pad points for the 4 bands are indicated below:

Set the signal generator to the required frequencies for each band, adjust the main tuning dial to those frequencies (with the bandspread condenser at minimum capacity) and then adjust the indicated trimmers and padders to resonance.

Trim	Band	Pad
1400 KC Adjust C_A C_E	Band 2	600 KC Adjust C_{24}
4 MC Adjust C_B C_F		2 MC Adjust C_{25}
14 MC Adjust C_C	Band 3	None-check at 7 MC
30 MC Adjust C_D C_H	Band 4	None-check at 18 MC

On the two high frequency bands where no padding adjustments are found, the checking frequencies should fall within 1 division of the dial calibration with no further adjustments.

During the R.F. alignment process it is advisable to "Rock" the main tuning condenser across the frequency on which you are making adjustments to the receiver. Once the exact point of maximum output is obtained further adjustment is unnecessary.

ANTENNA: **SUPER SKYRIDER MODEL SX23**

The SKYRIDER 23 has an antenna input circuit which will allow the use of either a doublet or Marconi (inverted "L") antenna. The approximate antenna input impedance of the SKYRIDER 23 is 400 ohms.

A very serviceable antenna will be the inverted "L", or Marconi type. This antenna should be approximately 75 feet long overall, including the lead-in to the set. Satisfactory operation of the SKYRIDER 23 is obtained throughout its tuning range with this type of antenna and because of that fact as well as its ease of construction it is highly recommended. Should a doublet antenna be used it is suggested that a transmission line of 400 ohms value of impedance be constructed so that a most efficient transfer of energy is obtained. The commercially available all wave doublet antennas are usually provided with a coupling transformer which matches the transmission line to the receiver. This transformer connects to the A_1 and A_2 terminals on the antenna strip. The half-wave length-doublet antenna cut for a particular frequency can be computed by the following formula:

$$\text{Length in feet} = \frac{468}{\text{Frequency in megacycles}}$$

This type of antenna is broken in the center with an insulator and has the transmission line connected to each resulting quarter wave section at that point. This antenna is a very good performer, in a direction broadside to its length, only on the relatively narrow group of frequencies for which it was cut. It does not function well on harmonic frequencies.

When using either type of doublet antennas the transmission line should be connected to A_1 and A_2 binding posts. The wire connecting the A_2 to ground or G can be left connected if the performance of the receiver is improved.

CONTROLS AND OPERATION

Each of the controls is identified by appropriate marking on the panel. The "Tone Control" turns the receiver "on" and "off", and also allow the operator to make adjustments for the type of reproduction most pleasing to him. Treble reproduction is to the far left position, just after the set is turned on, while the base is at the extreme right. Intermediate positions allow for any desired degree of mixing.

The "Pitch Control" is to be used when code or CW signals are being received. In its counter clockwise position the Beat Frequency Oscillator is "off". Rotating the control clockwise turns on the B.F.O. in addition to varying the pitch of the beat note to the operator's taste.

Directly below the two controls mentioned will be found the "Phone Jack". Any type of high impedance headphones may be used because no direct current flows in the headphone circuit. The strength of the signal in the headphones will be found to be at the proper level for most comfortable headphone reception. When headphones are used the speaker is automatically disconnected.

The "AF Gain" control adjusts the volume of the receiver by varying the output of the audio amplifier. Volume is controlled in both the headphone and loud speaker circuits and the setting of this control is optional with the user of the receiver for the amount of volume desired.

"AVC Off" positions, an extremely strong signal will cause the receiver to block. Because of the unusually low residual noise level of the SKYRIDER 23 it is advised to adjust all controls carefully in familiarizing yourself with their functions and effects.

The "Stand-By" or "Send-Receive" switch when in the "Send" position removes plate voltage from the tubes. This allows the receiver to be made temporarily inoperative should it be used in conjunction with a transmitter.

The hand-wheel marked "Tuning", is for adjusting the main dial to the frequency desired. The mechanism is quiet in operation and free from back lash. The conveniently located control will give the greatest tuning ease after continued hours of operation.

The "ANL" or Automatic Noise Limiter control turns the noise limiter "on" or "off". No modern communications receiver is complete without an effective noise limiter. With the A.N.L. switch in the "on" position the noise limiter will prove to be of great assistance and frequently mean the difference between hearing a signal which otherwise would be inaudible on the higher frequencies where ignition and other pulsating types of interference are most aggravating.

The "RF Gain" control adjusts the sensitivity of the receiver by varying the cathode bias on the RF and IF amplifiers. Maximum sensitivity will be obtained with this control rotated clockwise as far as it will go. When this is done a switch will be operated, the function of which will be described under S meter.

When using the receiver under varying local conditions of noise, it will be advisable to adjust both the "RF" and "AF" gain controls until the most favorable signal to noise ratio is found. Until such a time as you have become thoroughly familiar with the function of all controls it is suggested that the R. F. gain be advanced until the white dot on the knob is pointing approximately at the "8" on SKYRIDER. Later experiment to find the best position for a given signal bearing in mind that with the selectivity switch in any of the

CRYSTAL OPERATION

There are three controls which must be properly adjusted for most satisfactory crystal filter operation. Their operation shall be treated in the order in which they are called upon to perform their functions in the receiver.

Selectivity Switch -

There are three positions of selectivity with the Automatic Volume Control circuit operating. For high fidelity broadcast reception the selectivity switch should be rotated to the "IF Broad" position.

With the switch placed in the "IF Sharp" position the selectivity is greatly increased at no apparent sacrifice in tone reproduction.

The "Phone Crystal" position affords maximum selectivity with automatic volume control. The receiver will have to be accurately resonated on each desired signal because this step of selectivity greatly attenuates the side-bands of a modulated carrier. You will notice the apparent slot into which the signal falls, only in the exact center of which will intelligibility of a good order be maintained. The "Phone Crystal" position is recommended under conditions of extreme interference where adjacent channel stations are causing objectionable heterodynes.

Rotating the switch in a counter-clockwise position still farther allows the receiver to be used in the three selectivity positions with the A.V.C. circuit disconnected. When the selectivity switch is so adjusted it is then necessary to manually adjust the "RF Gain" to keep the signal under control.

In the "CW Crystal" position the maximum selectivity of the set is obtained. The drop in background noise is immediately apparent. This position is recommended only for the reception of CW or code signals because the selectivity is so great phone signals are practically unreadable. To realize the maximum in performance from the SKYRIDER 23 crystal circuit, the following two controls should be adjusted as described. First tune in an extremely strong CW signal.

The "Pitch Control" should be turned until a beat note is audible. Then adjust the main tuning control and go across the signal. Two distinct signals will be heard either side of zero beat, or the null position in the center tuning through which no signal is audible. See whether the low or the high frequency side of the signal (that which appears either side of zero beat) is the weaker. Leave the receiver set on whichever of the two signals is the weaker. Now very carefully adjust the "Phasing Control" until you have eliminated that signal as much as possible. As an additional step to see whether you have chosen the proper low or high frequency image to reject, rotate the "Pitch Control" through zero beat to the other side so that a beat note of approximately the same pitch as before is obtained. Now retune the receiver and it will be apparent that the signal on the other side of zero beat (as referred to the markings on the dial at which this signal was first tuned in) is reduced in volume. Again carefully adjust the "Phasing Control" and compare the strength of the audio image when this side has been phased out, or rejected. When you have demonstrated that the phasing or rejection is better on either the low or high frequency audio image the phasing control is left in that position and you then have the SKYRIDER 23 adjusted for the extremely selective crystal action for which it is noted.

The "Pitch and Phasing Controls" should be called upon frequently to demonstrate how, through proper adjustment, extreme conditions of interference can be coped with. Frequently, a slight adjustment of the pitch control will place a desired signal in the clear when the two signals differ in frequency by only a few hundred cycles. Minute adjustment of the phasing control will frequently obliterate an interferring signal by dropping it in the crystal slot.

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MODEL SX23
Super Skyrider
Schematic, Notes

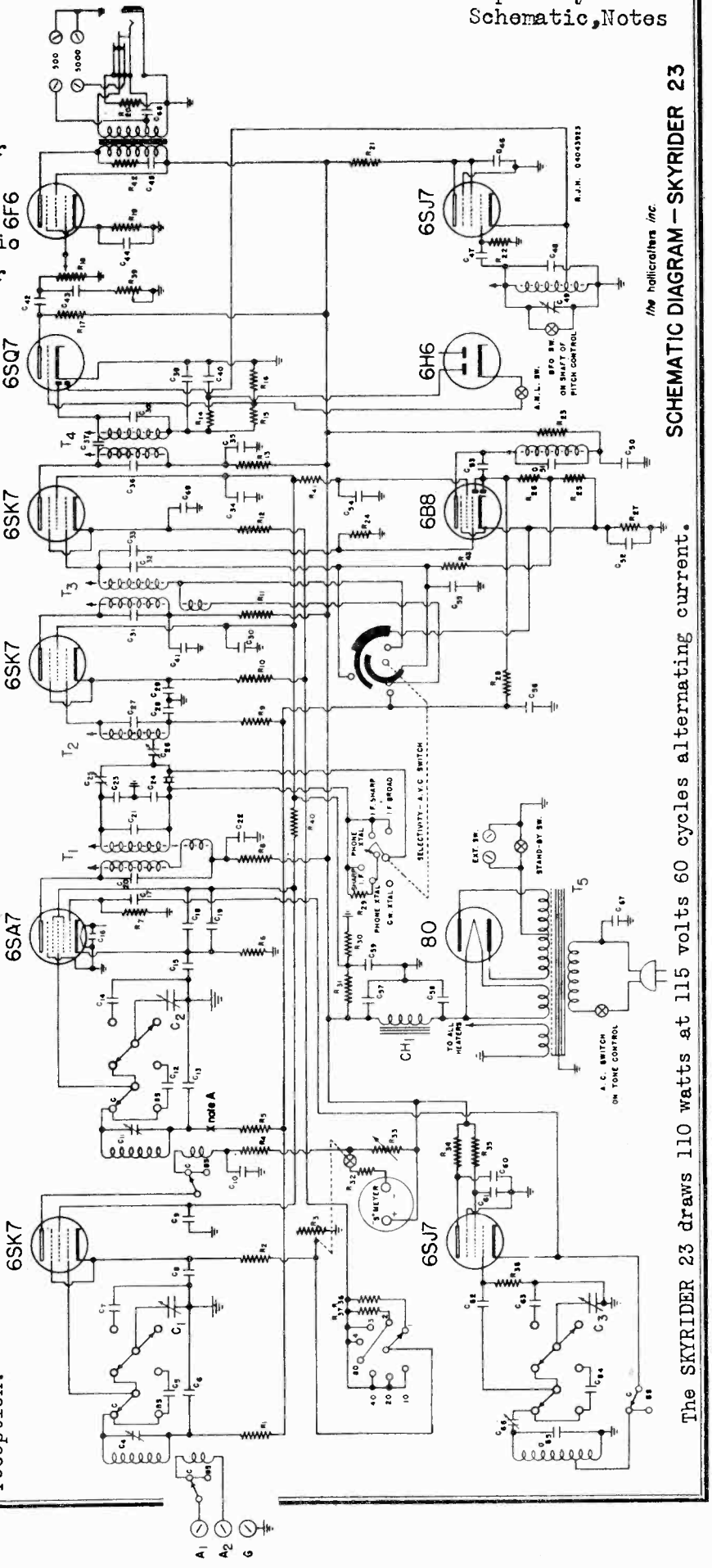
TUBE LINE-UP

6SK7 R.F. Amplifier
6SA7 1st Detector-Mixer
6SJ7 High Frequency Oscillator
6SK7 1st I.F. Amplifier
6SK7 2nd I.F. Amplifier
6SQ7 2nd Detector, 1st Stage of Audio
6F6 2nd Stage of Audio
6SJ7 Beat Frequency Oscillator
6H6 Automatic Noise Limiter
6B8 Amplified A.V.C.
80 Rectifier

S METER

Close to the license tag on the rear of the receiver will be found a knurled shaft which is to be used in adjusting the "S" meter. Prior to adjusting this control the R. F. gain control must be in the maximum gain position, or rotated clockwise until a switch which is mounted on this control, is heard to operate. Additionally, the Selectivity Switch must be in any one of the three "A.V.C. On" selectivity positions. When the above two conditions are filled the meter is in the circuit and should be adjusted as follows: Disconnect the antenna from the receiver, being sure no strong local signal is being picked up by the receiver with the antenna removed. Now adjust the S meter shaft until the meter rests at zero. Reconnecting the antenna will then show the meter indicating relative carrier strength in both S units as well as DB's or decibels. Should most accurate S meter indication be desired, it is recommended that the meter be adjusted with the Selectivity Switch in the step of selectivity most frequently used.

The S meter does not function with the Selectivity Switch in the "A.V.C. Off" position because the meter is connected in the A.V.C. circuit which preferably is used for telephone reception.



The SKYRIDER 23 draws 110 watts at 115 volts 60 cycles alternating current.

MODEL SX23, Super Skyrider
R-F Switching Schematic
Notes

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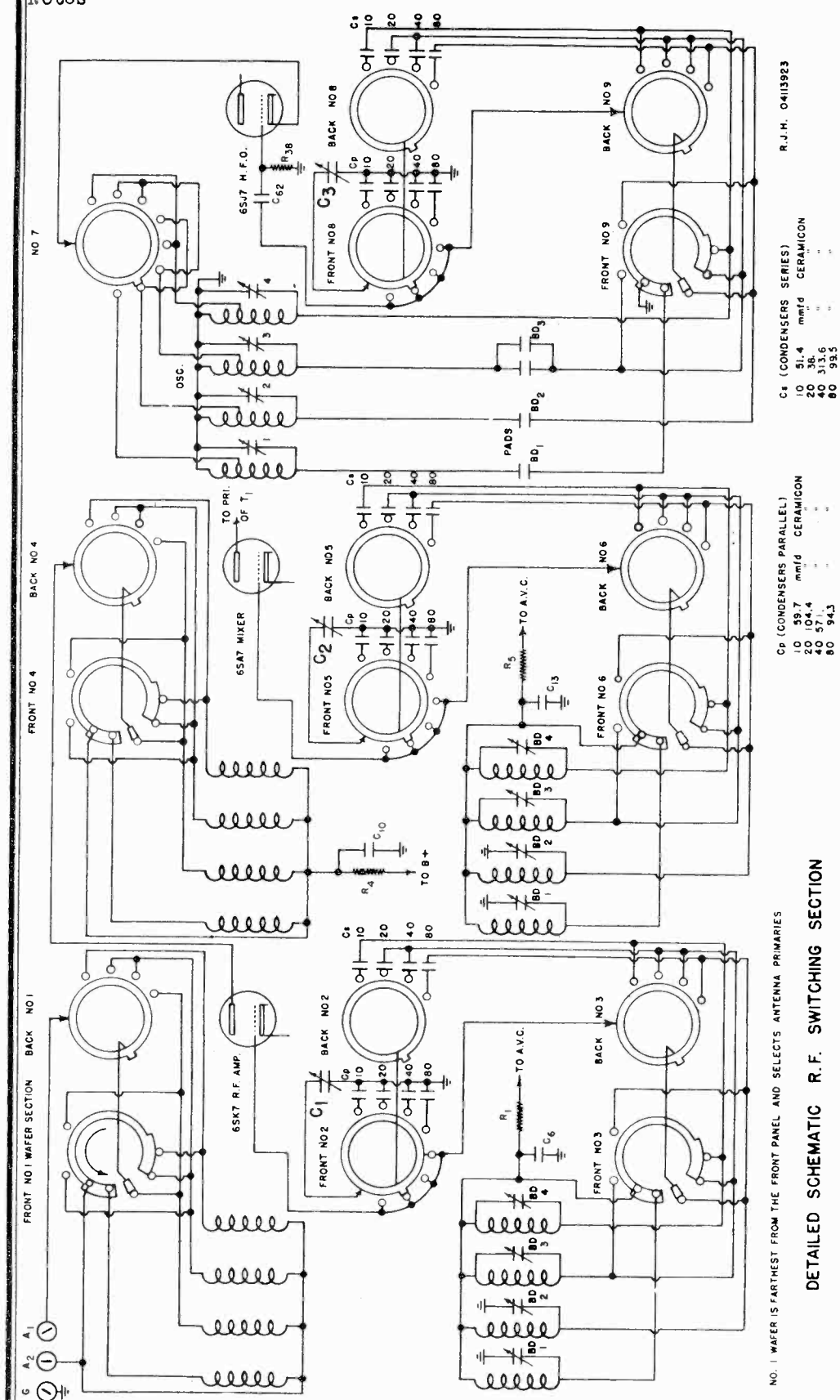

DETAILED SCHEMATIC R.F. SWITCHING SECTION

On the rear apron of the chassis you will find output terminal strips marked 500 and 5000 ohms. The Hallicrafters permanent magnet dynamic matching S23 speaker should be connected to the 5000 ohm terminals. The 500 ohm contacts can be connected to a separate speaker or a load of that impedance value. The terminals marked "EXT SW" should be connected to an external switch, a portion of which is used to turn "on" and "off" your transmitter. The "EXT SW" terminals are paralleled with the front panel "Send Receive" switch. In order to make the external switch operate the "Send Receive" switch must be left in the "send" position. In viewing the receiver from the back the right hand "EXT SW" contact is grounded. When connecting to associated equipment this point should be borne in mind so that no potential difference will arise between it and the receiver.

FREQUENCY RANGE

Band 1 - 540 KC - 1,700 KC
2 - 1.7 MC - 5.2 MC
3 - 5.2 MC - 16.5 MC
4 - 11 MC - 34.0 MC

Unless otherwise specified the SKYRIDER 23 operates on 110-125 volts 60 cycle alternating current. A universal transformer model is available which will operate on 25-60 cycle current. This transformer is provided with taps to cover in 5 steps a voltage range from 110 to 250 volts. Actual operation is identical with either the 25 or 60 cycle transformer.

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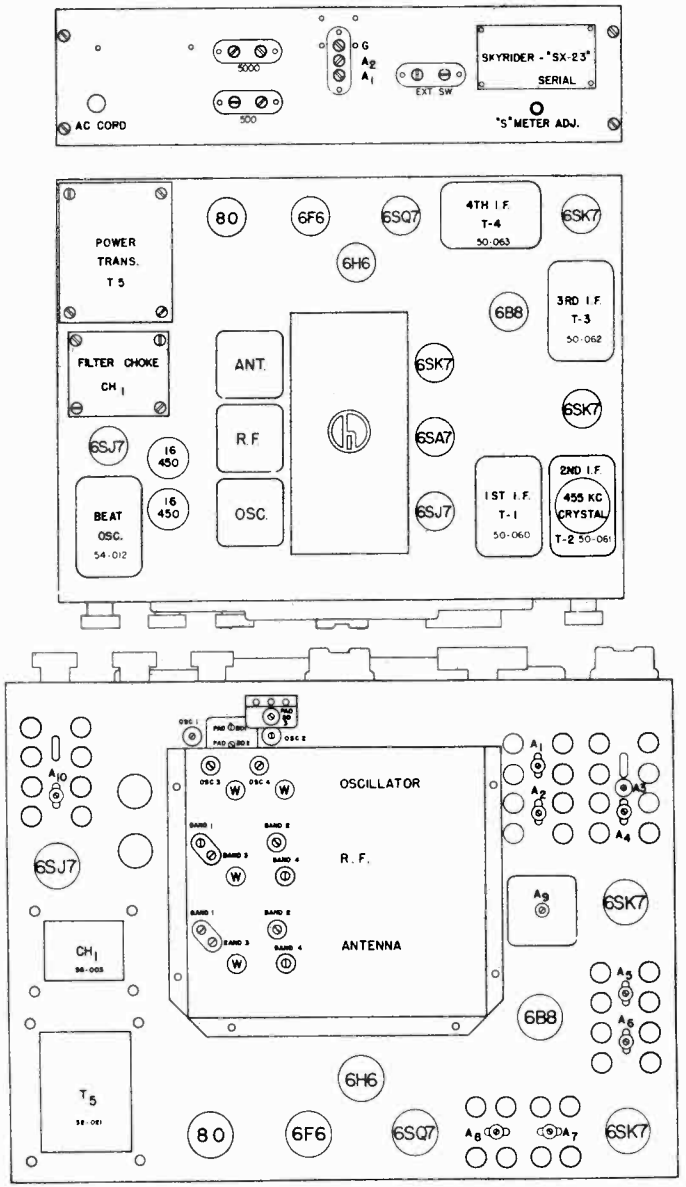
MODEL SX23, Super Skyrider Socket, Trimmers, Parts



LIST OF CONDENSERS SKYRIDER 23

NO.	VALUE	VOLTAGE	TYPE
1			
2	437 mmfd.		Main tuning gang
3			
4	1.2-12.0 "		R.F. Circuit trimmer
5	Series padding for Band Spread See detailed Schematic.		
6	.05 mfd.	200	Paper
7	Parallel padding for Band Spread See detailed Schematic.		
8	.05 mfd.	200	Paper
9	.01 "	400	"
10	.05 "	"	"
11	1.2-12 mmfd.		R.F. Circuit trimmer
12	Series padding for Band Spread		
13	.05 mfd.	200	Paper
14	Parallel Padding for Band Spread		
15	.05 mfd.	200	Paper
16	.002 "		Mica
17	50 mmfd.		Ceramic
18	.01 mfd.	400	Paper
19	.002 "		Mica
20	250 mmfd.		Ceramic
21	200 "		"
22	.05 mfd.	400	Paper
23	100 mmfd.		Ceramic
24	100 "		"
25	2-25 "	Variable	
26	5-50 "	"	Mica
27	250 "		Ceramic
28	.05 mfd.	200	Paper
29	.01 "	"	"
30	.05 "	"	"
31	250 mmfd.		Ceramic
32	250 "		"
33	250 "		Mica
34	.05 mfd.	200	Paper
35	.05 mfd.	400	Paper
36	250 mmfd.		Ceramic
37	3 "		Gimmick
38	100 "		Ceramic
39	50 "		Ceramic
40	.05 mfd.	200	Paper
41	.05 "	400	"
42	.01 "	"	"
43	.01 "	"	"
44	20 "	25	Electrolytic
45	.002 "		Mica
46	.01 "	400	Paper
47	250 mmfd.		Mica
48	500 "		Ceramic
49	2-25 "		Variable
50	.05 mfd.	400	Paper
51	150 mmfd.		Ceramic
52	.1 mfd.	200	Paper
53	250 mmfd.		Mica
54	.05 mfd.	"	Paper
55	.05 "	"	"
56	.05 "	"	"
57	16 "	475	Electrolytic
58	16 "	"	"
59	.25 "	200	Paper
60	.002 "		Mica
61	.002 "		"
62	50 mmfd.		Ceramic
63	Parallel padding for Band Spread		
64	Series "	" "	"
65	1.2-12 mmfd.		O & C trimmer
66	.002 mfd. in 3rd Band OSC Series tracking pad		
67	.01 "	400	Paper
68	.02 "	200	"
69	.1 "	"	"

LIST OF RESISTORS SKYRIDER 23

NO.	OHMS	WATTAGE	TOLERANCE
R1	100,000	1/3	20%
2	1,000	"	10%
3	10,000	R.F. Gain Control	
4	5,000	1/3	20%
5	100,000	"	"
6	600	"	10%
7	20,000	"	20%
8	5,000	"	"
9	100,000	"	"
10	1,000	"	10%
11	5,000	"	20%
12	1,000	"	10%
13	5,000	"	20%
14	1,000,000	"	"
15	200,000	"	10%
16	400,000	"	"
17	500,000	"	20%
18	500,000	A.F. Gain Control	
19	400	1	10%
20	5,000	2	20%
21	50,000	1	"
22	50,000	1/3	"
R23	5,000	1/3	20%
24	500,000	"	"
25	250,000	"	10%
26	200,000	"	"
27	500	"	"
28	1,000,000	"	20%
29	25,000	"	"
30	5,000	2	
31	6,500	7	
32	500	1/3	10%
33	500	"S" Meter Adjustment	
34	15,000	1	20%
35	25,000	"	"
36	3,000	1/3	10%
37	500	"	"
38	50,000	"	20%
39	500,000	Tone Control	
40	1,000	1/3	10%
41	1,000	"	"
42	10,000	1/2	20%
43	100,000	1/3	"

BAND SPREAD

Realizing that reset accuracy is a very desirable feature the SKYRIDER 23 was designed so that only the amateur bands from 10 to 80 meters could be bandspread. The switch mechanism and associated temperature compensated condensers are unique and eliminate the necessity of accurately resetting the main tuning dial whenever it is desired to band spread the amateur frequencies.

The four "Band Spread" positions found on the SKYRIDER 23 cover the frequencies indicated below:

Band 10 - 28 MC to 30 MC	40 - 7 MC to 7.30 MC
20 - 14 MC to 14.4 MC	80 - 3.50 MC to 4.00 MC

When operating the receiver in the band spread position it will be noticed that more than just the frequencies of each amateur band are covered. This has been found advisable for the reception of signals being sent on frequencies outside the amateur bands, as well as the reception of commercial stations for marker purposes, inasmuch as their exact frequency is usually known.

Each amateur band is spread over a sufficient number of divisions on the band spread scale to make tuning on that particular band effortless and accurate.

In addition to the frequency range in the circuit being identified by the Hallicrafters band switch knob under the main tuning dial, that particular band is also shown by referring to the illuminated indicator directly to the right of the main dial.

ALIGNMENT PROCEDURE

The alignment of the S23 is straightforward and requires no equipment other than the usual signal generator, or other signal source, and an output meter.

I. F. ALIGNMENT

No. 1 - Remove the "Bottom Pan" from the cabinet and then the square "RF Coil Shield Bottom" so that the RF oscillator and mixer tube bases, switch and coils are accessible.

No. 2 - Unsolder the control grid wire from 6SA7 tube base at the point at which it connects to switch section No. 6. Signal is applied to this grid for alignment of I. F. AVC and BFO circuits. An output meter is connected across 5000 ohm speaker terminals.

No. 3 - Connect the signal generator to the control grid of the 6SA7 mixer through a .01 mfd condenser. Now connect a 100,000, 1/3 watt, resistor from the control grid of the 6SA7 to AVC Return on the mixer RF coil form. (See note "A" Schematic).

No. 4 - Place the selectivity switch in "AVC Off IF Sharp" position; the wave band switch in #5.2-16.0 megacycle position or #3 band, volume and RF controls in maximum gain position.

No. 5 - Apply 455 KC signal of sufficient strength to give an approximate output of 500 milliwatt and adjust trimmers A1, A2, A4, A5, A6, A7 and A8 to maximum deflection of output meter.

B.F.O. ADJUSTMENT

Turn the BFO control so that the dot on the knob is pointing to the top of the cabinet and then adjust A10 until the beat note is zero frequency.

CRYSTAL ALIGNMENT

No. 6 - For alignment of crystal, place selectivity switch in CW crystal position, remove modulation from signal source, adjust BFO pitch control until a beat note of approximately 1000 cycles is attained. Detune the signal source from 455 KC and then adjust the crystal phasing control to a point where the hiss noise from the speaker is reduced to a minimum. Now vary the frequency of the signal source from about 453 to 457 KC. At some frequency between these points a sharp increase in speaker output will be noted. This is the resonant frequency of the crystal. The signal generator should be adjusted to this point of crystal resonance for maximum meter deflection. Touch up all trimmers, No. A2, A4, A5, A6, A7 and A8 for precise alignment to the crystal frequency. Assuming the output beat note is still set at approximately 1000 cycles, and leaving all controls on the receiver as previously adjusted, change the frequency of the signal generator until the output beat note is reduced from 1000 cycles down thru zero beat and up to the other side to a frequency of approximately 400 cycles. Now balance A1, and the crystal phasing control until the rejection slot is at minimum. It will be necessary to increase the output of the signal generator for this adjustment in order to obtain a satisfactory output level.

Note: A3 is a coupling condenser which should never need adjustment as it will not effect the alignment of the set but only vary the gain of the I. F. unit.

No. 7 - To adjust the AVC, turn the BFO pitch control to "off" position, the selectivity switch to "AVC On I. F. Sharp" position. Adjust the frequency of the modulated signal source to the resonant frequency of the I. F. unit with the signal strength sufficient to set up about 500 milliwatts in output meter. Now adjust A9 until the output is reduced to a minimum, which is the point where the AVC is resonant and operating properly.

Resolder the grid wire of the 6SA7 to the switch section contact and replace the R.F. coil shield bottom.

R.F. ALIGNMENT

The holes in the "RF Coil Box Cover" marked "W" as shown in the instruction book are to permit the insertion of a "Wand" into the coil forms for checking of alignment. The "Wand" is a rod of insulating material having a brass slug in one end and a powdered iron slug in the other. When the iron slug is placed in field of coil the inductance is increased, and when the brass slug is used, the inductance is decreased.

NOTE: When checking points of alignment the meter deflection should decrease when either end of "Wand" is used, if the set is properly aligned. If the meter deflection increases when the "Iron" end of "Wand" is in the field then the trimmer capacity should be increased. If, however, the meter reading increases when the "Brass" end of "Wand" is used then the trimmer capacity will have to be reduced.

When the condenser gang is fully closed be certain that the indicating line on the dial window is in line with the zero mark on the band spread calibration and the small line below the 550 KC calibration point. Place selectivity control in the "I. F. Sharp-AVC off" position. R. F. and Audio gain controls adjusted for maximum gain and signal of sufficient strength fed to the receiver to give approximately 500 milliwatts output.

Band No. 1 - "545 KC to 1700 KC"

Connect a wire between A2 and ground terminal or "G" on the antenna strip. Connect the ground side of the signal generator to the ground terminal of antenna strip and connect the high side of signal generator to A1 thru a 200 mmfd condenser.
Set the receiver dial and signal generator dial to 1500 KC - align trimmer indicated as Osc. 1 to resonance with this signal frequency and then adjust RF trimmer and antenna trimmer as indicated Band No. 1 to obtain maximum deflection on output meter. Next set the generator signal and receiver to 600 KC and while rocking the main tuning knob adjust low frequency pad (indicated as Pad BD1) until the output is maximum. Recheck alignment at 1500 KC and then the 600 KC position again for precise alignment.

Band No. 2 - "1700 KC to 5.2 Megacycles"

Note: Replace the 200 mmfd condenser with a 400 ohm resistor for alignment of Bands Nos. 2, 4 and 5.

Following same procedure as Band No. 1, align first at 4000 KC, using trimmers indicated as "Osc. 2" and R. F. trimmers "Band 2". The low frequency end is checked at 1600 KC by rocking condenser gang while adjusting pad BD2 until maximum output is obtained.

Band No. 3 - "5.2 Megacycles to 16 Megacycles"

The high frequency end of this band is aligned at 14 megacycles, using oscillator Trimmer "Osc-3" and RF trimmers indicating Band 3. The low frequency end is padded at 7. megacycles using series pad indicated "Pad BD3".

Band No. 4 - "10 Megacycles to 34. Megacycles"

This band is aligned at 30 megacycles first by setting dial at 30 megacycles and adjust Osc. 4 until signal is received, then by "rocking" condenser gang slightly and adjusting ("Band 4") RF trimmer until maximum output is obtained. Antenna trimmer, Band 4, is not aligned until the oscillator and R. F. trimmers are first adjusted for maximum output. It is not necessary to adjust the oscillator for low frequency tracking as this is adjusted at factory and should be permanent.

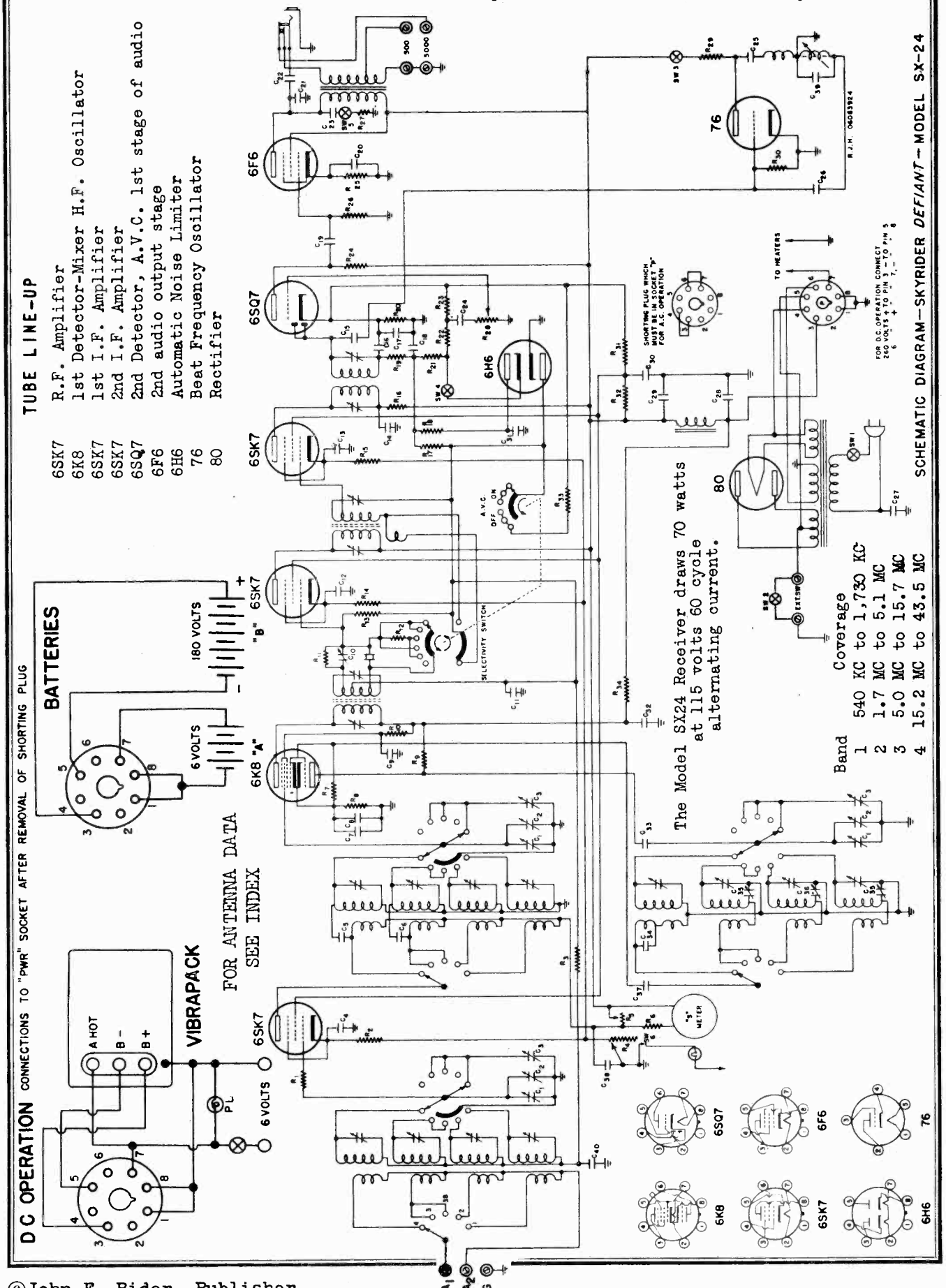
The band spread positions do not require alignment as the alignment for band coverage position also takes care of band spread alignment.

Schematic

THE HALLICRAFTERS INC.

MODEL SX24
Skyrider Defiant

Unless otherwise specified the SX24 Receiver operates on 100-125 volt 50-60 cycle current.



MODEL SX24, Skyrider Defiant
Socket, Trimmers
Parts List
Alignment

THE HALLICRAFTERS INC.

RESISTORS

NO.	OHMS	WATTAGE	NO.	OHMS	WATTAGE
1	30	1/3	18	1,000,000	1/3
2	200	"	19	50,000	"
3	100,000	"	20	100	"
4	10,000	R.F. Gain Control	21	250,000	"
5	500	Variable	22	100,000	"
6	400	1/3	23	250,000	"
7	50,000	"	24	250,000	"
8	200	"	25	500	1
9	15,000	1	26	500,000	1/3
10	30,000	1	27	5,000	1
11	2,000,000	1/3	28	500,000	A.F. Gain Control
12	50,000	"	29	20,000	1
13	500,000	"	30	50,000	1/3
14	300	"	31	20,000	1
15	300	"	32	15,000	1
16	1,000	"	33	150	1/3
17	1,000,000	"	34	5,000	1

CONDENSERS

NO.	CAPACITY	VOLTAGE	TYPE
1	440 mmfd	Per Section	
2	4 "	" "	
3	26 "	" "	
4	.05 mfd	200	Paper
5	25. mmfd		Ceramicon
6	10. "		"
7	.002 mfd		Mica
8	.05 "	200	Paper
9	.05 "	400	"
10	25. mmfd	Crystal Phasing	Air
11	.02 "	200	Paper
12	.05 "	"	"
13	.05 "	"	"
14	.02 "	400	"
15	3. "	Twisted Pair	
16	100. "		Mica
17	10. mfd	25	Electrolytic
18	50. mmfd		Mica
19	.05 mfd	400	Paper
20	10. "	25	Electrolytic
21	.005 mfd	600	Paper
22	.01 "	400	"
23	.02 "	600	"
24	.02 "	200	"
25	.01 "	400	"
26	100. mmfd		Mica
27	.01 mfd	600	Paper
28	30. "	350	Electrolytic
29	10. "	"	Electrolytic
30	.1 "	400	Paper
31	.05 "	200	"
32	"	350	"
33	10. mmfd		Mica
34	100 "		Ceramicon
35	105 "		
36	2200 "		
37	1400 "	"	Dual Pad
38	.002 mfd		Mica
39	.05 "	400	Paper
40	.0005 "		Mica
	.05 "	200	Paper

SW1 - AC Switch On AF Gain
SW2 - Send RC Switch
SW3 - B.F.O. on & OFF
SW4 - A.N.L. on & OFF
SW5 - Hi-Low Tone Switch
SW6 - S-Meter

ALIGNMENT PROCEDURE

455 KC, Intermediate-Frequency Alignment.
Have the controls set as follows:
AF and RF gain controls for maximum volume.
Remove 6K8 grid cap and connect the hot side of your 455 KC generator to this tube. Connect the ground terminal of the signal generator to the chassis of the receiver. Now feed a 455 KC signal into the receiver and set the pitch control to give a beat note of approximately 1000 cycles. Adjust all I.F. transformer trimmers for maximum gain with the exception of the secondary trimmer on transformer T1. In adjusting this trimmer it will be noted that the output reaches a maximum goes through a dip and then back to maximum again. Wobbulate the IF frequency and align to the dip between the two maximum points. A distinct change in the crystal note sounding like an apparent broadening of the crystal action will be noted when the correct adjustment has been reached. Now repeak carefully the other trimmers for maximum gain.

B.F.O. switch in the "ON" position.
Set band switch to #2 band.
Set main dial to 2 megacycles, band spread to zero.
Selectivity switch in "CW Sharp" position.

R. F. ALIGNMENT

Re-connect the grid cap to the 6K8 tube. Connect the hot side of the generator to the A_1 antenna terminal on the rear of the chassis. Be sure a jumper is connected to A_2 and G. Leave signal generator ground connected to the chassis of the receiver.

The location of the following trimmers and padders can be determined by referring to the top and bottom chassis views. All pad adjustments are for the low frequency end of each band while the trimmers are for the high frequency ends.

In order to get at the RF trimmers the guarantee card can be removed by placing a knife under the small snap fasteners holding it in place. So that most satisfactory adjustment of the trimmers and padders can be made, it is advisable to "Rock" the condenser gang across the signal being delivered by the generator until that particular circuit has been accurately peaked.

MAIN TUNING

BAND-SPREAD

"S" METER

When the R.F. gain control is advanced until a station is heard to operate, a light will appear behind the translucent scale of the meter itself. Only when this light is on will the meter indicate in "S" units. With the R.F. gain control backed off from maximum the meter is still in the circuit but will not indicate carrier level accurately. When so adjusted the meter can be used as a resonance indicator. On the rear apron of the chassis is the "S" meter adjustment screw. To set the "S" meter, disconnect the antenna and have the R.F. Gain Control on full and the selectivity switch in the "I.F. sharp A.V.C. on" position. Now, adjust this knurled knob until the meter reads zero. Reconnecting the antenna and tuning in a station will show its relative carrier intensity.

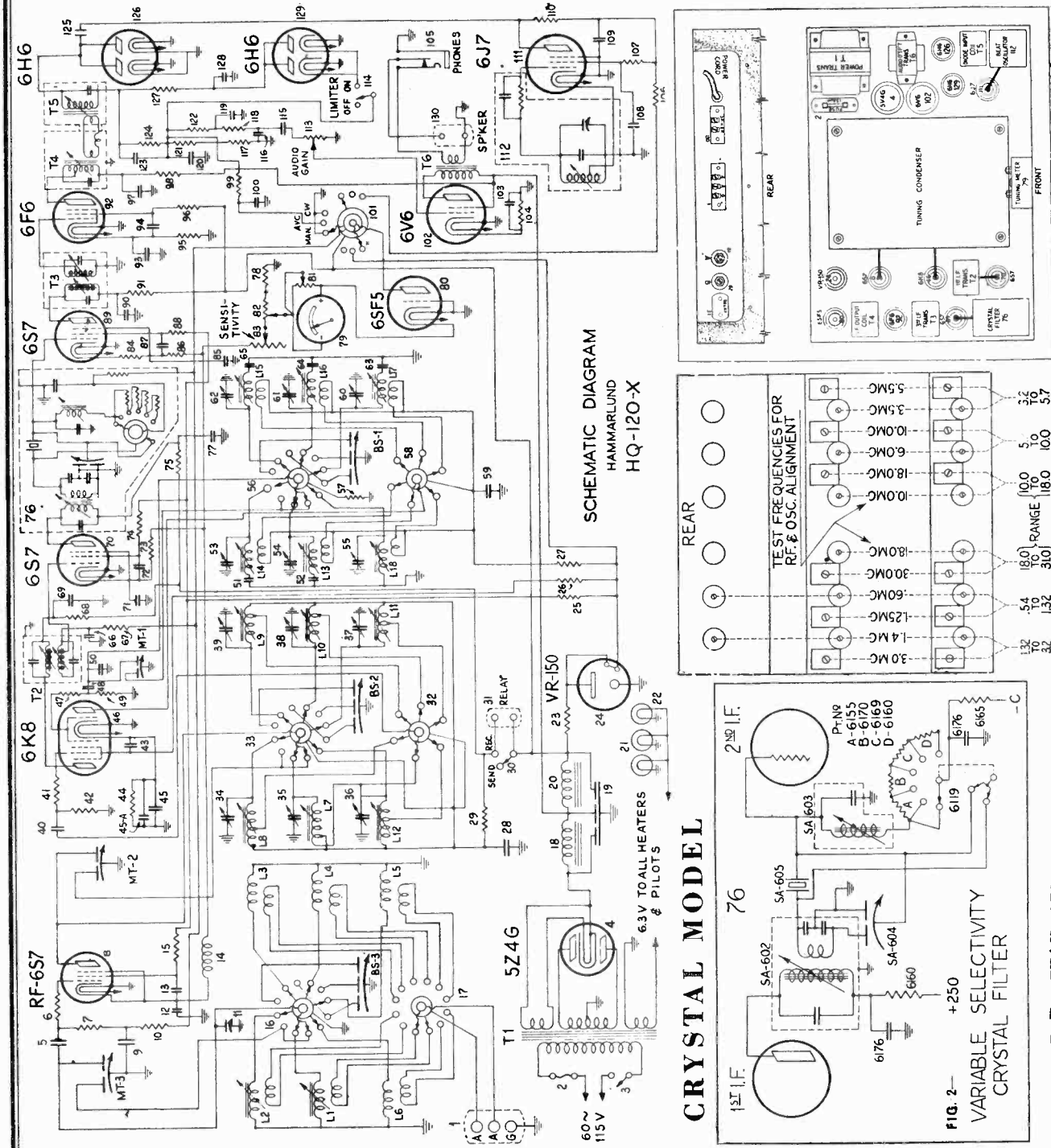
The 500 and 5000 ohm terminals are for connections to a loud speaker or other load of those impedance values. The matching SX23 speaker should be connected to the 5000 ohm strip. When headphones are plugged into the phone jack the 5000 ohm speaker connection is automatically disconnected.

Note: The accuracy of the main dial calibration will hold only if the BAND SPREAD condenser is set at minimum capacity, or the position indicated by "0" on the Band Spread dial which has been approached by turning the Band Spread Knob in a clockwise direction, or to the right, as far as it will go.

MODEL HQ-120X, Crystal
Schematic, Socket
Trimmers, Notes

HAMMARLUND MFG. CO.

12-tube superheterodyne covers a continuous range of from 31 to .54 mc. (9.7 to 555 meters) in 6 steps, thus taking in all important communication, amateur and broadcast bands.



ANTENNA REQUIREMENTS

The input of the "HQ-120" is arranged so that various types of antennas may be employed. The average input impedance is 400 to 600 ohms. The most common type of antenna used generally by the amateur and short wave listener is the Marconi, consisting of a single wire and ground connection.

CIRCUIT ARRANGEMENT

PRE-SELECTION: The pre-selector stage in this receiver is extremely high in gain due to its tuned grid and tuned plate circuits. An additional feature has been included in this stage in order to compensate for various types of antennas which may be used with the receiver. The adjustable compensating control which appears on the panel, directly underneath the meter, provides an external adjustment for perfectly aligning the circuits with any given antenna system. This is highly desirable for it is almost impossible to maintain fixed circuit alignment when antennas are frequently changed. Also, because the selectivity is thus improved and the gain considerably increased, this feature affords maximum signal-to-noise ratio and maximum image rejection. See Fig. 1.

BAND SPREAD: Much of the detail as to the band-spread arrangement has been covered in the introduction of this book. The band-spread control has five scales. The first is an arbitrary scale reading 0 to 200 for calibration in any of the bands covered by the receiver. This dial also includes four other scales calibrated in megacycles for the 80, 40, 20, and 10 meter amateur bands. It is rather unusual to find a band-spread dial calibrated directly in megacycles. However, due to the excellent stability of the receiver in general, and the outstanding design of the tuning condenser assembly, this has proved absolutely practical and, to say the least, most convenient.

CONVERTER STAGE: The converter stage uses the newly developed 6K8 tube which, incidentally, becomes more efficient as the frequency increases. The converter stage in this receiver has been treated in such a manner that the overall RF gain is relatively constant not only from one end of a particular amateur band to the other, but also from one band to the other. This is done because it can be readily seen that if the RF gain is not relatively uniform throughout each band and from one band to the other, the "S" meter reading will not be a true indication of signal strength. In some bands it would require a stronger signal to indicate "S-8" on the meter than in others. This has for a long time been a common ailment in receivers and a barrier to true meter readings. However, in the case of the "HQ-120-X" circuit adjustment has been made to permit accurate meter readings.

In order to increase stability, the oscillator is operated from a controlled voltage circuit employing the VR 150 voltage regulator tube. It is a well-known fact that fluctuations in power line voltage in many cases induce a frequency change in the high frequency oscillator stage. The use of the voltage regulator tube in a very effective circuit eliminates all danger from this source because the voltage applied to the oscillator portion of the converter remains constant regardless of power line changes. Also, the calibration of the receiver is maintained more accurately.

CRYSTAL FILTER: The crystal filter included in the "HQ-120-X" is an outstanding HAMMARLUND development. Unlike most other crystal filters, this one has five ranges of selectivity. These five degrees of selectivity are controllable directly from the panel by operation of a rotary switch. And, these degrees of selectivity remain permanent regardless of the rejector control setting. These five steps include 1, 2, and 3 for phone reception, varying from broad to fairly sharp, in convenient steps. The fourth and fifth are for CW or code reception. Four, being moderately selective and "five" the maximum selectivity of the crystal filter. The crystal can also be cut out for general use, by the sixth contact on the switch; see diagram in Fig. 2. Various curves showing the selectivity for these settings of the selectivity control are indicated in Fig. 3. There is absolutely no interlocking of the controls in this crystal filter. The rejector or phasing control can be set to eliminate a heterodyne of some particular frequency within its range, and will not require re-adjustment when the selectivity control of the filter is changed. Also, the output, or overall gain, of the receiver is not noticeably affected by changes in selectivity of the filter. This feature is extremely desirable, especially from the standpoint of accurately determining the strength of incoming signals. It is not necessary to make allowances for usual attenuation in the crystal filter, should it be necessary to change the selectivity in order to eliminate interference.

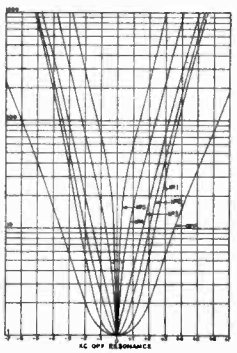


FIG. 3—Overall selectivity curves for 455 kc. I.F. amplifier and crystal filter. Labeling of the curves corresponds to the markings on the panel.

I. F. AMPLIFIER: The intermediate frequency amplifier consists of three stages employing iron core permeability-tuned transformers. The intermediate frequency is 455 kc. which has now become the R.M.A. standard. Overall selectivity curves for the I. F. amplifier with crystal filter are shown in Fig. 3. The A.V.C. arrangement in this amplifier provides remarkably smooth operation. There is a switch for cutting out the A.V.C. and providing manual control of volume or sensitivity.

NOISE LIMITER: The automatic noise limiter faithfully follows the carrier signal strength. It is intended to eliminate automobile-ignition interference and other similar disturbances. It works with the A.V.C either on or off and is so arranged that its operation does not affect the intelligibility of the received signal by altering the audio form. Its effect on modulation is negligible. There is also a switch on the panel for cutting out the noise limiter when it is not required, although it can be left in the circuit permanently without ill effects.

"S" METER: The "S" meter is calibrated to read in "S" units from 1 to 9. "S-1" corresponds to approximately .39 microvolts input at the antenna terminals. "S-9" corresponds to 100 microvolts. The meter is also calibrated up to 40 DB. above "S-9." "S-8" equals 50 M.V., "S-7"—25, "S-6"—12.5, etc. Special compensating controls for the meter are provided so that, regardless of particular local conditions, corrections can always be made for irregularities. These controls and the adjustment of them are thoroughly discussed under "Operation."

BEAT FREQUENCY OSCILLATOR: The beat frequency oscillator circuit is designed to effectively heterodyne signals of varied signal level. This oscillator is so isolated that it has no material effect on the operation of the I.F. amplifier. The variable control on the panel provides a wide selection of beat frequencies. A switch is also provided for cutting the oscillator off.

A. F. AMPLIFIER: The A.F. amplifier consists of a 6V6 tube with an output of approximately 4 watts. A manual gain control is provided in this stage in order that the operator may choose the proper amount of amplification. The output impedance is 6 ohms, and the output terminals connect directly to the voice coil of a permanent-magnet dynamic speaker.

POWER SUPPLY: Special care has been exercised in the design of this part of the receiver. Components used have a very large safety factor in order to insure satisfactory operation over a long period of time. A two-section filter is employed with a total inductance of 40 henries, and a total capacity of 40 microfarads. This heavy duty filter provides humless operation.

REALIGNMENT PROCEDURE

I. F. AMPLIFIER: The "HQ-120-X" receiver is aligned by the usual oscillographic method during final inspection. Its I. F. circuits are of an extremely stable type employing high grade silver-plated mica fixed condensers which are practically unaffected by even extreme changes in temperature or humidity. Accurate circuit alignment is accomplished by adjusting the position of the iron dust cores in the I. F. coils by means of the slotted screws protruding from the sides of the I. F. transformers T2, T3, T4, and T5 and the crystal filter shield 76. This construction results in tuned circuits that hold their adjustment regardless of mechanical shocks or atmospheric conditions. For these reasons it is extremely unlikely that realignment will be necessary and it should not be attempted unless there is very good reason to suspect trouble in the I. F. end of the receiver. Slight misalignment of transformers T2 and T3 will have the most marked effect on sensitivity and selectivity and their adjustment can be checked as follows:

Connect an output meter across the speaker voice coil leads. A low reading copper-oxide rectifier meter is quite suitable for this purpose. Connect a test oscillator (modulated) to the input terminals of the receiver. The frequency of this test oscillator may be anything within the range of the receiver, but its output must be steady. Then tune in its signal on the receiver with the crystal selectivity switch set on No. 1 (phasing control at centerscale) and adjust sensitivity (MAN) until a reading of approximately 1 volt is obtained on the output meter. It will now be found that the output meter reading is very sensitive to slight changes in tuning. After adjusting the tuning dial for peak output meter reading, check each adjusting screw on I. F. transformers T2 and T3. If any great change occurs readjust the tuning dial and again check the four I. F. adjustments. When no further improvement can be made T2 and T3 will be perfectly aligned. The lower, or plate circuit adjusting screw of the Crystal Filter transformer 76 may be checked at the same time and in the same manner.

To *perfectly* align the upper, or grid circuit of the crystal filter 76 an oscillograph and sweep oscillator are required. When such equipment is available the Crystal Selectivity switch may be set on No. 3 or No. 4 and the sweep frequency oscillator adjusted to coincide with the quartz crystal resonant frequency (phasing control at centerscale). Then, with Crystal Selectivity switch on No. 1, adjust the upper screw of Crystal Filter 76 for symmetrical pattern on the oscillograph screen. When such visual aligning equipment is not available a fairly satisfactory setting of this upper screw may be made as follows: After checking the alignment of T2, T3 and the lower screw of Crystal Filter 76 with the output meter as previously outlined, leave the Crystal Selectivity switch on No. 1 and tune in a broadcast station. Then adjust the upper screw in Crystal Filter 76 for best quality of reproduction of speech and music. In making this adjustment no attention should be paid to loudness. On either side of the correct setting, the speech and music will sound low and drummy, with a conspicuous absence of high audio frequencies. The correct setting can be checked by means of the tuning dial, by slowly turning it back and forth across resonance. When the upper screw is properly adjusted, the signal will tune in and out smoothly and there will be no peaks or loudspots as the dial is turned. In fact, the signal should tune in and out just as *smoothly* as with the Crystal "off" except that the band width will be noticeably *narrower*.

R. F. AND H. F. OSCILLATOR: Before attempting to realign these circuits the following instructions should be read through very carefully. As in the case of the I. F. amplifier, these circuits have also been accurately aligned during final inspection and great care has been taken in their design to insure stability and permanence of adjustment. Therefore, they should not be disturbed unless it is absolutely certain that readjustment is necessary. Even in that case, only very slight alterations will be necessary to restore the receiver to its original efficiency. In general, a small fraction of a turn on either inductance adjuster or trimmer condenser will suffice. These adjustments, together with their respective test frequencies, are clearly shown on the chart (Fig. 10). On the bands from 3.2 mc. to 31 mc. it is extremely important to have the band spread dial set at 200, since that is the setting at which the main dial has been calibrated. Naturally, the alignment of the receiver cannot be more accurate than the source of the test signal. The aligning during final inspection at the factory is accomplished with special test oscillators which are frequently compared with standard frequency crystals. The front row of adjustments shown on the chart on page 13 control the high frequency oscillator circuits and consequently the dial calibration. These adjustments should be disturbed *only* if the calibration of the main dial (with band spread dial at 200) is known to be off. As clearly indicated in the diagram, the inductance should be adjusted at the low test frequency in each band and the trimmer capacitor at the high test frequency. These adjustments mutually affect each other, therefore, if any considerable change is made at one end of a band the other end of the same band must be readjusted. This procedure must be repeated until no further readjustment at either end is necessary.

The adjustments in the middle row control the first detector input circuits. No great accuracy of test signal is required to check their correctness. Set the oscillator approximately to the frequency shown on the chart and tune in on the receiver (using the output meter). Then adjust for peak meter reading by means of the inductance adjuster at the low test frequency and the trimmer capacitor at the high frequency end. At 30 mc. there is a certain amount of interlock between the detector and H. F. oscillator, so in order to avoid a false setting of the trimmer capacitor in this range, it will be necessary to rock the tuning condenser back and forth while the test is being made.

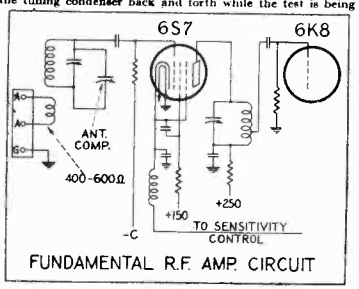


FIG. 1—Fundamental R.F. amplifier diagram showing antenna compensating condenser.

MAINTENANCE

This chart provides information as to the various voltages which will appear between certain tube socket prongs and the ground or B-negative side of the circuit. A slight explanation of the chart might be in order. As an example, when checking the R.F. tube (6S7) we find that the reading from pin 3 to ground should be 200 volts if read on a 0-250 scale meter. The scale that should be used for making the check is contained in the parentheses below the voltage. In the course of making this check it may be found that the voltage will vary slightly in some cases. This, of course, will be due to varying line voltage conditions in the particular location where the receiver is being tested. The voltage values indicated should be found in cases where the line voltage is exactly 117 volts. A meter having a resistance of 1000 ohms per volt with scales approximately as indicated can be used for the checking.

In compiling the parts lists, an endeavor has been made to indicate all values of parts readily obtainable in the open market. For instance, such common items as .02 mf. paper condensers with 500 volt ratings and 10,000 ohm ½w. resistors are standard items. Other parts whose values are not standard should be obtained by writing to the factory. Such parts as 5.5 mmf. silver mica condenser, of course, are not readily obtainable. However, in many cases these special items are located in parts of the circuit where it is almost impossible for them to become defective through ordinary operation of the receiver.

	SWITCH ON MAN.							SWITCH ON CW AVC	
TUBE	RF 6S7	Conv. 6K8	1-IF 6S7	2-IF 6S7	3-IF 6F6	Audio 6V6-G	REG VR150	B.O. 6J7	Meter 6F5
Pin 3 to ground	200 (250)	215 (250)	215 (250)	210 (250)	270 (500)	260 (500)	...	35 (250)	...
Pin 4 to ground	115 (250)	105 (250)	115 (250)	115 (250)	122 (250)	275 (500)	...	75 (250)	150 (250)
Pin 5 to ground	...	...	...	...	...	...	150 (250)	...	...
Pin 6 to ground	...	115 (250)	...	...	...	...	...	...	...
Pin 8 to ground	3.2 (10)	3.2 (10)	6.2 (10)	6.2 (10)	9.3 (10)	16 (100)	...	...	1.8 (10)

MODEL HQ-120X, Crystal Operating Notes, Parts

HAMMARLUND MFG. CO.

HQ-120-X OPERATION

After unpacking the receiver check the chassis carefully to determine that all tubes are properly fitted into their respective sockets. Also, be certain that all grid clips are in place on the tops of the tubes. It is possible that the grid clips or tubes may have been dislodged during transportation.

This receiver, unless it is a special model, operates on 105 to 125 volts AC at 50 to 60 cycles. If you are uncertain as to the type of power available for operating the receiver, check with your local power company office. An attempt to operate the set on other types of power is liable to ruin it. Next, connect the speaker to the receiver. Two wires from the permanent magnetic dynamic speaker connect to the two terminals on the rear edge of the chassis marked "speaker." The main power supply switch that turns the receiver on and off is operated in conjunction with the "audio gain" control. When this control is in the "off" position, the receiver is completely inoperative. So, the next operation is to turn this control on slightly and wait for the tubes to heat up to their operating temperature. In the meantime, set the band selector switch in the .54–1.32 megacycle position; this is the major part of the standard broadcast band, the remainder is covered in the 1.32 to 3.2 mc. band. Also, set the control marked "MAN-AVC.-BFO." in the AVC position. The crystal selectivity control knob should be set in the "off" position. This is the broadest setting. The control in the lower left-hand corner of the panel should be set in the "REC" position. This latter control turns the receiver on and off for stand-by and transmitting periods during communication, but does not disconnect the receiver from the power line thus leaving the tubes heated and ready for instant use. By this time, the receiver is in operation—tubes having had ample time to heat up. We can now tune in broadcast stations by turning the sensitivity control full on and advancing the audio gain control to the point permitting the desired volume. All tuning in the broadcast band is done with the "main tuning" control. The band-spread control does not operate in the first two ranges. For accurate tuning, it will be necessary to watch the "S" meter. At this point it might be well to mention that it is possible that the meter may not be operating properly and may require adjustment. Along the rear edge of the chassis we find two screw driver adjustments (see Fig. 11) marked "A" and "B." These are for aligning the meter so that it operates properly. First, with the receiver turned off the indicator on the meter should rest to the extreme left, at the beginning of the scale to the left of the first arrow. If not, the zero adjustment on the meter (the small screw in the lower central portion) should be adjusted and the receiver turned on again. Also, it might be wise to short-circuit the two antenna posts to ground in order to eliminate signal pickup because in adjusting the meter no signal should be present. With the receiver in the AVC position and the sensitivity control set on zero, the screw driver adjustment "A" on the rear of the chassis should be adjusted so that the indicating needle of the meter is opposite the arrow at the extreme right of the scale. With the "sensitivity" control turned to 10, adjust "B" so that the meter needle is opposite the small arrow at the left of the scale. This should be rechecked because there is a slight interlocking of these controls. It may be necessary to repeat the operation two or three times.

After the meter circuit has been properly aligned and the antenna system connected to the receiver (see chapter on antenna requirements) the main tuning control should be adjusted for maximum reading of the meter on any particular station. The antenna compensating control is the final tuning adjustment. This should be set also for maximum meter reading. If, for any reason, automatic volume control is not desired, the switch so marked should be set in the "MAN" (or manual) position. In this case, sensitivity is controlled with the control thus marked and then the audio control should be turned all the way on.

A jack is provided in the lower right-hand corner of the panel for those who desire to use head-phones. This jack cuts the speaker out of the circuit. On the rear of the chassis, will be found terminals marked "relay." These pin jacks are in parallel with the "send-receive" switch and can be connected to a send-receive relay for break-in operation.

Operation on the remaining high frequency bands is essentially the same, except that the band spread dial comes into use. There are five scales on the band-spread dial. The 0–200 scale is for general coverage and is an arbitrary scale for accurately logging in any one of the various short wave broadcast bands. The other scales are for each of the amateur bands from 80 to 10 meters inclusive, and are calibrated in megacycles. The main tuning dial is also calibrated in megacycles and this calibration holds true when the band-spread dial is set at 200 on the arbitrary scale.

In short wave reception of either amateur or short wave broadcast stations, other features of the receiver are brought into use. For instance, the beat frequency oscillator is used for CW code reception and also for logging weak phone stations. This oscillator is only available without the AVC action and, when turned on, brings the main sensitivity control into operation. The beat oscillator tuning control provides wide variety of tones—the selection of which will depend upon the operator. Also in short wave reception we may need the noise limiter. There is a switch on the panel which provides this feature. The noise limiter operates independent of the setting of any of the other controls on the panel. Its purpose is to limit the interference caused by automobile ignition and similar disturbances.

The next important feature is the crystal filter. Detailed description and diagram can be found under "Circuit Arrangement." The variable feature permits the operator to select the band width that best suits receiving conditions. Normally, the phasing control should be set at the arrow in the center of its scale. Adjustment of this control will cut out interference from stations on either side of the desired signal in any of the five selectivity ranges of the crystal filter. When using the crystal filter, select the band width that provides the greatest fidelity with a minimum of interference. The selectivity of the filter increases as the switch is rotated clockwise. The first three positions of the selectivity control are intended for phone reception, although they can also be used for code in cases where interference is not too severe. The remaining positions are, of course, for single signal code reception in extremely crowded bands.

HQ-120-X PARTS LIST

DIAGRAM	DESCRIPTION	PART NO.
L-1	Antenna coil .54–1.32 mc. range	6007
L-2	Antenna coil 1.32–3.2 mc. range	6010
L-3	Antenna coil 3.2–5.7 mc. range	6013
L-4	Antenna coil 5.7–10 mc. range	6016
L-5	Antenna coil 10–18 mc. range	6019
L-6	Antenna coil 18–31 mc. range	6022
L-7	R.F. coil .54–1.32 mc. range	6008
L-8	R.F. coil 1.32–3.2 mc. range	6011
L-9	R.F. coil 3.2–5.7 mc. range	6014
28	.005 mf. mica condenser	6056
30-114	Send-Receive and Limiter switches	6098
31	Relay pin jack	6142
32	Det. grid tap and osc. plate switch wafers	6064
34-35-36-37-38-39-53-54-55-60-61-62	Special MEX trimmer cond.	6055
42-49-117-118-121-122-124	50,000 ohm resistor (½ W.)	6075
44	230 ohm resistor (½ W.)	6156
45-71-85-94-100-108-109	.05 mf. condenser (500 V.)	6174
45A	.005 mf. mica condenser	6194
46	Tube socket 6K8-Conv. (iso.)	6107
47	15 ohm resistor (½ W.)	6154
48	50. mmf. condenser (silver)	6074
50	5.5 mmf. condenser (silver)	6151
51	673 mmf. condenser (silver)	6061
52	300 mmf. condenser (silver)	6060
56	H.F. osc. grid switch wafer	6132
57	10. ohm resistor (½ W.)	6089
64	.0015 mf. mica condenser	6058
65	.001 mf. mica condenser	6059
70-89	Tube socket 6S7	6109
73	700. ohm resistor (½ W.)	6159
76	Crystal filter	SA-600
78	50. ohm resistor ½ (W.)	6170
79	Tuning meter	6139
80	Tube socket 6SF-5	6106
81-82	80. ohm meter circ. potentiometers	6140
83	Sensitivity control 10,000 ohms	6096
84	400 ohm resistor (½ W.)	6168
86	300. ohm resistor (½ W.)	6169
92	Tube socket 6F6	6108
93-128	.1 mf. condenser (500 V.)	6173
95	600 ohm resistor (½ W.)	6158
96	50,000 ohm resistor 1 watt	6166
99-127	1-meg. resistor (½ W.)	6167
101	AVC-MAN-BFO switch	6097
102	Tube socket 6V6—Audio	6113
103	40 mf. electrolytic condenser	6171
104	350. ohm resistor (1 W.)	6157
105	Phone jack	6087
107-110	100,000 ohm resistor (½ W.)	6135
111	Tube socket 6J7	6112
112	Beat oscillator	SA-680
113	Audio gain control (500,000 ohm combined with power switch)	6095
115	.01 mf. condenser (500 V.)	6175
116-119-120	100. mmf. mica condenser	6191
123	1000. mmf. mica condenser	6177
125	10. mmf. mica condenser	6178
126-129	Tube socket 6H6	6111
130	Speaker terminal strip	3843
L-10	R.F. coil 5.7–10 mc. range	6017
L-11	R.F. coil 10–18 mc. range	6020
L-12	R.F. coil 18–31 mc. range	6023
L-13	H.F. osc. coil .54–1.32 mc. range	6009
L-14	H.F. osc. coil 1.32–3.2 mc. range	6012
L-15	H.F. osc. coil 3.2–5.7 mc. range	6015
L-16	H.F. osc. coil 5.7–10 mc. range	6018
L-17	H.F. osc. coil 10–18 mc. range	6021
L-18	H.F. osc. coil 18–31 mc. range	6024
T-1	Power transformer 50–60 cycle, 115 V.	6082
T-2	First I.F. transformer	6116
T-3	Third I.F. transformer	6118
T-4	I.F. output coil assembly	SA-660
T-5	Diode input coil	SA-670
T-6	Audio output transformer 6 ohm	6086
1	Antenna terminal strip	6088
2	Fuse block (1.5A fuse Pt. No. 6065)	3859
3	Power switch (comb. with audio gain control), 500,000 ohm	6095
4	Rectifier tube socket 5V4-G	6114
5-40	600 mmf. grid coupling condensers	6073
6-41	25. ohm resistor (½ W.)	6155
7	500,000 ohm resistor (½ W.)	6076
8	Tube socket 6S7-RF (iso.)	6107
9-12-13-43-59-66-69-72-77-87-90-97	.02 mf. paper cond. (500 V.)	6176
10-67-106	10,000 ohm resistor (½ W.)	6165
11	Antenna compensating condenser	SA-617
14	R.F. choke	CHX
15-29-68-74-75-88-91-98	2000 ohm resistor (½ W.)	6160
16-33	R.F. and detector grid switch wafer	6063
17	Antenna switch wafer	6062
18	First filter choke	6083
19	Filter condenser	6085
20	Second filter choke	6084
21	.15 amp. pilot lamps (6-8 V.)	6036
22	Dial and meter lamps socket assembly	6045
23	3000 ohm resistor (10 W. wire wound)	6161
24	Tube socket VR-150	6115
25	6000 ohm resistor (1 W.)	6163
26	7000 ohm resistor (1 W.)	6164
27	10,000 ohm resistor (1 W.)	6162

HOWARD RADIO CO.

MODEL 4B - BATTERY RECEIVER

This model must not be confused with the Model 4BT. Electrically they are much the same but the Model 4B is built into an upright table cabinet with an oval dial, whereas the 4BT is a flat type cabinet with straight line dial.

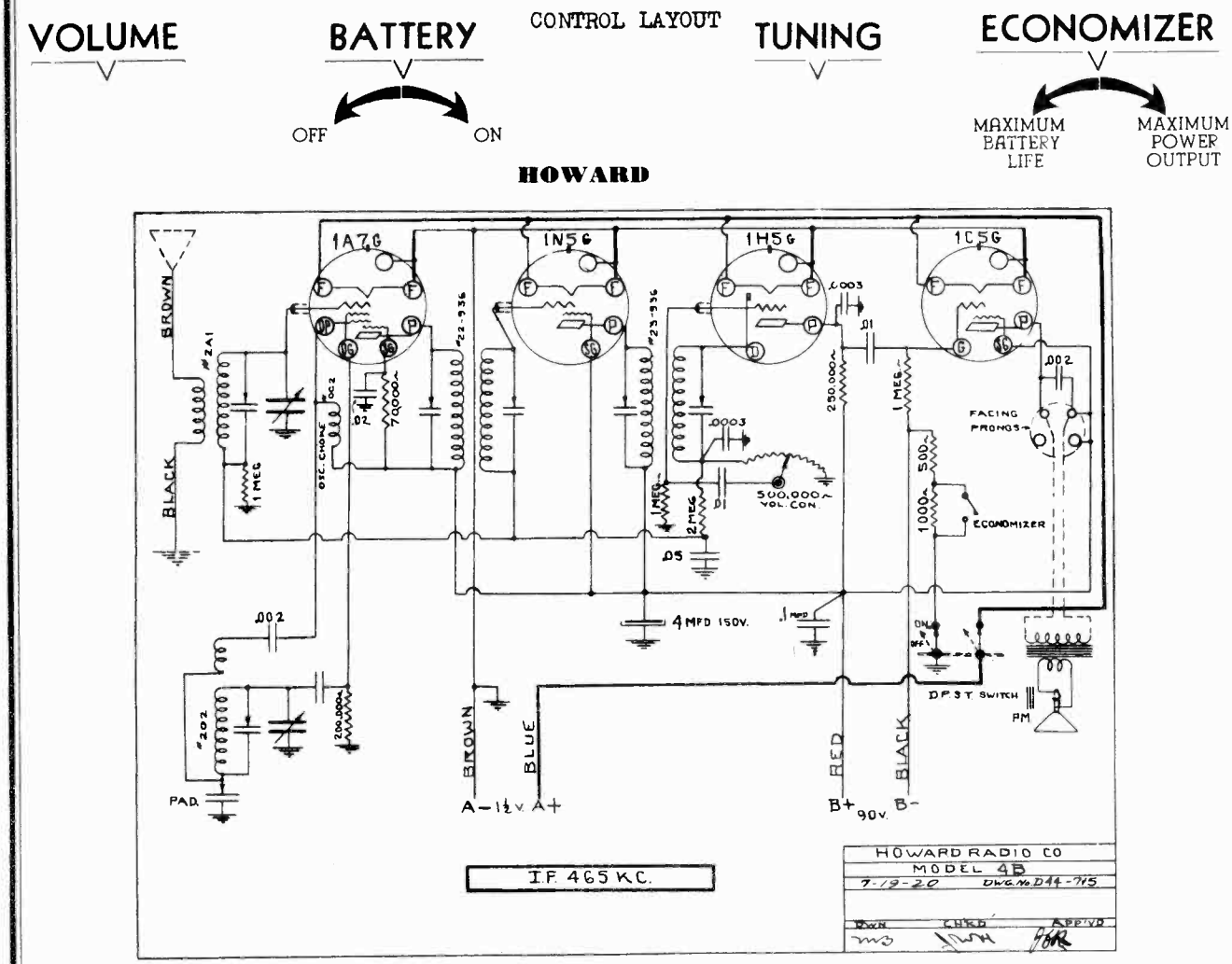
The function of the tubes is as follows: 1A7G - Modulator, 1N5G - IF Amplifier, 1H5G - Diode Det. AVC, 1C5G - Output.

The trimmers for the antenna and oscillator coils are mounted directly on each coil.

The output is rated at .180 to .360 milliwatts.

"A" Battery Drain at 1¼ volts - .25 amps.

"B" Battery Drain at 90 volts - .012 mils., or 7 mils. when using the "Economizer".



PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION
18-190T	Cabinet	21-720X	Drive Shaft with Friction Discs
21-270	Condenser - 2 Gang	10-328X	Drive Disc - 5-1/8 OD with Hub
36-266	Condenser - "E" Filter - Dual 10 Mfd. 200 V.	16-352	Escutcheon
		22-936	I.F. Assembly - 1st
49-262	Condenser - Padding	23-936	I.F. Assembly - 2nd
8218-3	Condenser - Trimmer, 3-30 Mmfd.	18-490	Knob - 1", Brown Bakelite
23-281	Control - Volume	8-490	Knob - 13/16", Brown Bakelite
0C2	Choke - Oscillator	17-602	Plug - 3 Prong, "B" Circuit
2A1	Coil - Antenna	18-602	Plub - 2 Prong, "A" Circuit
202	Coil - Oscillator	1-806	Speaker - 6", PM Type
7-427B	Dial Glass - 1 Band	12-917	Switch - S.P.S.T. for Economizer
4059	Dial Hand	16-917	Switch - D.P.S.T. - OFF-ON

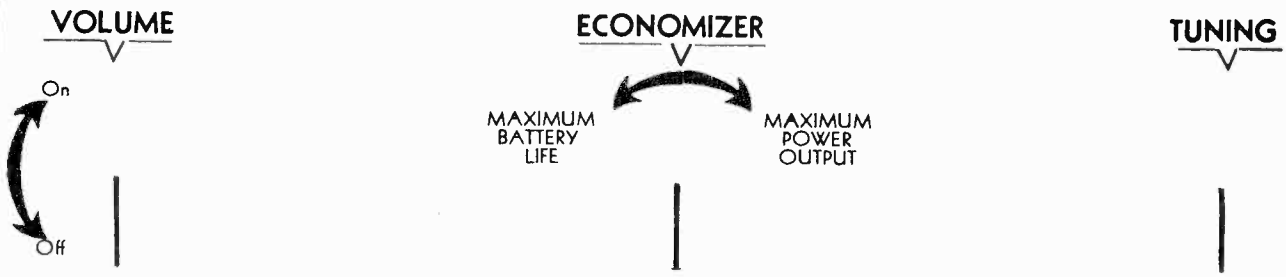
MODEL 4BT
Schematic, Voltage
Notes

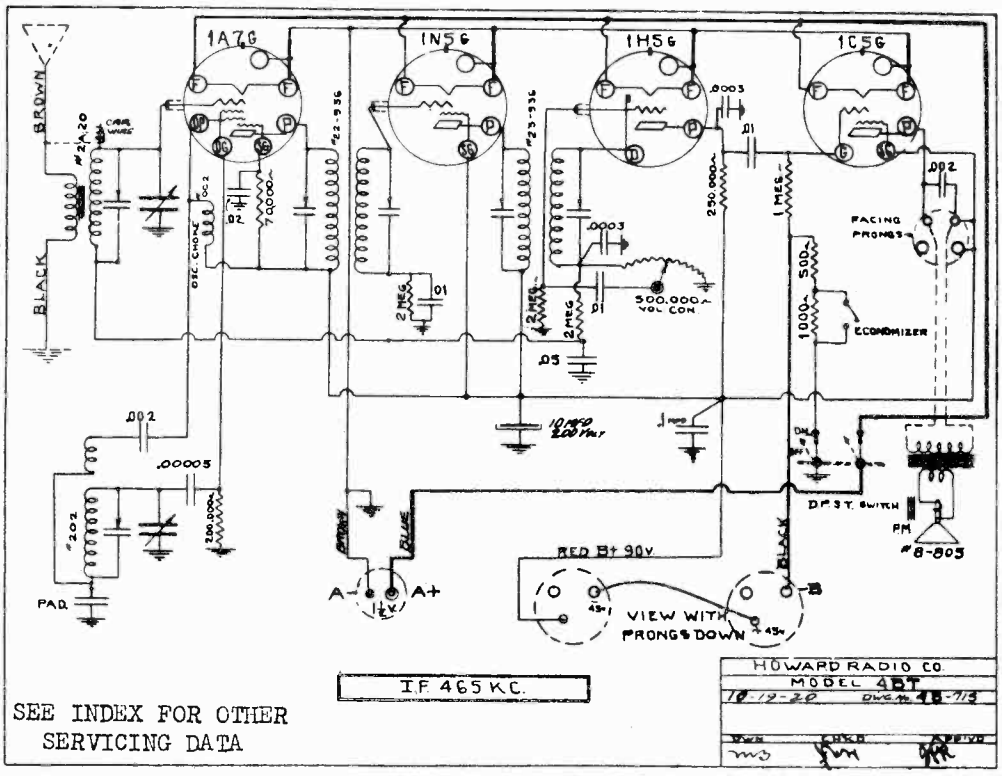
HOWARD RADIO CO.

MODEL 4BT - BATTERY RECEIVER

This receiver is designed on the 220 style chassis.
"A" Battery Drain at 1¼ volts - .25 amps.
"B" Battery Drain at 90 volts - .012 mils., or 7 mils. when using the "Economizer".
Output - .180 to .360 milliwatts, maximum.
The set is equipped with plugs that are inserted directly into the "A" and "B" batteries of the socket type construction since most all batteries are made that way at this time.

CONTROL LAYOUT





SEE INDEX FOR OTHER SERVICING DATA

REPLACEMENT PARTS LIST - MODEL 4BT

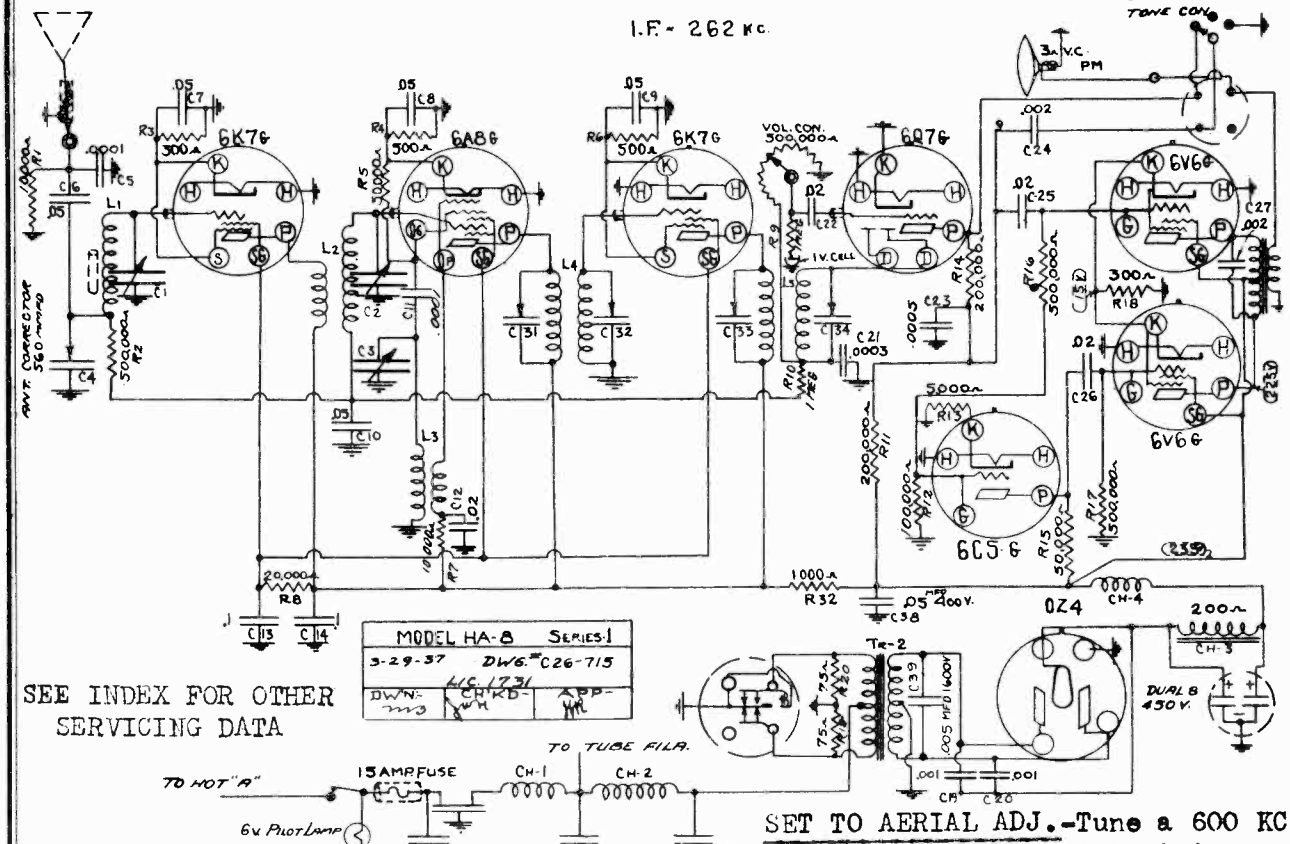
PART NUMBER	DESCRIPTION
38-270	Condenser - 2 Gang for Model 4BT
36-266	Condenser - "E" Filter - Dual 10 Mfd. 200 V.
49-262	Condenser - Padding
39-281	Control - Volume, with Switch
56-188	Cabinet
2A20	Coil - Antenna
202	Coil - Oscillator
OC2	Choke - Oscillator
62-310	Dial Glass - 1 Band
20-448	Dial Hand finished with Eyelet
1-288	Drive Cord - 36"

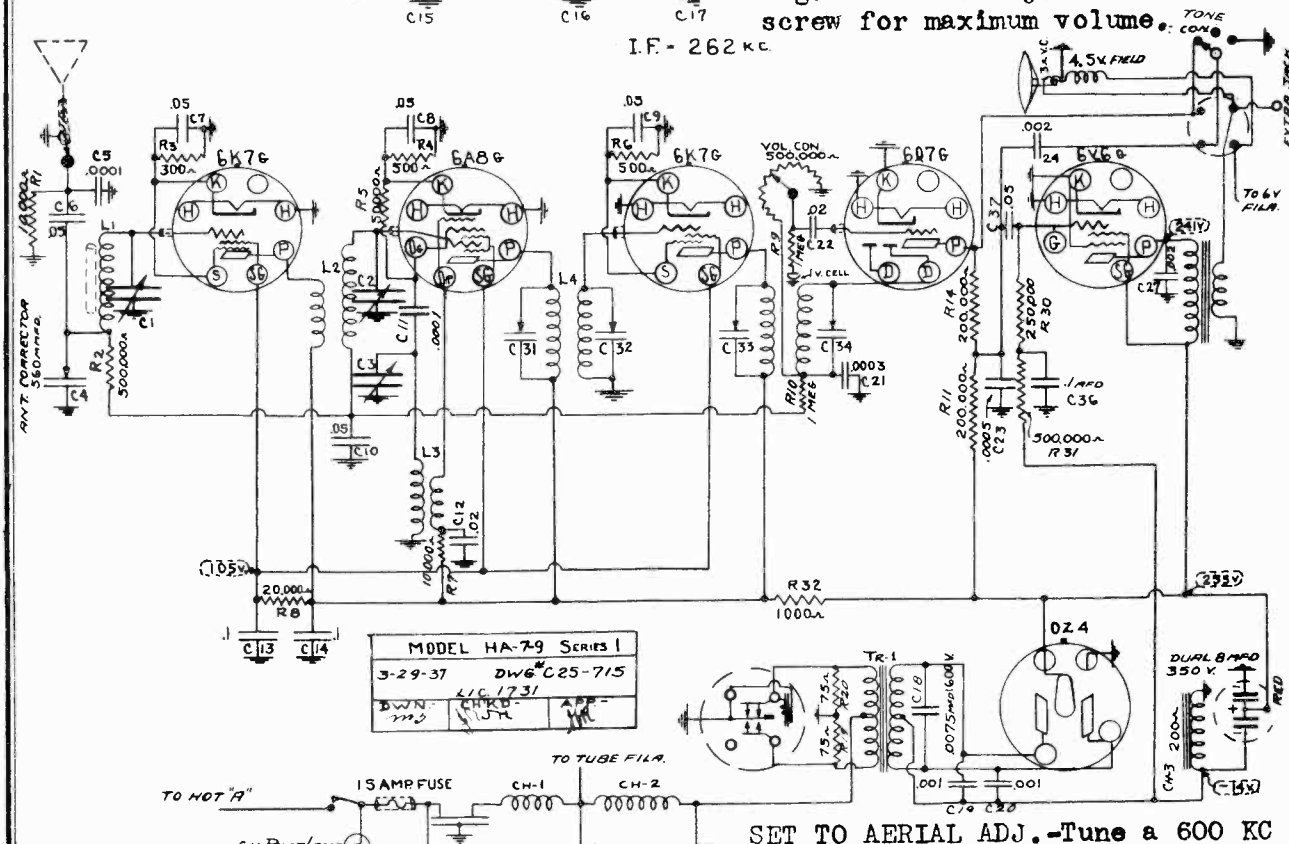
PART NUMBER	DESCRIPTION
17-829	Drive Cord Spring
34-720X	Drive Shaft with Wood Hub
4-429	Drive Shaft Grommet
12-788	Drive Shaft & Wood Hub
22-936	I.F. Assembly
23-936	I.F. Assembly
18-490	Knob - 1" Diameter - Brown Bakelite
1-609X	Pulley with 4-425 Gear Assembly
3-609	Pulleys for Drive Cord
J8-805	Speaker - 5" with Transformer - PM
17-917	Switch, Rotary Shaft

Alignment

HOWARD RADIO CO.

MODELS HA7, HA9
MODEL HA8
Schematics, Voltage

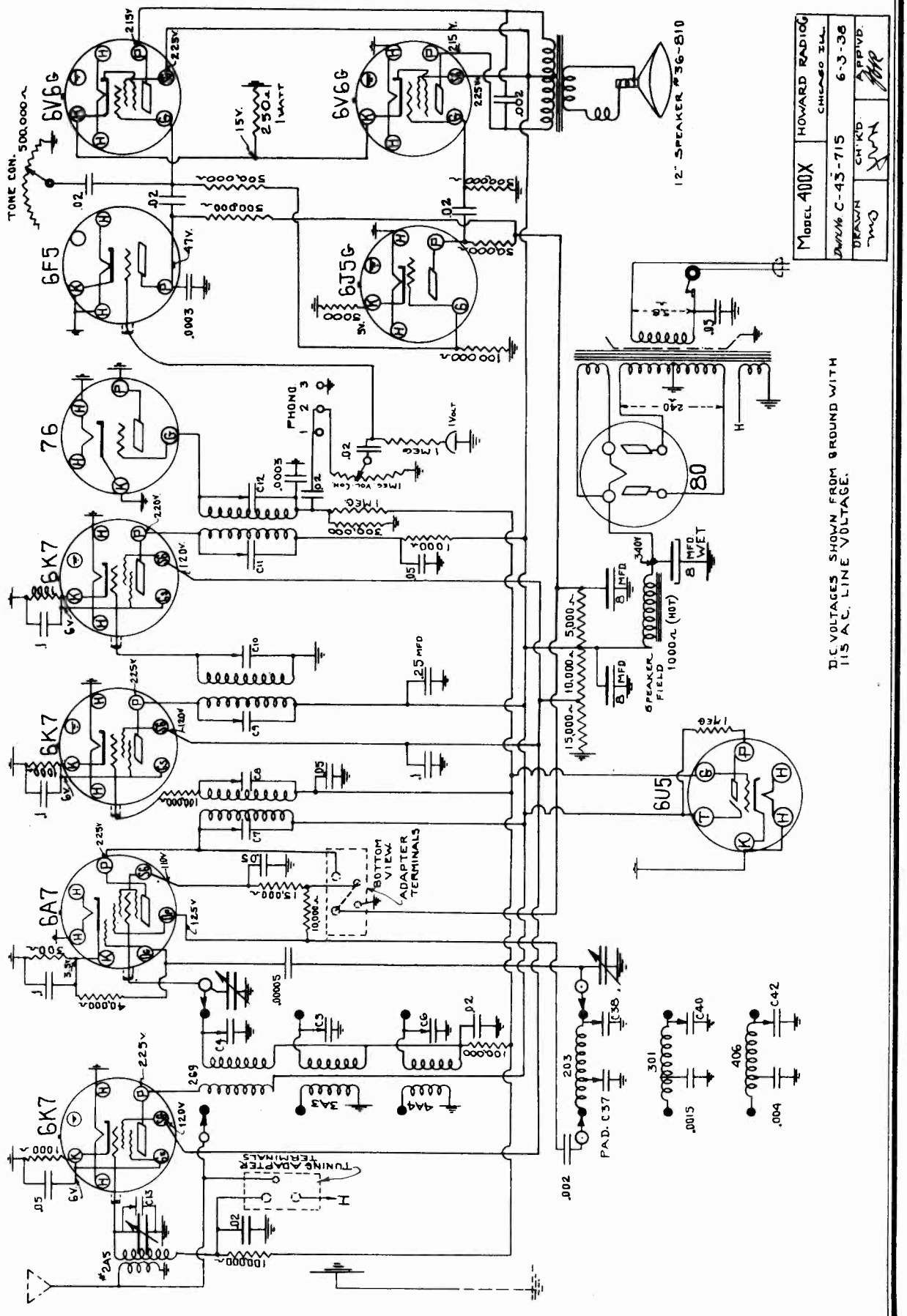




At any future date should the tubes be checked and changed it is very important that the same type tubes as specified be substituted. Do not substitute a metal tube for the glass type, especially in the 6V6G position.

MODEL 400X
Schematic, Voltage

HOWARD RADIO CO.



HOWARD RADIO CO.

MODEL 210
Push Button Adapter
Schematic, Instructions
Parts List

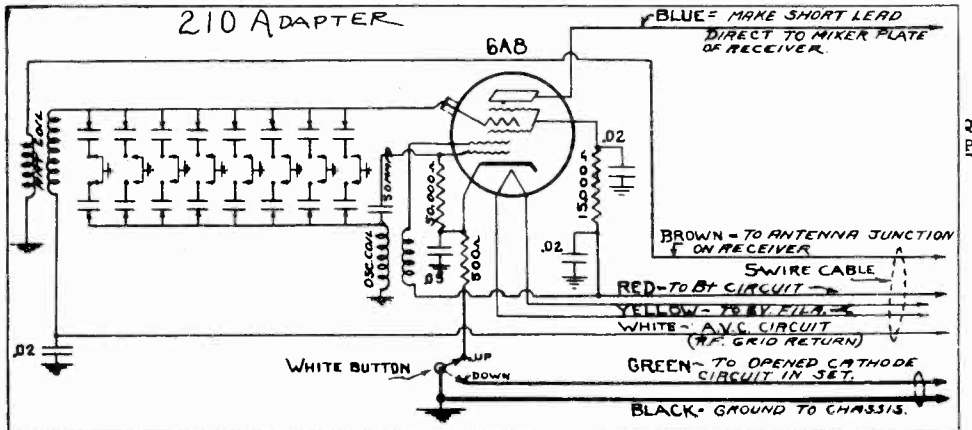
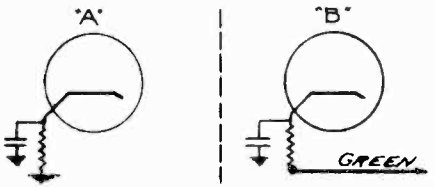
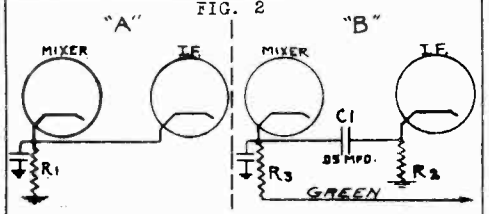


FIG. 1



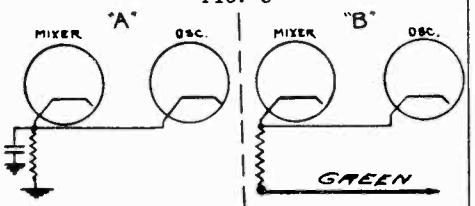
CATHODE CIRCUIT OF THE 6A7 OR 6A8 TUBES WHERE NO OTHER CATHODES ARE COMMON - MERELY REMOVE RESISTOR FROM GROUND AND ATTACH GREEN WIRE TO THE RESISTOR.
NOTE-SHOULD CATHODE BE ALREADY DIRECT TO GROUND - REMOVE GROUND AND CONNECT GREEN WIRE DIRECT TO CATHODE TERMINAL.

FIG. 2



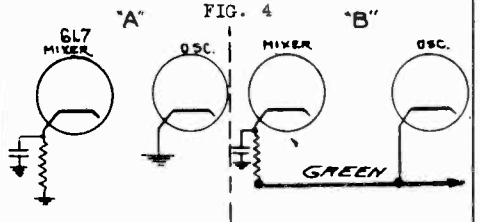
CIRCUITS IN WHICH I. F. CATHODES ARE CONNECTED COMMON TO MIXER CATHODE — SUBSTITUTE RESISTORS R2 AND R3 FOR R1 OF SUCH VALUES TO OBTAIN ORIGINAL CATHODE VOLTAGE. ADD C1 CONDENSER (.05 MFD 200 V.) BETWEEN CATHODES AS SHOWN, AND CONNECT GREEN WIRE TO END OF R3 RESISTOR.

FIG. 3



THE ABOVE ARRANGEMENT IS USED WHEN OSCILLATOR CATHODE AND THE MIXER CATHODE ARE COMMONLY COUPLED BY RESISTOR - MERELY REMOVE GROUND AND ATTACH GREEN WIRE AS SHOWN.

FIG. 4



WITH CIRCUITS AS SHOWN ABOVE WHERE 6L7 CATHODE USES BIAS RESISTOR AND THE SEPARATE OSCILLATOR CATHODE IS GROUNDED - TIE CATHODES TOGETHER SO THAT GREEN WIRE CONTROLS THE GROUND RETURN FOR BOTH.

H.R.CO. DWG No 41-715

PARTS LIST FOR MODEL "210" ADAPTER

QUANTITY PER SET	PART NO.	LIST PRICE	DESCRIPTION
1	2A12	.40	Coil - Antenna
1	2011	.40	Coil - Oscillator
1	20-266	1.10	Condenser - 16-8 Mfd. Electrolytic
1		.16	Condenser - .02 Mfd. 200 Volt
2		.16	Condenser - .02 Mfd. 400 Volt
1		.16	Condenser - .05 Mfd. 200 Volt
1		.16	Condenser - .00005 Mfd. Mica
1	39-262	.40	Condenser - Dual Trimmer
1	40-262	.40	Condenser - Dual Trimmer
1	41-262	.40	Condenser - Dual Trimmer
1	42-262	.40	Condenser - Dual Trimmer
1	43-262	.40	Condenser - Dual Trimmer
1	44-262	.40	Condenser - Dual Trimmer
1	45-262	.40	Condenser - Dual Trimmer
1	46-262	.40	Condenser - Dual Trimmer
1	22-352	.35	Escutcheon Plate
2	2-114	.25	Moulded Bar Trim
1	14-602	.15	Plug with shell, 3 prong
1	15-602	.15	Plug with shell, 4 prong
8		.05	Push Buttons - Brown
1		.05	Push Buttons - White
1		.15	Resistor - 500 Ohm 1/2 Watt
1		.15	Resistor - 15,000 Ohm 1/2 Watt
1		.12	Resistor - 40,000 Ohm 1/3 Watt
1		.15	Socket - 8 Prong
1	9-772	.15	Socket - 3 Prong for part # 14-602
1	10-772	.15	Socket - 4 Prong for part # 15-602
1		.30	Station Tab Sheet
4	7-658	.05	Filister Head Screws - 6-32 x 3/4 Long
4	1-182	.05	Cinch Buttons
4	17-844	.03	Friction Strip
4		.02	Wood Spacer - 1/4" long 3/8 OD
1	10-917	3.30	Switch - Push Button complete
			REPLACEMENT PARTS FOR ABOVE (less knobs)
1		.10	Selector Key "Off" position
8	4-488	.08	Selector Keys
1	5-114	.10	Latch Bar
1	11-829	.05	Bronze Spring for latch bar
1	10-829	.05	Coil Type Spring 1" for key
8	9-829	.05	Coil Type Spring 13/16" for 4-488 keys
9	21-972	.02	Felt Washers
18	7-829	.04	Main Contact springs, silver finish

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

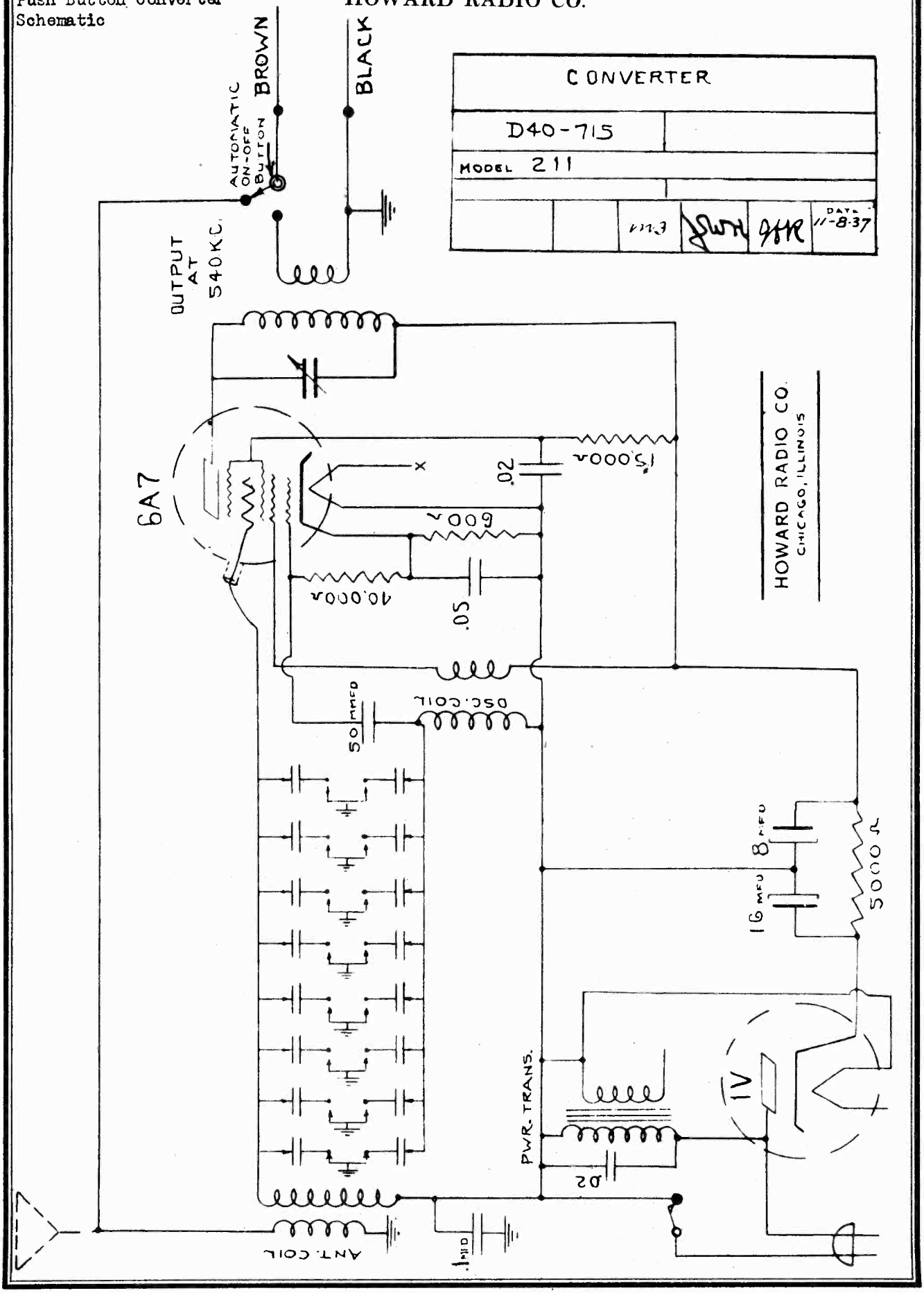
NOTE:

See installation instructions for the operation of this adapter.

MODEL 211
Push Button Converter
Schematic

HOWARD RADIO CO.

CONVERTER					
D40-715					
MODEL 211					
					DATE 11-8-37



MODEL 210
MODEL 211
Instructions

HOWARD RADIO CO.

MODEL 4B
MODEL 4BT
MODELS 220,270
MODELS 221,271
Alignment

MODELS 220, 221, 270, 271,
4B, 4BT
ALIGNMENT CHART

MODELS	CHECK BAND SWITCH POSITION & SET DIAL TO	GENERATOR FREQUENCY	GENERATOR CONNECTION	TRIMMER LOCATION	TRIMMER FUNCTION	APPROXIMATE MICROVOLTS FOR 50 MILLIWATT OUTPUT
220, 221	Maximum Capacity	465 KC	Grid of 6A7	C31,C32, C33,C34 Fig. 2	IF	27
220, 221	107 MC (1700 KC)	1700 KC	Antenna Lead	T10,T11 Fig. 2	Osc. & RF	9
220, 221	600 KC	600 KC	Antenna Lead	P 18	Osc. Pad. (Rock Dial)	10
270, 271	Maximum Capacity	465 KC	Grid of 6A7	C31,C32, C33,C34 Fig. 2	IF	27
270, 271	18 MC	18 MC	Antenna Lead	T1, T2 Fig. 3	Osc. & RF	20
270, 271	1.7 MC (1700 KC)	1.7 MC	Antenna Lead	T3, T4 Fig. 3	Osc. & RF	9
270, 271	600 KC	600 KC	Antenna Lead	P 12	Osc. Pad. (Rock Dial)	10
4BT	Maximum Capacity	465 KC	Grid of 1A7G	C31,C32, C33,C34 Fig. 2	IF	50-75
4BT	1.7 MC	1.7 MC	Antenna Lead	T10,T11	Osc. & RF	29
4BT	600 KC	600 KC	Antenna Lead	P 12 Fig. 2	Osc. Pad. (Rock Dial)	30

NOTE 1: When aligning the I.F. channel, a condenser of .05 MFD may be used in series with the generator lead.

NOTE 2: When aligning the broadcast band, a 250 MMFD condenser may be used in series with the signal generator.

NOTE 3: When aligning the short wave bands, a 400 ohm resistor may be used in series with the signal generator.

NOTE 4: Check for an image signal about .9 mc. lower in frequency. For example:- If a peak has been made at 6 mc. an image should be heard at about 5.1 mc. Otherwise the original setting was not correct.

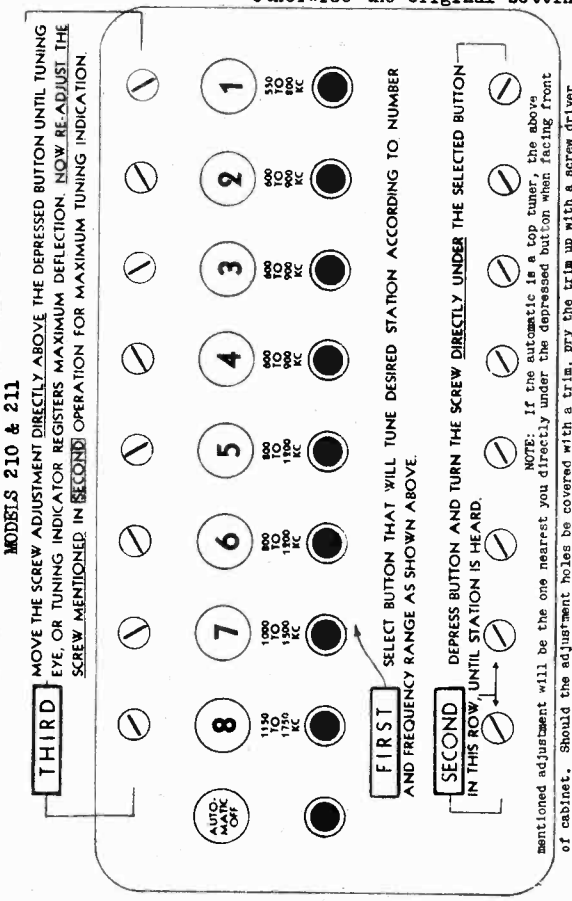
BATTERY RECOMMENDATIONS

The color code for the battery leads for the Models 4B or 4BT

Red	B+	90 volts
Black	B—	90 volts
Blue	A+	1½ volts
Brown	A—	1½ volts

SET-UP INSTRUCTIONS—HOWARD AUTOMATIC
MODELS 210 & 211

THIRD — MOVE THE SCREW ADJUSTMENT DIRECTLY ABOVE THE DEPRESSED BUTTON UNTIL TUNING EYE, OR TUNING INDICATOR REGISTERS MAXIMUM DEFLECTION. NOW RE-ADJUST THE SCREW MENTIONED IN SECOND OPERATION FOR MAXIMUM TUNING INDICATION.



FIRST — SELECT BUTTON THAT WILL TUNE DESIRED STATION ACCORDING TO NUMBER AND FREQUENCY RANGE AS SHOWN ABOVE.

SECOND — DEPRESS BUTTON AND TURN THE SCREW DIRECTLY UNDER THE SELECTED BUTTON IN THIS ROW, UNTIL STATION IS HEARD.

NOTE: If the automatic is a top tuner, the above mentioned adjustment will be the one nearest you directly under the depressed button when facing front of cabinet. Should the adjustment holes be covered with a trim, pry the trim up with a screw driver and remove while making adjustments.

FOURTH — Insert the station call letter tab over button number just selected. Repeat this procedure for the remaining buttons. Replace trim.

TO USE RADIO IN THE CONVENTIONAL MANNER, DEPRESS BUTTON MARKED "AUTOMATIC OFF".

EXAMPLE

Station desired, WGN: Frequency is 720 KC, therefore button 2, 3, or 4 can be used. Button 3 is depressed, the lower adjustment is moved until WGN is heard. The adjustment above #3 button is then adjusted for maximum eye deflection. The lower adjustment is again checked for maximum deflection.

WGN tab is removed from tab sheet and inserted in escutcheon over #3. Insert tab by pushing in place with finger-tip.

SUGGESTIONS

FIRST: Do not try to extend the adjustments beyond their frequency rating.

SECOND: Move adjustments slowly.

THIRD: Double-check before moving any adjustment to make sure the adjustment about to be moved corresponds to the depressed button. Carelessness will cause you to misadjust adjustments already completed.

FOURTH: Check adjustments occasionally for maximum deflection of eye or tuning indicator, while receiver is in service. This will not have to be done often but it is good assurance that your receiver is always tuned perfectly.

A good method to identify the station being set up, is to tune the station in by dial on radio set, then switch to automatic by depressing the button on which set-up is being made and tune in by adjustment same program as heard when tuned in by dial as mentioned above.

When selecting a station automatically it is only necessary to depress button carrying the desired station call letters.

To use manual tuning depress "Automatic OFF" button.

8-541

MODEL 4B
MODEL 4BT
MODELS 220,270
MODELS 221,271

HOWARD RADIO CO.

Socket, Trimmers
Tuner Data, Dial

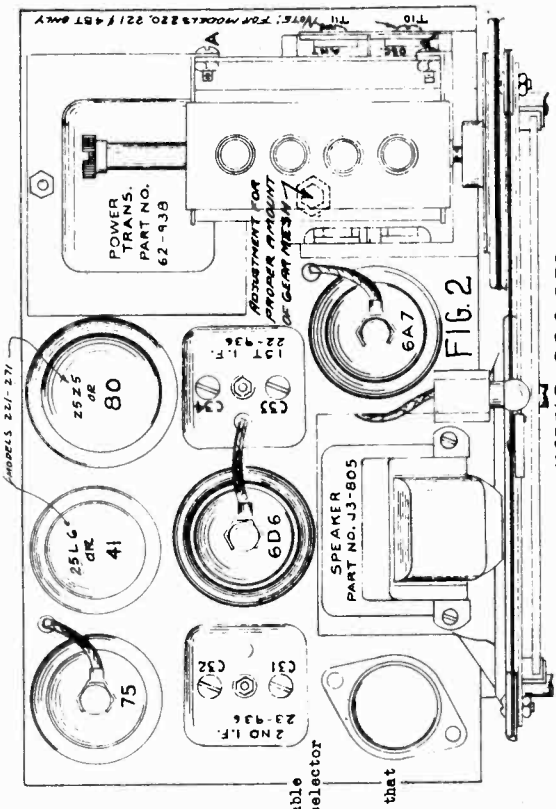


FIG. 2

MODELS 220, 270

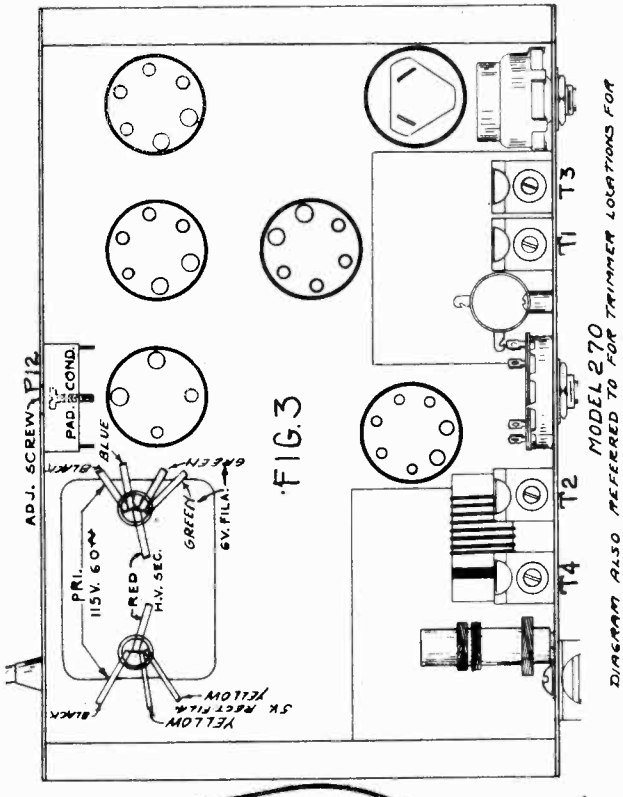


FIG. 3

MODEL 270

DIAGRAM ALSO REFERRED TO FOR TRIMMER LOCATIONS FOR OTHER MODELS

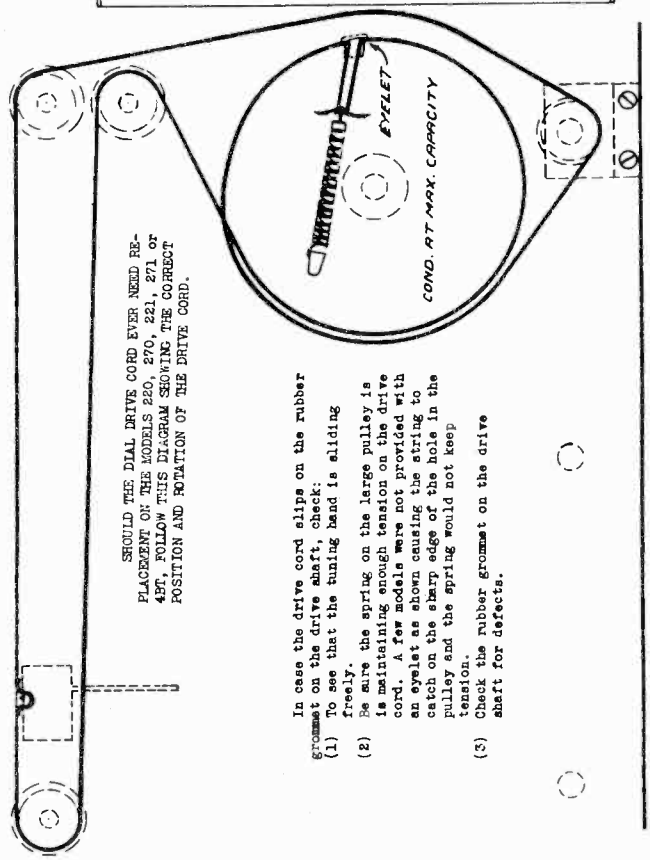
HOW TO SET AUTOMATIC TUNING BUTTONS

(1) From the rear of the tuning mechanism within the cabinet extends a slotted screw; loosen this screw by turning it to the left.
(2) Tune set in the regular way and decide upon what four stations are used the most in your locality.
(3) With a station exactly in tune press one button ALL THE WAY DOWN which will set the adjustment, then the button will spring back in its original position.
(4) Repeat this procedure for each of the remaining three buttons, being careful not to touch any other buttons while pressing down on one.
(5) Now tighten the rear screw, using a coin in the slot when tightening, if necessary, to make sure it will not loosen. Insert station letters into top of buttons.

THE GEAR ADJUSTMENT between the gear on the selector unit and the gear on the variable condenser is located on the top of the variable condenser in the form of a screw. The selector unit always tends to press against this screw head due to the mounting at point "A". See Fig. 2

To lower or raise the selector unit to change the gear spacing, loosen the hex nut that locks the adjustment screw and adjust as required.

SHOULD THE DIAL DRIVE CORD EVER NEED REPLACEMENT ON THE MODELS 220, 270, 221, 271 or 4BT, FOLLOW THIS DIAGRAM SHOWING THE CORRECT POSITION AND ROTATION OF THE DRIVE CORD.



In case the drive cord slips on the rubber grommet on the drive shaft, check:
(1) To see that the tuning hand is sliding freely.
(2) Be sure the spring on the large pulley is maintaining enough tension on the drive cord. A few models were not provided with an eyelet as shown causing the string to catch on the sharp edge of the hole in the pulley and the spring would not keep tension.
(3) Check the rubber grommet on the drive shaft for defects.

MODELS 220,270
Schematic,Voltage
Notes

HOWARD RADIO CO.

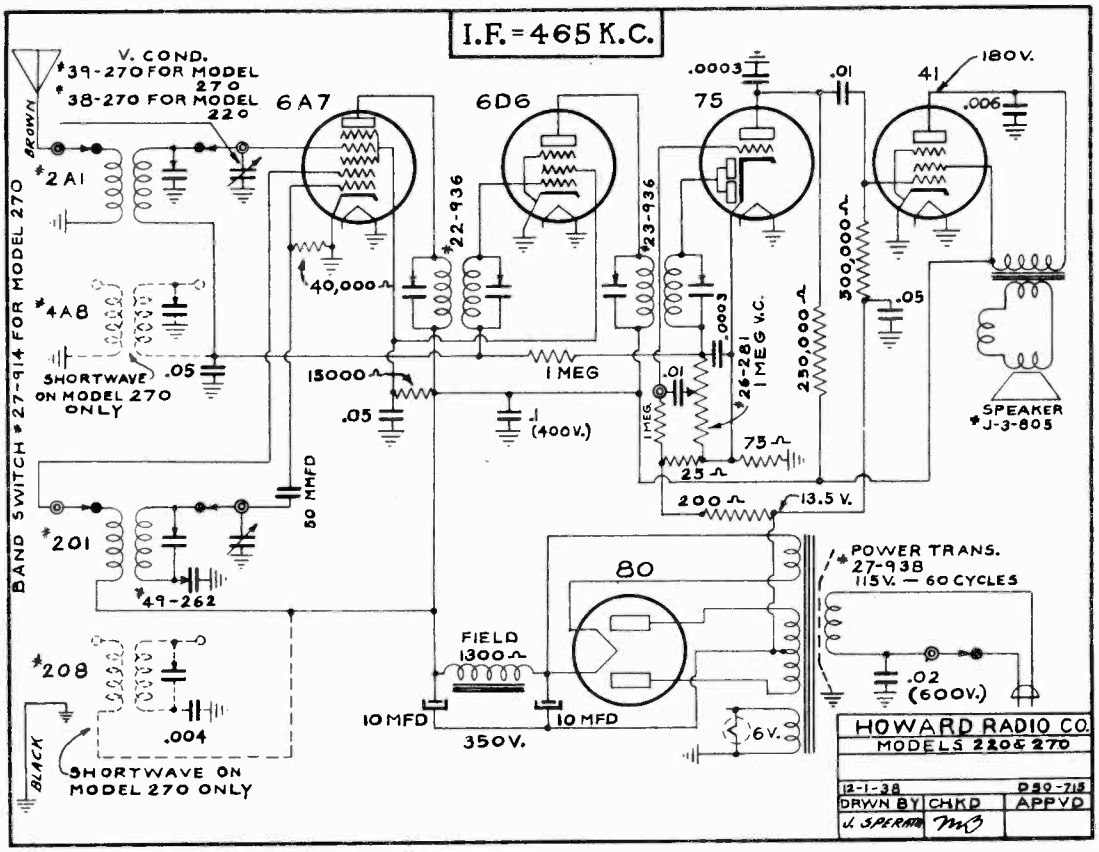
GENERAL DESCRIPTION - MODELS 220 and 270
FOR USE ON ALTERNATING CURRENT ONLY

The schematic diagram below covers both models 220 and 270, the main difference being the use of the short wave band for Model 270. The circuit is conventional with 6A7 mixer, 6D6, IF amplifier, 75 Diode Det. AVC, 41 Output, 80 Rectifier. The cathode circuit of the filter system is not grounded direct, the bias voltages are obtained by resistors from C.T. of high voltage to ground.

The output to be obtained will be from 1-1/2 to 2/25 watts, maximum.

For the models having four push buttons, a mechanical type tuner, the proper set-up is given on the following page.

FOR OTHER SERVICING DATA, SEE INDEX



REPLACEMENT PARTS LIST - MODELS 220 - 270

PART NUMBER	DESCRIPTION
27-914	Band Switch for Model 270
39-270	Condenser - 2 Gang for Model 270
38-270	Condenser - 2 Gang for Model 220
31-277	Condenser - "E" Filter - Dual 10 Mfd. 350 V.
50-262	Condenser - Single Trimmer 3-30 Mfd.
49-262	Condenser - Padding
36-281	Control - Volume, with Switch
53-188	Cabinet - Model 270
54-188	Cabinet - Model 220
62-310	Dial Glass - Model 220 - 1 Band
61-310	Dial Glass - Model 270 - 2 Band
20-448	Dial Hand finished with Eyelet
1-288	Drive Cord - 36"
17-829	Drive Cord Spring

PART NUMBER	DESCRIPTION
34-720X	Drive Shaft with Wood Hub
4-429	Drive Shaft Grommet
12-788	Drive Shaft & Wood Hub
6-425X	Gear with Hub for Selector Unit
18-490	Knob - 1" Diameter - Brown Bakelite
36-290	Push Buttons
2-276	Push Button Selector Unit
1-609X	Pulley with 4-425 Gear Assembly
3-609	Pulleys for Drive Cord
11-786	Pilot Light Sockets
2-498	Pilot Light - 6 V. Bayonet Type
J3-805	Speaker - 5-1/2" with Transformer 1300 Ohm Field
27-938	Transformer - Power 115 V. 60 Cycle

REFER TO SCHEMATIC DIAGRAM FOR REPLACEMENT PARTS NOT SHOWN IN ABOVE LIST.

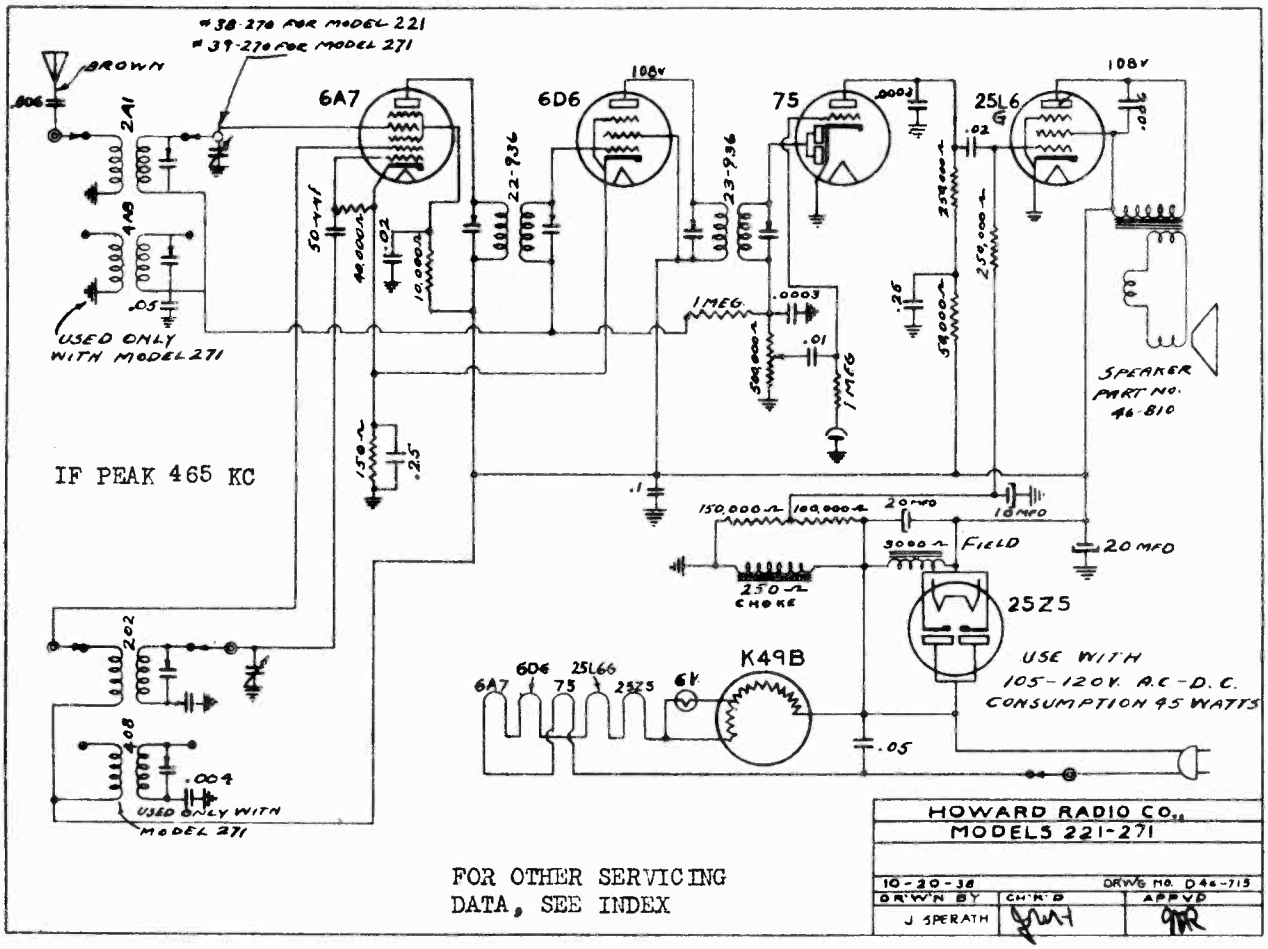
MODELS 221,271
Schematic,Voltage
Notes

HOWARD RADIO CO.

GENERAL DESCRIPTION - MODELS 221 and 271
FOR USE ON EITHER DIRECT OR ALTERNATING CURRENT

The schematic diagram below covers both 221 and 271 AC-DC Models, the main difference being that the 271 has a short wave band. Mechanical specifications are similar to the 220 - 270 series.

The maximum power output to be obtained is 2.7 watts, 1.7 watts undistorted.



FOR OTHER SERVICING DATA, SEE INDEX

REPLACEMENT PARTS LIST .- MODELS 221 - 271

PART NUMBER	DESCRIPTION
27-914	Band Switch for Model 271
39-270	Condenser - 2 Gang for Model 271
38-270	Condenser - 2 Gang for Model 221
32-266	Condenser - "E" Filter - Dual 20 Mfd. 150 Volt
50-262	Condenser - Single Trimmer 3-30 Mfd.
49-262	Condenser - Padding
36-281	Control - Volume, with Switch
53-188	Cabinet - Model 271
54-188	Cabinet - Model 221
62-310	Dial Glass - Model 221 - 1 Band
61-310	Dial Glass - Model 271 - 2 Band
20-448	Dial Hand finished with Eyelet
1-288	Drive Cord - 36"
17-829	Drive Cord Spring

PART NUMBER	DESCRIPTION
34-720X	Drive Shaft with Wood Hub
4-429	Drive Shaft Grommet
12-788	Drive Shaft and Wood Hub
19-212	Filter Choke - 240 Ohms
6-425X	Gear with Hub for Selector Unit
18-490	Knob - 1" Diameter - Brown Bakelite
36-290	Push Buttons
2-276	Push Button Selector Unit
1-609X	Pulley with 4-425 Gear Assembly
3-609	Pulleys for Drive Cord
2-498	Pilot Light - 6 V. Bayonet Type
46-810	Speaker - 5-1/2" with Transformer 3000 Ohm Field

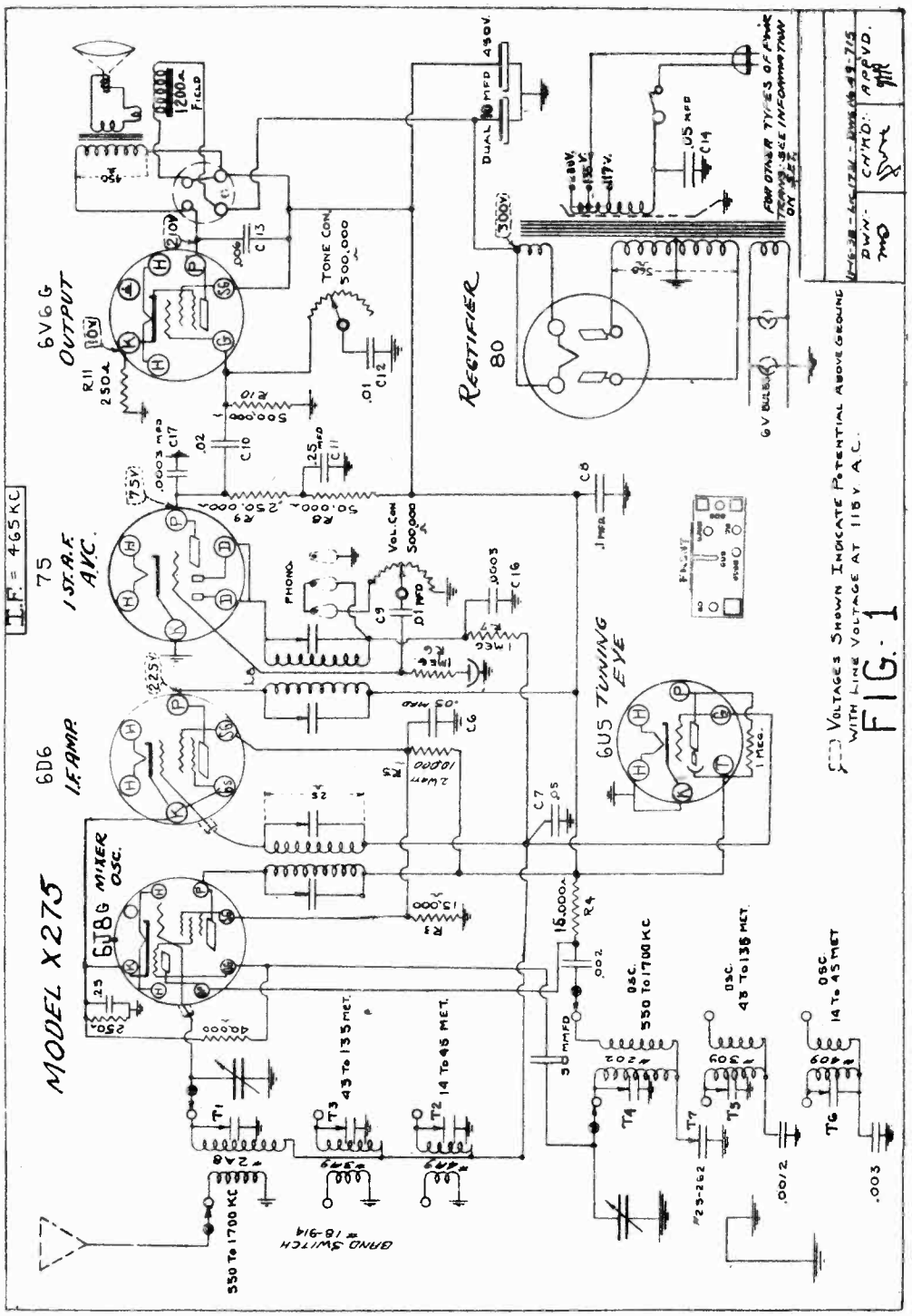
REFER TO SCHEMATIC DIAGRAM FOR REPLACEMENT PARTS NOT SHOWN IN ABOVE LIST.

MODEL X275
Schematic, Voltage

HOWARD RADIO CO.

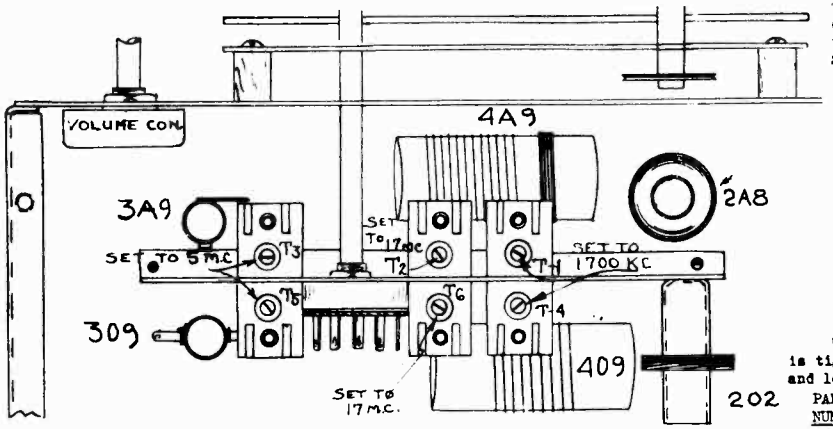
Each of the three bands has a separate antenna and oscillator coil.

The intermediate frequency stages are tuned to 465 KC and have a sensitivity of about 27 microvolts. (for 50 milliwatt output)
The maximum output is rated at about 5 watts, and 3.5 watts undistorted.

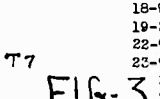


Use this receiver only with Alternating Current, 40-60 Cycles. The receiver is adaptable to three line voltages; determine the line voltage with which the set is to be used, then check the adjustable plug position on top of the power transformer, with the coded socket for 117, 135 and 240 volts. Insert plug in the correct socket before turning on set. REFER TO INSTRUCTION TAG ATTACHED TO POWER TRANSFORMER.

If any other type transformer is being used, a different tag will explain the correct connections.



BOTTOM VIEW



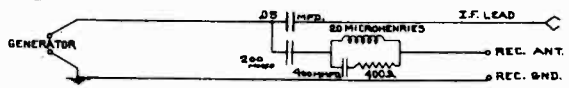
MODEL X275, 285

FIG. 3

ALIGNMENT

No change should be made with the I.F. or R.F. adjustments unless it is certain that such adjustments are necessary.

The following instructions are given with the assumption that the service station has the proper generator, means of measuring the output and proper input connections. The following circuit is recommended for the input from the signal generator.



See that the dial hand is straight across when the condenser is at full capacity.

After aligning the four trimmers of the IF system to 465 KC, refer to Fig. 3 showing the position of the R.F. trimmer and the frequency to which they are to be adjusted. Although the dial is calibrated in meters, there will be found on the dial extra points representing the frequency in kilocycles corresponding to the trimmer adjustments as shown in Fig. 3.

N O T E S:

Always peak the oscillator circuit first and recheck after the antenna circuit is adjusted.

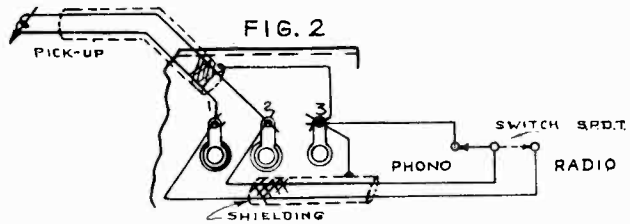
Be certain the alignment is not made at an image frequency.

Seal trimmers after final adjustment.

The normal voltages are shown on the schematic circuit taken from the various points to ground.

THE ADAPTATION OF THE SET FOR USE WITH PHONOGRAPH

Out of the back of the chassis there extends three lugs labeled "Phono" 1-2-3. For phonograph use, the jumper is removed and the pick-up leads from the pick-up are connected to Nos. 1 and 2 terminals, with the overall wire shield grounded to No. 3 terminal. A single pole double throw switch may be used to change from Radio to "Phono". See Fig. 2.



NOTE:

With certain models, the chassis is floated on cushion rubber. In shipment the chassis is tightened on corner wood strips. To release, loosen the four bottom screws, remove strips and let chassis float free

REPLACEMENT PARTS LIST MODEL 285

PART NUMBER	DESCRIPTION
18-914	Band Switch - 4 pole, 3 position
19-212	Choke - 340 Ohm
22-936	Coil Assembly
23-936	Coil Assembly
2A8	Coil - B.C. Antenna
202	Coil - B.C. Oscillator
4A9	Coil - S.W. Antenna
409	Coil - S.W. Oscillator
3A9	Coil - P.B. Antenna
309	Coil - P.B. Oscillator
OC-2	Choke - Oscillator Plate
32-266	Condenser - Dual 30 Mfd. 150 Volt
8218-3	Condenser - Single Trimmer
25-262	Condenser - Padding, 5 Plate
23-281	Control - Volume
11-278	Control - Tone & Switch

PART NO.	DESCRIPTION
285	Dial Class - Specify name on glass
2-498	Dial Lamp - 6 V. Bayonet Type
12-768	Dial Lamp Socket Assembly
9-328	Drive Disc - 2-3/4" dia. with hub & friction assembly
11-328	Drive Disc for mounting on V. Cond.
'85	Drive Shaft with friction discs
18-490	Knob for Controls
2-625	Resistor - Candohm 50 Ohms
3-191	Resistance Line Cord, 215 Ohms
J5-806	Speaker

REPLACEMENT PARTS LIST MODEL X275

PART NUMBER	DESCRIPTION
18-914	Band Switch - 4 pole, 3 position
22-936A	Coil - 1st I.F. Complete
23-936A	Coil - 2nd I.F. Complete
8547	Coil - P.B. Oscillator (301)
30-266	Condenser, Electrolytic Dual 10, 450 V.
8218-3	Condenser, Single Trimmer
25-262	Condenser, Padding
21-270	Condenser, Variable 2 Gang
11-278	Control - Volume
23-281	Control - Tone & Switch
X275	Dial Glass - Calibrated, specify name on glass
2-498	Dial Lamp - 6 V. Bayonet Type
11-768	Dial Lamp Socket Assembly
11-328	Drive Disc - for mounting on V. Cond. Shaft
9-328	Drive Disc - 2-3/4" dia. with hub & friction assembly
X275	Drive Shaft with friction discs
18-490	Knob for Controls
6-771	Socket and Cable for Tuning Eye
35-810	Speaker - 6-1/2"
52-938	Transformer - 40-60 Cycle, 3 tap Primary
37-938	Transformer - 40-60 Cycle, 2 range Primary

8546	Coil - P.B. Antenna
406	Coil - S.W. Oscillator
446	Coil - S.W. Antenna
202	Coil - B.C. Oscillator
2A8	Coil - B.C. Antenna

HOWARD RADIO CO.

HOWARD RADIO CO.

MODEL 285
Schematic, Voltage
Notes

THIS RECEIVER CAN BE USED ON EITHER ALTERNATING OR DIRECT CURRENT AND IS ADAPTABLE TO THREE DIFFERENT LINE VOLTAGES BY CHANGING THE TERMINAL ARRANGEMENT ON THE BACK OF THE CHASSIS.

BEFORE CONNECTING RADIO, VERIFY THE VOLTAGE WITH WHICH THE RADIO IS TO BE USED, AND FOLLOW DIRECTIONS AS GIVEN ON CHASSIS, OR AS FOLLOWS:

FOR A LINE VOLTAGE BETWEEN 100 and 125 VOLTS, CONNECT ALL THREE TERMINALS TOGETHER.

FOR A LINE VOLTAGE FROM 125 to 150 VOLTS, OMIT JUMPER BETWEEN EXTREME LEFT TERMINAL AND CENTER TERMINAL.

FOR A LINE VOLTAGE BETWEEN 200 and 240 VOLTS, REMOVE ALL CONNECTIONS.

BE CAREFUL NOT TO LET LOOSE ENDS OF THE WIRES TOUCH THE CHASSIS

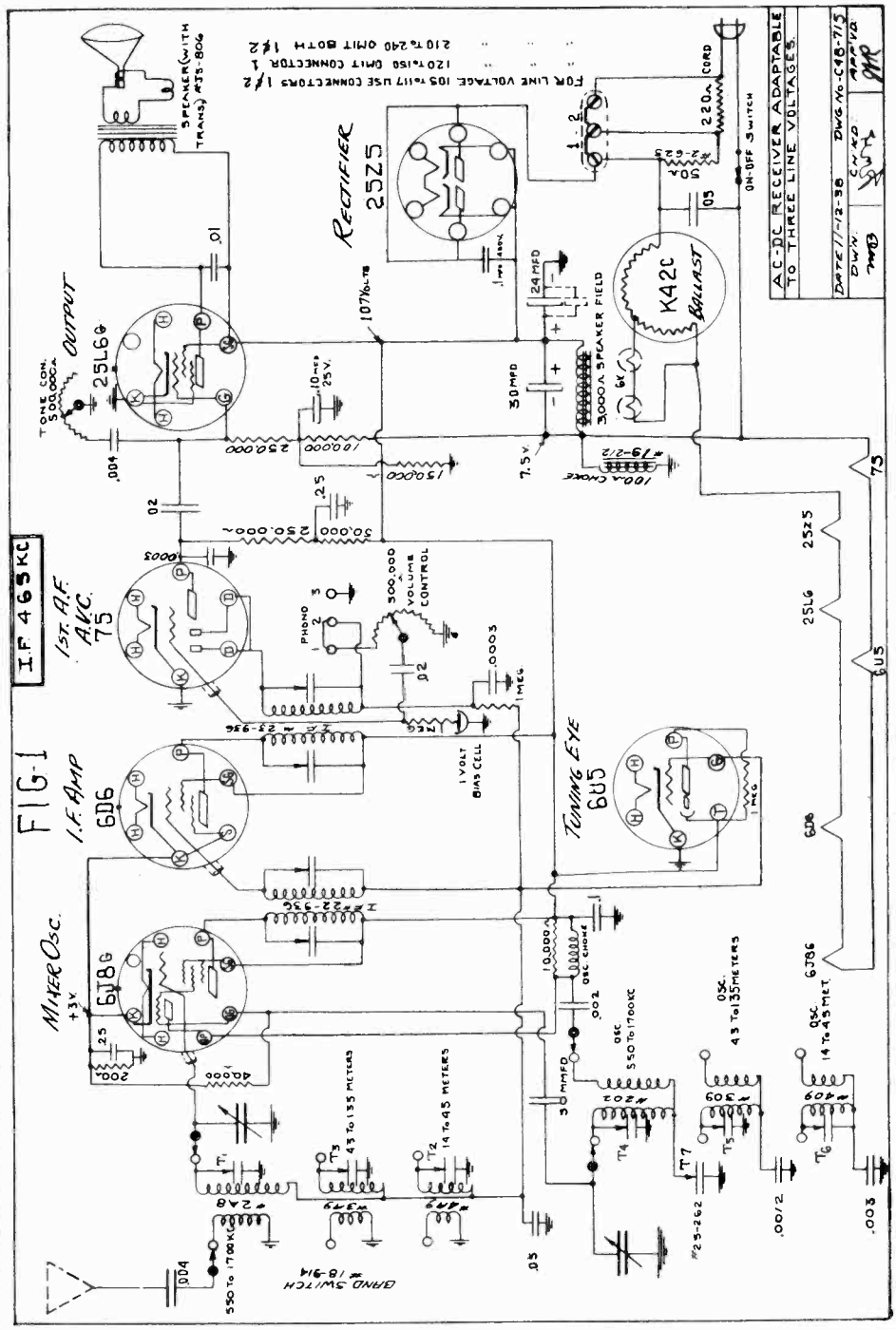


FIG-1

MODEL 285

DO NOT USE A GROUND ON THIS RECEIVER.

Each of the three bands has a separate antenna and oscillator coil.

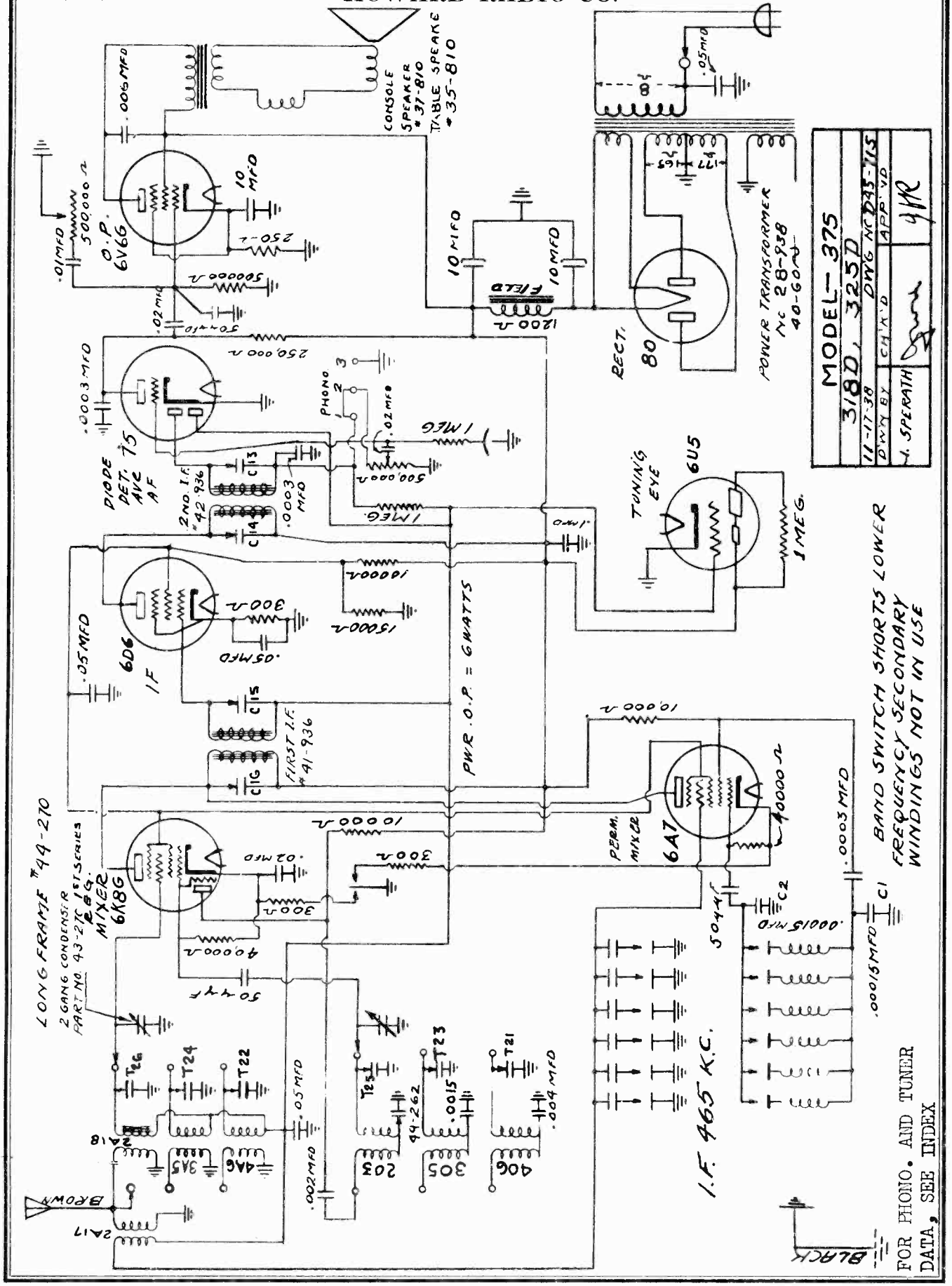
The intermediate frequency stages are tuned to 465 KC and have a sensitivity of about 27 microvolts. (for 50 milliwatt output)

The maximum output is rated at about 4-1/2 watts, and 2.4 watts undistorted.

The three line voltage ranges are obtained by use of the resistance cord, an extra resistor within the chassis, and the Ballast tube. See schematic diagram. The Ballast tube also provides necessary voltage for the two pilot lights connected in series.

MODELS 318D,325D,375
Schematic

HOWARD RADIO CO.



MODEL 377
Schematic, Voltage

HOWARD RADIO CO.

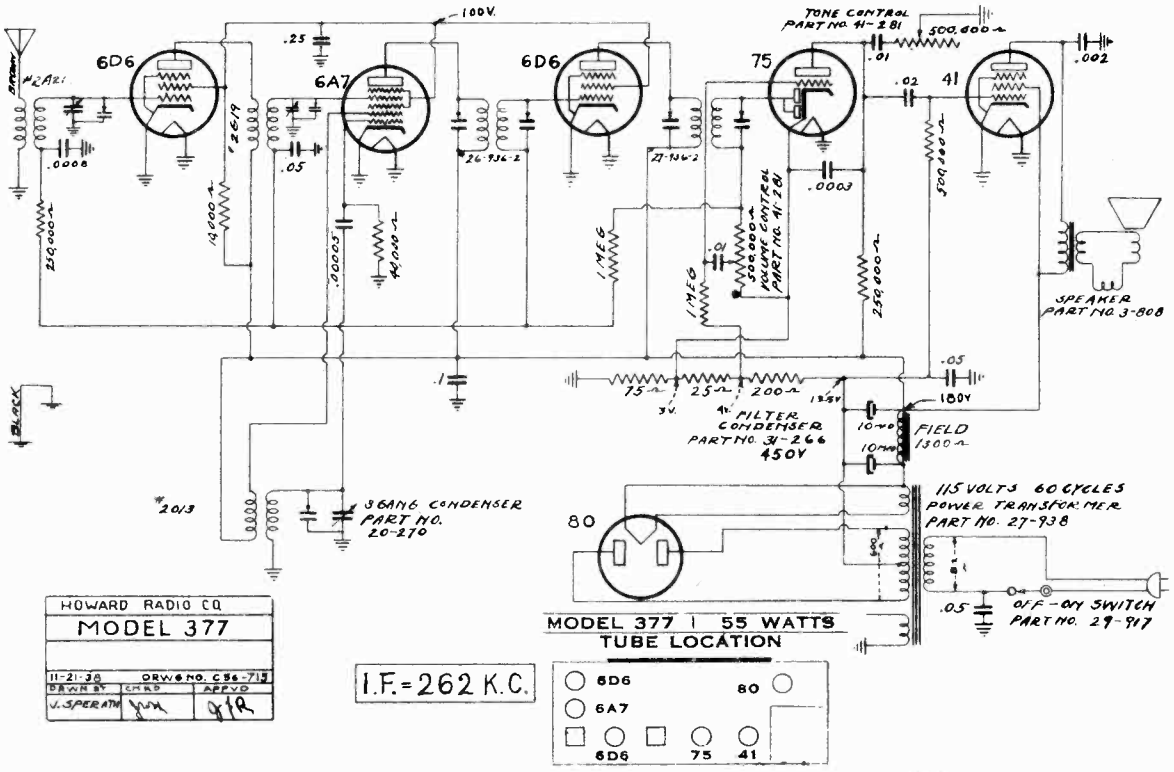
MODELS 318D, 325D, 375
Socket, Trimmers
Alignment

The Model 377 is designed as a single band for Broadcast reception. Three gang condenser is used to tune the Antenna, R.F. and Oscillator circuits. The Intermediate Frequency is 262 KC. The bias voltages are obtained by series resistors from the high voltage center tap to ground. The negative side of the filter is not grounded.

The maximum output obtainable is 2½ watts.

The variable condenser section for the oscillator circuit is the cut-plate type.

See circuit diagram for other specifications.



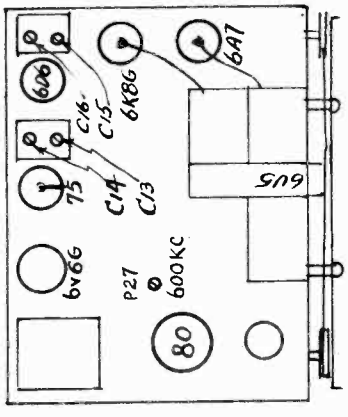


FIG. 6

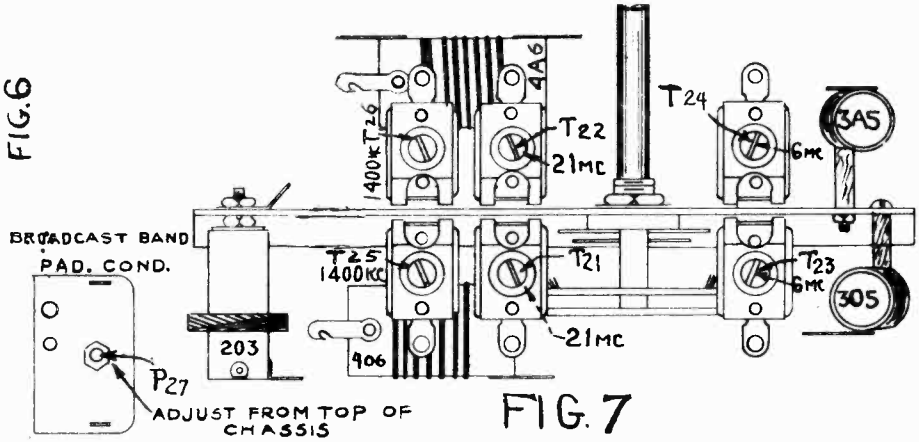


FIG. 7

ALIGNMENT CHART FOR MODEL 375

CHECK BAND SWITCH POSITION & SET DIAL TO	GENERATOR FREQUENCY	GENERATOR CONNECTION	TRIMMER LOCATION	TRIMMER FUNCTION	APPROXIMATE MICROVOLTS FOR 50 MILLIWATT OUTPUT
540 KC	465 KC	Grid of 6K8G	C13, C14, C15, C16 Fig. 6	I.F.	20
21 MC	21 MC	Antenna Lead	T21, T22 Fig. 7	OSC. & ANT.	5
6 MC	6 MC	Antenna Lead	T23, T24	OSC. & ANT.	3
1400 KC	1400 KC	Antenna Lead	T25, T26	OSC. & ANT.	1
600 KC	600 KC	Antenna Lead	P27	OSC. PAD	1

SET-UP INSTRUCTIONS FOR HOWARD PERMA-MATIC AUTOMATIC TUNER NO 1

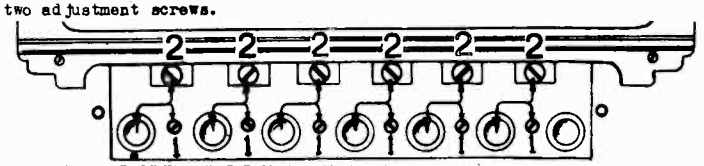
NOTE:-DO NOT ATTEMPT ANY ADJUSTMENTS UNTIL THE SET HAS BEEN TURNED ON AT LEAST 20 MINUTES.

(1) Remove the push-button escutcheon plate by prying forward from ends, taking care not to scratch cabinet.

(2) Depress any one of the selector buttons, tune the desired station in by turning slotted screw with small screw-driver (this screw is numbered 1 in the illustration and is always the screw adjacent to and right of depressed button.) This moves the iron core in oscillator circuits.

(3) Adjust the screw with slotted head for maximum electric eye deflection. This adjustment is numbered 2 in illustration and always the one directly above the station selector adjustment mentioned in above paragraph. If electric eye overlaps on strong stations, adjust for maximum overlap.

When making the two adjustments it is possible to obtain a strong deflection of the tuning eye apparently for a station and yet no station is present. THIS IS A NORMAL CONDITION and just means that the two adjustments are not close enough in relation to each other and can be corrected by varying the two adjustment screws.



THERE IS NO FREQUENCY DISCRIMINATION BETWEEN BUTTONS. ANY ONE OF SELECTORS WILL TUNE THE ENTIRE BROADCAST BAND (1600-540 KC).

NOTICE: DO NOT FORCE ANY ADJUSTMENTS if they tighten up in the course of adjustment, either the maximum or minimum has been reached and the adjustment should be made in opposite rotation.

It will be found easier to adjust if the low frequency stations are started on right side and progress toward high frequency stations to left. IN SAME ORDERS AS MAIN DIAL.

However, the above procedure is not absolutely necessary if there should be some preference for arranging stations otherwise.

AFTER ALL ADJUSTMENTS HAVE BEEN MADE -- GO OVER EACH ADJUSTMENT THE SECOND TIME TO MAKE CERTAIN THEY ARE CORRECT AND TO COMPENSATE FOR SUBSEQUENT ADJUSTMENTS.

It is a big help to tune the desired station in on mail dial while making adjustments, in order that the station can be quickly recognized by switching from manual back to button being adjusted.

It is not necessary to lock any of the adjustments as they are automatically locked.

Place station call letter tabs in escutcheon and replace escutcheon by pressing in place on cabinet.

NOTICE: Turning station selector screw clock-wise lowers the frequency.

Best results will be had when band switch is in broadcast position when using automatic tuning.

MECHANICAL ACTION OF THE HOWARD PERM-A-MATIC TUNER NO. 2 8-966 WITH SLIDE TYPE CONTACTS

USED IN MODELS 318D,325D 375,418,468 AND 525

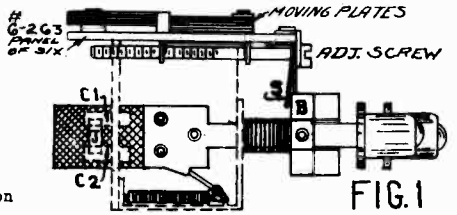


FIG.1

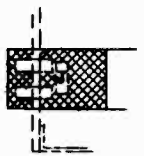


FIG.2

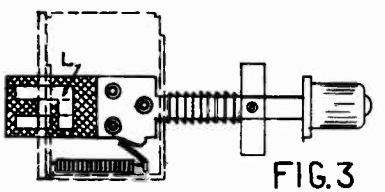


FIG.3

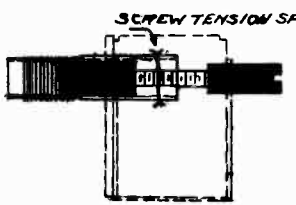


FIG.4

Fig. 1 shows one of the buttons depressed for a station. The trimmer panel assembly (for the antenna circuit) is designed with spring fingers "S" that make contact with cross bar "B" completing the ground circuit of the R.F. Trimmer.

When making the original set-up, the adjusting screw may indicate two positions for resonance. This is due to the possibility of the small amount of play in the screw thread and is of no concern as long as it is set to the exact resonance point.

The jumper contact "J" connects C1 contact to C2 contact with the button "IN". This completes the oscillator circuit for that particular button.

Fig. 2 shows the jumper position with the button "OUT".

Fig. 3 shows the manual OFF-ON button in the "OUT" position.

The "L" shaped sliding contact is the common cathode return circuit and alternates the bias on the 6K8 for manual tuning or on the 6A7 for push button tuning.

Fig. 4 shows the iron core movement within the oscillator coil. Its position is held stationary by the small spring wire across the coil form. The position of this spring must be such that no spring action is apparent from the end of the adjustment stud due to pressure with a screwdriver. Otherwise, when the screwdriver is removed, the core will shift out of position.

The button is held down by action of the latch bar and is released when another key raises the latch bar on its way down.

If it is necessary to replace a coil, mount it in line with the other coils and cement it in place.

WHEN ORDERING ANY PARTS, SPECIFY PART NUMBER AND DETERMINE WHETHER THE PART IS FOR PERM-A-MATIC TUNER NO. 1 OR NO. 2. TUNER NO. 1 WAS CONSTRUCTED WITH THE SLOTTED BRASS SCREW FOR CORE ADJUSTMENT, WHEREAS TUNER NO. 2 CONSISTED OF THE BLACK RUBBER STUD AS SHOWN IN FIG. 4.

MODEL Perm-A-Matic Tuner
No.9-966 Changes

HOWARD RADIO CO.

REPLACE HOWARD PERM-A-MATIC TUNERS #7-966 or #8-966 WITH PERM-A-MATIC TUNER #9-966 WHICH REQUIRES THE CHANGE OF THE ANTENNA COIL ON THE CHASSIS AS EXPLAINED AT THE BOTTOM OF THIS PAGE.

There are six leads between the tuner and the receiver circuits to be unsoldered. UNSOLDER THE CONNECTIONS FROM THE RECEIVER TERMINALS AND NOT FROM THE TUNING UNIT AS THE NEW TUNER WILL HAVE THE NECESSARY LEADS.

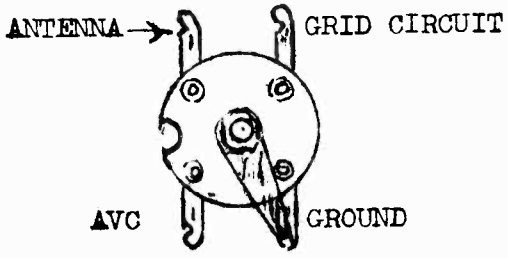
Mechanically, it is only necessary to remove two screws from the front plate to release the tuner.

Due to the fact that the two ceramic condensers (green in color), one each in the grid and plate circuits of the oscillator, are now a part of the new Tuner, they must be removed from within the receiver and returned with the tuner being replaced.

Since the colors of the leads are different in the two type tuners, it is advisable to follow the schematic diagram together with the following chart.

TUNER NO. 1 (7-966) LEAD COLOR	CIRCUIT	TUNER NO. 2 (8-966) TUNER NO. 3 (9-966) LEAD COLOR
Unsolder from ANTENNA COIL 2A17	GRID 6A7	SAME
WHITE WITH BLUE TRACER	CATHODE BIAS SWITCH	SAME
GREEN Unsolder from .0005 Condenser	OSCILLATOR GRID 6A7	SAME
GREEN Unsolder from .0003 Condenser	OSCILLATOR PLATE 6A7	BLUE
BROWN Unsolder from 6K8 Cathode	CATHODE RETURN FOR 6K8	BROWN WITH WHITE TRACER
BLUE	CATHODE RETURN FOR 6A7	GREEN WITH WHITE TRACER

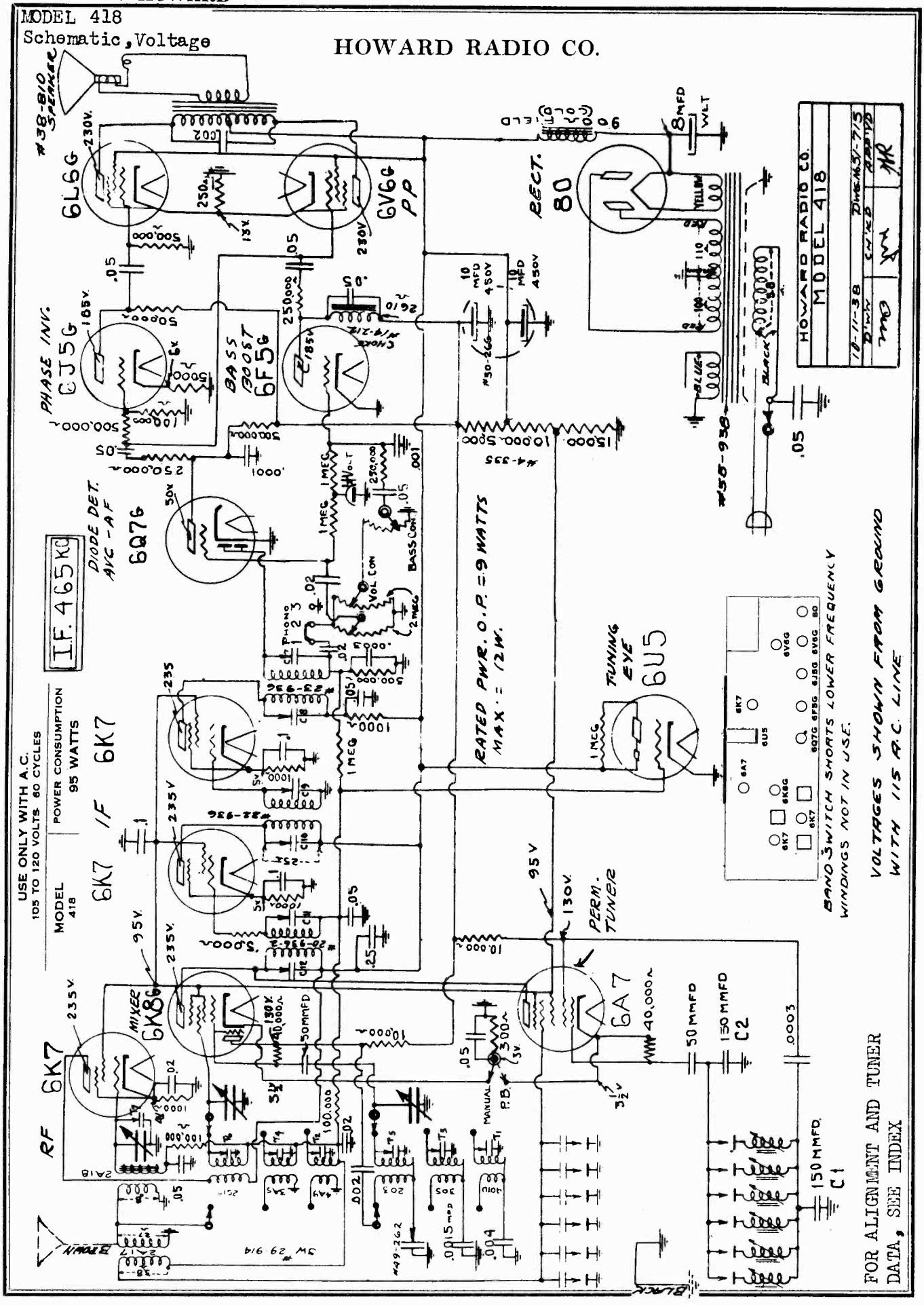
DUE TO THE FACT THAT THIS NEW UNIT, #9-966, HAS A DIFFERENT TRIMMER CAPACITY RANGE, THE ASSOCIATED ANTENNA COIL, 2A17, IN THIS CIRCUIT MUST BE CHANGED TO 2A23. THIS IS THE COIL ON THE LEFT SIDE WHEN FACING FRONT OF SET. FOLLOW DIAGRAM FOR TERMINAL ARRANGEMENT.

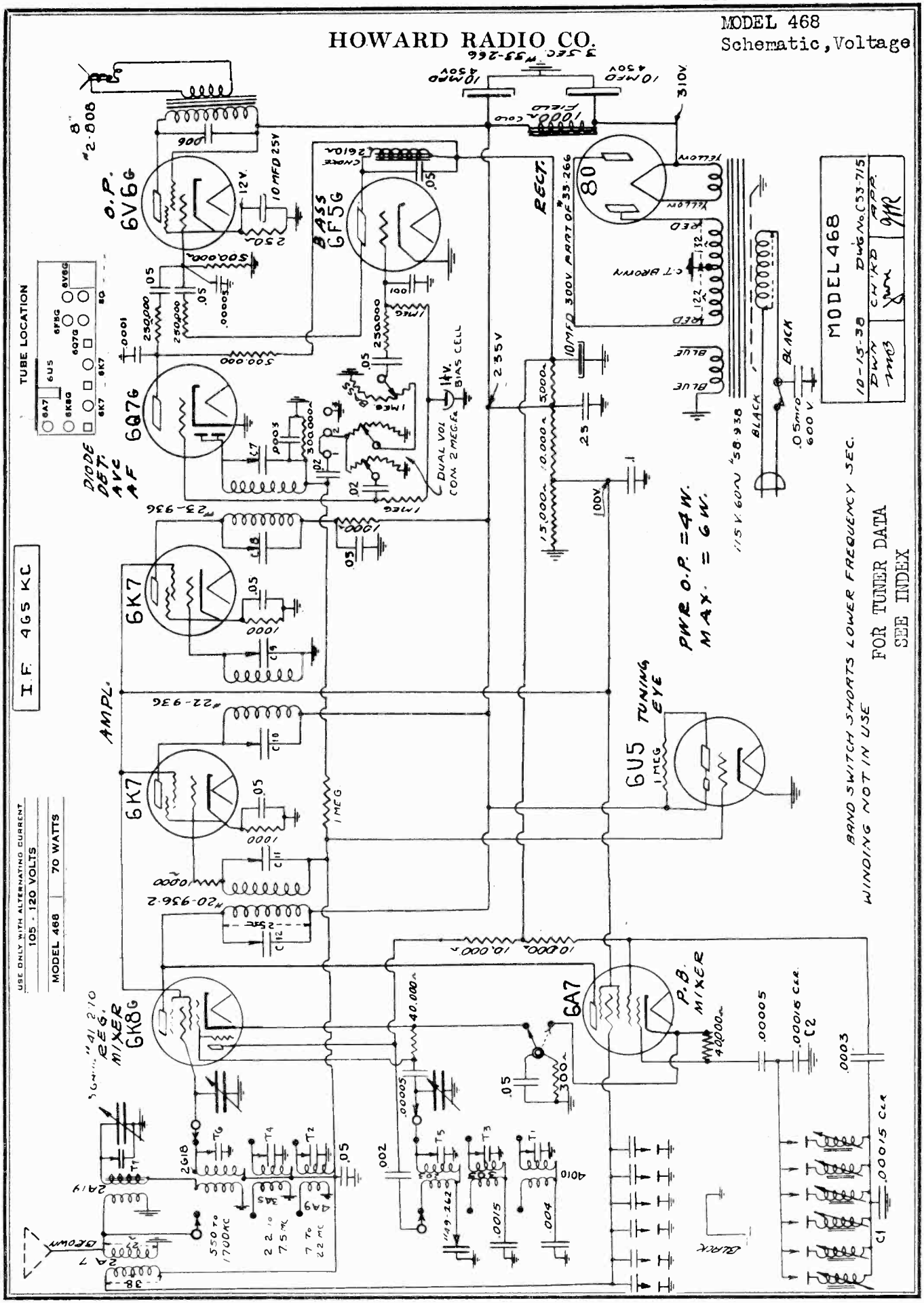


BOTTOM VIEW

MODEL 418
Schematic, Voltage

HOWARD RADIO CO.





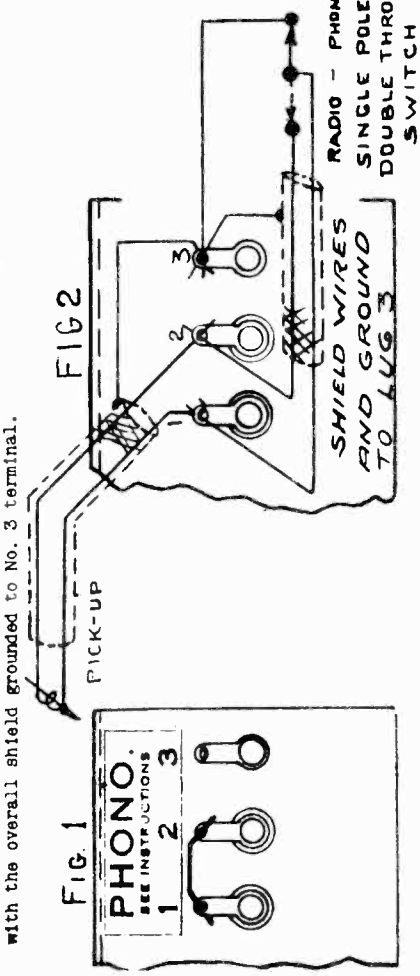
MODEL 418
MODEL 468
MODEL 525
Socket, Trimmers, Alignment
Phono. Data

HOWARD RADIO CO.

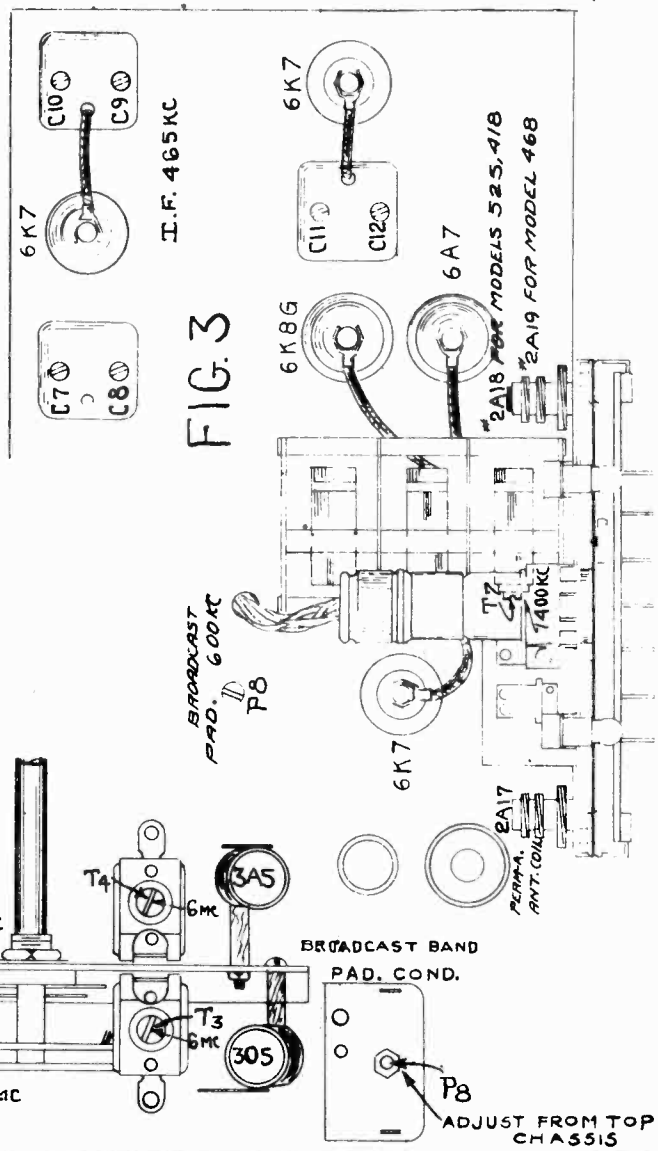
MODELS 318D, 325D, 375
Phono. Data

FOR ALL MODELS ADAPTABLE TO PHONOGRAPH CONNECTION

Out of the back of the chassis there extends three lugs as shown in Diagram Fig. 1. For phonograph use, the jumper is removed and a single pole, double throw switch is connected as shown in Fig. 2. The pick-up leads from the pick-up are connected to Nos. 1 and 2 terminals, with the overall shield grounded to No. 3 terminal.



NOTE 1 - When aligning the I.F. channel, a condenser of .05 MFD may be used in series with the generator lead.
NOTE 2 - When aligning the broadcast band, a 250 MMFD condenser may be used in series with the signal generator.
NOTE 3 - When aligning the short wave bands, a 400 ohm resistor may be used in series with the signal generator.
NOTE 4 - When aligning the short wave band, be sure not to adjust at the image frequency. This can be checked as follows: If the signal generator is set for 21,000 KC, the signal will be heard at 21,000 KC on the dial. The image signal, which is much weaker, will be heard at 21,000 less 2 times the IF, 465, (930KC) or 20,070 KC on the dial. It may be necessary to increase the input to hear the image. If the image is not heard then, the original alignment was not made at the right peak.
NOTE 5 - If there is an apparent lack of sensitivity, especially on the short wave bands, first check the 6K8G tube by substituting one or more in its place.



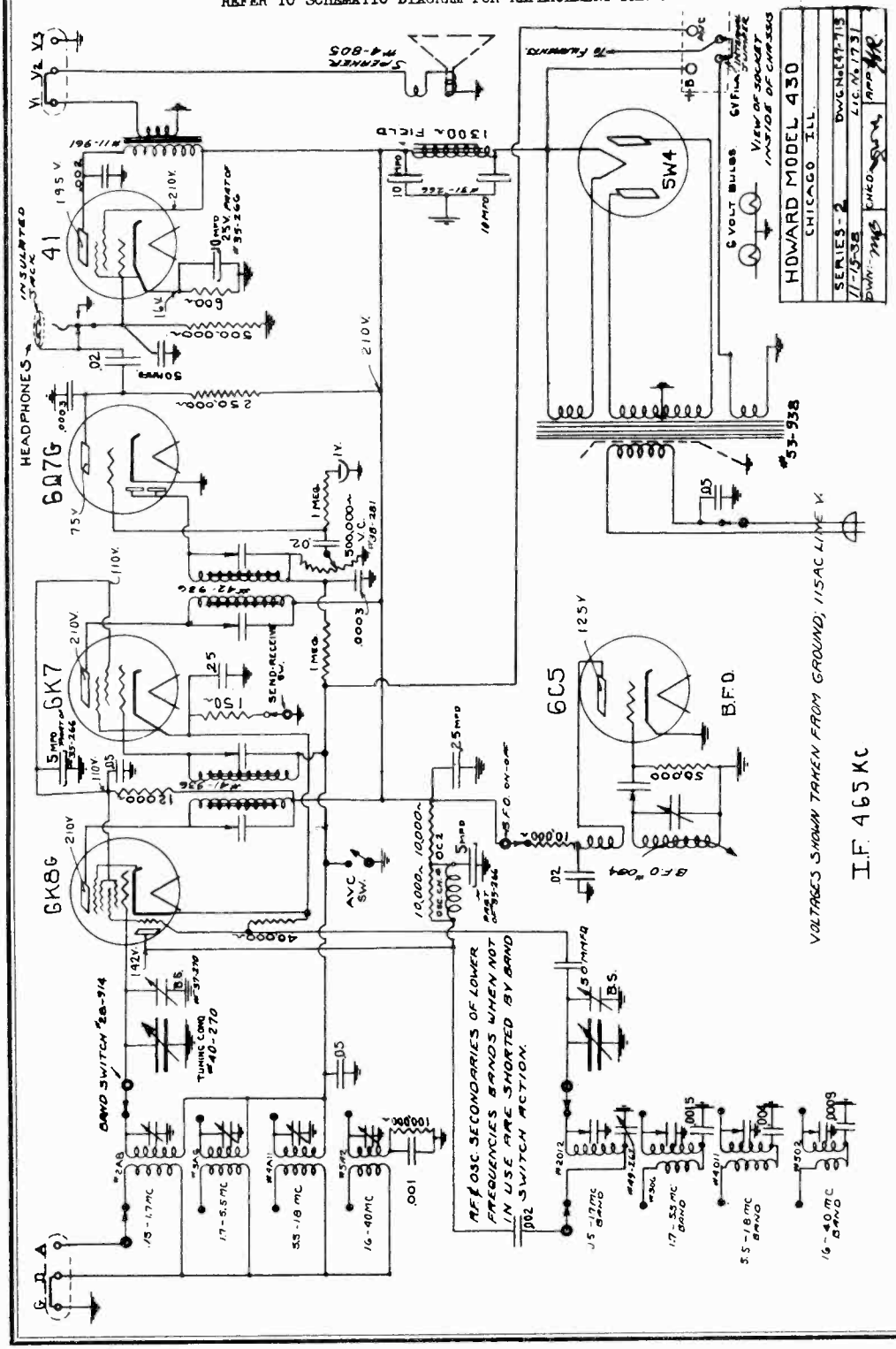
CHECK BAND SWITCH POSITION & SET DIAL TO	GENERATOR FREQUENCY	GENERATOR CONNECTION	TRIMMER LOCATION	TRIMMER FUNCTION	APPROXIMATE MICROVOLTS FOR 50 MILLIWATT OUTPUT
540 KC	465 KC	Grid of 6K8G	C7,C8,C9,C10,C11,C12 Fig. 3	I.F.	10 to 20
21 MC	21 .MC	Antenna Lead	T1, T2 Fig. 4	OSC. & ANT.	1
6 MC	6 MC	Antenna Lead	T3, T4 Fig. 4	OSC. & ANT.	5
1400 KC	1400 KC	Antenna Lead	T5,T6,T7 Fig. 4	OSC., R.F. & ANT.	1
600 KC	600 KC	Antenna Lead	P8 Fig. 3	OSC. PAD (Rock Dial)	1

MODEL 430, Series 2
Schematic, Voltage

HOWARD RADIO CO

PART NUMBER	DESCRIPTION
9-132	Ball Bearing - 1/8" Dia.
7601	Bias Cell - 1½ V.
52-188	Cabinet - Complete
17-829	Coil Spring for Drive Cord
50-262	Condenser - Single Trimmer
49-262	Condenser - Padding, BC Band
	Condenser - .0015 Mfd. - Mica
	Condenser - .0009 Mfd. - Mica
	Condenser - .004 Mfd. - Mica
40-270	Condenser - 2 Gang - Tuning
37-270	Condenser - 2 Gang - Band Spread
31-266	Condenser - "E", 10-10 Mfd. 350 V.
35-266	Condenser - "E", 10-5-5 Mfd. 350,350,25 V.
47-590	Dial Plate - Calibrated
1-288	Drive Cord
27-448	Tuning Hand
38-281	Volume Control - 1 Meg.
3-485	Headphone Jack
41-936	I.F. Assembly Complete (Input)
42-936	I.F. Assembly Complete (Output)
28-448	Indicator Pointer Hands
20-490	Knob - 1-1/8"
21-490	Knob - 1-9/16"
2-498	Pilot Light - 6 V. Bayonet
14-768	Pilot Light Socket - Bayonet
19-427	Pyralin Window
4-167	Rubber Mounting Feet
4-805	Speaker - 6½", Cord and Plug
15-829	Spring Clamp for Ball Bearing on Shaft
14-917	Toggle Switches - S.P.S.T.
53-938	Transformer - Power 115 V. 60 Cycles
11-961	Transformer - Output

REFER TO SCHEMATIC DIAGRAM FOR REPLACEMENT PARTS NOT SHOWN IN ABOVE LIST.



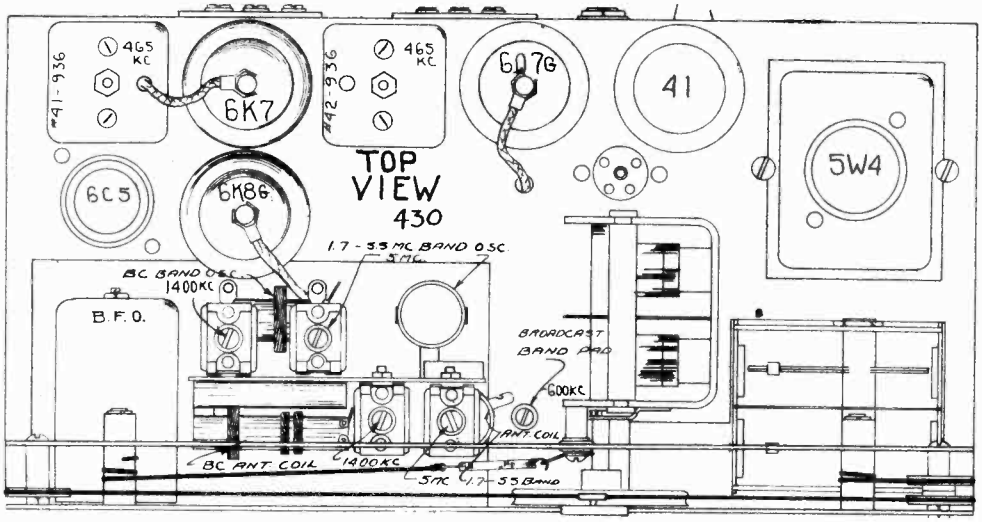
THE POWER OUTPUT for the Model 430 is about 1½ watts, undistorted.

Ceramic coil forms are used on the high frequency band. Ceramic trimmers are used throughout. The unused secondaries of the lower frequency bands are shorted as the band switch is shifted toward the higher frequency bands.

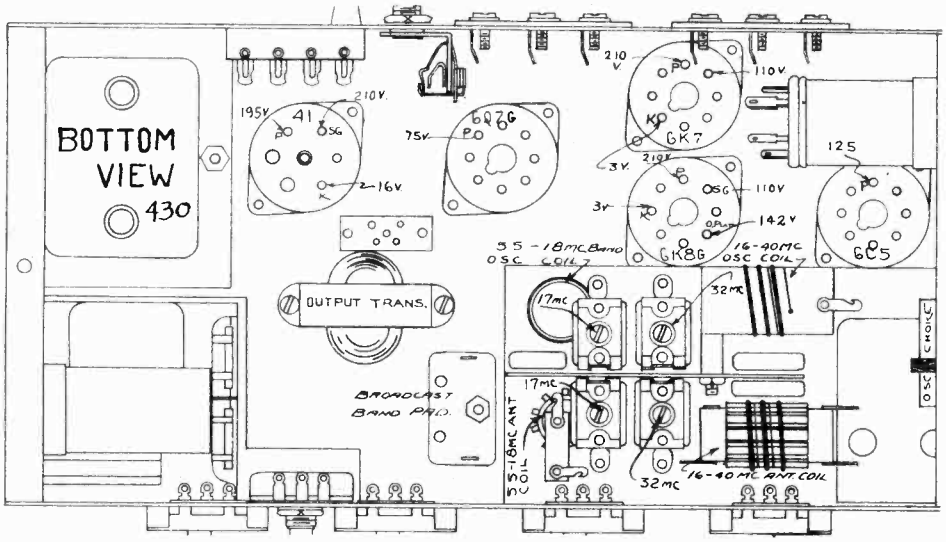
The frequency coverage from .55 to 42 megacycles is divided into four bands. The lower scale from 0 to 100 is for logging purposes. The left hand pointer indicates the band in operation. For correct tuning calibration, the Band Spread pointer must be at 100.

MODEL 430, Series 2
Alignment, Socket
Trimmers, Dial Data
MODEL 438
Dial Data

HOWARD RADIO CO.



NOTE 1: When aligning the I.F. channel, a condenser of .05 MFD may be used in series with the generator lead.
NOTE 2: When aligning the broadcast band, a 250 MMFD condenser may be used in series with the signal generator.
NOTE 3: When aligning the short wave bands, a 400 ohm resistor may be used in series with the signal generator.



NOTE 4: After the chassis has been removed from the cabinet, be sure when it is again assembled that the speaker plug is in place in the socket on top of the chassis and that the speaker cable wires do not lay back near the RF circuit, thus causing howling.

NOTE 5: Check for an image signal about .9 mc. lower in frequency. For example:- If a peak has been made at 6 mc. an image should be heard at about 5.1 mc. Otherwise the original setting was not correct.

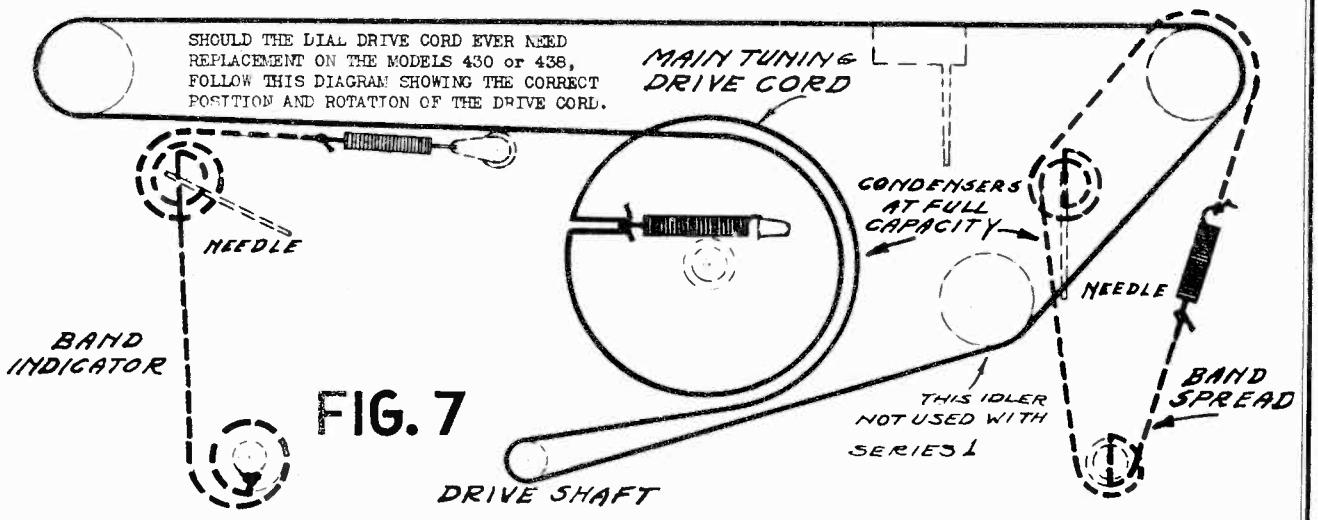
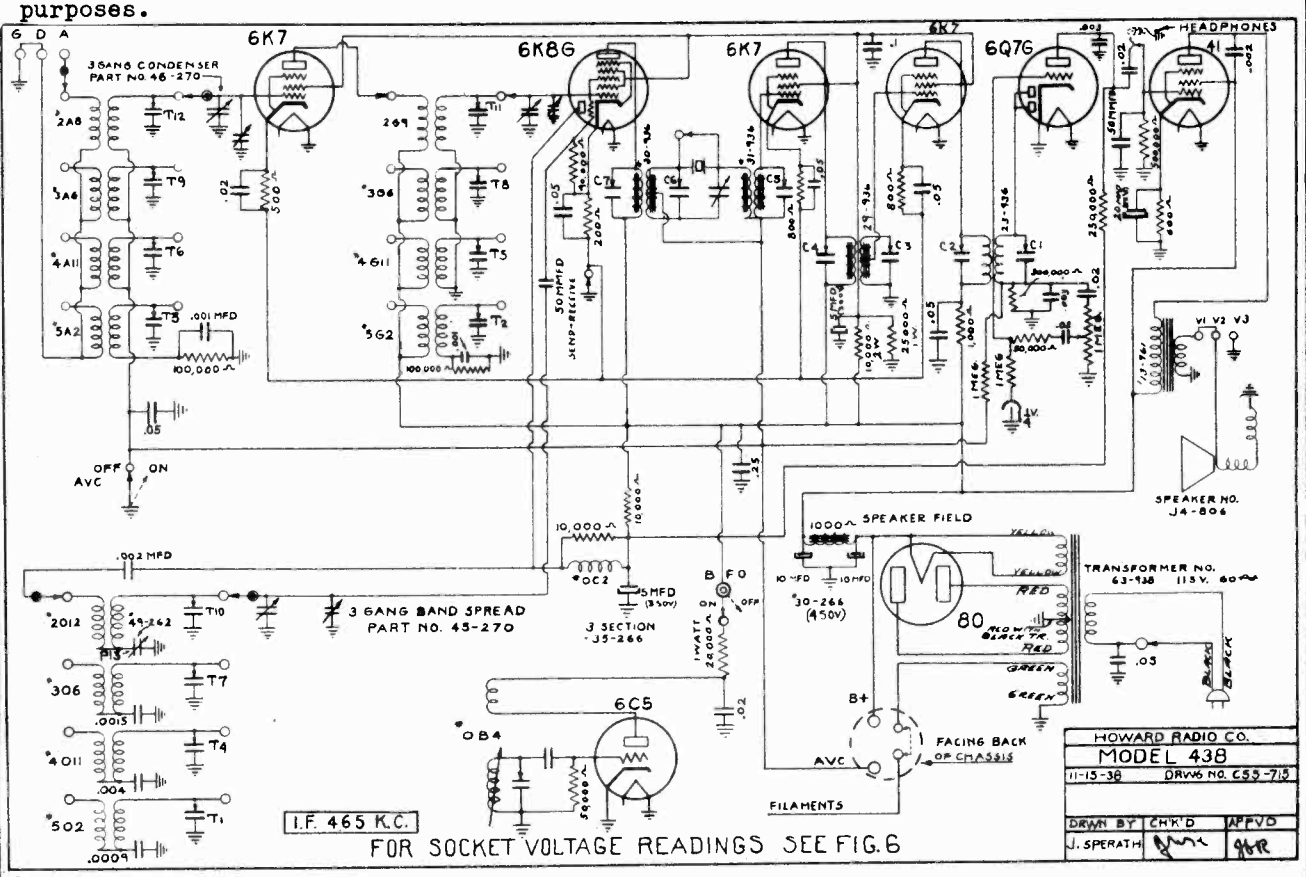


FIG. 7

MODEL 438
Schematic

HOWARD RADIO CO.

The frequency coverage from .55 to 42 megacycles is divided into four bands. The left-hand pointer indicates the band in operation. For correct tuning calibration, the band spread pointer must be set at 100. The lower scale 0 to 100 is for logging purposes.



FOR SOCKET VOLTAGE READINGS SEE FIG. 6

THE POWER OUTPUT will be about 2½ watts, undistorted.

For each band there is a Radio Frequency stage with individual coils for the RF Oscillator and Mixer stages for each band.

Ceramic coil forms are used on the high frequency band. Ceramic trimmers are used throughout. The unused coil secondaries of the lower frequency bands are shorted as the band switch is shifted to the higher bands.

The Intermediate Frequency is 465 KC. The Crystal input, Crystal output, and the 2nd IF consist of windings wound on iron cores.

PART NO.	DESCRIPTION
9-132	Ball Bearing - 1/8" dia.
7601	Bias Cell - 1½ V.
57-188	Cabinet - Complete
17-829	Coil Spring for Drive Cord
50-262	Condenser - Single Trimmer
58-262	Condenser - Variable Trimmer (Xtal Phase)
49-262	Condenser - Padding, BC Band
	Condenser - .0015 Mfd. - Mica
	Condenser - .0009 Mfd. - Mica
	Condenser - .004 Mfd. - Mica
1-303	Crystal - 465 KC
1-288	Drive Cord
35-268	Filter Condenser - 5,5,20 Mfd. 350,350 25 Volt
30-266	Filter Condenser - 10,10 Mfd. 450,450 Volt

PART NO.	DESCRIPTION
3-485	Headphone Jack
28-448	Indicator Pointer Hands
20-490	Knob - 1-1/8"
21-490	Knob - 1-9/16"
2-498	Pilot Light - 6 V. Bayonet
14-768	Pilot Light Socket - Bayonet
19-427	Pyralin Window
19-917	Rotary Switch
7-167	Rubber Mtg. Feet
J4-806	Speaker - 6½", Cord and Plug
15-829	Spring Clamp for Ball Bearing on Shaft
14-917	Toggle Switches - S.P.S.T.
27-448	Tuning Hand
40-281	Volume Control - 1 Meg.

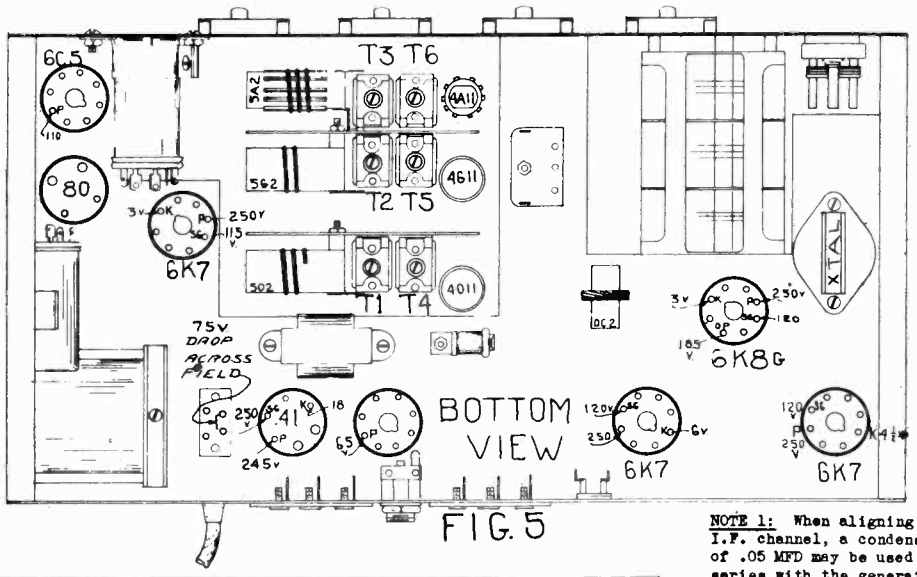
REFER TO SCHEMATIC DIAGRAM FOR REPLACEMENT PARTS NOT SHOWN IN ABOVE LIST.

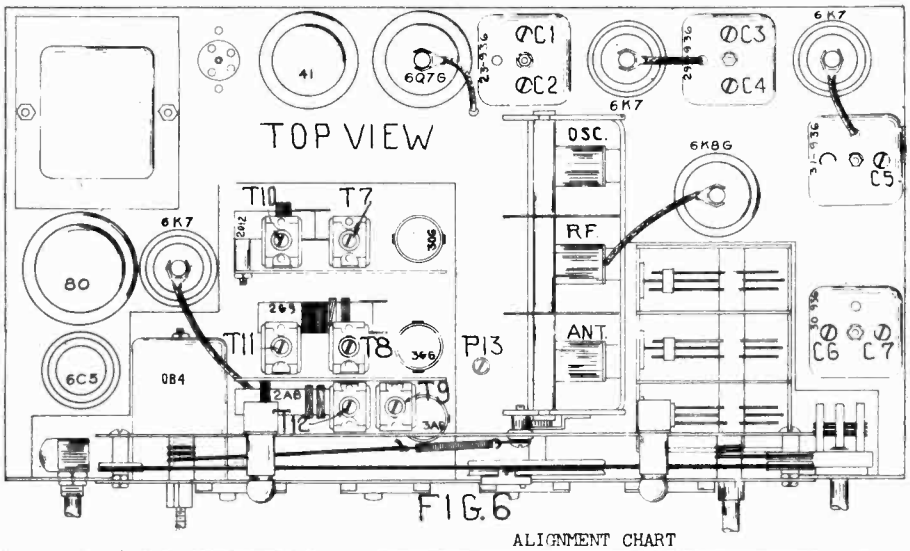
MODEL 438
Alignment, Socket Trimmers

HOWARD RADIO CO.

MODEL 440, Series 1,2
Crystal Alignment

NOTE: When using a Crystal set Phasing Control to almost minimum capacity. See special alignment instructions below for Crystal.





NOTE 1: When aligning the I.F. channel, a condenser of .05 MFD may be used in series with the generator lead.

NOTE 2: When aligning the broadcast band, a 250 MMFD condenser may be used in series with the signal generator.

NOTE 3: When aligning the short wave bands, a 400 ohm resistor may be used in series with the signal generator.

NOTE 4: After the chassis has been removed from the cabinet, be sure when it is again assembled that the speaker plug is in place in the socket on top of the chassis and that the speaker cable wires do not lay back near the RF circuit, thus causing howling.

NOTE 5: Check for an image signal about .9 mc. loser in frequency. For example:- If a peak has been made at 6 mc. an image should be heard at about 5.1 mc. Otherwise the original setting was not correct.

ALIGNMENT CHART

BAND MC	GENERATOR FREQUENCY	GENERATOR CONNECTION	TRIMMER LOCATION	TRIMMER ADJUSTMENTS	TRIMMER FUNCTION	APPROX. MICROVOLTS
IF	465 KC	Grid of 6K8G	See Fig. 6	C1, C2, C3, C4, C5, C6, C7	IF	15
42-16	32 MC	A and DG	See Fig. 5	T1, T2, T3	OSC. RF. ANT.	8
18- 5.5	17 MC	A and DG	See Fig. 5	T4, T5, T6	OSC. RF. ANT.	3
5.5- 1.7	5 MC	A and DG	See Fig. 6	T7, T8, T9	OSC. RF. ANT.	1
1.6- 5.5	1400 KC	A and DG	See Fig. 6	T10, T11, T12	OSC. RF. ANT.	1
1.6- 5.5	600 KC	A and DG	See Fig. 6	P13	OSC. PAD.	1

ALIGNMENT INSTRUCTIONS - FOR RECEIVERS EQUIPPED WITH CRYSTALS

(1) REMOVE CRYSTAL, set crystal phasing condenser to almost minimum capacity and throw "XTAL" switch to "IN" position.

(2) With the 465 KC signal, re-adjust the I.F. Trimmer C-6 by turning the screw counterclockwise. The signal now may be slightly weaker than before and sound "off-side". This, however, is a normal condition.

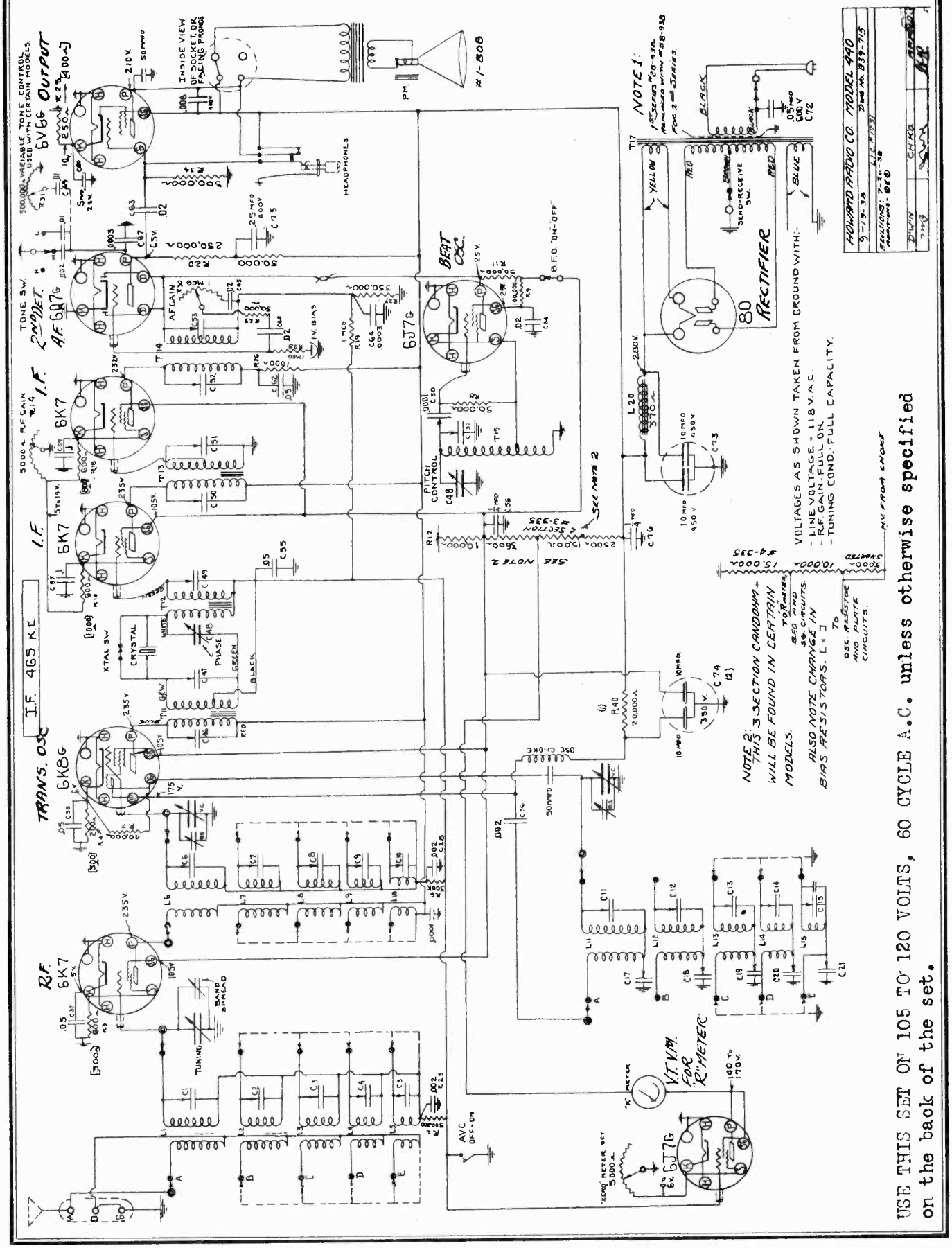
(3) REPLACE THE CRYSTAL - A very noticeable drop in signal strength may be noted due to the filtering action of the crystal and the frequency control of the signal generator must be "rocked" slowly back and forth until the increase in signal strength indicates the exact frequency of the crystal being used. Now re-align the entire I.F. system to this frequency.

(4) Adjust "XTAL" phasing condenser for the lowest pitched note possible and re-adjust signal generator frequency. Repeat and continue to repeat this alignment procedure until no further improvement in the alignment can be accomplished.

NOTE: If the "XTAL" switch should now be thrown to another position, an apparent rise in gain will be noticed, which is caused by the addition of higher frequencies and background noise, so it does not mean that the sensitivity of this set is impaired in any way by use of the crystal.

HOWARD RADIO CO.

MODEL 440, Series 1, 2
Schematic, Voltage



ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection - 4000 ohm or more copper oxide meter across 5 ohm terminals. Shunt with speaker.

Output meter reading to indicate .5 watt . . . . . 1.575 V.

Average sensitivity in microvolts for .5 watt output . . . . . See chart below

Generator ground lead connection . . . . . Direct to chassis

A.V.C. Switch . . . . . On

Band spread dial set at 100 . . . . . Min. Capacity

Generator modulation . . . . . 30%, 400 cycles

Position of volume control A.F. gain Position of volume control R.F. gain . Full On

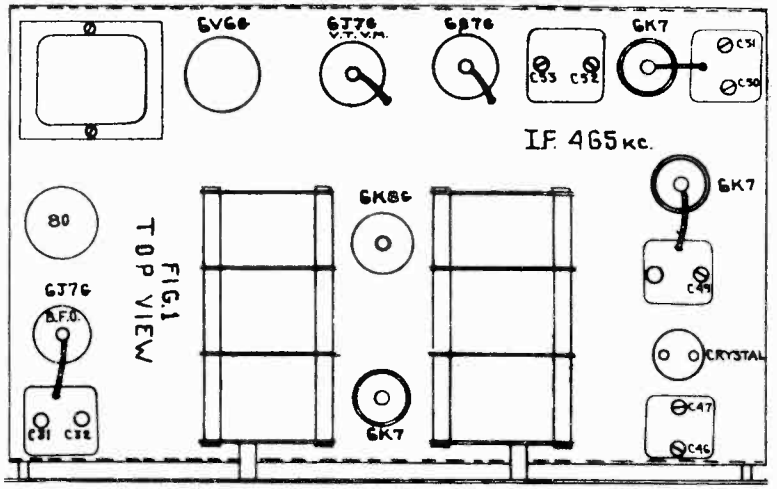
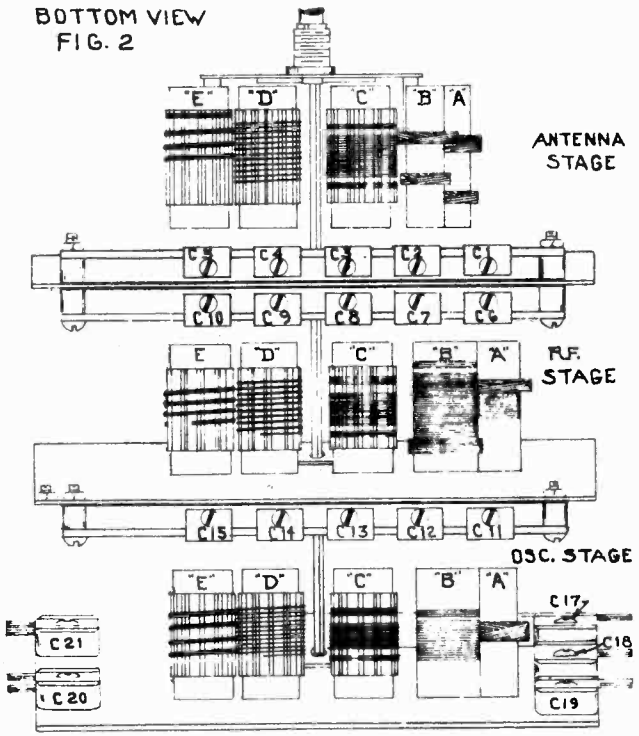


FIG. 1 TOP VIEW



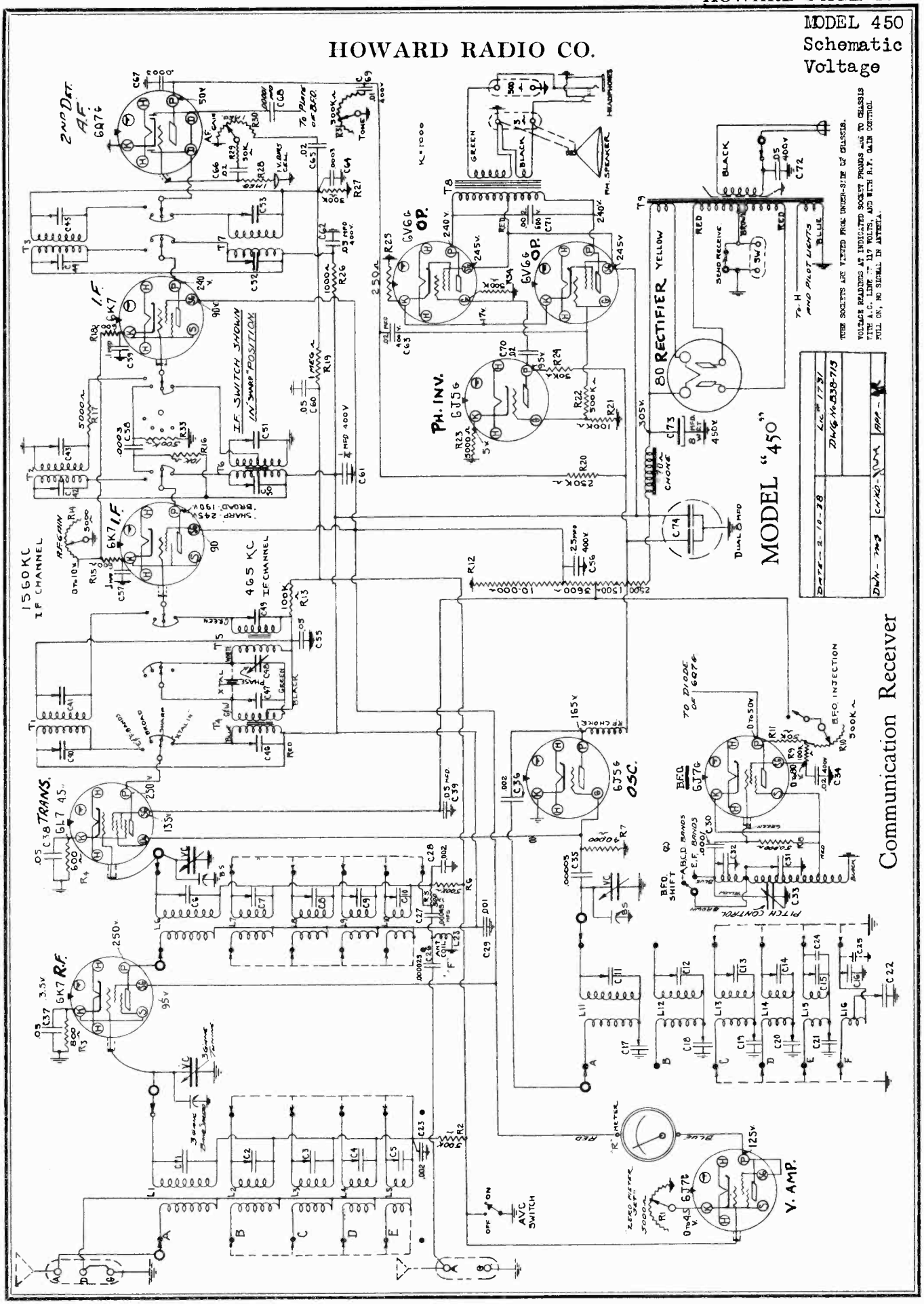
NOTE 1: When aligning the I.F. channel, a condenser of .05 MFD may be used in series with the generator lead.

NOTE 2: When aligning the broadcast band, a 250 MMFD condenser may be used in series with the signal generator.

NOTE 3: When aligning the short wave bands, a 400 ohm resistor may be used in series with the signal generator.

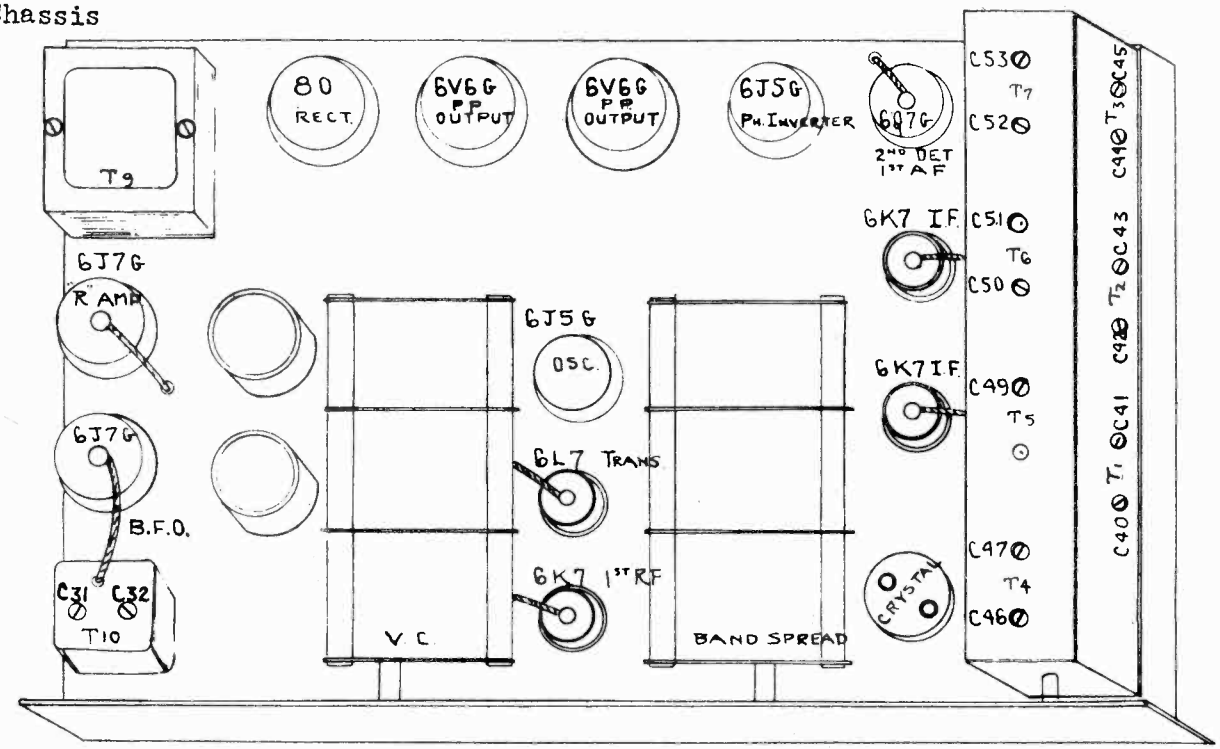
POSITION OF VARIABLE AND BAND SW.	GENERATOR FREQUENCY	GENERATOR CONNECTION	TRIMMER LOCATION	TRIMMER ADJUSTMENTS IN ORDER	TRIMMER FUNCTION	APPROX. MICRO-VOLTS
Closed "A" Band	465 KC	6L7 Grid	See Fig.1	C53,52,51, 50,49,47,46	I.F.	15
36 MC "E"	36 MC	A-D-G Ant. Term.	See Fig.2	C15, 10, 5	Osc Trans.Ant.	3
16 MC "E"	16 MC	A-D-G Ant. Term.		C21	Padder	3
15 MC "D"	15 MC	A-D-G Ant. Term.	See Fig.2	C14, 9, 4	Osc.Trans.Ant.	1
7 MC "D"	7 MC	A-D-G Ant. Term.			Padder	1
6 MC "C"	6 MC	A-D-G Ant. Term.	See Fig.2	C13, 8, 3	Osc.Trans.Ant.	1
3 MC "C"	3 MC	A-D-G Ant. Term.		C19	Padder	1
2.6 MC "B"	2.6 MC	A-D-G Ant. Term.	See Fig.2	C12, 7, 2	Osc.Trans.Ant.	1
1.3 MC "B"	1.3 MC	A-D-G Ant. Term.		C18	Padder	1
1.2 MC "A"	1200 KC	A-D-G Ant. Term.	See Fig.2	C11, 6, 1	Osc.Trans.Ant.	1
.6 MC "A"	600 KC	A-D-G Ant. Term.		C17	Padder	1

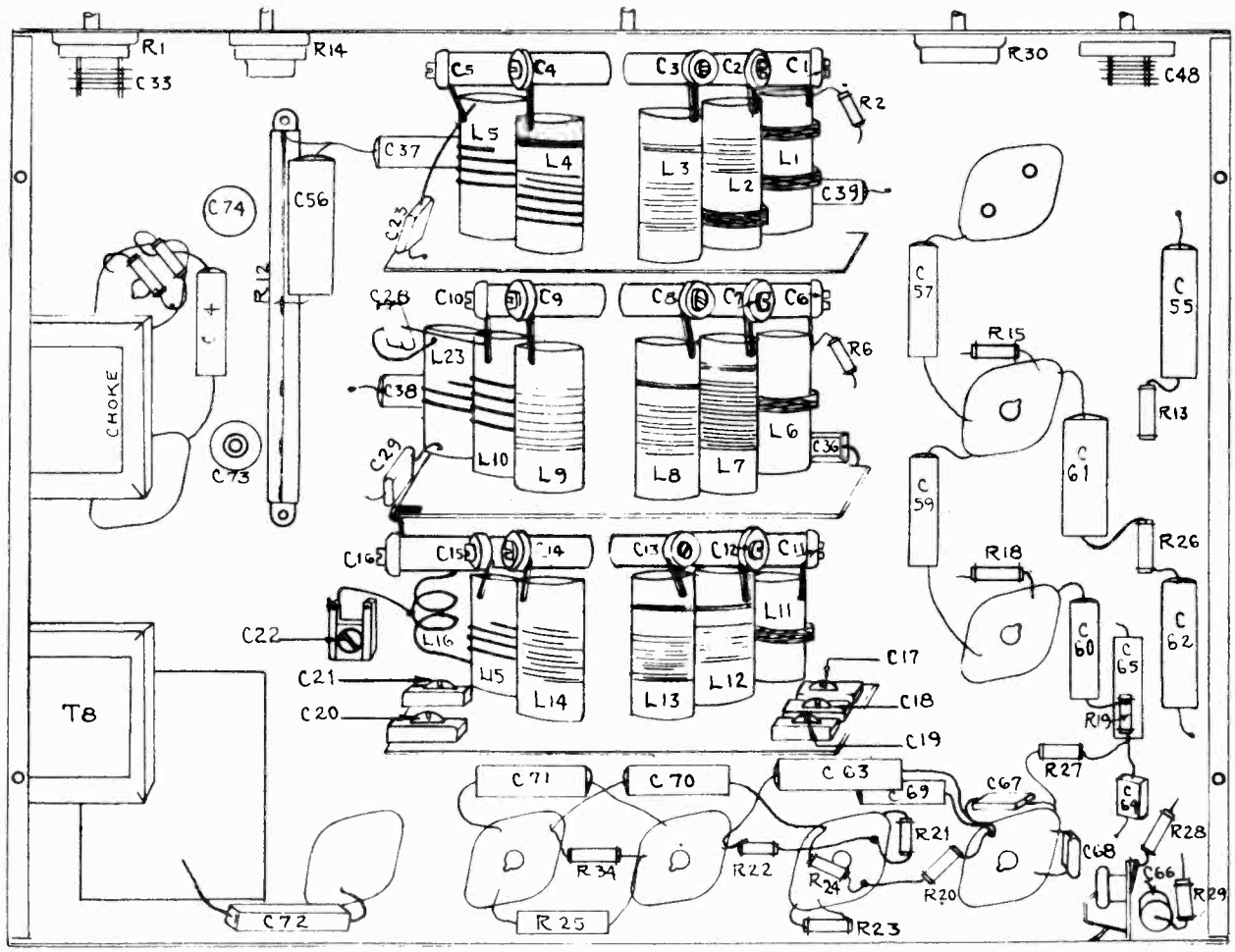
NOTE 4: When using a CRYSTAL, set PHASING CONTROL to almost minimum capacity. See special alignment instructions for Crystal MODEL 438

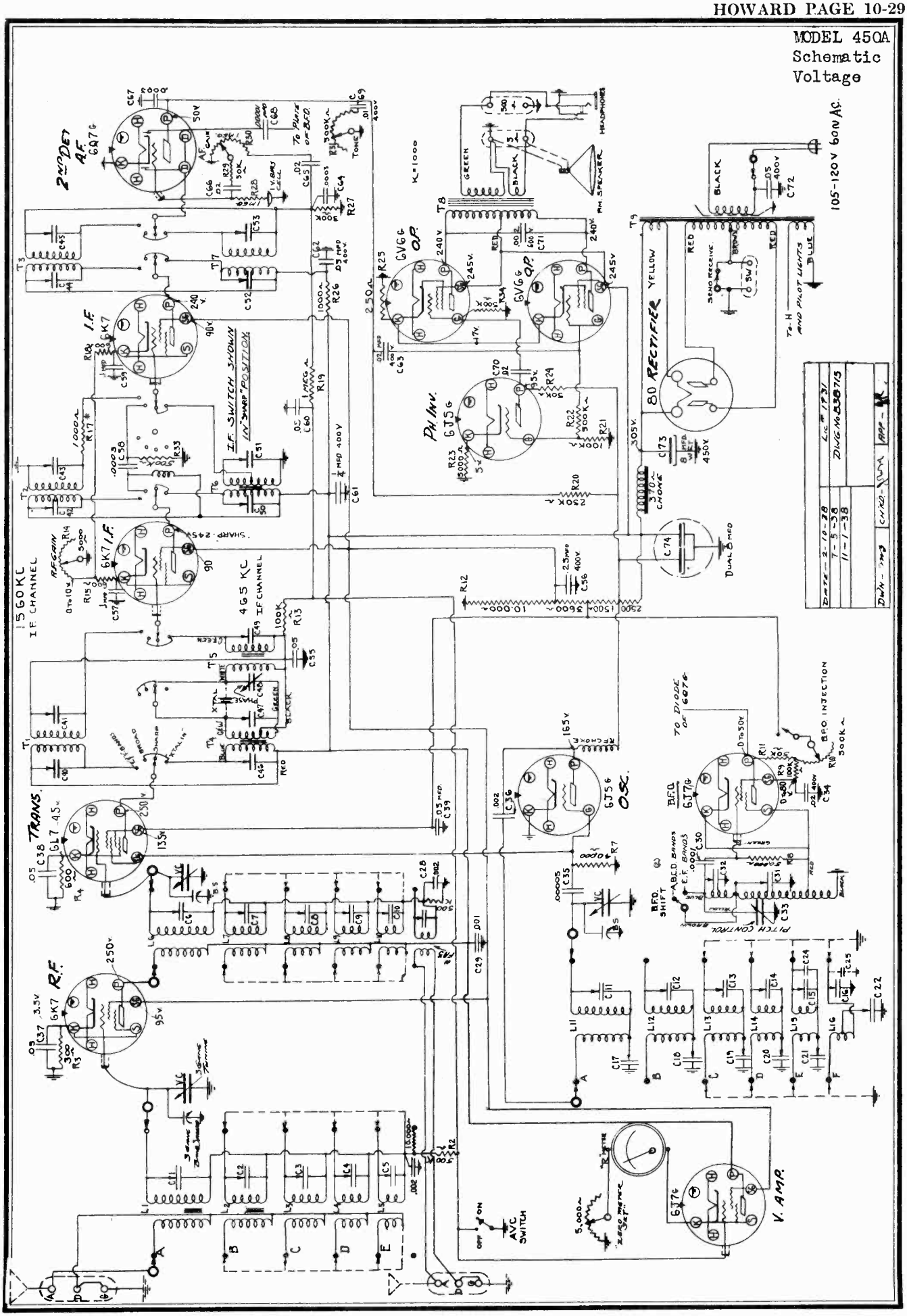


MODEL 450
MODEL 450A
Socket, Trimmers
Chassis

HOWARD RADIO CO.







MODEL 450
MODEL 450A
Antenna Data

HOWARD RADIO CO.

Color Code Data

ALIGNMENT FREQUENCIES:

Band A	600	AND	1200 KC
Band B	1.3	AND	2.6 MC
Band C	3.0	AND	6.0 MC
Band D	7.0	AND	15 MC
Band E	16	AND	36 MC
Band F	40	AND	60 MC

BANDS E & F - . . . . . 1560 KC

LOUD SPEAKER:

Type . . . . . Permanent Magnet Dynamic
Size . . . . Within Separate Case 10 Inch

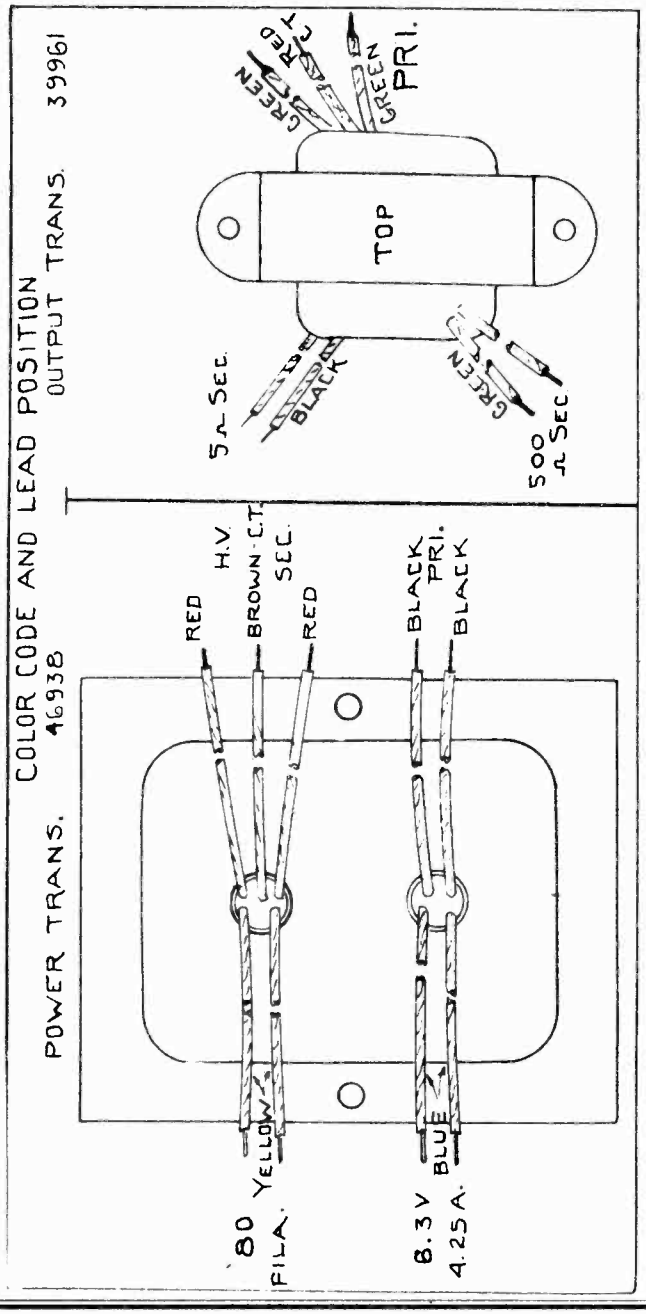
INTERMEDIATE FREQUENCY = BANDS A,B,C, & D - 465 KC

CHASSIS FEATURES:

SEND-RECEIVE terminals in rear of chassis for break-in connection.
RF Stages . . . . . One
VARIABLE CONDENSER . . . . . Three Gang
ANTENNAE . . . . . TWO REQUIRED
TYPE . . . . . SEE PAGE 3
HEADPHONE JACK . . . . . ON FRONT PANEL
Crystal Phaser.
Beat Frequency Oscillator, Pitch Control.
B.F.O. OFF-ON Switch with Injection Control.
Two range B.F.O. switch

OPERATING FEATURES:

A.V.C. with ON-OFF Switch
Three Gang Electrical Band Spread
A.F. Gain or Audio Level
R.F. Gain or Sensitivity
Tone Control
"R" Meter Showing Signal Strength
"R" Meter Zero Adjustment
Four-position IF Setting: 1560 KC
Iron Core Broad 465 KC
Iron Core Sharp 465 KC
Crystal Filter-In Position



POWER OUTPUT:

Type . . . . . Push Pull Output
Undistorted . . . . . 9 Watts
Maximum . . . . . 15 Watts

SPECIFICATIONS FOR A 5 METER ANTENNA

On the "F" band, we have found very good results by the use of a vertical rod 3/16" in diameter and about 59" long. Note that the lead from the base of this rod to the antenna terminal of the set should not be more than about eight inches.

The "G" terminal is for the connection to ground.

THE THREE TERMINALS - A, D, and G in the middle back of the chassis are for the ANTENNA AND GROUND connections. When using the conventional flat-top and lead-in type of antenna, CONNECT THE LEAD-IN TO THE TERMINAL MARKED "A", being sure that a wire jumper connects from D to G terminals. The G terminal is for the ground connection.

For any DOUBLET TYPE of antenna, remove the shorting jumper from D to G and connect the two leads of the doublet system to A and D.

Note* For maximum performance on short waves especially the two highest bands, a little experimenting can be done regarding the antenna location, length and type which is very important.

THE TERMINALS MARKED 500 OHMS which are connections from the out-put transformer can be connected when and if desired to any output load having 500 ohms impedance.

THE TERMINALS MARKED S W are for use of an external switch to turn the set on or off for a stand by This set of contacts may be connected to a relay or separate switch. Since these terminals are in the circuit across the panel switch for SEND and RECEIVE the switch would therefore have to be in the SEND position if the back CONTACTS are used in any way.

MODEL 450
MODEL 450A
Alignment

HOWARD RADIO CO.

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection.....4,000 ohm or more copper oxide meter across 5 ohm terminals. Shunt with speaker

Output meter reading to indicate .5 watt.....1.575 V.

Average sensitivity in microvolts for .5 watt output.....See chart below

Generator ground lead connection.....Direct to chassis

Dummy antenna value in series with generator output..... See Note 1 below

Connection of generator output lead.....See Chart Below

Generator modulation.....30%, 400 cycles

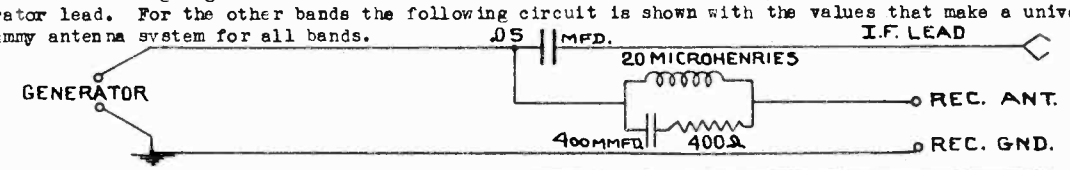
Position of volume control A.F. gain.....Full on

Position of volume control R.F. gain.....Full on

A.V.C. Switch.....On

Band spread dial set at 100.....Min. Capacity

NOTE 1 When aligning the two I.F. channels a condenser of .05 Mfd. may be used in series with the generator lead. For the other bands the following circuit is shown with the values that make a universal dummy antenna system for all bands.



POSITION OF VARIABLE AND BAND SW.	GENERATOR FREQ.	GENERATOR CONNECTION	POSITION OF I.F. BAND SWITCH	TRIMMER ADJUSTMENTS IN ORDER	TRIMMER FUNCTION	APPROX. MICROVOLTS
Closed "A" Band	465 KC	6L7 Grid	"XTAL" See Note 2	C53,52,51 50,49,47,46	I.F.	15
Closed "A" Band	1560 KC	6L7 Grid	"E" & "F"	C45,44,43 42,41,40	I.F.	15
60 MC "F"	60 MC	A-G Ant. Term.	"E" & "F"	C16	Osc.	Approx. 10
40 MC "F"	40 MC	A-G Ant. Term.	"E" & "F"	C22	Padder	Approx. 10
36 MC "E"	36 MC	A-D-G Ant. Term.	"E" & "F"	C15,10,5	Osc. Trans. Ant.	Approx. 3
16 MC "E"	16	A-D-G Ant. Term.	"E" & "F"	C21	Padder	Approx. 3
15 MC "D"	15 MC	A-D-G Ant. Term.	XTAL or "Sharp"	C14, 9,4	Osc. Trans. Ant.	Approx. 1
7 MC "D"	7 MC	A-D-G Ant. Term.	XTAL or "Sharp"	C20	Padder	Approx. 1
6 MC "C"	6 MC	A-D-G Ant. Term.	XTAL or "Sharp"	C13, 8,3	Osc. Trans. Ant.	Approx. 1
3 MC "C"	3 MC	A-D-G Ant. Term.	XTAL or "Sharp"	C19	Padder	Approx. 1
2.6MC "B"	2.6	A-D-G Ant. Term.	XTAL or "Sharp"	C12, 7,2	Osc. Trans. Ant.	Approx. 1
1.3MC "B"	1.3	A-D-G Ant. Term.	XTAL or "Sharp"	C18	Padder	Approx. 1
1.2MC "A"	1200 KC	A-D-G Ant. Term.	XTAL or "Sharp"	C11, 6,1	Osc. Trans. Ant.	Approx. 1
.6 MC "A"	600 KC	A-D-G Ant. Term.	XTAL or "Sharp"	C17	Padder	Approx. 1

NOTE 2: When using a CRYSTAL, set PHASING CONTROL to almost minimum capacity. See special alignment instructions below for Crystal. Align set in "sharp" position if set is without crystal.

ALIGNMENT INSTRUCTIONS - FOR RECEIVERS EQUIPPED WITH CRYSTALS

(A) REMOVE CRYSTAL, set crystal phasing condenser to almost minimum capacity and throw IF switch to "XTAL" position.

(B) With the 465 KC signal, re-adjust the I.F. Trimmer C-46 - the one nearest the front panel of the receiver - by turning the screw counter-clockwise. The signal now may be slightly weaker than before and sound "off-side". This, however, is a normal condition.

(C) REPLACE THE CRYSTAL - A very noticeable drop in signal strength may be noted, due to the filtering action of the crystal, and the frequency control of the signal generator must be "rocked" slowly back and forth, until the increase in signal strength indicates the exact frequency of the crystal being used. Now re-align the entire I.F. system to this frequency.

(D) Adjust "XTAL" phasing condenser for the lowest pitched note possible and re-adjust signal generator frequency. Repeat and continue to repeat this alignment procedure until no further improvement in the alignment can be accomplished.

NOTE: If the IF switch should now be thrown to another position, an apparent rise in gain will be noticed, which is caused by the addition of higher frequencies and background noise, so it does not mean that the sensitivity of this set is impaired in any way by use of the crystal.

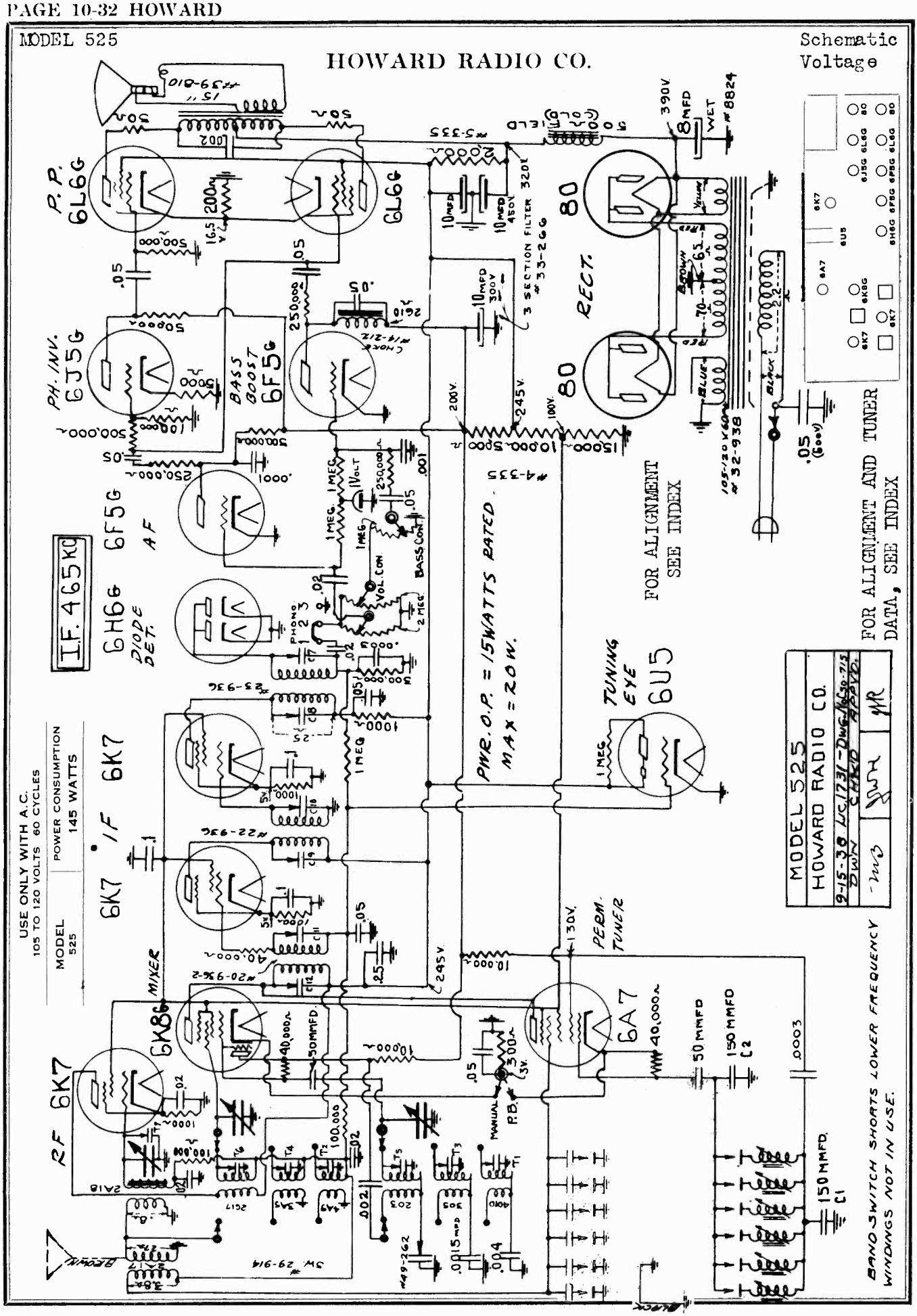
NOTE 3: THE BEAT FREQUENCY OSCILLATOR is adjusted for the A, B, C, D, Bands with Trimmer C31. With models having an "E" & "F" Band B.F.O.——Adjust C32 with dial at 1560 on Band D to 1560 KC. Recheck C31. Set pitch control to half capacity.

SINCE THE BAND SPREAD SYSTEM is accomplished by means of a separate three-gang condenser, the spread in degrees over the assigned amateur bands is as follows:-

(3.5-4 MC = 5400 + 180°)
(14.005-14.395 MC = 810)
(1.716-2 MC = 360 + 162°)

(56-60 MC = 144°)
(7-7.5 MC = 1500 + 180°)
(28-30 MC = 1600)

However, for those who wish to DOUBLE the amount of band spread, it is only necessary to remove one ROTOR plate from each section of the BAND SPREAD CONDENSER. This accomplished by merely cutting the separating link holding the two plates together and pulling the plate from the rotor shaft.



HUDSON MOTOR CAR CO.

MODEL DB-38
MODEL SA-38
Schematics, Socket
Trimmers, Alignment

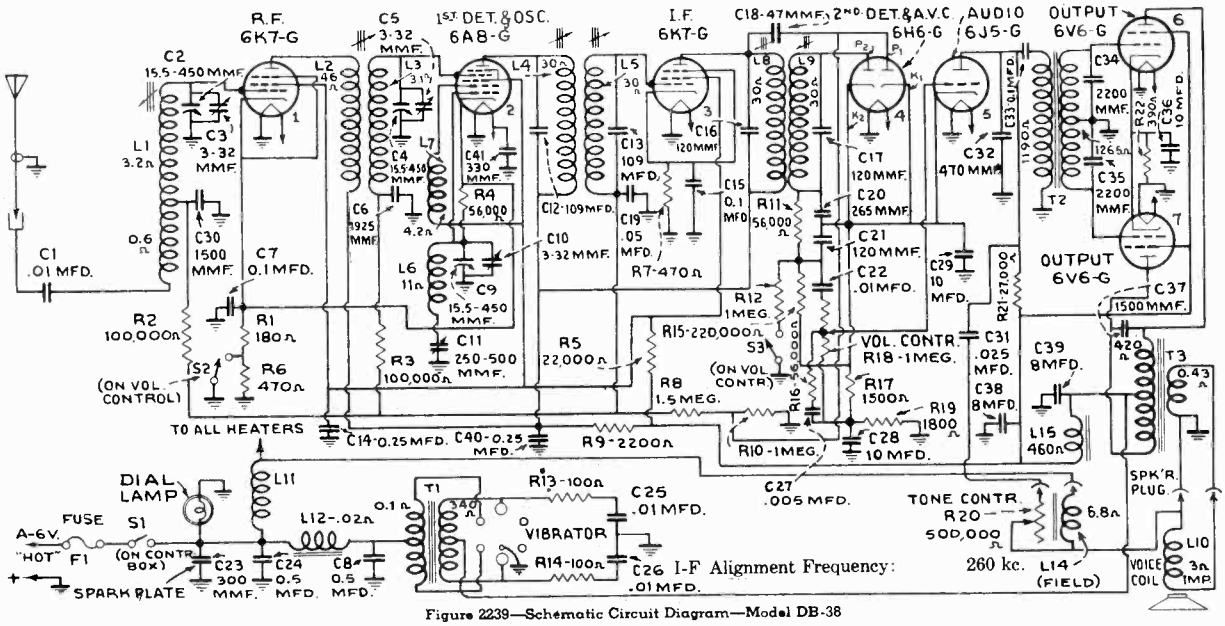


Figure 2239—Schematic Circuit Diagram—Model DB-38

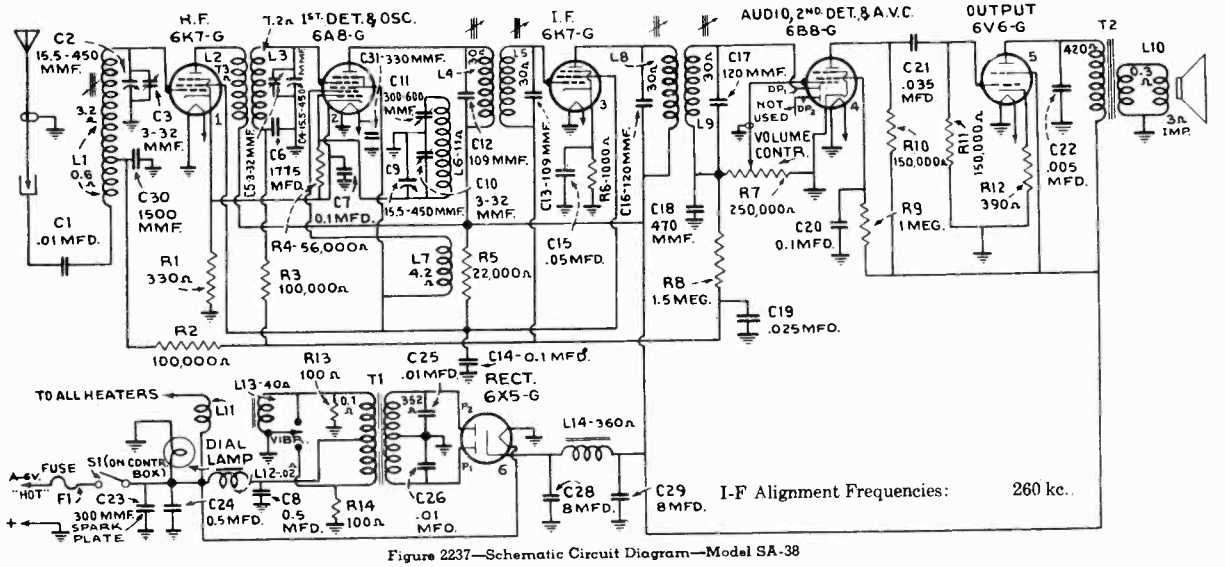


Figure 2237—Schematic Circuit Diagram—Model SA-38

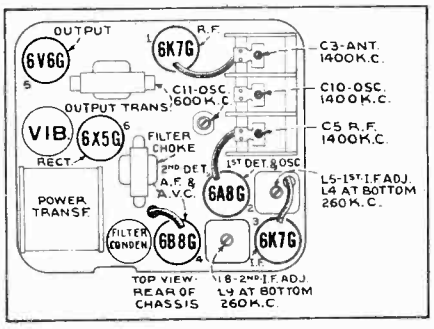


Figure 2235—Radiotron Location—Model SA-38

1938 HUDSON RADIOS
MODELS SA-38 AND DB-38

SA-38	DB-38
(1) 6K7-G	(1) 6K7-G
(2) 6A8-G	(2) 6A8-G
(3) 6K7-G	(3) 6K7-G
(4) 6B8-G	(4) 6H6-G
	(5) 6J5-G
(5) 6V6-G	(6) 6V6-G
(6) 6X5-G	(7) 6V6-G

Tuning Range: 550 kc. to 1600 kc. both models

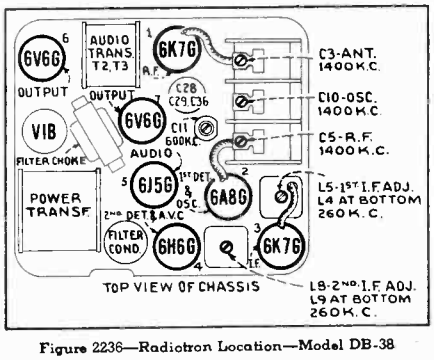
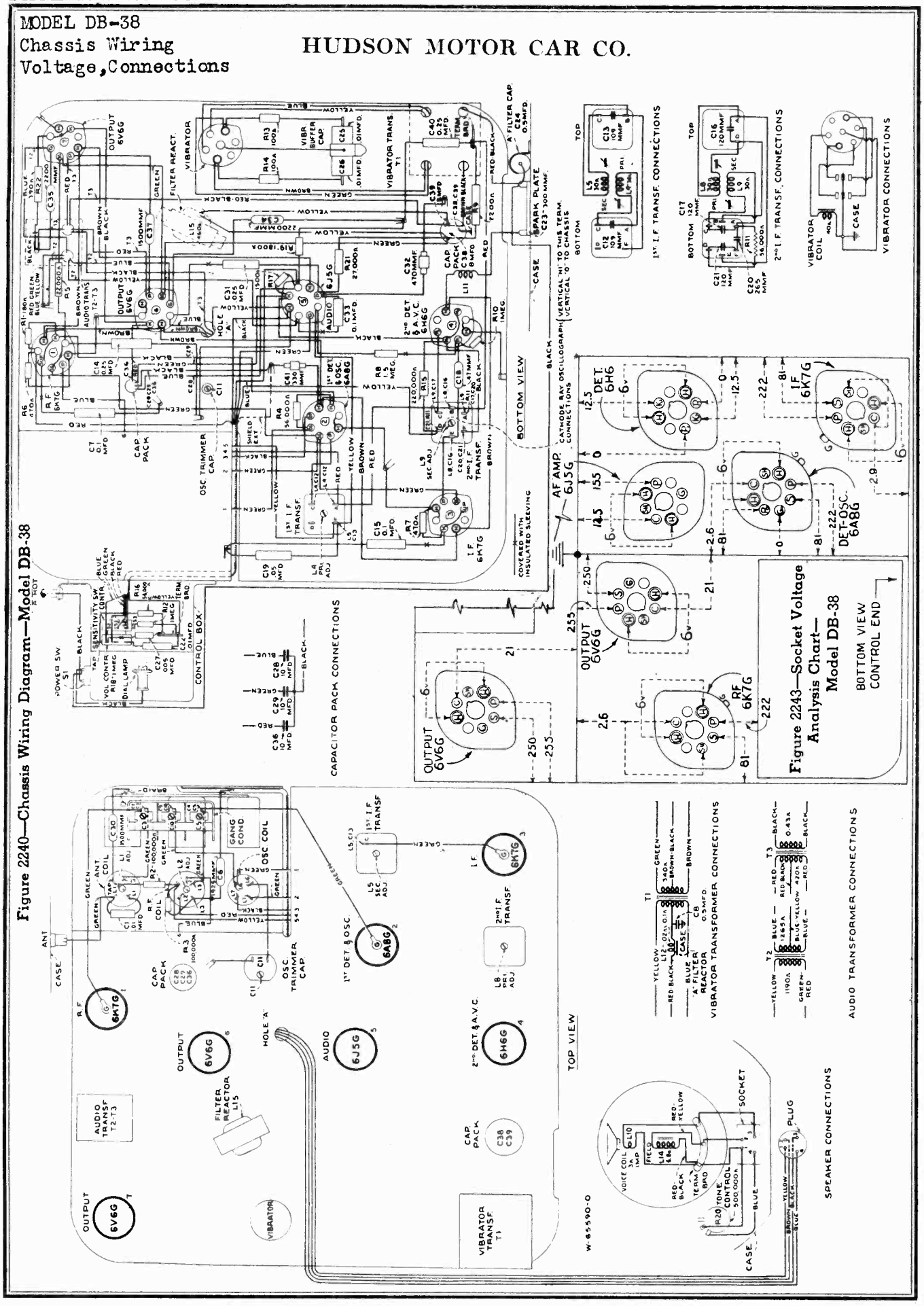


Figure 2236—Radiotron Location—Model DB-38

MODEL DB-38
Chassis Wiring
Voltage, Connections

HUDSON MOTOR CAR CO.



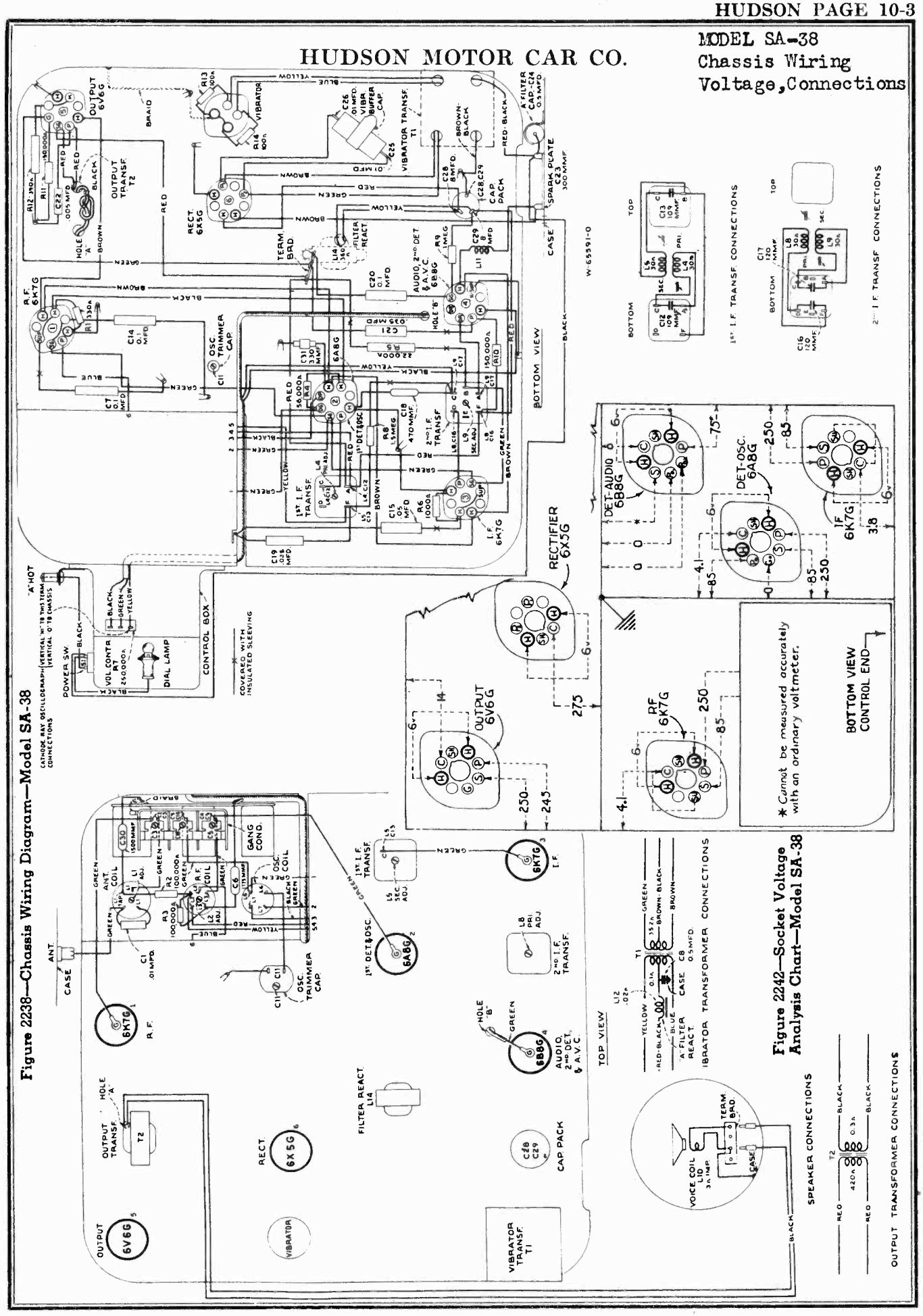


Figure 2238—Chassis Wiring Diagram—Model SA-38

Figure 2242—Socket Voltage Analysis Chart—Model SA-38

ALIGNMENT PROCEDURE

In readjusting the tuned circuits, it is important to apply a definite procedure and to use adequate and reliable test equipment. A standard test oscillator will be required as the source of signal at the specified alignment frequencies. Means for indication of the receiver output during alignment is also necessary to show accurately when the correct point of adjustment is reached. Two indication methods are applicable. One requires use of cathode-ray oscillograph equipment, and the other requires a voltmeter or output indicator. The cathode-ray alignment method is advantageous in that the indication provided is in the form of a wave image which represents the resonance characteristics of the circuits being tuned.

Adjust the control box by turning the tuning knob clockwise until a definite stop is reached at the high-frequency end of the dial scale. Then turn the tuning knob counter-clockwise until a definite stop is reached at the low-frequency end of the dial scale.

Figures 2235 and 2236 give the locations of the tubes and trimmer screws for adjustable capacitors and magnetite cores for models SA-38 and DB-38 respectively.

Place the receiver in operation with its two covers removed. Attach the output indicator across the loudspeaker voice coil circuit and advance the receiver volume control to full volume position. (If cathode-ray oscillograph is used for output indication, the vertical input terminals should be connected between the i-f transformer side of R15 (Figure 2240) and the receiver chassis for the DB-38 model, and between the high side of the volume control R7 (in control unit) (Figure 2238) and the receiver chassis for model SA-38. The cathode-ray oscillograph method of i-f alignment requires the conventional cathode-ray oscillograph, frequency modulator and signal generator set-up.)

For each adjusting operation, regulate the test oscillator output control so that the signal level is as low as possible and still observable on the indicating device. Use of such small signal will obviate broadness of tuning which would otherwise result from a.v.c. action on a stronger one.

I-F ADJUSTMENTS

1. Connect the "high" output of the test oscillator to the control grid cap of the i-f tube (6K7-G) through a 0.25 mfd. capacitor and connect the ground of the test oscillator to the receiver chassis. Adjust the frequency of the test oscillator to 260 kc. Tune the receiver to a point where no interference is received from the heterodyne oscillator or local stations.

2. Adjust the two screws L8 and L9 (attached to magnetite cores) of the second i-f transformer, one on top and one on bottom, until maximum output is produced on the indicating device.

3. Remove the test oscillator from the i-f tube input and connect it between the control grid cap of the first detector tube (6A8-G) and chassis ground, using the 0.25 mfd. capacitor as previously. Allow its tuning to remain at 260 kc. Tune the receiver to avoid interference as in 1.

4. Adjust the two screws L4 and L5 of the first i-f transformer for maximum (peak) receiver output.

5. Repeat procedures 1, 2, 3 and 4 as a check.

R-F ADJUSTMENTS

6. Connect the "high" output of the test oscillator to the antenna plug of the receiver through a 100 mmfd. capacitor, leaving the test oscillator ground connected to the receiver chassis. If the antenna lead-in is used, the value of this capacitor should be 50 mmfd. Tune the test oscillator to 1400 kc. Allow the output indicator to remain attached to the receiver as for i-f alignment.

7. Tune the receiver so that the dial reading is approximately halfway between 1300 and 1500 kc., which gives a 1400 kc. setting. Then adjust the oscillator, detector and antenna coil trimmers, C10, C5, and C3 respectively, adjusting each to the point producing maximum indicated receiver output.

8. Shift the test oscillator frequency to 600 kc. and tune the receiver to pick up this signal, disregarding the dial reading at which it is received. The oscillator series trimmer C11 should then be adjusted, simultaneously rocking the receiver tuning control backward and forward through the signal until maximum (peak) receiver output results from these combined operations.

9. The adjustment of C10, C5 and C3 should then be repeated as in operation 7 to correct for any change in their alignment due to the adjustment of C11.

NOTE: The antenna coil L1 has a magnetite core which is adjusted at the factory for the correct inductance. This adjustment should not be disturbed.

DB-38

Speaker:
Type: Electrodynamic 8"
Impedance (v.c.) 3 ohms. at 400 cycles
Vibrator: Synchronous
Power Output: Undistorted, 6 watts; maximum, 9 watts
Power Rating: Supply voltage 6.3 volts (storage battery)
Current drain 8.25 amperes at 6.3 volts
Fuse protection 15 amperes
R-F Alignment Frequencies:

Antenna coil	1400 kc.
Oscillator coil	600 kc. and 1400 kc.
Detector coil	1400 kc.

SA-38

Speaker:
Type: Six Inch Dynamic
Impedance (v.c.) 3 ohms. at 400 cycles
Vibrator: Non-synchronous
Power Output: Undistorted, 2.6 watts; maximum, 4 watts
Power Rating:

Supply voltage	6.3 volts (storage battery)
Current drain	6.0 amperes at 6.3 volts
Fuse protection	15 amperes

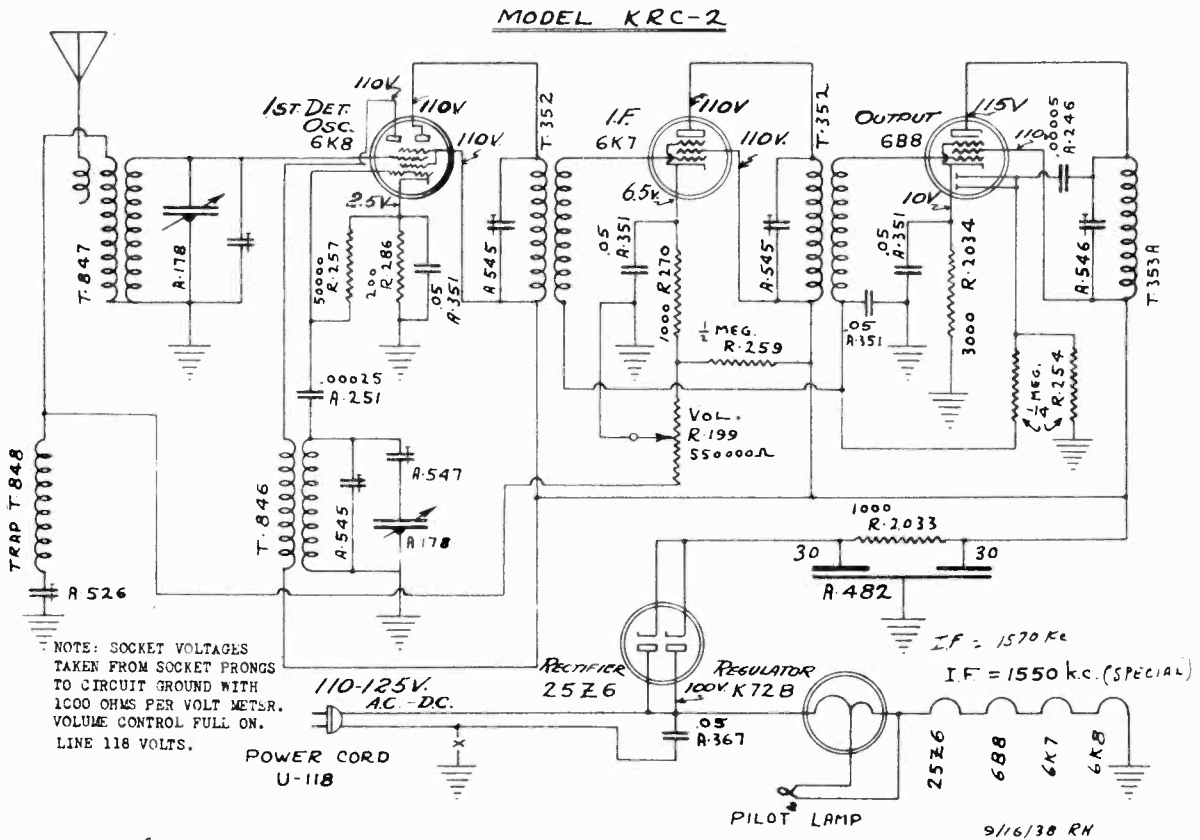
R-F Alignment Frequencies:

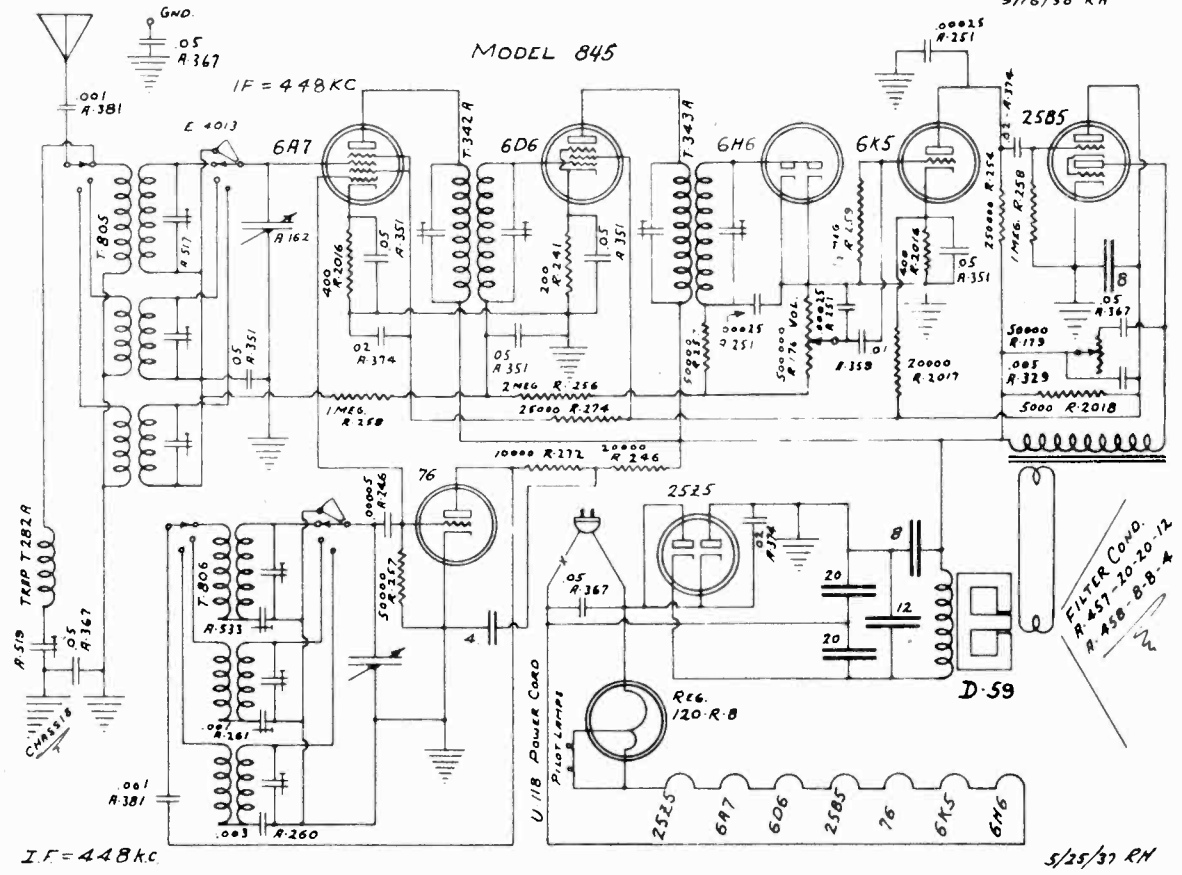
Antenna coil	1400 kc.
Oscillator coil	600 and 1400 kc.
Detector coil	1400 kc.

MODEL KRC-2, Tunemaster

INTERNATIONAL INDUSTRIES, INC.

MODEL 845
Schematics

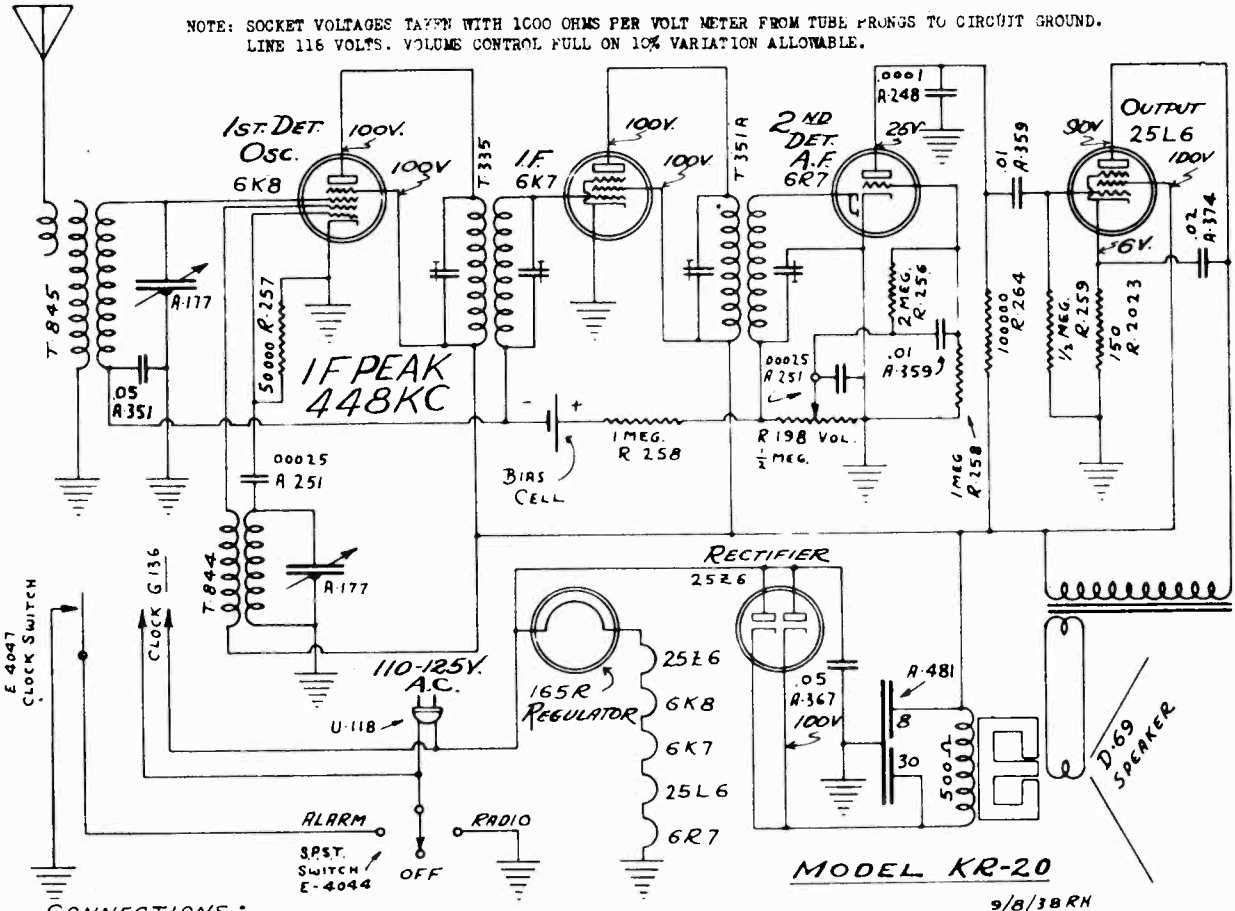




MODEL KR-20, Autime
Schematic, Voltage
Alignment

INTERNATIONAL INDUSTRIES, INC.

MODEL KRC-2
Alignment

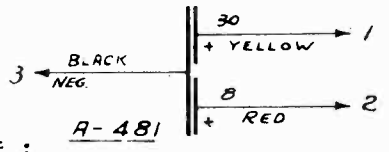


MODEL KR-20

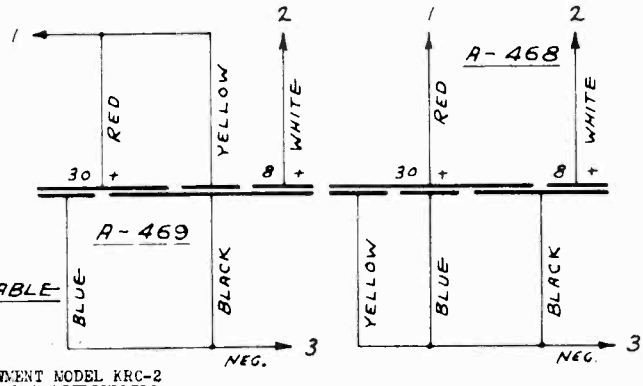
9/8/38 RH

CONNECTIONS:

1 - 30 μfd - TO RECTIFIER CATHODE
2 - 8 μfd. - TO B+
3 - NEGATIVE — TO GROUND.



NOTE:
THESE PARTS ARE INTERCHANGEABLE ON MODEL KR-20, BUT MUST BE CONNECTED AS SHOWN.



ALIGNMENT MODEL KRC-2

I. F. TRIMMERS: Feed 1570 Kc. modulated signal from signal generator directly to antenna of Tunemaster. Adjust both IF trimmers to maximum reading on output meter. Then adjust output coil trimmer to maximum.
R. F. TRIMMERS: Set Tunemaster dial at 1500 Kc. and feed 1500 Kc. signal from signal generator to antenna of Tunemaster. Set antenna trimmer approximately 1/4 turn from tight. Peak oscillator trimmer at 1500 Kc. Set dial at 600 Kc. and peak series oscillator trimmer. Move dial and series trimmer simultaneously by small amounts so as to get maximum output at 600 Kc. Tune back to 1500 Kc. and peak oscillator trimmer. Repeat previous peaking of series trimmer at 600 Kc. Retune to 1500 Kc. and peak oscillator trimmer. Set dial at approximately 1400 Kc. Tune signal generator to resonance with Tunemaster. Then peak antenna trimmer.

ALIGNMENT MODEL KR 20

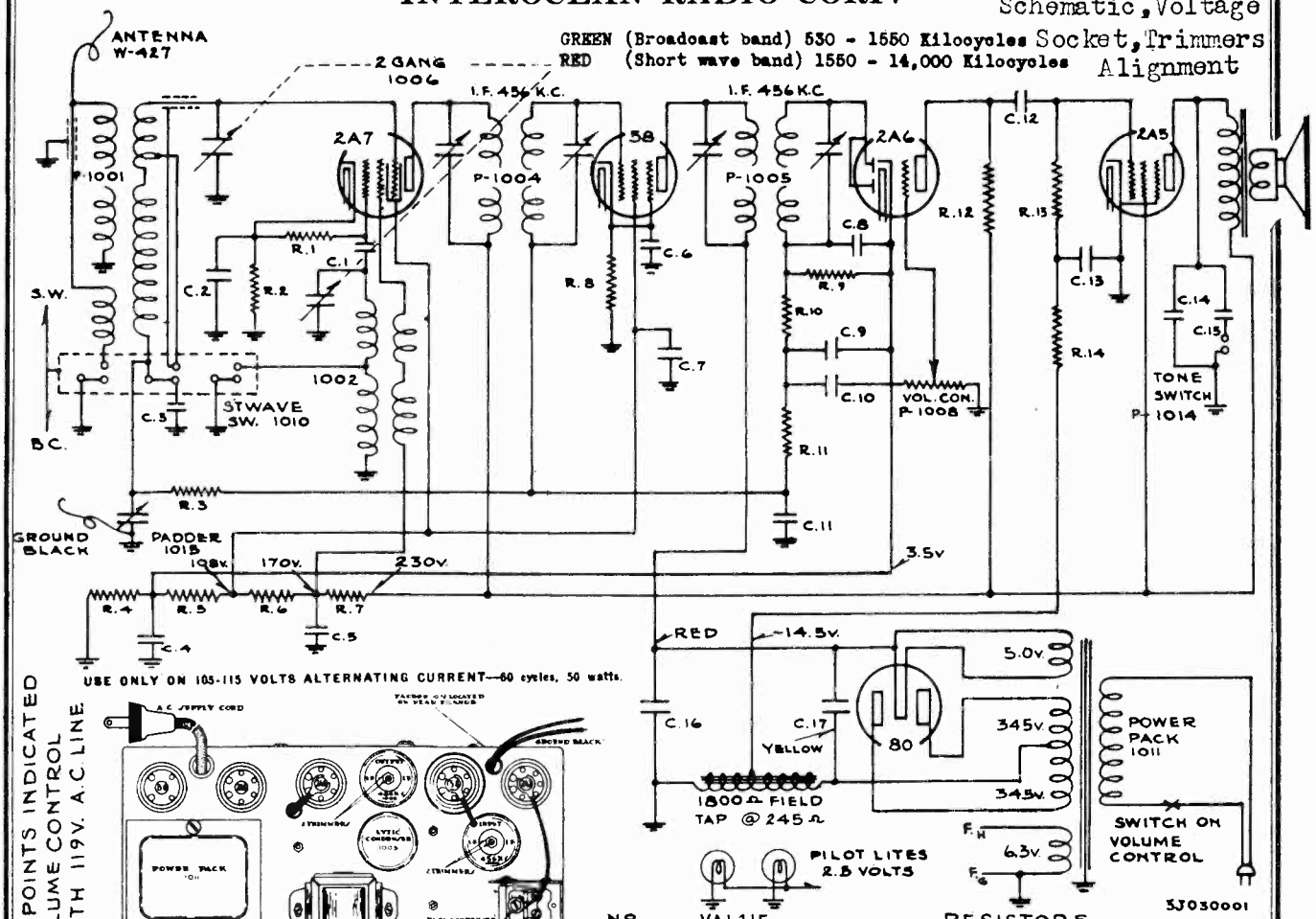
I. F. TRIMMERS: To align the I.F. circuits, set the signal generator to 448 Kc. and feed its modulated signal direct to the antenna. Adjust the first I.F. transformer trimmers for maximum meter reading. Go over both adjustments at least three or four times for accuracy. Repeat this process on the second I. F. transformer. If adjustments are not made accurately, selectivity will be poor and I. F. oscillation may result.
R. F. TRIMMERS: Turn the dial to 1500 Kc. and feed a very weak 1500 Kc. modulated signal from your signal generator to the antenna. Adjust the oscillator trimmer for maximum reading. Then peak the antenna trimmer to this setting. Aligning of broadcast band should be done on 1500, 1000 and 600 kilocycles. There is no adjustable padder condenser in this model so resonance on lower frequencies is accomplished by bending plates on tuning condensers.

KR 20 autime

INTEROCEAN RADIO CORP.

MODEL 202
Schematic, Voltage
Socket, Trimmers
Alignment

GREEN (Broadcast band) 530 - 1550 Kilocycles
RED (Short wave band) 1550 - 14,000 Kilocycles



Nº	VALUE
C.1 :-	250MMF.
C.2 :-	.05
C.3 :-	.05
C.4 :-	.05
C.5 :-	.05
C.6 :-	.05
C.7 :-	.1
C.8 :-	500MMF. X
C.9 :-	500MMF. X
C.10 :-	.01 X
C.11 :-	.1
C.12 :-	.01
C.13 :-	.05
C.14 :-	.01
C.15 :-	.02
C.16 :-	8MF. *
C.17 :-	8MF. *

RESISTORS

Nº	VALUE
R.1 :-	50M
R.2 :-	500 *
R.3 :-	250M
R.4 :-	250 *
R.5 :-	20M *
R.6 :-	6M *
R.7 :-	4M *
R.8 :-	300 *
R.9 :-	250M X
R.10 :-	50M X
R.11 :-	250M X
R.12 :-	250M
R.13 :-	300M
R.14 :-	250M.

* R.2, R.4, R.5, R.6, R.7 & R.8 IN ONE UNIT P-1012
* C.16 & C.17 IN ONE UNIT P-1003
X R.9, R.10, R.11, C.8, C.9 & C.10 IN I.F. CAN P-1005

ALIGNMENT

Connect oscillator at 456 KC to grid of 2A7 tube and ground wire. Variable condenser at minimum capacity, adjust four trimmers (one nut and one screw on each transformer trimmer) to resonance.

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

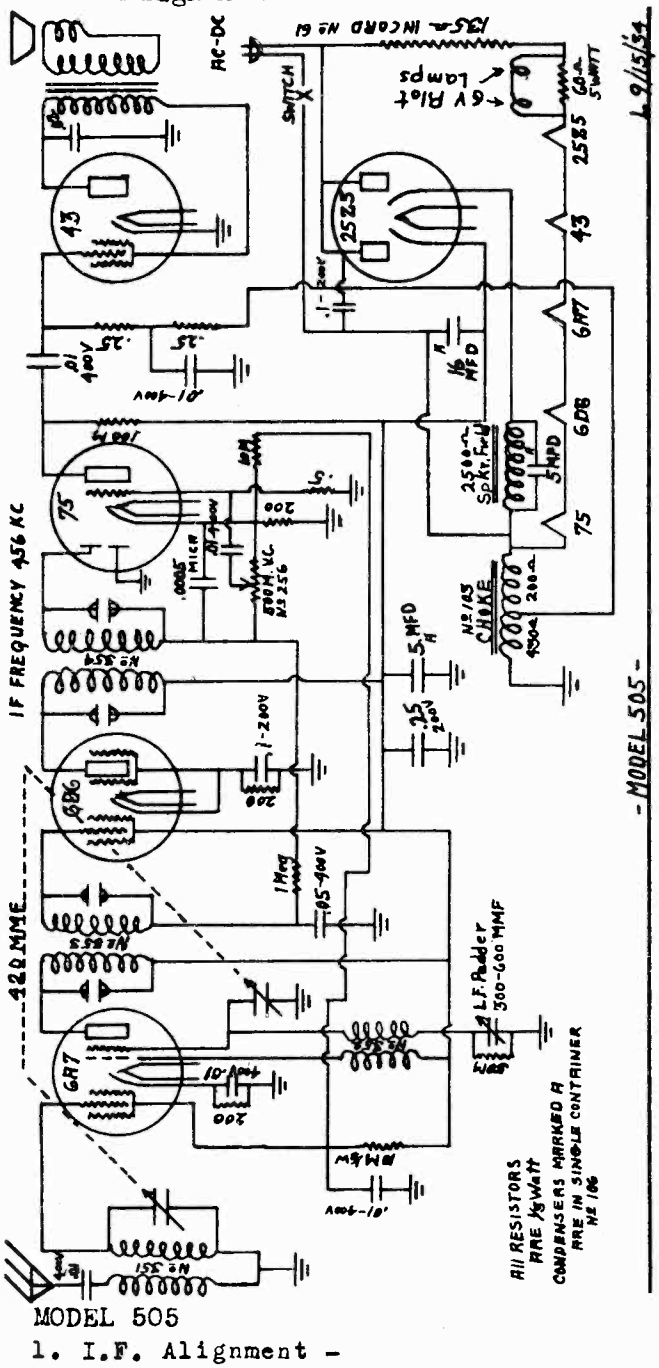
Short wave band, set wave changing switch to RED and with input oscillator connected as above and set at 1720 KC and at harmonics of 1000 KC (2000 KC), of 1200 KC (2400 KC), of 1400 KC (2800 KC), and 1720 KC (3440 KC). DO NOT BEND PLATES.

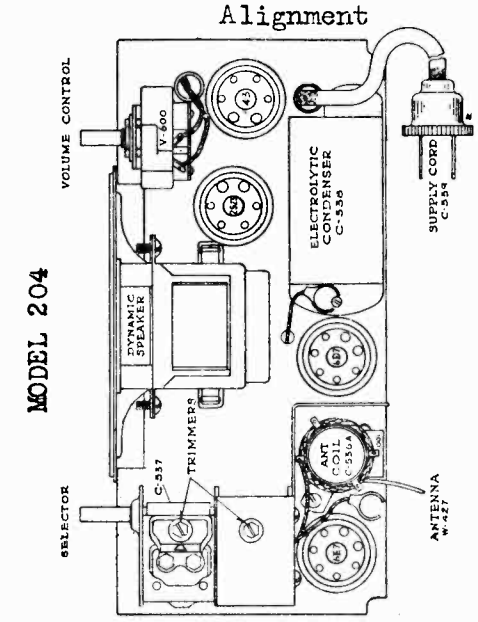
For failure to operate over both bands check 2A7 tube and connections to and contacts of wave changing switch.

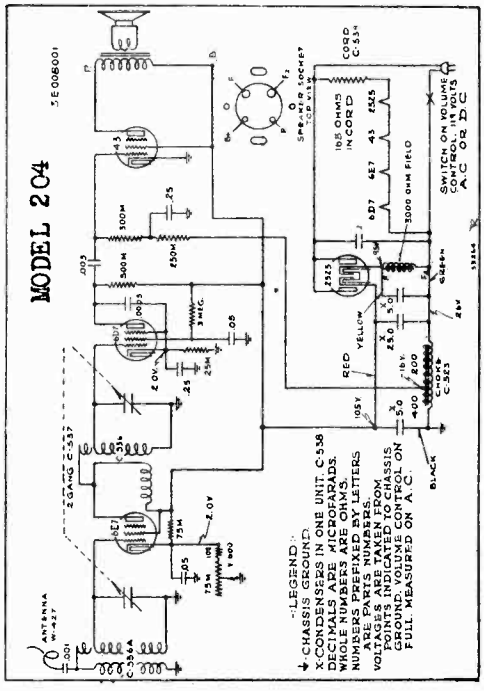
MODEL 505
Schematic, Alignment

INTEROCEAN RADIO CORP.

MODEL 204
Schematic, Socket
Trimmers, Voltage
Alignment







Schematic circuit diagram AC-DC Radio Receiver. Should it be necessary at any time to rebalance this set the procedure is as follows: Disconnect antenna wire and attach an oscillator in series with a 50 mmfd. condenser to the antenna coil. With variable condenser at its minimum capacity position—at the extreme left of its rotation-touch trimmer condensers for maximum deflection on an output meter connected across the primary of the speaker input transformer, check trimmer adjustment at 1400 kilocycles, then align at 1200-1000-800-600-540 kilocycles, bend slotted plates of variable condenser if necessary.

USE ONLY ON 105-115 VOLTS ALTERNATING (any cycles) or DIRECT CURRENT—35 WATTS.

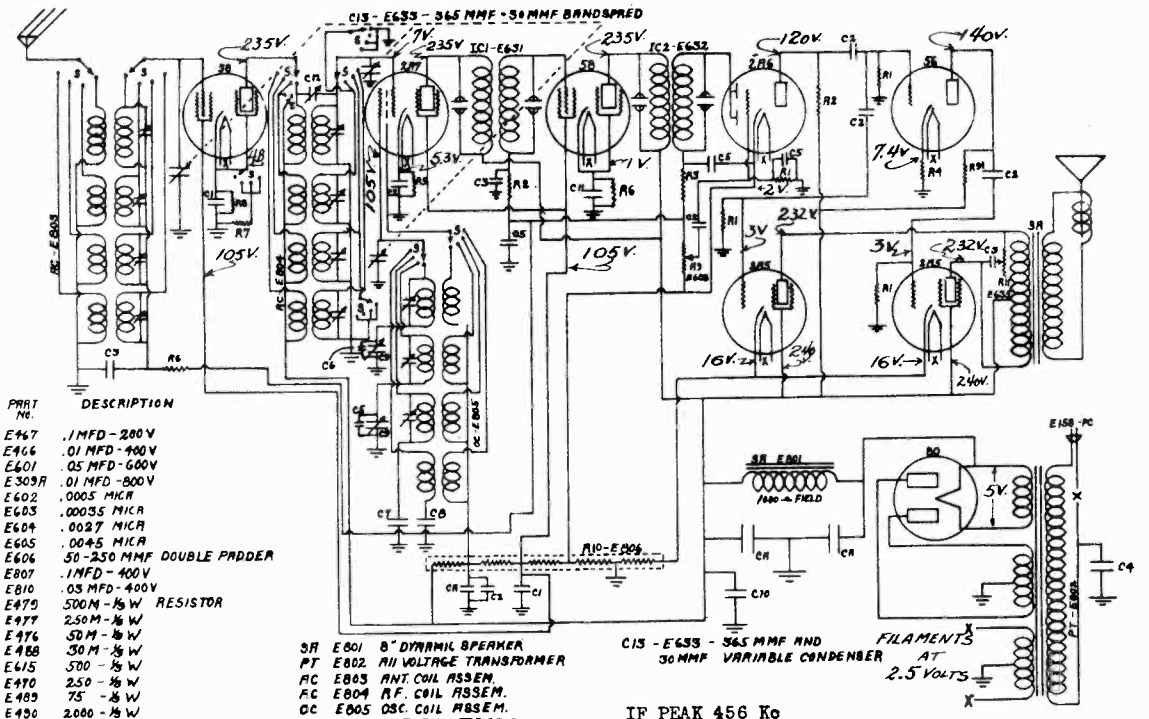
MODEL 505

1. I.F. Alignment -
   To peak I.F. transformers, apply an oscillator note of 456 KC to the grid of the 6A7 tube and adjust screws seen in tops of I.F. transformers until maximum peak is obtained.
2. Broadcast -
   Connect an oscillator adjusted to 1720 KC, to the antenna of set, then adjust trimmer of oscillator section first with variable condenser way open to peak output, next adjust antenna section trimmer on variable condenser to peak output.
3. Low Frequency Padder -
   Next apply a 600 KC note from oscillator and while rocking variable condenser back and forth across signal, adjust padder to maximum output.
4. Check alignment again at 1400 KC; 1000 KC and 800 KC. It will not be necessary to bend plates to align this receiver.

MODELS 508, 522, 525, 525A
Chassis 508

INTEROCEAN RADIO CORP.

MODELS 511, 524, 527, 527A
Chassis 511
Schematics, Voltage
Trimmers



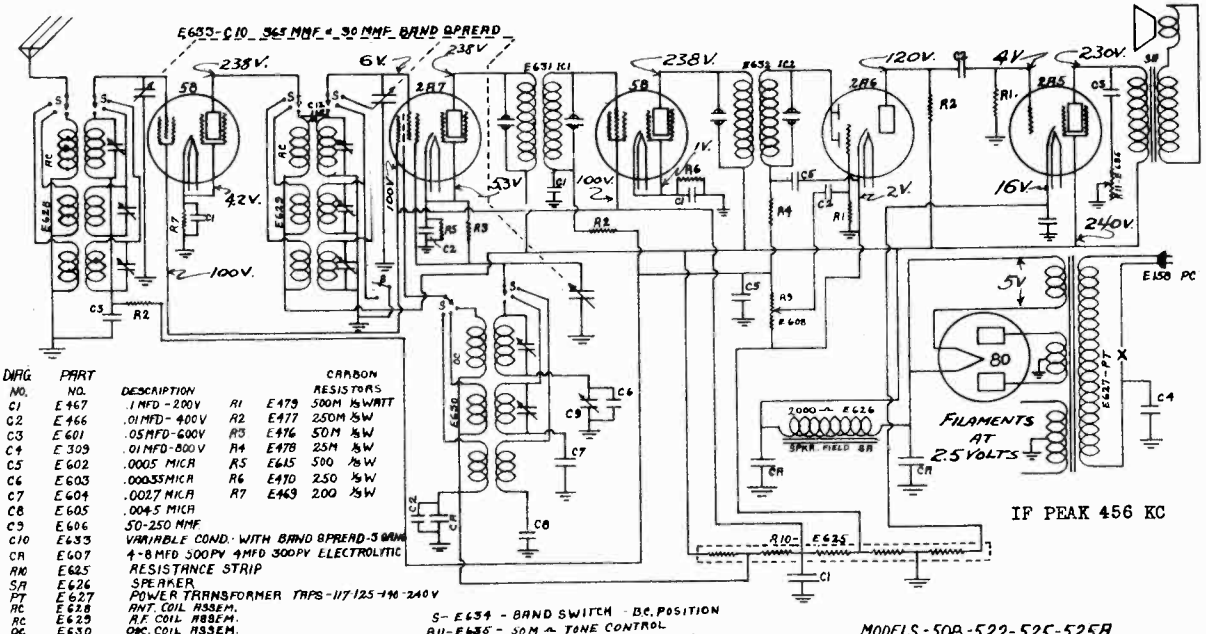
DIAG. NO.	PART No.	DESCRIPTION
C1	E467	.1 MFD - 200 V
C2	E466	.01 MFD - 400 V
C3	E601	.05 MFD - 600 V
C4	E309A	.01 MFD - 800 V
C5	E602	.0005 MICA
C6	E603	.00035 MICA
C7	E604	.0027 MICA
C8	E605	.0045 MICA
C9	E606	50-250 MMF DOUBLE PADDER
C10	E807	.1 MFD - 400 V
C11	E810	.03 MFD - 400 V
R1	E479	500 M - ½ W RESISTOR
R2	E477	250 M - ½ W
R3	E476	50 M - ½ W
R4	E478	30 M - ½ W
R5	E615	500 - ½ W
R6	E470	250 - ½ W
R7	E469	75 - ½ W
R8	E490	2000 - ½ W
R9	E608	500 M VOL. CONT. WITH SWITCH
R10	E806	METAL RESISTANCE STRIP
R11	E635	50 M V TONE CONTROL
R31	E808	100 M - ½ W RESISTOR
CR	E607	4-8 MFD-500 V, 4 MFD-300 V

SR	E801	8" DYNAMIC SPEAKER
PT	E802	A11 VOLTAGE TRANSFORMER
AC	E803	ANT. COIL ASSEM.
RC	E804	R.F. COIL ASSEM.
OC	E805	OSC. COIL ASSEM.
IC1	E631	I.F. TRANS. TOP GRID
IC2	E632	I.F. TRANS. BOTTOM GRID
PC	E158	POWER CORD
S	E809	5 GANG BAND SW. BC. POSITION
C12	E811	3-30 MMF PADDER

C13 - E633 - 365 MMF AND 30 MMF VARIABLE CONDENSER

TRIMMER LOCATION (BOTH MODELS)
CHASSIS 508:- BAND 1, TOPS OF RESPECTIVE CANS. BANDS 2 AND 3, BOTTOM OF CANS, (ANT., R.F., OSC.).
CHASSIS 511:-TRIMMERS WILL BE FOUND IN BOTTOM OF CANS, EXCEPT BAND 4 OSC (HAS NO TRIMMER).

NOTE:- THE VOLTAGES SHOWN ON BOTH SCHEMATICS ARE TAKEN WITH LINE 115 VOLTS, AERIAL AND GROUND DISCONNECTED, USING 1000 OHMS PER VOLT METER; TAKEN FROM POINTS INDICATED TO GROUND.



DIAG. NO.	PART NO.	DESCRIPTION
C1	E467	.1 MFD - 200 V
C2	E466	.01 MFD - 400 V
C3	E601	.05 MFD - 600 V
C4	E309	.01 MFD - 800 V
C5	E602	.0005 MICA
C6	E603	.00035 MICA
C7	E604	.0027 MICA
C8	E605	.0045 MICA
C9	E606	50-250 MMF
C10	E633	VARIABLE COND. WITH BAND SPREAD-3 GANG
CR	E607	4-8 MFD 500 PV 4 MFD 300 PV ELECTROLYTIC
R10	E625	RESISTANCE STRIP
SR	E626	SPEAKER
PT	E627	POWER TRANSFORMER TAPS - 117-125-190-240 V
RC	E628	ANT. COIL ASSEM.
RC	E629	R.F. COIL ASSEM.
OC	E630	OSC. COIL ASSEM.
IC1	E631	I.F. TRANS. - TOP GRID.
IC2	E632	I.F. TRANS. - BOTTOM GRID
PC	E158	POWER CORD + PLUG
R9	E608	500 M Ω VOLUME CONTROL WITH SWITCH

CARBON RESISTORS

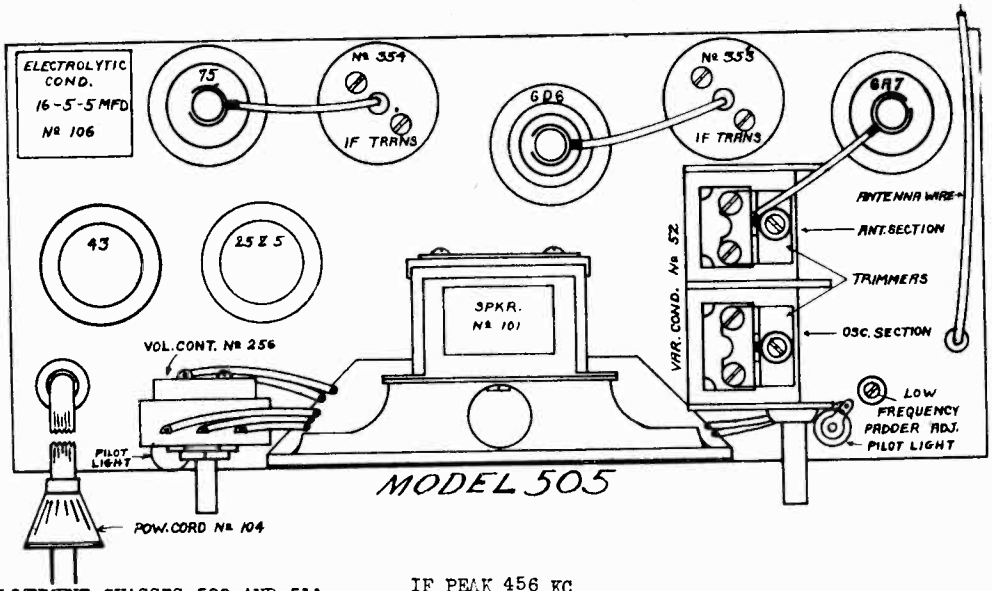
R1	E479	500M	½ WATT
R2	E477	250M	½ W
R3	E476	50M	½ W
R4	E478	25M	½ W
R5	E615	500	½ W
R6	E470	250	½ W
R7	E469	200	½ W

S - E634 - BAND SWITCH - BC. POSITION
R11 - E635 - 50 M Ω TONE CONTROL
C11 - E634 - 10 MFD 25 V ELECTROLYTIC
C12 - E811 - 3-30 MMF PADDER

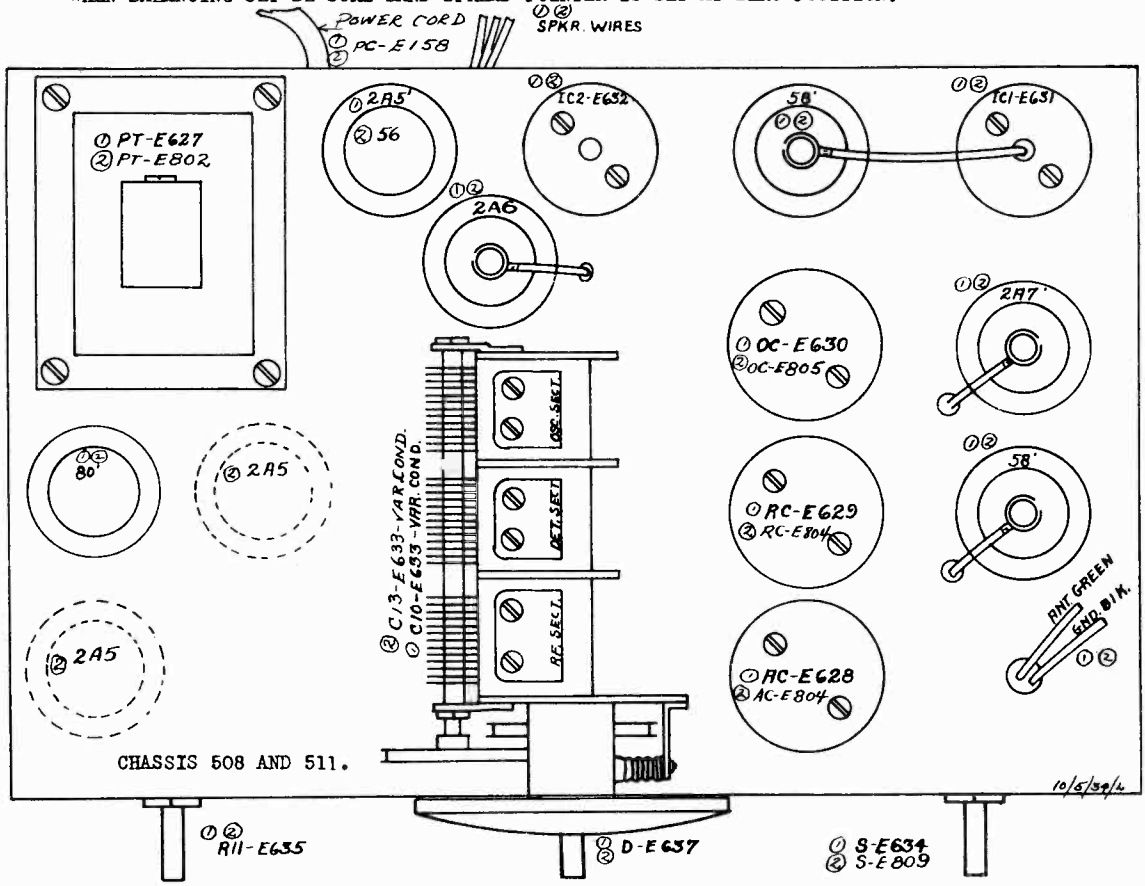
MODELS 508,522,525,525A
MODELS 511,524,527,527A
Socket,Trimmers
Alignment

INTEROCEAN RADIO CORP.

MODEL 505
Socket, Trimmers



ALIGNMENT, CHASSIS 508 AND 511. IF PEAK 456 KC
BAND 1:- ADJUST TRIMMERS AT 1500 KC AND IF PADDER AT 600 KC(BOTH AT RIGHT OF CHASSIS).
BAND 2:-(CHASSIS 508 ONLY) ADJUST AT 9000KC (NO L.F. PADDER ON THIS BAND).
BAND 2:-(CHASSIS 511 ONLY) ADJUST AT 3700KC, L.F. PADDER AT 1700 KC.
BAND 3:-(CHASSIS 508 ONLY) ADJUST AT 21,000KC (NO L.F. PADDER ON THIS BAND)
BAND 3:-(CHASSIS 511 ONLY) ADJUST AT 9,000KC.
BAND 4:-(CHASSIS 511 ONLY) ADJUST AT 21,000KC.
WHEN BALANCING SET BE SURE BAND SPREAD POINTER IS SET AT ZERO POSITION.



TUBE LAYOUT FOR MODELS 508-522-525-525A, CHASSIS 508 AND 511-524-527-527A, CHASSIS 511.
NOTE:- TUBES AND PARTS INDICATED ① ARE FOR CHASSIS 508; ② INDICATES SAME FOR CHASSIS 511.