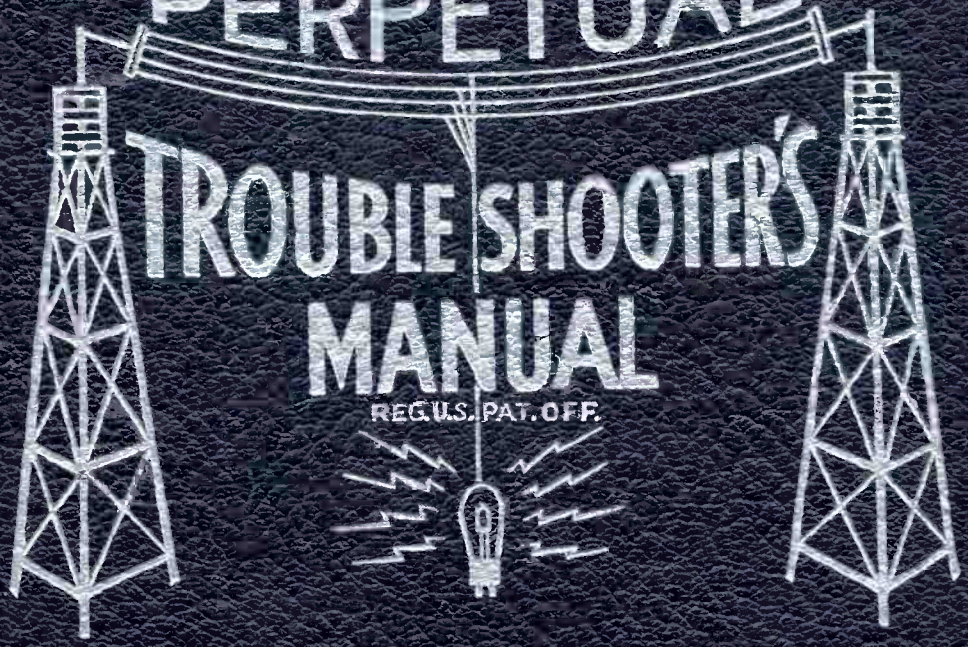
VOLUME VII

PERPETUAL TROUBLE SHOOTER'S MANUAL

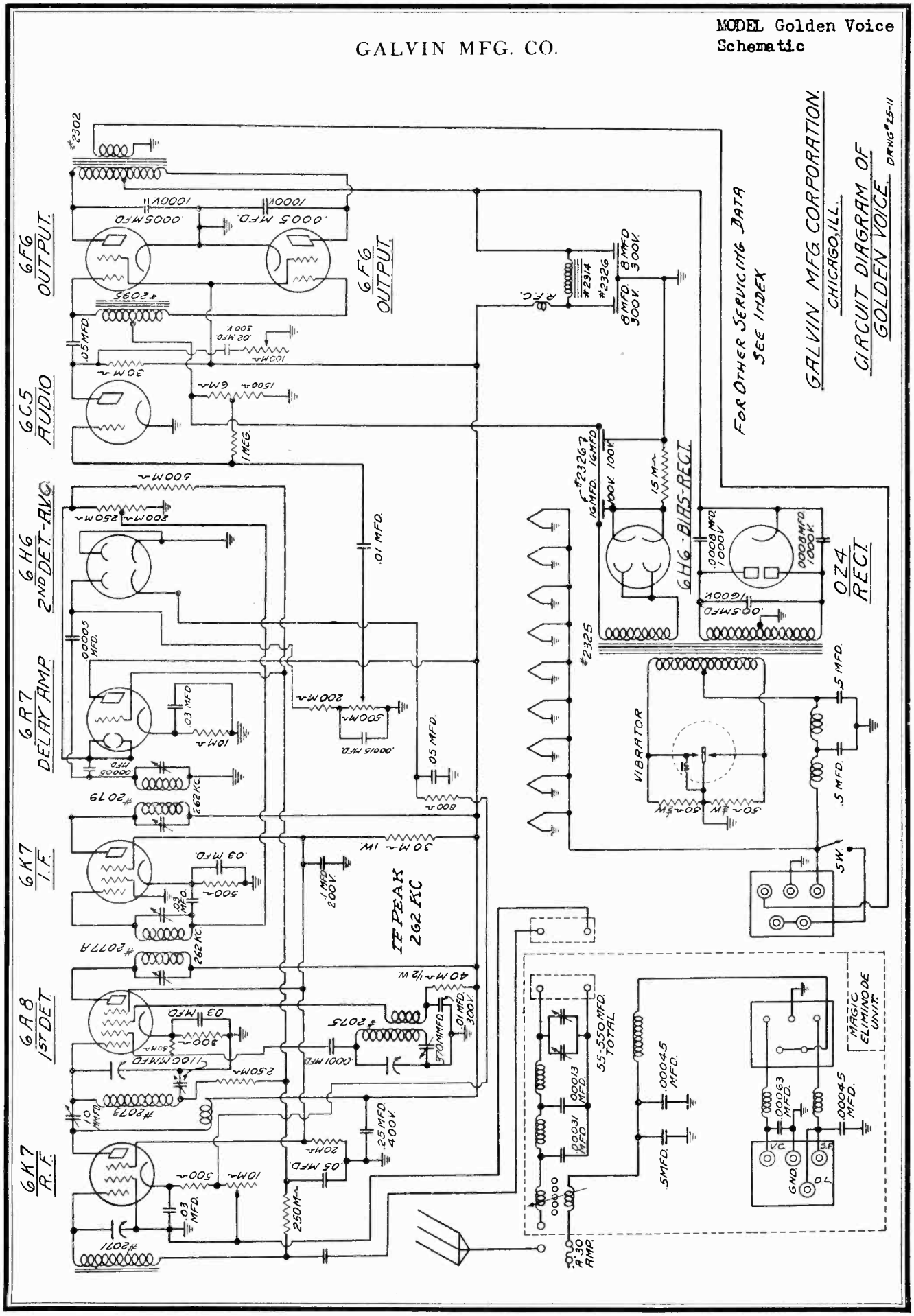
REG. U.S. PAT. OFF.



JOHN F. RIDER

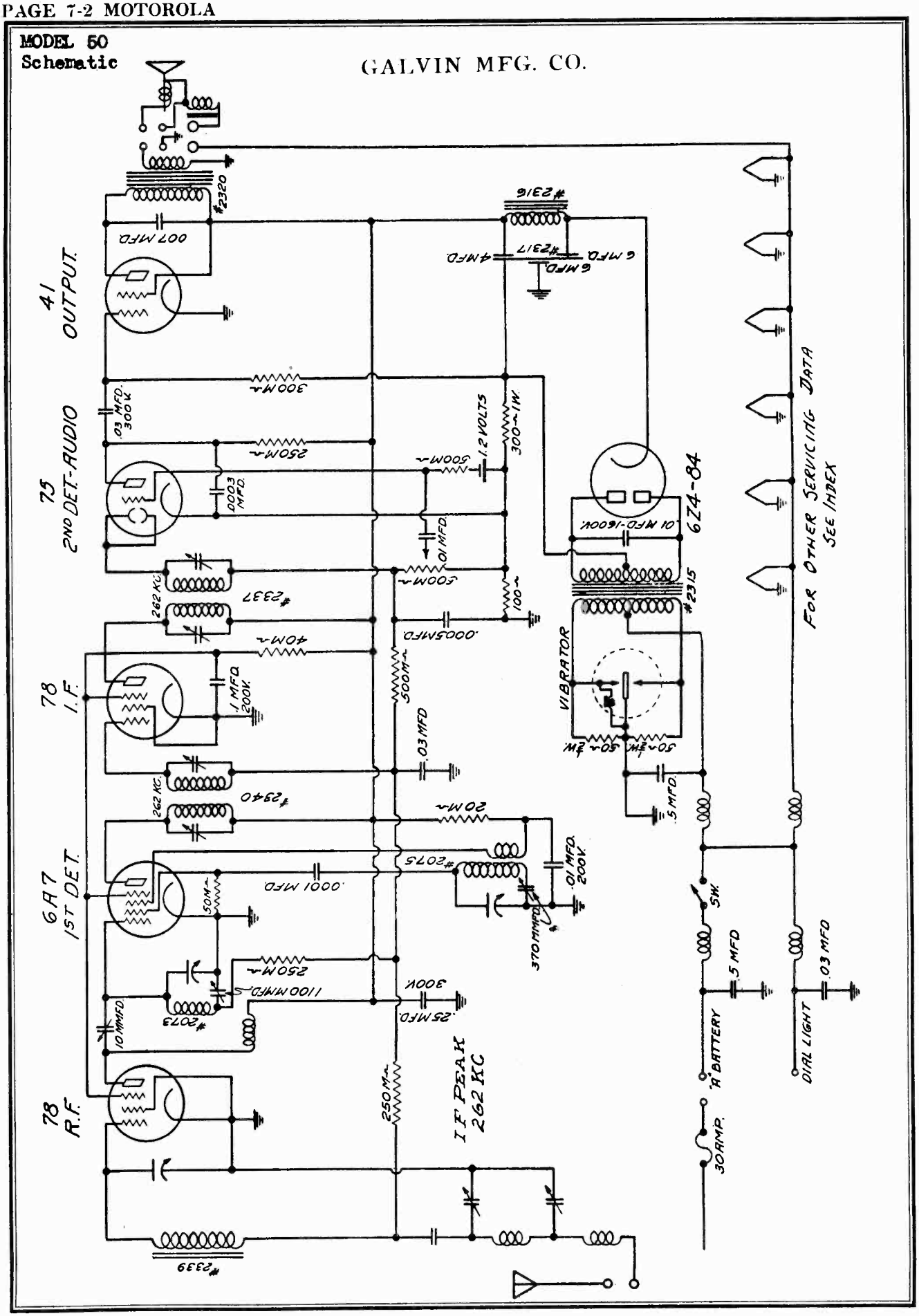
MODEL Golden Voice
Schematic

GALVIN MFG. CO.



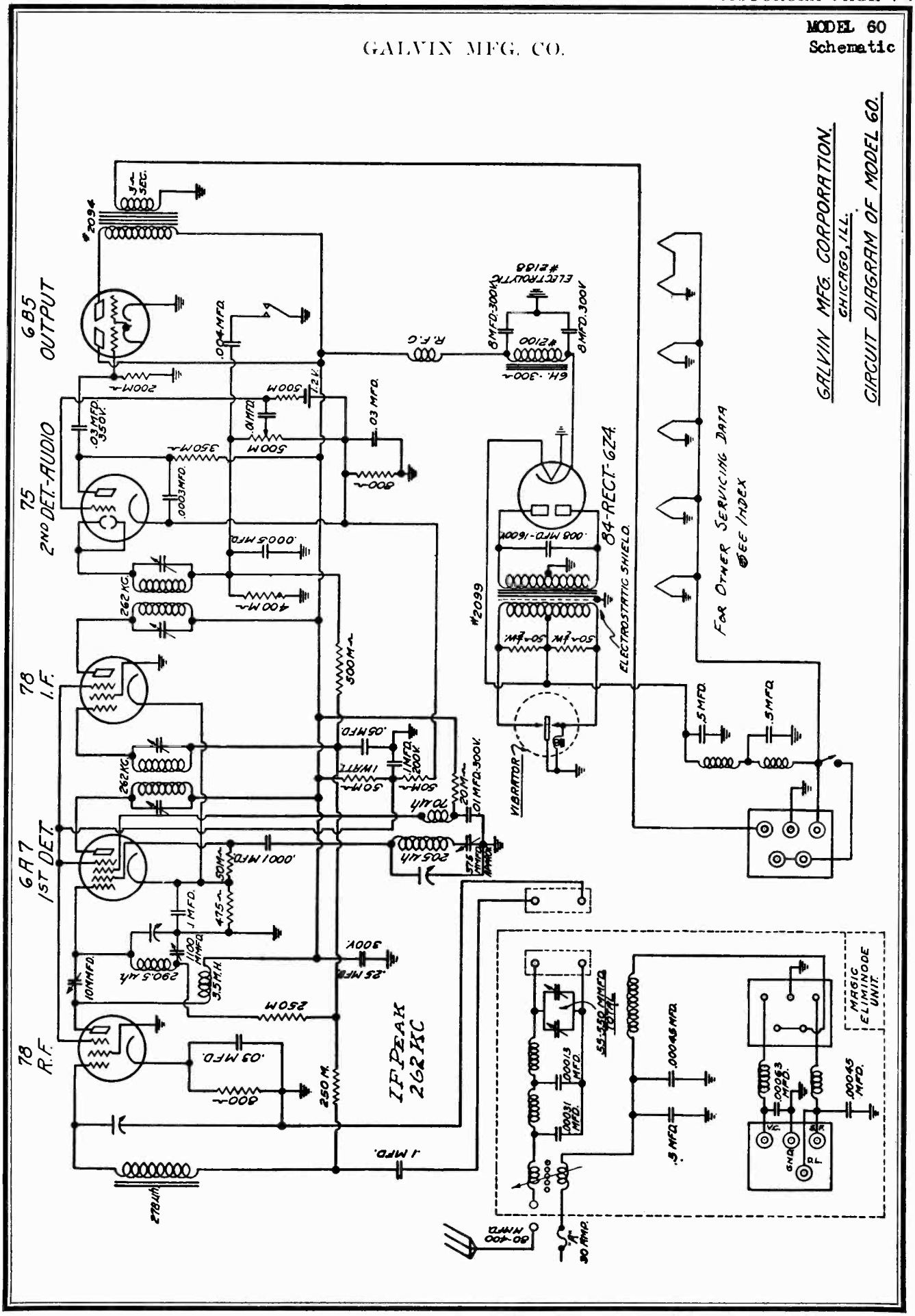
MODEL 50
Schematic

GALVIN MFG. CO.



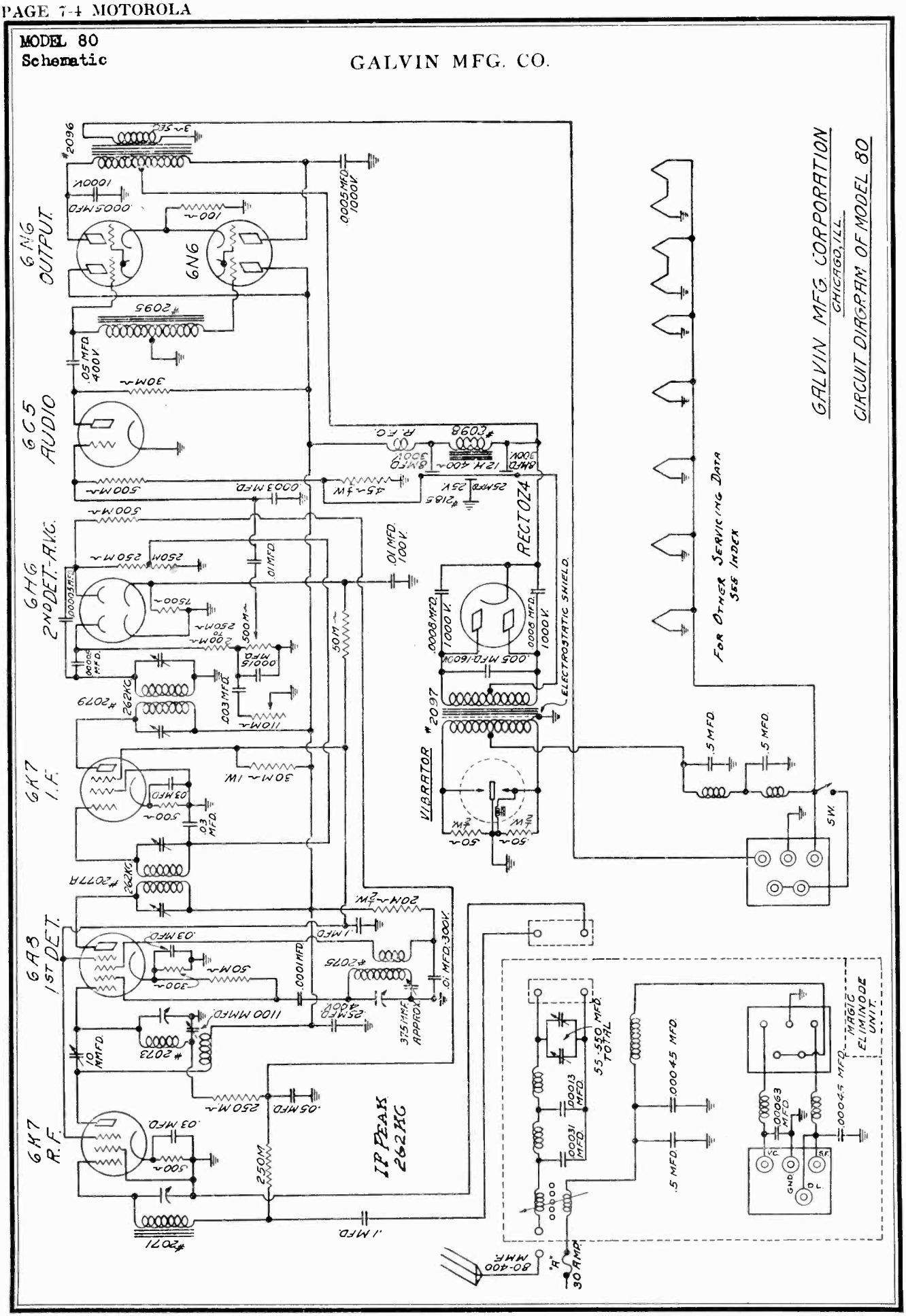
GALVIN MFG. CO.

MODEL 60
Schematic



MODEL 80
Schematic

GALVIN MFG. CO.



MODELS 50, 60, 80, Golden Voice Alignment, Sensitivity Magic Eliminode Notes Service Data

A DISCUSSION OF THE FUNCTION AND APPLICATION OF THE MAGIC ELIMINODE

The Magic Eliminode unit contains elements to perform the function of elimination of ignition interference introduced through supply leads and the antenna system. The interference introduced through the speaker leads and dial light lead is filtered by conventional low-pass filter chokes No. 3 and No. 4, condensers No. 17 and No. 18. Since the "A" lead No. 8 supplies the energy for balancing, this function is performed first, then the energy prevented from passing on to the receiver by another low-pass filter choke No. 1, condensers No. 16 and No. 19.

The "A" lead balancer consists of a pair of mutually coupled inductance coils No. 9 and No. 14, with an interposed electrostatic shield No. 10, and means for varying the coupling between these coils. This coupling variation is provided by varying the size of the aperture between these coils by a movable shutter No. 12, driven by screw No. 13. This provides a smoothly adjustable and constant coupling, permitting the coils to remain fixed and preventing the possibility of phase distortion by keeping their position constant and parallel. A filter circuit, chokes No. 5 and No. 6 and condenser No. 7, is used in conjunction with the balancer to provide means for removing odd phase components of ignition interference and sometimes completely removing interference of low intensity.

Since the balancer derives its energy from the "A" system, it follows that the "A" lead supplied with the set CANNOT be by-passed at the point of its connection to the automobile wiring system. If that is done, little or no balancing energy will be available in the balancing unit. It is of utmost importance that the receiver be in perfect tracking condition and the antenna stage trimmed at 600 K.C. after being connected to the car antenna. If this is not done, the balance which is obtained at one point in the broadcast band will not hold at another point in the band.

INSTALLATION OF MODELS CONTAINING THE MAGIC ELIMINODE

In the 1936 Motorolas the necessity for proper grounding between the receiver housing, jiffy bracket and bolts to the car body is just as important as it was in any previous Motorola model and its installation. The antenna lead-in is of such construction that free radiation from the car system will not penetrate its shield. However, if the antenna end of the shield is not connected to the body in the proper manner, the standing wave on the shield, due to this poor connection will be introduced into the antenna lead and seriously disturb the balancing condition, that is, perfection of balance and its consistency across the band. There are several supply leads and control cables entering the right end of the receiver. The connection between these control cable and the housing MUST be good. The filtering of the supply leads entering the sets is taken care of in the eliminode unit. Since the "A" lead, however, carries several amperes of "A" current modulated by the auto ignition system, this lead has a very high intensity of ignition field around it. Consequently, if it is placed close to the antenna trimmers or louvres in the housing, the energy radiated by it can be intercepted by the grid of the first tube or its associated receiver circuits. In view of this fact, it is very desirable to dress the "A" lead in back of or along the top rear edge of the receiver, but above all, away from the antenna trimmer openings.

There are several points on the car wiring circuit to which the "A" lead of the set can be connected. Since are depending upon the "A" circuit for balancing energy, the "A" lead must be connected to some point on th. system having a relatively high ignition potential. This point is usually at or near the ammeter or ignition switch Connecting it to the starter cable, which is practically the battery itself, will usually result in insufficient balancing energy.

ELIMINATION OF IGNITION INTERFERENCE WITH THE MAGIC ELIMINODE

There are several sources of interference encountered in auto radio receivers, such as interference created by the generator, gasoline gauge, oil pressure gauge, and such devices. This is ordinarily removed by a by-pass condenser. The ignition system itself radiates to the antenna from various wiring elements or metallic members. These can be divided into four general classifications.

(1) Radiation from the ignition secondary system, that is, spark plugs and leads thereto.
(2) Radiation from the ignition primary system including all of the leads connected to it.
(3) Radiation from metallic members or leads connected to distributor breaking points.
(4) Radiation from free metal members.

The first source of interference, is encountered in earlier makes of cars, where the effective shielding of the hood, bulkhead and other metal surrounding the spark plug leads is poorly connected to the car frame, permitted radiation from these leads to reach the antenna itself.

In the later type of car construction where welding of component parts is employed and a good connection between hood and body is provided either by the car manufacturer or the installer, this type of interference is very low at negligible.

The second source of interference, namely that radiated from the "A" system either to the roof antenna or to the under-car plate is still a very serious and sizeable interference. This interference is regular in character; in other words, of constant intensity for any given motor speed and readily balanceable by the balancer unit, provided that in the case of the under-car installation the antenna plate is on the correct side of the car. This can be determined by observing whether upon opening the shutter, No. 12, from an entirely closed position, the interference decreases or increases. If the interference continues to increase as the shutter is opened the antenna plate must be mounted under the opposite running board. If this additive condition occurs on a roof antenna, the balancer itself must be reversed.

The third type of interference usually encountered on cars having a relatively high resistance path between the ground side of the ignition primary and the breaker points is of an intermittent, irregular character and emanates from breaker point disturbances. This breaker point disturbance may be either a poor condition of the points themselves, or a poor adjustment of same, or the wrong time constant of the secondary circuit. This time constant is sometimes disrupted to such an extent by a distributor suppressor that serious flashing at the points occurs, resulting in breaker point disturbance.

Ordinarily, this interference is not of the same phase or wave shape as the major intensity to be balanced out. Therefore, a breaker point filter should be employed, unless some other effective means can be used, such as improving the point condenser itself, without disturbing the "A" system from the balancing standpoint. With this type of interference removed by a filter, the major intensity can be balanced out in the regular manner.

Any metal member standing free from the body of the car for an appreciable distance adjacent to or in a position to radiate to the antenna system, will sometimes contribute great intensity. Such members are exhaust pipes, torque tubes, gear shift levers, poorly grounded instrument panels, or other metal members of the car in poor connection with the frame. If the connection between one of these radiating members is of high but constant resistance and can be balanced, then no matter how high the intensity, the balance will remain constant. If, however, the resistance of the connection is variable with the motion of the car or weather conditions, and since any change in its connection will change the condition of the balance, this connection must be made permanent. In the case of the freely floating exhaust pipe where the intensity received is exceedingly high, this member should be bonded to the frame through a good, low resistance and non-inductive connection. This will reduce the intensity to a reasonable degree and once balance is obtained, it will remain throughout the life of the installation.

The point in the band at which the eliminode is balanced should be ordinarily at the point of greatest interference, since at this point any error in balancing will be very apparent. A great number of roof installations require the use of a dome-light filter.

The improved Motorola dome-light filter will absolutely eliminate transmission of interference via the dome-lite wire to the antenna. If, after balance has been obtained, it is observed that when tuning to say, the low frequency end of the band, a small amount of interference still remains, observe whether turning on or off the dome-light affects this interference. If so, the installation of the dome-light filter is incorrect in that a poor ground has been made or its location in the dome-light circuit is incorrect.

If this condition occurs relocate the filter to secure a better ground connection to the car body.

ALIGNMENT PROCEDURE

Remove the receiver from its housing and connect the speaker and bot "A" lead into the receptacle at the rear of the chassis, as shown in Fig. (1). Connect an 1100 mmf. dummy antenna across the two antenna receptacles (a) (b) Fig. 1 to replace the antenna pads located in the "MAGIC ELIMINODE UNIT."

Use an accurate, well shielded signal generator, such as Monarch Model 12 Generator, with a 200 mmf. condenser in series with the generator feeder at all times, and a good quality sensitive output meter.

I. F. ALIGNMENT AT 262 K.C. — ALL MODELS

Connect the output of the generator to the grid of the 1st I.F. tube. Turn the volume control of the receiver to maximum position and thereafter use the attenuator control of the signal generator to secure a readable voltage on the output meter connected across the voice coil.

By keeping the generator output as low as possible by means of its attenuator instead of by means of the volume control on the set, the effect of diode rectification and the application of A.V.C. voltage is very much minimized and a much better peak can be noted.

Now adjust the trimmer screws on the DIODE FEEDER for maximum reading of the output meter.

Having aligned the diode feeder, move the generator output to the grid of the first detector-mixer tube and adjust the trimmer of the 1st I.F. TRANSFORMER for maximum output meter reading.

ALIGNMENT PROCEDURE OF OSCILLATOR, R.F. AND ANTENNA STAGES

The aligning of the Oscillator, R.F. and Antenna stages in the 1936 Motorola is somewhat different than in previous models; therefore, extreme care must be used or serious loss of gain will result. Because misalignment will also decrease the effective coupling and the transfer ratio of one stage to another.

The pivot around which the proper alignment of the entire R.F. system revolves is the semi-fixed condenser (No. 1 Fig. 2) located at the bottom of the R.F. section of the variable condenser gang (end opposite the gear). This has been adjusted at the factory to exactly 1100 mmf.

It has purposely been placed in a position making it difficult to get at and should under no condition be touched unless you are absolutely sure that it has previously been tampered with and unless you have the proper equipment for adjusting it. To adjust it you will find it necessary to loosen the entire variable condenser mounting and rock the variable condenser forward. Then disconnect the leads to the Pivor condenser and set it with an accurate capacity bridge to exactly 1100 mmf. Reconnect the assembly and proceed with alignment.

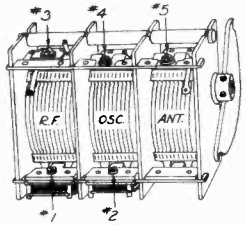


Fig. 2

Adjust the signal generator to 535 K.C. and feed its output into the grid of the R.F. tube. Rotate the variable condenser to the closed positions and adjust the pad condenser (No. 2 Fig. 2) (located at the bottom of renter section of tuning condenser) for maximum output.

Set the generator to 1600 K.C. and adjust the oscillator trimmer on the top of the center section of the variable condenser (No. 4 Fig. 2) for maximum output.

Next set the generator to 600 K.C. and rotate the variable condensers until the signal is heard. Now adjust the 600 K.C. pad located at bottom of center section of tuning condenser (No. 2 Fig. 2) for maximum output.

While adjusting rock the variable condensers back and forth to properly synchronize the R.F. and oscillator tuning condensers at this frequency.

Next set the generator frequency to 1400 K.C. and adjust trimmer (No. 3 Fig. 2) on the end section of tuning condenser for maximum reading of output meter. At this time it is well to check several points between 1400 K.C. and 600 K.C. and if necessary bend the end plates of the oscillator section of the tuning condenser slightly to secure perfect tracking across the frequency range.

Next couple the 1400 K.C. generator signal through the 1100 mmf. dummy antenna plugged into the antenna receptacle (a, b Fig. 1) and adjust the antenna trimmer condenser (No. 5, Fig. 2) for maximum reading of output meter.

This completes the alignment and no changes are necessary after placing chassis in housing.

Below is a table showing the input signal in microvolts required for each stage to secure 1 watt output at the voice coil of the receiver.

This will provide an easy method of checking the gain of each successive stage while aligning, and will quickly isolate any stage that falls below the normal average gain.

These readings are correct when using a 200 mmf. condenser as a dummy antenna in series with the signal generator feeder. The antenna stage reading will vary considerably with different values of dummy antenna; therefore, when using more than 200 mmf. the microvolt input required will be less and when using less than 200 mmf. the microvolt input required will be more.

GOLDEN VOICE

Average Microvolt Input	Generator Feeder Connected to Grid of	Generator Set at	Output Meter Across Voice Coil
50,000 to 60,000	6-K-7	262KC	Note—Voice coil resistance is 8 ohms — 2.82 volts AC equals 1 watt output.
900 to 1,800	6-A-8	262KC	
900 to 1,800	6-A-8*	600KC	
25 to 50	6-K-7	600KC	
1 to 2	Ant.	600KC	

MODEL 80

50,000 to 60,000	6-K-7	262KC	Voice coil resistance is 3 ohms—1.73 volts equals 1 watt output.
1,200 to 2,400	6-A-8	262KC	
1,200 to 2,400	6-A-8*	600KC	
30 to 60	6-K-7	600KC	
1 to 3	Ant.	600KC	

ADDITIONAL SERVICE NOTES

ADJUSTING PANEL TYPE CONTROL

The M-33 panel type control head may be adjusted by rotating the dial scale to the frequency desired for setting, for example 70 (700 K.C.), then insert a small screw driver through the hole at the bottom of the control head and push upward. This throws the film drum out of mesh with the idler gear. While holding the film drum in this position turn in the station desired, for example (WLW 700 K.C.), then allow the film drum to re-mesh with the idler gear.

BALANCING SETS TO HIGH CAPACITY AERIALS

The antenna systems in all models are adjusted to an antenna capacity range from 50 MMF to 375 MMF. However, should you desire to increase this range for extremely large aerials up to 700 MMF it may be done on all models, except No. 50, by removing the chassis from the housing and turning to the left, the flat head brass screw located in the lower center of the front face of the Eliminode casting. About two turns will be sufficient. Replace chassis and readjust antenna trimmer screws. If the antenna capacity is greater than 700 MMF it will be necessary to use the antenna series condenser, Part No. M94.

REVERSING PHASE IN BALANCING SYSTEM OF MAGIC ELIMINODE

In rare cases in cars having roof aerials it may be found that when operating the balancer the interference is additive and balance cannot be obtained. When this occurs it may be corrected by removing the cover from the Magic Eliminode and locating coil No. 9, Page 1. Pull this coil upward and revolve it 180° around the two ears as an axis and so that the two contacts face the Electrostatic shield. Be sure to replace ALL screws in Eliminode cover.

CHASSIS PICKUP

When installing Models No. 60, No. 80 and Golden Voice in the motor compartment of the car, a preliminary test for chassis pickup should be made before attempting to balance out the antenna interference.

When making this test it is necessary to use a well shielded dummy antenna plugged into the set in place of the regular antenna lead-in. The dummy antenna can be made by using a standard Motorola antenna series condenser, Part No. M-94, and short circuiting the inside connection to the shell.

Balance the antenna trimmer very carefully to this dummy so that the set is at maximum sensitivity, and then run the car motor. Should chassis pickup occur it can be isolated to the end of the set from which the flexible shafts and connections protrude.

Clean the paint around the flexible shaft bushings so that they ground perfectly to the set housing.

Keep the "A" lead away from the antenna trimmer screw openings.

Clean the cover wipers on the set housing, and if necessary, replace the small snap-in plug in the left end of the set with an 8/32 self-tapping screw so as to secure a better ground of the cover to the rear half of the set housing.

Proceed with the Eliminode balancing only after all trace of chassis pickup is eliminated.

1100 MMF DUMMY ANTENNA

This may be made from Motorola Part No. 1439 pad condenser connected across a two-way plug Motorola Part No. 2036, and adjusted to 1100 MMF. Use the M-34 antenna capacity bridge to adjust to the correct capacity.

(NOTE):—Do not confuse this with the 1100MMF Pivot Condenser (No. 1 Fig. 2).

POWER SUPPLY OF GOLDEN VOICE

Reference to the Golden Voice circuit diagram will show that a separate bias rectifier is used. This is a new departure in auto radio construction and accounts for the high efficiency of this receiver; however, when replacing the OZ-4 rectifier be sure to use one requiring only 12 to 15 milliamperes ionization current. Otherwise the power output of the receiver will drop when the set is in operation and the switch is turned off and immediately turned on again.

BIAS CELLS

In Models No. 50 and No. 60 the bias is supplied to the grid of the 75 tube by a 1.2 volt bias cell. This cell has an average life of two to three years; therefore, replacement is seldom necessary. Check it by replacement only, as a true voltage reading cannot be secured with an ordinary voltmeter.

VIBRATOR REPLACEMENTS

When replacing the vibrator in Models 80 and Golden Voice use only Mallory No. 94 or Radiart No. 5310. When replacing the vibrator in Models No. 50 and No. 60 use Radiart No. 5300 or Utah No. 18914.

SERVICE CABLES

Service extension cables for bench servicing of Models No. 60, No. 80 and Golden Voice may be secured from your Motorola Distributor at $1.00 net.

MODEL 60

20,000 to 40,000	78	262KC	Voice coil resistance is 3 ohms—1.73 volts equals 1 watt output.
800 to 2,400	6-A-7	262KC	
800 to 2,400	6-A-7*	600KC	
20 to 60	78	600KC	
1 to 3	Ant.	600KC	

MODEL 50

25,000 to 50,000	78	262KC	Voice coil resistance is 3.5 ohms—1.87 volts equals 1 watt output.
1,000 to 4,000	6-A-7	262KC	
1,000 to 4,000	6-A-7*	600KC	
40 to 160	78	600KC	
2 to 6	Ant.	600KC	

*Microvolt input required may be 10-20% more at 600KC than at 262KC. This is due to normal conversion loss in the translator tube. If greater, replace translator tube.

MODELS 50,60,80, Golden Voice Changes,Chassis

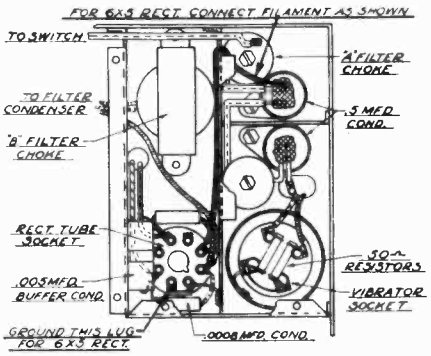
GALVIN MFG. CO.

We have been advised by the manufacturer that intermittent operation of their Motorola Golden Voice models, is due to low battery voltage delivered to the set from the car's battery. Check all connections between the car battery and the radio set to avoid undue voltage drop in the car wiring, as the OZ-4 rectifier tube will fail to start and fail to operate on a battery voltage of less than 5½ volts.

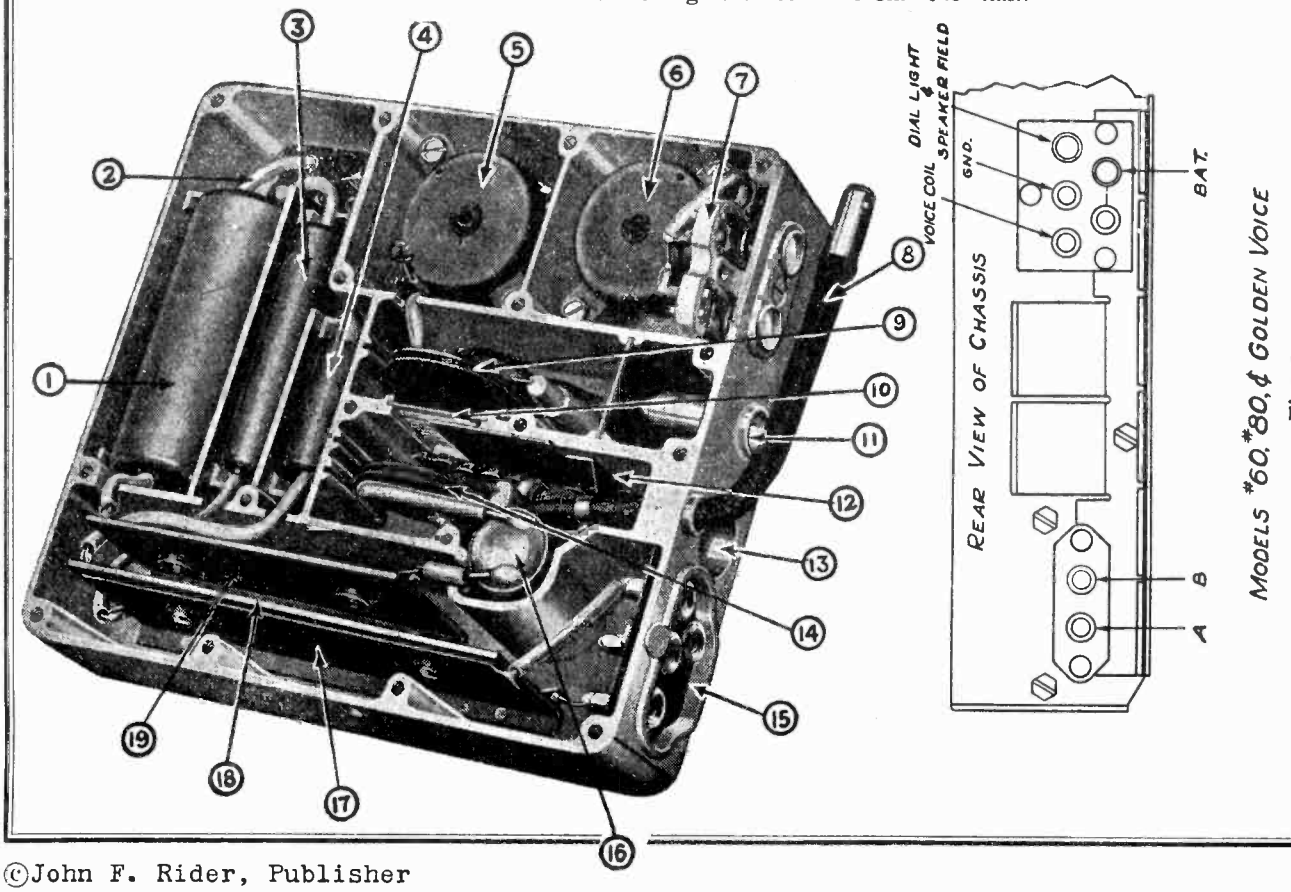
The OZ-4 tube requires 15 milliamperes or more of drain to produce ionization and proper rectification in this tube, and on battery voltages of less than 5½ volts the plate current drain of the receiver is insufficient to provide the 15 milliamperes starting current. Should the car wiring and the condition of the car battery indicate that at times the voltage may fall below 5½ volts, replace the OZ-4 rectifier tube with a 6X5 metal filament type rectifier.

With the exception of a few Golden Voice sets the filament contacts of the rectifier socket have been wired at the factory and the 6X5 rectifier may be plugged in the socket in place of the OZ-4. This will completely eliminate the difficulty due to low battery voltage.

On those Golden Voice sets not having the filament contacts of the rectifier socket wired, this wiring can be inserted by inverting the chassis and removing the cover from the hash compartment and connecting the filament contacts of the rectifier socket, as shown in the accompanying sketch. One contact to ground as indicated by the heavy arrow at the bottom of the socket and the other contact to the .5 mfd. condenser as indicated by heavy arrow at the top of the sketch. When replacing cover be sure that all screws are tight.



Connections when using a 6X5 in Motorola Golden Voice set

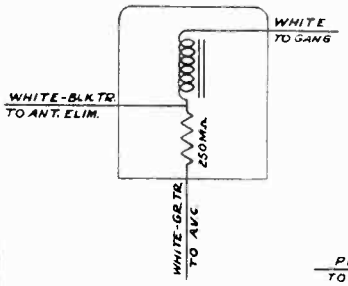


MODELS *60, *80, & GOLDEN VOICE

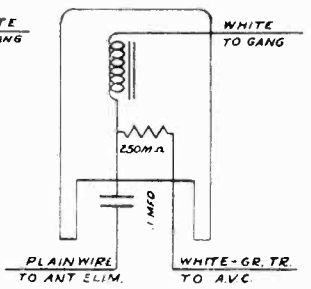
Fig. 1

GALVIN MFG. CO.

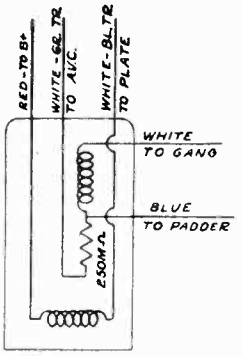
MODELS 50,60,80
Golden Voice
Coil & Transformer
Connections



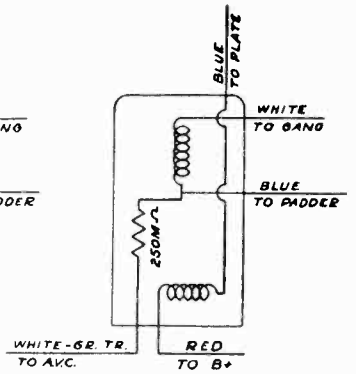
MODEL *50 ANT. COIL



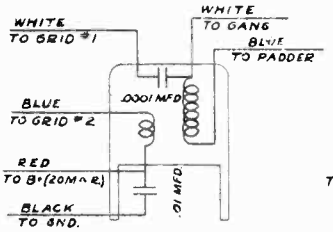
MODELS *60,*80¢ GOLDEN VOICE ANTENNA COIL



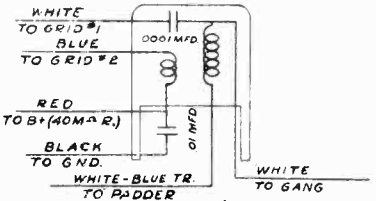
MODEL *50 RF COIL



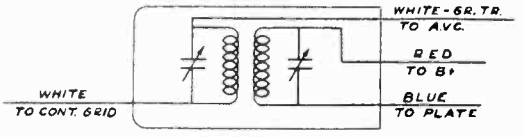
MODELS *60,*80¢ GOLDEN VOICE R.F. COIL



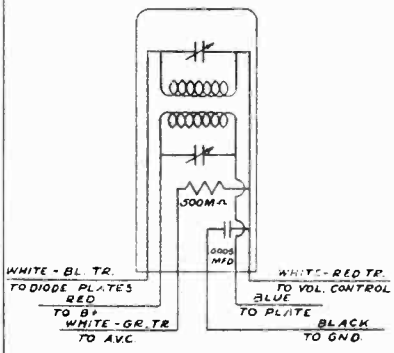
MODEL *50 OSC. COIL



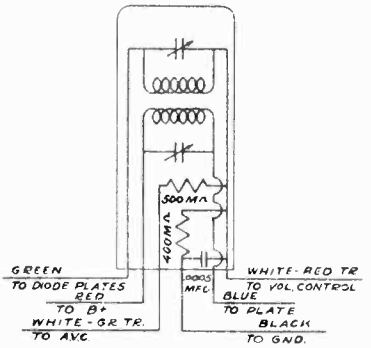
MODELS *60,*80¢ GOLDEN VOICE OSCILLATOR COIL



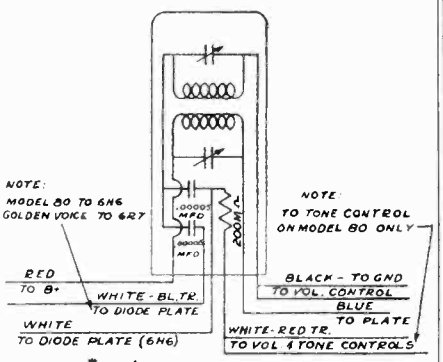
MODELS *50,*60,*80¢ GOLDEN VOICE I.F. COIL



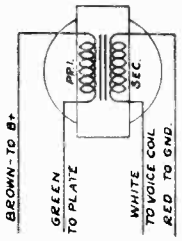
MODEL *50 DIODE COIL

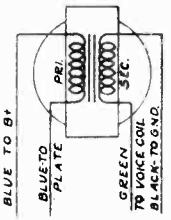


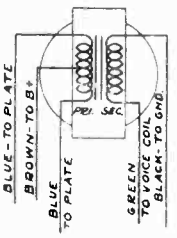
MODEL *60 DIODE COIL



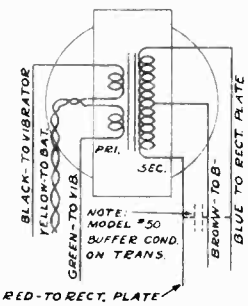
MODELS *80¢ GOLDEN VOICE DIODE COIL

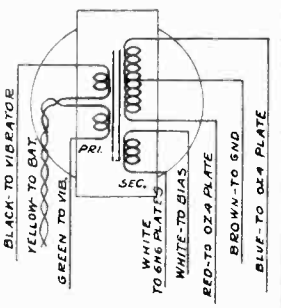






MODEL *50 MODEL *60 MODELS *80¢ G.V.
OUTPUT TRANSFORMERS

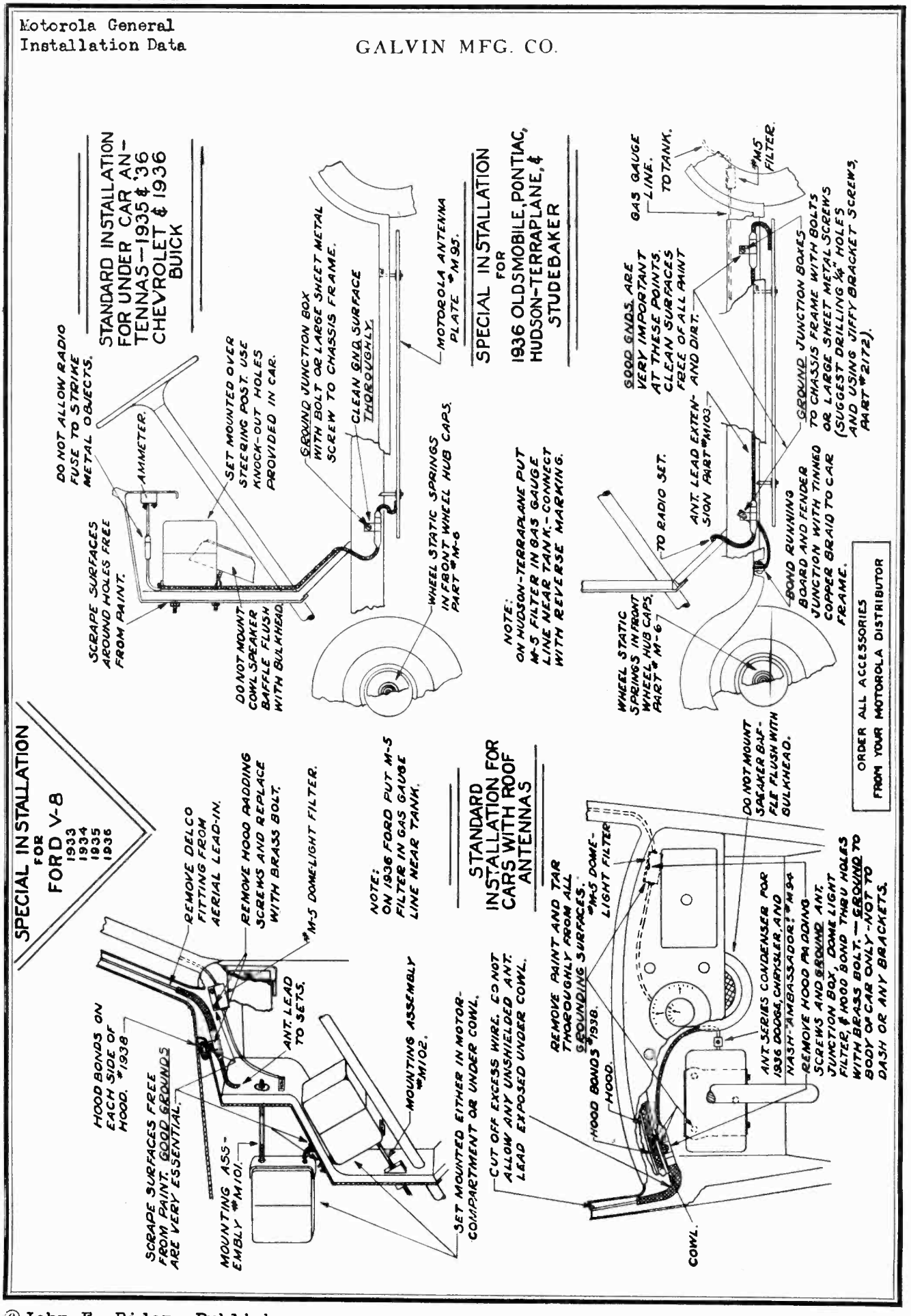




MODELS *50 *60 *80 GOLDEN VOICE
POWER TRANSFORMERS

Motorola General Installation Data

GALVIN MFG. CO.



GALVIN MFG. CO.

MODELS Golden Voice, 5T71, 6T12, 7T38, 7T47A, S-10
Parts Lists

Special Accessory Group

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Part No.	Description	List Price
	Control Heads	
M-33-A	Film type control head with shafts	$7.00
M-68	Cadillac-LaSalle control head and shafts, plate and knobs	8.00
M-66	Oldsmobile control head and shafts with knobs	8.00
M-99	Airplane type control head and shafts	7.00
M-100	Small airplane type control head and shafts	7.00
M-95	Running board antenna plate	2.95
	Medallion Plates and Knobs	
M-14	1934 DeSoto Medallion plate and knobs	$1.00
M-15	1934 Ford Medallion plate and knobs	1.00
M-16	1934 Walnut Medallion plate and knobs	1.00
M-17	1934 Plymouth Medallion plate and knobs	1.00
M-20	1934 Packard Medallion plate and knobs	1.00
M-21	Clamp mounting complete with knobs	1.00
M-29	1935 Ford Stand. Medallion plate and knobs	1.00
M-30	1935 Ford DeLuxe Medallion plate and knobs	1.00
M-31	1935 Plymouth (early), Dodge Medallion plate and knobs	1.00
M-31A	1935 Plymouth (late) Medallion plate and knobs	1.00
M-31B	1935 DeSoto Airstream Medallion plate and knobs	1.00
M-32	1935 Chrysler Airstream Medallion plate and knobs	1.00
M-34	1935 Chevrolet Medallion plate and kgobs	1.00
M-35	1935 Pontiac Medallion plate and knobs	1.00
M-36	1935 Oldsmobile Medallion plate and knobs	1.00
M-38	1935 Studebaker Dictator Medallion plate and knobs	1.00
M-38A	1935 Studebaker President Medallion plate and knobs	1.00
M-39	1935 DeSoto Airflow Medallion plate and knobs	1.00
M-40	1934 Chrysler Airflow Medallion plate and knobs	1.00
M-40A	1935 Chrysler Airflow Medallion plate and knobs	1.00
M-46	1935 Packard "120" Medallion plate and knobs	1.00
M-57	1934-'35 Hudson-Terraplane Medallion plate and knobs	1.00
M-58	1936 Buick Medallion plate and knobs	1.00
M-59	1936 Plymouth Medallion plate and knobs	1.00
M-60	1936 Dodge Medallion plate and knobs	1.00
M-61	1936 Ford DeLuxe Medallion plate and knobs	1.00
M-62	1936 Ford Standard Medallion plate and knobs	1.00
M-63	1936 Packard "120" Medallion plate and knobs	1.00
M-64	1936 Studebaker Dictator Medallion plate and knobs	1.00
M-65	1936 Chevrolet Medallion plate and knobs	1.00
M-67	1936 Pontiac Medallion plate and knobs	1.00
M-67A	1936 Pontiac DeLuxe Medallion plate and knobs	1.00
M-69	1936 Hudson Medallion plate and knobs	1.00
M-70	1936 Terraplane Medallion plate and knobs	1.00
M-71	1936 Graham Supercharger and Cavalier Medallion plate and knobs	1.00
M-72	1936 Graham Crusader Medallion plate and knobs	1.00
M-73	1936 Reo and Hupmobile Medallion plate and knobs	1.00
M-78A	1936 Chrysler Airflow Medallion plate and knobs	1.00
M-78E	1936 Chrysler Airstream "8" Medallion plate and knobs	1.00
M-78S	1936 Chrysler Airstream "6" Medallion plate and knobs	1.00
M-82	1936 DeSoto Airflow and Custom Medallion plate and knobs	1.00
M-83	1936 DeSoto DeLuxe Medallion plate and knobs	1.00
M-84	1936 Nash "400" Medallion plate and knobs	1.00
M-85	1936 Lafayette Medallion plate and knobs	1.00
M-86	1936 Studebaker President Medallion plate and knobs	1.00
M-89	Under-rim dash mounting and knobs (slim type)	1.00
M-90	Steering post control assembly and knobs	1.00
	Standard Speakers	
2322	5 in. speaker only	$3.25
M-96	6 in. under-cowl speaker complete	6.50
2156	6 in. speaker only	4.25
M-97	8 in. under-cowl speaker complete	9.50
2158	8 in. speaker only	6.00
M-98	10 in. under-cowl speaker complete	12.50
2329	10 in. speaker only	7.50
	Overhead Speakers	
1844A	1935 Ford ear-level speaker cpt.	$6.50
M-75	1936 General Motors type ear-level speaker complete	6.50
M-80	1936 Ford type ear-level speaker cpt.	6.50
M-87	1936 Nash-Lafayette type ear-level speaker complete	6.50
M-88	1936 Graham, 1935-'36 Studebaker, Reo (all models) ear-level speaker cpt.	6.50
	Dual Speaker Combinations	
M-92	6 in under-cowl speaker with General Motors type ear-level speaker—or—back-seat speaker	$13.00
M-93	8 in. under-cowl speaker with General Motors type ear-level speaker—or—back-seat speaker	16.00
	Miscellaneous Items	
M-1	Generator condensers	$0.40
	In lots of 100	.35
M-2	Screw-in type distributor suppressors	.50
	In lots of 100	.25
M-3	Plug-in type distributor suppressors	.50
	In lots of 100	.25
M-4	Spark plug suppressors	.30
	In lots of 100	.25
M-5	Dome light filters	.60
	In lots of 100	.50
M-6	Wheel Static Eliminators	.10
M-7	Service Tuning Shafts	.22
M-8	Extension service cables (specify model No.)	(Net) 1.00
M-24	Antenna capacity bridge	(Net) 4.95
M-26	Ammeter condenser	.50
M-27	Floor board screen	.20
M-28	Elastic stop nuts	.05
MF-17	1935 Ford engine compartment mounting	.85
M-42	Special shielded Ford ignition coil cond.	.50
M-44	Low loss lead-in for 1935 under-car aerial	1.25
M-52	Touch-up paint kit	.50
M-53	Wire brush	1.50
M-91	Antenna junction box (corner post)	.15
M-94	1936 Dodge series antenna condenser	.50
M-101	1936 Ford engine compartment mounting	1.00
M-102	1936 Ford under cowl mounting	.40
1938	1936 Ford hood bonding strip	.10
2423	Fuse insulator ("A" lead)	.per doz. .25

Model Golden Voice

Part No.	Description	List Price
	Chassis	
	Chassis only—less tubes	$45.00
2002	Volume control bracket	.10
2003	Volume control shaft support bracket	.10
2050	3-gang variable condenser	3.50
2051	Variable condenser mounting bracket	.15
2400	Shoulder screw (68TS)	.05
2401	Variable condenser drive gear (K-61A)	.25
2053	Variable coodenser adjustment cam	.05
2168	Volume control	1.00
2023	Volume control funnel	.05
2071	Antenna coil (complete in can)	1.60
2073	R. F. coil with plate choke (cpt. in can)	1.00
2075	Oscillator coil (complete in can)	1.00
2077-B	I. F. coil (complete in can)	1.25
2080	Diode coil (complete in can)	1.75
2407	Standard metal tube sockets (state type)	.15
2408	6N6 socket (special 8-7 prong)	.15
2034	2-way receptacle	.15
2035	5-way receptacle	.25
2038	Eliminode and chassis wiper	.20
1942	D/L mounting strip	.10
2409	Grid caps for metal tubes (per doz.)	.25
2410	.00005 mfd. type "O" condenser	.15
1039	.0001 mfd. type M. T. condenser	.15
2418	.0002 mfd. type M. T. condenser	.20
1042	.0005 mfd. 1000 V. condenser	.20
1400	.01 mfd. 100 V. T. T. condenser	.12
1403	.03 mfd. 120 V. condenser	.12
2251	.01 mfd. 300 V. condenser	.15
2252	.05 mfd. 400 V. condenser	.20
2254	.05 mfd. 25 V. condenser	.15
2256	.1 mfd. 200 V. condenser	.15
2264	.25 mfd. 200 V. condenser	.30
2261	.025 mfd. 100 V. condenser	.15
2275	.01 mfd. 100 V. condenser with 1 meg. resistor	.20
2276	.02 mfd. 800 V. condenser	.20
2277	.05 mfd. 120 V. condenser	.20
1777	Resistors (state value)	.15
2095	Input choke	1.25
2302	Output transformer	1.50
2167-A	Tone control	.50
2303	Sensitivity control	.50
2170	Tone control knob	.10
	"B" Power	
2020	Transformer can	$0.35
2021	Transformer can base	.10
2525	Power transformer	3.00
2030	Vibrator clamp	.10
2098	Filter choke (35 mills)	.70
2115	3 layer hash choke	.30
2116	3 layer hash choke	.30
1588	Power choke complete in shield	.35
2404	Vibrator	4.50
2326	Electrolytic condenser	2.50
2259	.5 mfd. 120 V. condenser	.40
2268	.005 mfd. 1600 V. condenser	.50
2411	.0008 mfd. 1000 V. M. W. condenser	.15
2033	Vibrator socket (4 prong)	.10
	O. Z. 4 Tube (Raytheon)	1.75
	Outer Housing	
2300	Medallion plate	$1.00
2308	Front cover	2.00
2309	Back cover	1.75
2419	Gold plug buttons (large)	.03
2420	Gold plug buttons (medium)	.03
1500	Small gold plug buttons (small)	.03
2018	Jiffy mounting bracket	.60
2019	Set mounting contact wiper	.10
2017	Set mounting studs	.05
2172	5/16-½ hex. head P. K. screws	.05
2171	5/16-18 hex. steel nuts (self locking)	.05
1995	Steel washers	.03
	Speaker	
	Speaker only—see page 1.	
2330	Housing only	$2.50
2331	Chrome bezel only	1.00
2332	Grill screen	.20
2333	Grill cloth	.25
2175	7 prong cable	.35
1300	Small pin prongs	.08
1301	Large pin prongs	.08
2155	Short speaker mounting stud	.20
1118	Long speaker mounting stud	.30
1797	2½ in. steel washers	.05
	⅛ in.—16 hex. head steel nuts (per doz.)	.25
2154	Spacer block (for mounting)	.10
2421	Cone and voice coil assembly	3.25
2422	Field coil	2.00
	Speaker replacement	5.00

NOTE: Due to the fact that speaker cones cannot be replaced by the service man in the field, it will be necessary to return all speakers to us for service. A charge will be made for parts and service according to the above rate (1799-1800).

Motorola Model 5T71

Part No.	Description	List Price
101	Control Head less shaft and cable	$6.00
102	BX-Flexible Shaft Complete	2.25
103	Walnut or Black Knobs	.10
104	Keys (No. 2178)—Each	.30
105	Dial Lights (No. 50)	.15
106	Lock Switch (No. 2174)	.75
107	Steering Post Clamps	.20
108	Volume Control (41-055)	1.00
109	Celluloid Dial	.25
110	Variable Condensers	3.50
111	Audio Choke (A-2016 or C-1013)	1.75
112	R. F. Coil	1.70
113	Antenna Coil	1.70
115	.01 Mfd. Tubular Condenser	.15
116	.05 Mfd. Tubular Condenser	.15
117	.003 Bakelite Condenser	.25
118	.00025 Mfd. Bakelite Condenser	.15
119	"A" Battery Cable	1.25
120	Speaker Cable	.75
121	"B" Battery Cable	.90
122	Antenna Cable	.75
123	Control Cable	1.10
124	Complete Cable Assembly	5.25
125	Resistors — State Value	.15
126	Speaker Housing	2.00
127	5X—1 Mfd. Condenser (No. 7063)	1.00
128	Condenser Gear (KS-4).	.50
129	8 Mfd. Electrolytic Condenser	.90
130	6 Way Receptacle or Plug	.25
131	Tube Sockets	.15
132	Pinion Housing (K-5-3)	.30
133	4 Ohm Flexible Wire Wound Resistor	.20
134	Antenna Plug or Receptacle	.10
	5T71 Speakers—Output Transformers—Speaker Cones	
135	00990-D-16 Jensen Speaker	$6.50
135-A	Z-1158 Output Transformer for above	1.65
136	1675-D-15 Jensen Speaker	6.60
136-A	M-1675-1 Output Transformer for above	1.65
137	1250A-D-16 Jensen Speaker	6.50
137-A	Z-1154 Output Transformer for above	2.10
138	8513 Utah Speaker	6.50
138-A	5237 Output Transformer for above	2.10
139	Cone and Voice Coil Assembly for Jensen Speaker 00990	2.25
140	Cone and Voice Coil Assembly for Jensen Speaker 1675	2.25
141	Cone and Voice Coil Assembly for Jensen Speaker 1250A	2.25
142	Cone and Voice Coil Assembly for Utah Speaker 8513	2.25
	Speaker Exchange Price	List 5.25

Motorola Model 6T12

Part No.	Description	List Price
201	Control Head less Shaft and Cable	$6.00
202	B. X. Flexible Shaft	2.25
203	Walnut or Black Knobs	.10
204	Keys (No. 2178) Each	.30
205	Dial Light	.15
206	Lock Switch	.75
207	Steering Post Clamp	.20
208	Volume Control (41-055)	1.00
209	Celluloid Dial (D-1)	.25
210	Control Terminal Board	.20
211	Audio Assembly (A-72-Y and C-1013)	4.00
212	R. F. Coils	1.70
213	Antenna Coil	1.70
214	Variable Condenser	3.50
215	6 Way Plug	.25
216	6 Way Socket	.25
217	Resistors — State Value	.15
218	Condenser Unit 5 x 1/10 Mfd. (No. 7063)	1.00
219	50 Mfd. Condenser	1.50
220	Tube Sockets	.15
221	R. F. Plate Choke	.50
222	.003 Mica Condenser	.25
223	.00025 Mica Condenser	.15
224	Condenser Gear (K-S-4)	.50
225	Acorn Cover Nuts	.05
226	Set Mtg. Bolts ¼"	.05
227	Pinion Housing	.30
228	Antenna Cable	.75
229	Control Cable	1.10
230	"A" Battery Cable	1.25
231	"B" Battery Cable	.90
232	Speaker Cable	.75
233	No. ¼ Amp. Fuses	.20
	6T12 Speakers—Output Transformers—Speaker Cones	
234	1430-D-14 Jensen Speaker	$6.50
234-A	M-1430-1 Output Transformer for above	2.55
235	1676-D-15 Jensen Speaker	6.50
235-A	M-1676-1 Output Transformer for above	2.10
236	1491-A-D-16 Jensen Speaker	6.50
236-A	Z-1155 Output Transformer for above	2.10
237	332-A-J-2 Jensen Speaker	5.50
237-A	Z-1157 Output Transformer for above	2.10
238	Cone and Voice Coil Assembly for Jensen Speaker 1430	2.25
239	Cone and Voice Coil Assembly for Jensen Speaker 1676	2.25
240	Cone and Voice Coil Assembly for Jensen Speaker 1491	2.25
241	Cone and Voice Coil Assembly for Jensen Speaker 332A	2.00
	Speaker Exchange Price	List 5.25

Motorola Model 7T38

Part No.	Description	List Price
301	Control Head Less Shafts	$6.00
302	BX-Flexible Shaft	2.25
303	Knobs (All Types)	.10
304	Keys (No. 2178) Each	.30
305	Dial Lights (No. 50)	.15
306	Lock and Switch (No. 2174)	.75
307	Steering Post Clamp	.20
308	Volume Control (No. 51-024)	1.00
309	Celluloid Dial (D-1)	.25
310	Dial Light Socket	.15
311	Variable Condenser	3.50
312	Untuned Transformer	1.00
313	R. F. Coils	1.70
314	Antenna Coil	1.70
315	Choke Coil—Lattice Wound (7T-38A Only)	.35
316	Push-Pull Transformer—Input (A-105-C)	3.00
317	A-105C and C-1092 Assem. (7T-38A Only)	6.00
318	.5 Mfd. Condenser (No. 1579)	.50
319	.05 Mfd. Condenser Spec. Can (No. 1382)	.40
320	.01 Mfd. Tubular Condenser	.15
321	.05 Mfd. Tubular Coodenser	.15
322	.015 Mfd. Tubular Condenser	.15
323	.003 Bakelite Condenser	.25
324	.04 Coupling Condenser	.25
325	50 Ohm Wirewound Resistor	.20
326	Resistors — State Value	.15
327	9 Prong Plug (Male) (J-9)	.50
328	9 Prong Socket (Female) (J-9)	.50
329	"A" Battery Cable (No. 953)	1.25
330	"B" Battery Cable (No. 952)	1.25
331	Speaker Cable (No. 651)	.75
332	Control Cable	1.10
333	Antenna Cable (No. 554)	.75
334	Complete Cable Assembly (No. 7T38)	5.75
335	Pinion Housing	.30
336	Tube Sockets	.15
337	2-Way Antenna Plug	.10
338	2-Way Receptacle	.10
339	R. F. Plate Choke	.50
	7T38 Speakers—Output Transformers—Speaker Cones	
340	1649-D-15 Jensen Speaker	$6.50
340-A	M-1649-1 Output Transformer for above	2.10
341	8507 Utah Speaker	6.50
341-A	5240 Output Transformer for above	2.10
342	8517 Utah Speaker	6.50
342-A	5240 Output Transformer for above	2.10
343	1225A-D-16 Jensen Speaker	6.50
343-A	Z-1153 Output Transformer for above	2.10
344	483A-D-15 Jensen Speaker	2.10
344-A	Z-1156 Output Transformer for above	2.10
345	1472A-D-16 Jensen Speaker	8.00
345A	M-2227-1 Output Transformer for above	2.10
346	Cone and Voice Coil Assembly for Jensen Speaker 1649	2.25
347	Cone and Voice Coil Assembly for Utah Speaker 8507	2.25
348	Cone and Voice Coil Assembly for Utah Speaker 8517	2.25
349	Cone and Voice Coil Assembly for Jensen Speaker 1225A	2.25
350	Cone and Voice Coil Assembly for Jensen Speaker 483A	2.25
351	Cone and Voice Coil Assembly for Jensen Speaker 1472A	2.25
	Speaker Replacement Price	List 5.25

Motorola Model 7T47A

Part No.	Description	List Price
401	Control Head	$6.00
402	BX-Flexible Shaft with Fibre Pinion	2.25
403	Knobs (All Types)	.10
404	Keys Each	.30
405	Dial Lights	.15
406	Dial Light Socket	.15
407	Lock & Switch (No. 2398)	.75
408	Control Head Clamp	.20
409	Volume Control (No. 290-B)	1.00
410	Celluloid Dial	.25
411	Variable Condenser (8-AB)	5.40
412	1st I. F. Transformer	2.00
413	Impedance Unit in Can (2nd I. F.)	2.00
414	R. F. Coils	1.00
415	Antenna Coil	.90
416	Choke Coil	.50
417	Oscillator Coil	1.00
418	20 Mfd. 50 Volt Elec Condenser (YB-30)	.75
419	.5 Mfd. Condenser in Can (No. 1379)	.50
420	.5—5—25 Mfd. Condenser in Can (No. 1486)	1.20
421	.25 Mfd. Condenser (No. 1471)	.40
422	.1 Mfd. Condenser in Can	.30
423	Muter Resistor Strip (1-D 50-350)	.35
424	Muter Resistor Strips (350-300-2D)	.40
425	55 Ohm C. T. Resistor	.20
426	Tube Socket	.15
427	Pinion Housing	.30
428	Transformer (No. 1681-B)	4.50
429	"A" Battery Cable (2 Wire)	1.00
430	"B" Battery Cable (3 Wire)	1.30
431	Speaker Cable	.90
432	Antenna Cable	.80
433	Control Cable (5 Wire)	1.10
434	Cable Assembly Cpt. with Cable Housing	7.50
435	9 Prong Plug (Male 1909-J)	.50
436	9 Prong Socket (Female 1809-J)	.50
437	Antenna Plug (No. 1902)	.10
438	Antenna Socket (No. 1802)	.10
439	10/24x2⅝" Set Bolts	.05
	7T47A Speakers—Output Transformers—Speaker Cones	
440	483-D-15 Jensen Speaker	$6.60
440-A	Z-1156 Output Transformer for above	2.10
441	2324-D-15 Stud Mounting Jensen Speaker	6.50
441-A	M-2324-1 Output Transformer for Above	2.10
442	Cone and Voice Coil Assembly for Jensen Speaker 483-A	2.25
443	Cone and Voice Coil Assembly for Jensen Speaker 2324-D-15	2.25
	Speaker Replacement Price	List 5.25

Motorola Models S-10 and Home Sets—1933

Part No.	Description	List Price
1150	3 Gang Variable Condenser (R-175-A)	3.00
1151	10 Mfd. 20 Volt Electrolytic Condenser	.50
1152	J-8 Volume Control 50M Ohm (R-2083)	1.10
1153	S-10 Volume Control 500M Ohm (R-1009)	1.00
1154	S-10 Sensitivity Control (R-1008)	.80
1155	S-10 and J-8 Tone Control (T-1029)	.60
1156	20 Ft. Remote Control Cable (R-107)	2.50
1157	Spec. Lgth. Remote Control Cable (Per Ft.)	.15
1158	R. F. Plate Choke (RC-115)	.75
1159	S-10 and J-8 Antenna Coil Complete (AD-109-10)	.75
1160	J-8 R. F. Coil Complete (AD-111)	.60
1161	S-10 R. F. Coil Complete (RR-111)	.60
1173	S-10 Electrolytic Condenser (R-8800)	2.00
1174	25 Mfd. S-10 Electrolytic Condenser (R-2520)	.75
1175	Fuse Block (F-2-B)	.15
1176	Bakelite Cap for Same (710)	.15
1177	1 Amp. Fuse (7AG)	.10
1178	Audio Transformer (0392-K)	2.50
1179	Power Transformer (2401)	4.50
1180	Filter Choke (1067-U)	2.10
1181	Filament Transformer (2399)	2.50
1182	12 Mfd. Electrolytic Cond. (No. 61180)	1.25
1183	Choke Coil for J-8 (No. 1725)	1.30
1184	Magnavox Speaker (R-2ADC)	9.00

MODELS M-33, M-33A, 34, Dual "6", Twin "8", 44, Super "6", 50, H-45, G-54, W-58, 55, 57

GALVIN MFG. CO.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Parts Lists

Motorola Models S-10 and Home Sets—1933 (Cont.)

1162	J-8 Oscillator Coil Complete (AD-112-22)	.75
1163	S-10 Oscillator Coil Complete (RO-112)	.80
1164	S-10 I. F. Coil Complete (RI-113)	1.50
1165	J-8 I. F. Coil Complete (AD-113)	1.50
1166	J-8 and S-10 Diode Coil Compl. (AD-114)	1.50
116"	Small Wood Knobs	.15
1168	Large Wood Knobs	.15
1169	Remote Control Cabinets J-8 or S-10	3.50
1170	Tunalites (R-1024)	2.50
1171	6/8 Volt Dial Lights (No. 40)	.12
1172	J-8 Electrolytic Condenser (R-21632)	3.00
1185	Spec. R-2ADC Magnavox Output Trans.	1.75
1186	Magnavox Cone and Voice Coil Assembly	2.00
1187	Rola K-7 Speaker (RK-720)	12.00
1188	Spec. T-9452 Rola Output Transformer	2.45
1189	Rola Cone and Voice Coil Assembly	3.25
1190	AC Cord and Plug	.40
1191	J-8 Amplifier Cabinet	15.00
1192	S-10 Amplifier Cabinet	18.00

NOTE: Escutcheon Plates, Dials and Drivers No Longer Available.

M-33

Part No.	Description	List Price
	1935 Film Type Control Head	
1681	Model 57 horizontal dial scale	$0.25
1662	Model 74 horizontal dial scale	.25
1622	Model 100 horizontal dial scale	.25
M-48	Model 57 vertical dial scale	.25
M-49	Model 75 vertical dial scale	.25
M-50	Model 100 vertical dial scale	.25
1624	Celluloid indicator film shield	.25
1608	Dial drive roller	.50
1606	Helical cut gear	.35
1604	Tuning shaft and drive worm gear	.50
M-44	Low loss lead-in	1.25
1654	Dual generator condenser	.60
1807	Dial light assembly complete less bulb	.30
1007	No. 50 dial light	.15

M-33A

Part No.	Description	List Price
	1936 Panel Type Control Head	
2211	Roller sprocket	$0.15
2212	Volume control shaft	.10
2213	Tuning shaft	.20
2214	Idler gear	.20
2215	Idler gear bushing	.10
2221	Celluloid crystal	.15
2222	Dial film strip	.25
2223	Dial light shield (green)	.10
2223-A	Dial light shield (red)	.10
2223-B	Dial light shield (blue)	.10
2227	Film tension spring	.10
2228	Sprocket hold-down spring	.10
2225	Tuning shaft 25 x 13/16 in.	1.00
2226	Volume control shaft 26 7/16 in.	1.00
1007	No. 50 dial light (6/8 volt)	.15
1326	Flexible shaft bushings	.25
1759	K-218 wire clips (per doz.)	.15
1807	Dial light assembly less bulb	.30

Motorola Models No. 34—Dual "6"—Twin "8"

Part No.	Description	List Price
	No. 34—D "6"—T "8" Control Unit	
1001-A	No. 34 Control Head Complete, less Shafts	4.00
1001-B	Dual-6 Control Head Complete less shafts	4.25
1001-C	Twin-8 Control Head Complete less shafts	4.25
1002	Pair Flexible Shafts Complete ..... Pr.	2.00
1003	Tone Control Knob	.10
1004	Tuning Knob	.15
1005	Key Knob — Volume	.15
1006	Keys (Per Pair)	.25
1007	Dial Lights (Round Bulb)	.15
1008	Dial Crystal	.15
1010-A	Model 34 Volume Control (K-3468)	1.00
1010-B	Dual 6 and Twin-8 Volume Control (K-68)	1.00
1011-A	No. 34 Dial Plate	.15
1011-B	Dual-6 Dial Plate	.15
1011-C	Twin-8 Dial Plate	.15
1012	Die Cast Gear for Variable Cond. (K-61)	.25
1013	Bezel Ring	.10
1014	Dial Light Assembly Complete	.30
1015	Horse Shoe Washers ..... Doz.	.25
1016	Dial Pointers ..... Each	.05
1024	Padder Condenser (1000 MMF) All Models	.50
1025	.2 Mfd. 200 V. Condenser (101)	.20
1026	.2 Mfd. 200 V. Condenser (101)	.20
1027	.02 Mfd. 300 V. Condenser (023)	.15
1028	.25 Mfd. 300 V. Condenser (102)	.20
1029	.01 Mfd. 100 V. Tiny Tot Condenser (100)	.12
1030	.05 Mfd. 200 V. Condenser (103)	.15
1031	.05 Mfd. 400 V. Condenser (104)	.18
1032	.02 Mfd. 200 V. Condenser (105)	.15
1033	.2 Mfd. 400 V. Condenser (106)	.15
1034	.01 Mfd. 400 V. Condenser (108)	.15
1035	.1 Mfd. 200 V. Condenser (114)	.15
1036	.01 Mfd. Padder Condenser (120)	.25
1037	.007 Mfd. 500 V. Tubular Condenser (141) (Replaces K-140)	.20
1038	.001 Mfd. Mica Condenser	.15
1039	.0001 Mfd. Mica Condenser	.15
1040	.0003 Mfd. Mica Condenser	.15
1041	.0005 Mfd. Mica Condenser	.15
1042	.0005 Mfd. White Dot Condenser	.20
1043	Resistors — (State value)	.15
1044	Twin-8 Input Audio Choke (2361-A)	1.00
1045	Twin-8 Output Transformer (2551)	1.25
1046	Twin-8 Input and Output Assemb. (10707) (Replaces No. 1044 and No. 1045)	2.50
1047	Variable Condenser Adjustment Cam	.10
1048	Variable Cond. Adj. Cam Guide Bracket	.10
1049	Variable Condenser Tension Spring	.05
1050	7 Way Chassis Plug	.50
1051	9 Point Solder Lug Strip	.10
1052	7 Point Solder Lug Strip	.10
1053	2 Way Speaker Receptacle — Dual-6 (No. 1802-G)	.10
1054	8 Point Solder Lug Strip with Tone Control Spring M-34	.15
1094	Dual-6 Speaker Plug (No. 2902)	.10
1095	Front Cover Only M-34 (No. 539)	.50
1096	Front Cover Cpt. less Speaker M-34 (539)	1.10
1098	Hash Wiper Springs ..... Per Doz.	.25
1099	Dual 6 Term. Strip—3 Terms. (No. 1731)	.10
1100	M-34 Term. Strip—2 Terminal (No. 1720)	.10
1101	Twin-8 Housing Terminal Strip (No. 1742)	.15
1102	"A" Battery Cable (Yellow) D-6 and T-8	.20
1103	"A" Bat. Cable (Black) D-6 and No. 34	.15
1104	3 Wire Speaker Cable	.25
1105	3½ Ft. Shielded Ant. Lead, D-6 and T-8	.35
1106-A	Antenna Lead M-34 (Male)	.30
1106-B	Antenna Lead M-34 (Female)	.20
1107	Solder Lug Strip 3 Pt. No. 34—D-6 and T-8	.10
1108	7 Way Chassis Receptacle	.50
1109	1 Way Antenna Receptacle	.10
1111	.004 Mfd. 300 V. Cond. and Choke (111)	.25
1112	.01 Mfd. 300 V. Cond. and Choke (112)	.25
1113	.001 Mfd. Red Dot Condenser	.15
1114	.003 Mfd. Yellow Dot Condenser	.20

No. 34—D "6"—T "8" Chassis

1017-A	Model No. 34—3 Gang Variable Cond.	2.50
1017-B	Dual-6—3 Gang Variable Condenser	2.50
1017-C	Twin-8—3 Gang Variable Condenser (State Make of Condenser when ordering.)	2.50
1018-A	Model 34 Antenna Coil Complete in Can	.60
1018-B	Dual-6 & Twin-8 Antenna Coil Cpt. in Can	.60
1019	R. F. Coil	.60
1020	Oscillator Coil	.80
1021	I. F. Coil	1.30
1022	Diode Coil	1.30
1023-A	Plate Choke—Enclosed Type	.20
1023-B	Plate Choke—Open Type	.20

No. 34—D "6"—T "8" "B" Power Unit

1055	Twin-8 "B" Power Unit Complete	12.00
1056	Dual-6 "B" Power Unit Complete	12.00
1057	Power Transf. (D-6 & T-8) (No. 2552)	2.50
1058	Power Transformer (D-6) (P-2534)	2.00
1059	Power Transformer (T-8) (P-2534MS)	2.25
1060	Power Transformer (M-34 Only) (P-2463)	2.00
1061	Radiart Vibrators M-34 (No. 3260-A)	4.50
1062	Elkonode Dual-6 & Twin-8 (T-53)	4.50
1063	Radiart Vibrator Dual-6 (No. 3599 and 3417)	4.50
1064	Filter Choke (5135-2543) (Interchangable D-6 and T-8)	.70
1065	Filter Choke M-34 (No. 4430)	.60
1066	Filter Block for Twin-8 (No. 8825)	1.80
1067	Filter Block for Dual-6 (No. 8426)	1.75
1068	Filter Block M-34 (No. 34)	1.20
1069	77-E Lattice Wound "B" Hash Choke Assembly	.25
1070	Dual 77-E Lattice Wound "B" Hash Choke Assembly	.50
1071	Hash Choke (No. 4386)	.50
1072	Hash Choke M-34 (No. 4402)	.30
1073	Hash Choke M-34 RNo. 4403)	.30
1074	Twin-8 Hash Chokes—Flat Type	.20
1075	Elkonode Shock Absorber Rubber Ring	.10
1076	4 Way Plug for Power Pack	.20
1077	Radiart Vibrator Socket	.10
1078	Mallory Elkonode Socket	.10
1079	4 Way Floating Type Elk. Receipt. (741)	.25
1080	Bakelite Shell for Elkonode Receipt. (716)	.20
1081	.5 Mfd. 120 V. Condenser (126)	.25
1082	.25 Mfd. 1600 Volt Condenser (131)	.25
1083	.5 Mfd. 120 V. Tubular Condenser (113)	.22
1084	.5 Mfd. 120 V. Elliptical Condenser (116)	.25
1084	.5 Mfd. 120 V. Electrolytic Cond. (116)	.25
1085	.02 Mfd. 1000 V. Condenser (117)	.20
1086	.5 Mfd. 120 V. Tubular Condenser (127)	.25
1087	.02 Mfd. 1000 V. Buffer Condenser (128)	.25
1088	Dual .5—.01 Mfd. Condenser (109 or 119)	.60

No. 34—D "6"—T "8" Outer Housing, Cable and Filters

1090	Rear Cover for Twin-8	.50
1091	Front Cover for Twin-8	.60
1092	Dual-6 Back Cover	.50
1093	Dual-6 Front Cover	.50

Motorola Models No. 44 and Super "6"

Part No.	Description	List Price
	No. 44 and Super "6"—Control Unit	
901	Control Head Complete	$6.00
902-A	32" Flexible Shaft (Model 44)	3.25
902-B	36" Flexible Shaft (Model S-6)	3.50
903	Spacer Block	.20
603	Clutch Spring	.10
904	Filler Ring	.20
905	Hexagon Nut (Eccentric)	.15
906	Convex Glass Crystal	.25
907	Chrome Plated Bezel	.25
908	Mounting Strap	.25
909-A	Dial Plate (Model 44)	.15
909-B	Dial Plate (Model S-6)	.15
910	Special Black Knob	.20
911	Condenser Gear, Bakelite (State Coarse or Fine Tooth)	.50
912	Keys (K-61) ..... Each	.20
913	Dial Light (No. 50)	.15
914	Drive Pinion	.20
928	.25 Mfd. 300 V. Tubular Cond. (No. 1848)	.20
929	.01 Mfd. 300 V. Tubular Cond. (No. 1741)	.15
930	.05 Mfd. 400 V. Tubular Cond. (No. 1999)	.15
931	.05 Mfd. 300 V. Tubular Cond. (No. 1972)	.15
932	.01 Mfd. 400 Volt Tubular Condenser	.15
933	2M-20M-20M Ohm Candohm Resistor (No. 4220A)	.50
934	2M-20M-20M-270 Ohm Candohm Resistor (No. 4622)	.60
935	Any Resistor (State Ohmage)	.15
936	10 Mfd. Electrolytic Condenser (No. 1020)	.50
937	1 Way Plug	.10
938	4 Way Plug	.20
939	Tube Socket, State Type	.10

No. 44 nd Super "6"—"B" Power Supply

940-A	44 Power Pack Cpt. in Can with Cover	12.00
915	500,000 Ohm Volume Control (6651-C)	1.00
916	Dial Light Socket	.15
917	Dial Light Assembly Complete	.50

No. 44 and Super "6"—Chassis

918	2 Gang Variable Condenser (44SM)	2.00
919-A	Model 44 Antenna Coil Complete in Can	1.00
919-B	Model S-6 Antenna Coil Complete in Can	1.00
920-A	Model 44 Oscillator Coil Complete in Can	.90
920-B	Model S-6 Oscillator Coil Complete in Can	.90
921	1st I. F. Coil Complete in Can	1.25
922	2nd I. F. Coil Complete in Can	1.25
923-A	Modle 44 Diode Coil Complete in Can	1.00
923-B	Model S-6 Diode Coil Complete in Can	1.00
924	.0005 Mfd. Midget Mica Condenser	.15
925	Alum. Tube Shield and Base (No. 01090)	.20
926	Audio I. P. Trans. (No. 2511) (S-6 Only)	1.50
927	.1 Mfd. 200 V. Condenser (No. 1669)	.15

Outer Housing, Cable and Filters

959	Model 44 Front Cover Cpt. less Speaker	.50
960	Model S-6 Front Cover Cpt. less Speaker	.40
961-A	Model 44 Back Cover	.40
961-B	Model S-6 Back Cover	.40
962	2 Way Receptacle (J-1802)	.15
963	4 Way Receptacle (No. 1804-G)	.20
964	Antenna Plug Shield Assembly	.35
965	Polarizing Receptacle (No. 1825)	.25
966	Cable Terminal Strip (2-T)	.10
967	"A" Battery Cable (Black)	.15
968	Speaker Cable (S-6 Only)	.25
969	Antenna Loom in Running Lengths, per ft.	.10
970	3½ Ft. Antenna Shielded Loom	.35
971	Red Dot Condensers, Mica	.15
972	.25 Mfd. 160 V. Tubular Condenser	.25
973	Dial Lite Filter Choke and Condenser	.25
974	20 Turns No. 12 Wire Elimiode Choke (Used on "A" Battery and Power Supply)	.20
975	26 Turns No. 16 W. Hash Eliminode Choke	.20
976	Volume Control Bracket	.10
977	Clutch Spring for Shaft Cone (No. 20-C)	.05

Motorola Models No. 44 and Super "6" (Cont.)

940-B	S-6 Power Pack Cpt. in Can with Cover	12.00
941	2 Way Plugs	.10
942	T-60 or 70-B Elkonode in Can with Plug	5.50
943	T-35 Elkonode in Cardboard Container with Leads (Model 44)	5.75
944	Vibrator (Utah) (G-536)	5.00
945	Power Transformer (No. 2230) (44 Only)	2.25
946	Power Transformer (No. 2270) (S-6 & 44)	2.25
947	Power Transformer (Utah) (No. 1092)	1.95
948	Filter Choke (No. 2060-F)	1.00
949	Filter Choke Coil (Utah) (No. 4267)	1.00
950	Aclay only for T-35 Elkonode	.80
951	8/12 Mfd. 300 V. Electrolytic Cond. (8123)	1.50
952	8/4 Electrolytic Condenser (No. 8420)	1.20
953	4/6 Mfd. Electrolytic (Utah) (No. 46200)	1.00
954	.5 Mfd. 160 V. Tubular Cond. (1784)	.50
955	.01 Mfd. 1600 V. Tubular Cond. (1789)	.40
956	5 Prong Socket with Spacer Pin	.15
957	R. F. Choke Coil Cpt. in can with Condenser and Leads	.70
978	S-6 Speaker Housing (6")	.75
979	Speaker Grill 6" for S-6 Only	.40
980	Short Speaker Stud	.20
981	Long Speaker Stud	.30
982	Thumb Screw for Stud Assembly	.10
983	Model 44 Speaker on front cover with plug connector complete	5.75
984	S-6 Speaker in Housing with Mtg. Studs and Cable Complete	8.50
985	Utah Model 44 Speaker less O. P. Transf. (No. 2060)	5.00
986	Magnavox Speaker less O. P. Transf. (44)	5.00
987	Utah Speaker for S-6 (Less Transf.) (6510)	6.50
988	Output Transformer for 44 (No. 7121)	1.25
989	Output Transf. for S-6 (No. 7202)	1.50
990	Cone and Voice Coil Assembly for No. 2060 Speaker	1.60
991	Cone and Voice Coil Assembly for Magnavox Speaker	1.60
992	Cone and Voice Coil Assembly for No. 6510 Speaker	2.00
	44 Speaker Replacement	5.25
	S6 Speaker Replacement	4.25

Model "50"

Part No.	Description	List Price
	Chassis	
	Chassis only—less tubes	$27.50
2549	Tube shield	.40
2545	Variable condenser mounting bracket	.25
2050	3 gang variable condenser	5.50
2053	Variable condenser adjustment cam	.05
2400	Shoulder screw 68TS	.05
2054	Variable condenser tension spring	.10
2536	Volume control	1.00
2023	Volume control funnel	.05
2339	Antenna coil (complete in can)	1.50
2073	R. F. coil (complete in can)	1.00
2074	Oscillator coil (complete in can)	1.00
2340	I. F. coil (complete in can)	1.25
2337	Diode coil (complete in can)	1.50
2320	Output transformer	1.00
	"B" Power	
2020	Transformer can	$0.35
2021	Transformer can base	.10
2030	Vibrator hold-down clamp	.10
2316	Filter choke	.60
2315	Power transformer	2.00
1588-C	Power choke (complete in shield)	.35
2404	Vibrator	4.50
2317	Electrolytic condenser	1.40
2116	3 layer hash choke	.30
2272	.01 mfd. buffer condenser	.25
2259	.5 mfd. 120 V. condenser	.40
2033	Vibrator socket (special)	.10
	Outer Housing	
2341	Front cover only	$1.75
2342	Back cover	1.25
1500	Plug button (small)	.03
1792	Plug button (large)	.03
2018	Jiffy mounting bracket	.60
2019	Set mounting contact wiper	.10
2017	Set mounting bolts	.05
2171	5/16 in. hex. head steel nuts	.05
2172	5/16 in. x ⅜ in. H. H. P. K. screws	.05
599	Glass tube sockets (state type)	.10
2402	Grip caps (per doz.)	.25
1815	Bias cell	.20
1777	Resistors (state value)	.15
1039	.0001 mfd. MT condenser	.15
1040	.0003 mfd. MT condenser	.15
1041	.0005 mfd. MT condenser	.15
2269	.007 mfd. 500 V. condenser	.20
2252	.05 mfd. 400 V. coupling condenser	.20
2255	.01 mfd. 1000 V. condenser with 500M ohm resistor and mounting strap	.30
2256	.1 mfd. 200 V. condenser	.15
2258	.25 mfd. 300 V. condenser	.50
1403	.03 mfd. 100 V. condenser	.15
2254	.05 mfd. 25 V. condenser	.15
2251	.01 mfd. 300 V. condenser	.15
	Speaker	
	Speaker only—see page 1.	
2353	Speaker plug (3 way) and cap	$0.10
2323	3 Way Socket	.10
2321	Grill screen	.10
2319	Grill cloth	.15
2425	Cone and voice coil	1.75
2426	Field coil	2.00
	Speaker replacement	2.00

NOTE: Due to the fact that speaker cones cannot be replaced by the service man in the field, it will be necessary to return all speakers to us for service. A charge will be made for parts and service according to the above rate (1799-1800).

Cables and Eliminode System

2334	Choke coil (resistance wire)	$0.25
2335	Choke coil (enameled wire)	.25
2118-A	Speaker field choke	.20
2119	Speaker voice coil choke	.20
2120	"A" lead filter choke	.25
1403	.03 mfd. 100 V. condenser	.15
2271	.5 mfd. 120 V. condenser	.40
2270	.1 mfd. 25 V. condenser	.15
2514	600 mmfd. padder condenser	.40
2310	Large prong dial light receptacle	.10
2511	Small prong antenna receptacle	.10
2176	Antenna loom complete	.75
2417	"A" cable complete with fuse	.40
2416	40 ampere fuse	.05

Models H-45—G-54—W-58 Home Sets—1934

Part No.	Description	List Price
1201	2 Gang Variable (For G-54—W-58) (No. 5456)	2.00
1202	2 Gang Variable (For H-45) (No. 5-24000)	2.00
1203	Vol. Control (G-54—W-58) (No. 5100)	1.00
1204	Volume Control (H-45) (No. 4338)	1.00
1205	Tone Control (No. 13037)	.60
1206	Power Transformer (No. 5523)	2.25
1207	Filter Choke (No. 2543-C)	.70
1208	Electrolytic Cond. (G-54—W-58) (5812)	2.50
1209	Electrolytic Condenser (H-45) (No. 4310)	2.00
1210	I. F. Coil Complete in Can (No. 45-I.)	1.50
1211	Diode Coil Complete in Can (No. 45-D)	1.50
1212	Antenna Coil Complete in Can (No. 45-A)	.55
1213	R. F. Coil Complete in Can (No. 45-A)	.55
1214	Oscillator Coil Complete in Can (45-O)	.70
1215	Any Socket — (State Marking)	.10
1216	.0005 Mfd. Mica Condenser	.15
1217	.0001 Mfd. Mica Condenser	.12
1218	.5 Mfd. Condenser (126)	.22
1219	.007 Mfd. Condenser (141)	.12
1220	.01 Mfd. Condenser (100)	.12
1221	.25 Mfd. Condenser (1775)	.20
1222	.05 Mfd. Condenser	.18
1223	.2 Mfd. Condenser	.20
1224	.05 Mfd. Condenser	.18
1225	Mallory Bias Cell	.20
1226	Any Resistor (State value)	.10
1227	5000 Ohm Red Devil Resistor 10 Watt	.50
1228	Cordohm and Plug for H-45	1.00
1229	A. C. Cord and Plug (G-54 and W-58)	.30
1230	5" Dynamic Speaker for H-45 (A-457)	3.50
1231	Output Transformer for Same (T-467)	.85
1232	Cone and Voice Coil Assembly (H-45)	1.60
1233	8" Dynamic Speaker for (G-54 and W-58) (A-583)	6.50
1234	Output Transformer for Same (T-610-A)	1.25
1235	Cone and Voice Coil Assembly (G-54—W-58)	2.25
1236	Knobs for H-45 (No. 259-260) ..... Pair	.25
1237	Knobs for G-54 and W-58 (No. 137) .Each	.10
1328	Celluloid Dial for G-54—W-58 (No. 520)	.20

Motorola Model No. 55

Part No.	Description	List Price
601	Control Head	$6.00
602	Flexible Shaft Complete with Pinion	3.50
603	Clutch Spring	.10
604	Shielded Dial Light Wire Cpt. with Dial Light Socket	.50
715	Volume Control	1.00
606	2 Gang Variable Condenser	2.00
607	Antenna Coil Complete in Can with Leads	1.00
608	Oscillator Coil Cpt. in Can with Leads	.80
609	I. F. Transformer Complete in Can	1.25
610	Diode Feeder Complete in Can	1.25
611	Resistors — State Value	.15
612	Tube Socket — State Type	.10
613	.05—160 Volt Condenser	.20
614	.015—200 Volt Condenser	.18
615	.0005 Mica Condenser	.12
616	.05—300 Volt Condenser	.20
617	.01—200 Volt Condenser	.18
618	.25—160 Volt Condenser	.20
619	.01 Mfd. 160 Volt Condenser	.15
	T-31 Elkonode (55A)	5.75
620	.5 Mfd. 160 Volt Condenser	.25
621	.0025 Mfd. Hash Filter Condenser	.20
622	2 Point Terminal Strip	.12
623	Filter Choke (No. 1663-G)	1.00
624	Power Transformer (No. 2149)	2.00
625	No. 34 Elkonode	5.75
626	Power Pack Assembly Complete	12.00
627	Dual 8 Mfd. Electrolytic Condenser	1.50
628	8-30 Mfd. Electrolytic Condenser	1.70
629	Hash Filter Choke	.30
630	.01—1600 V. Buffer Condenser	.50
631	"A" Solenoid Chokes	.25
632	.25 Mfd. 300 Volt Condenser	.35
633	Antenna Cable	.40
634	"A" Cable—3 Lead Shield	.80
635	5/16" Oval Head Set Mtg. Bolts	.05
636	Magnavox Dynamic Speaker No. 150-D-55	6.25
637	No. 2150 Output Transformer	1.25
638	Cone & Voice Coil Assembly for Magnavox Speaker No. 150	2.00
	Speaker Replacement Charge	3.25

Motorola Model 57

Part No.	Description	List Price
1770	Model 57 control head cpt. less shafts	$4.00
1761	Pair flexible shafts cpt. (30 in. long)	2.00
1761-A	Pair flexible shafts cpt. (24 in. long)	2.00
1761-B	Pair flexible shafts cpt. (18 in. long)	2.00
1761-C	Pair flexible shafts cpt. (36 in. long)	2.00
1003	Tone control knob (K-30)	.10
1509	Iron core I.F. coil cpt. in can	2.00
1510	Iron core diode coil cpt. in can	2.00
1451	Small tube shield (Fin. type)	.15
1455	Dual tube shield (Fin. type)	.20
1429	750 mfd. padder condenser (Red dot)	.50
1691	250 mmf. padder condenser (Blue dot)	.50

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

GALVIN MFG. CO.

MODELS 60,61,88,62,75
Parts Lists

Motorola Model 57 (Cont.)

1473-4	Volume control shaft cpt.	1.00
1473-5	Tuning shaft cpt.	1.00
1004	Tuning knob (Black finish)	.20
1005	Key knob Vol. control (Black finish)	.20
1006	Keys (Per pair)	.25
1007	Dial light (No. 50)	.15
1008	Dial crystal	.15
1557	Model 57 dial plate only	.15
1013-A	Bezel ring and cork gasket	.10
1769	Dial light assembly cpt. less Bulb	.30
1016	Dial pointers (K-9)	.05
1015	Horseshoe washers (per dozen)	.25
1012	Die cast gear for variable cond. (K-61-A)	.25
1449	Model 57 Volume control	1.00
1771	Dial plate and pointer assembly cpt.	.35
1758	Idler gear and shaft assembly	.15
1326	Bushings for end of flexible shafts	.30
1420	Drive shaft pinion fitting	.15
1422	Volume control shaft fitting	.15
1756	Mounting bracket for steering post	.15
1760	Pinion fitting for key	.15
1762	Flexible shafts any length (per ft. each shaft)	.60
1772	Steel gears	.05
1773	Tin sleeves for vol. control shaft	.05
1774	¼ x ⅜ in. fill. head screw for mtg. control	.03

Chassis

1442	2 gang variable condenser	$2.00
1053	2 way chassis receptacle (1802)	.10
1441	2 way speaker receptacle (1 large and 1 small prong)	.10
1109	1 way Antenna receptacle (91-S)	.10
1776	Sockets (state type)	.10
1520	Variable tension spring	.05
1502	Antenna coil cpt. in can	.60
1505	Oscillator coil cpt. in can	.80
1507	I.F. coil cpt. in can	1.50
1508	Diode coil cpt. in can	1.50
1574	New style air core antenna coil cpt. in can	.70
1670	Iron core ant. coil cpt. in can	2.00
1511	New type oscillator coil cpt. in can	.80

Outer Can, Cables and Filters

1457	Outer can only	$1.25
1458	Front cover only	1.25
1459-C	Back cover assembly cpt.	3.00
1458-C	Front cover cpt. with speaker and grill	5.50
1459-M	Back cover cpt. for 62 model	3.75
1842	Black plug buttons	.03
1393	1 way ant. plug (91-P and lug)	.10
1392	2 way clinc. plug (1902 and lug)	.10
1443	2 way speaker plug and cap	.10
1541	"A" battery cable and shield (36 ins. long)	.25
1543	"A" battery cable and shield (26 ins. long)	.20
1543-C	Shielded antenna lead in less bushings	.50
1545	5 Ft. antenna lead (replaces above)	.35
1500	Small cover hold down buttons	.03
1113	.001 red dot mica condenser	.15
1408	.5 mfd. 25 V. condenser	.30
1548	.5 mfd 25 V condenser (replaces above)	.25
1369	Hash choke (Pie wound in fibre container)	.15
1497-A	Hash choke (Round)	.20
1497-B	Hash choke (Round)	.20
1493-C	Hash choke (No. 15 wire)	.30
1826	Set mtg. studs (K-3516)	.05

Motorola Model 57 (Cont.)

1815	Bias cell	.20
1803	Bias cell mounting cup and terminal	.10
1520-B	Terminal mtg. strip and tone control spring	.10
1040	.003 mfd mica condenser	.15
1042	.0005 mfd mica condenser (White dot)	.20
1038	.001 mfd mica condenser	.15
1846-A	.00112 mfd mica condenser (Green dot)	.20
1400	.01 mfd 100 V. condenser	.12
1404	.05 mfd 400 V. condenser	.18
1416	.01 mfd 400 V. condenser	.15
1417	.1 mfd 400 V. condenser	.15
1418	.1 mfd 300 V. condenser	.20
1026	.02 mfd 400 V condenser (K-023)	.15
1816	.004 mfd 500 V. condenser (K-132)	.15
1517	.25 mfd 25 V. condenser	.20
1569	.01 mfd 250 V. condenser	.15
1409	.05 mfd 25 V. condenser	.15
1034	.01 mfd 25 V. condenser (K-108)	.15
1027	.25 mfd 500 V. condenser (K-102)	.20
1777	Resistors (state value)	.15

"B" Power Unit

1836	Power transformer (2985-A)	$2.00
1837	Filter choke (C-1492)	.60
1424	(Electrolytic condenser) (4 and 2 mfd at 250 volts)	1.00
1540	(Electrolytic condenser) (5, 3 and 10 mfd. at 280/200 and 25 volt). New	1.30
1453	Transformer can only	.30
1460	Elkonode socket case	.20
1461	Top cover for same	.05
1462	Bottom cover for same	.05
1350	Elkonode contact washer	.05
1784	Mallory Elkonode (53T)	4.50
1785	Radiart Vibrator (3815-B)	4.50
1405	.5 mfd 50 Volt condenser	.55
1413	.01 mfd 1600 Volt condenser	.25
1516	.02 mfd 400 Volt condenser	.20
1823	Hash choke (4586)	.30
1787	Lattice wound hash choke assembly (77-E)	.25
1838	18 T. No. 20 wire choke coil	.10
1493-A	28 T. No. 18 wire choke coil (in tube)	.20
1783	Perfosated gnat tube shield (G-621-U)	.15
1794	Shakeproof lockwashers (4018-32)	.05
1795	2¼ in steel washers (K-225)	.03
1796	8 x ½ in. oval hd. self tapping screws (per 100)	1.00
1564	Sponge Rubber (per doz.)	.25

Speaker

1550	5 in. Dynamic speaker only	$3.75
1550-A	Speaker cpt. with 2 way plug	3.90
1521	Wire screen for grill	.10
1551	Grill cloth	.10
1552	Cardboard gasket	.05
1458-C	Speaker cpt. m'd. on front cover	5.50
1838	Output transformer only	1.00
1840	Cone and voice coil assembly (replaced at factory)	1.75
1841	Speaker field coil (replaced at factory)	2.00
	Speaker Replacement	1.85

NOTE Due to the fact that dust-proofed-type speaker cones cannot be replaced by the service man in the field, it will be necessary to return all speakers to us for service. A charge will be made for parts and service according to the above rate (1799-1800).

Model "60"

Part No.	Description	List Price
	Chassis	
	Chassis only—less tubes	$30.00
2011	Tube shield (fin type)	.30
2013	Tube shield (formed)	.20
2050	3-Gang variable condenser	3.50
2051	Variable condenser mounting bracket	.15
2404	Shoulder screw (6STS)	.05
2053	Variable condenser adjustment cam	.05
2401	Variable condenser drive gear (K61A).	.25
2054	Variable condenser tension spring	.10
2166	Volume control	1.00
2025	Volume control funnel	.05
2071	Antenna coil (complete in can)	1.60
2073	R. F. coil (complete in can) includes plate choke	1.00
1403	.03 mfd. 100 V. TT condenser	.12
2273	.003 mfd. 100 V. condenser	.12
2251	.01 mfd. 500 V. condenser	.15
2254	.05 mfd. 25 V. condenser	.15
2278	.01 mfd. 100 V. condenser and 500M ohm resistor (with mounting straps)	.30
2256	.1 mfd. 200 V. condenser	.15
2257	.1 mfd. 25 V. condenser and mounting strap	.20
2258	.25 mfd. 300 V. condenser	.30
2263	.03 mfd. 500 V. condenser	.15
2267	.1 mfd. 25 V. condenser	.15
1777	Resistors (state value)	.15
2170	Tone control knob	.10
2146	Tone control terminal strip	.10
2148	Tone control screw	.10
2014-C	Tone control assembly complete	.40
	"B" Power	
2020	Transformer can	$0.35
2021	Transformer can base	.10
2030	Vibrator hold-down clamp	.10
2099	Power transformer	2.50
2100	Filter choke (70 mills)	.70
2115	3 layer hash chokes	.30
2116	5 layer hash chokes	.30
1588-C	Power choke complete in shield	.35
2404	Elkonode (94) Mallory	4.50
2188	Electrolytic condenser	1.60
2259	.5 mfd. 120 V condenser	.60
2260	.005 mfd. 1600 V. condenser	.40
2033	Vibrator socket (special)	.10
1776	No. 84 socket	.10
	Outer Housing	
2015	Front cover (less ornaments)	$1.50
2016	Rear cover	1.25
2196	Medallion plate	.50

Motorola Model "60"

Part No.	Description	List Price
2076	Oscillator coil (complete in can)	1.00
2077	I. F. coil (complete in can)	1.25
2078	Diode coil (complete in can)	1.60
2094	Output transformer	1.25
1776	Glass tube sockets (state type)	.10
2034	2-way receptacle	.15
2035	5-way receptacle	.25
2038	Eliminode and chassis wiper	.20
1929	Lug D/L Mounting Strip	.10
2402	Grid caps (per doz.)	.25
1815	Bias cell	.20
2040	D/L Mounting and B. C. cup	.15
1039	.0001 mfd. type M. T. condenser	.15
2403	.00015 mfd. type M. T. condenser	.15
1003	.0003 mfd. type M. T. condenser	.15
1041	.0005 mfd. type M. T. condenser	.15
2197	Name plate	.50
1500	Green plug buttons (small)	.03
1825	Green plug buttons (large)	.03
2018	Jiffy mounting bracket	.60
2019	Set mounting contact wiper	.10
2017	Set mounting bolts	.05
2412	Green plug buttons (Eliminode)	.03
2172	Spec. 5/16 set mounting S. T. screws	.05
2171	Spec. self-locking steel nuts	.03
	Speaker	
	Speaker only—see page 1.	
2160	Speaker housing	$0.75
2150	Speaker bezel (chrome)	.40
2159	Grill cloth	.15
1644-A	Screen	.10
2152	Speaker cable complete with pin proogs	.25
2194	Small pin cable prongs (less fibre caps)	.04
2195	Large pin cable prongs (less fibre caps)	.04
2153	3½ in speaker mounting bolt—7/16—14 Thread	.10
	7/16 hex. steel nuts (per doz.)	.25
	⅜ in iron washers (per doz.)	.25
	7/16 in. lockwashers (per doz.)	.25
2154	Spacer block	.10
1979	8 ft. speaker cable complete	1.00
1717	Doer-lead speaker only, less all accessories	4.50
2405	Cone and voice coil (replaced at factory)	2.25
2406	Field coil	2.00
2094	Output transformer	1.25
	Speaker replacement	2.75

NOTE Due to the fact that speaker cones cannot be replaced by the service man in the field, it will be necessary to return all speakers to us for service. A charge will be made for parts and service according to the above rate (1799-1800).

Motorola Models No. 61 and No. 88

Part No.	Description	List Price
501	No. 61 Control Head Complete	$6.00
502	No. 88 Control Head Complete	6.00
503	Flexible Shaft Complete	2.50
504	Black or Walnut Knobs	.10
505	Keys (D-700) Each	.30
506	Dial Lights	.15
507	No. 61 and No. 88 Lock & Switch (No. 2398)	.90
508	Dial Light Sockets	.15
509	No. 61 Black Clamp	.20
510	No. 88 Walnut Clamp	.20
511	No. 61 and No. 88 Volume Control (No. 290-B)	1.00
512	Celluloid Dial	.25
513	Terminal Strip Complete	.30
514	Type 800 Variable Condenser	4.00
515	Antenna Coil	1.00
516	R. F. Coil	1.25
517	Oscillator Coil	1.25
518	First I. F. Transformer	2.00
519	Diode Feeder	2.00
520	8 Mfd. 200 Volt Condenser (No. 8200W).	.80
521	8 Mfd. 200 Volt Condenser (No. 8200L).	.80
522	Filter Choke Coil (No. 1663-C)	1.00
523	9 Way Plug	.50
524	9 Way Socket	.50
525	"A" Filament Choke Coils	.30

Motorola Models No. 61 and No. 88 (Cont.)

Part No.	Description	List Price
532	No. 88 Complete Cable Assembly	5.30
533	No. 61 Complete Cable Assembly	5.10
534	Dual .1 Mfd. 200 V. Condenser (No. 1631)	.50
535	Pinion Housing Flange	.50
536	Power Transformer Assembly Complete	4.00
537	S-102 Elkonode (No. 88)	5.00
538	S-103 Elkonode (No. 61)	5.00
539	No. 88 Antenna Cable Only	.90
540	No. 61 Antenna Cable Only	.80
541	No. 88 Antenna Cable Assembly Complete	1.60
542	1 Way Antenna Plug	.10
543	Center Tap Audio Choke (No. 1759-C)	2.00
544	¼ Mfd. Bypass Condenser 300 V. (A19H)	.90
545	.1 Mfd. 200 V. Tubular Condenser	.20
546	.02 Mfd. 200 Volt Condenser	.25
547	.05 Mfd. 200 Volt Condenser	.25
548	.1 Mfd. ByPass Condenser in Can	.75
549	.5 Mfd. 200 V. Condenser (No. 1379)	.50
550	.002 Mfd. Bakelite Condenser	.25
551	.0005 Mfd. Bakelite Condenser	.20
552	160 Tooth Gear	.50
553	3 Way Terminal Mounting Strip	.10
554	4 Terminal Mounting Strips	.10
555	Service Cable	2.00
556	Resistors — State Value	.15
557	"A" Battery Lead Coated Lugs	.10
558	2 Way Receptacle	.10

Motorola Models No. 61 and No. 88 (Cont.)

Part No.	Description	List Price
526	No. 88 "A" Battery Cable	1.25
527	No. 61 "A" Battery Cable	1.10
528	No. 88 Speaker Cable	1.00
529	No. 61 Speaker Cable	.90
530	No. 88 Control Cable	1.50
531	No. 61 Control Cable	1.25
559	.05 Mfd. 1000 V. Buffer Cond. (No. 1616)	.60
560	Power Transformer Only (No. 1669-C)	2.75
561	No. 237 Special Socket — Inverted	.60
562	Tube Sockets	.15
563	BR-Tube Shield	.50
564	"BR" Rectifier Tube	2.75

No. 61 and No. 88 Speakers—Output Transformers—Speaker Cones

Model No. 88

565-A	M-227-I Output Transformer for above	$10.50
566	245-AS Wright DeCoster (Round can)	2.10
566-A	9-K-S Output Transformer for above	10.50
567	245-ASV Wright DeCoster (Temple can)	2.10
567-A	9-K-S Output Transformer for above	10.50
		2.10

Model No. 61

568	255-SAL Wright DeCoster Speaker	6.50
568-A	8-JL-2 Output Transformer for above	2.10
569	Cone and Voice Coil Assembly for 2227 Speaker	2.25
570	Cone and Voice Coil Assembly for 245AS Speaker	3.25
571	Cone and Voice Coil Assembly for 245ASV Speaker	3.25
572	Cone and Voice Coil Assembly for 255SAL Speaker	2.25
	Speaker Replacement Price	List 5.25

Special for Model 62

Part No.	Description	List Price
1670	Model 62 iron core antenna coil	$2.00
1457-M	Special Front Cover	1.25
1459-M	Special back cover assembly cpt.	3.75
1333	1 way antenna receptacle	.10
1493-C	No. 15 wire hash choke	.30

Eliminode

Models 60, 80 and Golden Voice

Part No.	Description	List Price
2060	Eliminode, complete in housing	$10.00
2061	Eliminode cover only with wiper	.50
2062	Electrostatic shield	.10
2065	Eliminode sliding plate	.10
2058	Eliminode travel screw	.10
2118	Speaker field choke	.20
2121	Pancake choke, pie-wound, 1 layer	.25
2122	Choke complete in fibre cup, pie-wound, 1 layer	.25
2119	Speaker voice coil choke	.20
2120	"A" lead filter choke	.25
2037	5 way male plug	.20
2036	2 way male plug	.10
2028	4 way receptacle	.20
2241	.0001 mfd. trimmer condenser	.15
2243	.0003 mfd. trimmer condenser	.20
2242	Padder condenser	.30
2259	.5 mfd. 120 V. condenser	.40
2416	30 ampere fuse (3-AG)	.05
2176	31 in. antenna loom, complete with plug	.75
2176A	44 in. antenna loom, complete with plug	1.00
2178	Male section "A" cable	.20
2179	"A" cable—battery end—comp. with fuse	.25
2181	Female junction box only	.10
2180	Junction box mounting strap	.05
2041	1 way antenna receptacle	.10
2042	Antenna lead plug and ferrule only	.20
2055	Elim. screw tension washer	.05

Motorola Model 75

Part No.	Description	List Price
	Control Unit	
1766	Model 75 control hd. cpt. less shafts	$4.25
1761	Pair flexible shafts cpt. (30 in.)	2.00
1473-4	Vol. control shaft cpt.	1.00
1473-5	Tuning control shaft cpt.	1.00
1003	Tone control knob (K-30)	.10
1761	Pair flexible shafts cpt. (30 ins. long)	2.00
1761-A	Pair flexible shafts cpt. (24 ins. long)	2.00
1761-B	Pair flexible shafts cpt. (18 ins. long)	2.00
1761-C	Pair flexible shafts cpt. (36 ins. long)	2.00
1764	Tuning knob (Ivory finish)	.20
1765	Key knob (Vol. control) (Ivory finish)	.20
1006	Keys (Per pair)	.25
1007	Dial lite No. 50	.15
1008	Dial crystal	.15
1756	Mounting bracket	.15
1565	Dial plate only (Model 75)	.15
1013-A	Bezel ring and cork gasket	.10
1763	Dial light assembly cpt. (less bulb)	.30
1016	Dial pointers (K-9)	.05
1015	Horseshoe washers (per dozen)	.25
1012	Die cast gear for var. condenser	.25
1466-A	Volume control (Model 75)	1.00
1767	Toge control assembly cpt.	.25
1768	Dial plate and pointer assembly cpt.	.55
1758	Idler gear and shaft	.15
1759	Grip fasteners for T.C. and D.L. wires (per dozen)	.15
1326	Bushings for end of flexible shafts	.30
1422	Volume control shaft fitting	.15
1420	Drive shaft pinion fitting	.15
1760	Pinion fitting for key	.15
1762	Flexible shafts any length (per ft. each shaft)	.60
1772	Steel gears	.05
1773	Tin sleeves for vol. control shaft	.05
1774	¼ x ⅜ in. fill. head screw for mtg. control	.05
	"B" Power Output	
1818	Power transformer (2839-B)	$2.25
1819	Power transformer (3030)	2.25
1820	Filter choke (2543-F)	.70
1821	Filter choke (3050)	.70
1465	6 and 6 mfd. at 350 volt, 3 lead Electrolytic condenser	1.60
1468	Electrolytic condenser 6/4/5 mfd at 200/200/12½ volts. New	1.60
1363	Transformer can	.40
1357	Elkonode socket case	.20
1358	Top cover	.10
1359	Bottom cover	.10
1350	Elkonode contact washer	.05
01457	Aluminum tube shield	.15
01109	Tube shield base	.05
1822	50 ohm ½ watt resistors	.15
1787	Lattice wound bash choke assembly (77-E)	.25
1823	Hash choke (4586)	.30
1072	Hash choke (4402)	.30
1490	13 turns No. 18 wire choke	.20
1493	30 turns No. 18 wire choke	.20
1516	.02 mfd 400 Volt condenser	.20
1405	.5 mfd 50 Volt condenser	.35
1413-B	.01 mfd 1600 Volt condenser	.25
1419-B	.02 mfd 1000 Volt condenser	.25
1548	.5 mfd 25 Volt condenser	.25
1784	Mallory elkonode (53T.)	4.50
1785	Radiart Vibrator (3815-B replaces all models)	4.50
1786	Spec elkonode for 12 volt operation (G-53T.)	5.50
	Outer Housing, Cables and Eliminode	
1365-C	(Model 75 outer can cpt. with Eliminode system and cables, less covers)	$9.00
1365-M	Same except for 79 Model	10.00
1367	Back cover	1.00
1366	Front cover only	1.25
1366-C	Front cover cpt. with speaker Grill, and spkr. plug	6.00
1366-M	Same except for 79 Model	6.25
1824	(Eliminode travel section cpt. with choke and bracket, ready to mount)	1.50
1349	Terminal strip	.20
1109	1 way receptacle	.10
1331	4 way socket	.20
1326	Bushing for ant. and M/N cables	.30
1541	"A" battery cable (36 ins. long)	.25
1543	"A" battery cable (26 ins. long))	.20
1343	Antenna lead in and bushing cpt.	.60
1346	Motor noise lead in and bushing cpt.	.60
1344	Shielded loom for ant. junction box	.15

Part No.	Description	List Price
	Chassis	
1467	3 gang variable condenser	$2.50
1811	1 way antenna plug (91-P)	.10
1434	4 way male plug	.20
1441	2 way speaker receptacle (1 large and 1 small pin)	.10
1776	Sockets (state type)	.10
1520	Variable tension spring	.05
1362	Tube shield with vol. cont. bracket	.25
1361	Dual tube shield (Fin. type)	.25
1439	1000 mmf padder condenser	.50
1492	Antenna coil cpt. in can	1.50
1483-A	R.F. coil cpt. in can (with plate choke)	.90
1812	Oscillator coil cpt. in can	.90
1587	New style diode coil cpt. in can	1.50
1811	I.F. Coil cpt. in can (K-685)	1.30
1814	Diode coil cpt. in can (K-690)	1.30
1666	Iron core antenna coil cpt.	2.00
1815	Bias cell	.20
1801	Mtg. cup for bias cell	.15
1817	.0002 mfd. mica condenser	.15
1040	.0003 mfd. mica condenser	.15
1041	.0005 mfd. mica condenser	.15
1038	.001 mfd. mica condenser	.15
1400	.01 mfd. 100 Volt condenser	.12
1400-A	.01 mfd. 100 Volt condenser	.12
1403	.03 mfd. 120 Volt condenser	.15
1027	.25 mfd. 300 Volt condenser	.20
1816	.004 mfd. 500 Volt condenser (K-142)	.15
1514	.1 mfd. 200 Volt condenser	.15
1515	.007 mfd. 500 Volt condenser	.20
1518	.01 mfd. 400 Volt condenser	.15
1566	.01 mfd. 400 Volt condenser	.15
1513	.05 mfd. 25 Volt condenser	.15
1573	.03 mfd. 120 Volt condenser	.20
1777	Resistors (state value)	.15
1790	Junction box assembly complete	.30
1545	Antenna lead in (new style)	.40
1545-A	Motor Noise lead in (new style)	.40
1335	Motor noise ant. receptacle (large prong)	.10
1333	Antenna receptacle (small prong)	.10
1500	Small pin cable prong	.08
1501	Large pin cable prong	.08
1574	Small fibre extruded washers (per dozen)	.30
1390	Long condenser plates	.05
1391	Round condenser plates	.05
1568	Insulator for round plates (per dozen)	.30
1476	Insulator for long plate (per dozen)	.30
1592	Extruded insulator for long plate	.03
1440	½ in x ½ in. wood dowel (per dozen)	.30
1480	½ in x 1½ in wood dowel (per dozen)	.30
1469	Small bash choke (pie wound)	.15
1469	Medium bash choke (pie wound)	.20
1040	.003 mfd. mica condenser	.15
1041	.0005 mfd. mica condenser	.15
1408	.5 mfd. 25 V. condenser	.30
1548	.5 mfd. 25 V. condenser	.25
1493-C	Hash choke (No. 15 wire)	.30
1487	Tone control choke and bracket	.20
1497-D	Hash choke	.20
1488	Hash choke	.20
1351	Steel gear for elim. adjust.	.15
1337	1½ in. eliminode travel screw	.10
1505	Ground clamp	.10
1825	Green plug button	.03
1794	Shakeproof lockwashers (4018-32)	.05
1795	2¼ in steel washers (K-225)	.03
1796	8 x ½ in. oval hd. self tapping screws (per 100)	1.00
1826	Set mtg. studs (K-3516)	.05
	Speaker	
1560	6 in. Dynamic speaker (6531-A-K-6A)	$4.00
1827	Output transformer for same (Z-1195)	1.25
1566	6 in. Dynamic speaker (6732-A-F6-R-7010)	4.00
1828	Output transformer for same (6732-A)	1.25
1829	Speaker cone and voice coil (replaced at factory)	2.25
1830	Speaker field coil (replaced at factory)	2.00
1443	2 way plug and cap	.10
1561	Grill cloth only	.15
1527	Wire screen for grill	.10
1562	Paper gasket	.05
	Speaker replacement	2.75

NOTE Due to the fact that speaker cones cannot be replaced by the service man in the field, it will be necessary to return all speakers to us for service. A charge will be made for parts and service according to the above rate (1829-1830).

MODELS 77,77-A,77-A(B Series) 79,80,M-99,100,110 Parts Lists

GALVIN MFG. CO.

Motorola Model No. 77 PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Part No.	Description	List Price
	No. 77—Control Unit	
701	Control Head Complete	$6.00
702	Flexible Shaft Complete with Worm Gear	3.50
703	Spacer Block	.20
603	Clutch Spring	.10
704	Filler Rings	.20
705	Hexagon Nut	.15
706	Convex Glass Crystal	.25
707	Chrome Plated Bezel	.25
708	Control Head Mounting Strap	.25
709	Dial Plate	.25
710	Special Black Tuning Knob	.25
711	Cond. Gear, State Fine or Coarse Tooth	.50
712	Keys (K-01) Each	.20
713	Dial Light (No. 50)	.15
714	Drive Pinion	.20
715	Volume Control (31-C)	1.00
716	Dial Light Socket	.15
	No. 77—Chassis	
717	3-Gang Variable Condenser	2.00
718	Variable Condenser Mtg. Bracket	.10
719	Antenna Coil Complete in Can	.50
720	R. F. Coil Complete in Can	.50
721	Oscillator Coil Complete in Can and untuned R. F. Transformer mounted thereon	1.35
722	Diode Feeder Complete in Can	1.00
723	I. F. Transformer Complete in Can	1.00
724	Tube Sockets — State Type	.15
725	I. P. Audio and Choke Assembly (2121)	2.50
726	7 Way Plug	.50
727	1 Way Antenna Plug	.10
728	Tone Control Bracket	.05
729	.005 Mfd. Type "P" Condenser Special for Tone Control Bracket	.25
730	.25 Mfd. Condenser in Can (No. 1772)	.60
731	.015 Mfd. Condenser (Tubular)	.15
732	25—350 Ohm Candohm Resistor	.20
	No. 77—"B" Power Unit	
733	"B" Power Unit Complete	12.00
734	Power Transformer (No. 2132)	2.75
735	Type 30 Elkonode	5.75
736	Filter Choke (No. 2119)	1.00
737	(No. 8300-B) 8 Mfd. 300 V. Electrolytic Condenser	.90
738	(No. 8300-A) 8 Mfd. 300 V. Electrolytic Condenser	.90
739	(No. 6530)—65 Mfd. 30 V. Electrolytic Condenser	.90
740	Lattice Wound—R. F. Chokes Complete	.30
741	.01 Mfd. 1600 V. Buffer Cond. in Can (1783)	.45
742	.0025 Mfd. Mica Condenser	.20
743	.001 Type MI Mica Condenser	.15
744	Elkonode Socket with Spacer Pin	.20
745	2 Way Power Unit Plugs	.10
746	2 Way Receptacle (HBJ)	.15
747	3 Way Polarity Receptacle	.25
748	Sponge Rubber Elkonode Cushion	.20
	No. 77—Outer Housing	
749	7 Way Receptacle	.50
750	3 Contact Terminal Strip	.20
751	20 Turns No. 12 Wire, Eliminode Choke (Used in "A" Batt. Spkr. Field, Voice Coil and Power Unit Circuit	.20
752	26 Turns No. 16 Wire Hash Choke	.20
753	Volume Control Bracket (23-C)	.10
754	Antenna Receptacle Shield Assembly	.35
755	Red Dot Mica Condensers	.15
756	.01 Mfd. 300 V. Tubular Condensers	.15
	No. 77—Cables and Filters	
757	"A" Battery Cable	.20
758	2 Wire Speaker Cable	.20
759	Shielded Antenna Loom	.35
760	5/16-18x3" Set Mtg. Bolts	.05
	No. 77—Speakers	
761	Speaker Housing—6" Size (No. 150H)	.75
762	Short Section of Adjustable Speaker Stud	.20
763	Long Section of Adjustable Speaker Stud	.30
764	Speaker Stud Thumb Screw	.10
765	Complete Stud Assembly	.60
766	Metal Grill for 6" Speaker (No. 150DM)	.40
767	Complete Speaker and Housing for Model 77 with adjustable Mtg. Bolts and Cable	8.00
768	Magnavox Dynamic Speaker No. 150-D-77	6.25
769	Output Transformer for Same (No. 2120)	1.25
770	Cone and Voice Coil Assembly	2.00
	Speaker Replacement Charge	4.00

Motorola Models No. 77-A and 77-A "B" Series

Part No.	Description	List Price
	No. 77A and 77A-"B"—Control Unit	
801	Control Head Complete	$6.00
802	Flexible Shaft Complete with Worm Gear	3.50
803	Spacer Block	.20
603	Clutch Spring	.10
804	Crescent Filler Ring	.20
805	Hexagon Nut (Eccentric)	.15
806	Convex Glass Crystal	.25
807	Chrome Plated Bezel	.25
808	Mounting Strap	.25
809	Dial Plate	.25
810	Special Black Knob	.25
811	Cond. Gear (Specify Coarse or Fine Pitch)	.50
812	Keys (K-01) Each	.20
813	Dial Lite (No. 50)	.15
814	Drive Pinion	.20
815	Volume Control Center Tap (6641-C)	1.00
816	Dial Light Socket	.15
	No. 77A and No. 77A-"B"—Chassis	
817	3 Gang Variable Condenser (77-SM)	2.00
818	Variable Condenser Mounting Bracket	.10
819	Variable Condenser Mounting Screws	.05
820	Brass Wipers Doz.	.25
821	Variable Condenser Tension Screws	.10
846	"B" Power Unit Complete	12.00
847	2 Way Plugs	.10
848	5 Prong Socket with Spacer Pin	.15
849	Electrolytic Condenser (No. 8420)	1.20
850	5 Mfd. 160 Volt Condenser	.30
851	R. F. Choke on Mounting Strip	.30
852	T-60 or 70-B Elkonode	5.50
853	Power Transformer (No. 2270)	2.25
854	Filter Choke Coil (No. 2060-F)	1.00
855	.01—1600 V. Condenser for T-60 Elkonode	.40
856	Sponge Rubber Elkonode Cushion Rings	.10
857	Special Spray Shield	.30
	No. 77A and No. 77A-"B"—Outer Housing	
858	Front Cover	.50
859	Back Cover	.50
860	7 Way Receptacle	.20
861	Antenna Receptacle Assembly	.35
862	.2 Mfd. 200 V. Tubular Condenser	.30
863	.05 Mfd. 300 V. Tubular Condenser	.15
864	Plug Buttons	.03
865	20 Turns No. 12 Wire, Eliminode Chokes (Used in "A" Batt. Spkr. Field, Voice Coil and Power Unit Circuit)	.20
866	26 Turns No. 16 Wire Hash Choke	.20
880	Speaker Housing for 8" Speaker	.90
881	Speaker Grill for 8" Speaker	.40
882	Speaker Stud Bolt (Short)	.20
883	Speaker Stud Bolt (Long)	.30
884	Thumb Screw 3/8"x3/4"	.10
885	Comp. Speaker and Assembly for 77-A and B as housing with Mtg. Bolts, and Cables	10.75
886	F-6 Rola Speaker and Output Trans	8.50
887	Output Transformer Only	1.65
888	Cone and Voice Coil Assembly for Same	2.25
	Speaker Replacement Charge	4.00

Special for Model 79

Part No.	Description	List Price
1666	Iron core antenna coil	$2.00
1365-M	Special outer can cpt.	10.00
1366-M	Special front cover with speaker	6.25
1366-TC	Special blank front cover with tone cont.	2.50
1333	1 way antenna receptacle	.10
M-44	Low loss lead-in	1.25
1654	Dual generator condenser	.60
1493-C	No. 15 wire hash choke	.30

Model "80"

Part No.	Description	List Price
	Chassis	
	Chassis only—less tubes	$37.50
2002	Volume control bracket	.10
2003	Shaft support bracket	.10
2050	3-gang variable condenser	3.50
2051	Variable condenser mounting bracket	.15
2400	Shoulder screws 6BTS	.05
2053	Variable condenser adjustment cam	.05
2401	Variable condenser drive gear (K61A)	.25
2054	Variable condenser tension spring	.10
2168	Volume control	1.00
2023	Volume control funnel	.05
2071	Antenna coil (complete in can)	1.60
2073	R. F. coil (complete in can) plate choke	1.00
2075	Oscillator coil (complete in can)	1.00
2077-A	I. F. coil (complete in can)	1.25
2079	Diode coil (complete in can)	1.60
2407	Metal tube sockets (state type No.)	.15
2408	No. 6N6 socket (special) 8-7 prong	.15
2034	2-way receptacle	.15
2035	5-way receptacle	.35
2038	Eliminode and chassis wiper	.20
1937	D/L mounting strip	.10
2409	Grid caps for metal tubes (per doz.)	.25
2410	.00005 mfd. type "O" condenser	.15
1039	.0001 mfd. type M. T. condenser	.15
1040	.0003 mfd. type M. T. condenser	.15
1041	.0005 mfd. type M. T. condenser	.15
1400	.01 mfd. 100 V. T. T. condenser	.12
2231	.01 mfd. 300 V. T. T. condenser	.15
2252	.05 mfd. 400 V. T. T. condenser	.20
	Outer Housing	
2008	Front cover, less ornaments	$1.75
2009	Rear cover	1.50
2254	.05 mfd. 25 V. condenser	.15
2278	.01 mfd. 100 V. and 500M ohm resistor	.30
2256	.1 mfd. 200 V. condenser	.15
2257	.1 mfd. 25 V. condenser with mounting strap	.20
2264	.25 mfd. 300 V. condenser	.30
1403	.03 mfd. 100 V. condenser	.15
1777	Resistors (state value)	.15
2273	.005 mfd. 100 V. condenser	.12
2095	Input choke	1.25
2096	Output transformer	1.25
2187	Tone control—110,000 ohm	.50
2170	Tone control knob	.10
	"B" Power	
2097	Power transformer	$2.50
2030	Vibrator hold down clamp	.10
2020	Transformer can	.35
2021	Transformer can base	.10
2098	Filter choke (35 mills)	.70
2115	3 layer hash choke	.30
2116	3 layer hash choke	.30
1988	Power choke complete in shield	.35
2404	Elkonode	4.50
2185	Electrolytic condenser	2.00
2259	.5 mfd. 120 V. condenser	.40
2268	.005 mfd. 1600 V. condenser	.50
2411	.0008 mfd. 1000 V. M. W. condenser	.15
2033	Vibrator socket 4 prong spec.	.10
1472	Grill screen	.10
2175	Speaker cable with pin prongs	.35
1300	Small pin prongs	.08
1301	Large pin prongs	.08

Model 80 (Cont.)

Part No.	Description	List Price
2198	Medallion plates (each)	.50
2199	Name plate	.50
1792	Black plug buttons (large)	.03
2412	Black plug buttons (medium)	.03
1500	Black plug buttons (small)	.03
2018	Jiffy mounting bracket	.60
2019	Set mounting contact wiper	.10
2017	Set mounting bolts	.05
2172	5/16 x 3/8 in. H. H. P. K. screws	.05
2171	5/16-18 hex. steel nuts self-locking	.05
	Speaker	
	Speaker only—see page 1.	
1375	Speaker housing	$0.90
1376	Speaker bezel	.60
2169	Grill cloth	.15
2155	Short speaker stud	.20
1118	K-385 Long speaker stud	.30
1797	K-250 2½ in. steel washer	.05
1809	3/8 x 16 hex. steel nuts (per doz.)	.25
	3/8 x 16 x 3/4 in. thumb screw	.05
	3/8 in. iron washer (per doz.)	.25
	3/8 in. lockwasher (per doz.)	.25
2413	Cone and voice coil	2.75
2414	Field coil	2.00
2096	Output transformer	1.25
	Speaker replacement	4.00

NOTE: Due to the fact that speaker cones cannot be replaced by the service man in the field, it will be necessary to return all speakers to us for service. A charge will be made for parts and service according to the above rate (1799-1800).

M-99

Part No.	Description	List Price
	Airplane Type Control Head	
2205	Pointer disc assembly	$0.25
2206	Dial plate (background)	.10
2207	Etched glass dial face	.25
2208	Bezel ring	.15
2415	K-13 stop set screws for knobs (per doz.)	.25
1008	Dial crystal	.15
2144	Felt washer for bezel	.05
1807	Dial light assembly less bulb	.30
1007	No. 50 6/8 volt dial light	.15
	3 ft. No. 20—1/64 black wire and plug	.10
2225	Tuning shaft, 25 13/16 in.	1.00
2226	Volume control shaft, 26 7/16 in.	1.00
1326	Flexible shaft bushings	.30
1759	K-218 Wire clips (per doz.)	.15

Motorola Model 100

Part No.	Description	List Price
	Control Unit	
1750	Model 100—Control head cpt. less shafts	$5.00
1761	Pair flexible shaft cpt. (30 ins. long)	2.00
1761-A	Pair flexible shafts cpt. (24 ins. long)	2.00
1761-B	Pair flexible shafts cpt. (18 ins. long)	2.00
1761-C	Pair flexible shafts cpt. (36 ins. long)	2.00
1473-4	Vol. control shaft cpt.	1.00
1473-5	Tuning shaft cpt.	1.00
1751	Tone control knob (K-37)	.10
1752	Tone control resistance unit (K-36)	.25
1753	Tone control assembly cpt. less resistor	.25
1754	Tuning knob (chrome plated)	.20
1755	Key knob (Vol. control) (chrome plated)	.20
1006	Keys per pair	.25
1007	Dial lite No. 50	.15
1008	Dial crystal	.15
1756	Mounting bracket for steering post	.15
1533	Glass Dial face	.30
1530	Black background plate	.10
1531	Retainer ring for dial face	.05
1532	Pointer disc	.05
1033-A	Bezel ring and cork gasket	.15
1763	Dial light assembly cpt.	.30
1015	Horseshoe washer (per dozen)	.25
1012	Die cast gear for variable	.25
1757	Pointer disc and shaft assembly cpt.	.15
1758	Idler gear and shaft	.15
1399	Volume control	1.00
1759	Clip fasteners for T.C. and D.L. wires (per dozen)	.15
1326	Bushing for end of flexible shafts	.30
1422	Volume control shaft fitting	.15
1420	Drive shaft Pinion fitting	.15
1760	Pinion fitting for key	.15
1762	Flexible shafts any length (per ft. each shaft)	.40
1772	Steel gears	.05
1773	Tin sleeves for vol. control shaft	.05
1774	1/4 x 3/8 in. fill. head screw for mtg. control	.03
	Chassis	
1303	3 gang variable condenser	$2.50
1311	Tube shield (finished type)	.50
1520	Variable tension spring	.05
1312	Variable condenser shield	.25
1331	4 way receptacle	.15
1348	1 way ant. receptacle	.10
1776	Sockets (state type)	.10
1439	1000 mmf. padder condenser	.50
1482	Antenna coil cpt. in can (76 tube)	1.50
1581	New type antenna coil cpt. in can (37 tube)	.75
1483	R.F. coil cpt. in can and plate choke	.75
1583	New style R.F. coil cpt. in can and plate choke	.75
1485	Oscillator coil cpt. in can	.90
1850	I.F. Coil cpt. in can (K-685)	1.50
1855	Diode coil cpt. in can (K-690)	1.50
1585	New Style I.F. coil cpt. in can	1.50
1587	New style diode coil cpt. in can	1.30
1586	New style plate choke only	.20
1779	Output transformer only	1.25
1780	Input audio choke only	1.25
1630	Iron core antenna coil cpt. in can	2.00
10857	Audio and output transformer assembly (76 tube)	2.50
1554	Audio and output transformer assembly (37 tube)	2.50
1040	.003 mfd. mica condenser	.15
1041	.0005 mfd. mica condenser	.15
1042	.0005 mfd. mica condenser (1000 volt—white dot)	.20
1400	.01 mfd. 100 volt condenser	.12
1401	.02 mfd. 200 volt condenser	.25
1402	.25 mfd. 300 volt condenser	.30
1404	.05 mfd. 400 volt condenser	.18
1406	.02 mfd. 400 volt condenser	.15
1407	.01 mfd. 300 volt condenser	.25
1409	.05 mfd. 120 volt condenser	.15
1791	Any length speaker cable cpt. (state length) (per foot)	.15
1327	Bushing for ant. and M/N.	.30
1412	.03 mfd. 400 V. condenser and coil	.35
1403	.03 mfd. 25 V. condenser	.12
1408	.5 mfd. 25 V. condenser	.50
1041	.0005 mfd. mica condenser	.15
1497	40 T—No. 18 wire hash choke	.20
1494	50 T—No. 18 wire hash choke	.20
1491	6 T—No. 18 wire hash choke	.20
1792	Black plug buttons	.03
1793	Set mounting studs (K-3536)	.05
1794	Shakeproof lockwashers (4018-32)	.03
1795	2¼ in. steel washers (K-225)	.03
1796	8x1¼ in. oval hd. self tapping screws (per 100)	1.00
	Speaker	
1470	8 in. dynamic speaker (Early Model)	$4.00
1570	8 in. dynamic speaker (Late Model)	6.00
1375	Speaker housing only	.90
1410	.01 mfd. 100 volt & .0 M. ohm condenser and padder	.15
1412	.03 mfd. 400 volt and coil condenser tone control	.35
1568	.002 mfd. 100 volt and 25 M. ohm condenser and padder	.20
1777	Resistors (state value)	.15
1433	500 ohm candohm resistors	.25
1436	50-70 ohm candohm resistors	.25
1438	290 ohm and 200 ohm variable resistor	.40
	"B" Power Unit	
1781	Power transformer (2988)	$2.50
1782	Filter choke (2543-D)	.70
1388	Electrolytic condenser (8/8/25 mfd. 350/350/25 volt	1.75
1307	Transformer can	.40
1309	Elkonode socket case	.15
1308	Cover for same	.10
1306	Choke and condenser shield can	.25
1350	Elk. contact washer	.05
1783	Perforated tube shield (G-621-U)	.15
1784	Mallory Elkonode (53T)	4.50
1785	Radiart Vibrator (3815-B replaces all models)	4.50
1786	Spec. elkonode for 12 volt operation (G-53 T)	5.50
1405	5 mfd. 50 v. condenser	.35
1403	.03 mfd. 120 v. condenser	.12
1406	.02 mfd. 400 v. condenser	.20
1413-0	.01 mfd. 1600 v. condenser (oil type)	.50
1567	.01 mfd. 1600 v. condenser (wax type)	.35
1419	.02 mfd. 1000 v. condenser	.25
1572	.02 mfd. 1000 v. condenser	.35
1787	Lattice wound hash choke assembly (77-E)	.25
1588	New style hash choke	.25
1588-C	New style hash choke mtd. in shield	.35
1497-C	Hash choke (paper tube)	.20
1788	Hash choke (3 layer pie wound) (K-6810A)	.35
1315-C	Model 100—outer can cpt. with Eliminode system and cables, less covers	$10.00
1315-M	Same except for 110 Model	11.00
1317	Back C. er only	1.00
1316	Front cover only	1.00
1316-C	Front cover cpt. with name plate	1.25
1789	Eliminode travel section cpt. with choke and bracket, ready to mount	1.50
1314	Terminal strip	.20
1350	4 way male plug	.20
1347	1 way ant. plug	.10
1341	"A" battery cable	.25
1343	Antenna lead in and bushing cpt.	.60
1546	Motor noise lead in bushing cpt.	.60
1545	Antenna lead in (new style)	.40
1545-A	Motor noise lead in (new style)	.40
1344	Shielded loom for ant. junction box	.15
1790	Junction box assembly cpt.	.50
1333	Antenna receptacle (small prong)	.10
1338	Motor noise receptacle (large prong)	.10
1300	Small pin cable prong	.08
1301	Large pin cable prong	.08
1374	Small fibre extruded washers (per dozen)	.30
1390	Long condenser plates	.05
1391	Round condenser plates	.05
1568	Insulator for round cond. plates (per doz.)	.30
1389-A	Insulator for 6 long condenser plates, each	.10
1476	Insulator for single long condenser plate (per dozen)	.30
1437	1/2x3/8 in. wooden dowel (per dozen)	.30
1440	1/2x1/8 in. wooden dowel (per dozen)	.30
1369	Small hash choke (pie wound)	.15
1351	Steel gear for elim. adjust.	.15
1337	1/4 in. eliminode travel screw	.10
1305	Ground clamp	.10
1342	3½ ft. speaker cable cpt. with term. prongs	.35
1502	Motorola name plate	.50
1376	Chrome plated speaker bezel	.60
1472	Wire screen for speaker	.10
1431	Grill cloth for speaker	.25
1117	Short speaker stud (K-382)	.20
1118	Long speaker stud (K-385)	.30
1797	2½ in. steel washers	.03
1798	Speaker cpt. in housing with mtg. studs, etc.	8.60
1799	Speaker cone and voice coil (replaced at the factory)	2.75
1800	Speaker field coil (replaced at the factory)	2.00
1809	3/8-16 x 3/4 Thumb Screw	.05
	Speaker Replacement	4.10

NOTE: Due to the fact that speaker cones cannot be replaced by the service man in the field, it will be necessary to return all speakers to us for service. A charge will be made for parts and service according to the above rate (1799-1800).

Special for Model 110

Part No.	Description	List Price
1630	Iron core antenna coil	$2.00
1315-M	Special outer can complete	11.00
1612-C	Special tone control assembly	.60
1333	1 way antenna receptacle	.10
M-44	Low loss lead-in	1.25
1654	Dual generator condenser	.60
1493-C	No. 15 wire hash choke	.30

Special Accessories for 1935 Ford Models

Part No.	Description	List Price
1442F	8 Ft. Speaker Cable	$1.00
1458-FC	Model F-57 Special Front Cover complete	2.50
1844	Special Ford Ant. Junction Box (All Models)	.60
1646	Overhead Speaker Mounting Bracket only	1.50
1645	Bezel Ring for same	.60
1644	Grill Screen for Ford or Studebaker	.25
M-51	Bezel Ring and screws for Studebaker Net	.35
1643	Grill Cloth for Ford or Studebaker	.15
1640-F	6" Dynamic Speaker for Overhead Mounting (all models)	4.00
1844-A	Ford Overhead Speaker complete with Bracket, Bezel and Cable, ready to mount	6.50
1366-FC	Model F-75 Special Front Cover complete	2.50
1651-F	Terminal Strip for Front Cover	.20
1647	Tin Shield Can for Front Cover Eliminode	.25
1403	.03 Mfd. 120 Volt Condenser	.12
1400	.01 Mfd. 100 Volt Condenser	.12
1777-D	Hash Choke	.20

GAMBLE-SKOGMO, INC.

MODEL 5-Y
Schematic, Voltage
Socket, Trimmers, Parts

VOLTAGES AT SOCKETS

Input 6.3 Volts—Antenna Disconnected at Connector

Type of Tube	Function	Volts at Heater	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M.A.
6D6	R. F.	6.2	154	95	3.0	5.2
6C6	1st Det. & Osc.	6.2	160	97	0	3.0
6D6	I. F.	6.2	154	95	3.0	5.2
75	2nd Det. & 1st A. F.	6.2	110	—	1.	.25
41	Power	6.2	143	146	14.	13.0

Dec, 1934

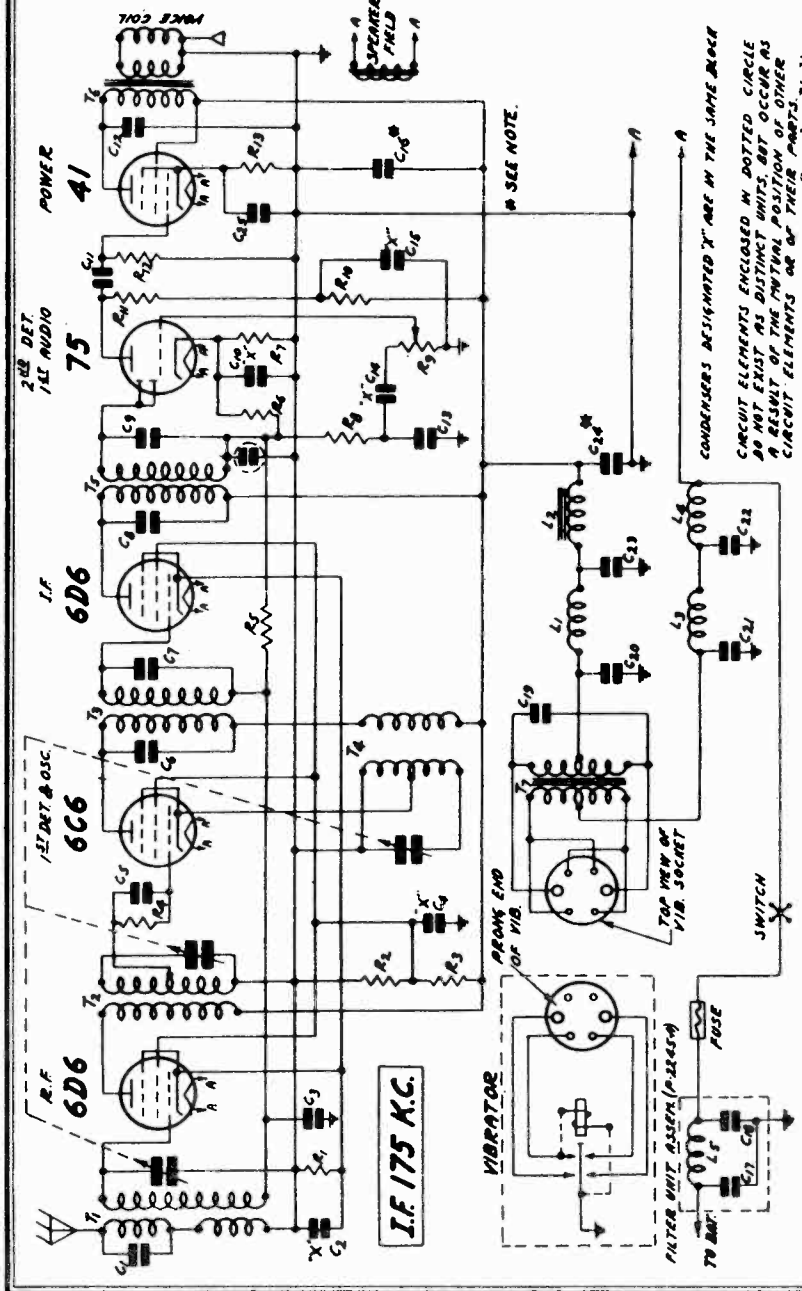


Fig. 1—*Schematic Circuit Diagram*

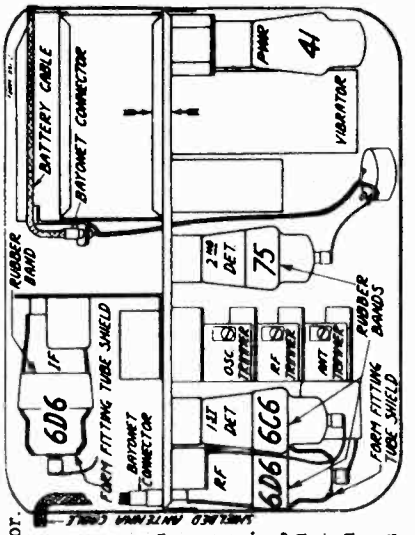


Fig. 2—*Location of Tubes and Vibrator*

On the Voltage Chart are given the voltages at the sockets with all tubes in and the set in operating condition. The antenna should be disconnected at the bavonet connector.

CONDENSERS

Part No.	Code	Capacity	Voltage	Type
P-81814	C1	250 mmf.	Part of Antenna Coil Assembly	
	C2	.50 mf.	200V.	Bypass Block
	C4	.10 mf.	140V.	
P-82600D	C10	.25 mf.	140V.	
	C14	.05 mf.	300V.	
	C15	.10 mf.	200V.	
P-81116	C3	.05 mf.	200V.	Tubular
P-81815	C5	.35 mmf.	Part of Grid Leak Assembly	
P-81806	C6	70 mmf.	Part of 1st I. F. & Osc. Coil Assembly	
	C7	70 mmf.		
P-81806	C8	70 mmf.	Part of 2nd I. F. Coil Assembly	
	C9	70 mmf.		
P-81115	C11	.05 mf.	300V	Tubular
P-81114	C12	.006 mf.	600V.	Tubular
P-81814	C13	250 mmf.		Moulded
P-81132	C16	.10 mf.	300V.	Tubular
	C17	.01 mf.	120V.	In Choke Condenser Unit
	C18	.01 mf.	120V.	
P-81120	C19	.007 mf.	1600V.	Tubular
P-81122	C20	.10 mf.	300V.	Tubular
P-81121	C21	.50 mf.	140V.	Tubular
P-81816	C22	.002 mf.		Moulded
P-82002	C23	4.0 mf.	250V.	Dry Electrolytic Block
	C24	2.0 mf.	250V.	
P-82500	C25	4.0 mf.	25V.	
	Gang	Condenser		

RESISTORS

Part No.	Code	Resistance	Watts	Type
P-B94351ww	R1	350 Ohm	.5	Flexible Wire Wound
P-B95253	R2	25,000 Ohm	.5	Carbon
P-B95103	R3	10,000 Ohm	.5	Carbon
P-A95105	R4	1 Megohm	.2	Carbon
P-A95105	R5	1 Megohm	.2	Carbon
P-A95504	R6	500,000 Ohm	.2	Carbon
P-A94752	R7	7,500 Ohm	.2	Carbon
P-A95104	R8	100,000 Ohm	.2	Carbon
P- 96017	R9	2 Megohm		Volume Control and Switch
P-A95503	R10	50,000 Ohm	.2	Carbon
P-A95204	R11	200,000 Ohm	.2	Carbon
P-A95504	R12	500,000 Ohm	.2	Carbon
P-B94801ww	R13	800 Ohm	.5	Flexible Wire Wound

In the first models of this receiver a bypass condenser block (P-82600) containing condensers: C2, C4, C10, C14, C15 and C16 was used. Condenser C16 was removed in the later models and added as a separate tubular condenser (P-81132) while the other condensers remained in the block (P-82600-D).

A second condenser change from the earlier models was in the electrolytic filter block (P-82002). In this block section C24 was changed from an 8 mfd., 250 volt to a 2 mfd., 250 volt condenser.

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself as broad tuning and lack of volume at portions or all of the standard wave band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attemped unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the standard wave band and an output meter are required for indicating the effect of adjustments.

First remove the cover of the box. Leave the antenna and battery cables connected to the chassis.

Disconnect the car antenna and connect antenna cable lead to the lead from the signal generator.

Set the signal generator for 1650 K. C. Turn the rotor to the full open position. The antenna lead from the signal generator adjustment is connected to the antenna lead of the receiver. Adjust the trimmer of the oscillator section of the 3 gang condenser until maximum output is obtained. The oscillator section is the one with the cut plate rotor.

Now set the signal generator for 1400 K. C. and turn the rotor until maximum output is obtained. Adjust the other two trimmers on the gang condenser for maximum output.

To calibrate the receiver, tune in a station of known frequency at about the center of the dial. Remove the escutcheon plate and glass. The pointer is held in position by friction. Grasp the pointer at the center and turn it until it points to the frequency of the station being received.

The use of the cut plate type of condenser eliminates the necessity of a 600 K. C. padder and, therefore, no adjustment at this frequency is required.

Adjusting Antenna Trimmer

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

Removing Chassis From Case

First unsolder the black, brown, yellow, and green speaker leads which connect to the terminal strip adjacent to the vibrator unit. Next, notice the small length of braided shielding which is soldered to the solder lug that is secured to the chassis case between the dial scale and the station selector control shaft. Unsolder this shielding at the lug.

Remove the 4 screws which hold the chassis in the case — 2 are in the side and 2 on the speaker panel of the chassis case. (Do not remove the four speaker mounting screws.)

Remove the two control knobs by pulling them off of the shaft.

Next remove the volume control. To do this first loosen the hexagonal nut on the inside of the case with a flat wrench. Then unscrew and remove the round knurled nut from the front.

The chassis may then be taken out.

Replacing Vibrator Unit

The vibrator unit is plugged in in the same manner as a tube. This unit may, in case of failure, be readily replaced. CAUTION—Polarity, as explained in the label on the unit and in the label on the metal box in the chassis, must be observed when plugging in vibrator unit.

In replacing the vibrator unit be sure to replace the corrugated cardboard pad, which prevents the unit from working its way out of the socket.

When servicing this receiver, a new vibrator unit should be tried out in the same manner as a new set of tubes would be tried out.

One or more vibrator units should be kept on hand for replacement purposes.

Replacing Volume Control

To remove the volume control and the switch, first pull the knob from the volume control shaft. Next loosen the hexagonal nut on the inside of the case with a flat end wrench. Then unscrew and remove the round knurled nut from the front.

The old volume control and switch connections may now be unsoldered and the new unit put in its place and the leads resoldered.

Fasten the volume control to the case in the reverse order in which it was removed.

D. C. Resistance of Windings

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

Part No.	Item	Code	D.C. Resistance in Ohms
P-5247	Antenna Trans. Pri. in Series	T1	17.50
P-5248	Antenna Trans. Sec.	T1	5.25
	R. F. Interstage Trans. Pri.	T2	2.31
	R. F. Interstage Trans. Sec. (Center Tap to Inside)	T2	3.23
	(Center Tap to Outside)		3.98
P-5249	1st I. F. Trans. Primary	T3	100.00
	1st I. F. Trans. Secondary	T3	100.00
	Oscillator Cathode Coil (Total)	T4	4.50
	Oscillator Plate Coil	T4	9.00
P-5250	2nd I. F. Trans. Pri.	T5	100.00
	2nd I. F. Trans. Sec.	T5	100.00
P-50656	Power Trans. Pri.	T7	0.36
	Power Trans. Sec.	T7	860.00
P-5174	"B" R. F. Choke	L1	1.65
P-50657	Power Choke	L2	390.00
P-5251	"A" Choke	L3	Small
P-5253	Line Choke	L4	Small
P-5252	Choke Coil	L5	Small
	Output Trans. Pri.	Tr	440.00
P-2228	Output Trans. Sec. and Voice Coil in Par.		0.80
	Speaker Field		6.00

When ordering parts be sure and give the part number. Also give the complete serial number which includes the Series No.

Part No.	Item
P-1885	6H6 Tube Socket
P-1886	6C6 Tube Socket
P-1775	75 Tube Socket
P-1911	41 Tube Socket
P-5247	Antenna Coil Assembly Less Can
P-40415B	Can for above assembly Part of Gang Condenser Assembly
P-5248	R. F. Inter-stage Coil Assembly Less Can
P-40447C	Can for above assembly -Part of Chassis Assembly
P-5249	1st I. F. and Oscillator Coils and Can Assembly
P-5250	2nd I. F. Coil and Can Assembly
P-2248	Dynamic Speaker
P-10159	Cardboard Baffle for Speaker
P-2228	Vibrator Unit
P-3030	Vibrator Socket
P-50656	Power Transformer
P-5251	R. F. "A" Choke Coil
P-5174	R. F. "B" Choke Coil
P-50657	Power Choke Coil Assembly
P-5253	Filament Choke Coil
P-2220	2 Half Tube Shields with Clamping Ring
P-2240	Grid Leak and Condenser Assembly
P-2224	Knobs
P-20940	Thumb Screws
P-10356	Glass Crystal
P-10361	Gasket for Glass Crystal
P-30342A	Grid Clip only
P-10233	Wide Rubber Bands for Tubes
P-70974	Shielded Antenna Cable
P-70781	"A" Battery Cable
P-1421	Single Lug Terminal Strip
P-3882	Double Insulated Terminal Strip
P-2232	Five Lug Terminal Strip
P-1933	Cinch Terminal Lug
P-20701	Drive Tension Spring
P-20953	Horse-shoe Lock (Washer)
P-3227	Dial Strip
P-20954	Dial Pointer

Replacing Drive Cord

The drive cord in this receiver may be replaced as follows:

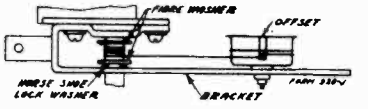


Fig. 3—*Cord Drive—Top View*

First remove the chassis from the case as explained on page 4.

Some of the first models did not have two fibre "end" washers on the drive shaft to protect the drive cord as shown in Fig. 3. If this is the case, these washers should be put on as follows:

Separate and take off the horse-shoe lock washer which holds the drive shaft in position. This may be done with a fine jawed, long nose plier.

Now pull the drive shaft out just far enough to permit the two fibre washers to be slipped over the end of the shaft.

Then slip the shaft back into place and replace the horse-shoe lock washer.

Knot one end of the new drive cord and with the condenser plates in a completely closed position, slip the drive cord through the small hole "A" in the drive drum — see Fig. 4. The knot will then be on the inside of the drum.

Now wrap the cord around the lower half of the drive drum as indicated and bring it up to the drive shaft. Proceed by wrapping it in a clockwise direction (front) around the drive shaft three and one-quarter turns between the two fibre washers, progressing towards the front of the chassis. Be sure that the condenser plates are kept in a closed position and that the cord is held tight.

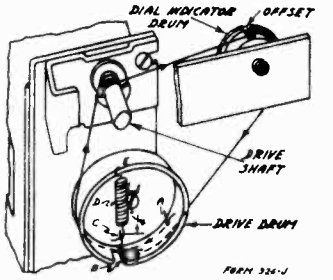


Fig. 4—*Cord Drive Replacement*

Set the dial indicator drum so that the offset is at the top or a little to the right of the center — see Fig. 4.

Wrap the cord from the drive shaft once around the offset in the dial indicator drum and then approximately one and one-half turns around the drum itself in a clockwise direction, progressing toward the back.

From the dial indicator drum draw the cord over the lower right hand quarter of drive drum as shown in Fig. 4.

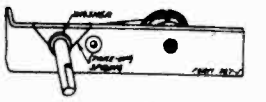


Fig. 5—*Drive "Take-up" Spring*

Then bring the cord inside of the drum by way of the turned-in portion of the flange at "B".

Tie the drive tension spring "D" to the loose end of the cord at the point "C" just above the top edge of the lip "B" as shown in the illustration. This should be done so that the lower hook of spring "D" at point "C" will be between ⅛" and ⅜" from top edge of the turned-in portion of the flange "B" in the flange of the drive drum. After the spring is hooked and the drive turned over several times the tension in the cord will cause this distance to become about ¼".

Now, by applying a tension on the drive spring "D", hook the other end of the spring into the small hole "E" near the top of the drive drum. Hook spring from the inside out.

After the cord has been put on it may be necessary to calibrate the receiver as explained in the article on condenser alignment.

All of the earlier models did not have drive shaft "take-up" springs. This spring will prevent any tendency toward change of setting should the receiver be subjected to vibration. To insert these springs and fibre washers on the drive shaft proceed as follows:

Remove the station selector knob by pulling it off of the shaft.

Slip the small fibre washer over the shaft and clip the "take-up" spring to the drive bracket as shown in Fig. 5.

The chassis may now be replaced into the case in the reverse order of the manner in which it was removed.

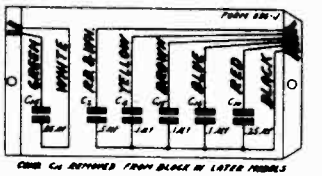
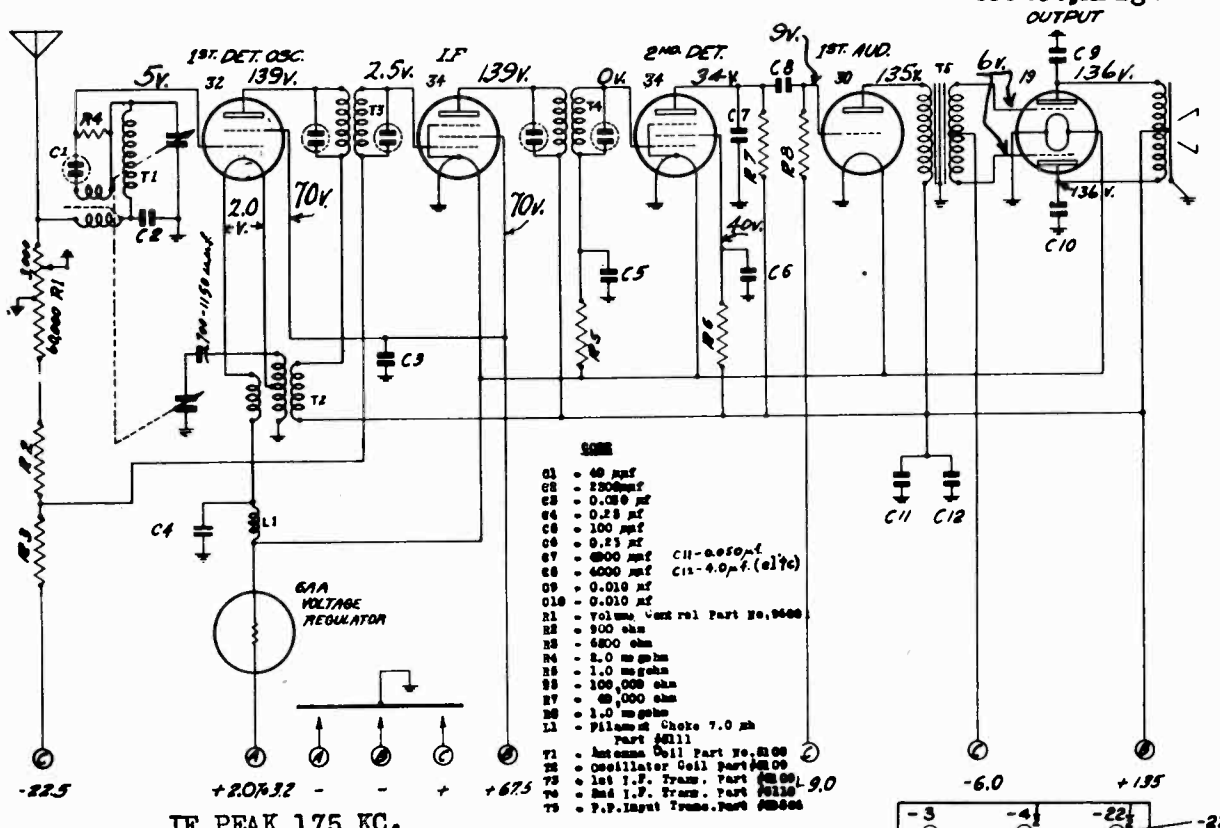


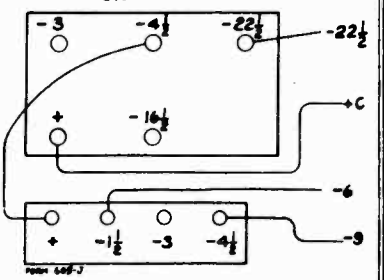
Fig. 6—*Condenser Block Internal Wiring*

Fig. 7—*Electrolytic Block Internal Wiring*

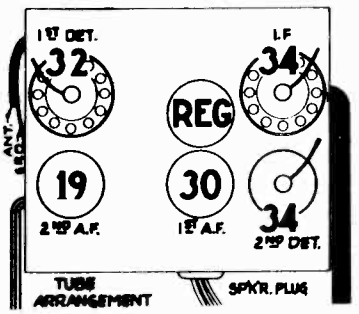
GAMBLE-SKOGMO, INC.

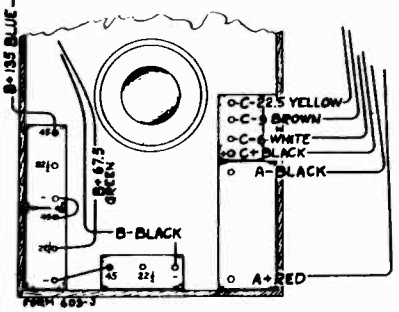
MODEL 06-A
Schematic, Voltage
Socket, Alignment





Optional "C" Battery Connections





Tube Arrangement and Battery Connections

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself is broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the broadcast band and an output indicating meter are advisable. The procedure is as follows:

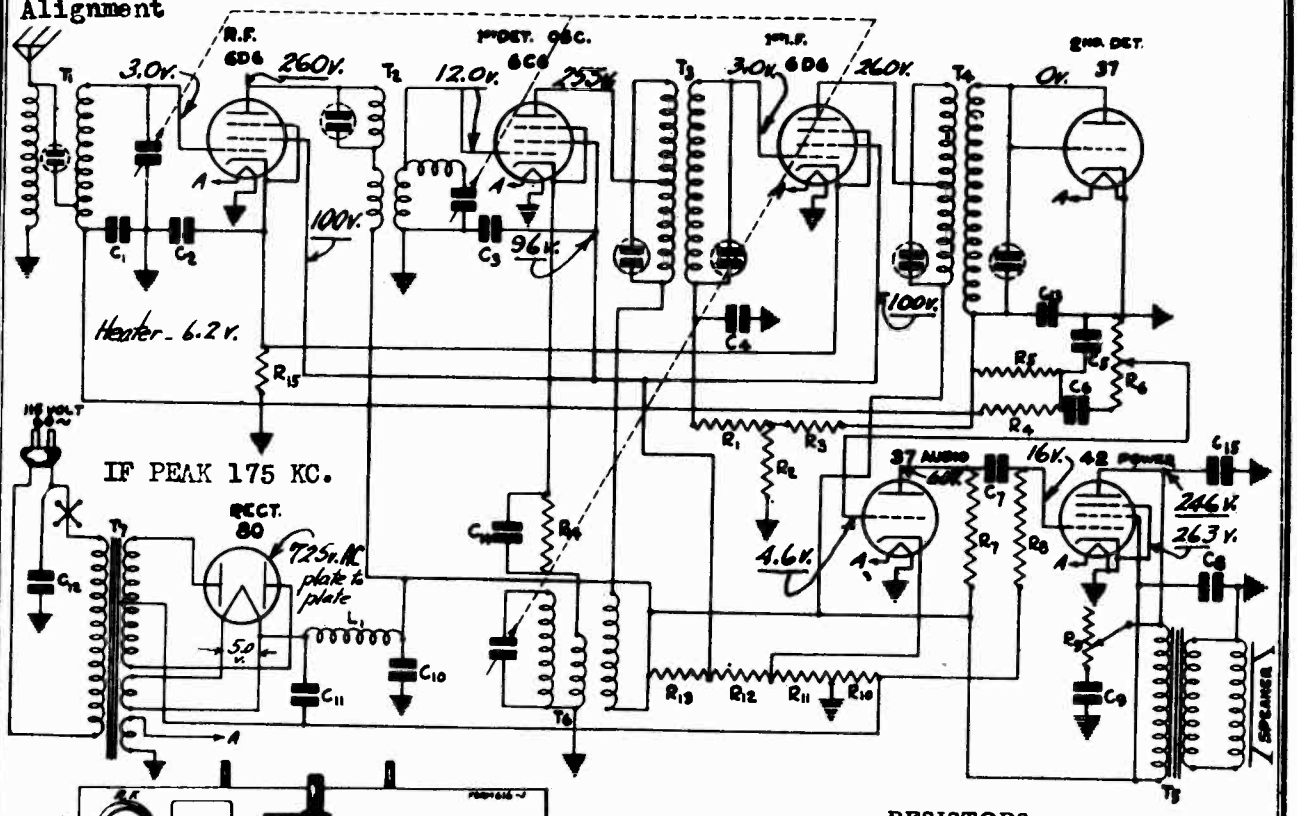
As the I.F. stages are self-tuned, no I.F. aligning at the intermediate frequency of 175 K.C. is required.

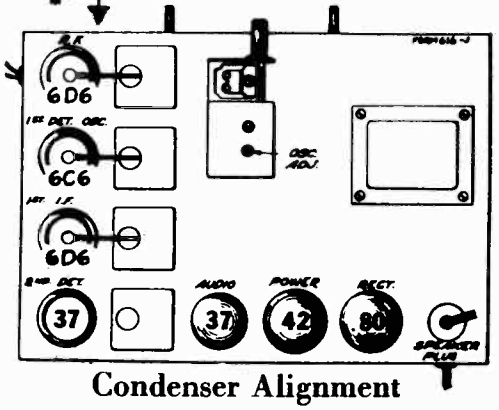
First set the signal generator for a signal of exactly 1400 K.C. Connect the antenna lead from the signal generator to the antenna lead of the receiver and the ground lead of the signal generator to the ground of the receiver. Then turn the tuning condenser rotor until the marker is at 1400 K.C. on the dial scale. Adjust the two trimmers on the tuning condenser for maximum output adjusting the oscillator trimmer first.

Next set the signal generator for a signal of 600 K.C. and adjust the oscillator 600 K.C. trimmer. The adjusting screw will be seen at the side of the tuning condenser and is reached from the top of the chassis. A non-metallic screw-driver is necessary for this adjustment. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting at the same time adjusting the 600 K.C. trimmer screw until the highest output is obtained.

MODEL 07-A
Schematic, Voltage
Socket, Trimmers, Parts
Alignment

GAMBLE-SKOGMO, INC.





Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself in broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the broadcast band, and an output indicating meter are desirable. The procedure is as follows:

As the I. F. stages are fixed tuned, no I. F. alignment at the intermediate frequency of 175 K. C. is required.

First set the signal generator for a signal of exactly 1400 K. C. Connect the antenna lead from the signal generator to the antenna lead of the receiver, and the ground lead from the signal generator to the ground lead of the receiver. Set the dial pointer on the 1400 K. C. mark on the dial scale and adjust the three trimmer condensers on the gang tuning condenser for maximum output, adjusting the oscillator trimmer first.

RESISTORS

Part No.	Code	Resistance	Type	List Price
P-A95105	R1	1 megohm	Carbon	$0.25
P-A95503	R2	50,000 ohm	Carbon	.25
P-A95154	R3	150,000 ohm	Carbon	.25
P-A95205	R4	2 megohm	Carbon	.25
P-A95104	R5	100,000 ohm	Carbon	.25
*	R6	1 megohm	Vol. Control & Switch	1.25
P-A95204	R7	200,000 ohm	Carbon	.20
P-A95204	R8	200,000 ohm	Carbon	.20
*	R9	150,000 ohm	Tone Control	.80
P-A98002	R10	250 ohm	Armoured Wire Wound	1.00
	R11	800 ohm		
	R12	20,000 ohm		
	R13	18,000 ohm		
P-A93452	R14	4,500 ohm	Carbon	.25
P-A94201	R15	200 ohm	Carbon	.20

"A" preceding the number signifies .2 watt.
"B" preceding the number signifies .5 watt.
"C" preceding the number signifies 1.0 watt.
*When ordering these parts specify shaft length and series number of receiver.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

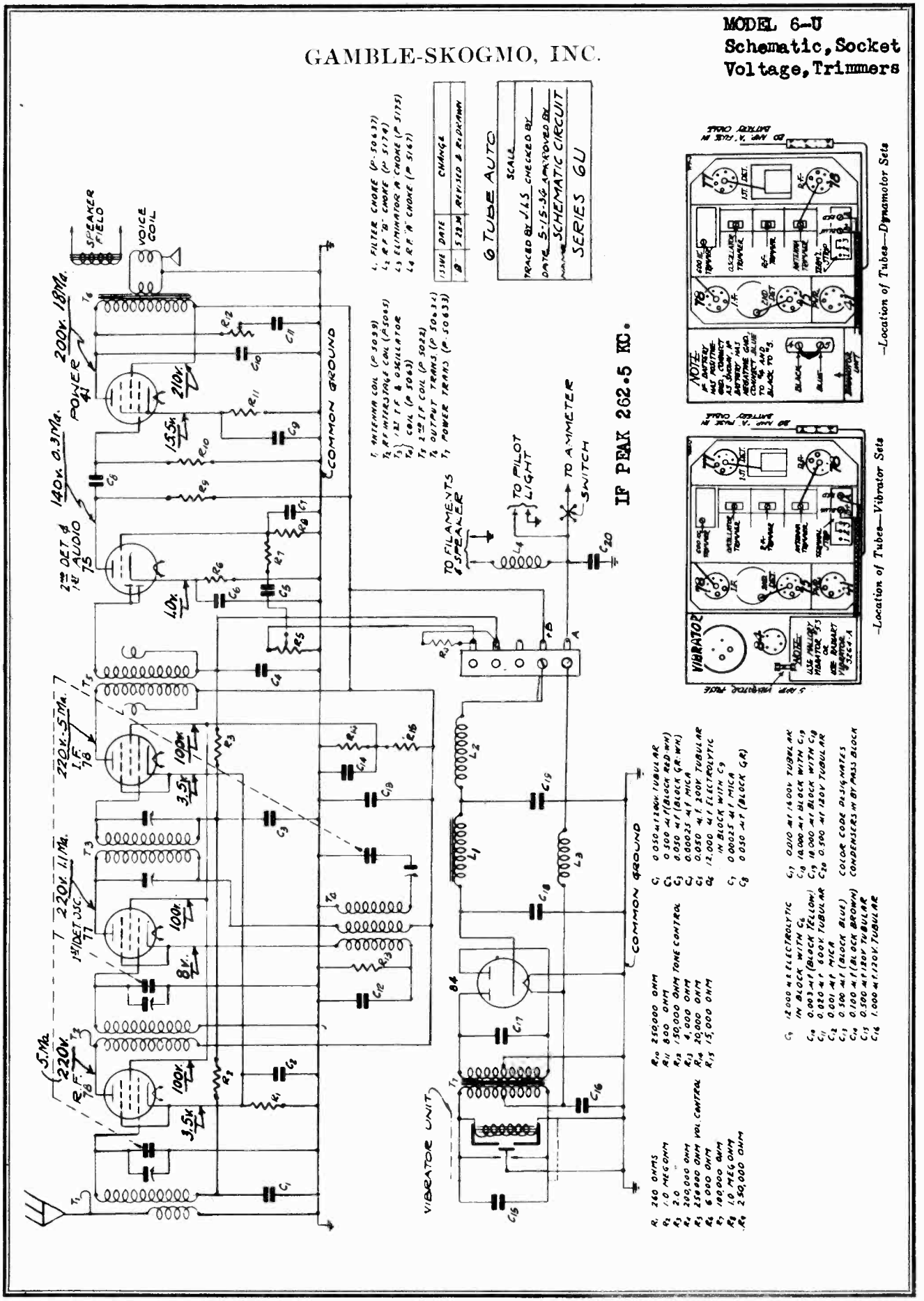
CONDENSERS

Part No.	Code	Capacity	Voltage	Type	List Price
P-80862	C1	.050 mfd.	200 V.	Tubular	$0.30
P-80864	C2	.10 mfd.	200 V.	Tubular	.30
P-80888	C3	.25 mfd.	200 V.	Tubular	.40
P-80862	C4	.050 mfd.	200 V.	Tubular	.30
P-80919	C5	250 mmfd.	600 V.	Moulded	.20
P-80862	C6	.050 mfd.	200 V.	Tubular	.30
P-80890	C7	.050 mfd.	400 V.	Tubular	.20
P-80930	C8	.25 mfd.	400 V.	Tubular	.30
P-80890	C9	.050 mfd.	400 V.	Tubular	.20
P-80916	C10	8.0 mfd.	450 V.	Electrolytic	1.50
P-80990	C11	16.0 mfd.	450 V.	Electrolytic	2.00
P-80997	C12	.010 mfd.	600 V.	Metal can	.50
P-80919	C13	250 mmfd.	600 V.	Moulded	.20
P-80914	C14	.002 mfd.	600 V.	Tubular	.20
P-80914	C15	.002 mfd.	600 V.	Tubular	.20
P-80991	Three Gang Condenser				3.85

The tuning condensers are all adjusted at the factory for the correct relative capacity between the oscillator section and the other two sections. As a rule no adjustment other than at 1400 K. C., as mentioned above, is required.

GAMBLE-SKOGMO, INC.

MODEL 6-U
Schematic, Socket Voltage, Trimmers



MODELS 7J-512, 7J-574
Voltage, Socket, Trimmers
Color Coding, Phono-Data

GAMBLE-SKOGMO, INC.

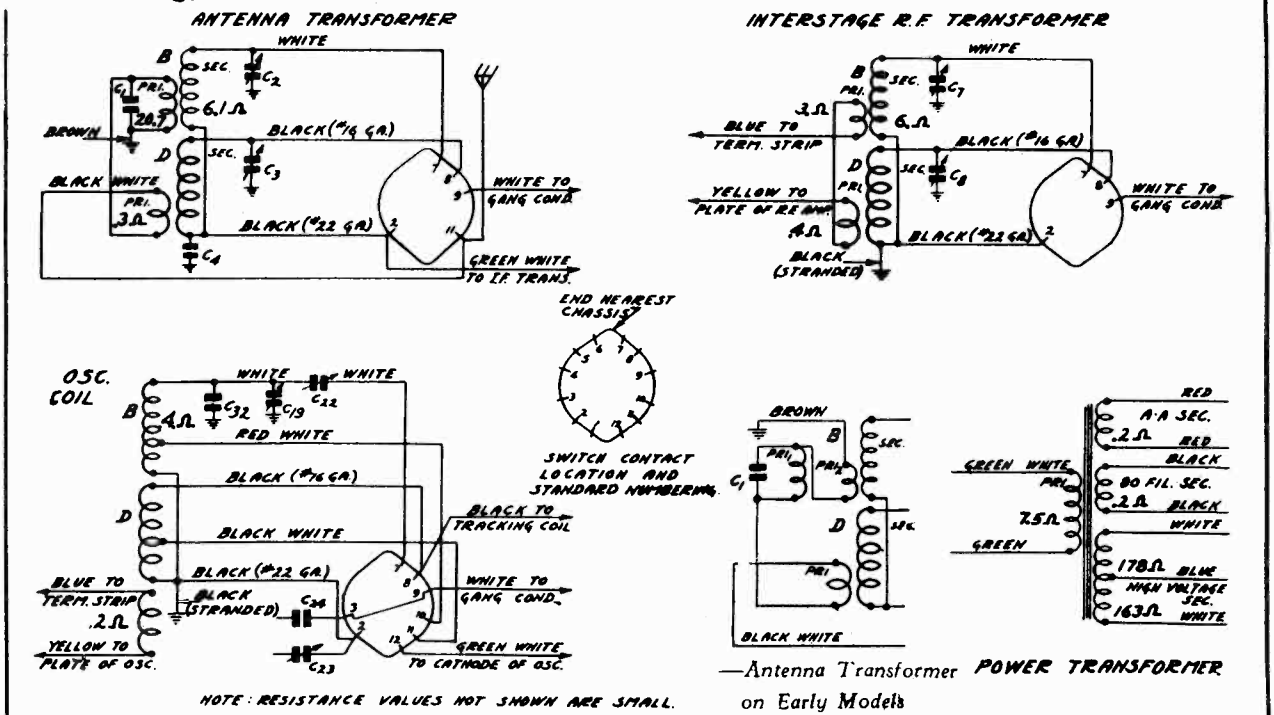


Fig. 3—Color Coding of Coil Wires and D. C. Resistance of Windings

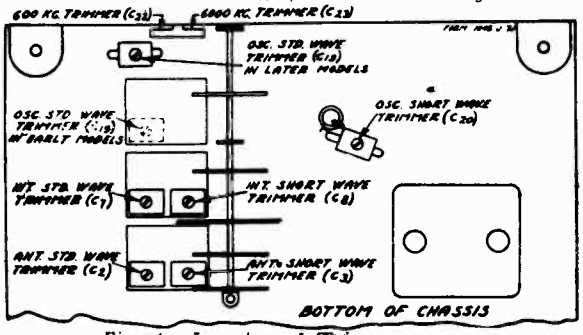


Fig. 4—Location of Trimmers

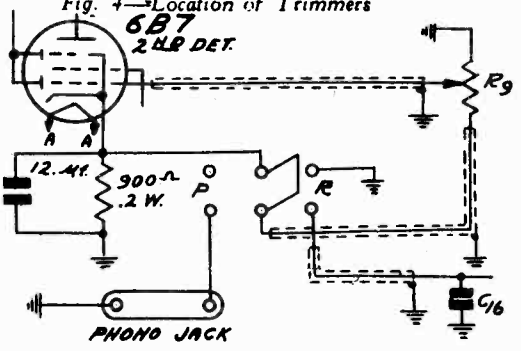


Fig. 7—Phonograph Connections

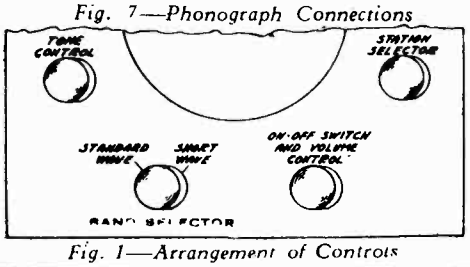


Fig. 1—Arrangement of Controls

VOLTAGES AT SOCKETS
Line Voltage - 112
Antenna Shorted to Ground

Type of Tube	Function	Heater Volts	Plate to Ground	Screen to Ground	Cathode to Ground	Plate M. A.
6D6	R. F.	6.1	240	95	3	7.
6D6	1st Det.	6.1	240	100	9	3.5
76	Osc.	6.1	100			5.
6D6	I. F.	6.1	240	120	3	7.5
6B7	2nd Det.	6.1	55	45	0	2.3
42	Power	6.1	225	240	17 (1)	38.0
80	Rectifier	4.6				32.0 per plate

(1) As read across R13.

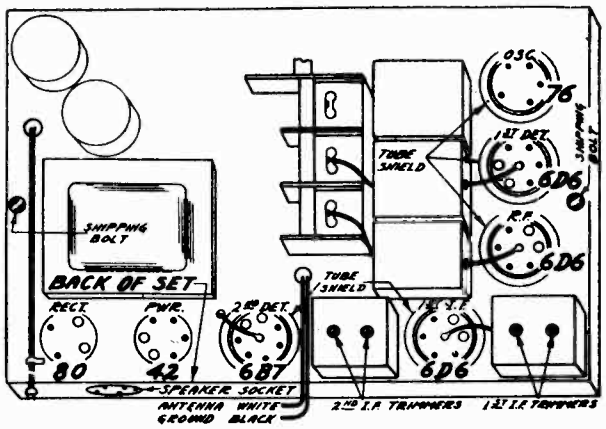
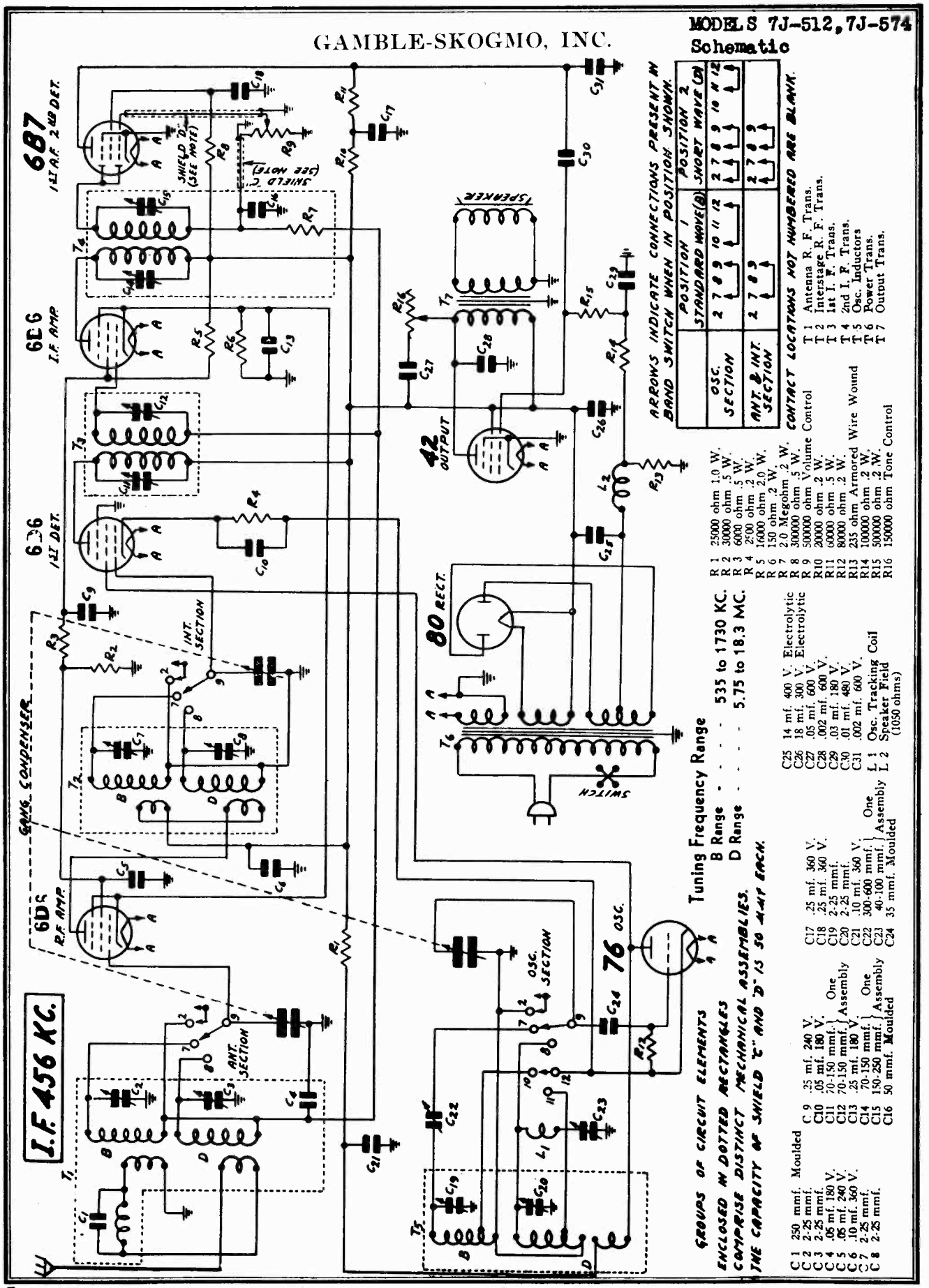


Fig. 6—Location of Tubes

GAMBLE-SKOGMO, INC.

MODELS 7J-512, 7J-574
Schematic



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

	POSITION 1 STANDARD WAVE (A)	POSITION 2 SHORT WAVE (B)
OSC. SECTION	2 7 8 9 10 11 12	2 7 8 9 10 11 12
ANT. & INT. SECTION	2 7 8 9	2 7 8 9

CONTACT LOCATIONS NOT NUMBERED ARE BLANK.

T 1 Antenna R. F. Trans.
T 2 Interstage R. F. Trans.
T 3 1st I. F. Trans.
T 4 2nd I. F. Trans.
T 5 Osc. Inductors
T 6 Power Trans.
T 7 Output Trans.

R 1 25000 ohm 1.0 W.
R 2 30000 ohm .5 W.
R 3 6000 ohm .5 W.
R 4 2700 ohm .2 W.
R 5 16000 ohm 2.0 W.
R 6 150 ohm .2 W.
R 7 2.0 Megohm .2 W.
R 8 300000 ohm .5 W.
R 9 500000 ohm Volume Control
R10 20000 ohm .2 W.
R11 60000 ohm .5 W.
R12 80000 ohm .2 W.
R13 235 ohm Armored Wire Wound
R14 100000 ohm .2 W.
R15 500000 ohm .2 W.
R16 150000 ohm Tone Control

C25 14 mf. 400 V. Electrolytic
C26 18 mf. 300 V. Electrolytic
C27 .05 mf. 600 V.
C28 .002 mf. 600 V.
C29 .03 mf. 180 V.
C30 .01 mf. 480 V.
C31 .002 mf. 600 V.

L 1 Osc. Tracking Coil
L 2 Speaker Field (1050 ohms)

Tuning Frequency Range

B Range - - - - - 535 to 1730 KC.
D Range - - - - - 5.75 to 18.3 MC.

GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES. THE CAPACITY OF SHIELD "C" AND "D" IS 50 MMF EACH.

C 1 250 mmf. Moulded
C 2 2-25 mmf.
C 3 2-25 mmf.
C 4 .05 mf. 180 V.
C 5 .05 mf. 240 V.
C 6 .10 mf. 360 V.
C 7 2-25 mmf.
C 8 2-25 mmf.
C 9 .25 mf. 240 V.
C10 .05 mf. 180 V.
C11 70-150 mmf. } One
C12 70-150 mmf. } Assembly
C13 .25 mf. 180 V.
C14 70-150 mmf. } One
C15 150-250 mmf. } Assembly
C16 50 mmf. Moulded
C17 .25 mf. 360 V.
C18 .25 mf. 360 V.
C19 2-25 mmf.
C20 2-25 mmf.
C21 .10 mf. 360 V.
C22 300-600 mmf. } One
C23 40-100 mmf. } Assembly
C24 35 mmf. Moulded

Dual band coverage is accomplished by means of dual sets of R. F. and oscillator coils and a three section double throw switch. The various circuits made and broken as this switch is thrown are indicated in the schematic circuit diagram Fig. 2.

Referring to the schematic, the standard wave coils are indicated by the letter B, while the short wave coils are indicated by the letter D. The antenna transformer primaries are connected in series. When the switch is in the standard wave position, the B secondary is connected to the grid circuit of the 6D6 R.F. amplifier while the C secondary is open circuited. When the switch is in the short wave position, the C secondary is connected to the grid circuit of this tube while the B secondary is short circuited. The secondary in use is tuned by the antenna section of the three gang condenser.

The output of the R. F. 6D6 tube is fed through another R. F. transformer with tuned secondary into a second 6D6 tube which functions as the first detector. The interstage section of the three gang condenser is used for tuning this circuit. As in the case of the antenna transformer, the R. F. interstage transformer standard wave windings are indicated in the schematic by the letter B, while the short wave windings are indicated by the letter D. The connections to the two coils are made in the same manner as described above for the antenna R. F. transformer.

A separate type 76 tube is employed in the oscillator circuit. Referring to the schematic, B is the standard wave grid coil and D is the short wave grid coil. The winding shown below is the oscillator plate coil. The grid coil in use is tuned by the oscillator section of the three gang condenser. The oscillating circuit is always resonant at 456 KC above the frequency to which the R. F. amplifier is tuned. When the switch is in the standard wave position, connections are completed to the B grid coil and the D grid coil is open circuited. When the switch is in the short wave position, connections are completed to the D grid coil and the B grid coil is short circuited. Padding condensers C22 and C23 are used in conjunction with the standard wave and short wave oscillator circuits respectively.

The oscillator potential is fed into the cathode circuit of the 6D6 first detector tube. This results in the intermediate or beat frequency of 456 K.C. being present in the plate circuit of this tube.

One stage of I. F. amplification is employed using a 6D6 tube. The primaries and secondaries of the first and second I. F. transformers are tuned by small trimmer condensers.

A type 6B7 duo diode pentode tube functions as the second detector and a one stage audio amplifier. The two diode plates are connected together. AVC voltage is applied through isolating resistors to the control grid circuits of the R. F. and I. F. tubes. The audio voltage developed across volume control resistor R9 is applied through the movable arm to the control grid of the 6B7 tube. Resistance coupling is used between the first audio stage and the output stage which employs a type 42 output pentode tube. A type 80 full wave rectifier tube is used in the power unit.

Alignment and Calibration

A signal generator that will provide an accurately calibrated signal at 456, 1730, 1500, 600, 18,300, 15,000 and 6000 KC and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used.

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

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

Connect the antenna lead of the signal generator thru a .1 MF condenser to the grid of the 1st detector.

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

Turn the band switch to the standard wave position.

Turn the volume control to the maximum position.

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

Then adjust the four I. F. trimmers until maximum output is obtained. The adjusting screws for these condensers are reached from the top of the chassis, and the location is shown in Fig. 6.

1730 KC Adjustment

Set the signal generator for 1730 KC.

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

Keep the band switch in the standard wave position.

Connect the antenna lead of the receiver through a 250 mmf. condenser to the output of the signal generator.

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

Adjust the oscillator standard wave trimmer (C19) until maximum output is obtained. The location of this trimmer is shown in Fig. 4.

1500 KC Adjustment

Set the signal generator for 1500 KC.

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

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

Adjust the interstage standard wave trimmer (C7) and antenna standard wave trimmer (C2) until maximum output is obtained.

Do not change the setting of the oscillator standard wave trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 600 KC trimmer until the peak of greatest intensity is obtained. See Fig. 4 for location of this trimmer.

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

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

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

Turn the band switch to the short wave position.

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

Adjust the oscillator short wave trimmer (C20) until maximum output is obtained. See Fig. 4 for location of this trimmer.

If a maximum output peak cannot be reached, it may be due to the fact that the antenna and interstage short wave trimmers are screwed down too far. Back off these two trimmer screws two or three turns and then adjust the oscillator short wave trimmer for maximum ouptut.

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

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

Adjust the interstage short wave trimmer (C8) and antenna short wave trimmer (C3) until maximum output is obtained.

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

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

Do not make any further change in the setting of the oscillator short wave trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

Turn the rotor slowly back and forth at the same time adjusting the 6000 KC trimmer until the peak of greatest intensity is obtained. See Fig. 4 for location of this trimmer.

Use a non-metallic screw driver for this adjustment.

Servicing R. F. Coil Assemblies

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

The lead colors and resistances of the various windings in each assembly are shown in Fig. 3.

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

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

Twenty-five Cycle Receivers

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

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

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

Phonograph Connections

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

For mounting the 12 mfd. 25 volt dry electrolytic condenser, two No. 27 drill holes should be drilled in the side of the chassis base directly below the wet electrolytic condensers. These holes are 1¼" from the bottom, ⅞" and 3¼" from the front of the chassis.

The ground lug which extends out from the side of the chassis should be bent back into the chassis wall.

The connections are made by opening the diode return circuit at the volume control. Unsolder the shielded lead which runs from the I. F. transformer to the volume control at the lug on the volume control. Cut this lead to length and connect it to the switch as shown in Fig. 7. The extra length of shielded lead which is provided, is connected from the volume control R9 to the phono switch as illustrated.

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

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

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

Changes in Early Models

In the early models of this receiver the oscillator standard wave trimmer C19 was in the oscillator coil can—see Fig. 4.

In the early models the antenna transformer had two B primary windings as shown in Fig. 5. In later models only one winding was used as shown in Fig. 3.

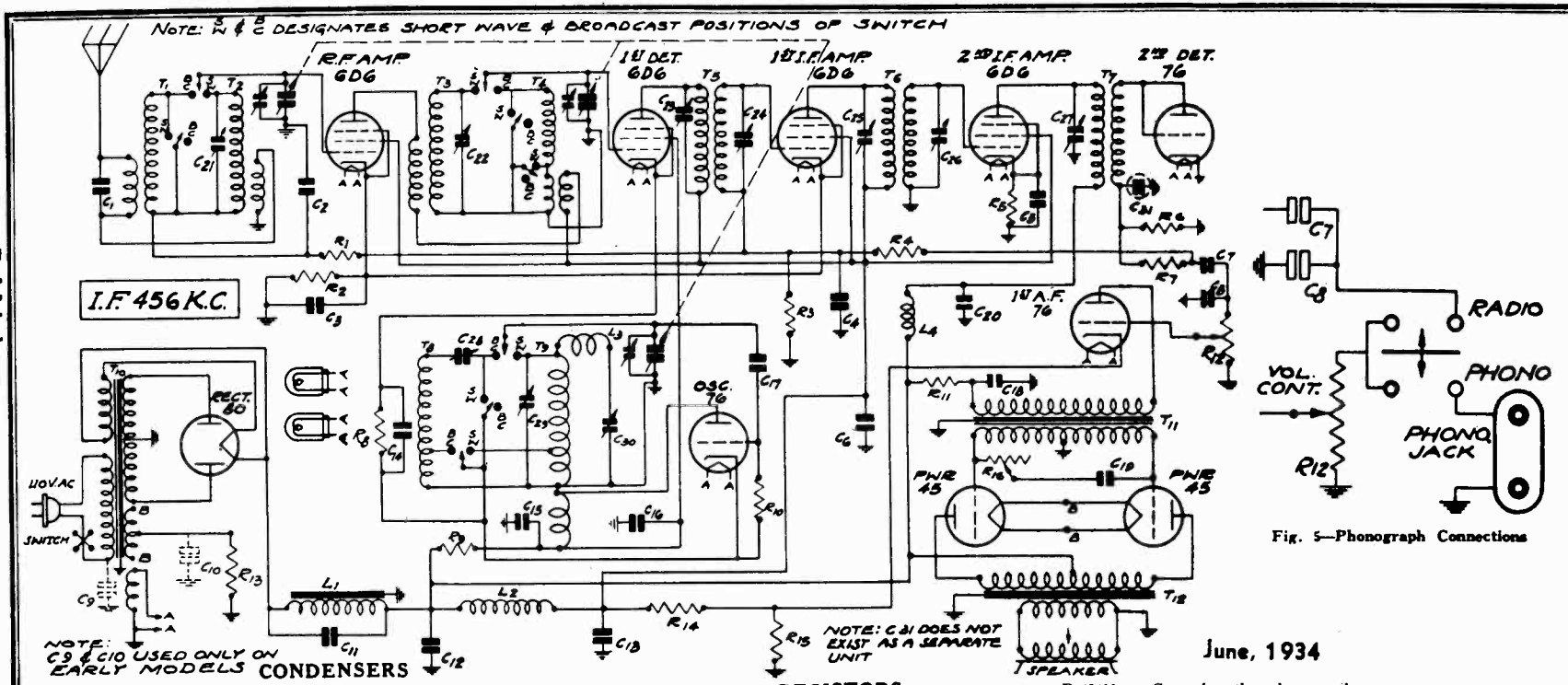


Fig. 5—Phonograph Connections

Fig. 1—Schematic Circuit Diagram

June, 1934

CONDENSERS

Part No.	Code	Capacity	Volts	Type
P-80919	C1	250 mmfd.		Moulded
P-80862	C2	.05 mfd.	200V.	Tubular
P-80888	C3	.25 mfd.	200V.	Tubular
P-80862	C4	.05 mfd.	200V.	Tubular
P-80862	C5	.05 mfd.	200V.	Tubular
P-80888	C6	.25 mfd.	200V.	Tubular
P-80862	C7	.05 mfd.	200V.	Tubular
P-81005	C8	35 mmfd.	600V.	Moulded
*P-80997	C9	.01 mfd.	600V.	Condenser in metal can
*P-80888	C10	.25 mfd.	200V.	Tubular
P-80985	C11	.15 mfd.	200V.	Tubular
P-81039	C12	16.0 mfd.	400V.	Wet Electrolytic
P-81018	C13	6.0 mfd.	150V.	Dry Electrolytic
	C16	2.0 mfd.	300V.	
	C18	2.0 mfd.	300V.	
P-80862	C14	.05 mfd.	200V.	Tubular
P-80864	C15	.10 mfd.	200V.	Tubular
P-81005	C17	35 mmfd.	600V.	Moulded
P-80863	C19	.004 mfd.	600V.	Tubular
P-81041	C20	.10 mfd.	400V.	Tubular
P-2102	C21	3-40 mmfd.		Ant. S.W. Trimmer
P-2102	C22	3-40 mmfd.		1st Det. S.W. Trimmer
P-2103	C23	200± 50 mmfd.		Dual Trimmer
	C24	200± 50 mmfd.		Part of I.F. Assem.
P-2103	C25	200± 50 mmfd.		Dual Trimmer
	C26	200± 50 mmfd.		Part of I.F. Assem.
P-1685	C27	70± 30 mmfd.		3rd I.F. Coil Trimmer
P-2112	C28	300-500 mmfd.		600 K.C. Trimmer
P-2102	C29	3-40 mmfd.		Osc. S.W. Trimmer
P-1685	C30	70± 30 mmfd.		6000 K.C. Trimmer
P-81027		Three Gang Condenser		

RESISTORS

Part No.	Code	Resistance	Watts	Type
P-A95204	R1	200,000 ohm	.2	Carbon
P-98023	R2	150 ohm	.5	Flex. Wire Wound
P-A95105	R3	1 megohm	.2	Carbon
P-A95205	R4	2 megohm	.2	Carbon
P-98024	R5	400 ohm	.5	Flex. Wire Wound
P-A94304	R6	300,000 ohm	.2	Carbon
P-A95104	R7	100,000 ohm	.2	Carbon
P-A94252	R8	2,500 ohm	.2	Carbon
P-98022	R9	30,000 ohm	2.0	Carbon
P-A95104	R10	100,000 ohm	.2	Carbon
P-C94303	R11	30,000 ohm	1.0	Carbon
P-96005	R12	2 megohm		Volume Control and Switch
P-98006	R13	780 ohm	3.0	Armored Wire Wound
	R14	6000 ohm	1.4	
	R15	460 ohm	.2	
P-97003	R16	3 megohm		Tone Control

*Used in Early Models only.

Part No.	Item
P-50638	Power Transformer 115V. 60 cycles T 10
P-50639	Power Transformer 115V. 25 cycles T 10
P-50640	Power Transformer 115-230V. 40-60 cycles T 10
P-50641	Power Choke L 1
P-50642	Audio Output Transformer T 12
P-50643	Audio Input Transformer T 11
P-5176	Antenna R.F. Trans. T 1 and T 2 less can
P-5177	Interstage R.F. Trans. T3 and T4 less can
P-5178	Oscillator Coil Assembly T8 and T9 less can
P-5186	3rd I. F. Coil T7 less can
P-40433	Cans for the above coils
P-5184	1st I.F. Coil & Can Assembly T5
P-5185	2nd I.F. Coil & Can Assembly T6
P-5190	H. F. Oscillator Tracking Coil L3
P-5151	I.F. Plate Isolating Reactor L4
P-70702	A.C. Cord & Plug
P-1421	Single Insulated Terminal Strip
P-1441	Double Insulated Terminal Strip
P-2060	Small Knob
P-2062	Large Knob
P-30342A	Grid Cap only
P-30456	Small Pointer
P-20912	Large Double End Pointer
P-2012	Pilot Light Bulb
P-10272	Rubber Mounting Feet
P-10320	Glass Crystal
P-20875	Crystal Retaining Ring
P-2152	8" Dynamic Speaker Mantel L2
P-1968	10" Dynamic Speaker Console L2
P-2101	Three Position Band Change Switch
P-20905	Condenser Shield
	8" Black Drive Cord (V.C. or T.C. Ind.)
	29" Black Drive Cord (Cond. Drive)
P-2126	Pilot Lamp Socket & Clip Assembly
P-20911	Bottom Shield
P-1011A	Phono-Radio Switch
P-1193	Phono Jack
P-2025	No. 80 Socket
P-1643	No. 45 Socket
P-2022	No. 76 Socket
P-1885	No. 6D6 Socket
P-1637	Speaker Socket
P-40434	Tube Shield—Aluminum (for earlier models)
P-40424	Tube Shield Base—Aluminum (for earlier-models)

Replacing Drive Cord

Remove chassis from cabinet.

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

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

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

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

Turn the drive drum until the opening in this drum is approximately vertical and with the hole at the top as shown in Fig. 4.

Remove the tension spring and the old drive cord.

See that the eyelet is in the hole in the drive drum as shown in Fig. 4. Insert one end of the drive cord from the outside through the hole in the eyelet in the drive drum.

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

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

Then tilt the chassis up on its back panel and bring the cord mentioned in the previous paragraph down to the drive shaft. Wrap it two and one-half times around the drive shaft as shown in Fig. 4.

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

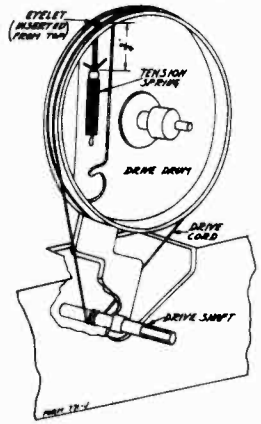


Fig. 4—Drive Cord Replacement

Insert the free end of the cord through the hole in the eyelet and tie it to the end of the tension spring. The end of the spring, when hanging free, should be approximately ½" from the flange of the drum as shown in Fig. 4. Cut off the surplus length of cord after it is knotted.

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

Replace the dial assembly and pointer.

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

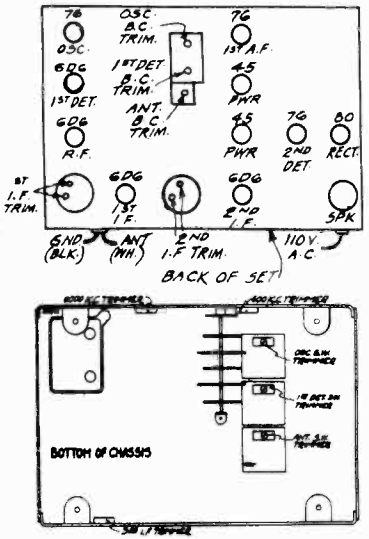


Fig. 2—Tube Arrangement & Location of Trimmers

Voltages at Sockets

LINE VOLTAGE — 115

ANTENNA SHORTED TO GROUND

Type of Tube	Function	Across Fils. or Heater	Plate to Cath.	Screen to Cath.	Cath. to Ground	Normal Plate M. A.
6D6	R. F.	6.3	95	95	2.8	7.0
6D6	1st Det.	6.3	88	95	9.2	2.9
76	Osc.	6.3	110	—	—	5.0
6D6	1st I. F.	6.3	95	95	2.8	7.0
6D6	2nd I. F.	6.3	300	95	3.3	6.0
76	2nd Det.	6.3	—	—	—	—
76	1st Audio	6.3	160	—	9.0	4.0
45	Output	2.5	245	—	48.0	30.0
80	Rectifier	5.0	890 V. A. C. pl. to pl.			58.0 per plate

Phono Connections

Phonograph connections can be made as shown in Fig. 5. A single pole double throw switch and double pin jack are required. These should be mounted on the back panel of the chassis close to the 2nd detector. The connections are made by opening the diode circuit at the point shown in the illustration and completing the connections to the switch and pin jacks as indicated. A high impedance pick-up should be used. If a low impedance pick-up is used a step-up transformer will be required for sufficient volume. The volume control of the set will regulate the phono volume.

Change in Early Models

In the early models of this receiver the side of the trimmer condenser C27 which is shown in Fig. 1 as connected to ground was connected to the B+ side of the 3rd I. F. coil primary.

Condenser Alignment

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

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

Intermediate Frequency Adjustment

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

Then adjust the five I. F. trimmer condensers until maximum output is obtained. The adjusting screws for the 1st and 2nd trimmer condensers are reached from the top of the chassis and are in the round I. F. cans - See Fig. 2. The openings to these trimmer condensers are covered over by small cover plates which are held in position by screws. Loosen these screws until the cover plates can be swung around. **CAUTION - Use an insulated screwdriver for adjusting trimmers to prevent short circuiting to ground.** In the 3rd I. F. coil, only the primary has a variable trimmer condenser. This condenser is mounted on the back panel of the chassis as shown in Fig. 2 and the adjustment screw is reached through a hole in the back panel.

Broadcast Band Adjustment

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

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

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

Short Wave Band Adjustment

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

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

Turn the broadcast short wave switch to the short wave position. Turn the rotor to the full open position. As explained above, the volume control should be at the maximum position and the signal should be reduced to prevent A. V. C. action. Set the signal generator for 18,300 K. C. Then adjust the oscillator short wave trimmer for maximum output. This trimmer is reached from under the chassis and its position is shown in Fig. 2. If a maximum output peak cannot be reached, it may be due to the fact that the antenna and 1st detector short wave trimmers are screwed down too far. Back off these two trimmer screws two or three turns and then adjust the oscillator short wave trimmer for maximum output.

Next set the signal generator for 15,000 K. C. Turn the rotor until maximum output is obtained. Then adjust the antenna and 1st detector short wave trimmers for maximum output.

Next set the signal generator for 6000 K. C. and adjust the 6000 K. C. trimmer. This condenser is mounted on the front panel of the chassis as shown in Fig. 2 and is reached through a hole in the front panel. Turn the tuning condenser rotor until maximum output is obtained. Then turn the rotor slowly back and forth over this setting, at the same time adjusting the 6000 K. C. trimmer screw until the highest output is obtained.

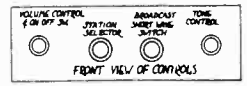


Fig. 3—Arrangement of Controls

D. C. Resistance of Windings

Following are the D.C. resistances of the various windings in the chassis.

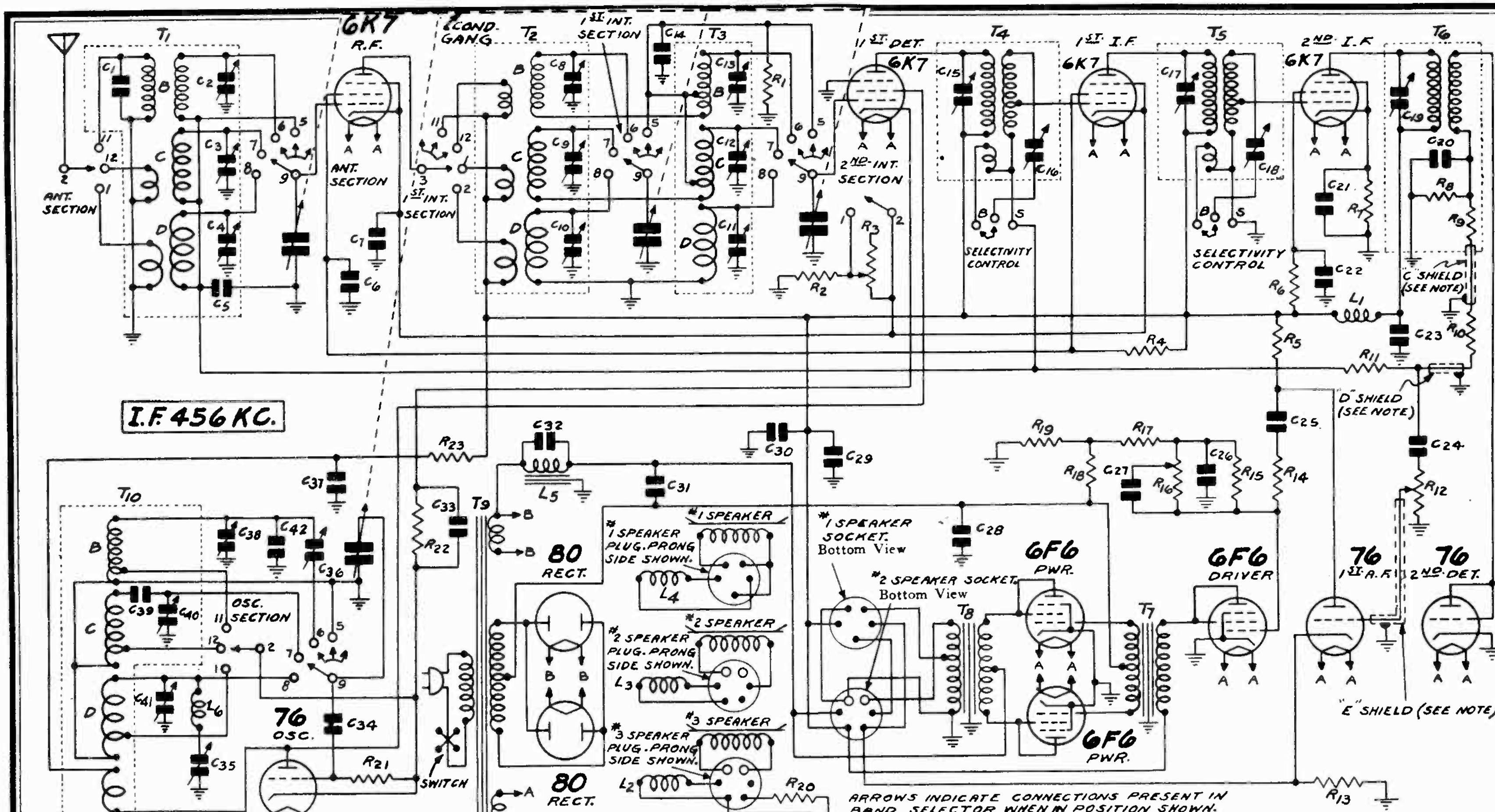
Part No.	Item	Code	D.C. Resistance in Ohms
P-5176	S.W. and B.C. Antenna R.F. Transformer Primaries (in series)	T1 T2	27.9
	B.C. Antenna R.F. Transformer Secondary	T1	3.0
	S.W. Antenna R.F. Transformer Secondary	T2	Small
P-5177	S.W. and B.C. Interstage R.F. Transformer Primaries (in series)	T3 T4	2.7
	B.C. Interstage R.F. Transformer Secondary	T4	4.4
	S.W. Interstage R.F. Transformer Secondary	T3	Small
P-5178	S.W. Oscillator Grid Coil	T9	Small
	S.W. Oscillator Plate Coil	T9	.25
	B.C. Oscillator Grid Coil	T8	3.5
P-5190	S.W. Oscillator Tracking Coil	L3	1.27
P-5184	1st I.F. Coil Primary	T5	5.0
	1st I.F. Coil Secondary	T5	5.0
P-5185	2nd I.F. Coil Primary	T6	5.0
	2nd I.F. Coil Secondary	T6	5.0
P-5186	3rd I.F. Coil Primary	T7	9.3
	3rd I.F. Coil Secondary	T7	26.3
P-50643	Audio Input Transformer Primary	T11	2300.
	Audio Input Transformer Secondary Center Tap to Outside	T11	2600.
	Audio Input Transformer Secondary Center Tap to Inside	T11	2008.
P-50642	Audio Output Transformer Primary Center Tap to Outside	T12	360.
	Audio Output Transformer Primary Center Tap to Inside	T12	320.
	Audio Output Transformer Secondary	T12	.44
P-1968	Speaker Voice Coil		3.0
	Speaker Field Coil	1-2	5000.
P-10641	Filter Choke	1-1	150.
P-50638	Power Transformer 115V. 60 Cycles Pri.	T10	5.3
	Power Transformer 115V. 60 Cycles H.T. Sec. Center Tap to Outside	T10	120.
	Power Transformer 115V. 60 Cycles H.T. Sec. Center Tap to Inside	T10	110.
	Power Transformer 115V. 60 Cycles Sec. (80 Fil.)	T10	Small
	Power Transformer 115V. 60 Cycles Sec. (AA Fil.)	T10	Small
	Power Transformer 115V. 60 Cycles Sec. (BB Fil.)	T10	Small

MODEL 22-CM-576
Schematic

GAMBLE-SKOGMO, INC.

Power Consumption - 140 Watts (At 115 volts 60 cycles)
Power Output - - - - - 15 Watts Undistorted

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



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

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

October, 1935

GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES.
"B" AND "S" ON SELECTIVITY CONTROL DENOTES "BROAD" AND "SHARP" RESPECTIVELY.
THE CAPACITY OF THE "C" SHIELD IS 20 μμf.
THE CAPACITY OF THE "D" SHIELD IS 70 μμf.
THE CAPACITY OF THE "E" SHIELD IS 16 μμf.
ON SETS USING ONE SPEAKER THE #3 SPEAKER IS FURNISHED.
ON SETS USING TWO SPEAKERS THE #1 AND #2 SPEAKERS ARE FURNISHED.

C 1	250 mmf.	
C 2	2-25 mmf.	
C 3	2-25 mmf.	
C 4	2-25 mmf.	
C 5	.05 mf. 180 V.	
C 6	.70 mf. 360 V.	
C 7	.25 mf. 180 V.	
C 8	2-25 mmf.	
C 9	2-25 mmf.	
C10	2-25 mmf.	
C11	2-25 mmf.	
C12	2-25 mmf.	
C13	2-25 mmf.	
C14	.05 mf. 180 V.	
C15	150-250 mmf.	One Unit
C16	150-250 mmf.	One Unit
C17	150-250 mmf.	One Unit
C18	150-250 mmf.	One Unit
C19	70-150 mmf.	
C20	50 mmf.	
C21	.05 mf. 180 V.	
C22	.05 mf. 360 V.	
C23	.10 mf. 360 V.	
C24	.01 mf. 480 V.	
C25	.05 mf. 360 V.	
C26	.25 mf. 180 V.	
C27	.004 mf. 600 V.	
C28	125.0 mf. 45 V.	Electrolytic
C29	18.0 mf. 290 V.	Electrolytic
C30	.25 mf. 360 V.	
C31	30.0 mf. 450 V.	Electrolytic
C32	.15 mf. 280 V. A. C.	
C33	.05 mf. 180 V.	
C34	35 mmf.	
C35	40-100 mmf.	One Unit
C36	300-600 mmf.	One Unit
C37	.25 mf. 360 V.	
C38	2-25 mmf.	
C39	1400 mmf.	
C40	2-25 mmf.	
C41	2-25 mmf.	
C42	10 mmf.	
R 1	25,000 ohm 0.2 watt	
R 2	150 ohm 0.2 watt	
R 3	2500 ohm	Dual Volume Control
R12	2.0 megohm	Dual Volume Control
R 4	50,000 ohm 1.0 watt	
R 5	60,000 ohm 0.5 watt	
R 6	100,000 ohm 0.5 watt	
R 7	500 ohm 0.2 watt	
R 8	200,000 ohm 0.5 watt	
R 9	100,000 ohm 0.2 watt	
R10	100,000 ohm 0.2 watt	
R11	2.0 megohm 0.2 watt	
R13	200 ohm 0.5 watt	
R14	250,000 ohm 0.2 watt	
R15	250,000 ohm 0.2 watt	
R16	3.0 megohm Tone Control	
R17	100,000 ohm 0.2 watt	
R18	128 ohm 2.5 watt	Armored Wire-Wound
R19	145 ohm 3.0 watt	Armored Wire-Wound
R20	7800 ohm 12.0 watt	
R21	80,000 ohm 0.2 watt	
R22	2,500 ohm 0.2 watt	
R23	27,000 ohm 1.0 watt	
T 1	Ant. R.F. Trans.	
T 2	1st Interstage R.F. Trans.	
T 3	2nd Interstage R.F. Trans.	
T 4	1st I.F. Trans.	
T 5	2nd I.F. Trans.	
T 6	3rd I.F. Trans.	
T 7	Push-Pull Input Trans.	
T 8	Push-Pull Output Trans.	
T 9	Power Trans.	
T10	Osc. Inductors	
L 1	2nd I. F. Plate Isolating Reactor	
L 2	No. 3 Speaker Field (1000 ohm)	
L 3	No. 2 Speaker Field (1000 ohm)	
L 4	No. 1 Speaker Field (6400 ohm)	
L 5	Choke Coil	
L 6	Osc. Tracking Coil	

MODEL 22-CM-576
Color Coding, Socket Trimmers, Voltage Phono Connections

GAMBLE-SKOGMO, INC.

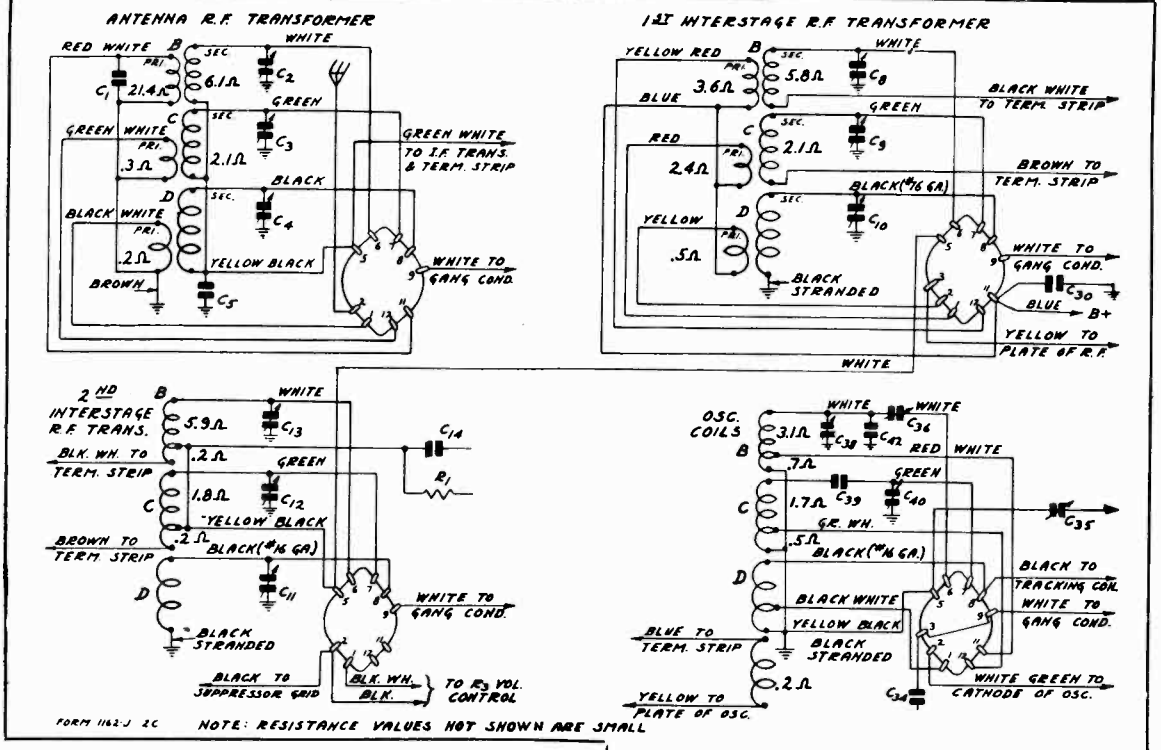


Fig. 4—Color Coding of Coil Wires and D. C. Resistance of Windings. (Also see complete D. C. Resistance List)

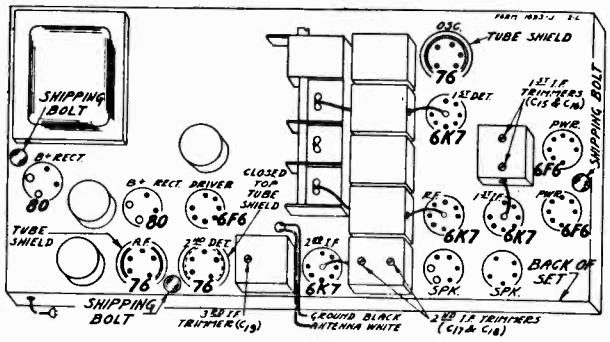
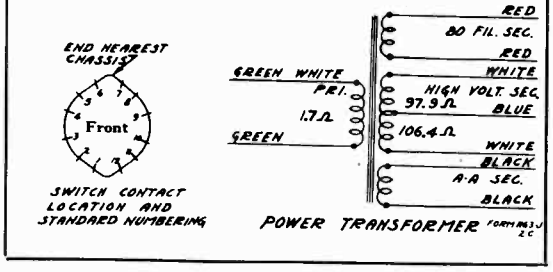


Fig. 5—Location of Tubes



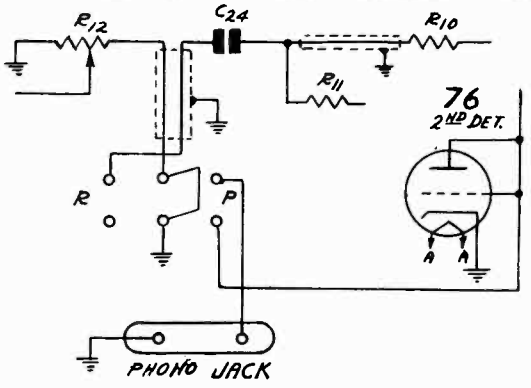


Fig. 7—Phonograph Connections

VOLTAGES AT SOCKETS

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

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

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

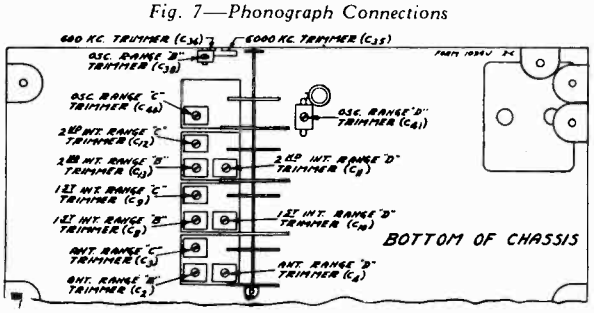


Fig. 3—Location of Trimmers

Alignment and Calibration

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

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

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

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

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

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

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

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

Turn the volume control to the maximum position

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

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

Range B Alignment

1730 KC Adjustment

Set the signal generator for 1730 KC.

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

Keep the band selector in the standard wave position.

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

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

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

1500 KC Adjustment

Set the signal generator for 1500 KC.

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

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

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

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

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

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

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

Range C Alignment

5800 KC Adjustment

Set the signal generator for 5800 KC.

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

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

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

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

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

5000 KC Adjustment

Set the signal generator for 5000 KC.

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

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

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

Range D Alignment

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

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

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

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

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

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

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

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

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

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

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

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

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

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

Use a non-metallic screwdriver for this adjustment.

Twenty-five Cycle Receivers

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

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

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

Servicing R. F. Coil Assemblies

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

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

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

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

Phonograph Connections

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

To mount the phono switch and phono jack, knockouts are provided in the back panel of the chassis as shown in Fig. 8.

The connections are made by opening the diode circuit at the volume control. Unsolder the condenser C24 from the lug on the volume control and reconnect this condenser to the new terminal strip provided (see parts list). This terminal strip should be secured to the inside of the front panel of the chassis base at a point near the volume control and should be soldered in position. From the terminal lug on the above strip, and from the volume control lug from which the condenser C24 was removed, connect leads to the phono switch on the rear panel of the chassis as shown in Fig. 7. Before connecting these two leads permanently to the switch, twist them together and enclose them in the shielded sleeving provided, being sure to ground the shielding at the extreme ends to the chassis base. At the point where the shielding passes the electrolytic condenser cover the cable with insulating tape. Complete the connections as shown in Fig. 7.

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

MODEL 77-A
Schematic
Alignment, Parts

GAMBLE-SKOGMO, INC.

C1	.01	200 V
C2	.05	200 V
C3	.004	MICA
C4	.0025	MICA
C5	.00005	MICA
C6	.25	200 V
C7	.5	100 V
C8	.25	200 V
C9	.05	200 V
C10	.05	200 V
C11	.001	400 V
C12	.01	200 V
C13	.05	200 V
C14	.01	400 V
C15	.02	400 V
C16	.001-.001	800 V

R1	100,000	OHMS
R2	10,000	"
R3	50,000	"
R4	20,000	"
R5	2,000	"
R6	500,000	"
R7	2,000,000	"
R8	500,000	VOL. CONT.
R9	500,000	"
R10	250,000	"
R11	1,000,000	"
R12	100,000	"

Model 77A
BATTERY SET

GENERAL Always eliminate all possible sources of trouble external to the receiver itself such as: Defective aerial, ground, or lightning arrestor, tubes, batteries, loud speakers.

TUBE FUNCTIONS "1-C-6" First detector—oscillator, "34" first I F amplifier, "34" second I F amplifier, "30" diode second detector, "32" first audio, "30" audio driver, "19" class B power tube.

CHECKING PARTS The resistance of coils and resistors is shown on the circuit diagram together with condenser capacities. Any defective part—either shorted or open—will result in either weak or distorted reception or none at all.

ALIGNMENT If all parts check OK and sensitivity is still low it is probably due to the set being out of alignment. It is necessary to use a reliable test oscillator or signal generator having accurate calibration and positive attenuation.

I F ALIGNMENT 456 K. C. Open tuning condenser (High Frequency dial setting). Connect signal generator to grid cap of 1-C-6 tube leaving present cap in place. Use a small condenser .002-.01 in series with signal generator lead wire. Adjust all five trimmers—two in top of each square I F transformer and the one in the top of the round (output) I F transformer. Go over these adjustments several times—it is best to use an output meter to indicate "peak". Reduce the output of the signal generator for final adjustments.

WAVE TRAP With the signal generator still on 456 K. C.—connect to antenna wire of set and adjust wave trap condenser to *minimum signal*.

The above will usually bring the set back to normal, check operation on stations and if satisfactory do not make any further adjustments.

BROADCAST BAND With the tuning condenser open and the signal generator set on 1735 K. C.—adjust B. C. Oscillator trimmer. Next—close tuning condenser and set signal generator to 540 K. C. adjust variable padding condenser for maximum signal. Adjust B. C. Antenna coil trimmer for maximum at 1400 K. C.

SHORT WAVE This is the most difficult for the service man and unless it is certain that the set does not compare favorably with a similar model under the same conditions of operation—the alignment should be left unchanged. If the service man feels that the short wave operation could be improved—proceed as follows: Connect signal generator to antenna and ground leads using a 300 ohm resistor in series with the antenna lead as a "dummy antenna". Set signal generator at 15,500 K. C. and tune in on the set (wave change switch in Short Wave position—left). Adjust S. W. oscillator trimmer—see diagram—using a fiber screw driver, move the point of response to the highest frequency setting possible on the dial or near the end of the 19 M. band. Then without moving the tuning dial turn the trimmer screw tighter and you should be able to find a second point of response (the image). Move trimmer back to "loose" position. If the image response cannot be found move the dial and readjust trimmer until it can be heard. Be sure to return to the "loose" or fundamental setting. Next adjust the S. W. antenna coil trimmer for best response retuning the dial at the same time. The low frequency end of the short wave band is fixed by the .004 mica padding condenser and will not change unless this condenser becomes defective.

ADDITIONAL NOTE The power output can be increased with only a slight increase in "B" current by increasing the 90 Volt connection to 112½ Volts. This increases the plate voltage on the driver tube.

PARTS PRICE LIST ON MODEL 77A CORONADO BATTERY TABLE RECEIVER

		List
E-17013	Bushing—Rubber—Cab. Mtg. (set of 6)	$ .50
E-17339	Cable—Battery with Terminals and Markers	1.00
E-17300	Cabinet	6.80
E-17301	Celluloid—for dial opening	.10
E-17299	Control—Volume	1.50
E-17290	Coil—Antenna	1.80
E-17291	Coil—Oscillator	1.60
E-17302	Condenser—Tuning	2.50
E-17071	Condenser—Padder	.50
E-17095	Condenser—Mica .004	.30
E-17092	Condenser—Mica .0025	.30
E-17091	Condenser—Mica .00005	.20
E-17303	Condenser—Tubular .5 Mfd. 100V	.40
E-17128	Condenser—Tubular .25 Mfd. 200V	.30
E-8661	Condenser—Tubular .05 Mfd. 200V	.20
E-8581	Condenser—Tubular .02 Mfd. 400V	.20
E-8877	Condenser—Tubular .01 Mfd. 200V	.20
E-8585	Condenser—Tubular .001 Mfd. 600V	.20
E-17304	Condenser—Tubular Dual .001 800V	.40
E-17349	Dial Scale and Frame	.50
E-17114	Knob—Tone, Vol., Wave Switch	.20
E-17113	Knob—Tuning	.20
E-17308	Pointer—Dial	.10
E-17105	Resistor—Carbon 2,000 Ohms	.20
E-17309	Resistor—Carbon 10,000 Ohms	.20
E-17310	Resistor—Carbon 20,000 Ohms	.20
E-8601	Resistor—Carbon 50,000 Ohms	.20
E-8885	Resistor—Carbon 100,000 Ohms	.20
E-8602	Resistor—Carbon 250,000 Ohms	.20
E-8886	Resistor—Carbon 500,000 Ohms	.20
E-8766	Resistor—Carbon 1,000,000 Ohms	.20
E-8887	Resistor—Carbon 2,000,000 Ohms	.20
E-17107	Shield—Tube 1-C-6	.30
E-17170	Shield—Tube 34	.30
E-17168	Socket 6 Prong Marked 1-C-6	.20
E-17166	Socket 4 Prong Marked 34	.20
E-17313	Socket 4 Prong Marked 30	.20
E-17165	Socket 4 Prong Marked 32	.20
E-17314	Socket 6 Prong Marked 19	.20
E-17315	Switch—Tone	.40
E-17316	Switch—Wave Change	.70
E-17317	Speaker—6½" Magnetic for Type "19"	3.50
E-17321	Transformer—Audio Driver	1.50
E-17292	Transformer—I. F. Input	1.50
E-17293	Transformer—I. F. Output	1.20
E-17334	Trap—Wave	.50

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Parts may be obtained from Service Department, Gamble Stores, Inc., Minneapolis, Minnesota.

GAMBLE-SKOGMO, INC.

MODEL 26-B-5
Schematic, Socket
Parts, Power Unit

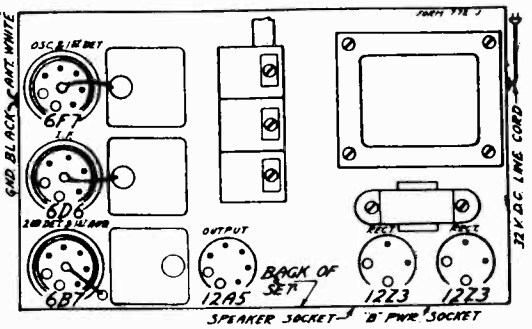


Fig. 2—Arrangement of Tubes

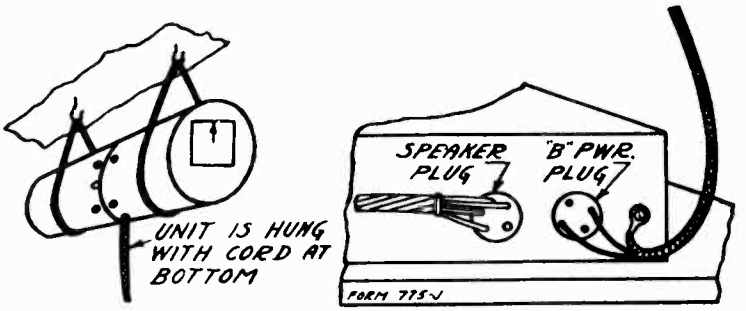
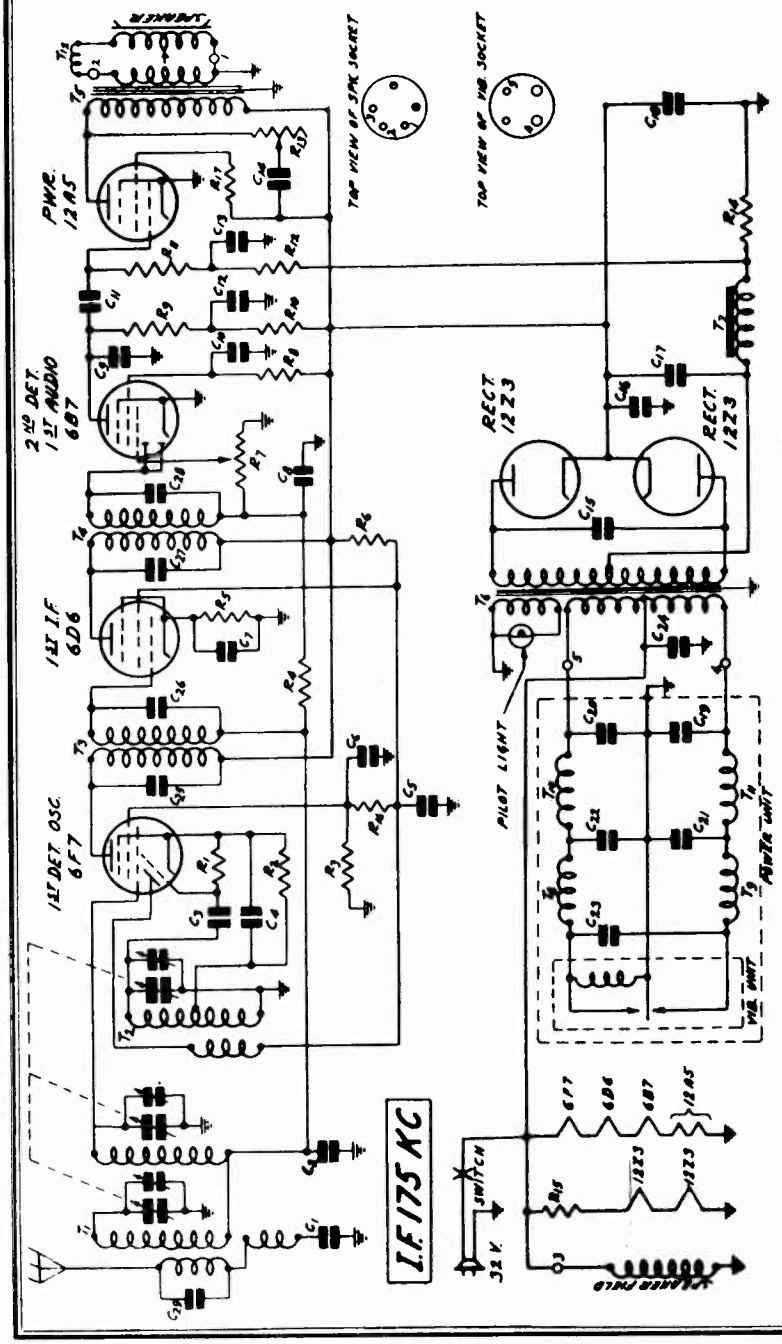


Fig. 3—Method of Installing "B" Power Unit



The numbers on the 2 sockets shown at the right above, correspond with the numbers as shown in the circuit.

Fig. 1—Schematic Circuit Diagram

CONDENSERS

Part No.	Code	Capacity	Voltage	Type
P-80862	C1	.05 Mf.	200V	Tubular
P-80862	C2	.05 Mf.	200V	"
P-81801	C3	.35 Mmf.		Wire Capacitor Part of Osc. Assem
P-80862	C4	.05 Mf.	200V	Tubular
P-80888	C5	.25 Mf.	200V	"
	C6	.05 Mf.	200V	"
P-81049	C7	.05 Mf.	200V	"
P-81811	C8	100 Mmf.		Wire Capacitor
P-81051	C9	.002 Mf.	600V	Tubular
P-80888	C10	.25 Mf.	200V	"
P-80872	C11	.01 Mf.	600V	"
P-80888	C12	.25 Mf.	200V	"
P-81062	C13	.01 Mf.	140V	"
P-81055	C14	.05 Mf.	400V	"
P-81052	C15	.015 Mf.	1600V	"
P-80887	C16	.10 Mf.	400V	"
	C17	8.0 Mf.	300V	Electrolytic Block
P-81016	C18	8.0 Mf.	300V	
P-80993	C24	.5 Mf.	140V	Tubular
P-81806	C25	70 Mmf.		Wire Capac. Part of 1st I.F.Assem.
P-81804	C26	45 Mmf.		Wire Capac. Part of 1st I.F.Assem.
P-81808	C27	90 Mmf.		Wire Capac. Part of 2nd I.F.Assem
P-81810	C28	100 Mmf.		Wire Capac. Part of 2nd I.F.Assem
P-81812	C29	200 Mmf.	Wire Capac.	Part of Ant. Assem.
P-81015				Three Gang Condenser

RESISTORS

Part No.	Code	Resistance	Wattage	Type
P-A95104	R1	100,000 Ohm	.2	Carbon
P-A95152	R2	1,500 Ohm	.2	Carbon
P-B94303	R3	30,000 Ohm	.5	Carbon
P-A98[illegible]	R4	2 Megohm	.2	Carbon
P- 98021	R5	400 Ohm	.2	Wire Wound
P-C93702	R6	7,000 Ohm	1.0	Carbon
P- 96014	R7	500,000 Ohm		Volume Control
P-B94204	R8	200,000 Ohm	.5	Carbon
P-B94603	R9	60,000 Ohm	.5	Carbon
P-A95203	R10	20,000 Ohm	.2	Carbon
P-A95504	R11	500,000 Ohm	.2	Carbon
P-A94104	R12	100,000 Ohm	.2	Carbon
P- 97011	R13	150,000 Ohm		Tone Control
P- 98035	R14	450 Ohm	2.0	Wire Wound
P- 98034	R15	25 Ohm	3.0	Wire Wound
P-B95602	R16	6,000 Ohm	.5	Carbon

Oct, 1934

MODEL 26-B-5
Alignment, Voltage
Resistance, Parts

GAMBLE-SKOGMO, INC.

VOLTAGES AT SOCKETS

Input 32 Volts—Antenna Shorted to Ground

Type of Tube	Function	Across Filament	Plate to Cathode	Screen to Cathode	Grid to Cathode	Normal Plate M.A.
6F7	1st Det. & Osc.	6.3	167(1)	90	2.6	7.0(1)
			117(2)		0	2.8(2)
6D6	I. F.	6.3	172	120	3.2	8.2
6B7	2nd Det.	6.3	25	25	7.25	2.0
12A5	Output	12.6	180	180	25	32
12Z3	Rectifier	12.6	225			25

(1) Pentode Section of Tube

(2) Triode Section of Tube

REPAIR PARTS LIST FOR 6 TUBE, 32 VOLT D. C. RECEIVER

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

MISCELLANEOUS

Part No.	ITEM
P-5200	Antenna Transformer Assembly less Can
P-40433	Can for Above Assembly
P-5302	Oscillator Coil and Can Assembly
P-5221	1st I. F. Coil and Can Assembly
P-5203	2nd I. F. Coil and Can Assembly
P-50626	Power Transformer
P-50624A-6R	Output Transformer
P-50637	"B" Filter Reactor
P-1885	6D6 Tube Socket
P-1944	6B7 Tube Socket
P-1945	6F7 Tube Socket
P-1946	12A5 Tube Socket
P-2020	12Z3 Tube Socket
P-1637	Speaker Socket
P-2060	Knob, Small
P-2062	Knob, Large
P-10272	Rubber Chassis Cushions
P-40445	Tube Shield
P-40443	Tube Shield Base
P-10320	Glass Crystal
P-20875	Crystal Retainer Ring
P-1421	Single Lug Mtg.
P-2130	Double Insulated Mtg. Lug
P-29912	Large Double End Pointer
P-10337	Celluloid Indicator Disc
P-30342	Grid Cap Only
P-70702	115 Volt Line and Plug Assembly
P-70703	Antenna and Ground Wires
P-2012	Pilot Light Bulbs (6.8 volts)
P-2147	Speaker 6" Mantel
P-2173	Speaker 8" Console
P-10347	Rubber Grommet (Small Gang Con. Mtg.)
P-10296	Rubber Grommet (Large)

"B" POWER UNIT PARTS

P-70770	Shield Cable and Plug
P-40439	Vibrator Shield Can
P-2153	Vibrator Unit
P-5172	R. F. Choke Coils
P-2021	Vibrator Socket
P-10349	Rubber Band (For Mtg. Vib.)
P-20926	Screw Hook (For Mtg. Vib.)
P-81101	C19 .01 Mf. 400V Tubular Condenser
P-81101	C20 .01 Mf. 400V Tubular Condenser
P-80888	C21 .25 Mf. 200V Tubular Condenser
P-80888	C22 .25 Mf. 200V Tubular Condenser
P-81054	C23 .5 Mf. 140V Tubular Condenser

INTERFERENCE ELIMINATION PARTS

Part No.	
P-91011	Spark Plug Suppressor
P-8093	Dual .5 Mfd. Generator Condenser

D. C. RESISTANCE OF WINDINGS

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

Part No.	Item	Code	D. C. Resistance in Ohms
P-5300	Primaries of Antenna Trans. in Series	T1	Small
	1st Secondary of Antenna Transformer	T1	3.2
	2nd Secondary of Antenna Transformer	T1	2.4
P-5202	Oscillator Plate Coil	T2	2.0
	Oscillator Grid Coil	T2	3.5
P-5221	1st I. F. Transformer Primary	T3	67
	1st I. F. Transformer Secondary	T3	93
P-5203	2nd I. F. Transformer Primary	T4	63
	2nd I. F. Transformer Secondary	T4	63
P-50624	Output Transformer Primary	T5	243
	Output Transformer Secondary and Bucking Coil in Series	T5 & L12	Small
P-50637	"B" Filter Reactor	T7	300
P-2147	Speaker Field		97
P-2173	Speaker Voice Coil		Small
P-50626	Power Transformer Primary	T6	
	Center Tap to Inside	T6	3.6
	Center Tap to Outside	T6	4.4
	Power Transformer H. V. Secondary	T6	
	Center Tap to Inside	T6	322
	Center Tap to Outside	T6	350
	Power Transformer Pilot Lamp Sec.	T6	.3
P-2153	Vibrator Unit Magnetizing Coil		1025
	Vibrator Unit Filter Chokes		3.0

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself as broad tuning and lack of volume at portions or all of the broadcast band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the broadcast band and at the intermediate frequency, and an output meter are required for indicating the effect of adjustments.

First set the signal generator for 1730 K. C. Turn the rotor to the full open position. The antenna lead from the signal generator adjustment is connected to the antenna lead of the receiver. Adjust the trimmer of the oscillator section of the 3 gang condenser until maximum output is obtained. The oscillator section is the one with the cut plate rotor.

Now set the signal generator for 1400 K. C. and turn the rotor until maximum output is obtained. Adjust the other two trimmers on the gang condenser for maximum output.

To obtain dial scale calibration tune in an 800 K. C. signal and set the dial pointer at that mark on the dial scale. When calibrated in this manner, the setting will be approximately correct at both ends of the scale.

The use of the cut plate type of condenser eliminates the necessity of a 600 K. C. padder and no adjustment at this frequency, therefore, is required.

Servicing Power Unit

Vibrator Unit

The vibrator is mounted inside the "B" power unit. Normally the vibrator will last upward of 1000 hours. However, in the same manner as a tube it may become defective in less time and require replacement.

If the tubes light and by touching the power unit case, no vibration is felt, then the vibrator unit is probably not operating. If the pilot lamp is not lighted this will be a further indication of the same fact.

To replace the vibrator unit in the power supply remove the end of the case on which the label is placed by taking out the four screws which hold the vibrator shield can to the framework. The old vibrator may then be withdrawn and a new unit inserted in the same manner as a tube.

One or more of the vibrator units should be kept on hand for replacement purposes. It is advisable when servicing the receiver, to try one out in the same manner as a new set of tubes would be tried.

GAMBLE-SKOGMO, INC.

MODEL 26-FM-552
R-F.Chassis
Schematic

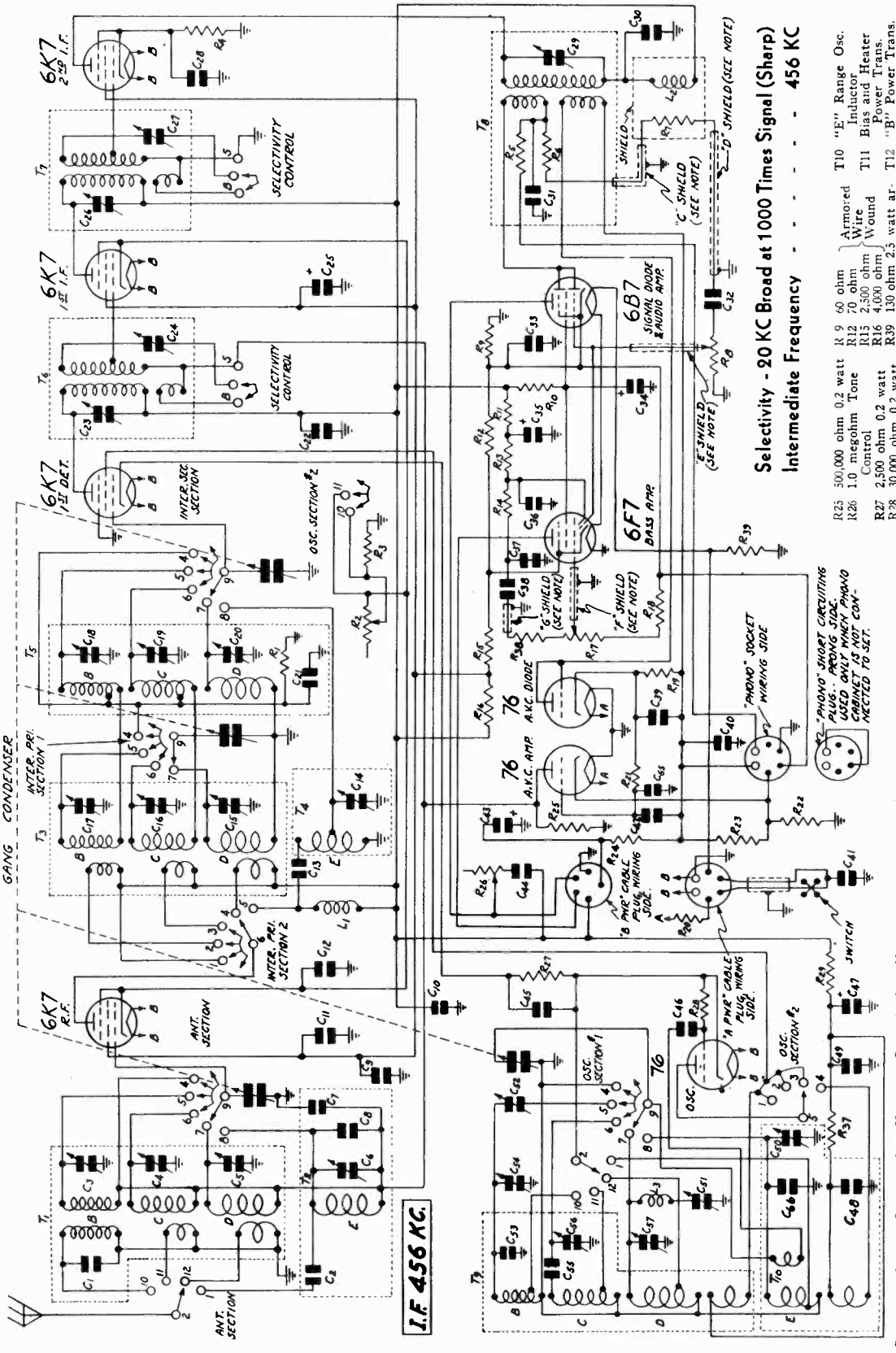
Power Consumption - - - - - - - 290 Watts
(At 115 Volts 60 Cycles)

Power Output - - - - - 30 Watts Undistorted

Sensitivity

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

Selectivity - 20 KC Broad at 1000 Times Signal (Sharp)
Intermediate Frequency - - - - - - - - 456 KC



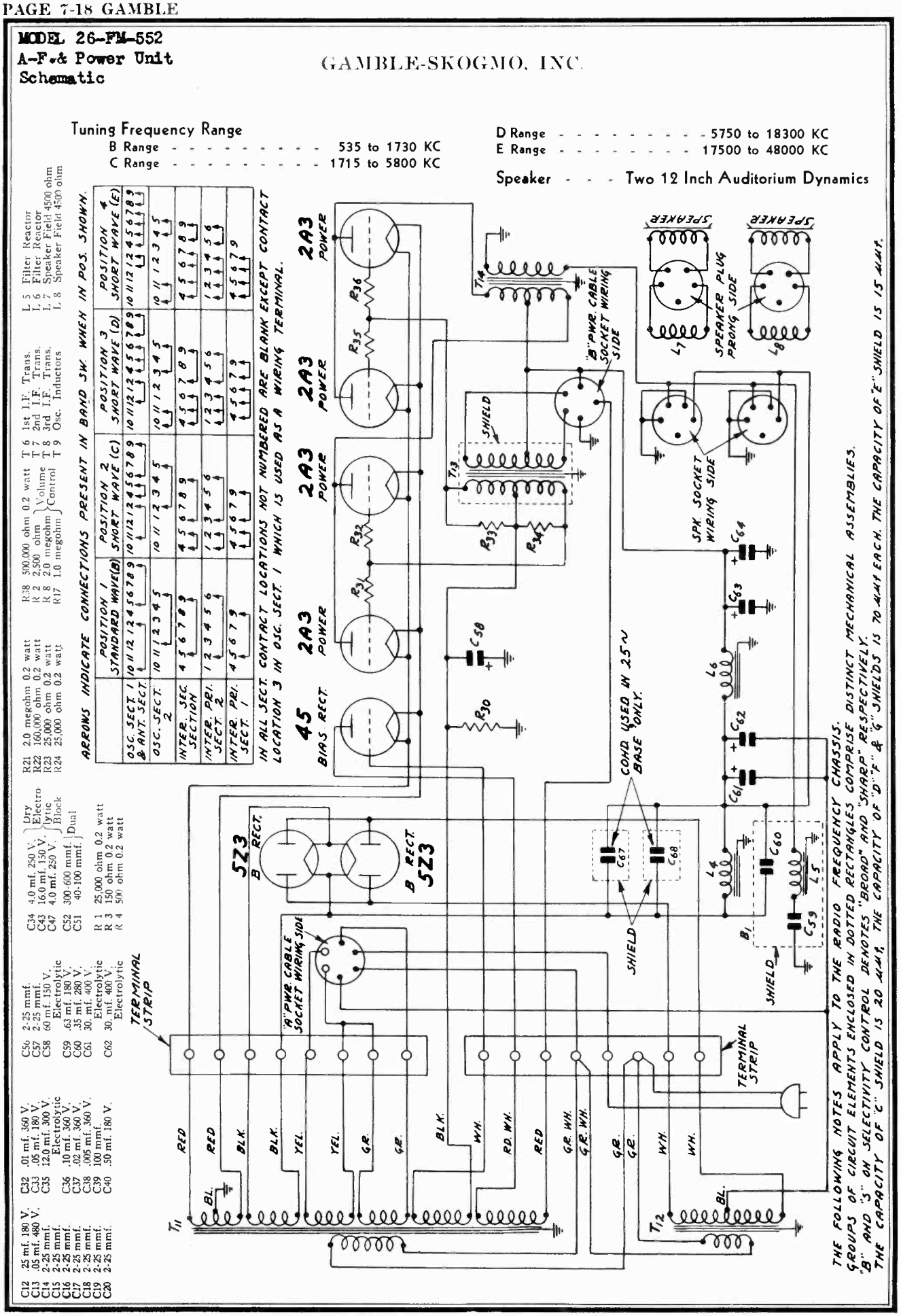
R25	500,000 ohm 0.2 watt	R 9	60 ohm	Armored Wire Wound	T10	"E" Range Osc. Inductor
R26	1.0 megohm Tone Control	R12	70 ohm		T11	Bias and Heater Power Trans.
		R15	2,500 ohm		T12	"B" Power Trans.
R27	2,500 ohm 0.2 watt	R16	4,000 ohm		T13	P-P Input Trans.
R28	30,000 ohm 0.2 watt	R39	130 ohm 2.5 watt armored wire wound		T14	P-P Output Trans.
R29	15,000 ohm 3.0 watt				B 1	Block Cond. and 10 KC Filter
R30	50,000 ohm 0.2 watt	T 1	Ant. R.F. Trans.			
R31	2,000 ohm 0.2 watt	T 2	"E" Range Ant. R.F. Trans.		L 1	"E" Range Int. Plate Reactor
R32	2,000 ohm 0.2 watt	T 3	1st Interstage R.F. Trans.		L 2	2nd I.F. Plate Isolating Reactor
R33	200,000 ohm 0.2 watt	T 4	"E" Range Int. R.F. Trans.		L 3	Osc. Tracking Coil
R34	200,000 ohm 0.2 watt	T 5	2nd Interstage R.F. Trans.		L 4	Filter Reactor
R35	2,000 ohm 0.2 watt					
R36	2,000 ohm 0.2 watt					
R37	150 ohm 0.2 watt					

R 5	100,000 ohm 0.2 watt	C63	30. mf. 400 V. Electrolytic	C 1	250 mmf.	C21	.05 mf. 180 V.
R 6	100,000 ohm 0.2 watt	C64	30. mf. 400 V. Electrolytic	C 2	35 mmf.	C22	.25 mf. 480 V.
R 7	100,000 ohm 0.2 watt	C65	500 mmf.	C 3	2-25 mmf.	C23	150-250 mmf. Dual
R10	60,000 ohm 1.0 watt	C66	20 mmf.	C 4	2-25 mmf.	C24	150-250 mmf. Dual
R11	10,000 ohm 0.5 watt	C67	.70 mf. 280 V. (Block)	C 5	2-25 mmf.	C25	60.0 mf. Electrolytic
R13	60,000 ohm 0.5 watt	C68	.70 mf. 280 V. (Block)	C 6	2-25 mmf.	C26	150-250 mmf. Dual
R14	40,000 ohm 0.2 watt			C 7	.05 mf. 180 V.	C27	150-250 mmf. Dual
R18	150,000 ohm 0.2 watt			C 8	35 mmf.	C28	.05 mf. 180 V.
R19	100,000 ohm 0.2 watt			C 9	250 mmf.	C29	70-150 mmf.
R20	2.0 ohm 1.0 watt armored wire wound			C10	.05 mf. 480 V.	C30	.10 mf. 480 V.
				C11	.25 mf. 180 V.	C31	50.0 mmf.

C41	.02 mf. 600 V.	C55	1400 mmf.
C42	.05 mf. 180 V.		
C44	.01 mf. 360 V.		
C45	.05 mf. 180 V.		
C46	35 mmf.		
C48	.05 mf. 360 V.		
C49	.10 mf. 360 V.		
C50	2-25 mmf.		
C53	10 mmf.		
C54	2-25 mmf.		

MODEL 26-FM-552
A-F & Power Unit
Schematic

GAMBLE-SKOGMO, INC.



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

R21 2.0 megohm 0.2 watt
R22 160,000 ohm 0.2 watt
R23 25,000 ohm 0.2 watt
R24 25,000 ohm 0.2 watt
R38 500,000 ohm 0.2 watt
R 2 2,500 ohm } Volume
R 8 2.0 megohm } Control
R17 1.0 megohm
T 6 1st I.F. Trans.
T 7 2nd I.F. Trans.
T 8 3rd I.F. Trans.
T 9 Osc. Inductors
L 5 Filter Reactor
L 6 Filter Reactor
L 7 Speaker Field 4500 ohm
L 8 Speaker Field 4500 ohm

C12	.25 mf. 180 V.	C32	.01 mf. 360 V.	C56	2-25 mmf.	
C13	.05 mf. 480 V.	C33	.05 mf. 180 V.	C57	2-25 mmf.	
C14	2-25 mmf.	C35	12.0 mf. 300 V. Electrolytic	C58	60 mf. 150 V. Electrolytic	
C15	2-25 mmf.			C59	.63 mf. 180 V.	
C16	2-25 mmf.	C36	.10 mf. 360 V.	C60	.35 mf. 280 V.	
C17	2-25 mmf.	C37	.02 mf. 360 V.	C61	30. mf. 400 V. Electrolytic	
C18	2-25 mmf.	C38	.005 mf. 360 V.	C62	30. mf. 400 V. Electrolytic	
C19	2-25 mmf.	C39	100 mmf.			
C20	2-25 mmf.	C40	.50 mf. 180 V.			

C34 4.0 mf. 250 V. } Dry
C43 16.0 mf. 150 V. } Electro
C47 4.0 mf. 250 V. } lytic Block
C52 300-600 mmf. } Dual
C51 40-100 mmf. }
R 1 25,000 ohm 0.2 watt
R 3 150 ohm 0.2 watt
R 4 500 ohm 0.2 watt

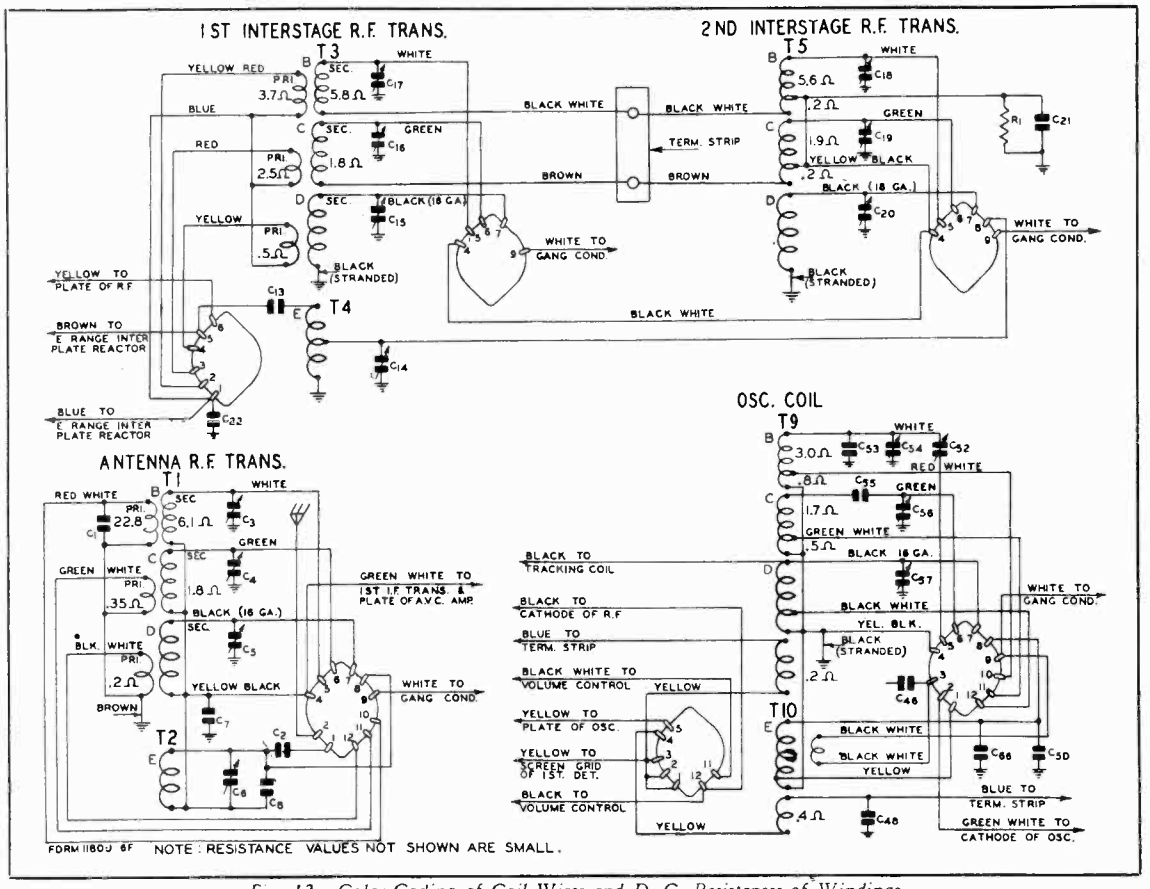


Fig. 12—Color Coding of Coil Wires and D. C. Resistances of Windings

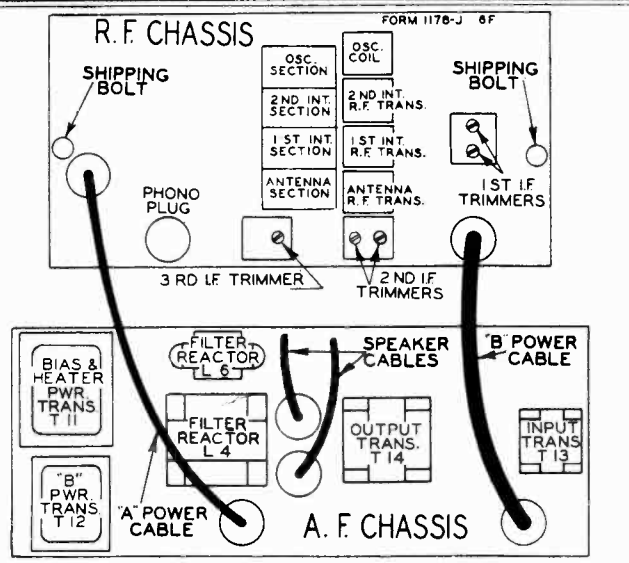


Fig. 4—Top View of Chassis Showing Location of Units

Changes in Early Models

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

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

Resistor R38 was not used in early models.

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

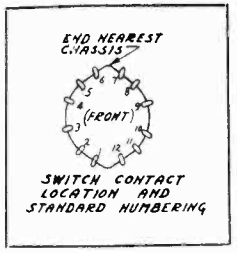


Fig. 9—Numbering of Switch Contacts

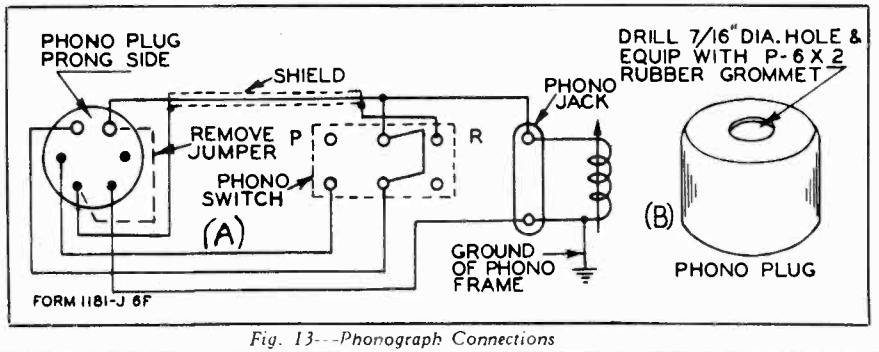


Fig. 13—Phonograph Connections

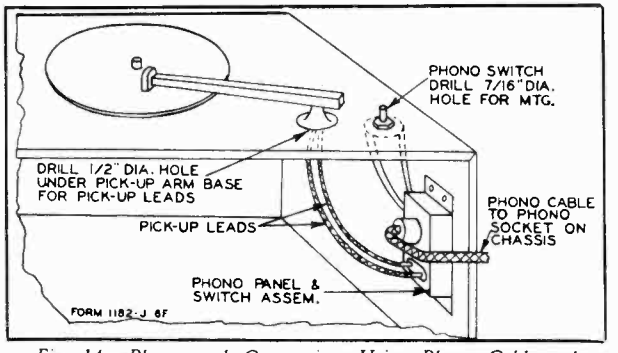


Fig. 14—Phonograph Connections Using Phono Cable and Panel Assembly

MODEL 26-FM-552
Chassis Views

GAMBLE-SKOGMO, INC.

Voltage, Trimmers
Switch Data

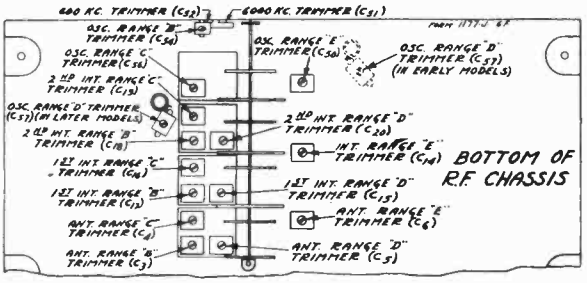


Fig. 6—Trimmer Location

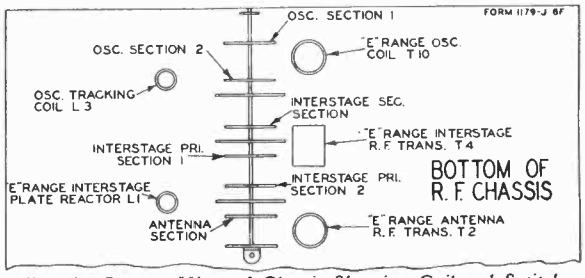


Fig. 5—Bottom View of Chassis Showing Coil and Switch Section Location

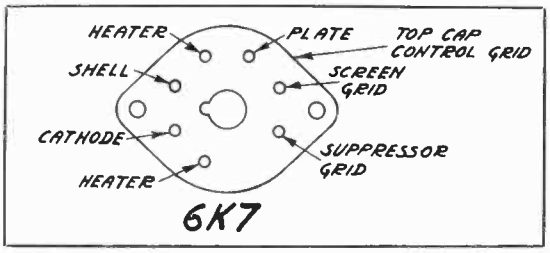


Fig. 7—Bottom View of Metal Tube Socket

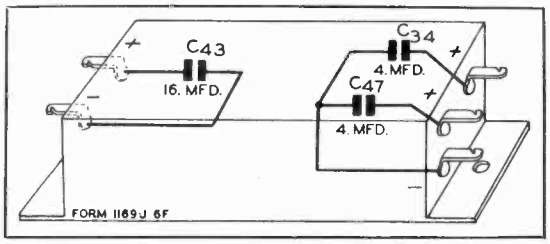


Fig. 8—Condenser Block Internal Wiring

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

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

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

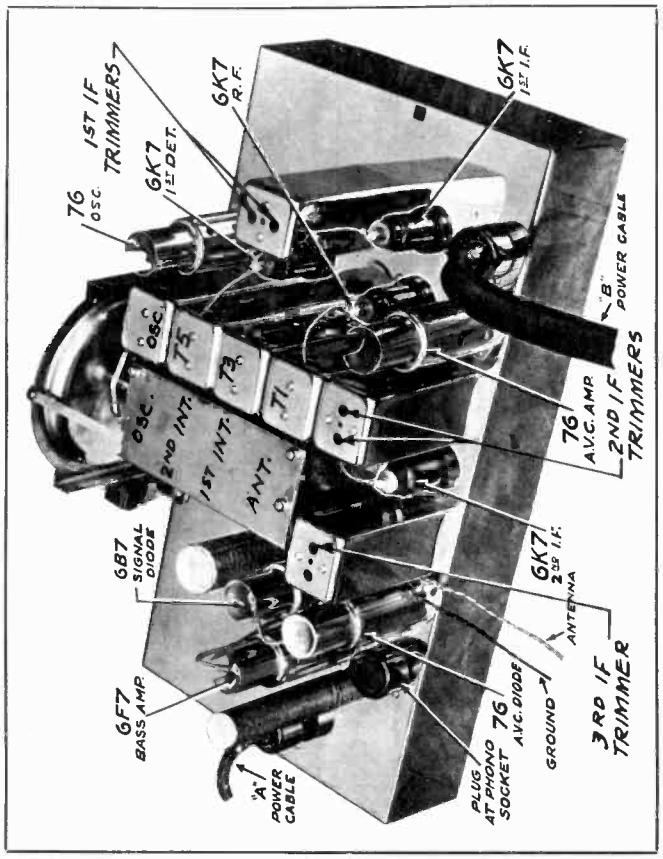


Fig. 10—Tube Arrangement in R.F. Chassis

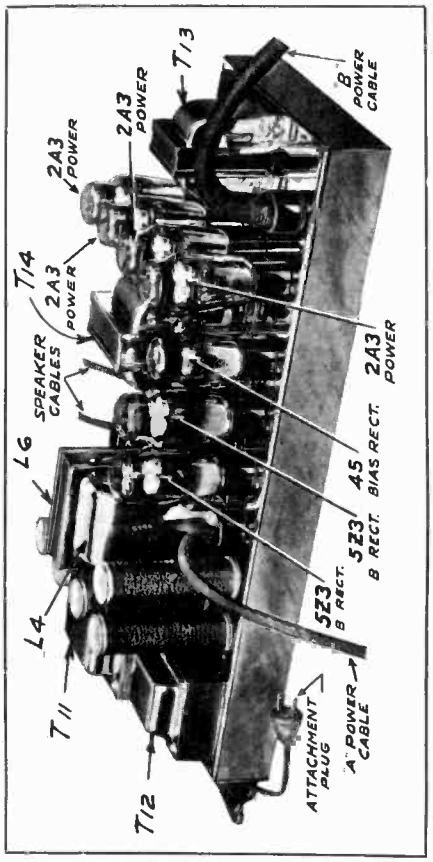


Fig. 11—Tube Arrangement in A.F. Chassis

GAMBLE-SKOGMO, INC.

MODEL 26-FM-552
Circuit Data Alignment, Phono-Data

Circuit

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Metal Tubes

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

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

Phonograph Connections

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

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

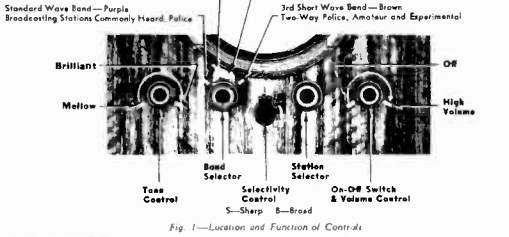


Fig. 1—Location and Function of Controls

Phonograph in Separate Cabinet

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

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

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

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

Phonograph and Radio in Combination Cabinet

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

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

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

Alignment and Calibration

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

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

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

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

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

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

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

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

Turn the volume control to the maximum position.

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

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

Range B Alignment

1730 KC Adjustment

Set the signal generator for 1730 KC.

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

Keep the band selector in the standard wave position.

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

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

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

1500 KC Adjustment

Set the signal generator for 1500 KC.

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

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

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

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

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

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

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

Range C Alignment

5800 KC Adjustment

Set the signal generator for 5800 KC.

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

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

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

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

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

5000 KC Adjustment

Set the signal generator for 5000 KC.

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

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

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

Range D Alignment

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

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

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

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

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

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

15,000 KC Adjustment

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

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

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

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

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

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

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

Use a non-metallic screwdriver for this adjustment.

Range E Alignment

48,000 KC Adjustment

Set the signal generator for 48,000 KC.

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

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

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

Adjust the oscillator Range E trimmer (C50) until maximum output is obtained. See Fig. 6 for location of this trimmer.

40,000 KC Adjustment

Set the signal generator for 40,000 KC.

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

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

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

Switch Contact Location Numbering

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

Twenty-five Cycle Receivers

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

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

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

Replacement Parts

NOTICE—A change has been made in our parts numbering system. Old parts which are used in new receivers will have a new number assigned to them. For your convenience we are listing below the new part number and the corresponding old part number, should there be one. **Order by new part number only.**

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

MISCELLANEOUS
(IN R. F. CHASSIS)

New Part No.	Old Part No.	Description	List Price
P-3A120	1944	Type 6B7 Tube Socket (7 Prong)	$ .15
P-3A121	1945	Type 6F7 Tube Socket (7 Prong)	.15
P-3A126	2022	Type 76 Tube Socket (5 Prong)	.10
P-3A211		Type 6K7 Tube Socket (7 Prong) Metal Tube	.15
P-3A213		Phono Socket (6 Prong) in R.F. Chassis	.10
P-6A206		Phono Plug and Cap Assembly	.40
P-32X56		Tube Shield (Used on 6B7, 6F7, 76 Osc. & 76 A.V.C. Amp.)	.20
P-32X57		Close Top Type Tube Shield (76 A.V.C. Diode)	.15
P-32X54		Tube Shield Bases for above Shields	.10
P-12A206		12 Inch Dynamic Speaker (55 Cycle Resonance Point)	23.30
P-12A213		12 Inch Dynamic Speaker (70 Cycle Resonance Point)	23.30
P-17X8		Glass Crystal	.20
P-28X40		Crystal Retaining Ring	.10
Specify Name of Knob and Model of Receiver		Small Push-On Type Knob Large Set Screw Type Knob Selectivity Control Knob; Special Set Screw Type	.15 .20 .45
P-2X38	10387	Felt Washers (for use with above knobs)	.10
P-8X23	10272	Rubber Chassis Mounting Cushions	.10
P-2A48		Band Selector Switch Only	3.95
P-2A49		Selectivity Control Switch	.85
P-4A50		Two Lug Terminal Strip (Mtg. hole in Center)	.10
P-4A49		Single Lug Terminal Strip (Mounting hole used)	.10
P-4A41	2139	Four Lug Terminal Strip (3 Lugs Insulated—Ground Lug extended as Mounting Foot)	.10
P-4A17	1421	Single Lug Terminal Strip (Mounting Foot to Right of Lug)	.10
P-4A46	2286	Two Lug Terminal Strip (1 Lug Insulated—Ground Lug extended as Mounting Foot)	.10
P-4A18	1441	Two Lug Terminal Strip (2 Lugs Insulated—Mounting Foot in Center)	.10
P-13X220		"A" Power Cable	1.56
P-13X221		"B" Power Cable	2.90
P-13X214		Antenna and Ground Lead Assembly	.30
P-6A205		"A" Power Cable Plug (6 Prong Pin Plate)	.10
P-6A204		"B" Power Cable Plug (5 Prong Pin Plate)	.10
P-30X14	30342	Grid Clip Only (6B7 and 6F7 Tubes)	.10
P-30X44		Grid Clip Only (6K7 Tubes)	.10

(IN A. F. CHASSIS)

P-3A63	1643	Type 45 Tube Socket (4 Prong)	.10
P-3A130	2026	Type 5Z3 Tube Socket (4 Prong)	.10
P-3A209		Type 2A3 Tube Socket (4 Prong)	.10
P-3A58	1637	5 Prong Speaker Socket	.10
P-3A208		"A" Power Cable Socket	.10
P-3A207		"B" Power Cable Socket	.10
P-4A31		10 Lug Terminal Strip	.10
P-4A17	1421	Single Lug Terminal Strip (Mounting Foot to Right of Lug)	.10
P-4A18	1441	Two Lug Terminal Strip (2 Lugs Insulated—Mounting Foot in Center)	.10
P-13X80	70786	Line Cord and Plug	.50

RESISTORS

New Part No.	Code	Resistance	Wattage	Type	List Price
P-A95253	R1	25,000 Ohms	0.2	Carbon	$ .10
P-36X212	R2 R8 R17	2,500 Ohms 2.0 Megohms 1.0 Megohm	3 Section Volume Control and Switch		3.15
P-A94151	R3	151 Ohms	0.2	Carbon	.15
P-A94501	R4	500 Ohms	0.2	Carbon	.15
P-A95104	R5	100,000 Ohms	0.2	Carbon	.15
P-A95104	R6	100,000 Ohms	0.2	Carbon	.15
P-A95104	R7	100,000 Ohms	0.2	Carbon	.10
P-43X46	R9 R12 R15 R16	60 Ohms 70 Ohms 2,500 Ohms 4,000 Ohms	0.5 0.5 6.0 10.0	Armored Wire Wound	1.30
P-C94603	R10	60,000 Ohms	1.0	Carbon	.15
P-B95103	R11	10,000 Ohms	0.5	Carbon	.10
P-B95603	R13	60,000 Ohms	0.5	Carbon	.10
P-A94403	R14	40,000 Ohms	0.2	Carbon	.15
P-A94154	R18	150,000 Ohms	0.2	Carbon	.15
P-A94104	R19	100,000 Ohms	0.2	Carbon	.15
P-43X47	R20	2.0 Ohms	1.0	Armored Wire Wound	.15
P-A95205	R21	2.0 Megohms	0.2	Carbon	.10
P-A94164	R22	160,000 Ohms	0.2	Carbon	.15
P-A94253	R23	25,000 Ohms	0.2	Carbon	.15
P-A94253	R24	25,000 Ohms	0.2	Carbon	.15
P-A95504	R25	500,000 Ohms	0.2	Carbon	.10
P-40X208	R26	1.0 Megohm		Tone Control	1.25

RESISTORS—Continued

New Part No.	Code	Resistance	Wattage	Type	List Price
P-A94252	R27	2,500 Ohms	0.2	Carbon	$ .15
P-A94303	R28	30,000 Ohms	0.2	Carbon	.15
P-E94153	R29	15,000 Ohms	3.0	Carbon	.30
*P-A95503	R30	50,000 Ohms	0.2	Carbon	.10
*P-A95202	R31	2,000 Ohms	0.2	Carbon	.10
*P-A95202	R32	2,000 Ohms	0.2	Carbon	.10
*P-A95204	R33	200,000 Ohms	0.2	Carbon	.10
*P-A95204	R34	200,000 Ohms	0.2	Carbon	.10
*P-A95202	R35	2,000 Ohms	0.2	Carbon	.10
*P-A95202	R36	2,000 Ohms	0.2	Carbon	.10
P-A95151	R37	150 Ohms	0.2	Carbon	.10
P-A95504	R38	500,000 Ohms	0.2	Carbon	.10
P-43X51	R39	130 Ohms	2.5	Armored Wire Wound	.35

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

CONDENSERS

New Part No.	Code	Capacity	Voltage	Type	List Price
P-47X59	C1	250 mmf.		Moulded	$ .15
P-47X53	C2	35 mmf.		Moulded	.10
P-17A36	C3	2-25 mmf.	Range B	Antenna Trimmer	.25
P-17A36	C4	2-25 mmf.	Range C	Antenna Trimmer	.25
P-17A36	C5	2-25 mmf.	Range D	Antenna Trimmer	.25
P-17A41	C6	2-25 mmf.	Range E	Antenna Trimmer	.10
P-46X140	C7	0.05 mf.	180	Tubular	.15
P-47X53	C8	35 mmf.		Moulded	.10
P-47X52	C9	250 mmf.		Moulded	.15
P-46X158	C10	0.05 mf.	480	Tubular	.20
P-46X142	C11	0.25 mf.	180	Tubular	.25
P-46X144	C12	0.25 mf.	180	Tubular	.30
P-46X153	C13	0.05 mf.	480	Tubular	.20
P-17A41	C14	2-25 mmf.	Range E	Interstage Trimmer	.10
P-17A36	C15	2-25 mmf.	Range D	1st Interstage Trimmer	.10
P-17A36	C16	2-25 mmf.	Range C	1st Interstage Trimmer	.10
P-17A36	C17	2-25 mmf.	Range B	1st Interstage Trimmer	.10
P-17A36	C18	2-25 mmf.	Range B	2nd Interstage Trimmer	.10
P-17A36	C19	2-25 mmf.	Range C	2nd Interstage Trimmer	.10
P-17A36	C20	2-25 mmf.	Range D	2nd Interstage Trimmer	.10
P-46X140	C21	0.05 mf.	180	Tubular	.15
P-46X154	C22	0.25 mf.	480	Tubular	.35
P-17A30	C23 C24	150-250 mmf. 150-250 mmf.		1st I.F. Trimmer Condensers	.45
P-44X23	C25	60.0 mf.	150	Wet Electrolytic	2.05
P-17A30	C26 C27	150-250 mmf. 150-250 mmf.		2nd I.F. Trimmer Condensers	.45
P-46X140	C28	0.05 mf.	180	Tubular	.15
P-17A40	C29	70-150 mmf.	3rd	I.F. Primary Trimmer	.30
P-46X155	C30	0.10 mf.	480	Tubular	.20
P-47X56	C31	50 mmf.		Moulded	.10
P-46X138	C32	0.01 mf.	360	Tubular	.15
P-46X140	C33	0.05 mf.	180	Tubular	.15
P-45X305	C34 C43 C47	4.0 mf. 16.0 mf. 4.0 mf.	250 150 250	Dry Electrolytic Block	2.50
P-44X26	C35	12.0 mf.	300	Tubular	1.25
P-46X148	C36	0.10 mf.	360	Tubular	.20
P-46X149	C37	0.02 mf.	360	Tubular	.15
P-46X147	C38	0.005 mf.	360	Tubular	.15
P-47X57	C39	100 mmf.		Moulded	.10
P-46X156	C40	0.50 mf.	180	Tubular	.30
P-48X202	C41	0.02 mf.	600	Metal Case Block	.40
P-46X140	C42	0.05 mf.	180	Tubular	.15
P-46X138	C44	0.01 mf.	360	Tubular	.15
P-46X140	C45	0.05 mf.	180	Tubular	.15
P-47X55	C46	35 mmf.		Moulded	.10
P-46X152	C48	0.05 mf.	360	Tubular	.20
P-46X146	C49	0.10 mf.	360	Tubular	.20
P-17A41	C50	2-25 mmf.		Moulded	.10
P-17A35	C51 C52	300-600 mmf. 40-100 mmf.	600 6000	KC Osc. Padding Cond. KC Osc. Padding Cond.	.45
P-47X63	C53	10 mmf.		Moulded	.15
P-17A41	C54	2-25 mmf.	Range B	Oscillator Trimmer	.10
P-47X60	C55	1400 mmf.		Moulded	.30
P-17A36	C56	2-25 mmf.	Range C	Oscillator Trimmer	.10
P-17A41	C57	2-25 mmf.	Range D	Oscillator Trimmer	.10
*P-44X23	C58	60.0 mf.	150	Wet Electrolytic	2.05
*	C59	0.63 mf.	180	Part of P-48X201 Cond. Block and 10 KC Reactor Assembly	.45
*	C60	0.35 mf.	280		
*P-44X22	C61	30.0 mf.	400	Wet Electrolytic	1.75
*P-44X22	C62	30.0 mf.	400	Wet Electrolytic	1.75
*P-44X22	C63	30.0 mf.	400	Wet Electrolytic	1.75
*P-44X22	C64	30.0 mf.	400	Wet Electrolytic	1.75
P-47X61	C65	500 mmf.		Moulded	.15
P-47X68	C66	20 mmf.		Moulded	.15
†*P-48X203	C67	0.70 mf.	280	Metal Case Block	1.95
†*P-48X203	C68	0.70 mf.	280	Metal Case Block	1.95
P-25A40	4 Section Gang Condenser and Drive Assembly—Less Dial Assembly				7.85

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

†Used in 25 Cycle receivers only.

TRANSFORMERS AND COILS

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

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

DIAL AND DRIVE ASSEMBLY

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

PHONO ATTACHMENT PARTS

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

The first two items only are required

New Part No.	Old Part No.	Description	List Price
P-13X228		Phono Cable (20 feet long)	$5.25
P-13A7		Phono Panel and Switch Assembly Complete	4.15
		The following items are part of the phono panel and switch assembly (P-13A7) listed above and may be purchased separately:	
P-25X263		Phono Attachment Panel Only	2.40
P-2A50		Phono Switch	.60
P-3A12	1193	Phono Jack	.10
P-6A205		6 Prong Phono Cable Pin Plate	.10
P-19X6	20351	Flat Washers	.10
P-30A36	2122	Switch Knob	.20

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

The first item only is required

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

Prices Subject to Change Without Notice.

D. C. Resistance of Windings
Refer to Figs. 12, 2 & 3.

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

GAMBLE-SKOGMO, INC.

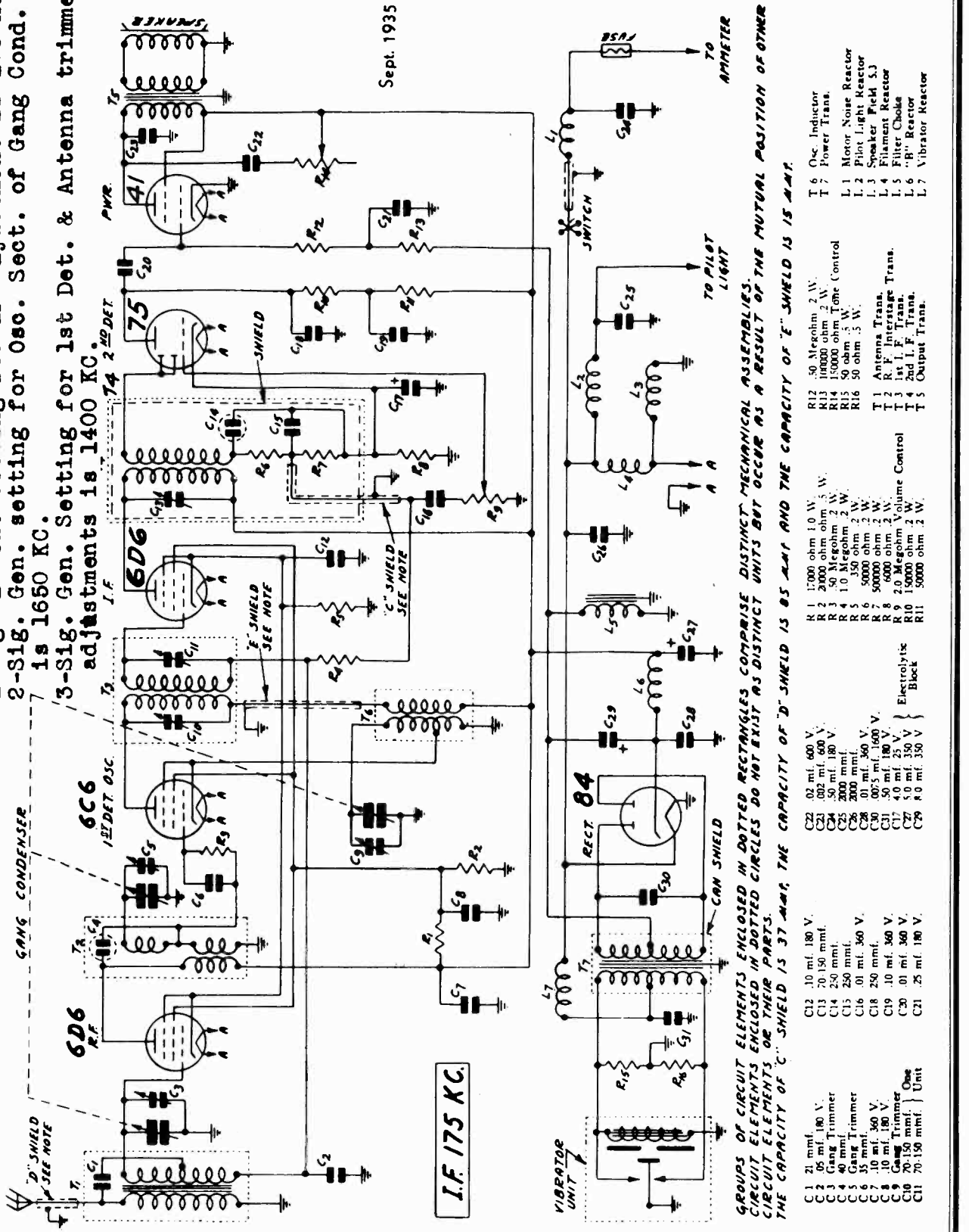
MODEL 26-R-1
Schematic
Alignment

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

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

Sept. 1935

1-Signal Gen. setting for IF adjustment is 175 KC.
2-Sig. Gen. setting for Osc. Sect. of Gang Cond. is 1650 KC.
3-Sig. Gen. Setting for 1st Det. & Antenna trimmer adjustments is 1400 KC.



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

C1 21 mmf.
C2 .05 mf. 180 V.
C3 Gang Trimmer
C4 40 mmf.
C5 Gang Trimmer
C6 35 mmf.
C7 .10 mf. 360 V.
C8 .10 mf. 180 V.
C9 Gang Trimmer
C10 70-150 mmf. } One
C11 70-150 mmf. } Unit
C12 .10 mf. 180 V.
C13 70-150 mmf.
C14 250 mmf.
C15 250 mmf.
C16 .01 mf. 360 V.
C18 250 mmf.
C19 .10 mf. 360 V.
C20 .01 mf. 360 V.
C21 .25 mf. 180 V.
C22 .02 mf. 600 V.
C23 .002 mf. 600 V.
C24 .50 mf. 180 V.
C25 2000 mmf.
C26 2000 mmf.
C28 .01 mf. 360 V.
C30 .005 mf. 1600 V.
C31 .50 mf. 180 V.
C17 4.0 mf. 25 V. } Electrolytic
C27 5.0 mf. 350 V. } Block
C29 8.0 mf. 350 V. }
R 1 17000 ohm 1.0 W.
R 2 24000 ohm .5 W.
R 3 .50 Megohm .2 W.
R 4 1.0 Megohm .2 W.
R 5 350 ohm .2 W.
R 6 50000 ohm .2 W.
R 7 500000 ohm .2 W.
R 8 6000 ohm .2 W.
R 9 2.0 Megohm Volume Control
R10 150000 ohm .2 W.
R11 50000 ohm .2 W.
R12 .50 Megohm .2 W.
R13 10000 ohm .2 W.
R14 150000 ohm Tone Control
R15 50 ohm .5 W.
R16 50 ohm .5 W.
T 1 Antenna Trans.
T 2 R. F. Interstage Trans.
T 3 1st I. F. Trans.
T 4 2nd I. F. Trans.
T 5 Output Trans.
T 6 Osc. Inductor
T 7 Power Trans.
L 1 Motor Noise Reactor
L 2 Pilot Light Reactor
L 3 Speaker Field S.J.
L 4 Filament Reactor
L 5 Filter Choke
L 6 "B" Reactor
L 7 Vibrator Reactor

MODEL 26-R-1
Voltage, Socket
Trimmers, Color Code
Resistance, Mounting

GAMBLE-SKOGMO, INC.

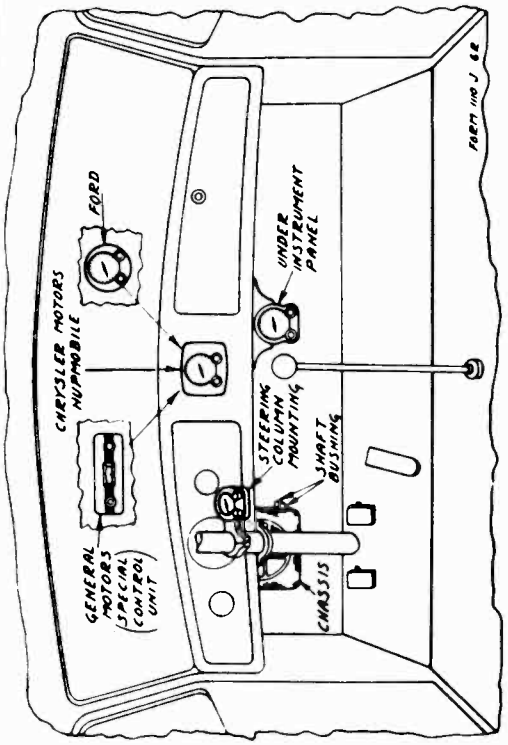


Fig. 5—Various Control Unit Mountings

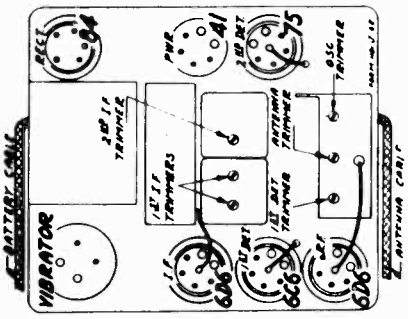


Fig. 2—Location of Tubes and Trimmers

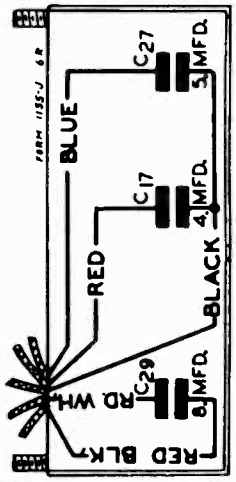


Fig. 4—Condenser Block—Internal Wiring

VOLTAGES AT SOCKETS

Antenna Disconnected Battery 6 Volts Under Load

Type of Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground	Cathode Current M. A.
6D6	R. F. Amp.	5.8	220	90	4.5	6.3
6C6	1st Det. Osc.	5.8	220	90	0	2.4
6D6	I. F. Amp.	5.8	220	90	4.5	6.3
75	2nd Det.	5.8	1300(1)		1.2	0.3
41	Power	5.8	210	220	16(2)	25.5
84	Rectifier	5.8				50.0

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

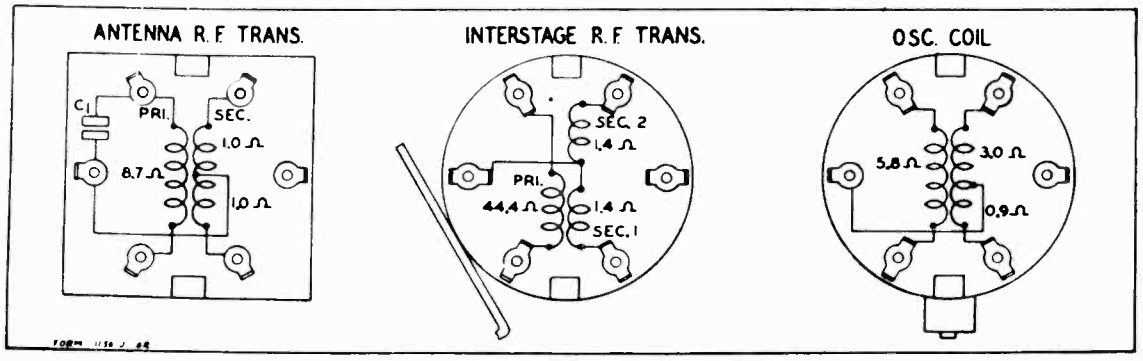


Fig. 3—R. F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

D. C. Resistance of Windings

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

Part No.	Winding	Code	D. C. Resistance in Ohms
P-9A443	Antenna Transformer	T1	
	Primary Winding		8.7
	Secondary Winding-Either Portion		1.0
P-9A439	Interstage Transformer	T2	
	Primary Winding		44.4
	Secondary Winding—Either Portion		1.4
P-9A441	1st I. F. Transformer	T3	
	Primary Winding		93.5
	Secondary Winding		97.6
P-9A442	2nd I. F. Transformer	T4	
	Primary Winding		44.1
	Secondary Winding		49.6
P-12A227	Dynamic Speaker		
	Output Transformer Primary	T5	416.6
	Output Transformer Secondary	T5	Small
	Speaker Field	L3	5.3
	Speaker Voice Coil		Small
P-9A440	Oscillator Coils	T6	
	Grid Coil		
	Long Portion		3.0
	Short Portion		0.9
	Plate Coil		5.8
P-53X108	Power Transformer	T7	
	Primary Winding		
	Center Tap to Inside		Small
	Center Tap to Outside		Small
	Secondary Winding		
	Center Tap to Inside		200.
	Center Tap to Outside		200.
P-9A444	Motor Noise Reactor	L1	Small
P-9A448	Pilot Light Line Reactor	L2	Small
P-9A446	Filament Reactor	L4	Small
P-52X42	Filter Choke	L5	312.5
P-9A447	R. F. "B" Plate Reactor	L6	4.1
P-9A445	Vibrator Filter Reactor	L7	Small

GAMBLE-SKOGMO, INC.

MODEL 27-C-1
Schematic, Voltage
Socket, Parts

RESISTORS

Part No.	Code	Resistance	Wattage	Type
P-A95104	R1	100,000 Ohm	.2	Carbon
P-A93803	R2	30,000 Ohm	.2	Carbon
P-A95104	R3	100,000 Ohm	2	Carbon
P-A93602	R4	6,000 Ohm	.2	Carbon
P-B93902	R5	9,000 Ohm	.5	Carbon
P-A95505	R6	5 Megohm	.2	Carbon
P- 96012	R7	1 Megohm		Volume Control
P-A95505	R8	5 Megohm	.2	Carbon
P-A94603	R9	60,000 Ohm	.2	Carbon
P-A95104	R10	100,000 Ohm	.2	Carbon
P-A95104	R11	100,000 Ohm	.2	Carbon

Voltages at Sockets
ANTENNA SHORTED TO GROUND

Type of Tube	Function	Fila-ment Volt.	Plate to Neg. Filament	Screen to Neg. Filament	Grid to Neg. Filament	Normal Plate M. A.
34	1st Detector	2.0	135	55	3.0 av.	1.90
30	Oscillator	2.0	75		0.0	3.70
34	I.F.	2.0	135	70	3.0 av.	3.00
30	2nd Detector	2.0	2			
34	1st A.F.	2.0	140	65	4.0	2.30
30	2nd A.F.	2.0	135		8.0	3.10
19	Output	2.0	137		6.0	1.00 per plate

Fig. 1. Schematic Circuit Diagram

CONDENSERS

Part No.	Code	Capacity	Voltage	Type
P-80862	C1	0.050	Mf.	200V Tubular
P-80862	C2	0.050	Mf.	200V Tubular
P-80862	C3	0.050	Mf.	200V Tubular
P-80864	C4	0.100	Mf.	200V Tubular
P-81801	C5	35	Mmf.	Cap. Part of Osc. Coil Assem.
P-80888	C6	0.250	Mf.	200V Tubular
P-80862	C7	0.050	Mf.	200V Tubular
P-80988	C8	1.500	Mf.	140V Tubular
P-1966	C9	70-140	Mmf.	Trimmer
P-81800	C10	50	Mmf.	Cap. Part of 2nd I.F. Coil As.
P-80981	C11	0.010	Mf.	400V Tubular
P-80888	C12	0.250	Mf.	200V Tubular
P-80945	C13	500	Mmf.	Moulded
P-80862	C14	0.050	Mf.	Tubular
P-80888	C15	0.250	Mf.	200V Tubular
P-81014	C16	16.00	Mf.	Electrolytic Block
	C17	16.00	Mf.	
P-80914	C22	0.002	Mf.	600V Tubular
P-80914	C23	0.002	Mf.	600V Tubular
P-81812	C24	200	Mmf.	Cap. Part of Ant. Assem.
P-81807	C25	70	Mmf.	Cap. Part of 1st I.F. Coil As.
P-81805	C26	45	Mmf.	Cap. Part of 1st I.F. Coil As.
P-81018	Three Gang Condenser			

Fig. 2. Location of Tubes and Battery Connections

Oct., 1934

Condenser Alignment

Misalignment or mistracking of condensers generally manifests itself as broad tuning and lack of volume at portions or all of the standard wave band. The receivers are all properly aligned at the factory with precision instruments and realignment should not be attempted unless all other possible causes of the faulty operation have first been investigated and unless the service technician has the proper equipment. A signal generator that will provide accurately calibrated signals over the standard wave band and at the intermediate frequency, and an output meter are required for indicating the effect of adjustments.

First set the signal generator to a frequency of 175 KC. Connect the antenna lead of the lead generator to the grid of the 1st detector thru a .05 mfd. condenser. The ground lead from the signal generator goes to the ground lead of the receiver. Adjust trimmer condenser C9 on the back panel of the chassis until maximum output is obtained. **A non-metallic screw driver should be used in making this adjustment as the I. F. trimmer is at B+ potential.**

Next set the signal generator for 1730 KC. Turn the rotor to the full open position. The antenna lead from the signal generator is in this instance connected to the antenna lead of the receiver. Adjust the trimmer of the oscillator section of the 3 gang condenser until maximum output is obtained. The oscillator section is the one with the cut plate rotor.

Then set the signal generator for 1400 KC and turn the rotor until maximum output is obtained. Adjust the other two trimmers on the gang condenser for maximum output.

To obtain dial scale calibration tune in an 800 KC signal and set the dial pointer at that mark on the dial scale. When calibrated in this manner, the setting will be approximately correct at both ends of the scale.

The use of the cut plate type of condenser eliminates the necessity of a 600 KC padder and no adjustment at this frequency, therefore, is required.

Replacing Drive Cord

Remove chassis from cabinet.

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

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

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

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

Turn the drive drum until the opening in this drum is approximately vertical and with the hole at the top as shown in Fig. 4.

Remove the tension spring and the old drive cord.

See that the eyelet is in the hole in the drive drum as shown in Fig. 4. Insert one end of the drive cord from the outside through the hole in the eyelet in the drive drum.

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

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

Then tilt the chassis up on its back panel and bring the cord mentioned in the previous paragraph down to the drive shaft. Wrap it two and one-half times around the drive shaft as shown in Fig. 4.

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

Insert the free end of the cord through the hole in the eyelet and tie it to the end of the tension spring. The end of the spring, when hanging free, should be approximately ¾" from the flange of the drum as shown in Fig. 4. Cut off the surplus length of cord after it is knotted.

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

Replace the dial assembly and pointer.

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

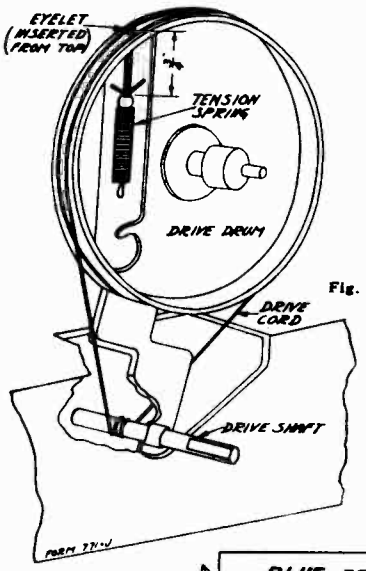


Fig. 4 Drive Cord Replacement.

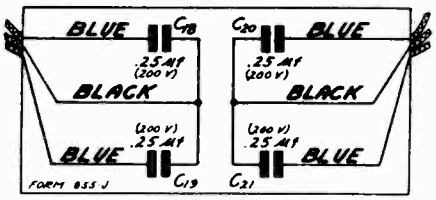


Fig. 3. Four Section Condenser in Power Unit Box

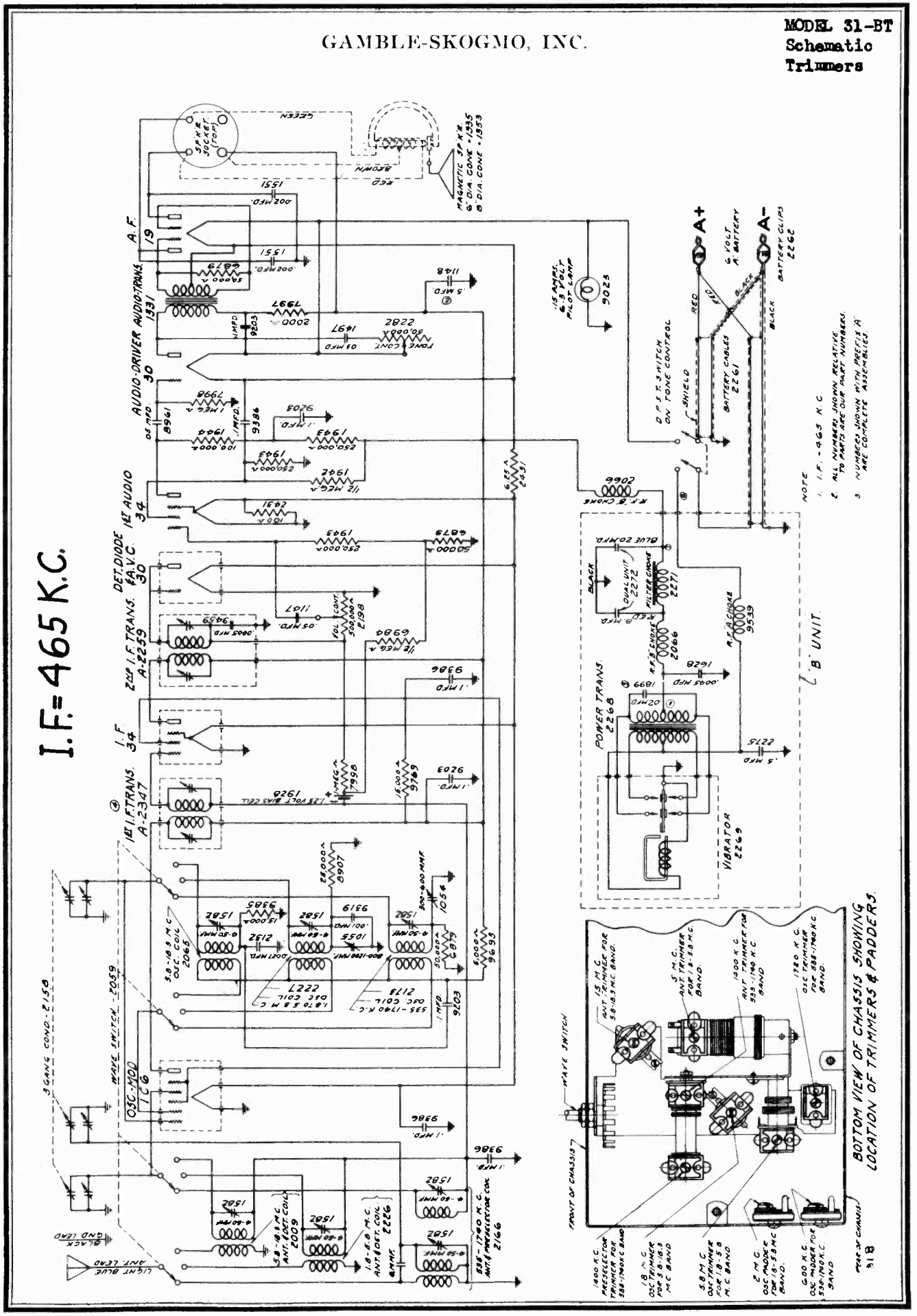
D. C. Resistance of Windings

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

Part No.	Item	Code	D. C. Resistance in Ohms
P-5200	Double Tuned Antenna Transformer, Primaries in series	T1	20.1
	Double Tuned Antenna Transformer Secondary Preselector	T1	3.3
	Double Tuned Antenna Transformer Secondary Detector	T1	3.1
P-5169	Oscillator Grid Coil	T4	3.6
	Oscillator Plate Coil	T4	1.6
P-5170	I. F. Coil Primary	T2	89.
	I. F. Coil Secondary	T2	126.
P-5171	I. F. Reactor Coil Plate Winding	T3	99.
	I. F. Reactor Coil Grid Winding	T3	429.
P-5172	Double Filament Reactor Assembly each section	L1, L2	Small
P-5173	Combined Filament Reactor Assembly each section	L3, L4	Small
P-50621	Audio Plate Reactor	L5	4940.
P-50622	Iron Core Isolating Reactor	L6	Small
P-5222	Filament Reactor	L10	Small
P-50625	Audio Transformer Primary	T5	1066.
	Audio Transformer Secondary (center tap to inside)	T5	614.
	Audio Transformer Secondary (center tap to outside)	T5	666.
P-2010	6" Magnetic Speaker (center tap to inside)		260.
	6" Magnetic Speaker (center tap to outside)		300.

GAMBLE-SKOGMO, INC.

MODEL 31-BT
Schematic
Trimmers



MODEL 31-BT
Alignment
Parts List

GAMBLE-SKOGMO, INC.

"Coronado". Model 31BT

Service Notes For The Six Volt Battery Operated Six Tube Superheterodyne Receiver

ALIGNMENT PROCEDURE: Realignment of this receiver should never be necessary unless one of the oscillator, antenna, or I.F. coils has been replaced. Lack of sensitivity, and poor tone quality may be due to any one or a combination of causes, such as weak or defective tubes, battery or speaker, inadequate or excessively long antenna, open or grounded bias resistor, bypass condenser, etc. Under no circumstances should realignment be attempted until all other possible sources have been first thoroughly investigated and have been definitely proven not to be the cause.

If an I.F. tube is replaced it is advisable to realign the I.F. amplifer, particularly if the replacement tube is one of a different manufacture than the one in the receiver. It is important when aligning to carefully follow the procedure in the order given, otherwise the receiver will lack sensitivity and the dial calibration will be incorrect.

IT IS IMPERATIVE THAT AN ACCURATELY CALIBRATED OSCILLATOR BE USED WITH SOME TYPE OF OUTPUT MEASURING DEVICE.

INTERMEDIATE ALIGNMENT:

1. Connect the high side of the test oscillator output to the control grid of the 1C6 modulator tube through a .02 Mfd. condenser. Leave the grid cap connected to the grid terminal of the tube, and connect the ground side of the test oscillator to the receiver ground.
2. Set the test oscillator frequency to 465 kilocycles (this must be accurate).
3. Align the second intermediate transformer by turning one of the trimmer screws accessible through holes in the top of the transformer shields up and down (increasing and decreasing capacity) until maximum reading is obtained on the output meter, after which adjust the other trimmer screws of the same transformer for maximum sensitivity.
4. Adjust the first intermediate transformer in the same manner as the second I.F. transformer.

TO ALIGN THE VARIABLE CONDENSER: It is important when aligning the gang condenser, padding and trimmer to follow the procedure carefully, otherwise the receiver will be insensitive and the dial calibration will be incorrect. The padding and trimmer condensers located underneath the chassis will be referred to by their function as indicated on the circuit diagram.

1. Connect the high output side of the test oscillator through a 400 ohm resistor to the receiver antenna lead and the low side to the set ground.
2. Place the band selector switch for operation on the 5.8 to 18 megacycle band, tune the receiver dial, and set the test oscillator frequency to EXACTLY 18 MEGACYCLES.

Rotate gang condenser so that plates are completely out of mesh and then tune in the 18 MEGACYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING THE 18 MEGACYCLE OSCILLATOR TRIMMER. When adjusting this trimmer two peaks, the fundamental and the image peak will be noticed. CARE MUST BE TAKEN THAT THE FUNDAMENTAL PEAK AND NOT THE IMAGE PEAK IS USED FOR ALIGNING THE RECEIVER AT 18 MEGACYCLES. Always back off the trimmer to minimum capacity, then screw down the trimmer (add capacity) until the first peak which is the fundamental and the proper one to use is tuned in. If the trimmer is screwed down beyond the point where the first peak is received, the incorrect image peak will be tuned in. After completing adjustment of the oscillator trimmer at 18 megacycles always check to see if the proper peak has been used. To do this leave the test oscillator frequency at 18 megacycles, increase the output of the test oscillator and tune the receiver dial to approximately 17 megacycles. Then vary the receiver dial slightly to the right and left of 17 megacycles, and if the fundamental peak was used in aligning at 18 megacycles the test oscillator signal will be heard at approximately 17 megacycles on the receiver dial. If it is not possible to receive the signal, then the fundamental peak was not used and the 18 megacycle oscillator trimmer must be properly readjusted.

3. With band selector switch set for operation on 5.8 to 18 megacycle band tune the receiver dial and set test oscillator frequency to EXACTLY 16 MEGACYCLES and adjust 16 MEGACYCLE ANTENNA TRIMMER FOR MAXIMUM 16 MEGACYCLE SIGNAL SENSITIVITY.
4. Place band selector switch for operation on 1.8 to 5.8 megacycle band, tune the receiver dial, and set test oscillator frequency to EXACTLY 5.8 MEGACYCLES.

Rotate gang condenser so that plates are completely out of mesh and BRING IN 5.8 MEGACYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING THE 5. MEGACYCLE OSCILLATOR TRIMMER.

5. Leave the band selector switch for operation on the 1.8 to 5.8 megacycle band and tune the receiver dial and set the test oscillator frequency to approximately 2 megacycles. While rocking the gang condenser slightly to the right and left, adjust the 2 megacycle oscillator padder condenser for maximum sensitivity.
6. Replace the 400 ohm resistor in series with test oscillator lead with a 200 mmfd. condenser, place the band selector switch for operation on the 535 to 1720 kilocycle band and set test oscillator frequency to EXACTLY 1720 KILOCYCLES.

Rotate gang condenser so that plates are completely out of mesh and BRING IN THE 1720 KILOCYCLE SIGNAL TO MAXIMUM OUTPUT by adjusting 1720 kilocycle oscillator trimmer.

7. With band selector switch placed for operation on the 535 to 1720 kilocycle band set test oscillator frequency and receiver dial to EXACTLY 1400 KILOCYCLES. Adjust 1400 kilocycle preselector and antenna trimmers for maximum 1400 kilocycle signal sensitivity.
8. Leave band selector switch for operation on 535 to 1720 kilocycle band, tune receiver dial and set test oscillator frequency to approximately 600 kilocycles. While rocking gang condenser slightly to right and left adjust 600 kilocycle oscillator padder for maximum sensitivity.

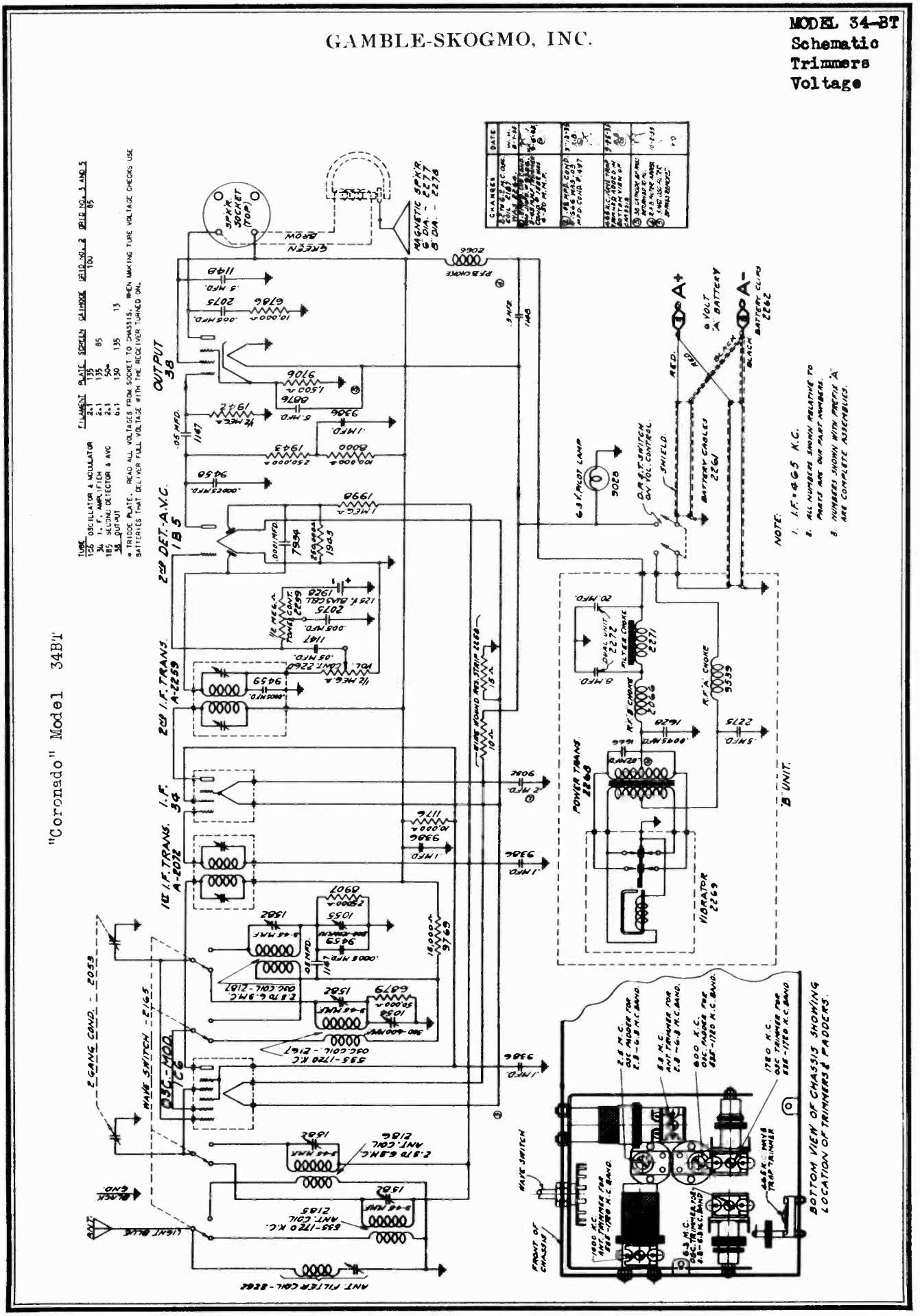
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Part Number		List Price
2166	535-1720 K.C. Band Antenna and Preselector Coil	$1.30
2173	535-1720 K.C. Band Oscillator Coil	.65
2226	1.8-5.8 M.C. Band Antenna Coil	.70
2227	1.8-5.8 M.C. Band Oscillator Coil	.55
2009	5.8-18. M.C. Band Antenna Coil	.60
2065	5.8-18. M.C. Band Oscillator Coil	.65
2072	First I. F. Transformer	1.55
2259	Second I. F. Transformer	1.60
2158	Three Gang Condenser	3.60
2122	Tuning Dial Assembly	2.00
1054	Padding Condenser	.55
1055	Padding Condenser	.55
1331	Audio Transformer	1.40
1928	Bias Cell	.22
2282	Tone Control with Off and On Switch	1.24
2198	Volume Control	.85
2059	Wave Switch	.75
2272	8 & 20 Mfd. Dry Electrolytic Condenser	1.95
2268	Power Transformer	2.35
2271	Filter Choke	1.00
2066	R. F. Choke	.28
9530	R. F. "A" Choke	.15
2269	Vibrator	6.00
2273	Sponge Rubber Vibrator Pad	.10
2430	6.25 Ohm Wire Wound Resistor	.19
1942	500,000 Ohm 1/3 Watt Resistor	.19
1943	250,000 Ohm 1/3 Watt Resistor	.19
1944	100,000 Ohm 1/3 Watt Resistor	.19
7998	1 Meg Ohm 1/3 Watt Resistor	.19
6984	500,000 Ohm 1/3 Watt Resistor	$ .19
6879	50,000 Ohm 1/3 Watt Resistor	.19
9693	5,000 Ohm 1/3 Watt Resistor	.19
9769	15,000 Ohm ½ Watt Resistor	.19
8907	25,000 Ohm 1/3 Watt Resistor	.19
9285	15,000 Ohm 1/3 Watt Resistor	.19
9431	100 Ohm 1/3 Watt Resistor	.19
9319	.001 Mfd. Moulded Condenser	.21
9458	.00025 Mfd. Moulded Condenser	.21
9459	.0005 Mfd. Moulded Condenser	.21
2132	.0027 Mfd. Moulded Condenser	.21
1628	.0045 Mfd. Moulded Condenser	.21
9386	.1 Mfd. 200 Volt Condenser	.19
9203	.1 Mfd. 400 Volt Condenser	.20
1147	.07 Mfd. 200 Volt Condenser	.19
8961	.05 Mfd. 400 Volt Condenser	.19
1551	.002 Mfd. 600 Volt Condenser	.18
1497	.03 Mfd. 600 Volt Condenser	.19
2275	.5 Mfd. 100 Volt Condenser	.50
1666	.03 Mfd. 600 Volt Condenser	.18
2073	.5 Mfd. 400 Volt Condenser	.56
2261	Battery Cable (Single Section)	.65
2262	Battery Clips	.17
8051	Black Rubber Sleeving	.10
8052	Red Rubber Sleeving	.10
1335	Six Inch Speaker	6.25
1353	Eight Inch Speaker	7.00
1739	13/16" Knobs	.22
1740	15/16" Knobs	.22
1794	15/16" Knobs	.25

GAMBLE-SKOGMO, INC.

MODEL 34-BT
Schematic
Trimmers
Voltage

"Coronado" Model 34BT



MODEL 34-BT
Alignment
Parts List

GAMBLE-SKOGMO, INC.

SERVICE NOTES
FOR THE
TWO BAND
SIX VOLT BATTERY OPERATED
FOUR TUBE SUPERHETERODYNE RECEIVER

ALIGNMENT PROCEDURE: REALIGNMENT OF THIS RECEIVER SHOULD NEVER BE NECESSARY UNLESS ONE OF THE OSCILLATOR, ANTENNA, OR I. F. COILS HAS BEEN REPLACED. LACK OF SENSITIVITY, SELECTIVITY, AND POOR TONE QUALITY MAY BE DUE TO ANY ONE OR A COMBINATION OF CAUSES, SUCH AS WEAK OR DEFECTIVE TUBES, BATTERY, OR SPEAKER, INADEQUATE OR EXCESSIVELY LONG ANTENNA, OPEN OR GROUNDED RESISTOR, BYPASS CONDENSER, ETC. UNDER NO CIRCUMSTANCES SHOULD REALIGNMENT BE ATTEMPTED UNTIL ALL OTHER POSSIBLE SOURCES HAVE BEEN FIRST THOROUGHLY INVESTIGATED AND HAVE BEEN DEFINITELY PROVEN NOT TO BE THE CAUSE. IF AN I. F. TUBE IS REPLACED IT IS ADVISABLE TO REALIGN THE I. F. AMPLIFIER, PARTICULARLY IF THE REPLACEMENT TUBE IS ONE OF A DIFFERENT MANUFACTURE THAN THE ONE IN THE RECEIVER. IT IS IMPORTANT WHEN ALIGNING TO CAREFULLY FOLLOW THE PROCEDURE IN THE ORDER GIVEN, OTHERWISE THE RECEIVER WILL LACK SENSITIVITY AND THE DIAL CALIBRATION WILL BE INCORRECT. IT IS IMPERATIVE THAT AN ACCURATELY CALIBRATED OSCILLATOR BE USED WITH SOME TYPE OF OUTPUT MEASURING DEVICE.

INTERMEDIATE ALIGNMENT:

1. CONNECT THE HIGH SIDE OF THE TEST OSCILLATOR OUTPUT TO THE CONTROL GRID OF THE 1C6 MODULATOR TUBE THROUGH A .02 MFD. CONDENSER. LEAVE THE GRID CAP CONNECTED TO THE GRID TERMINAL OF THE TUBE, AND CONNECT THE GROUND SIDE OF THE TEST OSCILLATOR TO THE RECEIVER GROUND.

2. SET THE TEST OSCILLATOR FREQUENCY TO 465 KILOCYCLES (THIS MUST BE ACCURATE).

3. ALIGN THE SECOND INTERMEDIATE TRANSFORMER BY TURNING ONE OF THE TRIMMER SCREWS ACCESSIBLE THROUGH HOLES IN THE TOP OF THE TRANSFORMER SHIELDS UP AND DOWN (INCREASING AND DECREASING CAPACITY) UNTIL MAXIMUM READING IS OBTAINED ON THE OUTPUT METER, AFTER WHICH ADJUST THE OTHER TRIMMER SCREW OF THE SAME TRANSFORMER FOR MAXIMUM SENSITIVITY.

4. ADJUST THE FIRST INTERMEDIATE TRANSFORMER IN THE SAME MANNER AS THE SECOND I. F. TRANSFORMER.

TO ALIGN THE VARIABLE CONDENSER: IT IS IMPORTANT WHEN ALIGNING THE GANG CONDENSER, PADDING CONDENSER, AND WAVE TRAP TO FOLLOW THE PROCEDURE CAREFULLY, OTHERWISE THE RECEIVER WILL BE INSENSITIVE AND THE DIAL CALIBRATION WILL BE INCORRECT. THE TRIMMER AND PADDING CONDENSER WILL BE REFERRED TO BY THEIR FUNCTION AS INDICATED ON THE CIRCUIT DIAGRAM.

1. CONNECT THE HIGH OUTPUT SIDE OF THE TEST OSCILLATOR THROUGH A .00025 MFD. CONDENSER TO THE RECEIVER ANTENNA LEAD AND THE LOW SIDE TO THE SET GROUND.

2. SOME CODE AND AIRCRAFT SIGNALS ARE BROADCAST ON A FREQUENCY THE SAME OR NEAR THE INTERMEDIATE FREQUENCY OF THE RECEIVER. TO ELIMINATE INTERFERENCE FROM THESE SIGNALS A 465 KILOCYCLE ANTENNA FILTER IS INCORPORATED IN THE RECEIVER. TO ADJUST, TUNE RECEIVER DIAL TO APPROXIMATELY 1000 KILOCYCLES AND SET TEST OSCILLATOR FREQUENCY TO EXACTLY 465 KILOCYCLES. THEN ADJUST THE 465 KILOCYCLE WAVE TRAP TRIMMER CONDENSER FOR MINIMUM 465 KILOCYCLE SIGNAL RESPONSE.

3. PLACE BAND SELECTOR SWITCH FOR OPERATION ON THE 1720-540 KILOCYCLE BAND, ROTATE GANG CONDENSER SO THAT PLATES ARE COMPLETELY OUT OF MESH, SET TEST OSCILLATOR FREQUENCY TO EXACTLY 1720 KILOCYCLES, AND ADJUST 1720 KILOCYCLE OSCILLATOR TRIMMER FOR MAXIMUM 1720 KILOCYCLE SIGNAL OUTPUT.

4. WITH BAND SELECTOR SWITCH SET FOR OPERATION ON THE 1720-540 KILOCYCLE BAND, SET THE TEST OSCILLATOR FREQUENCY AND RECEIVER TUNING DIAL TO EXACTLY 1400 KILOCYCLES. THEN ADJUST 1400 KILOCYCLE ANTENNA TRIMMER FOR MAXIMUM 1400 KILOCYCLE RESPONSE.

5. TUNE RECEIVER DIAL AND SET TEST OSCILLATOR FREQUENCY TO APPROXIMATELY 600 KILOCYCLES. WHILE ROCKING GANG CONDENSER SLIGHTLY TO RIGHT AND LEFT ADJUST 600 KILOCYCLE OSCILLATOR PADDER FOR MAXIMUM SENSITIVITY.

6. PLACE BAND SELECTOR SWITCH FOR OPERATION ON THE 2.3-6.2 MEGACYCLE BAND, ROTATE GANG CONDENSER SO PLATES ARE COMPLETELY OUT OF MESH, AND SET TEST OSCILLATOR FREQUENCY TO EXACTLY 6.3 MEGACYCLES. BRING IN 6.3 MEGACYCLE SIGNAL TO MAXIMUM OUTPUT WITH 6.3 MEGACYCLE OSCILLATOR TRIMMER.

7. WITH BAND SELECTOR SWITCH ON 2.3-6.3 MEGACYCLE BAND SET RECEIVER DIAL AND TEST OSCILLATOR FREQUENCY TO EXACTLY 5.8 MEGACYCLES. ADJUST 5.8 MEGACYCLE ANTENNA TRIMMER FOR MAXIMUM 5.8 MEGACYCLE SIGNAL RESPONSE.

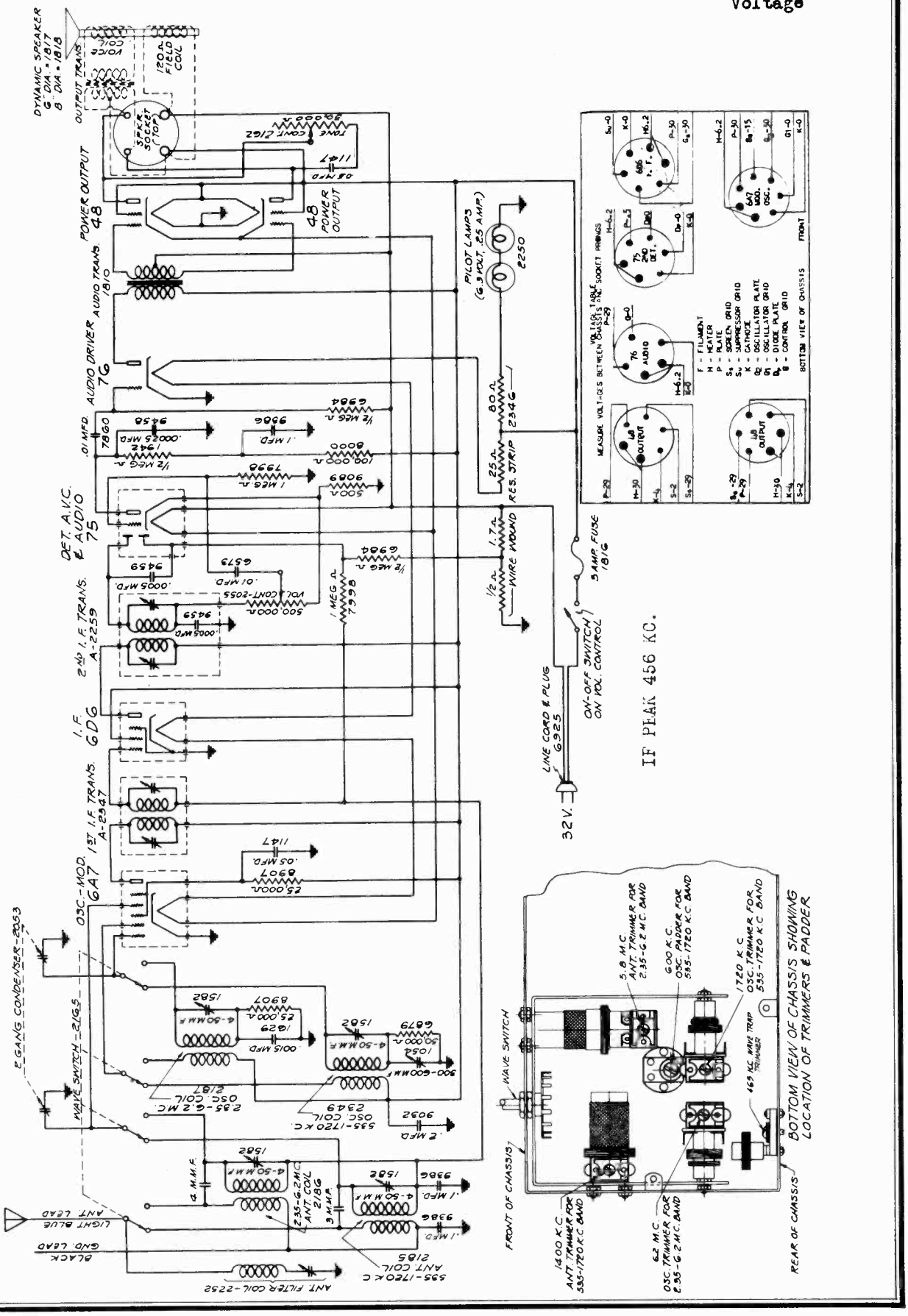
8. LEAVE BAND SELECTOR SWITCH FOR OPERATION ON THE 2.3-6.3 MEGACYCLE BAND, TUNE RECEIVER DIAL AND SET TEST OSCILLATOR FREQUENCY TO APPROXIMATELY 2.5 MEGACYCLES. THEN WHILE ROCKING GANG CONDENSER SLIGHTLY TO RIGHT AND LEFT ADJUST 2.5 MEGACYCLE PADDING CONDENSER FOR MAXIMUM SENSITIVITY.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

PART NUMBER		LIST PRICE	PART NUMBER		LIST PRICE
2252	ANTENNA FILTER COIL	$ .65	8907	25,000 OHM 1/3 WATT RESISTOR	$ .19
2185	540 TO 1720 KILOCYCLE BAND ANTENNA COIL	.80	6786	10,000 OHM 1/3 WATT RESISTOR	.19
2167	540 TO 1720 KILOCYCLE BAND OSCILLATOR COIL	.55	9765	15,000 OHM 1/2 WATT RESISTOR	.19
2186	2.4 TO 6.2 MEGACYCLE BAND ANTENNA COIL	.70	1176	10,000 OHM 1/2 WATT RESISTOR	.19
2187	2.4 TO 6.2 MEGACYCLE BAND OSCILLATOR COIL	.35	9706	1,500 OHM 1/3 WATT RESISTOR	.19
2072	FIRST I. F. TRANSFORMER	1.55	1054	PADDING CONDENSER	.55
2259	SECOND I. F. TRANSFORMER	1.60	1055	PADDING CONDENSER	.55
2053	TWO GANG CONDENSER	2.65	8876	5 MFD. DRY ELECTROLYTIC CONDENSER	.85
2121	TUNING DIAL ASSEMBLY COMPLETE	2.25	9458	.00025 MFD. MOULDED CONDENSER	.21
2260	VOLUME CONTROL WITH SWITCH	1.20	9459	.0005 MFD. MOULDED CONDENSER	.21
2239	TONE CONTROL	.80	7934	.0001 MFD. MOULDED CONDENSER	.21
2165	WAVE SWITCH	.70	1628	.0045 MFD. MOULDED CONDENSER	.21
2047	BIAS CELL MOUNTING STRIP	.11	1666	.02 MFD. 600 VOLT CONDENSER	.18
1928	BIAS CELL	.22	2275	.5 MFD. 200 VOLT CONDENSER	.50
2268	POWER TRANSFORMER	2.35	9386	.1 MFD. 200 VOLT CONDENSER	.19
2271	FILTER CHOKE	1.00	1147	.05 MFD. 200 VOLT CONDENSER	.17
9539	R.F. "A" CHOKE	.45	1148	.5 MFD. 200 VOLT CONDENSER	.40
2066	R.F. CHOKE	.28	9032	.2 MFD. 200 VOLT CONDENSER	.23
2269	VIBRATOR	6.00	2261	BATTERY CABLE (SINGLE SECTION)	.65
2273	SPONGE RUBBER VIBRATOR PAD	.10	2262	BATTERY CLIPS	.17
2258	WIRE WOUND RESISTOR STRIP	.40	8051	BLACK RUBBER SLEEVING	.10
1942	500,000 OHM 1/3 WATT RESISTOR	.19	8052	RED RUBBER SLEEVING	.10
1943	250,000 OHM 1/3 WATT RESISTOR	.19	2277	6" MAGNETIC SPEAKER	6.00
7998	1 MEGOHM 1/3 WATT RESISTOR	.19	2278	8" MAGNETIC SPEAKER	6.75
8000	100,000 OHM 1/3 WATT RESISTOR	.19	1740	15/16" KNOBS	.22
6879	50,000 OHM 1/3 WATT RESISTOR	.19	1739	13/16" KNOBS	.22
			9023	6.3 VOLT .15 AMPERE PILOT LIGHT	.19

GAMBLE-SKOGMO, INC.

MODEL 36-L
Schematic
Socket, Trimmers
Voltage



MODEL 36-L
Alignment
Voltage, Parts

GAMBLE-SKOGMO, INC.

Service Notes For The Two Band Thirty-Two Volt Six Tube Superheterodyne Receiver

ALIGNMENT PROCEDURE: Realignment of this receiver should never be necessary unless one of the oscillator, antenna or I. F. coils has been replaced. Lack of sensitivity, selectivity, and poor tone quality may be due to any one or a combination of causes, such as weak or defective tubes, battery, or speaker, inadequate or excessively long antenna, open or grounded resistor, bypass condenser, etc. Under no circumstances should realignment be attempted until all other possible sources have been first thoroughly investigated and have been definitely proven not to be the cause. If an I. F. tube is replaced it is advisable to realign the I. F. amplifier, particularly if the replacement tube is one of a different manufacture than the one in the receiver. It is important when aligning to carefully follow the procedure in the order given, otherwise the receiver will lack sensitivity and the dial calibration will be incorrect.

It is imperative that an accurately calibrated oscillator be used with some type of output measuring device.

INTERMEDIATE ALIGNMENT:

1. Connect the high side of the test oscillator output to the control grid of the 6A7 oscillator modulator tube through a .02 mfd. condenser. Leave the grid cap connected to the grid terminal of the tube, and connect the ground side of the test oscillator to the receiver ground.

2. Set the test oscillator frequency to 465 kilocycles (this must be accurate).

3. Align the second intermediate transformer by turning one of the trimmer screws accessible through holes in the top of the transformer shields up and down (increasing and decreasing capacity) until maximum reading is obtained on the output meter, after which adjust the other trimmer screw of the same transformer for maximum sensitivity.

4. Adjust the first intermediate transformer in the same manner as the second I. F. transformer.

TO ALIGN THE VARIABLE CONDENSER: It is important when aligning the gang condenser, padding condenser, and wave trap to follow the procedure carefully, otherwise the receiver will be insensitive and the dial calibration will be incorrect. The trimmer and padding condenser will be referred to by their function as indicated on the circuit diagram.

1. Connect the high output side of the test oscillator through a .00025 mfd. condenser to the receiver antenna lead and the low side to the set ground.

2. Some code and aircraft signals are broadcast on a frequency the same or near the intermediate frequency of the receiver. To eliminate interference from these signals a 465 kilocycle antenna filter is incorporated in the receiver. To adjust, tune receiver dial to approximately 1000 kilocycles and set test oscillator frequency to exactly 465 kilocycles. Then adjust the 465 kilocycle wave trap trimmer condenser for minimum 465 kilocycle signal response.

3. Place band selector switch for operation on the 1720-540 kilocycle band, rotate gang condenser so that plates are completely out of mesh, set test oscillator frequency to exactly 1720 kilocycles, and adjust 1720 kilocycle oscillator trimmer for maximum 1720 kilocycle signal output.

4. With band selector switch set for operation on the 1720-540 kilocycle band, set the test oscillator frequency and receiver tuning dial to EXACTLY 1400 KILOCYCLES, then adjust 1400 kilocycle antenna trimmer for maximum 1400 kilocycle signal response.

5. With band selector switch set for operation on the 1720-540 kilocycle band, tune receiver dial and set test oscillator frequency to approximately 600 kilocycles. While rocking gang condenser slightly to right and left adjust 600 kilocycle oscillator padder for maximum sensitivity.

6. Place band selector switch for operation on the 2.35-6.2 megacycle band, rotate gang condenser so plates are completely out of mesh, and set test oscillator frequency to exactly 6.2 megacycles. Bring in 6.2 megacycle signal to maximum output with 6.2 megacycle oscillator trimmer.

7. With band selector switch on 2.35-6.2 megacycle band set receiver dial and test oscillator frequency to exactly 5.8 megacycles. Adjust 5.8 megacycle antenna trimmer for maximum 5.8 megacycle signal response.

VOLTAGE TABLE

Tube		Filament	Plate	Screen	Cathode	Grid No. 2	Grid No. 3 & 5
6A7	1st Detector and Oscillator	6	32		.5	32	15
6D6	I. F. Amplifier	6	32	32	.6		
75	2nd Detector and A.V.C.	6	5*				
76	1st Audio	6	30				
48	Output	6	30	32	5		
48	Output	6	30	32	5		

*Triode plate comparative voltage only. Read all voltages from socket to chassis. PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Part Number		List Price
2252	Antenna Filter Coil	$0.65
2185	540-1720 Kilocycle Band Antenna Coil	.80
2349	540-1720 Kilocycle Band Oscillator Coil	.65
2186	2.35-6.2 Megacycle Band Antenna Coil	.70
2187	2.35-6.2 Megacycle Band Oscillator Coil	.55
2347	First I. F. Transformer	1.65
2259	Second I. F. Transformer	1.60
2053	Two Gang Condenser	2.65
2165	Wave Switch	.70
2111	Tuning Dial Assembly Complete	2.25
2112	Calibrated Dial Scale	.30
2250	Pilot Lamp Bulb 6.3 Volt .25 Ampere	.19
2055	Volume Control With Off and On Switch	1.10
2162	Tone Control	.80
1810	Audio Transformer	1.75
1054	Padding Condenser	.55
1582	Trimmer Condenser	.21
2346	Wire Wound Resistor Strip	.75
7998	1 Meg Ohm ½ Watt Resistor	.19
6984	500,000 Ohm ½ Watt Resistor	.19
8000	100,000 Ohm ½ Watt Resistor	.19
6879	50,000 Ohm ½ Watt Resistor	.19
8907	25,000 Ohm ½ Watt Resistor	.19
9089	500 Ohm ½ Watt Resistor	.19
1942	300,000 Ohm ½ Watt Resistor Insulated Type	.19
6573	.01 Mfd. 200 Volt Condenser	.17
7860	.01 Mfd. 400 Volt Condenser	.17
9386	.1 Mfd. 200 Volt Condenser	.19
9032	.2 Mfd. 200 Volt Condenser	.23
1147	.05 Mfd. 200 Volt Condenser	.19
9459	.0005 Mfd. Moulded Condenser	.21
9458	.00025 Mfd. Moulded Condenser	.21
1629	.001 Mfd. Moulded Condenser	.21
1548	Fuse Block Receptacle	.25
1816	Fuse	.12
1817	Six Inch Dynamic Speaker	7.25
1818	Eight Inch Dynamic Speaker	9.00
1740	15/16" Knob	.22
1739	13/16" Knob	.22

GAMBLE-SKOGMO, INC.

MODEL 46-L-1
Schematic
Socket, Trimmers
Coil Data

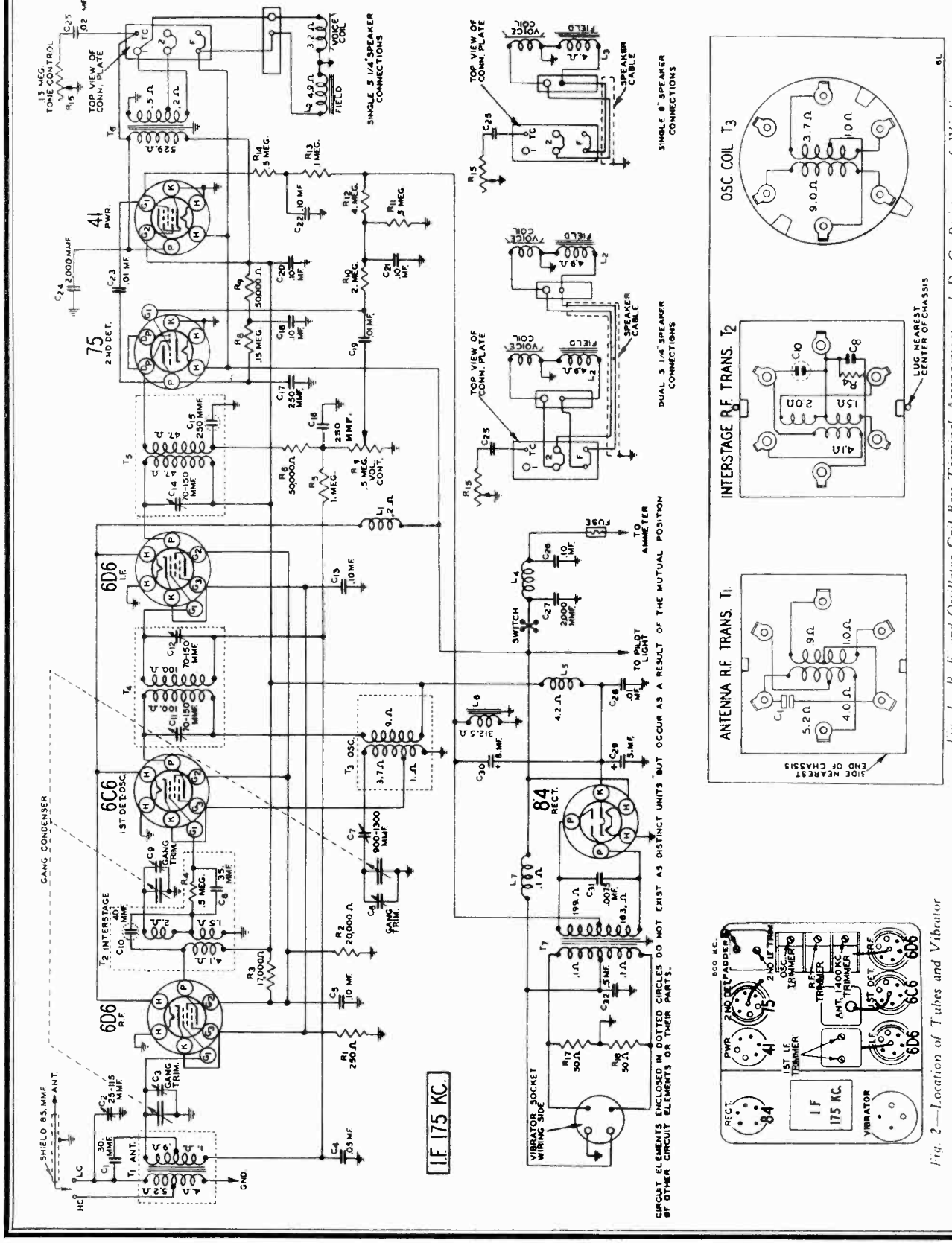


Fig. 4 R. F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

Fig. 2—Location of Tubes and Vibrator

6 Tube
Automobile Radio

June 1936

This model is a 6 tube automobile radio covering the standard wave band. It has a tuning range as shown in the specifications above. The signal is fed through an antenna transformer with tuned secondary into a 6D6 tube which functions as an R.F. amplifier. A tapped connection is provided in the primary of the antenna transformer for installations in cars in which a high capacity antenna is used.

The output of the R.F. tube is fed through another R. F. transformer with tuned secondary into a 6C6 tube which functions as the first detector and oscillator. The oscillating circuit is tuned by the oscillator section of the gang condenser and is always resonant at a frequency 175 KC above the frequency to which the R.F. circuits are tuned.

One stage of I.F. amplification is employed using a 6D6 tube. The primary and secondary of the first I.F. transformer and the primary of the second I.F. transformer are tuned by small trimmer condensers.

A 75 dual diode-triode tube functions as a diode 2nd detector, AVC tube and a one stage audio amplifier. AVC voltage is applied to the control grid circuits of the 6D6 R.F. and I.F. tubes. The manual volume control varies the audio voltage applied to the grid of the 75 tube.

In the output stage a 41 tube is employed. A dynamic reproducer is used. Provision is made for a single roof speaker and dual speaker (chassis and roof) connections. The electrical connections for the different speaker installations are shown in the schematic. For the single 8 inch or dual 5¼ inch speakers, the tapped connection of the output transformer secondary is used.

The vibrator in the power unit interrupts the current through the primary of the power transformer. The use of a vibrating interrupter in the primary circuit and a high ratio transformer results in the application of high voltage AC to the rectifier tube plates. The 84 full wave rectifier tube, filter choke and filter condensers convert this high voltage AC into high voltage DC for the plate and screen circuits.

Alignment and Calibration

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

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

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

I. F. Adjustment

Set the signal generator for a signal of 175 KC.

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

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

Set the volume control at the maximum position.

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

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

1575 KC Adjustment

Set the signal generator for 1575 KC.

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

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

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

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

1400 KC Adjustment

Set the signal generator for 1400 KC.

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

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

Do not change the setting of the oscillator trimmer.

600 KC Adjustment

Set the signal generator for 600 KC.

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

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

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

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

Adjusting Antenna 600 KC Trimmer

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

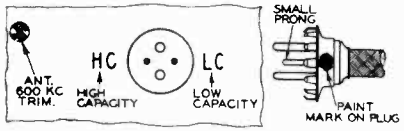


Fig. 3—Antenna Plug Insertion

Calibrating the Receiver

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

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

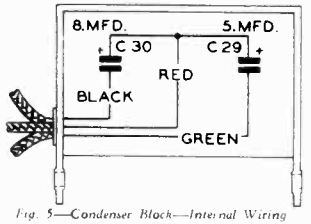


Fig. 5—Condenser Block—Internal Wiring

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

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

Roof Speaker

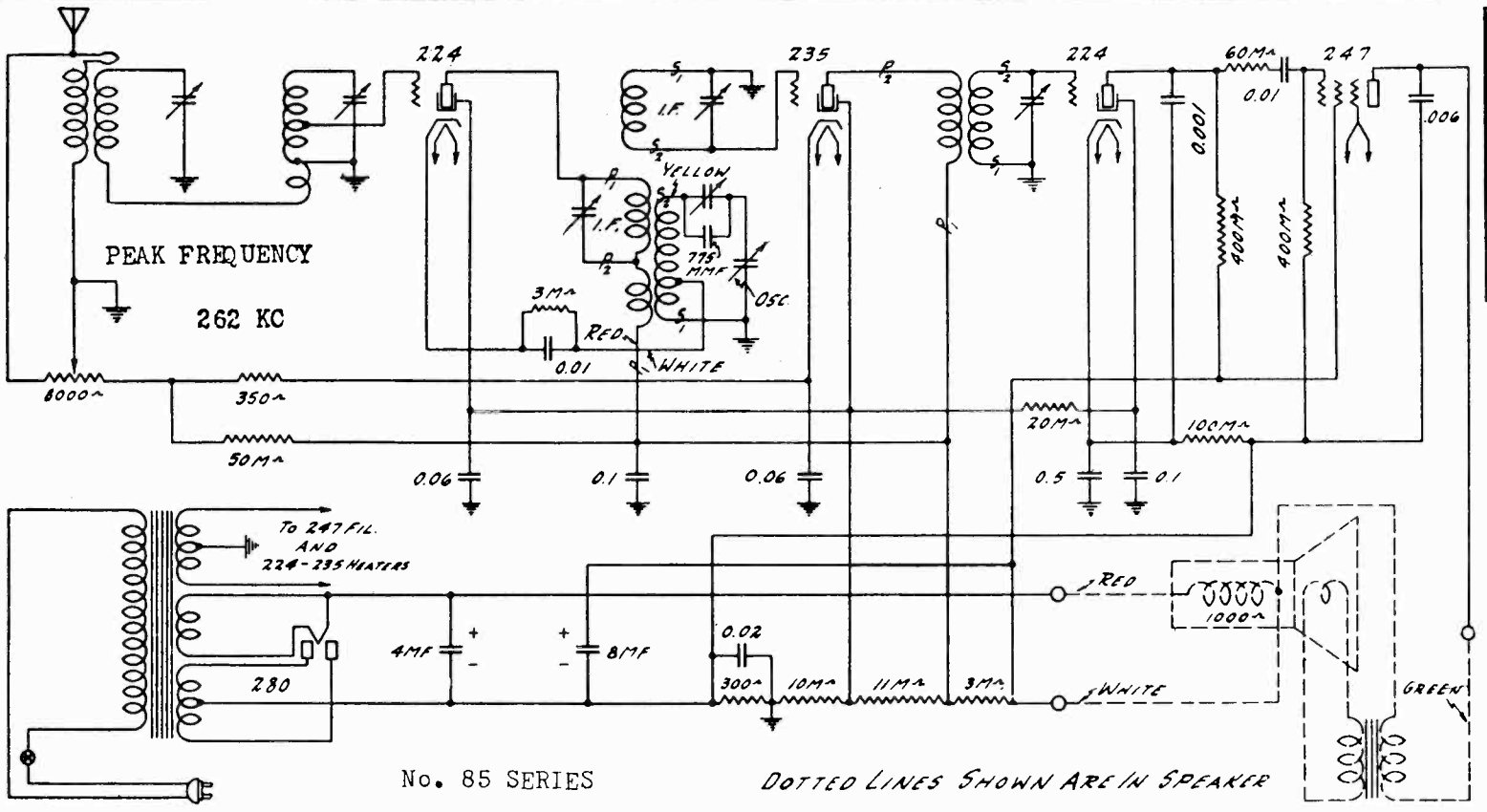
The Ford and General Motors 1936 automobiles have provision for mounting a speaker in the car roof (Ford 5¼ inch speaker, General Motors 5¼ or 8 inch speaker). This model is so designed that roof speaker installations in those cars can readily be made.

There are three general types of speaker installation. In the first type of installation the single 5¼ inch speaker attached to the chassis cover is used. In the second type of installation a single 5¼ inch or 8 inch roof speaker is used. The third type of installation is the dual speaker mounting using two 5¼ inch speakers, one in the car roof and the other on the chassis cover. (The 8 inch and 5¼ inch speakers cannot be used together).

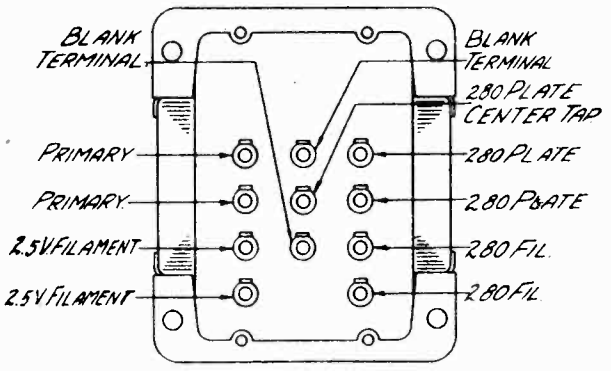
The electrical connections of the different speaker installations are shown in the schematic—Fig. 1. Complete information regarding the method of making the installations and the kits of parts required are in the installation manual packed with each radio.

Instrument Panel Mounting Kits

Car	Year & Model	Panel Kit No.
Buick	1936	*21A16
Cadillac	1936	†21A39
Chevrolet	1936-35 Standard & Master	‡21A11
Chrysler	1936 Six	*21A19
	1936 Eight	*21A30
	1936 Airflow	*21A31
	1935-34 Except Imperial	*21A47
DeSoto	1936 Airflow & Airstream Custom	*21A22
	1936 Airstream DeLuxe	*21A26
	1935 DeLuxe	*21A46
	1934	*21A47
Dodge	1936 DeLuxe	*21A13
	1935	*21A45
	1934	*21A49
Plymouth	1936 DeLuxe	‡21A12
	1936-35 Standard	*21A37
	1935 DeLuxe	*21A33
	1934	*21A49
Pontiac	1936-35 Standard-DeLuxe 6 & 8	‡21A15
Studebaker	1936 Dictator	*21A20
	President	*21A24
Terraplane	1936	*21A18
	1935	*21A48
	1934	*21A35
Steering column and under panel kit.		‡21A23
Ford	1936 Standard & DeLuxe	‡21A10
	1935 DeLuxe	
	1935 Standard	*21A32
	1934	*21A38
Hudson	1936	*21A17
	1935	*21A48
	1934	*21A35
Lafayette	1936-35	*21A50
LaSalle	1936	†21A40
Lincoln	Zephyr 1936	‡21A10
Nash	1936-35	*21A36
Oldsmobile	1936	*21A14
	1935	*21A34
Packard	1936 120-8	*21A21
	1935 120	*21A41



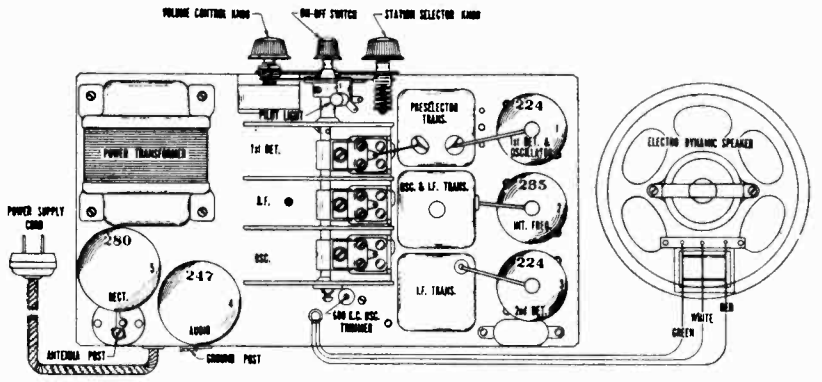
There are certain features to be noted in this receiver. The mixer is of the autodyne type, wherein it functions as a mixer (1st detector) and also as an oscillator. Also that the grid lead from the mixer tube joins the grid coil at a tap upon this winding. This tap is so apportioned that the circuit acts to suppress the tranmission of image frequency signals, in this case 524 KC higher than the frequency setting of the tuned circuit. The IF transformer is also of special structure combining the coupling transformer and also the oscillator system. The structure of this transformer-oscillator is illustrated upon the next page.



Power Transformer Terminals

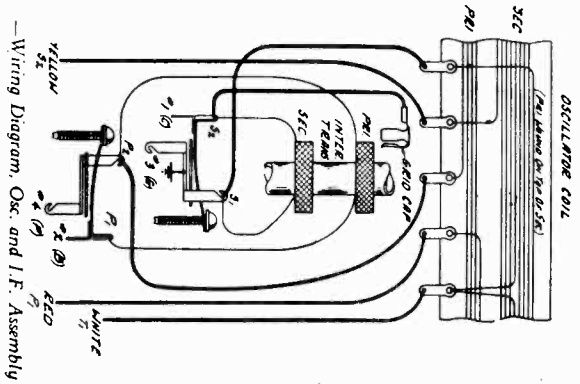
GAMBLE-SKOGMO, INC.

MODEL 85
Schematic
Socket



Top View

Chassis showing Tube Sequence and Speaker Connections.



Wiring Diagram, Osc. and I.F. Assembly

VOLTAGES AT SOCKETS
LINE VOLTAGE 115—VOLUME CONTROL AT MAXIMUM

Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Cathode Volts	Plate MA	Grid Test MA
224	1	1st Det. & Osc.	2.25	165	4.5–5.25(1)	65	.4	4.5–5.25(1)	1.3	2.0
235	2	I.F.	2.25	165	2.5	65	1.5	2.5	6.4	7.4
224	3	2nd Det.	2.25	128	6.5	60(2)	.05	6.5	.22	.23
247	4	Audio	2.25	205	16. (3)	225	8.0		29.	33.*
280	5	Rect.	4.9						27. Per Plate	

(1) Varies with frequency setting of dial approximately as shown.
(2) Voltage as measured with 600,000 ohm meter.
(3) Measured across 300 ohm section of voltage divider resistor.

CONDENSER ALIGNMENT

Aligning Intermediate Condensers—A nonmetallic screw driver is necessary for aligning the intermediate condensers. A signal of 262 K.C. is required. Remove the grid cap from the grid connection of the 224 1st detector tube and connect the lead from the signal generator to the grid of the 224 1st detector. The tube shield should be left on. One way to make this connection is to bring the antenna lead from the signal generator through the slot in the shield for the grid wire. A grid cap on the end of the antenna lead of the signal generator will facilitate making this connection. This lead, of course, should be insulated.

The oscillator coil must be shorted out by grounding the lead from the tap on the secondary. This is the white lead which comes through the porcelain base of the oscillator and I.F. assembly. This lead terminates at a lug on a vertically mounted bakelite terminal strip. Connect the jumper from this lug to the ground Connect the ground lead from the signal generator to the ground post of the chassis.

The intermediate condenser adjusting screws are reached from the bottom of the chassis. There are two on the porcelain base of the oscillator and 1st I.F. transformer assembly, Part No. 3382 and one on the porcelain base of the 2nd I.F. transformer assembly, Part No. 3388. The volume control should be at maximum setting. Then adjust the three intermediate condenser screws until maximum output is obtained on the output meter. After all three have been adjusted the first time, go over them again and check the setting for maximum output.

Aligning R.F. and Oscillator Condensers—For adjusting the R.F. and oscillator condensers the signal input from the signal generator should be made to the antenna post. Adjust the signal generator for a signal of exactly 1400 K.C. Then turn the tuning condenser rotor until the pointer is at exactly 1400 on the dial scale. Then adjust the three trimmers on the tuning condenser for maximum output adjusting the oscillator trimmer first (trimmer nearest back of chassis). Turn the screws up or down until greatest deflection on output indicating meter is obtained.

Then set the signal generator for a signal of 600 K.C. and turn the tuning condenser rotor until the output is at maximum. The next step is to adjust the oscillator 600 K.C. trimmer condenser. The adjusting screw for this condenser is in back of the tuning condenser and is reached from the top of the chassis. To correctly adjust this oscillator 600 K.C. trimmer it will be necessary to turn the screw to several different positions using a nonmetallic screw driver. At every position of this adjusting screw turn the tuning condenser rotor until maximum output is obtained. For each position of the adjusting screw there will be a maximum output and the correct position of the adjusting screw is the setting at which the deflection on output indicating meter is the greatest.

Next set the signal generator again for a 1400 K.C. signal and check the adjustment of the tuning condenser trimmers at this frequency for maximum output. Then set the signal generator for a signal of 1000 K.C. and turn the tuning condenser rotor until the output indicating meter shows maximum deflection. Then bend the slotted rotor plate sections of each tuning condenser bank which are last in mesh, in or out until maximum output is obtained. Tune in a signal at 750 K.C. and then at 600 K.C. and follow the same procedure bending the rotor plate sections last in mesh until maximum output is obtained. Do not change the setting of the oscillator 600 K.C. trimmer in any way after it has once been set as indicated above.

FLUTTERING OR MOTORBOATING

Fluttering or motorboating may be due to an open 8 Mfd. electrolytic filter condenser or to low capacity in this condenser. It may also be due to an open or low capacity .06 Mfd. screen by-pass condenser. If the 4 and 8 Mfd. electrolytic condenser units are reversed in position fluttering may result. The correct position of these two units is shown in Fig. 1.

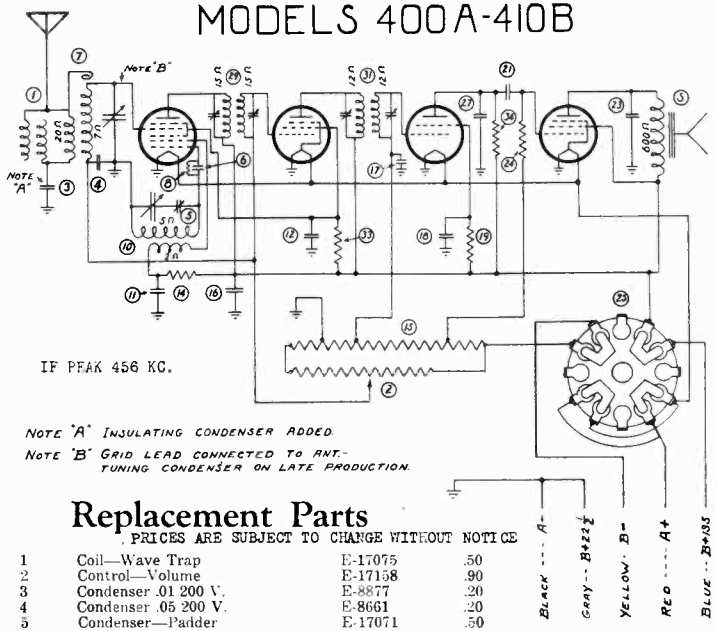
A 224 1st detector with characteristics varying considerably from the standard may cause fluttering. Try out some new 224 tubes in this socket. A defective oscillator and 1st I.F transformer assembly may also be responsible for this type of disturbance. If, after the tubes have been changed and the other possibilities suggested in this article have been investigated, fluttering persists, it may be advisable to secure a new oscillator and 1st I.F. transformer assembly and try it out in the receiver. Motorboating may be due to a poor grid connection to the 235 I.F. tube and to the 224 2nd detector.

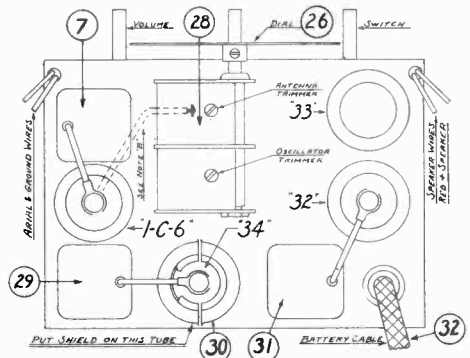
ELECTROLYTIC FILTER CONDENSERS

There are two dry electrolytic condenser units in the No. 99 chassis. One of these units is an 8 Mfd., 450 volt condenser, Part No. 2803. The other unit is a 4 Mfd., 450 volt condenser, Part No. 3366.

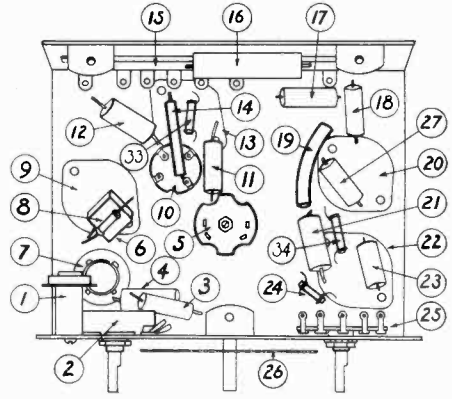
In replacing the electrolytic condenser units great care should be taken to wire them in with the correct polarity. Tag the leads when they are taken off the old condensers. The positive terminal of the condenser is identified by a + symbol on the box. The positive lead in the chassis can be determined by referring to the schematic circuit diagram.

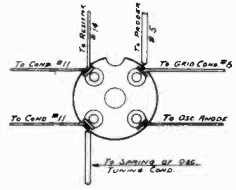
MODELS 400A-410B





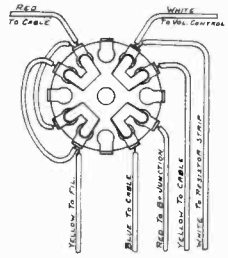
TOP VIEW OF SET - LOCATION OF TUBES



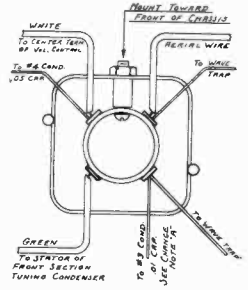


OSCILLATOR COIL

Type 1-C-6 as Det. OSC.
34 as I. F.
32 as 2nd. Det.
33 as Output.



SWITCH WIRING
SHOWN IN "ON" POSITION



ANTENNA COIL.

Replacement Parts

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

1	Coil—Wave Trap	E-17075	.50
2	Control—Volume	E-17158	.90
3	Condenser .01 200 V.	E-8877	.20
4	Condenser .05 200 V.	E-8661	.20
5	Condenser—Padder	E-17071	.50
6	Condenser—Grid .0002 MICA	E-8873	.20
7	Coil—Antenna	E-17156	.90
8	Register—OSC. GRID. 50,000	E-8601	.20
9	Socket "1-C-6"	E-17168	.20
10	Coil—Oscillator	E-17155	.60
11	Condenser .01 400 V.	E-8583	.20
12	Condenser .05 200 V.	E-8661	.20
13	Socket "34"	E-17166	.20
14	Resistor 15,000	E-17164	.20
15	Resistor Strip	E-17184	.70
16	Condenser .25 200 V.	E-17128	.30
17	Condenser .05 200 V.	E-8661	.20
18	Condenser .01 400 V.	E-8583	.20
19	Resistor 2,000,000	E-8887	.20
20	Socket "32"	E-17165	.20
21	Condenser .01 400 V.	E-8583	.20
22	Socket "33"	E-17167	.20
23	Condenser .002 800 V.	E-17002	.20
24	Resistor 500,000	E-8886	.20
25	Switch—Battery	E-17173	.70
26	Dial	E-17160	.50
27	Condenser .001 600 V.	E-8585	.20
28	Condenser—Tuning	E-17172	2.10
29	Transformer—I. F. INPUT	E-17194	1.50
30	Shield—34 Tube	E-17170	.30
31	Transformer—I. F. OUTPUT	E-17073	1.50
32	Cable—Battery, with Terminals	E-17199	.70
33	Resistor 15,000	E-17164	.20
34	Resistor 250,000	E-8602	.20
	Cabinet—Model 400A	E-17027	6.20
	Cabinet—Model 400A	E-17027	5.20
	Cabinet—Model 410B	E-17227	14.00
	Speaker—Model 400A	E-17169	3.50
	Speaker—Model 410B	E-17228	4.00
	Knobs—Tuning	E-17114	.20
	Terminals—for Battery Cable	E-17185	.04

Alignment Proceedure

Do not attempt the complete alignment of this set without having a reliable test oscillator or signal generator. Before making any adjustments always be sure that everything has been checked that is mentioned in the section above under "Possible Sources of Trouble."

I. F. alignment—connect the signal generator lead to the grid of the 1-C-6 tube. The ground lead from the signal generator should be connected to the chassis. Connect an output meter on the speaker. Turn tuning condenser open. Set signal generator to 456, attenuating enough so that set does not overload. "Peak" I. F. trimmers—using as low a signal as will give a readable output, going over them at least twice.

Padder Condenser.

Place set in operation and connect signal generator to antenna lead. Close tuning condenser. Set signal generator for 530 K. C. and adjust padder for maximum signal.

Trimmer Condensers.

Open tuning condenser. Leave signal generator connected as above and set for 1730 K. C.—adjust oscillator trimmer (rear section) for maximum.

Change signal generator to 1200 K. C. and tune this in on set, then adjust antenna trimmer for maximum.

Possible Sources of Trouble

1. **Weak volume**, antenna lightning arrestor shorted, exhausted batteries either "A" or "B", weak tubes, tube shield on 34 tube not grounded, defective part—in set—check circuits. Set out of alignment—see paragraph below before attempting to align.

2. **Distorted reproduction**—defective tubes, weak batteries, shorted or open condenser or resistor in set. Defective speaker.

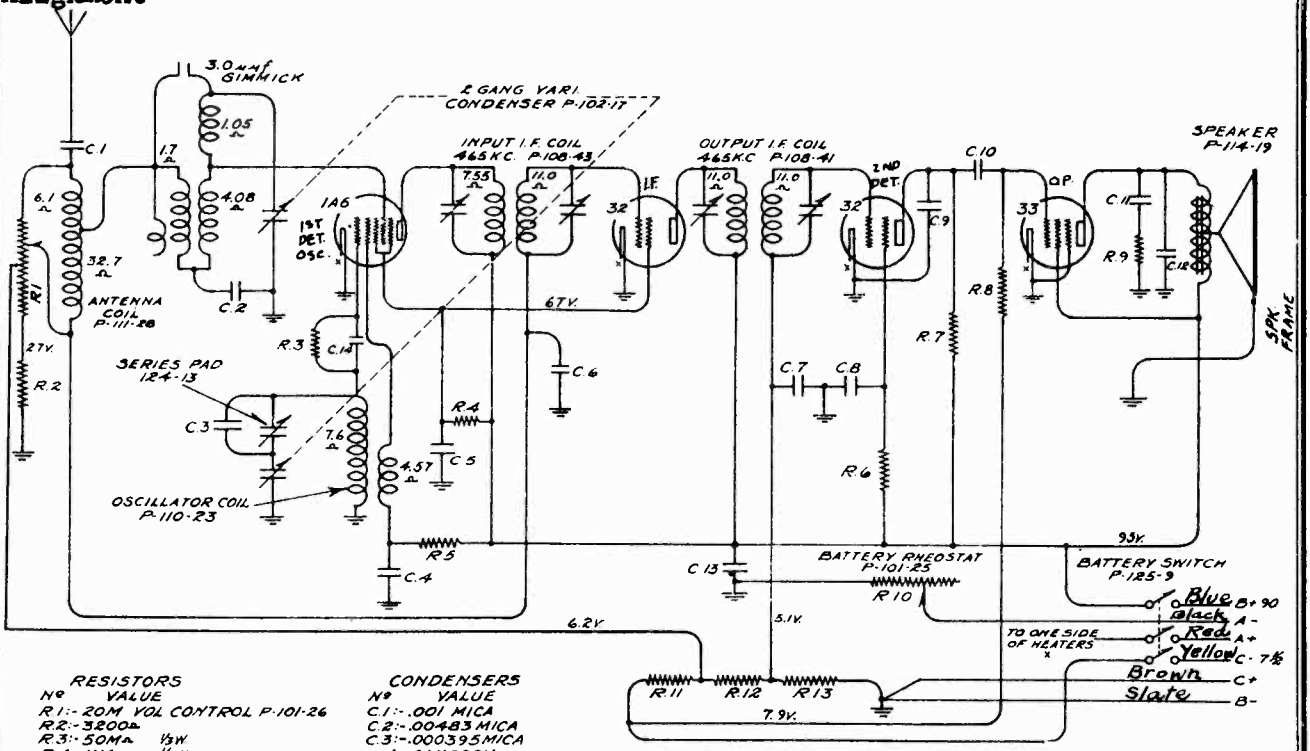
3. **Oscillation—set may "whistle" when tuning in a station and volume** may be low,—tube shield on 34 tube not making contact with ground clip, defective 34 tube, speaker wires close to 32 tube.

4. **Set does not operate at all**—if tubes and batteries have been checked, it is probable that some part has failed or some wire is shorted or connection broken—refer to circuit and check for continuity and resistance. Small condensers can be checked for "open" by placing a new condenser of similar capacity in parallel.

NOTE. When testing set with batteries connected—it is a good plan to place a standard 10 Watt 110 Volt lamp in series with the BLUE "B" battery wire to protect the tubes in case of a short circuit.

MODEL 404
Schematic, Socket Voltage, Trimmers Alignment

GAMBLE-SKOGMO, INC.



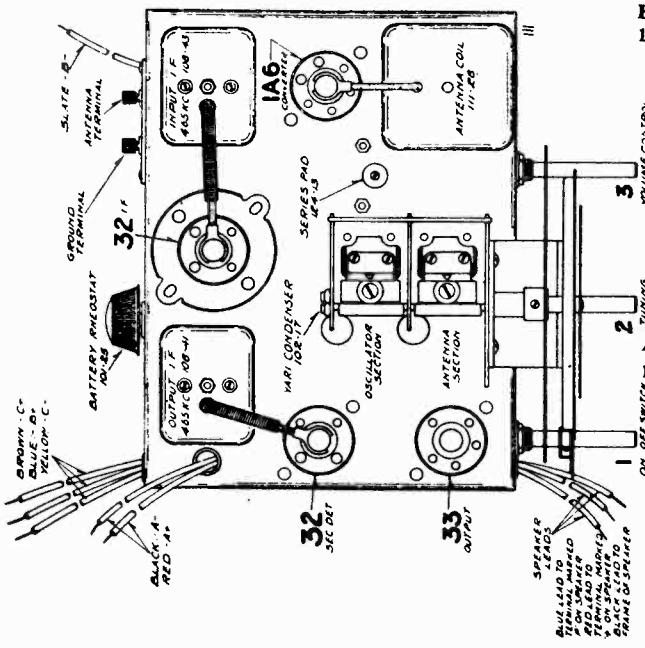
RESISTORS		
Nº	VALUE	
R.1	20M VOL CONTROL P-101-26	
R.2	3200Ω	
R.3	50MΩ	⅓W.
R.4	11MΩ	⅓W.
R.5	10MΩ	⅓W.
R.6	3MEGΩ	⅓W.
R.7	750MΩ	⅓W.
R.8	500MΩ	⅓W.
R.9	35MΩ	⅓W.
R.10	4Ω BAT. RHEOSTAT P-101-25	
R.11	1300Ω	
R.12	1920Ω	
R.13	9800Ω	⅓W.

CONDENSERS	
Nº	VALUE
C.1	.001 MICA
C.2	.00483 MICA
C.3	.000395 MICA
C.4	.01 X 200V.
C.5	.05 X 200V.
C.6	.25 X 200V.
C.7	.05 X 200V.
C.8	.01 X 200V.
C.9	.00025 MICA
C.10	.01 X 400V.
C.11	.01 X 400V.
C.12	.0005 MICA
C.13	.25 X 200V.
C.14	.00025 MICA

- NOTE -
R. 2, R.11, R.12 ARE IN ONE UNIT. P-106-21
C.4, C.5 ARE IN ONE UNIT P-118-11
C.6, C.13 " " " " P-118-5
C.7, C.8 " " " " P-118-11
NUMBERS PREFIXED BY LETTER 'P' ARE PART Nos
ALL VOLTAGES INDICATED ARE WITH NEW BATTERIES, VOLUME CONTROL ON FULL

IF PEAK 465 KC.

Serial No. 5D115200A and up



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 124-13 (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 800, 1000, 1200 K.C. DO NOT BEND PLATES.

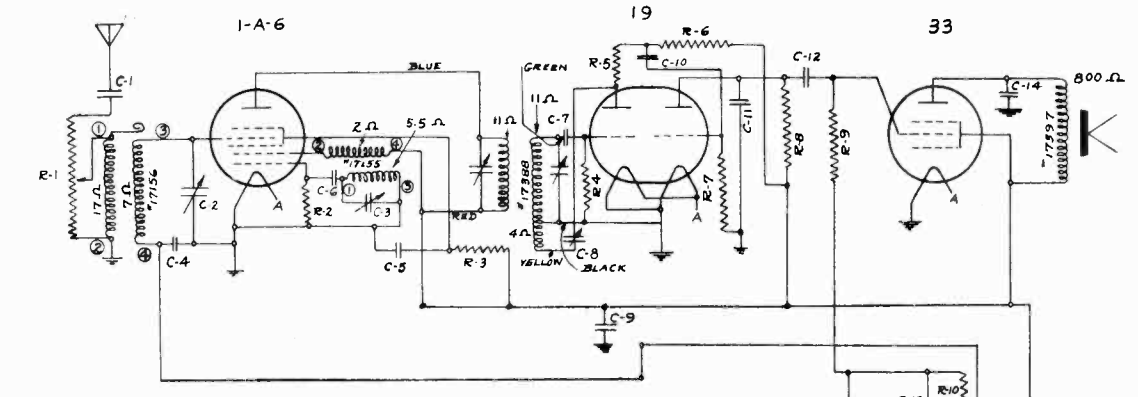
ALIGNING I.F. TRANSFORMERS: (465 K.C.)

1. With volume control full on and with variable condenser at its minimum capacity position, plates entirely out of mesh, and with 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 108-41 and 108-43, 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 33 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.

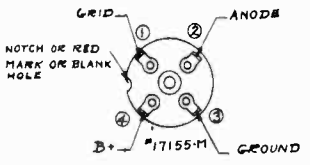
GAMBLE-SKOGMO, INC.

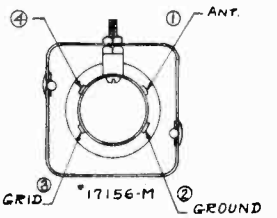
MODEL 430
Schematic
Alignment, Parts



C-1	.01	200V
C-2, C-3	TUNING COND. 370-OT	
C-4	.05	200V
C-5	.01	200V
C-6	.0002	MICA
C-7	.0002	MICA
C-8	.00003	REGENERATION
C-9	.25	200V
C-10	.01	200V
C-11	.0005	600V
C-12	.01	200V
C-13	10 MFD.	25 V ELECTROLYTIC
C-14	.002	800V

R-1	10,000	VOL. CONTROL 17381
R-2	50,000	
R-3	15,000	
R-4	2,000,000	
R-5	10,000	
R-6	250,000	
R-7	1,000,000	
R-8	250,000	
R-9	1,000,000	
R-10	400	CANDOHM PART 17375
R-11	100	





MODEL 430
BATTERY RADIO

Coronado Model 430

GENERAL: This model is designed for the greatest possible efficiency from the three tubes that the set uses. It is not intended to take the place of the more powerful Coronado models, but is recommended for the customer who is content with reception of stations at a reasonable distance, and wants a compact set at a low price. It is intended for use only on an outside aerial and ground.

TUBE FUNCTIONS: "1A6" first detector-oscillator, "19" one section as second detector regenerative at an IF frequency of 456 K.C., the other section as first audio amplifier, "33" power tube.

CHECKING PARTS: In case of sub-normal performance, check the following in order named: aerial, ground, lightning arrestor, batteries, tubes, speaker, set parts, alignment. The resistance and capacity values of all major parts are shown on the diagram.

ALIGNMENT: Open tuning condenser (high frequency dial setting) connect a signal generator or test oscillator to the grid cap of the 1A6 tube, leaving the present cap in place. Use a small condenser .002-.01 in series with the signal generator lead wire. If the second detector is oscillating—causing the set to "squeal"—turn the "regeneration control" screw (on back of chassis) to the "left" until the oscillation stops. Set the signal generator to 456 K.C. and adjust the two trimmer screws in the top of IF transformer to "peak"-reducing the output of the signal generator so that only an audible signal is obtained during final adjustments. Now turn the regeneration control to the "right" until oscillation starts, then back it off until the set is stable and recheck the IF adjustments. It is best practice to use an output meter to indicate "peak".

ANTENNA AND OSCILLATOR ALIGNMENT: Connect signal generator to aerial lead wire from set and adjust oscillator trimmer (rear section of tuning condenser) for 1730 K.C. Adjust antenna trimmer at 1000 K.C.

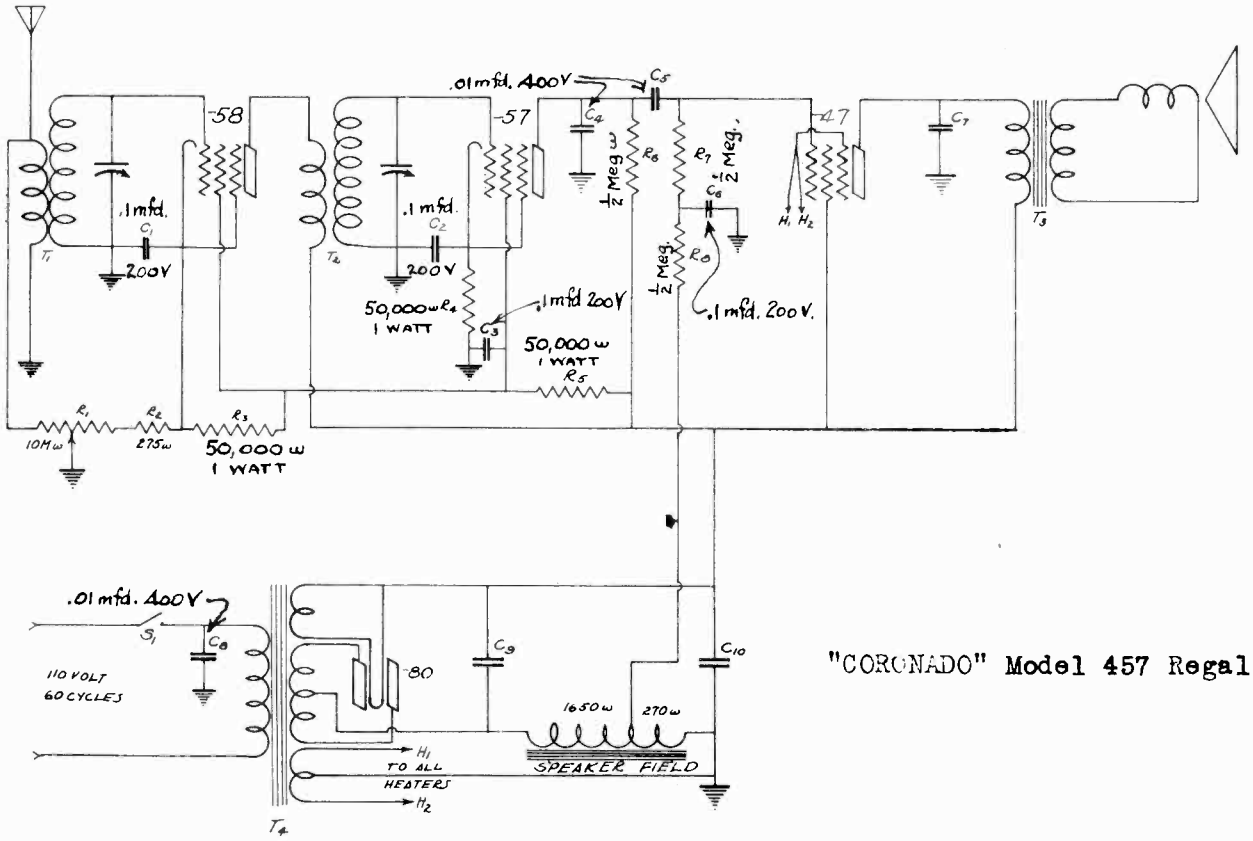
ADDITIONAL NOTE: If all parts have been checked, the set carefully aligned, and performance is still not comparable to another set of the same model, the trouble is probably due to a defective IF transformer and this should be replaced with a new one.

PARTS PRICE LIST ON MODEL 430 CORONADO BATTERY TABLE RECEIVER
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

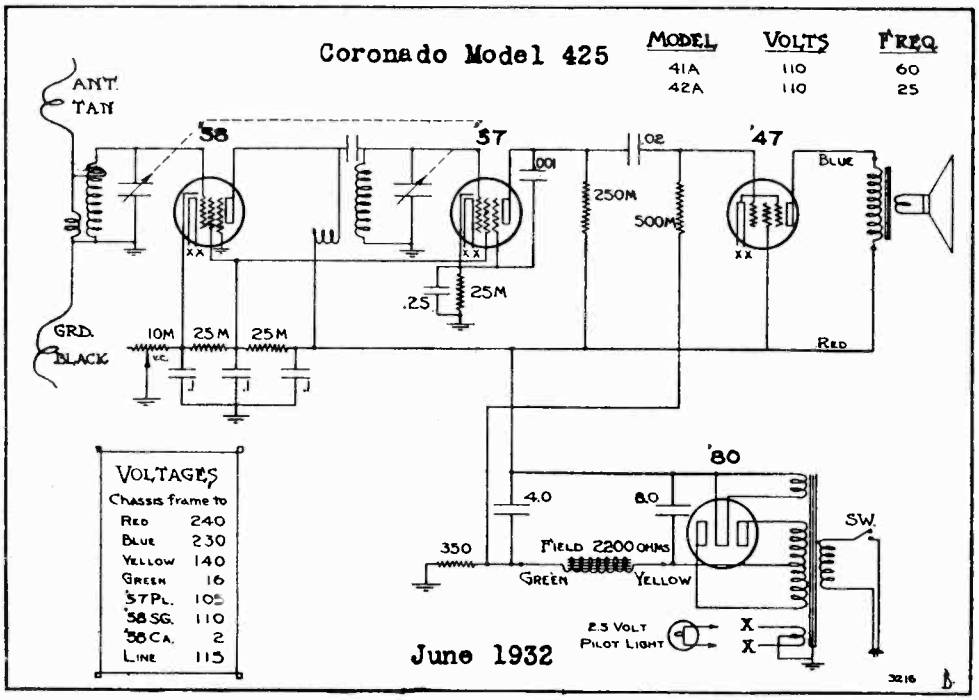
	List		List
E-17377—Assb.—Cable & Markers	$ .70	E-17164—Resistor—Carbon 15,000 Ohm	.20
E-17156M—Coil—Antenna	.90	E-8601 —Resistor—Carbon 50,000 Ohm	.20
E-17155M—Coil—Oscillator	.60	E-8602 —Resistor—Carbon 250,000 Ohm	.20
E-17380—Condenser—Tuning	2.10	E-8766 —Resistor—Carbon 1,000,000 Ohm	.20
E-8873 —Condenser—Mica .0002	.20	E-8887 —Resistor—Carbon 2,000,000 Ohm	.20
E-8874 —Condenser—Tubular .0005 x 600V	.20	E-17375—Resistor—Candohm	.30
E-17002—Condenser—Tubular .002 x 800V	.20	E-17160—Scale—Dial	.50
E-8877 —Condenser—Tubular .01 x 200V	.20	E-17167—Socket—5-Prong #33	.20
E-8661 —Condenser—Tubular .05 x 200V	.20	E-17386—Socket—6-Prong #1-A-6	.20
E-17128—Condenser—Tubular .25 x 200V	.30	E-17314—Socket—6-Prong #19	.20
E-17080—Condenser—Electrolytic 10 Mfd. x 25V	.60	E-17388—Transformer—Regenerative I. F	1.50
E-17373—Condenser—Regeneration	.50	E-17161—Escutcheon	.30
E-17381—Control—Volume	1.00	E-17114—Knob—Wood	.20
E-17309—Resistor—Carbon 10,000 Ohm	.20	E-17397—Speaker—5" Magnetic	3.00

MODEL 425
MODEL 457, Regal
Schematics

GAMBLE-SKOGMO, INC.



"CORONADO" Model 457 Regal



GAMBLE-SKOGMO, INC.

MODEL 516, Symphony
Schematic, Socket
MODEL 501
Schematic
Alignment

Low Battery Signal Fading & Motorboating may be corrected by bypassing "B" bat. from B plus to B minus with a .5 or 1 mf cond. Use a DC continuous 200 V. minimum rating.

"Coronado" Model 501
BATTERY OPERATED
FIVE TUBE SUPERHETERODYNE

Set oscillator at 456 KC.

To align variable condensers:-
Tune receiver to 1400 KC on dial and set oscillator to this frequency.
Tune set to 600 KC on dial and adjust oscillator to this 600 Kc frequency.

IF PEAK 456 KC.

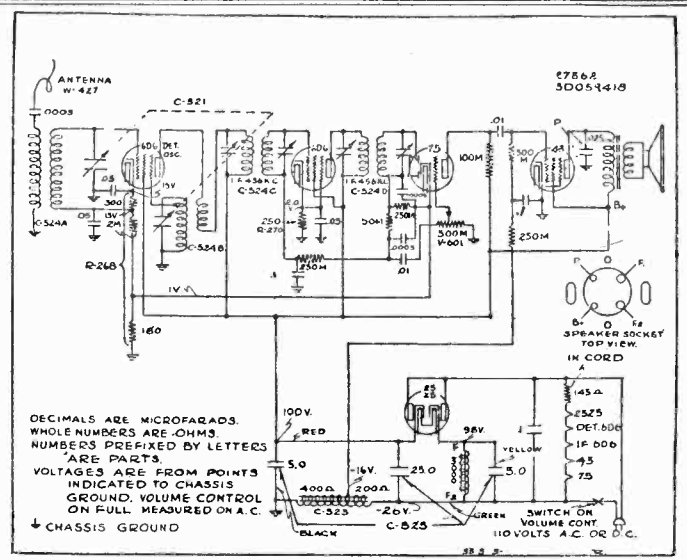
"Coronado" Model 516 Symphony
516-2V BATTERY SET

PARTS LIST

525

Part No.	Description	List Price
C 145	.1—400 Volt Condenser	$0.25 ea.
C 155	.0005 Mica Condenser	.20 ea.
C 521	Two Gang Condenser	2.50 ea.
C 522	.01—400 Volt Condenser	.25 ea.
C 523	600 Ohm Choke Coil	1.25 ea.
C 524A	Antenna Coil	.80 ea.
C 524B	Oscillator Coil	.70 ea.
C 524C	I. F. Transformer, Input	1.25 ea.
C 524D	I. F. Transformer, Output	1.25 ea.
C 525	5-25-10 Electrolytic Condenser	2.00 ea.
C 525B	5-25-10 Electrolytic Condenser	2.00 ea.
C 525C	5-25 Mfd. Electrolytic Condenser	1.50 ea.
C 525D	5 Mfd. Electrolytic Condenser	.50 ea.
C 526	By-Pass Condenser Block	1.50 ea.
C 527	Special Cord and Plug	1.25 ea.
1030 & C 531	Dual .05 Condenser	.30 ea.
1032 & C 534	Dual .1-.025 Condenser	.30 ea.
1031	Dual .1 x .05 Condenser	.30 ea.
K 214	Knobs	.15 ea.
R 268	2480 Ohm Resistor	.50 ea.
R 270	250 Ohm—Wire Wound Resistor	.25 ea.
V 601	Volume Control	1.35 ea.
W427	Antenna Wire	.30 ea.
	All carbon resistors	.20 ea.
	All sockets	.20 ea.
	Dynamic speakers	5.00 ea.
	Cabinets	2.50 ea.
	Carrying cases	2.00 ea.
	Adapters for 220 volt operation	2.25 ea.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE



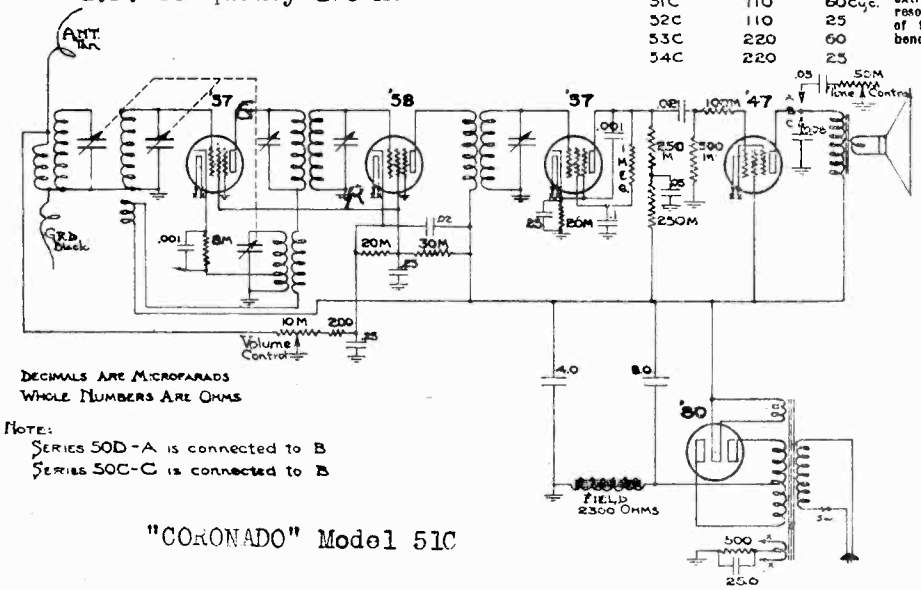
Schematic circuit diagram AC-DC Superheterodyne, with automatic volume control

Should it be necessary, at any time, to rebalance this set the procedure is as follows: Attach a 456 kilocycle oscillator to the grid of the 6A7 tube in back of the variable condenser and adjust the trimming condensers of the I. F. transformers to maximum deflection on an output meter connected across the primary of the speaker input transformer. While adjusting these trimmers, the variable condenser should be at the maximum capacity position—at the extreme right of its rotation.

Next disconnect the antenna wire and connect an oscillator in series with a 75 mmf. condenser to the antenna coil. Rotate the condenser plates to the minimum capacity position—extreme left turn, and adjust the trimmer condenser of the rear section of the variable condenser to resonance with an oscillator set at 1725 kilocycles, then adjust the condenser of the front section of the variable condenser to resonance. Align at 1400—1200—1000—800—600—530 kilocycles, bend slotted plates of variable condenser if necessary.

I.F. frequency 175 KC.

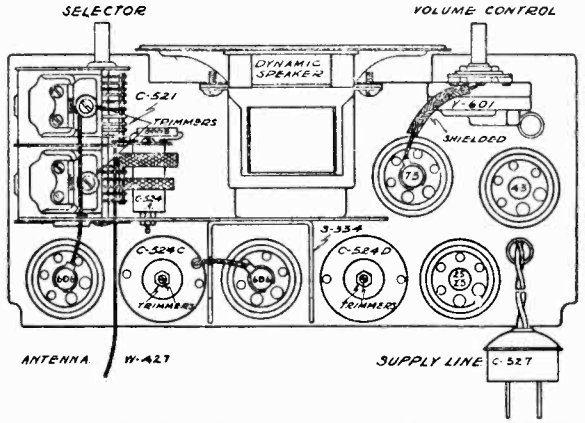
MODEL	VOLTS	FREQ.
51C	110	60cyc.
52C	110	25
53C	220	60
54C	220	25



NOTE:
SERIES 50D-A is connected to B
SERIES 50C-C is connected to B

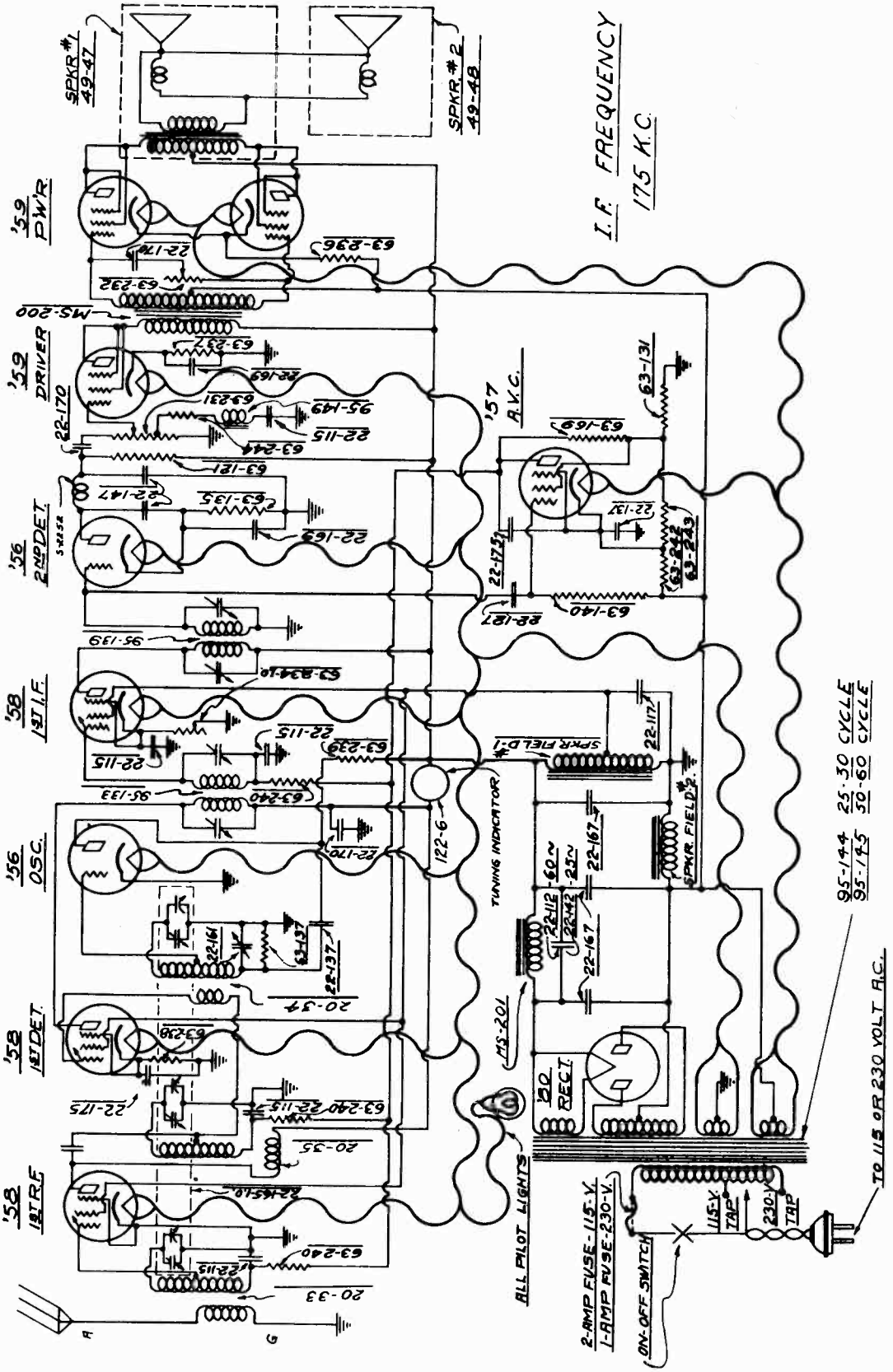
"CORONADO" Model 51C

"CORONADO" Model 525



GAMBLE-SKOGMO, INC.

MODEL Z-521
Schematic

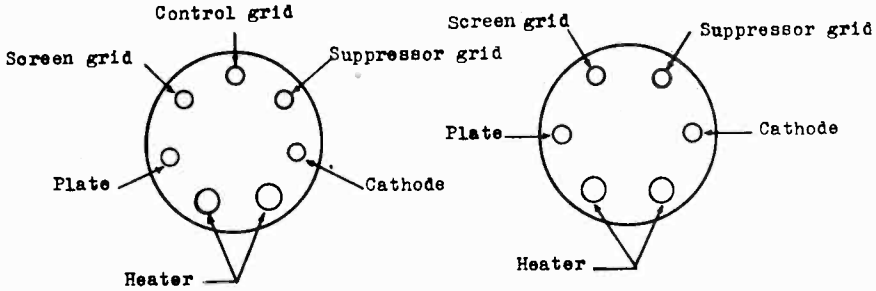


VOLTAGE READINGS

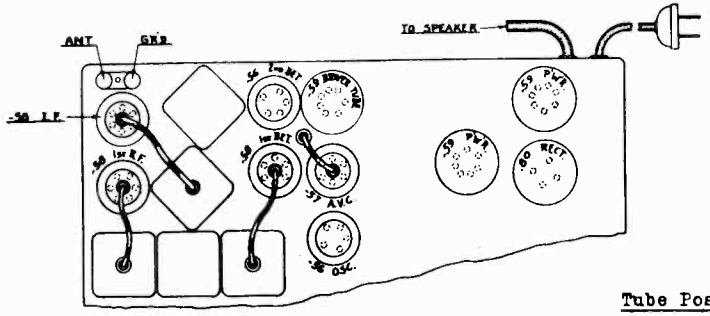
Antenna Disconnected — Meter 1000 Ohms Per Volt

Tube Type	Position	Fil. Volt.	Plate Volt.	Cath. Volt.	Screen Volt.	Plate Current
Z-58	R.F.	2.5	220	0	100	5.2
Z-58	1st Det.	2.5	220	+2	100	3.
Z-56	Osc.	2.5	120	0	0	4.
Z-58	I.F.	2.5	220	0	100	6.
Z-56	2nd Det.	2.5	120	20	0	.75
Z-57	A.V.C.	2.5	-40	-75	-2	0
Z-59	Driver	2.5	220	+25	220	8.2
Z-59	Power	2.5	230	-65	230	25.
Z-59	Power	2.5	230	-65	230	25.
Z-80	Rect.	5.0	400*			62.5*

Line voltage 115 (Reading to Ground) Volume control maximum



Six and seven prong socket connections (Bottom of socket)



Tube Position

PARTS AND PRICES

Z-521

Dial and Meter Assembly

11-3	Dial Pulley String.....per ft.	$ .25
26-38	Calibrated Dial Strip.....	.15
80-69	Dial Cord Tension Spring.....	.01
80-85	Volume and Tone Control Dial Tension Spring.....	.01
83-274	Volume Control Dial Strip.....	.10
83-275	Tone Control Dial Strip.....	.10
100-18	2.5 Volt Pilot Lamp.....	.12
122-5	Shadowgraph Meter.....	2.00

Condensers

22-112	.1 mfd 300 Volt (Filter).....	.25
22-115	.1 " 200 " (5 used, see footnote).....	.35
22-117	.5 " 300 " (Filter).....	.50
22-137	.05 " 400 " (Oscillator Plate).....	.25
22-142	.4 " 300 " (Filter, 25 Cycle Only).....	.40
22-147	.0005 600 " (2nd Detector Plate).....	.20
22-161	Padder.....	.45
22-165	Three Gang Variable.....	3.50
22-167	8. mfd 500 Volt (Filter).....	1.50
22-169	8. " 50 " (2nd Detector Cathode, Driver Cathode, and 1st Audio Cathode).....	.55
22-170	.1 " 400 " (1st Detector Plate, Audio Coupling and Tone Control).....	.25

Resistors

63-121	100M Ohm 1 Watt (2nd Detector Plate).....	.25
63-135	50M " 1 " (2nd Detector Cathode).....	.25
63-137	250M " ½ " (Oscillator Grid).....	.25
63-140	1 Meg" ½ " (A. V. C. Grid).....	.25
63-169	400 " ½ " (A. V. C. Plate).....	.25
63-231	Volume Control Assembly.....	1.25
63-232	Tone Control Assembly.....	.75
63-234	Sensitivity Control.....	.75
63-236	500 Ohm.....(Power Bias) (Wide Metal).....	.25
63-237	1500 " .....(Driver Bias)(Narrow Metal).....	.25
63-238	1000 " ¼ Watt (1st Detector Cathode).....	.25
63-239	24M " 1 " (Oscillator Plate).....	.25
63-240	1900 " ½ " (R.F.,1st Detector & I.F. Grids).....	.25
63-242	2500 " ½ " (A. V. C. Cathode).....	.25
63-243	18M " 1 " (A. V. C. Cathode).....	.25
63-244	500 " ¼ " (Acoustic Filter).....	.25

Coils

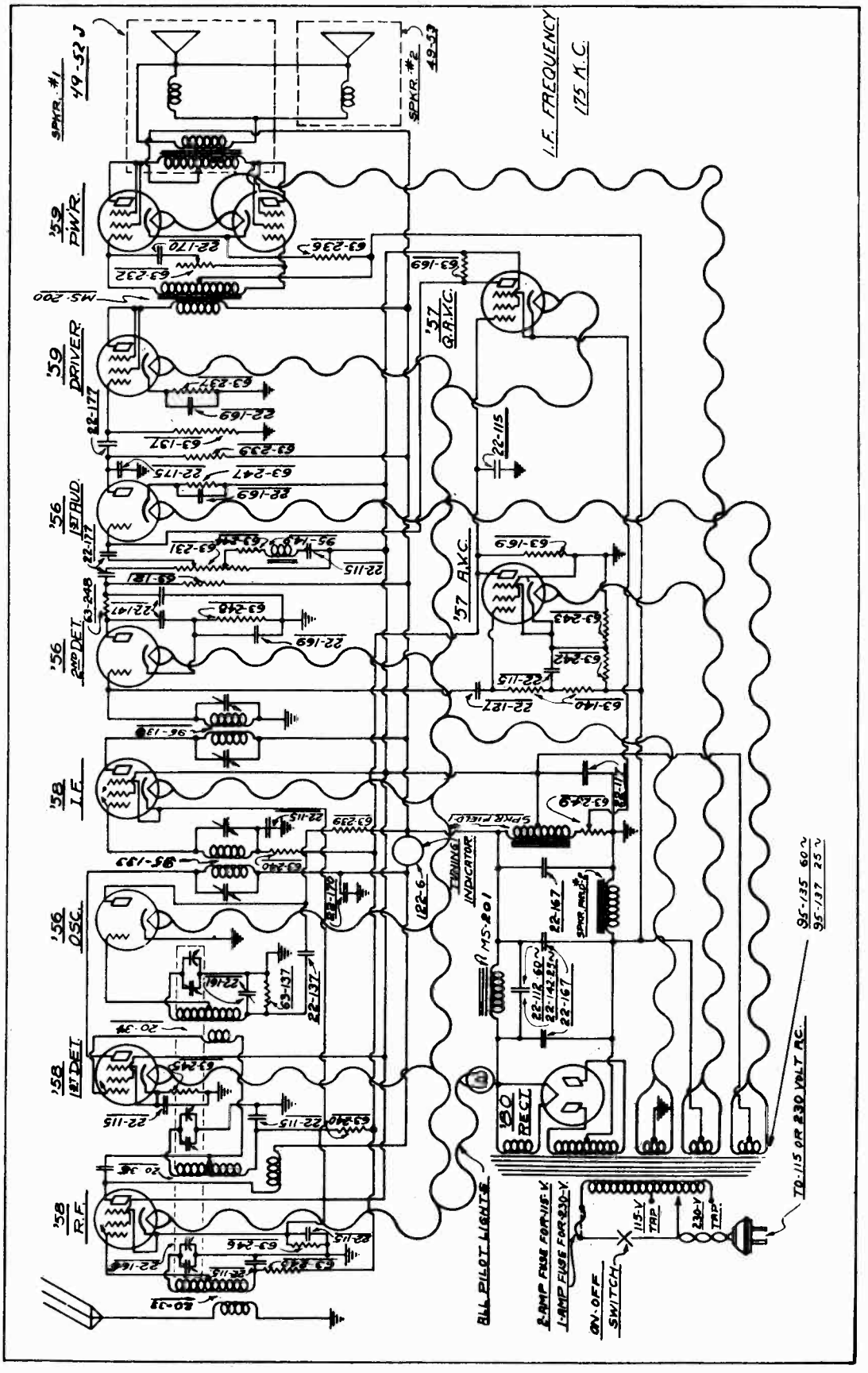
20-33	Antenna Coil.....	.75
20-34	Oscillator Coil.....	.85
20-36	Detector Coil.....	1.00
S-2252	2nd Detector Plate Choke and Bracket.....	.50
95-133	1st I. F. Transformer (with Grid Lead).....	1.25
95-139	2nd I. F. Transformer (without Grid Lead).....	1.25

*22-115 R. F., 1st Detector, I. F. Grid Returns, I. F. Cathode, and Acoustic Filter.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

GAMBLE-SKOGMO, INC.

MODEL Z-530
Schematic



VOLTAGE READINGS - MODELS 530 531 533

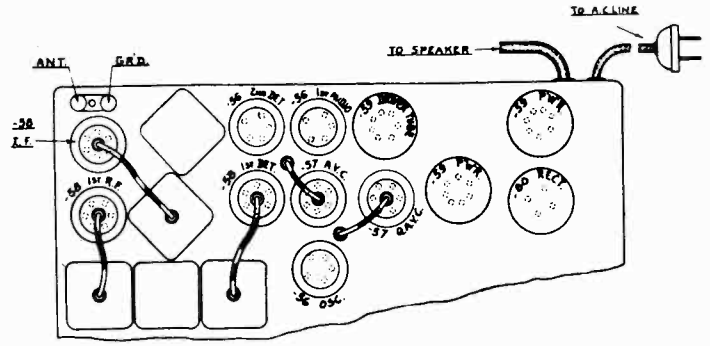
Antenna Disconnected — Meter 1000 Ohms Per Volt

Tube Type	Position	Fil. Volt.	Plate Volt.	Cath. Volt.	Screen Volt.	Supp. Volt.	Plate Current
Z-58	1st R.F.	2.5	175	2.2	75	2.2	5.7
Z-58	1st Det.	2.5	190	4.5	75	4.5	2.3
Z-56	Osc.	2.5	100	0	-	-	3.5
Z-58	1st I.F.	2.5	200	2.2	75	2.2	5.5
Z-56	2nd Det.	2.5	110	10	-	-	.3
Z-56	1st Audio	2.5	170	80	-	-	.8
Z-57	A.V.C.	2.5	-	-45	-	-85	-
Z-57	G.A.V.C.	2.5	30	13	75	13	-
Z-59	Driver	2.5	190	20	190	190	13
Z-59	Power	2.5	195	-70	195	195	22
Z-59	Power	2.5	195	-70	195	195	22
Z-80	Rect.	5.0	360	-	-	-	65

Line Voltage 115 (Reading to Ground) Volume control maximum

(All readings, with exception of heaters, taken from socket connections to ground. Use 1,000 ohm per volt D. C. meter.)

BALANCE I.F. frequency at 175 K.C. Condenser gang at 1500 K.C. and oscillator padder at 600 K.C.



Tube Position

PARTS AND PRICES — MODELS 530 531 533, CHASSIS 2038

Dial and Meter Assembly

11-3	Dial Pulley String.....per ft.	$ .10
26-38	Calibrated Dial Strip.....	.15
80-69	Dial Cord Tension Spring.....	.01
80-85	Volume and Tone Control Dial Tension Spring.....	.01
83-274	Volume Control Dial Strip.....	.10
83-275	Tone Control Dial Strip.....	.10
100-18	2½ Volt Pilot Lamp.....	.12
122-5	Shadowgraph Meter.....	2.00

Condensers

22-112	.1 mfd 300 volt...(Filter).....	.25
*22-115	.1 " 200 " ...(Eight Used, See Below).....	.35
22-117	.5 " 300 " ...(Filter).....	.50
22-127	.000025 600 " ...(A.V.C. Grid).....	.35
22-137	.05 mfd 400 " ...(Oscillator Plate).....	.25
22-142	.4 " 300 " ...(Filter 25 Cycle Only).....	.40
22-147	.0005" 600 " ...(2nd Detector Plate).....	.20
22-161	Padder.....	.45
22-165	Three Gang Variable.....	3.50
22-167	8. mfd 500 volt...(Filter).....	1.50
22-169	8. " 50 " ...(2nd Det. Cathode, Driver Cathode & 1st Audio Cathode).....	.55
22-170	.1 " 400 " ...(1st Det. Plate, Tone Control).....	.25
22-175	.002 " 600 " ...(1st Audio Plate).....	.25
22-177	.2 " 400 " ...(2nd Det. Plate, 1st Audio Grid, 1st Audio Plate).....	.25

Resistors

63-121	100M ohm 1 watt...(2nd Detector Plate).....	.25
63-137	250M " ½ " ...(Driver Grid).....	.25
63-140	1 meg" ½ " ...(A.V.C. Grid & Cathode).....	.25
63-169	400 " ½ " ...(A.V.C. & G.A.V.C. Plate).....	.25
63-231	Volume Control & Switch Assembly.....	1.40
63-232	Tone Control.....	.75
63-236	500 ohm ...(Wide Metal) (Power Tube Bias).....	.25
63-237	1500 " ...(Narrow Metal) (Driver Tube Bias).....	.25
63-239	24M " 1 watt...(Osc. & 1st Audio Plate).....	.25
63-240	1900 " ½ " ...(R.F. 1st Det. & I.F. Grids).....	.25
63-242	2500 " ½ " ...(A.V.C. Cathode).....	.25
63-243	18M " 1 " ...(A.V.C. Cathode).....	.25
63-244	500 " ½ " ...(Acoustic Filter).....	.25
63-245	1500 " ½ " ...(1st Detector Cathode).....	.25
63-246	150 " ½ " ...(R.F. Cathode).....	.25
63-247	8M " ½ " ...(1st Audio Cathode).....	.25
63-248	50M " 1 " ...(2nd Det. Plate & Cathode).....	.25
63-249	Sensitivity & Quiet Control.....	.75

*22-115 R.F. 1st Detector, I.F. Grid Returns, A.V.C. Plate, A.V.C. Cathode, 1st Detector Cathode, R.F. Cathode, and Acoustic Filter.

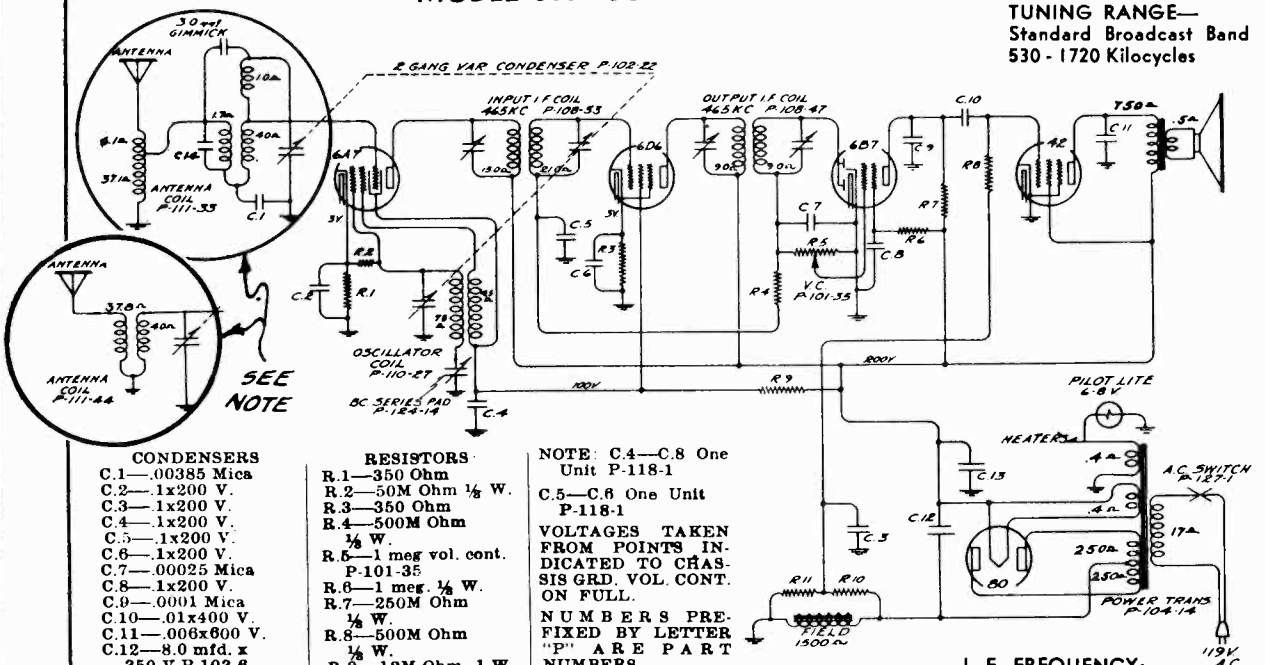
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

GAMBLE-SKOGMO, INC.

MODEL 578(Two Types)
Serial 5G133670A to
5K173250A and
Above Serial 5K173250A
Schematic, Voltage, Parts

MODEL 578—5G133670A—5K173250A

TUNING RANGE—
Standard Broadcast Band
530 - 1720 Kilocycles



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 1/8 W.
R.3—350 Ohm
R.4—500M Ohm 1/8 W.
R.5—1 meg vol. cont. P-101-35
R.6—1 meg. 1/8 W.
R.7—250M Ohm 1/8 W.
R.8—500M Ohm 1/8 W.
R.9—12M Ohm 1 W.
R.10—800M Ohm 1/8 W.
R.11—201M Ohm 1/8 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

REPAIR PARTS LIST
MODEL 578 - SERIES A
Serial No. 5G133670A and up

PART NO.	DESCRIPTION
	CONDENSERS
100-11	.01 x 400 Volt Tubular Condenser
100-19	.006 x 600 Volt Tubular Condenser
100-20	.1 x 200 Volt Tubular Condenser
103-6	8 Mfd. x 350 Volt Electrolytic Condenser
103-7	8 Mfd. x 300 Volt Electrolytic Condenser
118-1	Dual .1 x 200 Volt Tubular
129-5	.0001 Mica - Type MT - 20%
129-12	.00025 Mica - Type MT - 20%
129-43	.00385 Mica - Type MW - 5%
	RESISTORS
130-3	500M Ohm - 1/8 Watt - 20% - 100 Volt Carbon
130-8	201M Ohm - 1/8 Watt - 10% - 20 Volt Carbon
130-11	250M Ohm - 1/8 Watt - 20% - 50 Volt Carbon
130-12	50M Ohm - 1/8 Watt - 20% - 20 Volt Carbon
130-19	1 Meg Ohm - 1/8 Watt - 20% - 100 Volt Carbon
130-46	800M Ohm - 1/8 Watt - 10% - 100 Volt Carbon
130-49	12M Ohm - 1 Watt - 20% - 100 Volt Carbon
130-74	350 Ohm - 1/8 Watt - 20% - 10 Volt Wire Wound
	COILS
108-47	Output I.F. Transformer Complete
108-53	Input I.F. Transformer Complete
110-27	Oscillator Coil Complete
111-33	Antenna Coil Complete
111-44	Antenna Coil SK173250A-up
	TRANSFORMERS
104-14	50/60 Cycle Power Transformer
104-17	Universal Power Transformer 40 Cy. Primary
104-18	25 Cycle Power Transformer
	SOCKETS
121-6	Six Prong Socket - Type 42
121-6	Six Prong Socket - Type 6D6
121-7	Seven Prong Socket - Type 6B7
121-7	Seven Prong Socket - Type 6A7
121-8	Five Prong Socket - Type Speaker
121-9	Four Prong Socket - Type 80
	SPEAKER
114-15	Six Inch Dynamic Speaker
114-16	Five Inch Dynamic Speaker
	MISCELLANEOUS
101-35	Volume Control Less Switch
102-22	Two Gang Variable Condenser
107-5	Line Cord & Plug
112-15	Dial Crystal Only
112-16	Dial Pointer
112-19	Drive Disc Assembly Complete
112-40	Pilot Light Bracket
112-60	Drive Bracket Assembly Complete
112-66	Bakelite Escutcheon Complete with Glass
112-113	Dial Scale
115-22	Tube Shield
116-5	6-8 Volt, T-50 Pilot Light Bulb
124-14	Type J-6-S Series Pad
127-1	Line Switch
131-2	Bakelite Knob
135-14	Dial Pointer Screw

MODEL 578, Series A
Socket, Trimmers
Alignment

GAMBLE-SKOGMO, INC.

Model 578—Series A

5-TUBE A. C. SUPERHETERODYNE RECEIVER

DESCRIPTION

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.

Resistance of coils and transformer windings are indicated in ohms on schematic circuit diagram.

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 illustrations) and also sometimes equipped with 25 cycle transformers with 105-115 volt or 220 volt primaries, not universals.

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.

Resonance Indicator:

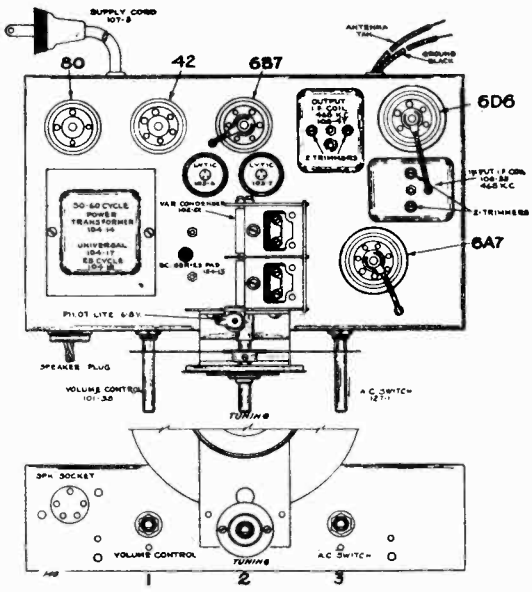
Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the plate and screen terminals of the type 42 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable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

Alignment

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

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.

Service Notes

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

MODEL 2-ODM-578
Schematic, Parts
Resistance Data

GAMBLE-SKOGMO, INC.

Replacement Parts

NOTICE—A change has been made in our parts numbering system. Old parts which are used in new receivers will have a new number assigned to them. For your convenience we are listing below the new part number and the corresponding old part number, should there be one. **Order by new part number only.**

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

New Part No.	Old Part No.	Description	List Price
P-3A126	2022	Type 76 Glass Tube Socket	$0.10
P-3A113	1855	Type 6I6 Glass Tube Socket	.10
P-3A211		Type 6h7 Metal Tube Socket	.15
P-3A63	1643	Type 45 Glass Tube Socket	.10
P-3A129	2025	Type 80 Glass Tube Socket	.10
P-32X30	40424	Tube Shield Base to Fit All Shields Below	.10
P-32X32	40434	Bottle-neck Type Shield (Used on 6I6 Tubes)	.15
P-32X50		Closed Top Type Shield (Used on 2nd Det. Tube)	.10
P-3A58	1637	Speaker Socket	.10
P-12A208		10" Dynamic Speaker Complete with Output Transformer	6.70
Specify Name of Knob & Model of Receiver		Small Push-on Type Knob	.15
		Large Set Screw Type Knob	.20
		Special Selectivity Control Knob (Set Screw Type)	.45
P-2X38	10387	Felt Washers for use with above knobs	.10
P-17X1	10320	Glass Crystal	.15
P-28X25	20865	Crystal Retainer Ring	.10
P-8X23	10272	Rubber Chassis Mounting Cushions	.10
P-2A44		Band Change Switch	2.05
P-2A45		Selectivity Control Switch	.45

TRANSFORMERS AND COILS

P-9A405	T1	Antenna R. F. Transformer & Can Assembly	$2.80
P-9A425	T2	Interstage R. F. Transformer & Can Assembly	2.30
P-9A426	T9	Oscillator Coil & Can Assembly	2.30
P-9A397	T3	1st I. F. Transformer & Can Assembly	2.15
P-9A398	T4	2nd I. F. Transformer & Can Assembly	1.85
P-9A399	T5	3rd I. F. Transformer & Can Assembly	2.25
P-50X16	50643?7	Audio Input Transformer	2.40
P-51X32	T6	Audio Output Transformer (Part of Speaker—May be Secured Separately)	2.40
P-53X94	T8	Power Transformer—115 Volt; 60 Cycle	4.70
P-53X95	T8	Power Transformer—115 Volt; 25 Cycle	8.20
P-53X96		Power Transformer—115-230 Volt; 40-60 Cycle	6.70
P-9A391	L3	High Frequency Oscillator Tracking Coil	.25
P-9A400	L1	2nd I. F. Plate Isolating Reactor	.60

DIAL AND DRIVE ASSEMBLY

P-5A27		Gang Condenser Bracket and Bearing	$ .45
P-26X220		Drive Shaft	.15
P-24X207		Drive Pulley with set screw	.10
P-28X70		Main Shaft Pointer Stud	.10
P-24X205		Gear (Rotary)	.10
P-24X210		Gear (Stationary)	.10
P-28X35		Gear Spreader Spring	.05
P-26X205		Main Pointer Shaft Assembly	.45
P-26X209		Micrometer Pointer Shaft Assembly	.55
P-24X209		Compound Gear Assembly	.25
P-37X33		Tension Pulley Arm Assembly	.15
P-28X42		Tension Pulley Spring	.10
P-8X35		Drive Belt	.20
P-30X36		Dial Clamp to secure Dial Strip to frame (with 6-32x3/16" mounting screw)	.10
		Dial Strip Only (Specify Series No. and Name of Receiver)	.50
P-15X22		Double End Pointer	.30
P-33X25		Micrometer Pointer	.70
P-7A26	3012	Pilot Lamp Bulb (6-8V)	.15
P-7A27	2126	Pilot Lamp Sockets & Spring Clips	.30

DIAL AND DRIVE ASSEMBLY—Continued

New Part No.	Old Part No.	Description	List Price
P-15A48		Dial Bracket Assembly Complete	3.95
P-28X34		Pointer Slide, Take-up Spring Only	.10
P-10X9		4" Black Drive Cord Only Dozen	.10
P-29X42		Brass Collars and Set Screws Only for Securing above Drive Cord to Shaft	.10

NOTE: The Gang Condenser and Drive Assembly, less Dial Assembly, can be purchased complete—see Condenser List.

RESISTORS

P-D93163	R1	16,000 ohms 2.0	Carbon	$0.45
P-A94151	R2	150 ohms 0.2	Carbon	.15
P-36X206	R3 / R10	2,500 ohms / 2.0 Megohms	Dual Volume Control	1.75
P-A94401	R4	400 ohms 0.2	Carbon	.15
P-C94303	R5	30,000 ohms 1.0	Carbon	.15
P-A94304	R6	300,000 ohms 0.2	Carbon	.15
P-A95104	R7	100,000 ohms 0.2	Carbon	.10
P-A95205	R8	2.0 Megohms 0.2	Carbon	.10
P-A94105	R9	1.0 Megohm 0.2	Carbon	.15
P-40X205	R11	3.0 Megohms Tone Control		.75
P-A95104	R12	100,000 ohms 0.2	Carbon	.10
P-B94102	R13	1,000 ohms 0.5	Carbon	.15
P-E94253	R14	25,000 ohms 3.0	Carbon	.30
P-C94253	R15	25,000 ohms 1.0	Carbon	.15
P-A95252	R16	2,500 ohms 0.2	Carbon	.10
P-A94803	R17	80,000 ohms 0.2	Carbon	.15
P-A95104	R18	100,000 ohms 0.2	Carbon	.10

CONDENSERS

P-47X59	C1	250 mmf.	Moulded	$0.15
P-17A36	C2	2-25 mmf.	Range B Antenna Trimmer	.10
P-17A36	C3	2-25 mmf.	Range C Antenna Trimmer	.10
P-17A36	C4	2-25 mmf.	Range D Antenna Trimmer	.10
P-46X80	C5	0.05 mf.	180 Tubular	.15
P-46X104	C6	0.25 mf.	240 Tubular	.25
P-17A36	C7	2-25 mmf.	Range B Interstage Trimmer	.10
P-17A36	C8	2-25 mmf.	Range C Interstage Trimmer	.10
P-17A36	C9	2-25 mmf.	Range D Interstage Trimmer	.10
P-46X117	C10	0.25 mf.	180 Tubular	.25
P-46X121	C11	0.25 mf.	360 Tubular	.30
P-17A30	C12 / C13	150-250 mmf. / 150-250 mmf.	1st I. F. Trimmer Condensers	.40
P-17A30	C14 / C15	150-250 mmf. / 150-250 mmf.	2nd I. F. Trimmer Condensers	.40
P-46X80	C16	0.05 mf.	180 Tubular	.15
P-44X18	C17	4.0 mf.	150 Wet Electrolytic	.85
P-46X105	C18	0.10 mf.	360 Tubular	.20
P-17A40	C19	70-150 mmf.	3rd I. F. Primary Trimmer	.30
P-47A56	C20	50 mmf.	Moulded	.10
P-46X120	C21	0.01 mf.	360 Tubular	.15
P-46X123	C22	0.50 mf.	180 Tubular	.30
P-46X114	C23	0.004 mf.	600 Tubular	.15
P-44X11	C24	18.0 mf.	250 Wet Electrolytic	1.10
P-44X30	C25	14.0 mf.	400 Wet Electrolytic	1.25
P-46X119	C26	0.05 mf.	360 Tubular	.20
P-46X80	C27	0.05 mf.	180 Tubular	.15
P-47X58	C28	.35 mmf.	Moulded	.10
P-17A41	C29	2-25 mmf.	Oscillator Range D Trimmer	.10
P-17A36	C30	2-25 mmf.	Oscillator Range C Trimmer	.10
P-47X60	C31	1400 mmf.	Moulded	.30
P-17A41	C32	2-25 mmf.	Oscillator Range B Trimmer	.10
P-17A35	C33 / C34	300-600 mmf. / 40-100 mmf.	600 KC Padding Condenser / 6000 KC Padding Condenser	.45
P-42X63	C35	10 mmf.	Moulded	.15
P-25A38		3 Section Gang Condenser Complete with Drive Assembly—Less Dial Assembly		5.40

PHONO ATTACHMENT PARTS

P-2A31	2172	Phono Switch (Double Pole Double Throw Switch)	$0.60
P-3A12	1193	Phono Jack	.10
P-10A36	2122	Switch Knob	.20
P-4A17	1421	Terminal Strip	.10
		7 Inches of No. 8665 Shielded Sleeving (5/16 Dia.)	.15

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

D. C. Resistance of Windings
Refer to Fig. 4.

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

Part No.	Winding	Code	D.C. Resistance in Ohms
P-9A405	Antenna R. F. Transformer	T1	
	Range B Primary Winding		21.8
	Range C Primary Winding		0.3
	Range D Primary Winding		0.2
	Range B Secondary Winding		6.3
	Range C Secondary Winding		1.8
	Range D Secondary Winding		Small
P-9A425	Interstage R. F. Transformer	T2	
	Range B Primary Winding		2.5
	Range C Primary Winding		1.4
	Range D Primary Winding		0.4
	Range B Secondary Winding		6.0
	Range C Secondary Winding		2.0
	Range D Secondary Winding		Small
P-9A426	Oscillator Coils	T9	
	Range B Grid Coil		
	Red White Tap to White		3.0
	Red White Tap to Ground		1.0
	Range C Grid Coil		
	Green White Tap to Green		1.2
	Green White Tap to Ground		0.5
	Range D Grid Coil		
	Black White Tap to Black		Small
	Black White Tap to Ground		Small
	Oscillator Plate Coil		0.2
P-9A397	1st I. F. Transformer	T3	
	Primary Winding		4.6
	Secondary Winding		
	Long Portion		3.4
	Short Portion		1.7
	Coupling Winding		0.2
P-9A398	2nd I. F. Transformer	T4	
	Primary Winding		9.4
	Secondary Winding		9.0
	Coupling Winding		0.5
P-9A399	3rd I. F. Transformer	T5	
	Primary Winding		10.2
	Secondary Winding		28.4
P-50X16	Audio Input Transformer	T7	
	Primary Winding		2350.
	Secondary Winding		
	Center Tap to Inside		2000.
	Center Tap to Outside		2690.
P-51X32	Audio Output Transformer	T6	
	Primary Winding		
	Center Tap to Inside		198.
	Center Tap to Outside		222.
	Secondary Winding		0.4
P-12A208	Dynamic Speaker (10")		
	Speaker Voice Coil		1.6
	Speaker Field	1,2	570.
P-53X94	115 Volt 60 Cycle Power Trans.	T8	
	Primary Winding		4.8
	Tube Filament Secondary (A-A)		0.2
	Tube Filament Secondary (B-B) (45)		0.1
	Rectifier Filament Secondary		0.1
	High Voltage Secondary Winding		
	Center Tap to Inside		118.
	Center Tap to Outside		1.96
P-9A430	2nd I. F. Plate Isolating Reactor	L1	.36
P-9A391	High Frequency Oscillator Tracking Coil	L3	1.2

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

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

GROUPS OF CIRCUIT ELEMENTS ENCLOSED IN DOTTED RECTANGLES COMPRISE DISTINCT MECHANICAL ASSEMBLIES. 'B' AND 'S' ON SELECTIVITY CONTROL DENOTES 'BROAD' AND 'SHARP' RESPECTIVELY. THE CAPACITY OF THE 'C' SHIELD IS 35 μμf. THE CAPACITY OF THE 'D' SHIELD IS 80 μμf.

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

C 1	250 mmf.	C11	.25 mf. 360 V.	C21	.01 mf. 360 V.	C31	1400 mmf.
C 2	2-25 mmf.	C12	150-250 mmf. / ONE	C22	.50 mf. 180 V.	C32	2-25 mmf.
C 3	2-25 mmf.	C13	150-250 mmf. / UNIT	C23	.004 mf. 600 V.	C33	300-600 mmf. / ONE
C 4	2-25 mmf.	C14	150-250 mmf. / ONE	C24	18.0 mf. 200 V.	C34	40-100 mmf. / UNIT
C 5	.05 mf. 180 V.	C15	150-250 mmf. / UNIT	C25	14.0 mf. 400 V.		
C 6	.25 mf. 240 V.	C16	.05 mf. 180 V.	C26	.05 mf. 360 V.		
C 7	2-25 mmf.	C17	4.0 mf. 150 V.	C27	.05 mf. 180 V.		
C 8	2-25 mmf.	C18	.10 mf. 360 V.	C28	.35 mmf.		
C 9	8-25 mmf.	C19	70-150 mmf.	C29	2-25 mmf.		
C10	.25 mf. 180 V.	C20	50 mmf.	C30	2-25 mmf.		

R 1	16,000 ohm 2.0 W.	R 5	30,000 ohm 1.0 W.
R 2	150 ohm .2 W.	R 6	300,000 ohm .2 W.
R 3	2,500 ohm / Dual Volume	R 7	100,000 ohm .2 W.
R10	2.0 megohm / Control	R 8	2.0 megohm .2 W.
R 4	400 ohm .2 W.	R 9	1.0 megohm .2 W.
		R11	3.0 megohm Tone Cont.
		R12	100,000 ohm .2 W.
		R13	1,000 ohm .5 W.
		R14	25,000 ohm 3.0 W.
		R15	25,000 ohm 1.0 W.
		R16	2,500 ohm .2 W.
		R17	80,000 ohm .2 W.

T 1	Ant. R.F. Trans.
T 2	Interstage R.F. Trans.
T 3	1st I.F. Trans.
T 4	2nd I. F. Trans.
T 5	Diode Input Trans.
T 6	Audio Output Trans.
T 7	Audio Input Trans.
T 8	Power Trans.
T 9	Osc. Inductors
L 1	Isolating Reactor
L 2	Speaker Field (570 Ohms)
L 3	Osc. Tracking Coil

MODEL 2-ODM-578
Circuit Data
Alignment, Changes
Voltage, Coil Data
Socket, Trimmers
Phono Connections

GAMBLE-SKOGMO, INC.

10 Tube - 3 Band

All-Wave High Fidelity Receiver

This model is a three band receiver with a tuning range in each band as shown in the specifications above. Three band coverage is accomplished by means of three sets of R. F. and oscillator coils and a three section triple throw switch.

Referring to the schematic circuit diagram, Fig. 2, T1 and T2 are the antenna and interstage R. F. transformer assemblies and T9 is the oscillator coil assembly. The standard wave, 1st and 2nd short wave coils in each assembly are indicated by the letters B, C and D respectively. The three sections of the band switch are designated in the schematic as the antenna, interstage and oscillator sections.

The band switch completes connections to the coils in use. It also short circuits the R. F. transformer secondary and oscillator coil of lower frequency not in use.

The antenna transformer with tuned secondary feeds into a type 6K7 R. F. amplifier tube. The output of this tube is fed through the interstage R. F. transformer with tuned secondary into another 6K7 tube which functions as the 1st detector.

A separate type 76 tube is employed in the oscillator circuit. Referring to the oscillator assembly T9, Fig. 2, B, C and D refer to the standard wave, 1st short wave and 2nd short wave oscillator coils respectively. The oscillating circuit is always resonant at 456 KC above the frequency to which the R. F. amplifier is tuned.

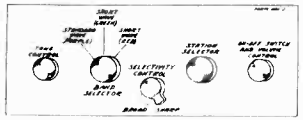


Fig. 1—Arrangement of Controls

The oscillator potential is fed into the cathode circuit of the 6K7 first detector tube. This results in the intermediate or beat frequency of 456 KC being present in the plate circuit of this tube.

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

Selectivity Control—Referring to the 1st and 2nd I. F. transformers T3 and T4 in Fig. 2, it will be noted that there are coupling windings shown in the illustration below the primaries.

When the selectivity control is in the sharp position, the coupling winding is open circuited and the loose coupling which exists between the primary and secondary of this transformer results in high selectivity.

When the selectivity control is in the broad position, the coupling winding which is wound under the primary is connected in series with the secondary. This provides overcoupling which results in a greatly widened resonance curve. Passage of a wide range of audio frequencies is thus obtained.

Dual Volume Control—A dual manual volume control is employed. In one section the audio voltage applied to the 76 1st audio tube is varied (R10). In the other section the R. F. and 1st I. F. bias is varied (R3). The purpose of the latter section is to reduce the sensitivity of the receiver at low volume settings in order to cut down noise pick-up between stations. The variable section R3 is shorted out through contact No. 4 of the interstage section of the band selector when in the 2nd short wave position.

A type 76 tube functions as a diode second detector. AVC voltage is applied through isolating resistors to the control grid circuits of the R. F. and 1st I. F. tubes. The audio voltage developed across volume control resistor R10 is applied through the movable arm to the control grid of the Type 76 1st audio tube. Transformer coupling is used between the first audio stage and the output stage which employs two type 45 tubes. A type 80 full wave rectifier tube is used in the power unit.

Alignment and Calibration

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

A signal generator that will provide an accurately calibrated signal at 456, 1730, 1500, 600, 5800, 5000, 18,300, 15,000 and 6000 KC and an output indicating meter are required. It will be practically impossible to align the receiver if unsatisfactory apparatus is used.

If a station is tuned in with the selectivity control in the broad position and this control is then turned to the sharp position, the station may disappear. This is not an indication that the receiver is out of alignment.

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

I. F. Adjustment

Set the signal generator for a signal of 456 KC.

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

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

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

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

Turn the volume control to the maximum position.

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

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

Range B Alignment

1730 KC Adjustment

Set the signal generator for 1730 KC.

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

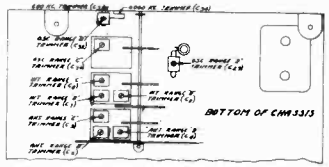


Fig. 3—Location of Trimmers

Keep the band selector in the standard wave position.

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

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

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

1500 KC Adjustment

Set the signal generator for 1500 KC.

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

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

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

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

600 KC Adjustment

Set the signal generator for 600 KC.

Turn the tuning condenser rotor until maximum output is obtained.

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

Range C Alignment

5800 KC Adjustment

Set the signal generator for 5800 KC.

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

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

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

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

5000 KC Adjustment

Set the signal generator for 5000 KC.

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

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

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

Range D Alignment

18,300 KC Adjustment

Set the signal generator for 18,300 KC.

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

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

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

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

15,000 KC Adjustment

Set the signal generator for 15,000 KC.

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

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

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

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

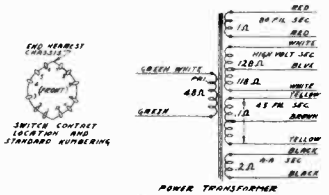
Do not make any further change in the setting of the oscillator Range D trimmer.

6000 KC Adjustment

Set the signal generator for 6000 KC.

Turn the tuning condenser rotor until maximum output is obtained.

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



Changes in Early Models

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

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

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

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

Phonograph Connections

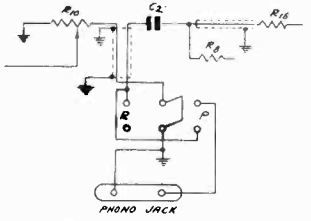


Fig. 7—Phonograph Connections

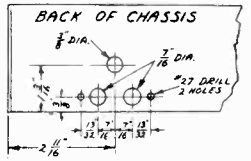


Fig. 8—Details of Panel Drilling for Phono Assembly

Twenty-five Cycle Receivers

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

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

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

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

Type of Tube	Function	Heater (Volts)	Plate to Ground	Screen (if used) to Ground	Cathode to Ground	Cathode M. A.
6K7 (6U7)	R. F.	6.1	265	120	3.7	9.0
6K7 (6U7)	1st Det.	6.1	265	110	9.5	3.8
76	Osc.	6.1	110			5.8
6K7 (6U7)	1st. I. F.	6.1	265	120	3.7	9.0
6K7 (6U7)	2nd I. F.	6.1	265	120	3.7	9.0
76	2nd Det.	6.1				
76	1st A. F.	6.1	265		14	5.0
45	Power	2.5	265		50 (1)	22
80	Rectifier	4.9				90 (total)

(1) As read with 300 Volt Scale. Grid to Ground.

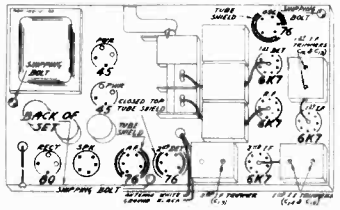
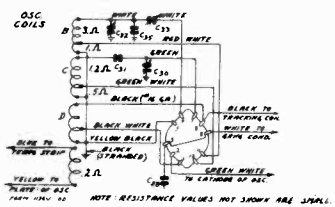
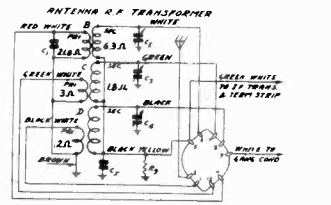
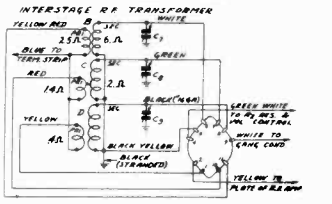


Fig. 5—Location of Tubes

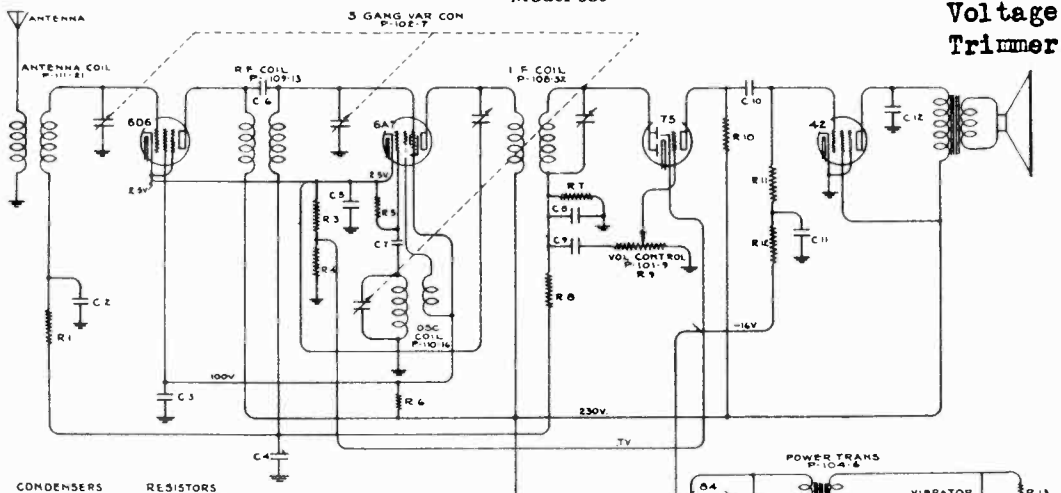






MODEL 580
Schematic
Voltage, Socket
Trimmers, Data

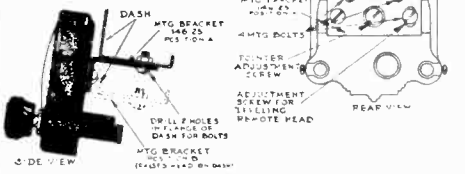
GAMBLE-SKOGMO, INC.
Model 580

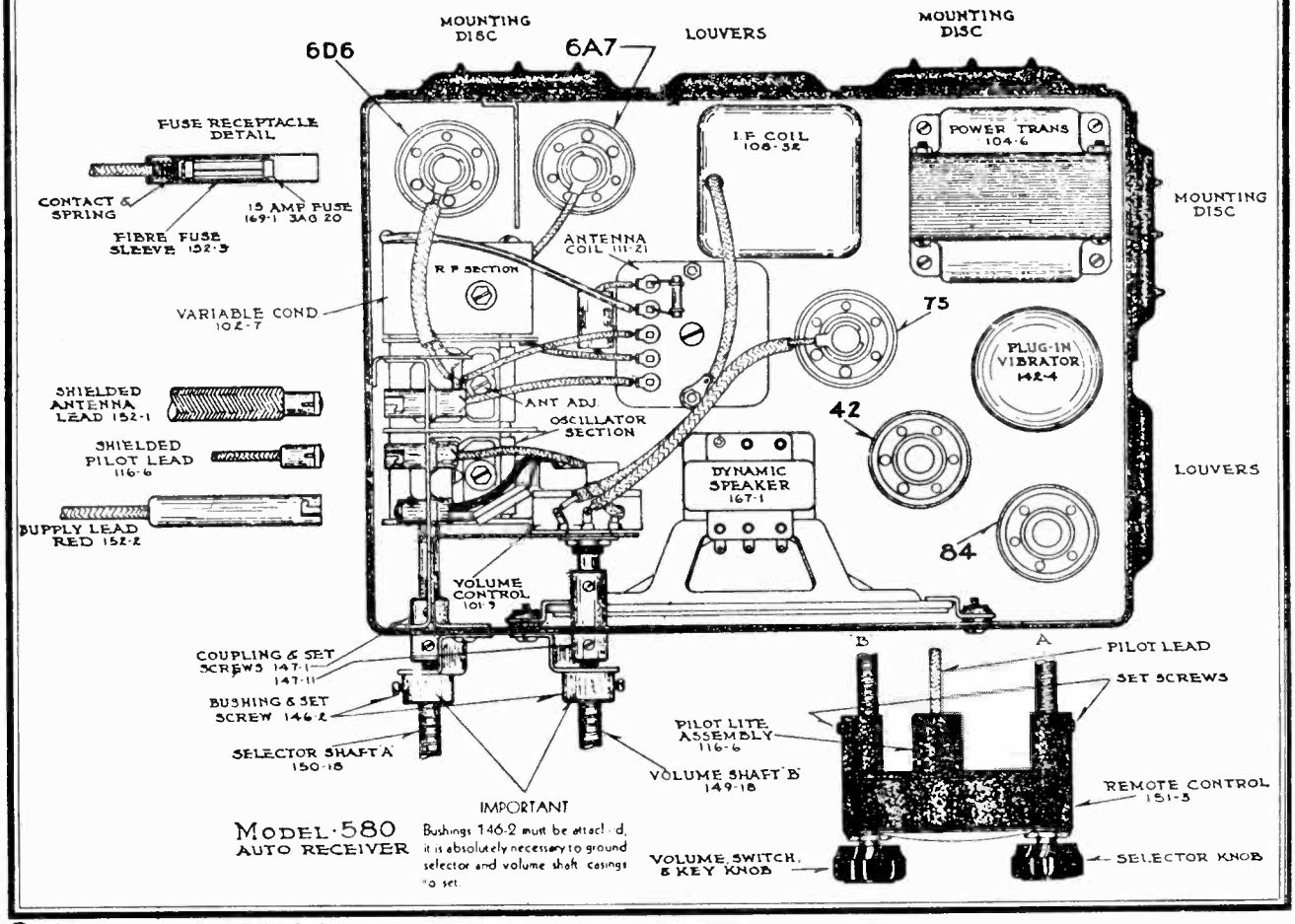


CONDENSERS		RESISTORS	
No	VALUE	No	VALUE
C 1	.002 MICA	R 1	100M ½W
C 2	.05 X 200V	R 2	100
C 3	.1 X 200V	R 3	100 ½W
C 4	.05 X 200V	R 4	50 ½W
C 5	.03 X 200V	R 5	50M ½W
C 6	15 μμf GIMMICK	R 6	1.9M 1W
C 7	100 μμf MICA	R 7	500M ½W
C 8	500 μμf MICA	R 8	500M ½W
C 9	.01 X 400V	R 9	500M VOL CONTROL
C 10	.01 X 400V	R 10	2.5M ½W
C 11	.1 X 200V	R 11	500M ½W
C 12	.006 X 600V	R 12	3.01M ½W
C 13	40 MFD X 350V	R 13	100
C 14	5.0 MFD X 350V		
C 15	.01 X 1400V		
C 16	5 MFD X 12V		
C 17	5 MFD X 12V		

NOTE
C 3, 4, 5 IN ONE UNIT PART No. 145-11
C 13, 14 IN ONE UNIT PART No. 119-15
C 16, 17 IN ONE UNIT PART No. 148-4
R 13, 2 IN ONE UNIT PART No. 104-6
NUMBERS PREFIXED BY LETTER 'P' ARE PART NUMBERS.
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND VOLUME CONTROL ON FULL

IF PEAK 175 KC.





IMPORTANT

Bushings 146-2 must be attached, it is absolutely necessary to ground selector and volume shaft casings to set.

MODEL 580 AUTO RECEIVER

INSTALLATION AND SERVICE INSTRUCTIONS

MODEL 580

FIVE TUBE-SUPERHETERODYNE AUTO RADIO

TUBE COMPLEMENT:

1—Type 6D6—remote cut-off pentode as an R. F. amplifier.
1—Type 6A7—pentode as an oscillator and first detector.
1—Type 75 —duplex diode triode second detector automatic volume control and first audio.
1—Type 42 —pentode output tube.
1—Type 84 —high vacuum full wave rectifier.

ACCESSORIES:

The carton of accessories packed with this set contains the following:
1—No. 152-1 shielded plug-in type antenna cable.
1—No. 152-2 plug-in battery cable.
1—No. 149-18 flexible volume control shaft (slotted fitting).
1—No. 150-18 flexible selector shaft (key fitting).
2—No. 146-2 brackets for anchoring flexible shafts to set container.
2—No. 135-S—3" x ⅜" carriage bolts and nuts for mounting set to bulk head.
2—No. 134-1—⅜" x 1" iron washers.
2—No. 134-2—⅜" lockwashers.
6—No. 154-2 set screws, 4 for attaching flexible cables to set, 2 for anchoring cables to brackets.
4—No. 155-6—No. 6 x ¾" binding head self-tapping screws for attaching brackets (No. 146-2).
6—168-1—Spark plug type suppressors.
1—168-2—Distributor type suppressor.
1—No. 148-1 generator condenser.
1—No. 148-3 ammeter condenser.
1—No. 151-3 remote control head.
1—No. 116-6 pilot light assembly complete.
1—No. 146-8 Die cast mounting bracket.
1—No. 146-12 Steering column strap.
1—No. 116-S 6-8 volt bulb.
1—No. 169-1 15 amp. fuse.
1—No. 152-3 Fuse insulating sleeve.

RECEIVER INSTALLATION:

Determine most satisfactory or desirable mounting position. In most cases it will be found that the receiver can be mounted on the car bulk head, above and to the right of the steering post.

Use the paper template included with these instructions and which is the same size as the set. Mark location for two mounting bolts if mounted on the long side and for one mounting bolt if mounted on the short side.

Then drill two (2) one-half inch (½") holes, making certain that the paint around the hole on the engine side of fire wall or bulk head is scraped clean to insure a good ground connection between receiver and the frame of the car. Assemble brackets number 146-2 to case with self-tapping screws.

Insert bolts through dash, assemble plain, lockwashers and nuts on engine side, then hang receiver over bolt heads and tighten nuts securely.

Mount the remote control unit on steering column by means of mounting bracket or attach to instrument panel or under dash (see illustration).

Two flexible shafts are furnished, one with a slotted fitting on one end, which is the volume control shaft (number 149-18), the other is the selector shaft, with key fitting at one end (number 150-18).

Make certain that the outer casings of flexible shafts go into remote control bushings for approximately five-sixteenths of an inch and tighten set screws to secure cables. If cables are pushed too far into remote control head, shafts will not turn freely. Always try to install drive shafts in as straight a line as possible from remote control to set. AVOID SHARP BENDS IN CABLES.

IMPORTANT—READ CAREFULLY:

We are prepared to exchange, without charge, our standard number 149-18 and 150-18, eighteen inch cables for twenty-four inch cables, number 149-24 and 150-24. You will find that 99% of the installations can be made with the standard eighteen inch cables, and bear in mind that the shorter the cable, the smoother the drive.

DASH MOUNTING FOR THE REMOTE CONTROL HEAD:

The majority of the new 1935 model automobiles have provisions made for mounting the remote control head of an auto radio on the dash. We have available special escutcheon plates for this purpose which can be secured upon request at an additional cost of $1.00. *When requesting escutcheon plates specify make and model of the car, also the finish of the dash.*

Following is a list of 1935 model automobiles which contain removable ash tray receivers and which are able to accommodate the *remote control head of our model 580 auto receiver.*

Chrysler Airstream	Nash	Reo
Dodge	Packard	Ford V-8
Plymouth	Graham DeLuxe	
De Soto Airstream	Hupmobile	

Following is a list of 1935 model automobiles which do not contain ash tray receivers but with the aid of the special drilling dimensions furnished herewith the left hand panel on the dash may be drilled to accommodate our regular remote control head.

La Fayette (Nash)	Graham (Standard)
Franklin	Studebaker

For installation of our remote control head on the following cars we recommend standard steering column or dash mounting with the aid of a bracket:

Auburn	Terraplane	De Soto & Chrysler Airflow
Buick	Pontiac	Hudson
Cadillac	Chevrolet—Standard	Lincoln
La Salle	& De Luxe	Oldsmobile

Many of the 1931 model automobiles contain the same size ash tray receiver as the 1935 models and naturally installation of the remote control head can be made on these models.

We have found that our model 580 auto receiver will fit above the steering column on the fire wall of 75% of the late model automobiles and for dash mounting of the remote control head this location works out very satisfactorily.

The Cadillac, La Salle, Chevrolet, Pontiac and Oldsmobile 1935 automobiles have special blank escutcheon plates on the dash which are intended for remote control heads for auto receivers. The cut-out behind these blank escutcheons will not accommodate our remote control head and for installation in these models we recommend using standard steering column mounting for the remote control head or dash mounting using a bracket as illustrated in drawings contained herein.

DIAL ADJUSTMENT:

Mount control head to steering column by means of bracket and strap or under dash by means of bracket or to instrument panel (see illustrations). Attach cables as above. Tune set to some station of a known frequency (between 800 and 1200 K.C.), hold selector knob, then with a screw driver adjust the slotted screw on back of the control head, and in that way adjust the dial pointer to the correct frequency setting.

CONNECTIONS TO BATTERY:

The battery cable, number 152-2, (red wire with fuse receptacle at one end and terminal lug at other end) must be connected to battery terminal of ammeter. At the same time connect ammeter capacitor, number 148-3, to battery terminal of ammeter, other end of condenser to any convenient grounded screw on back of instrument panel. Make certain that insulating sleeve is slipped over fuse when fuse is placed in receptacle, before inserting in receiver (see illustration). All bypass leads should be as short as possible.

When connected properly, the discharge due to current drawn by the receiver should not indicate on the ammeter. This is important, since if improperly connected, as shown by the deflection of ammeter, additional motor interference may be encountered.

PILOT LIGHT:

Pilot light assembly, part number 116-6, a shielded cable, plugs into the set and to the rear of the remote control unit (see illustrations).

ANTENNA CONNECTION:

The antenna is connected to the receiver by means of the antenna cable, number 152-1. The antenna wire is the single black wire projecting from the end of the cable. Splice this wire to the roof antenna lead and ground the pig-tail shielding as close to the corner post of the car as possible.

OPERATION:

Place key (knob) in lock of left hand control of the remote control unit. After waiting approximately 45 seconds for tubes to heat up, rotate station selector, right hand knob, until a desirable program is heard. De-tuning will very seriously affect the tone quality of this receiver.

MOTOR NOISE SUPPRESSION:

The ignition system of every automobile generates high frequency electrical interference. This high frequency interference arising from the ignition coil, the distributor and the spark plugs must be properly suppressed in order to obtain satisfactory reception. Each car will present more or less an individual problem but there is a definite procedure to follow which holds true in every case.

This first essential procedure is to disconnect the high tension leads to the spark plugs and attach the spark plug suppressors (168-1) (for V 8 Fords 168-4) the special distributor type suppressor (168-2) which is inserted in the center contact of the distributor as indicated in the illustration of a typical installation. (NOTE V 8 FORD USES NO DISTRIBUTOR SUPPRESSOR.) For cap type distributor, exchange the standard plug type distributor suppressor (168-2) for a special cable type suppressor (168-3) from your dealer. In some few cases, such as Buicks it is sometimes necessary to use cable type (168-3) suppressors. This type of suppressor is inserted in the leads running from the distributor to the spark plugs and which are concealed underneath the metal plate which covers the spark plugs.

After the spark and distributor suppressors have been properly fastened the next in importance is the generator condenser (148-1), this filters a high pitched whining noise which would otherwise be heard as the motor is accelerated.

It is sometimes necessary in cars where the ignition coil is located under the dash, to use an additional capacitor (148-1) obtainable from your dealer. It must be installed between the battery side of the ignition coil and the frame of the car. Next connect capacitor (148-3) from the battery side of ammeter to frame of car. This is necessary in practically every installation and a good connection to the frame of the car is of utmost importance.

After standard suppression has been applied and the hood clamped down to prevent radiation, the receiver should be turned on and the dial turned off a station, with the volume control at maximum. If motor noise is still objectionable the next step is to determine whether the interference is originating through chassis pickup or from the antenna.

To check for chassis pickup, disconnect the antenna from the antenna cable and ground the antenna lead to shield of cable, or remove antenna cable. Chassis pickup can be reduced by reducing the gap between plug contacts and the rotating arm in the distributor head. To do this, apply solder to the end of the rotor arm. Replace the rotor in the distributor and turn the engine over slowly with the crank in order to clean the excess solder. The rotor should not brush or wipe the contacts inside the distributor cap, but should just clear them. As an additional precaution check the breaker points. They should be thoroughly cleaned and adjusted or new points installed if they are badly worn. The ignition system of a car must be kept in good condition and leaky cracked high tension wires and bad spark plugs should be replaced. In many cars the low tension battery leads, etc., are grouped together with the high tension wires. These leads will very often pick up motor noise and feed it into the receiver through the battery circuit. In cases such as these it will be necessary to separate the low tension from the high tension wires and run them through another hole if they run from the engine compartment up to the instrument panel. This condition is particularly true on the V 8 Ford as the battery and primary leads run through a special tube which also houses the high tension leads. Shield and ground these leads. It is also necessary on V 8 Fords to install a capacitor between the primary terminal of the coil and ground.

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. ⅜" 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. In extreme cases it has been found necessary to ground the steering column. Free wheeling cables should be grounded at the point at which they go through the fire wall of the car.

On cars which have a wooden bulkhead it is necessary to line the motor side with thin sheet metal and ground. This will prevent interference from entering the inside of the car and from there being picked up by the antenna. It is also necessary in some installations to connect a capacitor from the hot side of the dome light wire to frame of the car. This lead can usually be found by referring to the electrical wiring diagram of the car. If the ignition coil is mounted inside the driving compartment, it may be necessary to shield the high tension lead running from the coil to the distributor. This cannot be done effectively, however, if the wire has rubber insulation. Where the car is so equipped this wire should be replaced with a good quality high tension wire such as Packard cable. When applying the shield over this wire be sure that it terminates at least an inch from both ends of the lead and that the shield is grounded at both ends; one end under the dash and the other to the engine. It may be necessary to by-pass the electrical connections of all gauges such as oil, water, gas (Hudson-Terraplane).

The foregoing rules should remove any trace of chassis pickup. Now connect the antenna to the receiver and test for motor noise pickup. It is entirely probable that if any noise is present it will be very slight and only noticeable between stations.

No absolute rule for complete motor noise elimination can be specified inasmuch as many times two cars of the same make present entirely different problems and require bonding or shielding at different points.

A word or two concerning antennas; naturally the performance of any radio depends on the effectiveness of the antenna. The later model cars are coming through with very good Antennas already installed and no trouble should be experienced from this angle with of course an occasional exception. The older cars present a more difficult problem and naturally the service man will have to take cases of this nature into consideration. Many of the older cars on the market today have a wire network in the roof which is nothing more than ordinary chicken wire.

This wire network acts as a support to the roof and is in the majority of cases grounded directly to the body of the car at the point at which the roof meets the sides of the body. Service men frequently tack antennas to the underside of the top material in these cars, this is not satisfactory. There are but two things to do. Either an underslung (plate or strap) antenna must be used or the wire network must be cut from all grounds to the car. If this is done this network will in itself make a very good antenna, but it will be necessary to cut the wire network back for a distance of at least three inches from all sides of the car.

When running the lead-in up the corner post of the car to the roof antenna ground it every few inches to the frame of the body of the car. If this is not possible insulate it, otherwise scratchy noises will result.

Shield high tension leads.

The ignition system of car must be kept in good condition.

It is advisable to advance the generator charging rate in order to compensate for the additional drain of the receiver on car storage battery. THIS SHOULD BE DONE BY A COMPETENT SERVICE STATION.

BALANCING SET TO ANTENNA:

When this set has been installed and is ready for operation it may be found necessary (depending on antenna) to balance set to this antenna. This is accomplished as follows:

With the receiver tuned to a very weak station, about 130 to 140 (1300 to 1400 kilocycles) on the dial, adjust the antenna trimmer with a screw driver until maximum volume is attained. To reach the antenna trimmer remove the plug button from the top of the case.

SERVICE NOTES:

Model 580 is a five tube superheterodyne receiver with an intermediate frequency of 175 kilocycles and a tuning range of from 530 to 1550 kilocycles.

This receiver has been carefully designed to facilitate servicing, the top and bottom covers are both removable, any part is replaceable without removing the chassis from the cabinet. All adjustments are made without removing the chassis from the cabinet.

Should it ever become necessary or desirable to re-align this receiver, the proper method is as follows:

I. F. ALIGNMENT:

1. With variable condenser at its maximum capacity position and with volume control full on, connect in series with a .1 mfd. condenser, an oscillator set at 175 kilocycles to the grid cap of the 6A7 tube.

2. Adjust trimming condensers of I. F. transformer, part number 108-32 (two adjustments) to resonance, as indicated on an output meter connected across the primary terminals of the speaker input transformer or between the plate and screen terminals of the type 42 output tube. The connection to the tube can be made by means of an adapter. Maximum deflection of the meter indicates resonance.

Note: I. F. transformer adjustments are accessible from the bottom of the chassis—the bottom cover must be removed.

R. F. ALIGNMENT:

1. Attach oscillator connected in series with a 200 mmfd. condenser to the antenna lead and with the variable condenser at its minimum capacity position (extreme right of its rotation) and with an oscillator set at 1550 kilocycles, adjust condenser trimmer of oscillator section (Front shaft end) to resonance.

2. Re-set oscillator to 1400 kilocycles, rotate variable condenser to pick up signal, adjust antenna (center section) and R. F. (rear section) trimmers to resonance.

3. Check alignment at 1400-1000-600-530 kilocycles by setting oscillator to these frequencies and picking up signal by rotating condenser.

4. Bend slotted plates of antenna and R. F. sections only if necessary. UNDER NO CIRCUMSTANCES BEND PLATES OF OSCILLATOR SECTION.

NOTES:

Voltages from chassis to different points are indicated on schematic circuit diagram, and should be measured with a voltmeter having a resistance of 1000 ohms per volt.

Failure to operate, noisy or weak reception, may be due to defective tubes or poor contact between cap on top of tube and grid clip.

Tubes may be checked by replacing with another tube which is known to be good.

If fuse blows out frequently, and insulating sleeve has been properly placed over fuse, the trouble probably is in the vibrator and vibrator should be replaced.

NEVER ATTEMPT TO ADJUST VIBRATOR POINTS.

Case rattles may be due to one or more of the following:

Loose screws in top or bottom covers. Loose elements in tubes. Loose tube shield. Loose R. F. coil shield. Loose grill cloth.

GAMBLE-SKOGMO, INC.

MODEL 550
Schematic
Alignment, Parts

IF PEAK 456 KC.

C-1	.01	200 V
C-2	.05	200 V
C-3	.00037	TUNING COND.
C-4		
C-5	.00002	MICA
C-6	.0008	PAD
C-7	.05	200 V
C-8	.25	200 V
C-9	.01	200 V
C-10	.0005	600 V
C-11	.05	200 V
C-12	.0005	600 V
C-13	.01	200 V
C-14	10 MFD.	25 V ELECTROLYTIC
C-15	.002	800 V

R-1	50,000	
R-2	2,000,000	
R-3	15,000	
R-4	500,000	
R-5	500,000	VOL. CONTROL
R-6	500,000	
R-7	250,000	
R-8	1,000,000	
R-9	500	

MODEL 550
BATTERY RADIO

GENERAL: Always eliminate all possible sources of trouble external to the receiver itself, such as: defective aerial, ground, or lightning arrestor, tubes, batteries, loud speaker.

TUBE FUNCTIONS: "1A6" First detector—oscillator, "34" IF amplifier, "30" diode second detector, "32" first audio amplifier, "33" power tube.

CHECKING PARTS: The resistance of coils and resistors is shown on the circuit diagram together with condenser capacities. Any defective part, either shorted or open or greatly different in value than that specified will result in weak reception or none at all.

ALIGNMENT: If all tubes, batteries, and set parts check OK and sensitivity is still low it is probably due to the set being out of alignment. It is necessary to use a reliable test oscillator or signal generator having accurate calibration and positive attenuation.

IF ALIGNMENT 456 K. C.: Open tuning condenser (dial at high frequency end) connect signal generator to grid cap of 1A6 tube leaving present cap in place. Use a small condenser .002—.01 in series with the signal generator lead. Adjust all four IF trimmers, two in top of each IF can. Go over the adjustments several times—reducing the output of the signal generator to as low an output as will give an audible signal. It is best practice to use an output meter connected across the speaker to indicate "peak".

ANTENNA & OSCILLATOR ALIGNMENT:—Connect signal generator to antenna lead of set, with tuning condenser open, adjust oscillator trimmer (rear section of tuning condenser) to peak on a 1730 K.C. signal from generator, close tuning condenser and adjust padder condenser (under chassis) on 540 K.C. signal, then recheck 1730 K.C. adjustment. Adjust antenna trimmer on 1000 K.C. signal.

Note: a strip of bakelite about three-sixteenths thick, one inch wide, and about six inches long with a slot sawed in one end will facilitate adjustment of padder screw.

DISTORTION: On sets bearing serial numbers below J 3604 a decided improvement can be made by the following changes:

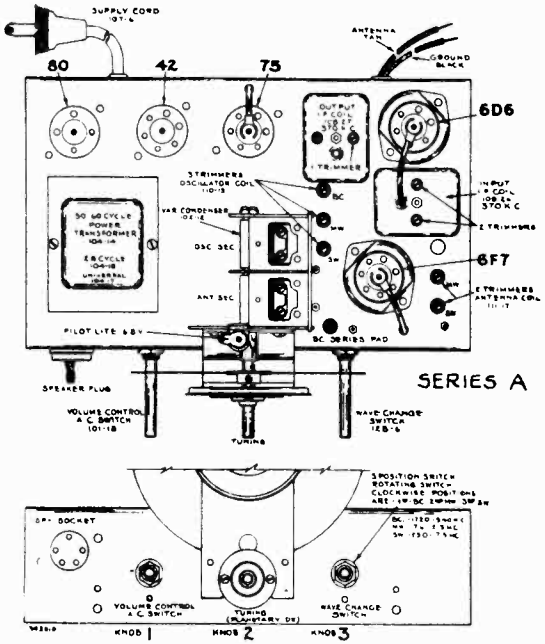
1. Change R-7, 250,000 Ohm resistor to 100,000 Ohm resistor.
2. Remove R-4 500,000 Ohm resistor.
3. Short out C-9 .01 200 Volt condenser.
4. Change C-15, .002 800 Volt condenser, to .0025 Mica or 800 Volt paper.

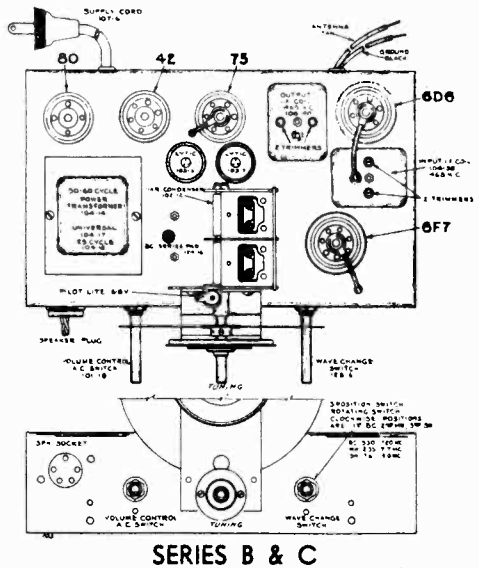
Equivalent changes were made in circuit on models having serial numbers higher than J 3604.

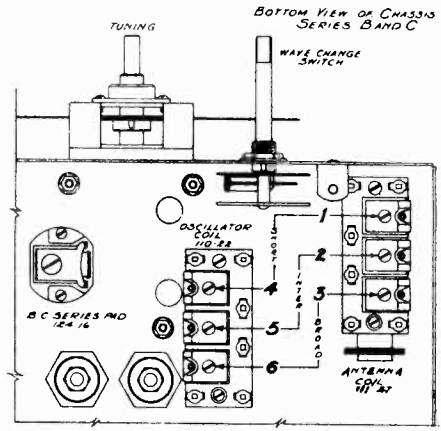
PARTS PRICE LIST ON MODEL 550 CORONADO BATTERY TABLE RECEIVER

		List
E-17400	Assb.—Cable & Markers	$ .70
E-17383	Assb.—Dial Scale & Frame	.50
E-17195	Bushing—Pointer	.02
E-17372	Coil—Antenna	1.80
E-17155	Coil—Oscillator	1.60
E-17402	Condenser—Tuning	2.50
E-17071	Condenser—Padder .500 M. M. F.	.50
E-8873	Condenser—Mica .0002	.20
E-8874	Condenser—Tubular .0005 x 600V	.20
E-17002	Condenser—Tubular .002 x 800V	.20
E-8877	Condenser—Tubular .01 x 200V	.20
E-8661	Condenser—Tubular .05 x 200V	.20
E-17128	Condenser—Tubular .25 x 200V	.30
E-17080	Condenser—Electrolytic 12 x 35 V	.60
E-17403	Control—Volume	.80
E-17404	Pointer—Dial	.10
E-17374	Resistor—Candohm 15,000 Ohm	.30
E-17164	Resistor—Carbon	.20
E-8601	Resistor—Carbon 50,000 Ohm	.20
E-8883	Resistor—Carbon 100,000 Ohm	.20
E-8602	Resistor—Carbon 250,000 Ohm	.20
E-8886	Resistor—Carbon 500,000 Ohm	.20
E-8766	Resistor—Carbon 1,000,000 Ohm	.20
E-8887	Resistor—Carbon 2,000,000 Ohm	.20
X-17311	Screw—Pointer, Binding Head	.02
E-17166	Socket—4-Prong #34	.20
E-17167	Socket—5-Prong #33	.20
E-17165	Socket—4-Prong #32	.20
E-17313	Socket—4-Prong #30	.20
E-17386	Socket—6-Prong #1-A-6	.20
E-17406	Switch—2-P. Gnd	.30
E-17073	Transformer—H. Q. Input	1.50
E-17076	Transformer—H. Q. Output	1.50
E-17413	Celluloid—Dial Protector	.10
E-17114	Knob—Wood	.20
E-17169	Speaker—6½" Magnetic	3.50

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE







LIST OF REPAIR PARTS - MODEL 585 (SERIES A - B - C)

Parts Used in Ser. A	Parts Used in Ser. B	Parts Used in Ser. C.	DESCRIPTION
			CONDENSERS
100-11	100-11	100-11	.01 x 400V—25%
100-15	100-15	100-15	.015 x 400V—Plus 10%; Minus 20%
100-19	100-19	100-19	.001 x 600V—25%
100-20	100-20	100-20	.1 x 120V—25%
Not Used	100-22	100-22	.05 x 200—25%
Not Used	103-6	103-6	8 Mfd. x 350V Electrolytic
Not Used	103-7	103-7	8 Mfd. x 300V Electrolytic
118-1	118-1	118-1	Dual .1 x 200V—Plus 50%; Minus 10% (Series B & C use 3 per set)
119-11	Not Used	Not Used	4-3-4 Mfd. Electrolytic
119-12	Not Used	Not Used	8-8-4 Mfd. Electrolytic (For 25 Cy. Only
129-2	129-2	129-2	.0005 Mica—MT—20%
129-5	129-5	129-5	.0001 Mica—MT—20%
129-15	129-15	Not Used	.00055 Mica—MT—5%
129-16	129-16	Not Used	.00287 Mica—MW—5%
Not Used	Not Used	129-23	.002 Mica—MW—5%
Not Used	Not Used	129-24	.000425 Mica—MT—5%
			RESISTORS
130-3	130-3	130-3	500M Ohm—1/5 Watt—20%—100V—Carbon
130-11	130-11	130-11	250M Ohm 1/3 Watt—20%—50V—Carbon
130-12	130-12	130-12	50M Ohm—1/3 Watt—20%—20V—Carbon
130-19	130-19	130-19	1 Meg Ohm—1/3Watt—20%—100V—Carbon
130-20	130-20	130-20	100M Ohm—1/5 Watt—20%—50V—Carbon
Not Used	130-32	130-32	250 Ohm—1/3 Watt—20%—10V—Wire W.
130-38	Not Used	Not Used	2 Meg Ohm—1/3 Watt—20%—20V—Carbon
130-39	130-39	130-39	700 Ohm—1/3 Watt—20%—20V—Carbon
130-40	Not Used	Not Used	19M Ohm—1/2 Watt—20%—150V—Carbon
130-41	Not Used	Not Used	800 Ohm—1/3 Watt—20%—20V—Carbon
130-42	130-42	130-42	20M Ohm—1/2 Watt—20%—100V—Carbon
Not Used	130-44	130-44	25M Ohm—1/2 Watt—20%—150V—Carbon
Not Used	130-46	130-46	800M Ohm—1/5 Watt—10%—100V—Carbon
Not Used	130-47	130-47	160M Ohm—1/5 Watt—10%—100V—Carbon
Not Used	130-48	130-48	15M Ohm—1/5 Watt—10%—20V—Carbon
			POWER TRANSFORMERS
104-14	104-14	104-14	50/60 Cycle Power Transformer
104-17	104-17	104-17	Universal Power Trans.—40 Cy. Primary
104-18	104-18	104-18	25 Cycle Power Transformer
			COILS
Not Used	105-9	Not Used	Antenna Choke Coil
Not Used	Not Used	105-10	Antenna Choke Coil
108-26	108-26	Not Used	Input I. F. Transformer Complete
108-27	Not Used	Not Used	Output I. F. Transformer Complete
Not Used	108-28	Not Used	Output I. F. Transformer Complete
Not Used	Not Used	108-38	Input I. F. Transformer Complete
Not Used	Not Used	108-40	Output I. F. Transformer Complete
110-13	Not Used	Not Used	Oscillator Coil Complete
Not Used	110-14	Not Used	Oscillator Coil Complete
Not Used	Not Used	110-22	Oscillator Coil Complete
111-17	Not Used	Not Used	Antenna Coil Complete
Not Used	111-18	Not Used	Antenna Coil Complete
Not Used	Not Used	111-27	Antenna Coil Complete
			SOCKETS
121	121	121	Four Prong Socket—Type 80
121	121	121	Five Prong Socket—Speaker
121	121	121	Six Prong Socket—Type 42
121	121	121	Six Prong Socket—Type 75
121	121	121	Six Prong Socket—Type 6D6
121	121	121	Seven Prong Socket—Type 6F7
			MISCELLANEOUS
101-18	101-18	101-18	Volume Control
102-12	102-12	102-12	Two Gang Variable Condenser
106-18	Not Used	Not Used	Metal Clad Resistor
107-5	107-5	107-5	Line Cord

DESCRIPTION

Tubes

The Tube complement of this chassis is as follows:

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

Series "A" chassis are equipped with dry electrolytic filter condensers and are serially numbered on paper tags which are attached to the line cord and to the inside of the cabinet.

Series "B" and "C" chassis are serially numbered on the back flange of the chassis, series "B" beginning with number "5A100510B" and up; series "C" chassis, beginning with number "5B105635C", differs only from series "B" in that the I.F. frequency was changed from 370 to 465 kilocycles.

Series "B" and "C" may be identified by the letter "B" and "C" at the end of the serial numbers.

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," "B," and "C."

All voltages are measured with 119 volts on the primary of the power transformer.

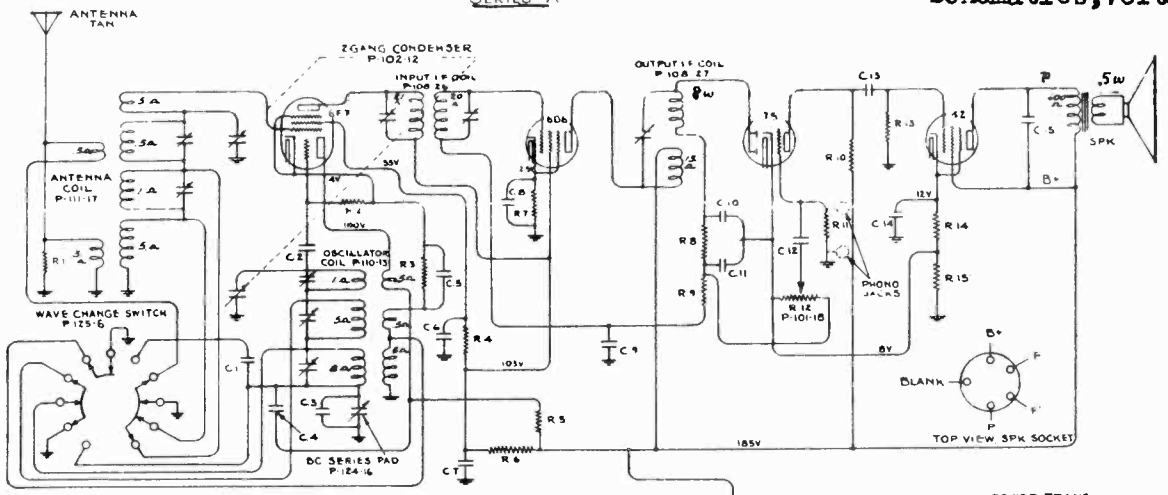
Resistance of coils and transformer windings are indicated in ohms on schematic circuit diagram.

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 illustrations) and also sometimes equipped with 25 cycle transformers with 105-115 volt or 220 volt primaries, not universals.

MODEL 585
Series A,B,C
Schematics,Voltage

GAMBLE-SKOGMO, INC.

SERIES A



LEGEND

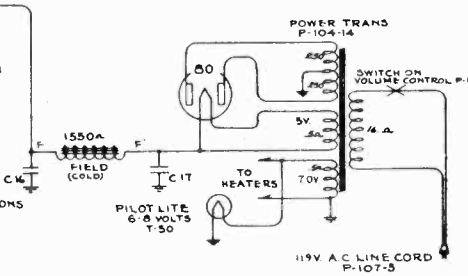
CONDENSERS		RESISTORS	
Nº	VALUE	Nº	VALUE
C.1 -	2870 mmf MICA	R.1 -	800Ω ½W.
C.2 -	100 "	R.2 -	50MΩ "
C.3 -	475 "	R.3 -	700Ω "
C.4 -	.1 X 200V	R.4 -	100MΩ "
C.5 -	.1 X 200V.	R.5 -	2.0MΩ ½W
C.6 -	.1 X 200V	R.6 -	1.9MΩ ½W.
C.7 -	.1 X 200V	R.7 -	200Ω "
C.8 -	.1 X 200V	R.8 -	50MΩ ½W
C.9 -	.1 X 200V.	R.9 -	1 MEG "
C.10 -	500 mmf MICA	R.10 -	250MΩ "
C.11 -	500 mmf MICA	R.11 -	2 MEG. "
C.12 -	.05 X 200V	R.12 -	500MΩ VOL. CONTROL
C.13 -	.01 X 400V	R.13 -	500MΩ ½W
C.14 -	4.0 MFD X 25V	R.14 -	500Ω "
C.15 -	.015 X 400V	R.15 -	35Ω "
C.16 -	3.0 MFD X 250V		
C.17 -	4.0 MFD X 300V		

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

NUMBERS PREFIXED BY LETTER 'P' ARE PART NUMBERS.

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

WAVE CHANGE SWITCH P-125-6 - 3 POSITIONS
ROTATING CLKWISE:
1st POSITION - BC. 1720 - 540 KC.
2nd " - MW. 7.6 - 2.3 MC.
3rd " - SW. 23.0 - 7.5 MC.
SWITCH SHOWN AT SW. POSITION



TUNING RANGE—SERIES A:
Standard Broadcast Band
540 - 1720 Kilocycles
Intermediate Band
2.3 - 7.6 Megacycles
Short Wave Band
7.5 - 23.0 Megacycles

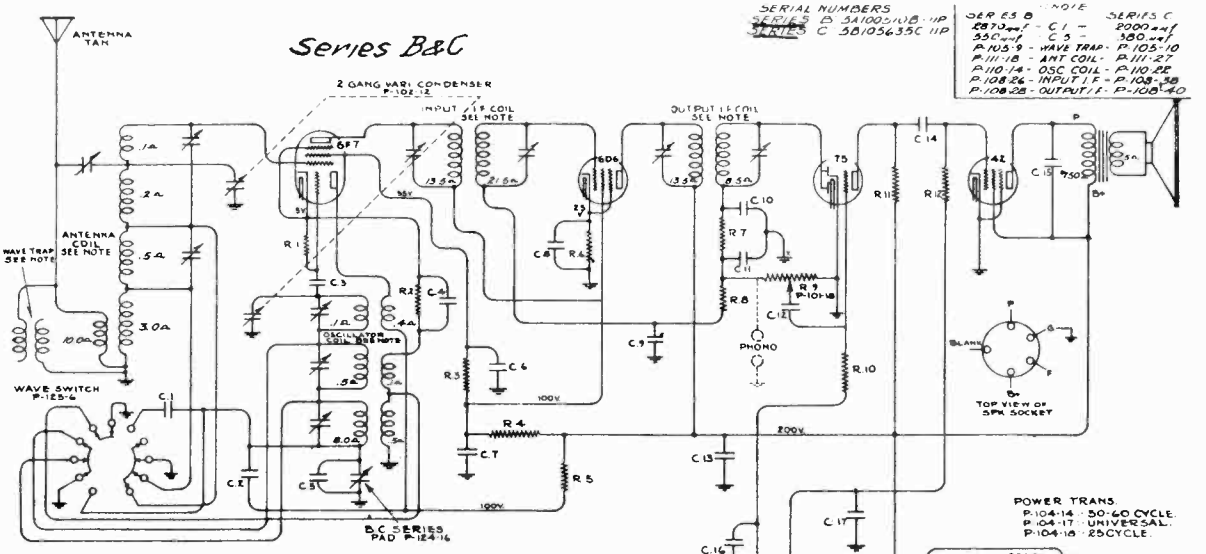
TUNING RANGE—SERIES B & C:
Standard Broadcast Band
530 - 1720 Kilocycles
Intermediate Band
2.35 - 7.7 Megacycles
Short Wave Band
7.6 - 19.0 Megacycles

I. F. FREQUENCY:
Series A } 370 K.C.
Series B }
Series C 465 K.C.

Series B&C

SERIAL NUMBERS
SERIES B 341001-UP
SERIES C 381056350 UP

NOTE
SERIES B
2870 mmf - C.1 -
350 mmf - C.2 -
P-105-9 - WAVE TRAP - P-105-10
P-111-18 - ANT COIL - P-111-27
P-110-14 - OSC COIL - P-110-22
P-108-26 - INPUT I.F. - P-108-38
P-108-28 - OUTPUT I.F. - P-108-40
SERIES C
2000 mmf
380 mmf



CONDENSERS		RESISTORS	
Nº	VALUE	Nº	VALUE
C.1 -	SEE NOTE	R.1 -	80Ω ½W
C.2 -	.1 X 200V	R.2 -	700 "
C.3 -	100 mmf MICA	R.3 -	100M "
C.4 -	.1 X 200V	R.4 -	2.5M ½W
C.5 -	SEE NOTE	R.5 -	20M "
C.6 -	.1 X 200V	R.6 -	250 ½W
C.7 -	.1 X 200V	R.7 -	50M "
C.8 -	.1 X 200V	R.8 -	500M "
C.9 -	.1 X 200V.	R.9 -	500M VOL CONT'L
C.10 -	100 mmf MICA	R.10 -	1 MEG. ½W
C.11 -	100 mmf MICA	R.11 -	250M "
C.12 -	.05 X 200V	R.12 -	" "
C.13 -	8.0 MFD X 300V P-103-7	R.13 -	15M "
C.14 -	.01 X 400V	R.14 -	150M "
C.16 -	.1 X 200V	R.15 -	800M "
C.17 -	.1 X 200V		
C.18 -	8.0 MFD X 350V P-103-6		
C.15 -	.015 x 600V		

C.4, C.8 IN DUAL UNIT P-118-1
C.7, C.9 " " " "
C.16, C.17 " " " "

NUMBERS PREFIXED BY LETTER 'P' ARE PART NUMBERS.

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

WAVE SWITCH P-125-6, 3 POSITIONS ROTATING CLKWISE:
1st POSITION - BC. 1720-530 KC.
2nd " - MW. 7.7 - 2.35 MC.
3rd " - SW. 19.0 - 7.6 MC.
SWITCH SHOWN AT SW. POSITION

ALIGNING INSTRUCTIONS—SERIES A

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

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

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

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

Resonance Indicator:

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

SERIES A

Alignment

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

Aligning I. F. Transformers

1. With volume control full on, the extreme right of its rotation, and with wave changing switch in the broadcast position, extreme left of its rotation, and with variable condenser at its minimum capacity position, plates, entirely out of mesh, adjust the I.F. transformers (adjustments at the top of parts number 108-26 and 108-27—see top view).
   (a) Connect external oscillator in series with I.F. dummy antenna. With external oscillator adjusted to 370 kilocycles, in series with I.F. dummy antenna to the control grid cap of the type 6D6 tube and chassis ground, adjust output I.F. transformer, part number 108-27, to resonance.

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

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

Broadcast Band Alignment—(540 - 1720 Kilocycles)

1. With wave changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, and with external oscillator connected in series with broadcast dummy antenna to tan antenna lead and black ground lead, make the following adjustments:
   (a) Set external oscillator to 1720 kilocycles and adjust oscillator trimmer to resonance. This adjustment is the rear adjustment of a group of three located next to the variable condenser.
   (b) Readjust external oscillator to 600 kilocycles and adjust broadcast series pad to resonance by rotating condenser to approximately 600 kilocycles, rocking it slowly to and fro until by adjusting pad maximum output is attained. This adjustment is located at the front of the chassis next to the variable condenser and wave changing switch.
   (c) Check for tracking and sensitivity at 1400 and 1000 kilocycles. Note: It is extremely necessary in making all of the above adjustments that the fundamental signal of the oscillator be tuned in and not the image frequency, which will fall below the fundamental.

Short Wave Band Alignment—(7.5 - 23.0 Megacycles)

1. This band is aligned after the I.F. adjustments have been completed. Set wave selector switch in the short wave position, extreme right of its rotation, set pointer of dial to 21 megacycles.
   (a) With external oscillator set at 21 megacycles, and connected to the tan antenna lead in series with the short wave dummy and to the black ground lead, adjust the oscillator short wave trimmer until generator signal is picked up. This trimmer is the one closest to the front of the chassis of the group of three trimmers located next to the gang condenser (see top view of chassis).
   (b) Adjust short wave antenna trimmer to resonance. This adjustment is to the right of the 6F7 tube and is the one closest to the front of the chassis (see top view).
   (c) Re-set external oscillator to 9 megacycles and pick up oscillator signal by rotating variable condenser, moving dial pointer. Check for tracking and sensitivity and do not bend plates. Note: It is extremely necessary in making all of the above adjustments that the fundamental signal of the oscillator be tuned in and not the image frequency, which will fall below the fundamental.

Intermediate Band Alignment—(2.3 - 7.6 Megacycles)

1. With wave selector switch in the center position and with dial pointer set to 7 megacycles, makes the following adjustments:
   (a) With external oscillator set at 7 megacycles and connected in series with the short wave dummy antenna to the tan antenna lead and black ground lead, same as for short wave adjustments, adjust center trimmer of oscillator coil, part number 110-13, until 7 megacycle signal is picked up. This is the center adjustment of a group of three located next to the gang condenser (see top view).
   (b) Adjust antenna trimmer to resonance, this adjustment is the rear of a group of two located at the right of the chassis next to the 6F7 tube (see top view).
   (c) Re-set external oscillator to 2.5 megacycles (2500 kilocycles), pick up signal by rotating condenser and moving dial pointer. Check for tracking and sensitivity. Do not bend plates. Note: It is extremely necessary in making all of the above adjustments that the fundamental signal of the oscillator be tuned in and not the image frequency, which will fall below the fundamental.

Service Notes

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

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

Notes—(Series "A" Only)

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

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

ALIGNING INSTRUCTIONS—SERIES "B" & "C"

Note: These instructions are written for series "C". The instructions are identical for series "B", except that for series "B" the I.F. frequency is 370 kilocycles and for series "C", 465 kilocycles. Also, the I.F. transformers are different:

Series "B"
Part No. 108-26—Input I. F. Trans.
Part No. 108-28—Output I. F. Trans.
Series "C"
Part No. 108-38—Input I. F. Trans.
Part No. 108-40—Output I. F. Trans.

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

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

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

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

Resonance Indicator:

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

Alignment

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

Aligning I. F. Transformers

1. With volume control full on, the extreme right of its rotation, and with wave changing switch in the broadcast position, extreme left of its rotation, and with variable condenser at its minimum capacity position, plates entirely out of mesh, adjust the I.F. transformers (two adjustments at the top of parts number 108-38 and 108-40—see top view).
   (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 108-40, to resonance.
   (b) Move generator output clip from grid of 6D6 to grid cap of 6F7 tube and align input I.F. transformer, part number 108-38.
   (c) With generator connected to grid of type 6F7 tube, readjust output I.F. transformer, part number 108-40, to resonance.

Broadcast Band Alignment—(530 - 1720 Kilocycles)

1. With wave changing switch in the broadcast position, extreme left of its rotation, and with gang condenser in its minimum capacity position, plates entirely out of mesh, 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 to resonance, for location of this adjustment, number 6, see diagram.
   (b) Re-set external oscillator to 1400 kilocycles, rotate condenser, pick up oscillator signal and adjust antenna trimmer to resonance. For location of this adjustment, number 3, see diagram.
   (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, see top view—part number 124-16.
   (d) Check for tracking and sensitivity at 1000 kilocycles.

NOTE (Series "B" and "C" Only)

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.

Short Wave Band Alignment—(7.6 - 19.0 Megacycles)

1. This band is aligned after the I.F. adjustments have been completed. Set wave changing switch to short wave position, extreme right of its rotation, set dial pointer to 18 megacycles.
   (a) With external oscillator adjusted to 18 megacycles and connected in series with short wave dummy antenna to tan antenna and black ground leads, adjust the oscillator short wave trimmer until generator signal is picked up. For location of this adjustment, number 4, see diagram.
   (b) Adjust short wave antenna trimmer to resonance. For location of this adjustment, number 1, see diagram.
   (c) Re-set external oscillator to 9 megacycles, rotate condenser, move dial pointer to 9 megacycles and check for tracking and sensitivity. Do not bend plates. Note: It is extremely necessary in making all of the above adjustments that the fundamental signal of the oscillator be tuned in and not the image frequency, which will fall below the fundamental.

Intermediate Band Alignment—(2.35 - 7.7 Megacycles)

1. With wave changing switch in center position, and with dial pointer set to 7 megacycles, make the following adjustments:
   (a) With external oscillator set at 7 megacycles and connected in series with short wave dummy antenna, as for short wave adjustments, adjust trimmer of oscillator coil, part number 110-22 until 7 megacycle signal is picked up. For location of this adjustment, number 5, see diagram.
   (b) Adjust antenna trimmer to resonance, adjustment number 2, see diagram.
   (c) Re-set external oscillator to 2.5 megacycles (2500 kilocycles), rotate variable condenser, move pointer, pick up oscillator signal and check for tracking and sensitivity. Note: It is extremely necessary in making all of the above adjustments that the fundamental signal of the oscillator be tuned in and not the image frequency, which will fall below the fundamental.

Service Notes

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

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

OPERATION

CONTROLS.—The three control knobs on the front of the cabinet, in sequence from left to right are (see illustration):

KNOB 1.—*Volume Control and "On-Off" Switch Are Combined.* When turning on, a click will be heard and the dial will light. Wait approximately 45 seconds for the tubes to heat up. Turn knob all the way to the left to turn set off.

KNOB 2.—*Tuning.* The upper end of the pointer covers the standard broadcast band scale, which is marked in kilocycles, the lower end of the pointer covers the intermediate and short wave bands. The lower scale is the short wave band, marked in megacycles, the short heavy lines on this scale are marked in meters. It is at these points that many foreign broadcasters may be heard. The inner scale, marked in megacycles, includes the 49 meter broadcasting channel, which is shown by the short heavy line, it also includes amateurs and police calls.

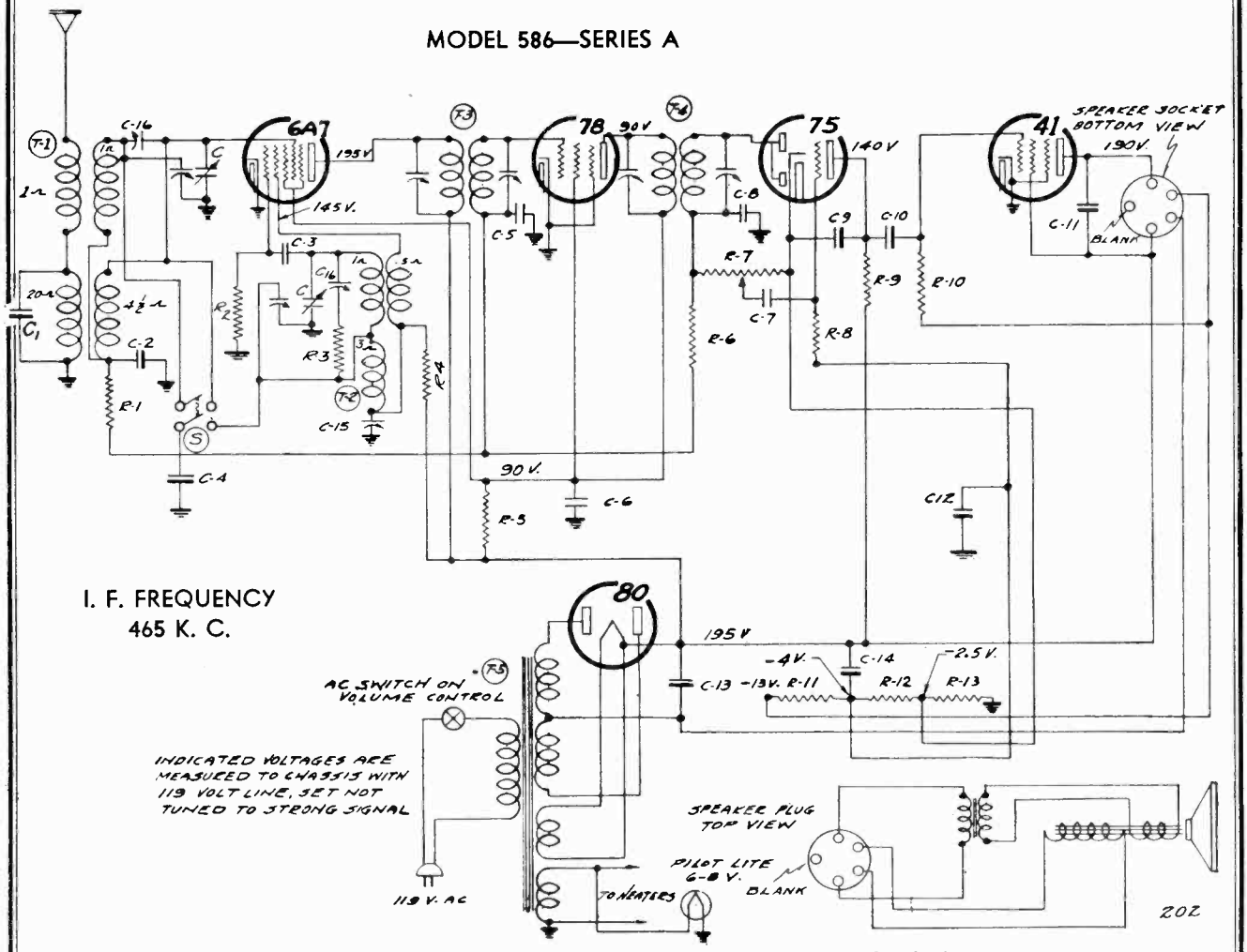
KNOB 3.—*Wave Changing Switch.* The knob is marked with three dots and the cabinet with a pin. When the right hand dot is in line with the pin, the switch is set in the broadcast band position, when center dot is opposite pin, the intermediate band is in position and when the left dot is opposite pin, the short wave band is connected. Switch turned all the way left—broadcast position, center intermediate, all the way right—short wave.

GAMBLE-SKOGMO, INC.

GAMBLE-SKOGMO, INC.

MODEL 586-A
Schematic, Voltage
Socket, Trimmers

MODEL 586—SERIES A



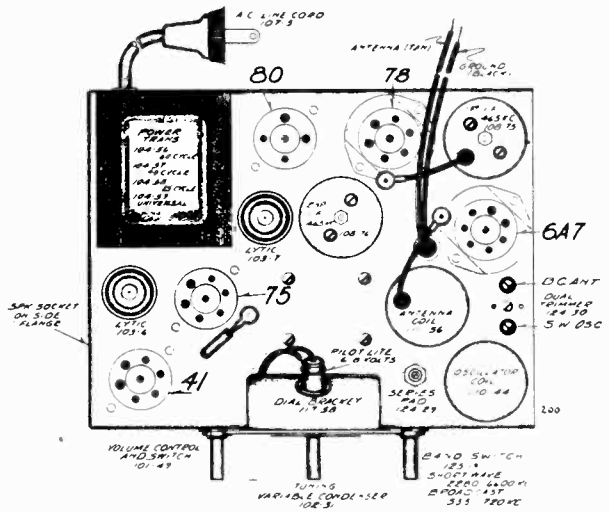


FIG. 1—TOP VIEW

TUNING RANGE—

Standard Broadcast Band
535-1720 Kilocycles.

Short Wave Band
2280-6600 Kilocycles

TUBES:

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

The type and function of each tube is as follows:

1—Type 6A7 Pentagrid Mixer, First Detector-oscillator

1—Type 78 Remote Cut-Off Pentode, I. F. Amplifier (465 K.C.)

1—Type 75 Duplex Diode Triode Second Detector, A.V.C. and First Audio.

1—Type 41 Pentode Output Amplifier.

1—Type 80 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 586 - Series A

5-TUBE

2-Band A. C. Superheterodyne Receiver

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

REPAIR PARTS (Serial No. 6E248475 and up)

Part No.	Schematic Reference	Description	No. Used in Set	List Price Ea.
		CONDENSERS		
100-6	C-12; C-6	.25 x200 Volt Tubular—Without Bracket	2	$0.35
100-9	C-5	.05 x200 Volt Tubular	1	.25
100-11	C-10; C-7	.01 x400 Volt Tubular	2	.25
100-19	C-11	.0005x600 Volt Tubular	1	.25
100-20	C-2	.02 x400 Volt	1	.25
103-6	C-13	8 Mfd. x 350 Volt Electrolytic	1	.85
103-7	C-14	8 Mfd. x 300 Volt Electrolytic	1	.75
129-5	C-9	.0001 Mica—Type O—20%	1	.25
129-12	C-8	.00025 Mica—Type O—20%	1	.25
129-61	C-4	.0017 Mica—Type W—2½%	1	.35
129-62	C-3	.00035 Mica—Type O—10%	1	.25
129-63	C-1	.0004 Mica—Type W—10%	1	.25
		RESISTORS		
100-28	R-11; R-12; R-13	220 Ohm (R-11), 33 Ohm (R-12), 52 Ohm (R-13), Metal Clad Resistor	1	.35
130-12	R-2	50M Ohm-1/3 Watt-20%-20 V.-Carbon	1	.20
130-20	R-9	100M Ohm-1/3 Watt-20%-50 V.-Carbon	1	.20
130-22	R-4	5M Ohm-1/3 Watt-20%-10 V.-Carbon	1	.20
130-77	R-5	10M Ohm-1 Watt-20%-100 V.-Carbon	1	.20
130-100	R-10	150M Ohm-1/3 Watt-20%-50 V.-Carbon	1	.20
130-110	R-6	1 Meg Ohm-1/10 Wt.-10%-100 V.-Carbon	1	.20
130-111	R-1	100M Ohm-1/10 Wt.-20%-50 V.-Carbon	1	.20
130-112	R-3	100 Ohm-1/10 Wt.-20%-10 V.-Carbon	1	.20
130-113	R-8	2 Meg Ohm-1/10 Wt.-20%-100 V.-Carbon	1	.20
		COILS		
108-75	T-3	465 K.C. Input I.F. Coil Assembly Complete with Can	1	1.25
108-76	T-4	465 K.C. Output I.F. Coil Assembly Complete with Can	1	1.25
110-44	T2	Oscillator Coil Assembly Complete with Can	1	1.25
111-56	T-1	Antenna Coil Assembly Complete with Can	1	1.50
		SOCKETS		
121-6		Six Prong Socket—Marked "7S"	1	.10
121-6		Six Prong Socket—Marked "75"	1	.10
121-6		Six Prong Socket—Marked "41"	1	.10
121-7		Seven Prong Socket—Marked "6A7"	1	.10
121-8		Five Prong Socket—Marked "SPKR"	1	.10
121-9		Four Prong Socket—Marked "80"	1	.10
		SPEAKER		
114-16		Five Inch Dynamic Speaker	1	4.50
		TRANSFORMERS		
104-56	T-5	60 Cycle—110 Volt Power Transformer	1	2.75
104-57		40 Cycle—110 Volt Power Transformer		3.50
104-58		25 Cycle—110 Volt Power Transformer		3.75
104-59		40 Cycle Primary—Universal Power Transformer		4.00
		MISCELLANEOUS		
101-49	R-7	Volume Control & A.C. Switch (1 Meg Ohm)	1	1.00
102-31	C	Two Gang Variable Condenser	1	2.25
107-5		Line Cord & Plug	1	.50
112-15		Dial Crystal Only—Less Escutcheon	1	.12
112-13a		Bakelite Escutcheon Complete with Crystal	1	.35
112-156		Pilot Light Assembly	1	.10
112-150		Dial Scale	1	.29
112-160		Dial Pointer Complete with Screw	1	.05
115-22		Tube Shield	2	.15
116-13		6-8 Volt, T-3¼ Pilot Light Bulb	1	.10
117-58		Dial Housing	1	.20
117-50		Pointer Stud	1	.03
117-49		Pointer Bushing Assembly	1	.15
117-91		Drive Pulley	1	.10
120-7		Belt Tension Spring	1	.03
124-20	C-15	Type TU5 Series Pad	1	.35
124-30	C-16	Dual Ceramic Padder	1	.30
125-19	S	Band Switch	1	.40
131-2		Bakelite Knob	3	.10
131-43		Cinch Button for Fastening Dial Scale	5	.03
131-49		Drive Belt	1	.03
134-9		Compression Spring	1	.01

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 41 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. 108-76 Output I.F. Transformer
Part No. 108-75 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 78 tube, and adjust the output I.F. transformer (No. 108-76) to resonance.

   (b) With "Dummy 1" still connected, move oscillator output clip from grid of 78 to grid cap to 6A7 and adjust input I.F. transformer (No. 108-75) to resonance.

   (c) With oscillator still connected to 6A7, readjust output I.F. transformer (108-76) if necessary.

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.

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.

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 6A7 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 6A7 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 6A7 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).

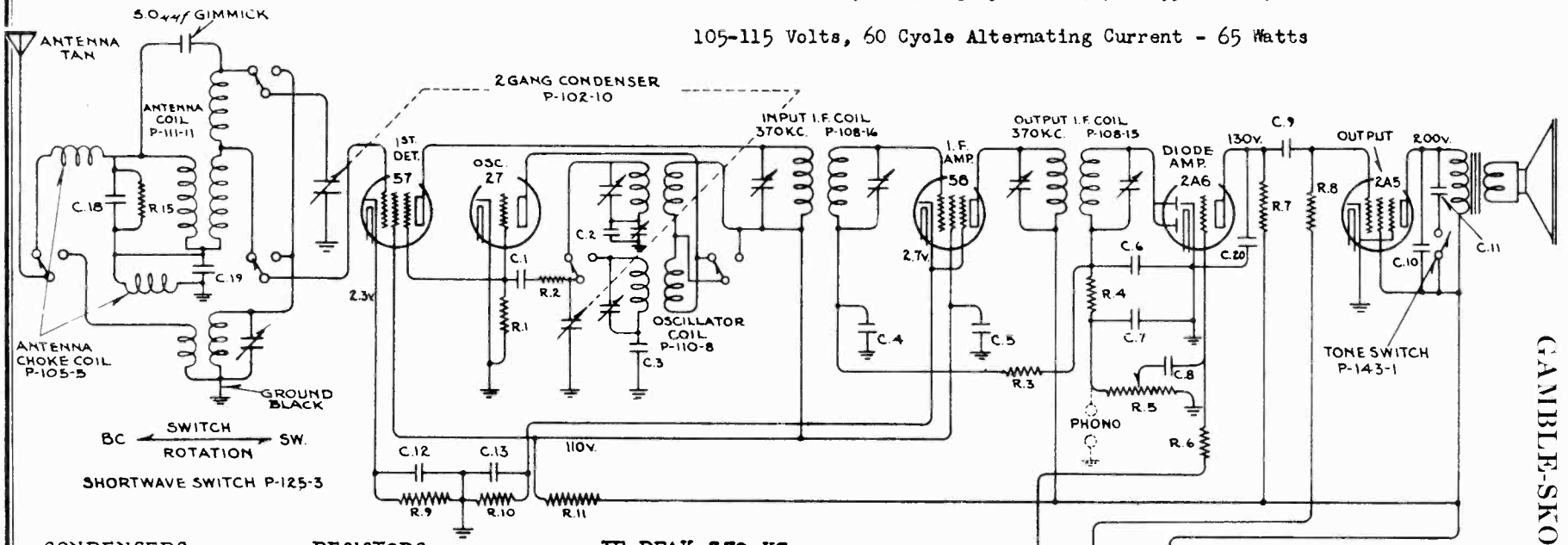
   (c) Repeat adjustments "a" and "b" until sensitivity is at its maximum.

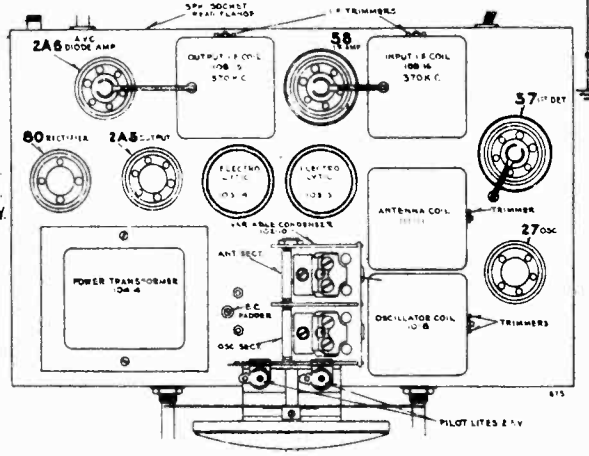
GAMBLE-SKOGMO, INC.

MODEL 675
Schematic, Socket Trimmers, Voltage

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

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





CONDENSERS		RESISTORS	
Nº	VALUE	Nº	VALUE
C.1 :-	50 MICA	R.1 :-	50M. 1/3W.
C.2 :-	490 MICA	R.2 :-	50 1/3W.
C.3 :-	5M MICA	R.3 :-	500M 1/3W.
C.4 :-	.05 X 200V.	R.4 :-	50M 1/3W.
C.5 :-	.05 X 400V.	R.5 :-	500M VOLUME CONTROL P-101-11
C.6 :-	100 MICA	R.6 :-	500M 1/3W.
C.7 :-	100 MICA	R.7 :-	250M 1/3W.
C.8 :-	.05 X 200V.	R.8 :-	250M 1/3W.
C.9 :-	.05 X 400V.	R.9 :-	1000
C.10 :-	.003 X 400V.	R.10 :-	275
C.11 :-	.02 X 400V.	R.11 :-	13M
C.12 :-	.1 X 200V.	R.12 :-	25M 1/3W
C.13 :-	.1 X 200V.	R.13 :-	250M 1/3W.
C.14 :-	.25 X 200V.	R.14 :-	750M 1/3W.
C.15 :-	.25 X 200V	R.15 :-	10M 1/3W.
C.16 :-	18 MFD. 350V. P-103-3		
C.17 :-	16 MFD 400V. P-103-4		
C.18 :-	120 μμf.		
C.19 :-	.01 μμf.	C.20 :-	.0005 MICA.

NOTE :-
CONDENSERS C.10, C.11 IN DUAL UNIT.
" C.14, C.15 " " "
" C.13, C.4 " " "
RESISTORS R.9, R.10, R.11 IN ONE UNIT P-106-13
NUMBERS PREFIXED BY LETTER "P" ARE PART NUMBERS.

34265

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

MODEL 675
Alignment
Notes

GAMBLE-SKOGMO, INC.

SERVICE NOTES

Voltages taken from different points of the circuit are measured with a voltmeter having a resistance of 1000 ohms per volt and are made between the points indicated and the chassis pan. These voltages are indicated on the 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.

ALIGNMENT:

No aligning adjustments should be made until the set has been thoroughly checked for all other possible causes of trouble, such as poor installations, low line voltages, defective tubes, condensers and resistors.

ALIGNING I.F. TRANSFORMERS:

1. With volume control full on, at the extreme right of its rotation, and with wave selector switch in the broadcast position, extreme left of its rotation, and with variable condenser at its minimum capacity position, extreme left of its rotation, plates entirely out of mesh, adjust the I.F. transformers (parts number 108-15 and 108-16) in the following manner:
   (a) Connect an external oscillator which has been adjusted to 370 kilocycles, in series with a .1 mfd. condenser to the control grid cap of the type 57 first detector tube (see diagram and chassis).
   (b) Adjust trimming condensers of both I.F. transformers (Parts number 108-15 and 108-16) to resonance. Use as a resonance indicator an output meter connected across the primary of the speaker input transformer or by means of an adapter between plate and screen terminals of type 2A5 output tube. Maximum deflection of the meter indicates resonance. Care should be taken to use only enough signal to give a readily readable output.
   Note: The two adjustments on each transformer are accessible through holes in the transformer cans from the back of the chassis.

BROADCAST BAND ALIGNMENT:

1. Shift frequency of external oscillator to 535 kilocycles and connect in series with a 200 mmfd. condenser to the tan antenna wire and the black ground wire.
   (a) Set the variable condenser in its maximum capacity position, extreme right of its rotation.
   (b) Adjust the broadcast oscillator series trimmer to resonance with oscillator. This trimmer is located between the gang condenser and the power transformer (see top view).
2. Shift frequency of external oscillator to 1712 kilocycles and set variable condenser in its minimum capacity position, extreme left of its rotation, plates entirely out of mesh.
   (a) Adjust the broadcast oscillator shunt trimmer to resonance. This adjustment is the top adjustment in the oscillator coil can, part number 110-8.

SHORT WAVE BAND ALIGNMENT:

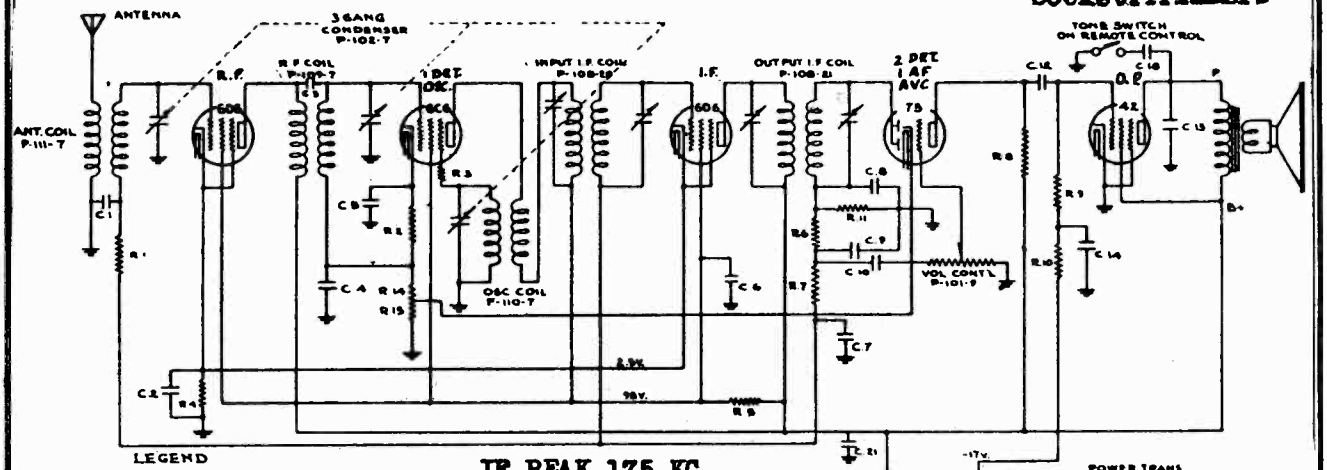
1. Set the wave changing switch in the short wave position, extreme right of its rotation, and change external oscillator frequency to 15 megacycles.
   (a) Adjust variable condenser with selector knob so that pointer is opposite the 15 megacycle calibration on the dial.
   (b) Adjust the short wave oscillator shunt trimmer to resonance with the signal (use extreme care and make certain that you do not adjust to resonance with the image instead of the signal). This trimmer is the bottom trimmer (closest to the chassis) on the oscillator coil, part number 110-8, and is accessible from the side of the chassis.
   (c) Adjust the short wave antenna trimmer to resonance (single trimmer in antenna can, part number 111-11, accessible from the side of the chassis, between type 27 and 57 tubes).

NOTES:

Should the planetary vernier dial drive mechanism fail to function properly, it will probably be found to be due to a cracked or broken compression spring. This drive may be dis-assembled by removing the two screws which fasten it to the dial bracket. The part number of the compression spring is 112-31. All of the other dial parts are hardened and should cause no trouble.

GAMBLE-SKOGMO, INC.

MODEL 670-A
Schematic, Voltage
Socket. Trimmers

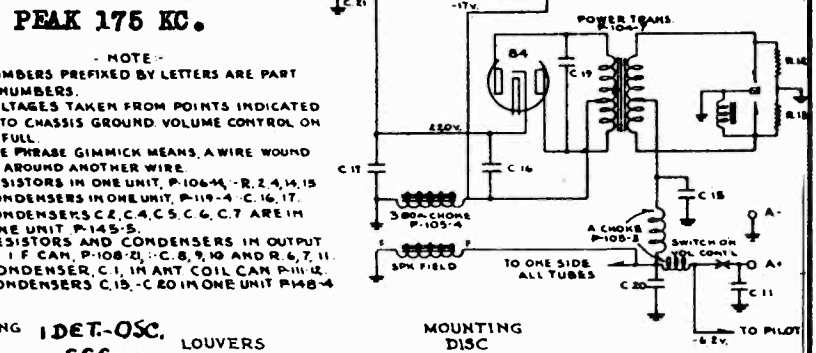


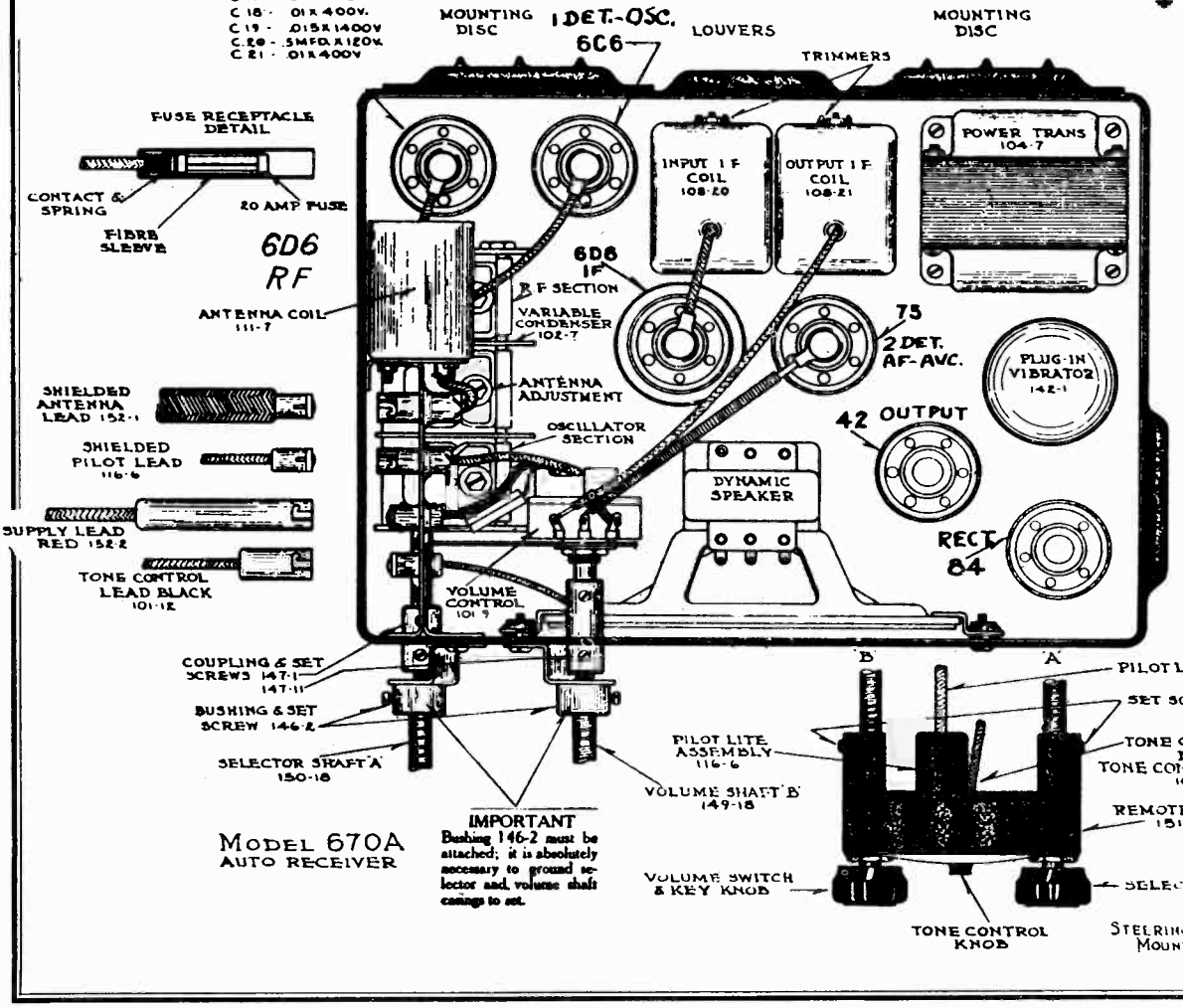
RESISTORS		CONDENSERS	
Nº	VALUE	Nº	VALUE
R 1 -	250M ½W	C 1 -	.05 X 200V.
R 2 -	450Ω	C 2 -	1 X 200V.
R 3 -	1500Ω	C 3 -	11.5 mmf GIMMICK
R 4 -	150Ω	C 4 -	.05 X 200V.
R 5 -	25M 1W.	C 5 -	.05 X 200V.
R 6 -	50M ½W	C 6 -	1 X 200V.
R 7 -	250M ½W.	C 7 -	1 X 200V.
R 8 -	250M ½W	C 8 -	.0005 MICA
R 9 -	200M ½W	C 9 -	.0005 MICA
R 10 -	300M ½W	C 10 -	.01 X 400V.
R 11 -	250M ½W.	C 11 -	.002 MICA.
R 12 -	100Ω	C 12 -	.01 X 400V.
R 13 -	100Ω	C 13 -	.003 X 600V.
R 14 -	5M	C 14 -	1 X 200V.
VAR RESISTOR (Vol. cont'l)	500M	C 15 -	.5 MFD. X 120V.
R 15 -	200Ω	C 16 -	8 MFD. X 350V.
		C 17 -	8 MFD. X 350V.
		C 18 -	.01 X 400V.
		C 19 -	.015 X 1400V
		C 20 -	.5 MFD. X 120V.
		C 21 -	.01 X 400V

IF PEAK 175 KC.

- NOTE -

NUMBERS PREFIXED BY LETTERS ARE PART NUMBERS.
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND. VOLUME CONTROL ON FULL.
THE PHRASE GIMMICK MEANS, A WIRE WOUND AROUND ANOTHER WIRE.
RESISTORS IN ONE UNIT, P-106-14 - R. 2, 4, 14, 15
CONDENSERS IN ONE UNIT, P-119-4 - C. 16, 17.
CONDENSERS C.2, C.4, C.5, C.6, C.7 ARE IN ONE UNIT P-145-5.
RESISTORS AND CONDENSERS IN OUTPUT I.F. CAN, P-108-21 - C. 8, 9, 10 AND R. 6, 7, 11.
CONDENSER, C. 1, IN ANT. COIL CAN P-111-12.
CONDENSERS C.19, - C.20 IN ONE UNIT P-148-4





MODEL 670A
AUTO RECEIVER

IMPORTANT
Bushing 146-2 must be attached; it is absolutely necessary to ground selector and volume shaft casings to set.

MODEL 670-A
Alignment
Installation Data

GAMBLE-SKOGMO, INC.

BALANCING SET TO ANTENNA:

When this set has been installed and is ready for operation it may be found necessary (depending on antenna) to balance set to this antenna. This is accomplished as follows:

With the receiver tuned to a very weak station, about 130 to 140 (1300 to 1400 kilocycles) on the dial, adjust the antenna trimmer with a screw driver until maximum volume is attained. To reach the antenna trimmer remove the plug button from the top of the case.

I. F. ALIGNMENT:

1. With variable condenser at its maximum capacity position and with volume control full on, connect in series with a .1 mfd. condenser, an oscillator set at 175 kilocycles to the grid cap of the 6C6 tube.

2. Adjust trimming condensers of both input and output I. F. transformers, parts number 108-20 and 108-21 (see top view of chassis) to resonance with an oscillator, as indicated on an output meter connected across the primary terminals of the speaker input transformer or between the plate and screen terminals of the type 42 output tube. The connection to the tube can be made by means of an adapter. Maximum deflection on the output meter indicates resonance.

Note: Each I. F. transformer has two adjustments, both of these adjustments on both transformers are accessible through holes located in the back of the case between the two mounting plates and directly under the louvres.

R. F. ALIGNMENT:

1. Attach oscillator connected in series with a 200 mmfd. condenser to the antenna lead and with the variable condenser at its minimum capacity position (extreme right of its rotation) and with an oscillator set at 1550 kilocycles, adjust condenser trimmer of oscillator section (Front shaft end) to resonance.

2. Re-set oscillator to 1400 kilocycles, rotate variable condenser to pick up signal, adjust antenna (center section) and R. F. (rear section) trimmers to resonance.

3. Check alignment at 1500-1000-800-600-530 kilocycles by setting oscillator to these frequencies and picking up signal by rotating condenser.

4. Bend slotted plates of antenna and R. F. sections only if necessary. UNDER NO CIRCUMSTANCES BEND PLATES OF OSCILLATOR SECTION.

NOTES:

Voltages from chassis to different points are indicated on schematic circuit diagram, and should be measured with a voltmeter having a resistance of 1000 ohms per volt.

Failure to operate, noisy or weak reception, may be due to defective tubes or poor contact between cap on top of tube and grid clip.

Tubes may be checked by replacing with another tube which is known to be good.

If fuse blows out frequently, and insulating sleeve has been properly placed over fuse, the trouble probably is in the vibrator and vibrator should be replaced.

NEVER ATTEMPT TO ADJUST VIBRATOR POINTS.

Case rattles may be due to one or more of the following:

Loose screws in top or bottom covers. Loose elements in tubes. Loose tube shield. Loose R. F. coil shield. Loose grill cloth.

RECEIVER INSTALLATION:

Determine most satisfactory or desirable mounting position. In most cases it will be found that the receiver can be mounted on the car bulk head, above and to the right of the steering post.

Use the cardboard template which is the same size as set and mark location for two mounting bolts, if mounted on the long side and one bolt if on the short side.

Then drill two (2) one-half inch (½") holes, making certain that the paint around the hole on the engine side of fire wall or bulk head is scraped clean to insure a good ground connection between receiver and the frame of the car. Assemble brackets number 146-2 to case with self-tapping screws.

Insert bolts through dash, assemble plain, lockwashers and nuts on engine side, then hang receiver over bolt heads and tighten nuts securely.

Mount the remote control unit on steering column by means of mounting bracket or attach to iustrument panel or under dash (see illustration).

Two flexible shafts are furnished, one with a slotted fitting on one end, which is the volume control shaft (number 149-18), the other is the selector shaft, with key fitting at one end (number 150-18).

Make certain that the outer casings of flexible shafts go into remote control bushings for approximately five-sixteenths of an inch and tighten set screws to secure cables. If cables are pushed too far into remote control head, shafts will not turn freely. Always try to install drive shafts in as straight a line as possible from remote control to set. AVOID SHARP BENDS IN CABLES.

IMPORTANT—READ CAREFULLY:

We are prepared to exchange, without charge, our standard number 149-18 and 150-18, eighteen inch cables for twenty-four inch cables, number 149-24 and 150-24. You will find that 99% of the installations can be made with the standard eighteen inch cables, and bear in mind that the shorter the cable, the smoother the drive.

DIAL ADJUSTMENT:

Mount control head to steering column by means of bracket and strap or under dash by means of bracket or to instrument panel (see illustrations). Attach cables as above. Tune set to some station of a known frequency (between 800 and 1200 K.C.), hold selector knob, then with a screw driver adjust the slotted screw on back of the control head, and in that way adjust the dial pointer to the correct frequency setting.

CONNECTIONS TO BATTERY:

The battery cable, number 152-2, (red wire with fuse receptacle at one end and terminal lug at other end) must be connected to battery terminal of ammeter. At the same time connect ammeter capacitor, number 148-3, to battery terminal of ammeter, other end of condenser to any convenient grounded screw on back of instrument panel. Make certain that insulating sleeve is slipped over fuse when fuse is placed in receptacle, before inserting in receiver (see illustration). All bypass leads should be as short as possible.

When connected properly, the discharge due to current drawn by the receiver should not indicate on the ammeter. This is important, since if improperly connected, as shown by the deflection of ammeter, additional motor interference may be encountered.

PILOT LIGHT:

Pilot light assembly, part number 116-6, a shielded cable, plugs into the set and to the rear of the remote control unit (see illustrations).

TONE CONTROL:

The tone control assembly, part number 101-12, attaches to the back of the remote control head by means of a special screw and plugs into the set (see illustrations).

ANTENNA CONNECTION:

The antenna is connected to the receiver by means of the antenna cable, number 152-1. The antenna wire is the single black wire projecting from the end of the cable. Splice this wire to the roof antenna lead and ground the pig-tail shielding as close to the corner post of the car as possible.

OPERATION:

Place key (knob) in lock of left hand control of the remote control unit. After waiting approximately 45 seconds for tubes to heat up, rotate station selector, right hand knob, until a desirable program is heard. De-tuning will very seriously affect the tone quality of this receiver. Tone control knob located between two black knobs (see illustrations) is a BASS and TREBLE switch, it is not a variable tone control. Turning it to the right makes the BASS connection, turning it to the left makes the TREBLE connection. You will note that the BASS position assists materially in reducing interference from static, street car lines and other high pitched disturbances.

MOTOR NOISE SUPPRESSION:

The ignition system of every automobile generates high frequency electrical interference. This high frequency interference arising from the ignition coil, the distributor and the spark plugs must be properly suppressed in order to obtain satisfactory reception. Each car will present more or less an individual problem but there is a definite procedure to follow which holds true in every case.

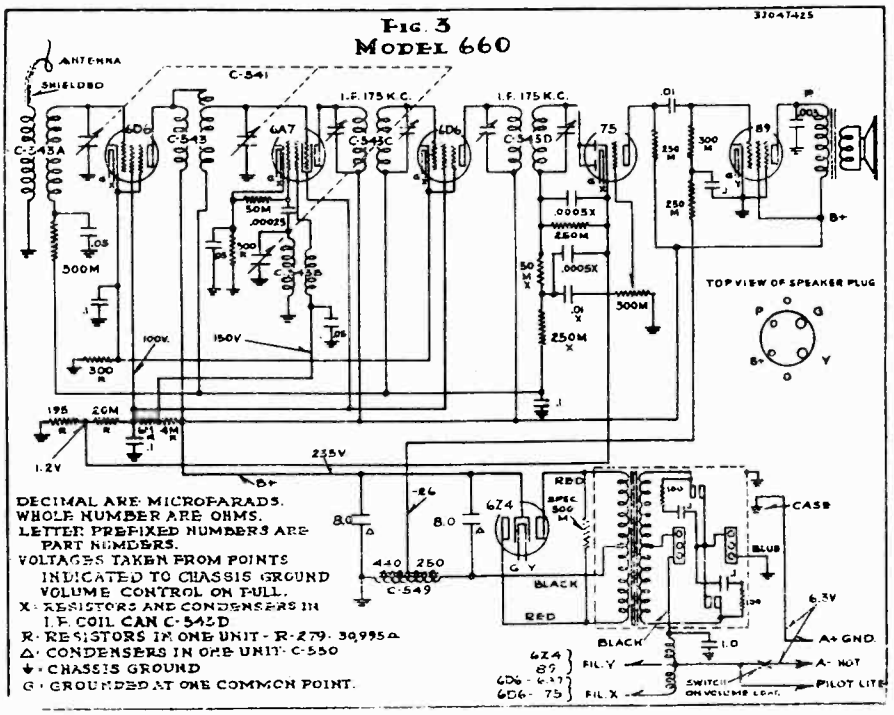
This first essential procedure is to disconnect the high tension leads to the spark plugs and attach the spark plug suppressors (168-1) (for V 8 Fords 168-4) the special distributor type suppressor (168-2) which is inserted in the center contact of the distributor as indicated in the illustration of a typical installation. (NOTE V 8 FORD USES NO DISTRIBUTOR SUPPRESSOR.) For cap type distributor, exchange the standard plug type distributor suppressor (168-2) for a special cable type suppressor (168-3) from your dealer. In some few cases, such as Buicks it is sometimes necessary to use cable type (168-3) suppressors. This type of suppressor is inserted in the leads running from the distributor to the spark plugs and which are concealed underneath the metal plate which covers the spark plugs.

After the spark and distributor suppressors have been properly fastened the next in importance is the generator condenser (148-1), this filters a high pitched whining noise which would otherwise be heard as the motor is accelerated.

It is sometimes necessary in cars where the ignition coil is located under the dash, to use an additional capacitor (148-1) obtainable from your dealer. It must be installed between the battery side of the ignition coil and the frame of the car. Next connect capacitor (148-3) from the battery side of ammeter to frame of car. This is necessary in practically every installation and a good connection to the frame of the car is of utmost importance.

GAMBLE-SKOGMO, INC.

MODEL 660
Schematic, Voltage
Socket, Trimmers
Parts List



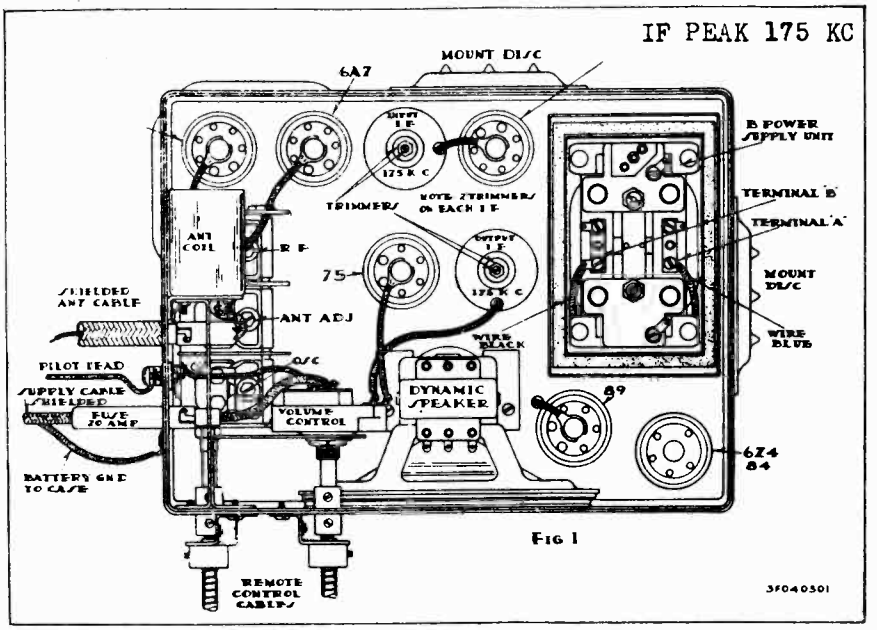


FIG 1

SCHEMATIC CIRCUIT DIAGRAM

MODEL 660 AUTORADIO

See instructions for serial notes etc.

PARTS LIST

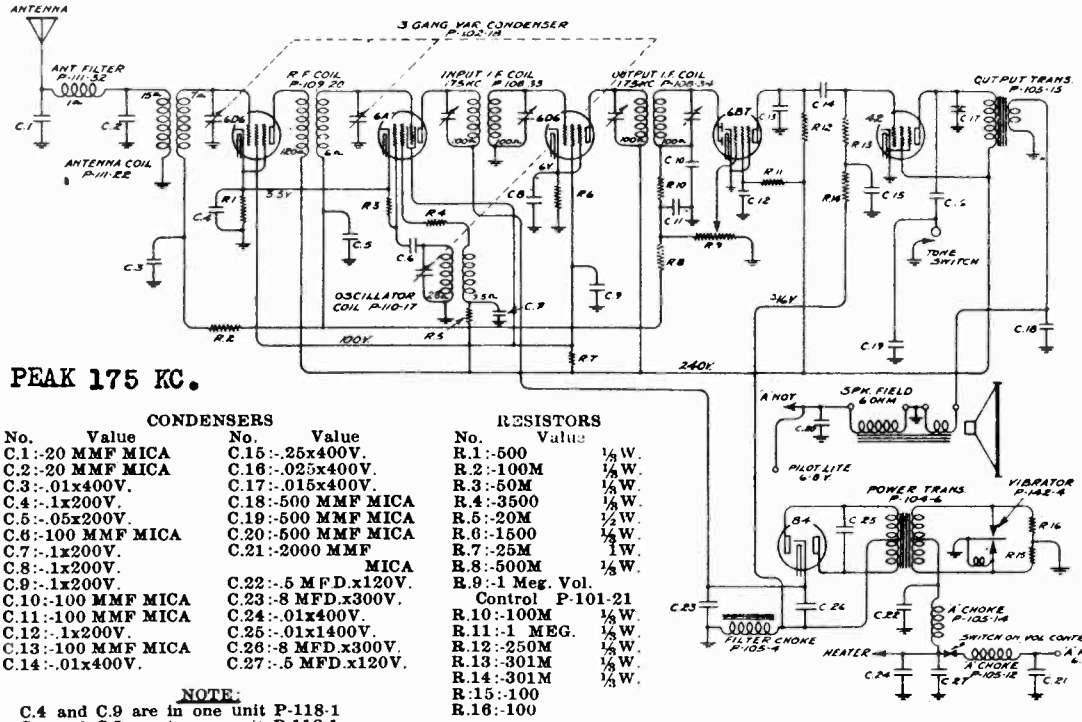
Part No.	Description	List Price Each
A 660	Battery Cable—Plug Type.	1.75
B 104	Cable Shaft Brackets.....	.35
B 660	Antenna Cable—Plug Type	.80
C 106	Shaft Couplings	.35
C 117	"A" Choke—Small	.25
C 118	"A" Choke—Large	.35
C 144	Dual .1-200 Volt Condenser	.35
C 152	.00025 Mica Condenser...	.20
C 155	.0005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

PRICES ARE SUBJECT TO CHANGE

MODEL 680
Schematic, Voltage

GAMBLE-SKOGMO, INC.
MODEL 680

Socket, Trimmers
Alignment, Mounting



IF PEAK 175 KC.

CONDENSERS

No.	Value
C.1	:-20 MMF MICA
C.2	:-20 MMF MICA
C.3	:-.01x400V.
C.4	:-.1x200V.
C.5	:-.05x200V.
C.6	:-100 MMF MICA
C.7	:-.1x200V.
C.8	:-.1x200V.
C.9	:-.1x200V.
C.10	:-100 MMF MICA
C.11	:-100 MMF MICA
C.12	:-.1x200V.
C.13	:-100 MMF MICA
C.14	:-.01x400V.
C.15	:-.25x400V.
C.16	:-.025x400V.
C.17	:-.015x400V.
C.18	:-500 MMF MICA
C.19	:-500 MMF MICA
C.20	:-500 MMF MICA
C.21	:-2000 MMF MICA
C.22	:-.5 MFD.x120V.
C.23	:-8 MFD.x300V.
C.24	:-.01x400V.
C.25	:-.01x1400V.
C.26	:-8 MFD.x300V.
C.27	:-.5 MFD.x120V.

RESISTORS

No.	Value
R.1	:-500 ⅛ W.
R.2	:-100M ⅛ W.
R.3	:-50M ⅛ W.
R.4	:-3500 ⅛ W.
R.5	:-20M ½ W.
R.6	:-1500 ⅛ W.
R.7	:-25M 1 W.
R.8	:-500M ⅛ W.
R.9	:-1 Meg. Vol. Control P-101-21
R.10	:-100M ⅛ W.
R.11	:-1 MEG. ⅛ W.
R.12	:-250M ⅛ W.
R.13	:-301M ⅛ W.
R.14	:-301M ⅛ W.
R.15	:-100
R.16	:-100

NOTE:
C.4 and C.9 are in one unit P-118-1
C.7 and C.8 are in one unit P-118-1
C.26 and C.23 are in one unit P-119-17
R.16 and R.15 are in one unit P-106-6
Numbers prefixed by letter "P" are part numbers.
Voltages taken from points indicated to chassis ground. Vol. control on full, no signal.

Serial No. 60001 and up.

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.

RESONANCE INDICATOR:

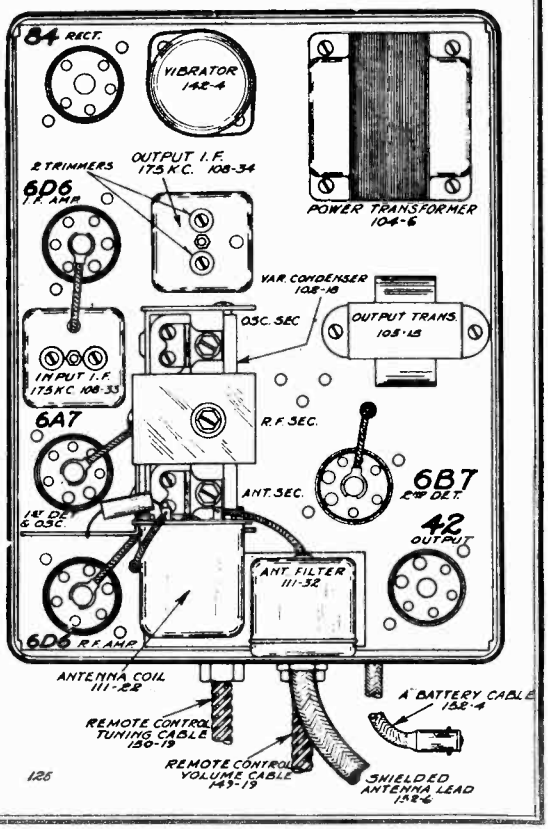
Use as a resonance indicator an output meter connected across the primary of the speaker input transformer, or by means of an adapter between the plate and the screen of the type 42 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output.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

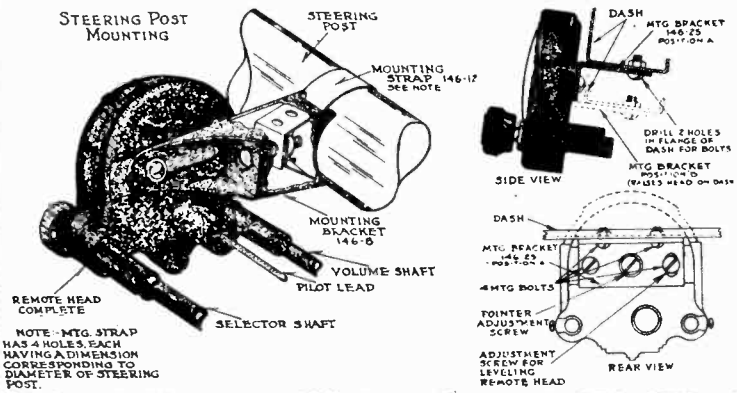
I.F. ALIGNMENT:

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 175 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 (108-33) and output (108-34) 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:

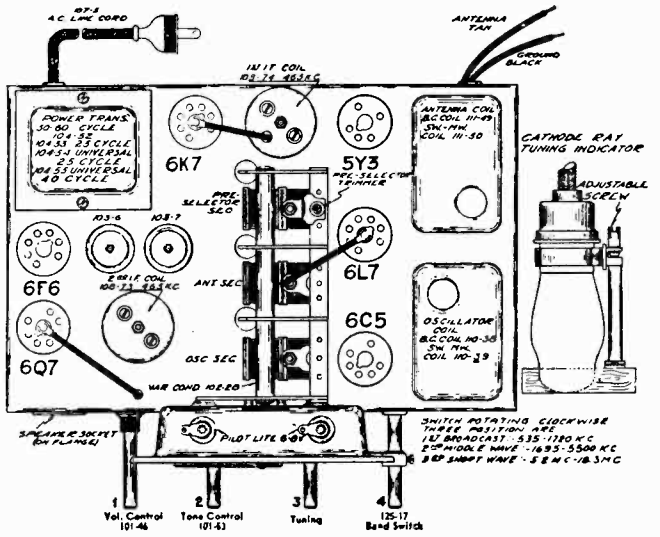
1. With variable condenser in its minimum capacity position, connect test oscillator set at 1550 K.C. and in series with broadcast dummy, to the antenna lead of receiver.
2. Adjust oscillator trimmer of variable condenser to resonance (this adjustment is on the end section of the three gang condenser—see 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.





GAMBLE-SKOGMO, INC.

MODEL 686, A & B
Schematic, Voltage
Socket, Trimmers
Parts List



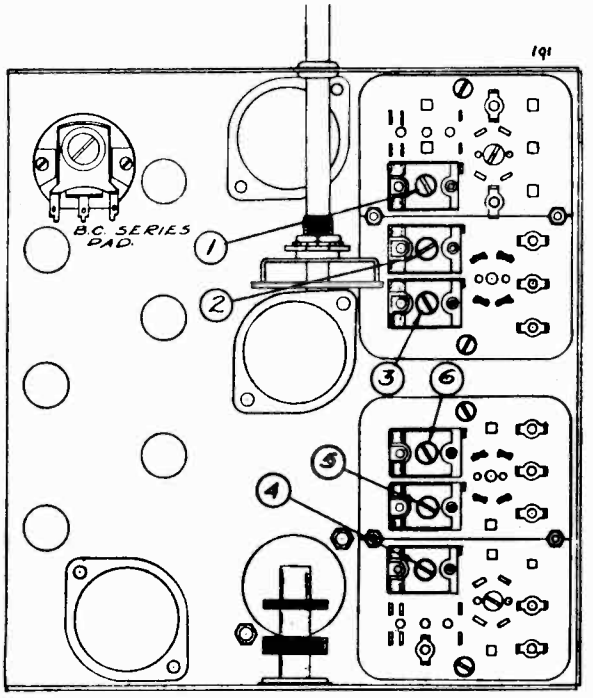
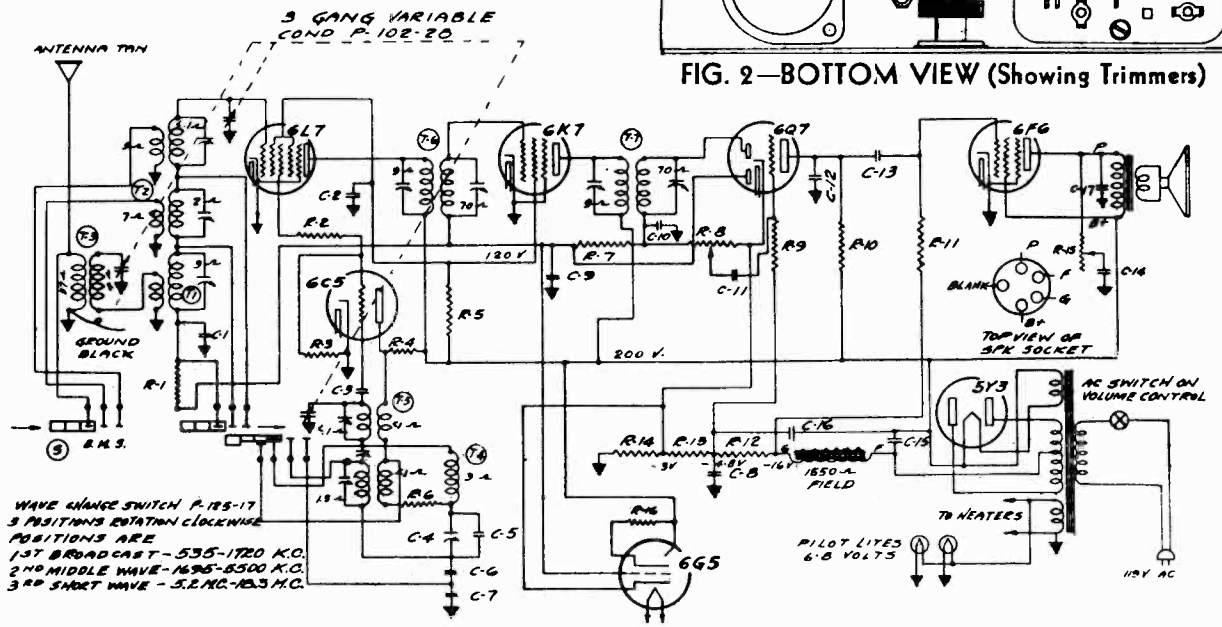


FIG. 2—BOTTOM VIEW (Showing Trimmers)

POWER TRANSFORMER
50-60 CYCLE P-104-52
25 CYCLE P-104-53
UNIVERSAL 25 CYCLE P-104-54
UNIVERSAL 40 CYCLE P-104-55

MODEL 686 SERIES A, B

I. F. FREQUENCY 465 K. C.



No.	Part No.	Description
		RESISTORS
R1	130-20	100M Ohm—⅛ Watt—20%—50 Volt—Carbon
R2	130-105	150 Ohm—⅛ Watt—20%—10 Volt—Carbon
R3	130-12	50M Ohm—⅛ Watt—20%—10 Volt—Carbon
R4	130-104	9M Ohm—1 Watt—20%—100 Volt—Carbon
R5	130-104	9M Ohm—1 Watt—20%—100 Volt—Carbon
R6	130-27	50 Ohm—½ Watt—20%—3 Volt—Carbon
R7	130-19	1 Meg Ohm—⅛ Watt—20%—100 Volt—Carbon
R8	101-46	1 Meg Ohm—Volume Control
R9	130-4	3 Meg Ohm—⅛ Watt—20%—100 Volt—Carbon
R10	130-103	100M Ohm—⅛ Watt—20%—50 Volt—Carbon
R11	130-102	500M Ohm—⅛ Watt—10%—50 Volt—Carbon
R12, R13, R14	106-26	220 Ohm, 32 Ohm, 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	.05 x 200 Volt—25%
C2	100-20	.1 x 200 Volt—25%
C3	129-39	.00005 Mica (MT—0)—20%
C4	124-28	Series Pad (80—225)
C5	129-56	.00055 Mica (MT—0)—10%
C6	129-55	.0034 Mica (MW—W)—2½%
C7	129-54	.003 Mica (MW—W)—2½%
C8	100-20	.1 x 200 Volt—25%
C9	100-22	.05 x 200 Volt—25%
C10	129-12	.00025 Mica (MT—0)—20%
C11	100-11	.01 x 400 Volt—25%
C12	129-2	.0005 Mica (MT—0)—20%
C13	100-11	.01 x 400 Volt—25%
C14	100-27	.025 x 600 Volt—25%
C15	103-6	8 Mfd. x 350 Volt Electrolytic
C16	103-7	8 Mfd. x 300 Volt Electrolytic
C17	100-25	.002 x 600 Volt—20%
		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	108-74	Input I.F.—465 K.C.
T7	108-73	Output I.F.—465 K.C.
S	125-17	Band Switch

Model 686 Series A & B

TUBE COMPLEMENT

The tube complement of the model 686 and model 786 consists of the latest "Metal-Glass" tubes which are interchangeable with metal tubes. They are as follows:

1-Type 6L7 Pentagrid Mixer, First Detector.
1-Type 6C5 Oscillator.
1-Type 6K7 Remote Cut-off Pentode, I.F. Amplifier (465 K.C.).
1-Tvpe 6Q7 Duplex Diode Triode Second Detector, A.V.C. and First Audio.
1-Type 6F6 Pentode Output Amplifier.
1-Type 5Y3 or 5W4 High Vacuum Rectifier. (Note: 5Y3 available in "Metal-Glass" only.)
1-Type 6G5 Cathode-Ray Tuning Indicator. (Note: 6G5 available in all glass only, and only with model 786.)

The tube complement of the model 685 is as follows:

1-Type 6L7 Pentagrid Mixer, First Detector.
1-Type 6C5 Oscillator.
1-Type 6K7G 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 6F6G Pentode Output Amplifier.
1-Type 5Y3 High Vacuum Rectifier.

ALIGNING INSTRUCTIONS:

CAUTION:—No aligning adjustments should be attempted without first thoroughly checking over all other possible causes of trouble, such as poor installations, open or grounded antenna systems, low line voltages, defective tubes, condensers and resistors. In order to properly align this chassis, an oscillator (generator) is absolutely necessary. No aligning adjustments should be attempted with the chassis in the cabinet. Remove the knobs and the four bolts which are used to fasten the chassis.

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

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.

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 6F6 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. 108-73 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.

ALIGNMENT PROCEDURE

The following adjustments to be made after the I.F.'s have been aligned as explained above.

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.

LIST OF REPAIR PARTS

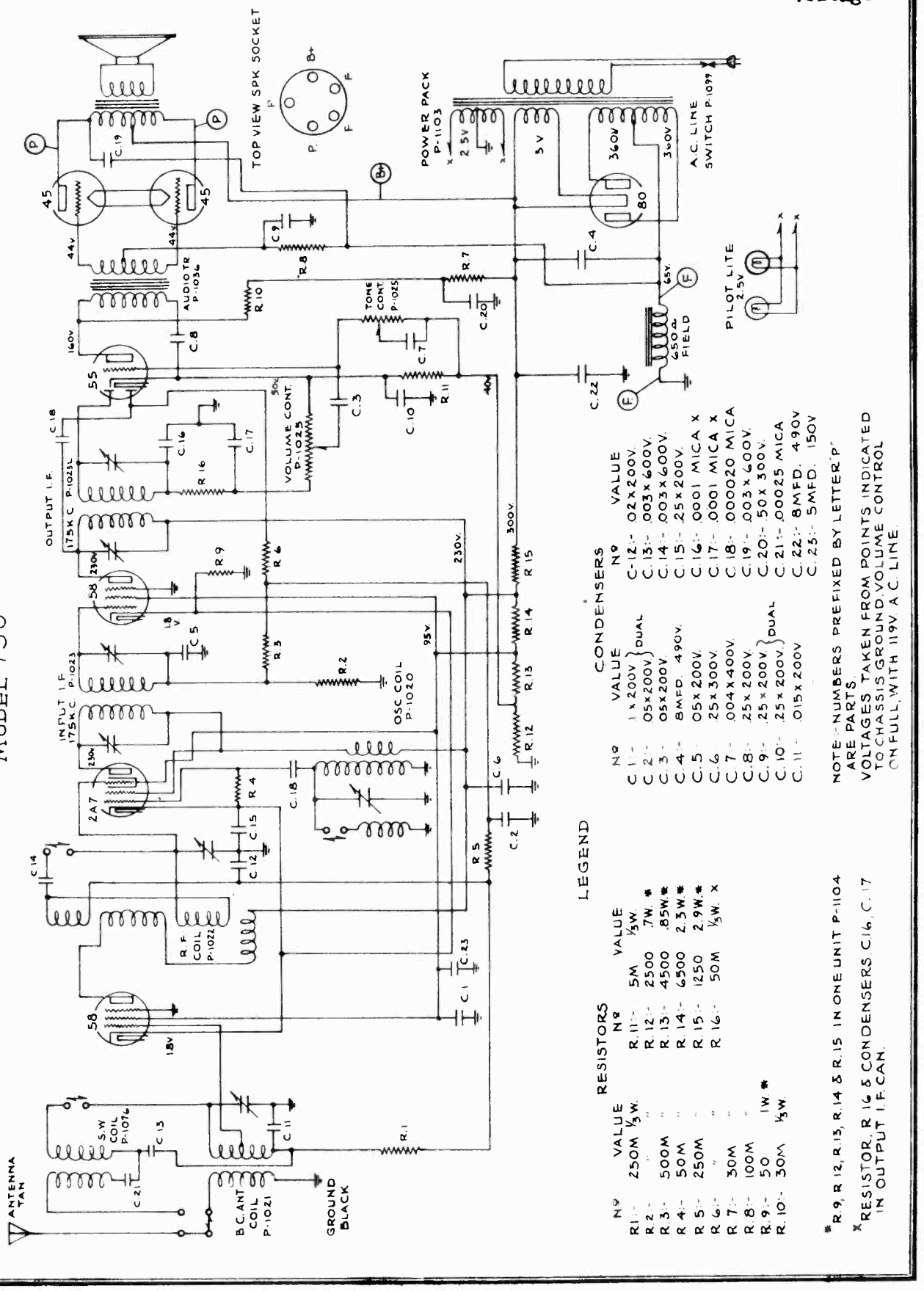
(Serial No. 6E249476 and up)

Part No.	Description	Circuit Diagram Reference	List Price
	CONDENSERS		
100-11	.01 x 400 Volt Tubular	C11-C13	$0.25
100-20	.1 x 200 Volt Tubular	C2-C8	.25
100-22	.05 x 200 Volt Tubular	C1-C9	.25
100-25	.002 x 600 Volt Tubular	C17	.25
100-27	.025 x 600 Volt Tubular	C14	.25
103-6	8 Mfd. x 350 Volt Electrolytic	C15	.85
103-7	8 Mfd. x 300 Volt Electrolytic	C16	.75
129-2	.0005 Mica—Type MT—20%	C12	.25
129-12	.00025 Mica—Type MT—20%	C10	.25
129-39	.00005 Mica—Type MT—20%	C3	.25
129-54	.003 Mica—Type MW—2½%	C7	.85
129-55	.0034 Mica—Type MW—2½%	C6	.85
129-56	.00055 Mica—Type MT—10%	C5	.25
	RESISTORS		
106-26	Metal Clad Resistor	R12-13-14	$0.35
130-4	8 Meg Ohm—½ Watt—20%—130 Volt Carbon	R8	.20
130-12	50M Ohm—½ Watt—20%— 20 Volt Carbon	R3	.20
130-19	1 Meg Ohm—½ Watt—20%—100 Volt Carbon	R7	.20
130-20	100 M Ohm—½ Watt—20%— 50 Volt Carbon	R1	.20
130-27	60 Ohm—½ Watt—20%— 3 Volt Carbon	R6	.20
130-102	500 M Ohm—½ Watt—10%— 50 Volt Carbon	R11	.20
130-103	100 M Ohm—½ Watt—10%— 50 Volt Carbon	R10	.20
130-104	9M Ohm— 1 Watt—20%—100 Volt Carbon	R4-R5	.20
130-105	150 Ohm—½ Watt—20%— 10 Volt Carbon	R2	.20
	COILS		
108-73	Output I.F. Coil Assem. Comp. with Can.	T7	$1.50
108-74	Input I.F. Coil Assem. Comp. with Can.	T6	1.50
110-38	Broadcast Oscillator Coil Assem. Complete with Can.	T4	.50
110-39	Mid Wave and Short Wave Oscillator Assem. less Can.	T5	1.50
111-49	Broadcast Antenna Coil Assembly Complete with Can.	T1	.75
111-50	Mid Wave and Short Wave Antenna Coil Assem. less Can.	T2	1.50
111-51	Broadcast Preselector Coil Assembly	T3	.75
	SOCKETS		
121-8	Five Prong Socket—Marked "SPKR"		$0.10
121-12	Seven Prong Socket—Marked "6K7"		.10
121-14	Seven Prong Socket—Marked "6F6"		.10
121-15	Five Prong Socket—Marked "5Y3"		.10
121-17	Six Prong Socket—Marked "6C5"		.10
121-18	Seven Prong Socket—Marked "6L7"		.10
121-26	Seven Prong Socket—Marked "6Q7"		.10
	SPEAKERS		
114-15	Six Inch Dynamic Speaker		$5.00
114-16	Five Inch Dynamic Speaker		4.50
	TRANSFORMERS		
104-52	50/60 Cycle Power Transformer		$3.50
104-53	25 Cycle Power Transformer		4.50
104-54	Universal Transformer 25 Cycle Primary		5.00
104-55	Universal Transformer 40 Cycle Primary		5.00
	MISCELLANEOUS		
101-46	Volume Control and Switch	R8	$1.25
101-48	Tone Control Model 686 Series A	R15	.50
101-53	Tone Control, Model 686 Series B, and Model 786	R15	.65
102-28	Three Gang Variable Condenser		4.00
107-5	Line Cord and Plug		.50
115-35	Antenna, Oscillator, Shield		.15
124-28	J-S Series Pad 3 Pl.	C4	.35
125-17	Band Switch	S	$0.85
128-45	"Tone" Knob with Spring		.15
128-44	"Volume" Knob with Spring		.15
128-46	"Band Switch" Knob with Spring		.15
128-47	"Tuning" Knob with Spring		.15

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

GAMBLE-SKOGMO, INC.

MODEL 750
Schematic
Voltage



LEGEND

RESISTORS

No	VALUE	
R.1 -	250M	1/3W.
R.2 -	"	"
R.3 -	500M	"
R.4 -	50M	"
R.5 -	250M	"
R.6 -	"	"
R.7 -	30M	"
R.8 -	100M	"
R.9 -	50	1W.*
R.10 -	30M	1/3W
R.11 -	5M	1/3W.
R.12 -	2500	.7W.*
R.13 -	4500	.85W.*
R.14 -	4500	2.3W.*
R.15 -	1250	2.9W.*
R.16 -	50M	1/3W. x

CONDENSERS

No	VALUE	
C.1 -	1 x 200V	} DUAL
C.2 -	.05x200V	
C.3 -	.05x200V	
C.4 -	8MFD. 490V.	
C.5 -	.05x200V.	
C.6 -	.25x300V.	
C.7 -	.004x400V	
C.8 -	.25x200V.	
C.9 -	.25x200V	} DUAL
C.10 -	.25x200V	
C.11 -	.015x200V	
C-12 -	.02x200V.	
C.13 -	.003x600V.	
C.14 -	.003x600V.	
C.15 -	.25x200V.	
C.16 -	.0001 MICA	x
C.17 -	.0001 MICA	x
C.18 -	.000020 MICA	
C.19 -	.003x600V.	
C.20 -	.50x300V.	
C.21 -	.00025 MICA	
C.22 -	8MFD. 490V	
C.23 -	5MFD. 150V	

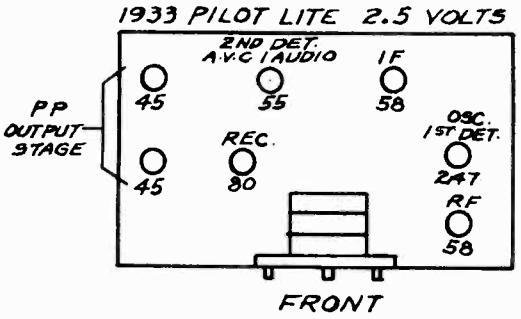
NOTE: NUMBERS PREFIXED BY LETTER "P" ARE PARTS.
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND. VOLUME CONTROL ON FULL, WITH 119V A.C. LINE

*R.9, R.12, R.13, R.14 & R.15 IN ONE UNIT P-1104

xRESISTOR, R.16 & CONDENSERS C.16, C.17 IN OUTPUT I.F. CAN.

MODEL 750
Alignment
Socket

GAMBLE-SKOGMO, INC.



SERVICE MANUAL SEVEN TUBE SUPERHETERODYNE WITH A.V.C. AND SHORT WAVE

105-115 Volts Alternating Current, 50-60 Cycles, 80 Watts. 530-1720 Kilocycles - 1700-4500 Kilocycles.

SERVICE NOTES

Should it be at any time necessary to rebalance this set, the correct proceedure is as follows:

1. Volume and tone controls on full during all alignment.
2. Squelch switch in "no squelch" position (counter-clockwise (left) rotation) during all alignment.
3. Adjust variable squelch control on rear flange of chassis to maximum counter-clockwise (left) position.
4. Set variable condenser in minimum capacity position (plates open) at the start of all aligning.

I.F. ALIGNMENT

The intermediate frequency of model 750 is 175 kilocycles, and is aligned as follows:

1. Connect oscillator (set at 175 kilocycles) to I.F. grid (second 58 tube) and adjust both trimmers of second I.F. transformer (underneath chassis) to resonance (maximum deflection on an output meter connected across the primary of the speaker input transformer).
2. Connect oscillator output to converter grid (2A7 tube) and adjust both trimmers of first I.F. transformer to resonance. Under no conditions touch the trimmers of the second I.F. transformer after adjusting them (see No. 1).

The four trimmers of the two I.F. transformers are all adjusted from the bottom of the chassis (one nut and one screw adjustment on each I.F. transformer trimmer).

BROADCAST BAND ALIGNMENT

Wave changing switch in clockwise (right) position.

1. Connect an oscillator in series with a 200 mmfd. condenser to the Tan (antenna) lead and Black (ground) lead. With the oscillator set at 1720 kilocycles and the variable condenser at its minimum position (extreme right of its rotation), adjust trimmer of oscillator (rear) section to resonance.
2. Change oscillator to 1400 kilocycles, rotate variable to this frequency and adjust R.F. and antenna trimmers (center and front trimmers respectively) to resonance. Do not touch the oscillator trimmer.
3. Check tracking at the following points only: 1200-1000-800-600-534 kilocycles. NOTE: This receiver will be slightly out of track at 534 kilocycles - do not bend plates in an attempt to track it at this frequency. Rotor plates of condensers should not be bent, except if absolutely necessary, and then only on the center and front sections.

SHORT WAVE BAND ALIGNMENT

Wave changing switch in counter-clockwise (left) position.

1. The frequency range of this short wave band is approximately 1700 to 4500 kilocycles.
2. Peak short wave antenna coil to resonance with oscillator set at 1720 kilocycles by slipping primary.
3. Check for sensitivity at the following frequencies only: 1720 and 3700 kilocycles - under no conditions touch trimmers or plates of variable condenser while checking short wave band.

NOTES:

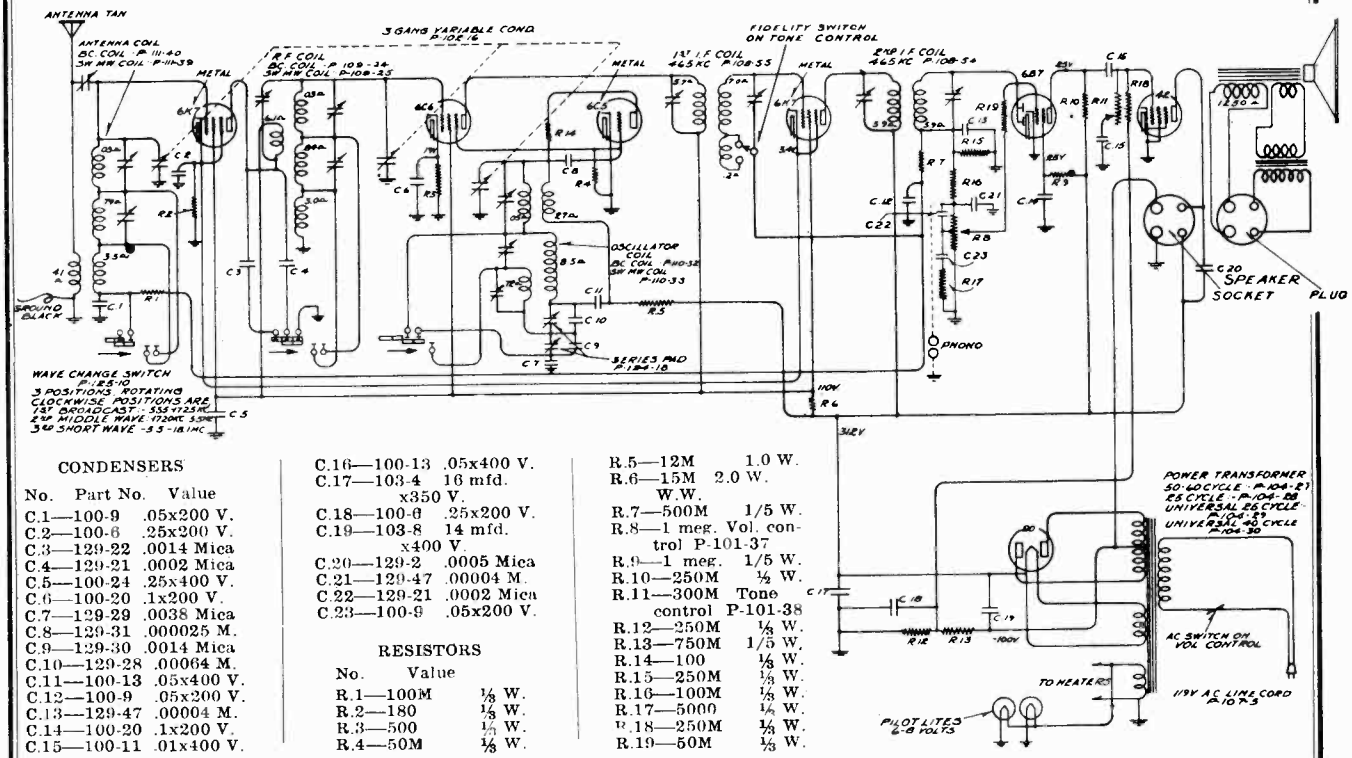
For failure to operate over both bands, check 2A7 tube and connections to and contacts of wave changing switch.

Condenser shaft to which pointer is attached is rotated by means of a celluloid dial attached to the condenser shaft and a bronze friction drive assembly, to which is attached the selector knob. Should this drive ever slip or become rough, it can be adjusted for smooth operation by sliding the bronze washer drive assembly either closer to the variable shaft or farther away from it in the slot in which it is mounted, to insure smooth operation.

GAMBLE-SKOGMO, INC.

MODEL 770
Schematic
Voltage
Socket, Trimmers

—MODEL 770—SERIES A



CONDENSERS

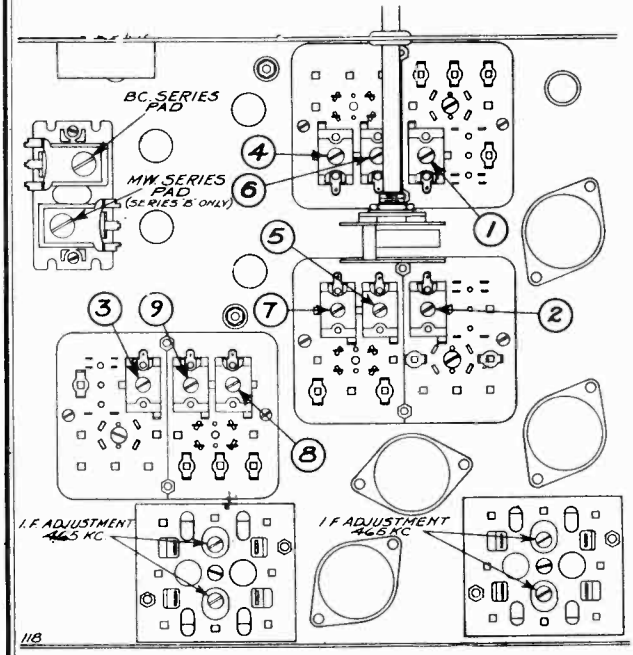
No.	Part No.	Value
C.1	100-9	.05x200 V.
C.2	100-6	.25x200 V.
C.3	129-22	.0014 Mica
C.4	129-21	.0002 Mica
C.5	100-24	.25x400 V.
C.6	100-20	.1x200 V.
C.7	129-29	.0038 Mica
C.8	129-31	.000025 M.
C.9	129-30	.0014 Mica
C.10	129-28	.00064 M.
C.11	100-13	.05x400 V.
C.12	100-9	.05x200 V.
C.13	129-47	.00004 M.
C.14	100-20	.1x200 V.
C.15	100-11	.01x400 V.
C.16	100-13	.05x400 V.
C.17	103-4	16 mfd. x350 V.
C.18	100-6	.25x200 V.
C.19	103-8	14 mfd. x400 V.
C.20	129-2	.0005 Mica
C.21	129-47	.00004 M.
C.22	129-21	.0002 Mica
C.23	100-9	.05x200 V.

RESISTORS

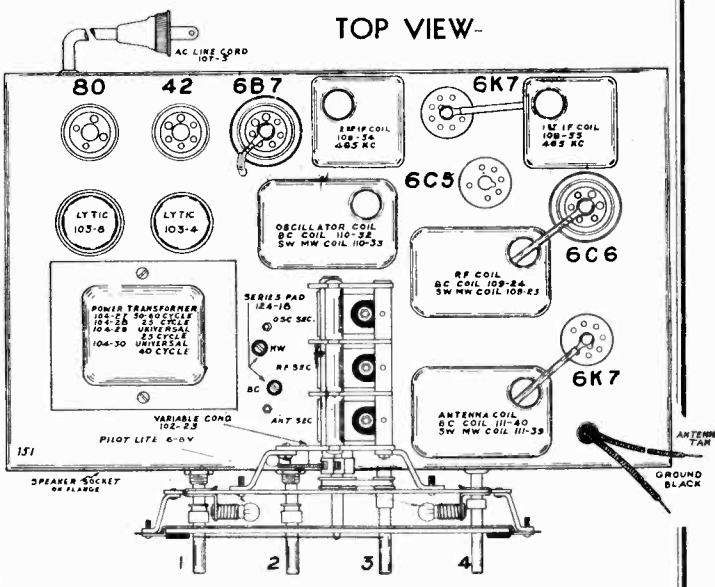
No.	Value	
R.1	100M	1/3 W.
R.2	180	1/3 W.
R.3	500	1/3 W.
R.4	50M	1/3 W.
R.5	12M	1.0 W.
R.6	15M	2.0 W. W.W.
R.7	500M	1/5 W.
R.8	1 meg. Vol. control P-101-37	
R.9	1 meg.	1/5 W.
R.10	250M	1/3 W.
R.11	300M Tone control P-101-38	
R.12	250M	1/3 W.
R.13	750M	1/5 W.
R.14	100	1/3 W.
R.15	250M	1/3 W.
R.16	100M	1/3 W.
R.17	5000	1/3 W.
R.18	250M	1/3 W.
R.19	50M	1/3 W.

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.



TOP VIEW



MODEL 770 - Series A

7-Tube All Wave Superheterodyne with Avc.

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 and B.

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.

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 screen terminals of the type 42 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range 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 properly to 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. 108-54 Output I.F. Transformer
Part No. 108-56 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 "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 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 6C6 and adjust input I.F. transformer to resonance.

   (c) With oscillator still connected to 6C6, 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.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

REPAIR PARTS LIST—

CONDENSERS

100-6	.25 x 200 Volt Tubular Condenser—with Bracket	$0.35
100-9	.05 x 200 Volt Tubular Condenser	.25
100-11	.01 x 400 Volt Tubular Condenser	.25
100-13	.05 x 400 Volt Tubular Condenser	.25
100-20	.1 x 200 Volt Tubular Condenser	.25
100-24	.25 x 400 Volt Tubular Condenser—with Bracket	.35
103-4	16 Mfd. x 350 Volt Electrolytic	.50
103-8	14 Mfd. x 400 Volt Electrolytic	1.35
118-12	.1 - .25 x 200 Volt Dual Tubular	1.35
129-2	.0005 Mica - Type MT - 20%	.50
129-21	.0002 Mica - Type MT - 20%	.25
129-22	.0014 Mica - Type MW - 5%	.25
129-28	.00064 Mica - Type MT - 5%	.25
129-29	.0038 Mica - Type MW - 2½%	.25
129-30	.0014 Mica - Type MW - 20%	.50
129-31	.000025 Mica - Type MT - 15%	.25
129-47	.00004 Mica - Type MT - 30%	.25
		.25

RESISTORS

130-3	500M Ohm - ½ Watt - 20% - 100 Volts - Carbon	.20
130-11	250M Ohm - ½ Watt - 20% - 50 Volts - Carbon	.20
130-19	1 Meg Ohm - ½ Watt - 20% - 100 Volts - Carbon	.20
130-20	100M Ohm - ½ Watt - 20% - 50 Volts - Carbon	.20
130-22	5M Ohm - ½ Watt - 20% - 10 Volts - Carbon	.20
130-37	750M Ohm - ½ Watt - 20% - 50 Volts - Carbon	.20
130-49	12M Ohm - 1 Watt - 20% - 150 Volts - Carbon	.20
130-52	50M Ohm - ½ Watt - 20% - 10 Volts - Carbon	.20
130-53	180 Ohm - ½ Watt - 10% - 10 Volts - Carbon	.20
130-54	500 Ohm - ½ Watt - 20% - 10 Volts - Carbon	.20
130-60	100 Ohm - ½ Watt - 20% - 10 Volts - Carbon	.20
130-61	15M Ohm - 2 Watt - 20% - 180 Volts - Wire Wound	.20
130-62	250M Ohm - ½ Watt - 20% - 50 Volts - Carbon	.40
		.20

COILS

108-54	Output I.F. Coil Assembly Complete - Less Can	1.50
108-55	Input I.F. Coil Assembly Complete - Less Can	2.50
109-24	Broadcast R.F. Coil Assembly Complete	.50
109-25	Mid-Wave & Short Wave R.F. Coil Assembly Complete—Less Can	1.50
110-32	Broadcast Oscillator Coil Assembly Complete—Less Can	.50
110-33	Mid-Wave & Short Wave Oscillator Coil Assembly Complete—Less Can	1.00
111-39	Mid- Wave & Short Wave Antenna Coil Assembly Complete—Less Can	1.00
111-40	Broadcast Antenna Coil Assembly Complete—Less Can	.75

TRANSFORMERS

104-27	50/60 Cycle Power Transformer	4.50
104-28	25 Cycle Power Transformer	7.00
104-29	Universal - 25 Cycle Primary	7.50
104-30	Universal - 40 Cycle Primary	7.00

SOCKETS

121-6	Six Prong Type "6C6"	.10
121-6	Six Prong Type "42"	.10
121-7	Seven Prong Type "6B7"	.10
121-9	Four Prong Type "Spkr"	.10
121-9	Four Prong Type "80"	.10
121-12	Seven Prong Type "6K7"	.10
121-17	Six Prong Type "6C5"	.10

SPEAKERS

114-27	Eight Inch Dynamic Speaker	6.50
114-30	Ten Inch Dynamic Speaker	8.00

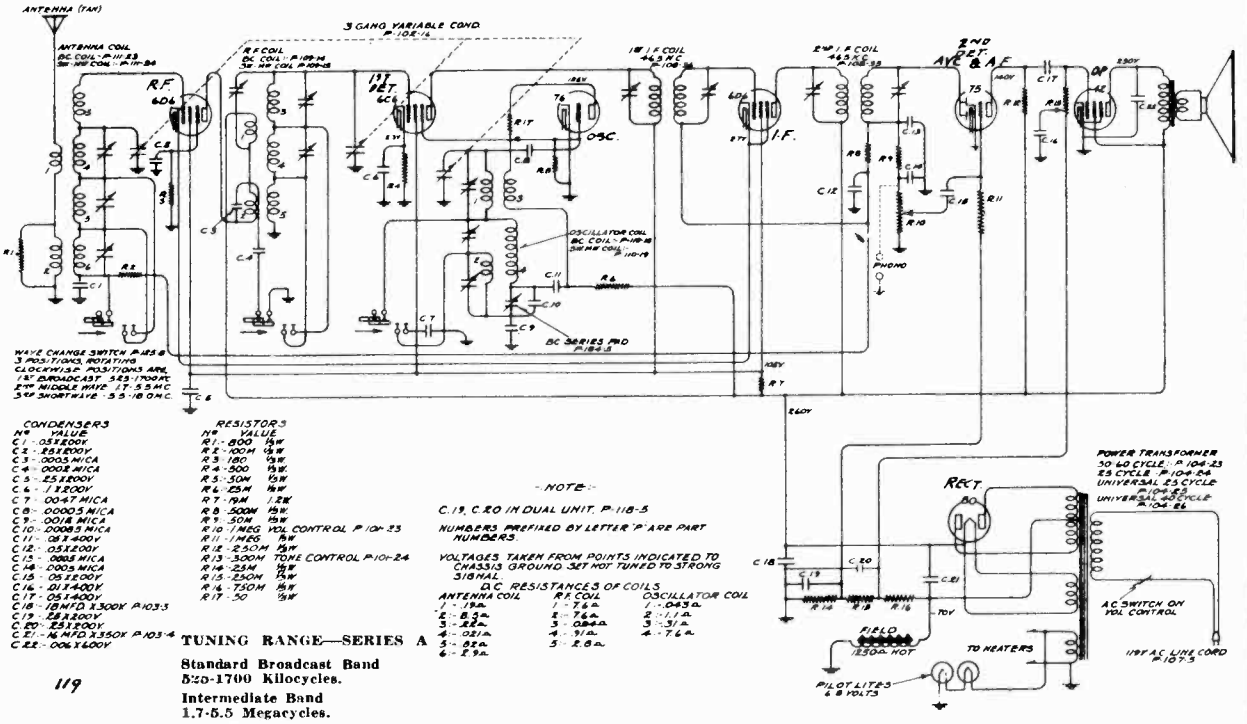
MISCELLANEOUS

101-37	Volume Control and Switch	1.35
101-38	Tone Control and Fidelity Switch	1.35
102-23	Three Gang Variable Condenser	5.00
107-5	Line Cord & Plug	.50
115-22	Tube Shield	.15
115-35	Antenna, Oscillator and R.F. Shield	.15
115-36	I.F. Shield	.15
124-18	J-5-4D Series Dual Pad	.60
125-16	Wave Change Switch	.90
128-15	Small Wood Knob with Spring	.15
128-16	Large Wood Knob with Set Screw	.20
128-17	Large Wood Knob with Spring	.15

GAMBLE-SKOGMO, INC.

MODELS 777C, 777L
Series A & B
Schematics, Voltage

SERIES A



WAVE CHANGE SWITCH P.125-8
3 POSITIONS, ROTATING
CLOCKWISE POSITIONS ARE,
1ST BROADCAST 525-1700 KC
2ND MIDDLE WAVE 1.7-5.5 MC
3RD SHORTWAVE 5.5-18.0 MC

CONDENSERS

No.	VALUE
C1	.05 1200V
C2	.25 1200V
C3	.0005 MICA
C4	.0002 MICA
C5	.25 1200V
C6	.1 1200V
C7	.0047 MICA
C8	.00005 MICA
C9	.0018 MICA
C10	.00005 MICA
C11	.05 400V
C12	.05 1200V
C13	.0002 MICA
C14	.005 MICA
C15	.05 1200V
C16	.01 3400V
C17	.05 1400V
C18	16 MFD. X 300V P.103-3
C19	.25 1200V
C20	.25 1200V
C21	16 MFD. X 350V P.103-4
C22	.006 X 600V

RESISTORS

No.	VALUE
R1	800 1/2W
R2	100M 1/2W
R3	180 1/2W
R4	500 1/2W
R5	50M 1/2W
R6	25M 1/2W
R7	1M 1.2W
R8	500M 1/2W
R9	50M 1/2W
R10	1 MEG VOL CONTROL P.101-23
R11	1 MEG 1W
R12	2.5 OM 1/2W
R13	300M TONE CONTROL P.101-24
R14	25M 1/2W
R15	250M 1/2W
R16	750M 1/2W
R17	50 1/2W

- NOTE -
C.19, C.20 IN DUAL UNIT P.118-5
NUMBERS PREFIXED BY LETTER 'P' ARE PART NUMBERS.
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND. SET NOT TUNED TO STRONG SIGNAL.

D.C. RESISTANCES OF COILS

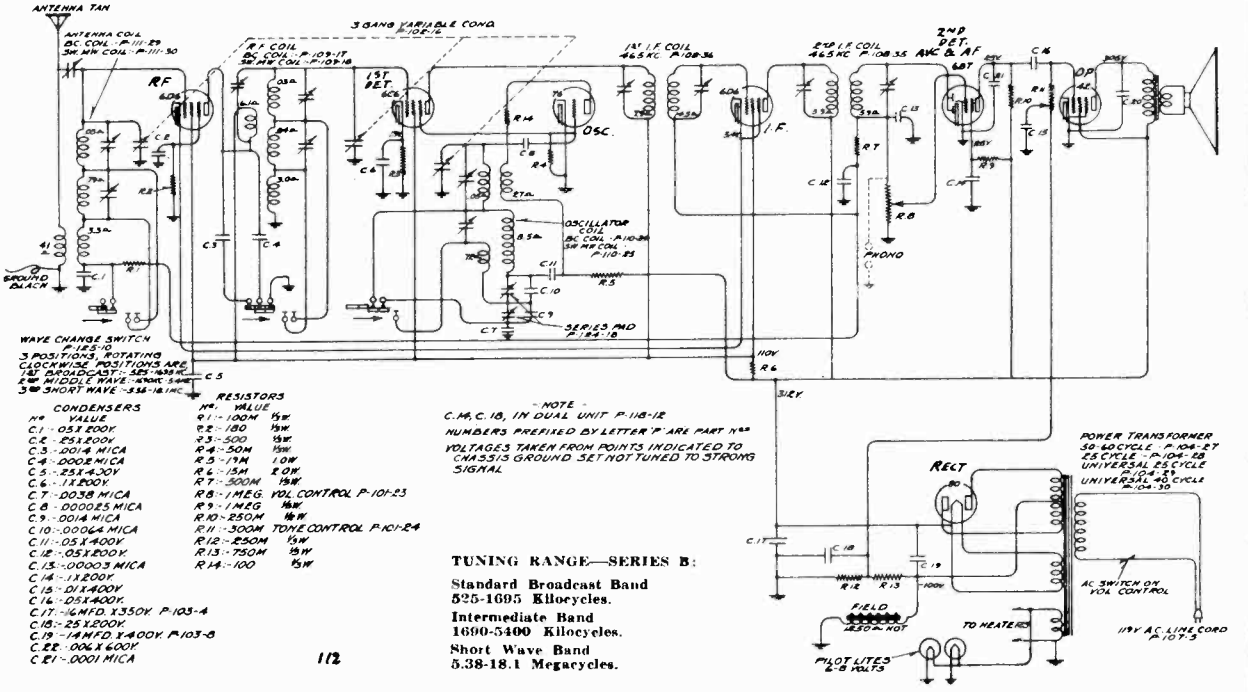
ANTENNA COIL	R.F. COIL	OSCILLATOR COIL
1 - 19Ω	1 - 7.6Ω	1 - .043Ω
2 - 8.3Ω	2 - 7.6Ω	2 - 1.1Ω
3 - 22Ω	3 - .084Ω	3 - .3Ω
4 - .021Ω	4 - .9Ω	4 - 7.6Ω
5 - .82Ω	5 - 2.8Ω	
6 - 2.9Ω		

TUNING RANGE—SERIES A

Standard Broadcast Band
525-1700 Kilocycles.
Intermediate Band
1.7-5.5 Megacycles.
Short Wave Band
5.5-18.0 Megacycles.

I. F. Frequency — 465 Kilocycles

SERIES B



WAVE CHANGE SWITCH P.125-10
3 POSITIONS, ROTATING
CLOCKWISE POSITIONS ARE
1ST BROADCAST 525-1650 KC
2ND MIDDLE WAVE 1.67-5.4 MC
3RD SHORT WAVE 5.38-18.1 MC

CONDENSERS

No.	VALUE
C1	.05 1200V
C2	.25 1200V
C3	.0014 MICA
C4	.0002 MICA
C5	.25 1400V
C6	.1 1200V
C7	.0038 MICA
C8	.000025 MICA
C9	.0014 MICA
C10	.00064 MICA
C11	.05 1400V
C12	.05 1200V
C13	.00003 MICA
C14	.1 1200V
C15	.01 1400V
C16	.05 1400V
C17	.16 MFD. X 350V P.103-4
C18	.25 1200V
C19	.14 MFD. X 400V P.103-8
C22	.006 X 600V
C21	.0001 MICA

RESISTORS

No.	VALUE
R1	100M 1/2W
R2	180 1/2W
R3	500 1/2W
R4	50M 1/2W
R5	19M 1.0W
R6	1.5M 2.0W
R7	500M 1/2W
R8	1 MEG VOL CONTROL P-101-23
R9	1 MEG 1/2W
R10	250M 1/2W
R11	300M TONE CONTROL P.101-24
R12	250M 1/2W
R13	750M 1/2W
R14	100 1/2W

- NOTE -
C.16, C.18, IN DUAL UNIT P.118-12
NUMBERS PREFIXED BY LETTER 'P' ARE PART NOS.
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND. SET NOT TUNED TO STRONG SIGNAL

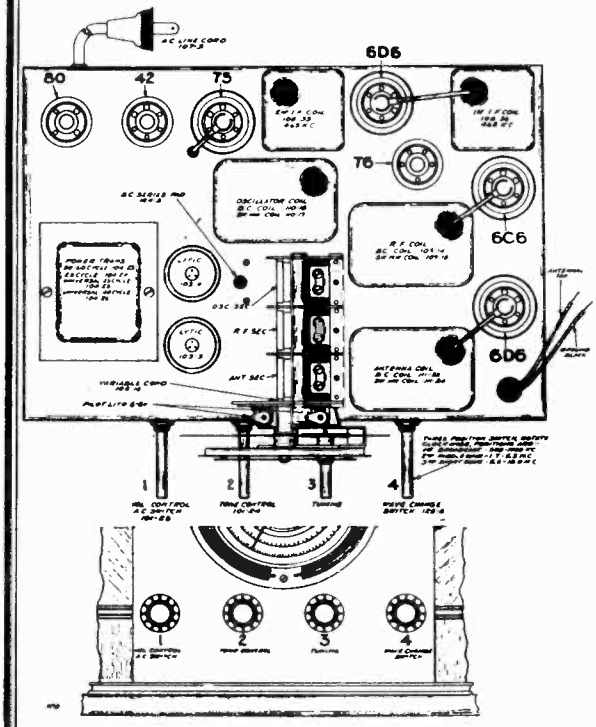
TUNING RANGE—SERIES B:

Standard Broadcast Band
525-1695 Kilocycles.
Intermediate Band
1690-5400 Kilocycles.
Short Wave Band
5.38-18.1 Megacycles.

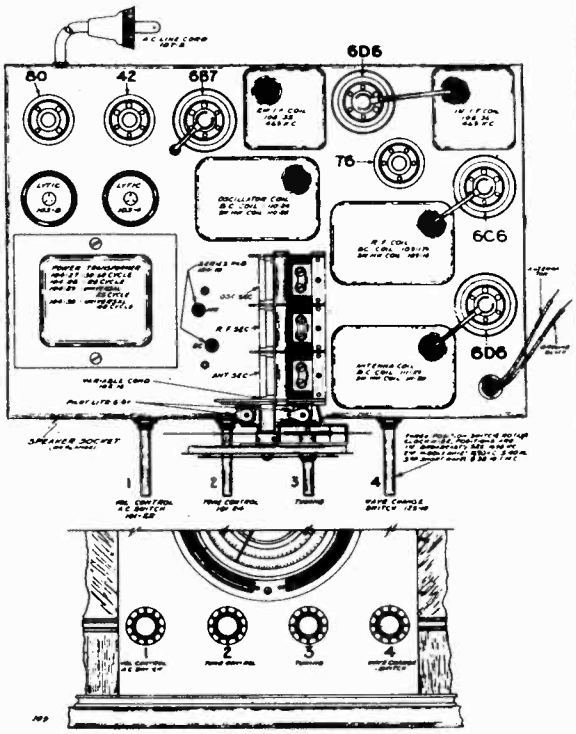
MODELS 777C, 777L
Socket, Trimmers
Parts List

GAMBLE-SKOGMO, INC.

TOP VIEW - SERIES A

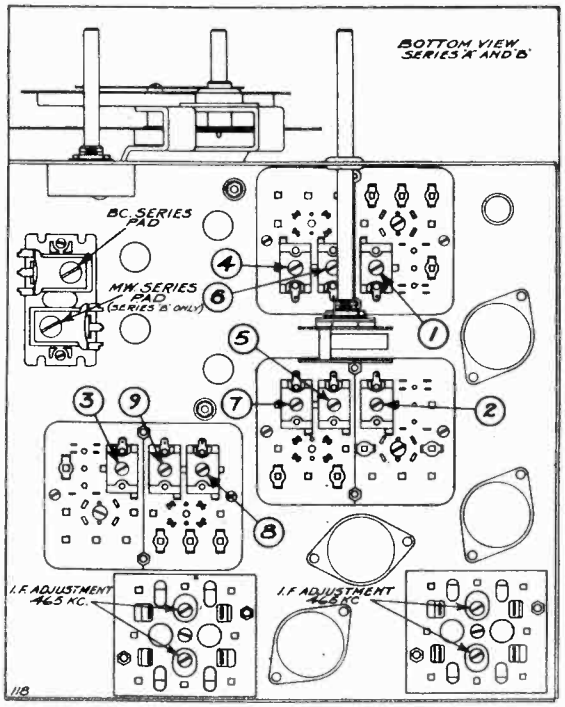


TOP VIEW - SERIES B



Parts Used In Ser. A Only	Parts Used In Ser. B Only	DESCRIPTION	List Price Each
		CONDENSERS	
		Unless Otherwise Listed—All Molded Mica	$0.25
		Unless Otherwise Listed—All Single Section Tubular Paper By-Pass	.25
		Unless Otherwise Listed—All Dual Section Tubular Paper By-Pass	.50
103-3	Not Used.	18 Mfd. x 300 V. Electrolytic	1.35
103-4	103-4	16 Mfd. x 350 V. Electrolytic	1.35
Not Used.	103-8	14 Mfd. x 400 V. Electrolytic	1.35
129-20	Not Used.	.0047 Mica—Type MH + or — 5%	.50
Not Used.	129-29	.0038 Mica—Type MW + or — 2½%	.50
		RESISTORS	
		Unless Otherwise Listed—All Resistors	.20
Not Used.	130-61	15M Ohm—2 Watt + or — 20%—180 V.	.40
		COILS	
108-35	108-35	Output I.F. Coil Assembly Complete—Less Can	1.50
108-36	108-36	Input I.F. Coil Assembly Complete—Less Can	1.50
109-14	Not Used.	Broadcast R.F. Coil Assembly Complete—Less Can	1.00
109-15	Not Used.	Mid-Wave & Short Wave R.F. Coil Assembly Complete—Less Can	1.50
Not Used.	109-17	Broadcast R.F. Coil Assembly Complete—Less Can	.70
Not Used.	109-18	Mid-Wave & Short Wave R.F. Coil Assembly Complete—Less Can	1.50
110-18	Not Used.	Broadcast Oscillator Coil Assembly Complete—Less Can	.50
110-19	Not Used.	Mid-Wave & Short Wave Oscillator Coil Assembly Complete—Less Can	1.25
Not Used.	110-24	Broadcast Oscillator Coil Assembly Com.—Less Can	.75
Not Used.	110-25	Mid-Wave & Short Wave Oscillator Coil Assembly Complete—Less Can	1.50
111-23	Not Used.	Broadcast Antenna Coil Assembly Com.—Less Can	1.00
111-24	Not Used.	Mid-Wave & Short Wave Antenna Coil Assembly Complete—Less Can	1.50
Not Used.	111-29	Broadcast Antenna Coil Assembly Com.—Less Can	1.00
Not Used.	111-30	Mid-Wave & Short Wave Antenna Coil Assembly Complete—Less Can	1.50
		TRANSFORMERS	
104-23	Not Used.	50/60 Cycle Power Transformer	3.50
104-24	Not Used.	25 Cycle Power Transformer	5.00
104-25	Not Used.	Universal—25 Cycle Primary	7.50
104-26	Not Used.	Universal—40 Cycle Primary	6.00
Not Used.	104-27	50/60 Cycle Power Transformer	4.50
Not Used.	104-28	25 Cycle Power Transformer	7.00
Not Used.	104-29	Universal—25 Cycle Primary	7.50
Not Used.	104-30	Universal—40 Cycle Primary	7.00
		SPEAKERS	
114-13	114-13	Six Inch Speaker	6.00
114-17	114-17	Eight Inch Speaker	6.50
114-18	114-18	Ten Inch Speaker	8.00

		MISCELLANEOUS	
101-23	101-23	Volume Control and Switch	
101-24	101-24	Tone Control	
102-16	102-16	Three Gang Variable Condenser	
107-5	107-5	Line Cord and Plug	



GAMBLE-SKOGMO, INC.

MODELS 777C, 777L
Series A & B
Alignment

NOTE: IN SERIES B THE TYPE 75 WAS REPLACED BY TYPE 6B7, DUPLEX DIODE PENTODE AS A SECOND DETECTOR, A.V.C. AND AUDIO.

Series A and B chassis are serially numbered on the back flange of the chassis, series A beginning with number "5B104021A" and up, series B chassis beginning with number "5D114175B" and up. Series A and B may be identified by the letter "A" and "B" at the end of the serial numbers.

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 and B.

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.

ALIGNING INSTRUCTIONS

Dummy Antennas

The following dummy antennas are used in aligning both series A and B 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 screen terminals of the type 42 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

ALIGNMENT PROCEDURE SERIES A ONLY

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 550 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 1500 K.C., move dial pointer to 1500 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 position center of its rotation, and with external oscillator set at 5 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 5 megacycles and adjust intermediate wave oscillator (adjustment number 9), intermediate wave R.F. (adjustment number 5) and intermediate antenna (adjustment number 4) to resonance.
   (b) Re-set external oscillator to 1800 K.C. and pick up signal by rotating variable condenser and check for sensitivity.
   (c) Re-check broadcast sensitivity as outlined under "Broadcast Band Alignment".

Series "A" chassis have no intermediate band series oscillator pad adjustment.

ALIGNMENT PROCEDURE SERIES B ONLY

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.

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

Series A and B.

Series A—Part No. 108-35 Output I.F. Transformer
Series A—Part No. 108-36 Input I.F. Transformer
Series B—Part No. 108-35 Output I.F. Transformer
Series B—Part No. 108-36 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, and with wave changing switch in the broadcast position, extreme left of its rotation, and with 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 6D6 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 6D6 to grid cap to 6C6 and adjust input I.F. transformer to resonance.
   (c) With oscillator still connected to 6C6, re-adjust output I.F. transformer.

MODEL 780
Schematic
Alignment
Parts List

GAMBLE-SKOGMO, INC.

- CONDENSERS -

C-1	.01	200v.	C-9	.05	200v
C-2	.05	200v.	C-10	.05	200v.
C-3	.004	MICA	C-11	.001	400 v
C-4	.0025	"	C-12	.01	200 v
C-5	.00005	"	C-13	8 M.F.	150v
C-6	.25	200 v	C-14	.01	200 v.
C-7	.5	160 v.	C-15	.02	400 v.
C-8	.25	200 v.	C-16	.001 - .001	300v.

- RESISTORS -

R-1	100 M	R-6	500 M.
R-2	10 M	R-7	2 MEG.
R-3	50 M	R-8	500 M.
R-4	20 M	R-9	250 M.
R-5	2 M	R-10	1 MEG

MODEL 780 & 780-B
BATTERY RADIO

GENERAL Always eliminate all possible sources of trouble external to the receiver itself such as: **Defective** aerial, ground, or lightning arrestor, tubes, batteries, loud speakers

TUBE FUNCTIONS "1-C-6" First detector—oscillator, "34" first I F amplifier, "34" second I F amplifier, "30" diode second detector, "1-B-5" first audio, "30" audio driver, "19" class B power tube.

CHECKING PARTS...The resistance of coils and resistors is shown on the circuit diagram together with condenser capacities. Any defective part—either shorted or open—will result in either weak or distorted reception or none at all.

ALIGNMENT...If all parts check OK and sensitivity is still low it is probably due to the set being out of alignment. It is necessary to use a reliable test oscillator or signal generator having accurate calibration and positive attenuation.

I F ALIGNMENT 456 K. C....Open tuning condenser (High Frequency dial setting). Connect signal generator to grid cap of 1-C-6 tube leaving present cap in place. Use a small condenser .002-.01 in series with signal generator lead wire. Adjust all five trimmers—two in top of each square I F transformer and the one in the top of the round (output) I F transformer. Go over these adjustments several times—it is best to use an output meter to indicate "peak". Reduce the output of the signal generator for final adjustments.

WAVE TRAP With the signal generator still on 456 K. C.—connect to antenna wire of set and adjust wave trap condenser to minimum signal.

The above will usually bring the set back to normal, check operation on stations and if satisfactory do not make any further adjustments.

BROADCAST BAND With the tuning condenser open and the signal generator set on 1735 K. C.—adjust B. C. Oscillator trimmer. Next—close tuning condenser and set signal generator to 540 K. C. adjust variable padding condenser for maximum signal. Adjust B. C. Antenna coil trimmer for maximum at 1400 K. C.

SHORT WAVE This is the most difficult for the service man and unless it is certain that the set does not compare favorably with a similar model under the same conditions of operation—the alignment should be left unchanged. If the service man feels that the short wave operation could be improved—proceed as follows. Connect signal generator to antenna and ground leads using a 300 ohm resistor in series with the antenna lead as a "dummy antenna". Set signal generator at 15,500 K. C. and tune in on the set (wave change switch in Short Wave Position—left). Adjust S.W. oscillator trimmer—see diagram—using a fibre screw driver, move the point of response to the highest frequency setting possible on the dial or near the end of the 19 M. band. Then without moving the tuning dial turn the trimmer screw tighter and you should be able to find a second point of response (the image). Move trimmer back to "loose" position. If the image response cannot be found move the dial and readjust trimmer until it can be heard. Be sure to return to the "loose" or fundamental setting. Next adjust the S.W. antenna coil trimmer for best response retuning the dial at the same time. The low frequency end of the short wave band is fixed by the .004 mica padding condenser and will not change unless this condenser becomes defective.

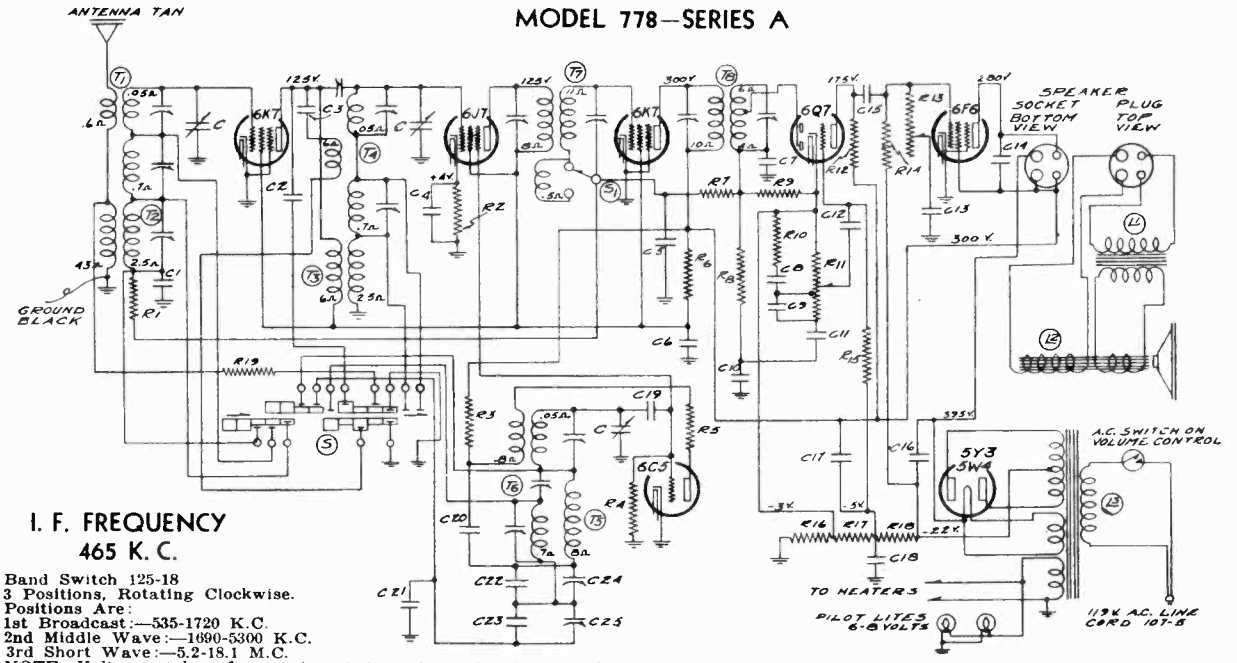
PARTS PRICE LIST ON MODEL 780 CORONADO BATTERY TABLE RECEIVER
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

	List
E-17339—Assb—Cable & Markers	$1.00
E-17290—Coil—Antenna	1.80
E-17291—Coil—Oscillator	1.60
E-17422—Control—Volume	1.50
E-17091—Condenser—Mica	.20
E-17092—Condenser—Mica .0025 M. W	.30
E-17093—Condenser—Mica .004 M. W	.30
E-17071—Condenser—Padder 500 MMF	.50
E-17303—Condenser—Tubular .5 x 200 V	.20
E-17128—Condenser—Tubular .25 x 200 V	.20
E-8661 —Condenser—Tubular .05 x 200 V	.20
E-1735—Condenser—Electrolytic	.60
E-8877 —Condenser—Tubular .01 x 200 V	.20
E-8584 —Condenser—Tubular .02 x 400 V	.20
E-8585 —Condenser—Tubular .001 x 600 V	.20
E-17304—Condenser—Tubular Dual .001 x 800 V	.30
E-17356—Condenser—Tuning	2.10
E-17043—Bushing—Rubber Chassis Mounting (6)	.50
E-17357—Dial Including Glass	1.80
E-17368—Escutcheon	.50
E-17113—Knob—Tuning	.30
E-17114—Knob—Tone Control Volume. Wave	.20
E-17371—Plate—Name	.10
E-17105—Resistor—Carbon	.20
E-17309—Resistor—Carbon	.20
E-17310—Resistor—Carbon	.20
E-8601 —Resistor—Carbon	.20
E-8885 —Resistor—Carbon	.20
E-8602 —Resistor—Carbon	.20
E-8886 —Resistor—Carbon	.20
E-8766 —Resistor—Carbon	.20
E-8887 —Resistor Carbon	.20
E-17168—Socket—6-Prong #1-C-6	.20
E-17166—Socket—4-Prong #34	.20
E-17313—Socket—4-Prong #30	.20
E-17314—Socket—6-Prong #19	.20
E-17359—Socket—6-Prong #1-B-5	.20
E-17423—Switch—Tone	.40
E-17364—Switch—Wave Change	.70
E-17321—Transformer—Audio Driver	1.50
E-17292—Transformer—I. F. Input	1.50
E-17293—Transformer—I. F. Output	1.20
E-17334—Trap—Wave	.50
E-17317—Speaker—6½" Magnetic (table model)	3.50
E-17421—Speaker—8" (console)	4.00

GAMBLE-SKOGMO, INC.

MODEL 778-A
Schematic, Voltage
Socket, Trimmers
Parts List

MODEL 778—SERIES A



I. F. FREQUENCY
465 K. C.

Band Switch 125-18
3 Positions, Rotating Clockwise.
Positions Are:
1st Broadcast:—535-1720 K.C.
2nd Middle Wave:—1690-5300 K.C.
3rd Short Wave:—5.2-18.1 M.C.
NOTE—Voltages taken from points indicated to chassis ground.
Set not tuned to strong signal.

RESISTORS

No.	Part No.	Description
R1	130-20	100M ohms—1/3 Watt—20%—50 Volt—Carbon
R2	130-43	2500 ohms—1/3 Watt—20%—20 Volt—Carbon
R3	130-77	10M ohms—1 Watt—20%—100 Volt—Carbon
R4	130-12	50M ohms—1/3 Watt—20%—20 Volt—Carbon
R5	130-60	100 ohms—1/3 Watt—20%—10 Volt—Carbon
R6	130-88	10M ohms—2 Watt—20%—Wire Wound
R7	130-3	500M ohms—1/3 Watt—20%—100 Volt—Carbon
R8	130-20	100M ohms—1/3 Watt—20%—50 Volt—Carbon
R9	130-11	250M ohms—1/3 Watt—20%—50 Volt—Carbon
R10	130-22	5000 ohms—1/3 Watt—20%—10 Volt—Carbon
R11	101-47	1 meg ohm—(Volume Control with A.C. Switch)
R12	130-20	100M ohms—1/3 Watt—20%—50 Volt—Carbon
R13	101-38	100M ohms—(Tone Control with Fidelity Switch)
R14	130-3	500M ohms—1/3 Watt—20%—100 Volt—Carbon
R15	130-38	2 meg ohm—1/3 Watt—20%—100 Volt—Carbon
R16	106-27	38 ohms—10% Muter Resistor
R17	106-27	28 ohms—10% Muter Resistor
R18	106-27	220 ohms—10% Muter Resistor
R19	130-27	50 ohms—1/3 Watt—20%—Carbon

Note: R16, R17, R18 in one unit—part No. 106-27

CONDENSERS

C	102-30	One Section of three gang variable condenser
C1	100-9	.05—200 Volt—25%
C2	129-59	.0003 Mica—MT—0—5%
C3	129-39	.00005 Mica—MT—0—20%
C4	100-9	.05—200 Volt—25%
C5	100-9	.05—200 volt—25%
C6	100-24B	.25—400 Volt—20%
C7	129-5	.0001 Mica—MT—0—20%
C8	100-9	.05—200 Volt—25%
C9	129-2	.0005 Mica—MT—0—20%
C10	129-60	.00015 Mica—MT—0—20%
C11	100-9	.05—200 Volt—25%
C12	100-11	.01—400 Volt—25%
C13	100-26	.02—400 Volt—25%
C14	100-32	.0005—1000 Volt—20%
C15	100-11	.01—400 Volt—25%
C16	103-8	14 mfd.—400 Volt Electrolytic
C17	103-6	8 mfd.—350 Volt Electrolytic
C18	100-6B	.25—200 Volt—20%
C19	129-31	.000025 Mica—MT—0—15%
C20	100-13	.05—400 Volt—25%
C21	129-54	.003 Mica—MW—W—2½%
C22	129-57	.0005 Mica—MT—0—5%
C23	129-58	.0021 Mica—MW—W—5%
C24	124-18	Padder, 175 mmf. working capacity.
C25	124-18	Padder, 300 mmf. working capacity.

Note: C24, C25 in one unit—part No. 124-18.

PARTS

T1	111-54	M.W. and S.W. Antenna Coil Assem.
T2	111-55	Broadcast Ant. Coil Assem.
T3	109-30	Broadcast R.F. Coil Assem.
T4	109-29	M.W. and S.W. R.F. Coil Assem.
T5	110-43	Broadcast Osc. Coil Assem.
T6	110-42	M.W. and S.W. Osc. Coil Assem.
T7	108-64	Input I.F. Coil—465 Kc.
T8	108-63	Output I.F. Coil—465 Kc.
L1		Output Trans. (on speaker).
L2	114-36	8" Speaker (Field Resistance 1250 Ohms)
L3	104-27	Power Transformer (50-60 Cycle)
S	125-18	Band Switch
S1	101-38	Fidelity Switch on Tone Control

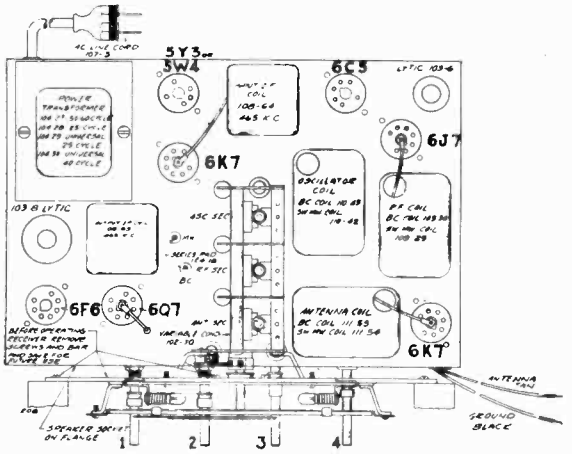


FIG. 3—TOP VIEW—MODEL 778—SERIES A

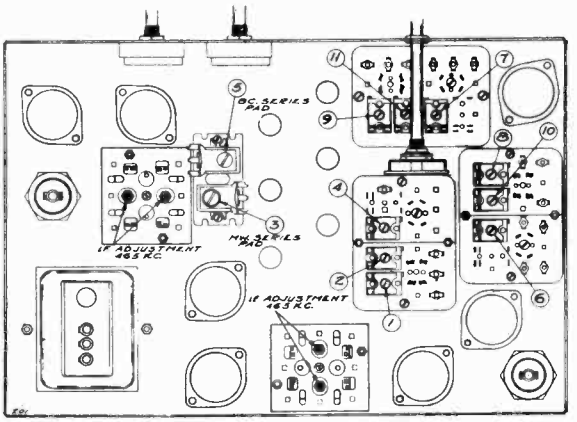


FIG. 1—BOTTOM VIEW SHOWING TRIMMERS

MODEL 778-A
Alignment

GAMBLE-SKOGMO, INC.

NEVER ATTEMPT TO REPLACE FUSE WITHOUT FIRST DISCONNECTING POWER.

NEVER REPLACE WITH FUSE OTHER THAN 2 AMPERE RATING.

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 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 condener, open by-pass condensers frequently cause oscillation and distorted tone.

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 resistance 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 6F6 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 multirange 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. 108-63 Output I.F. Transformer
Part No. 108-64 Input I.F. Transformer

Three 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 "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 tube, located between the two I.F. transformers, and adjust the output I.F. transformer (108-63) 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 (108-64) to resonance.

(c) With oscillator still connected to 6J7, re-adjust output I.F. transformer if necessary.

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 fan antenna and black ground lead, make the following adjustments.

(a) Adjust broadcast series pad (adjustment number 5) 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 108-63 output I.F. transformer. See top view, Fig. 3.

(b) Re-set external oscillator to 1400 K.C., move dial pointer to 1400 K.C. and adjust oscillator (adjustment number 4), R.F. (adjustment number 6) and antenna (adjustment number 7) to resonance. See bottom view for location of these adjustments, Fig. 1.

(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 fan antenna and black ground lead, make the following adjustments.

(a) Move dial pointer to 17 megacycles and adjust short wave oscillator (adjustment number 1), short wave R.F. (adjustment number 8) and short wave antenna (adjustment number 9) 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 1400 K.C. and connected in series with "Dummy 3" to the fan 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 (adjustment number 3) (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 10), intermediate wave antenna (adjustment number 11) and intermediate wave oscillator (adjustment number 2) 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.

DESCRIPTION

The tube complement of this chassis is as follows:

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 (465 K.C.)
1—Type 6Q7 duplex diode pentode second detector, A.V.C. and audio.
1—Type 6F8—pentode output amplifier.
1—Type 5Y3 or 5W4—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 100, 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

NOTE: Chassis with serial numbers from 6C229300 to 6D242726 were equipped with a fuse in the primary circuit of the power transformer and supplied with a type 5Z4 rectifier tube.

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.

MODEL 778 - Series A

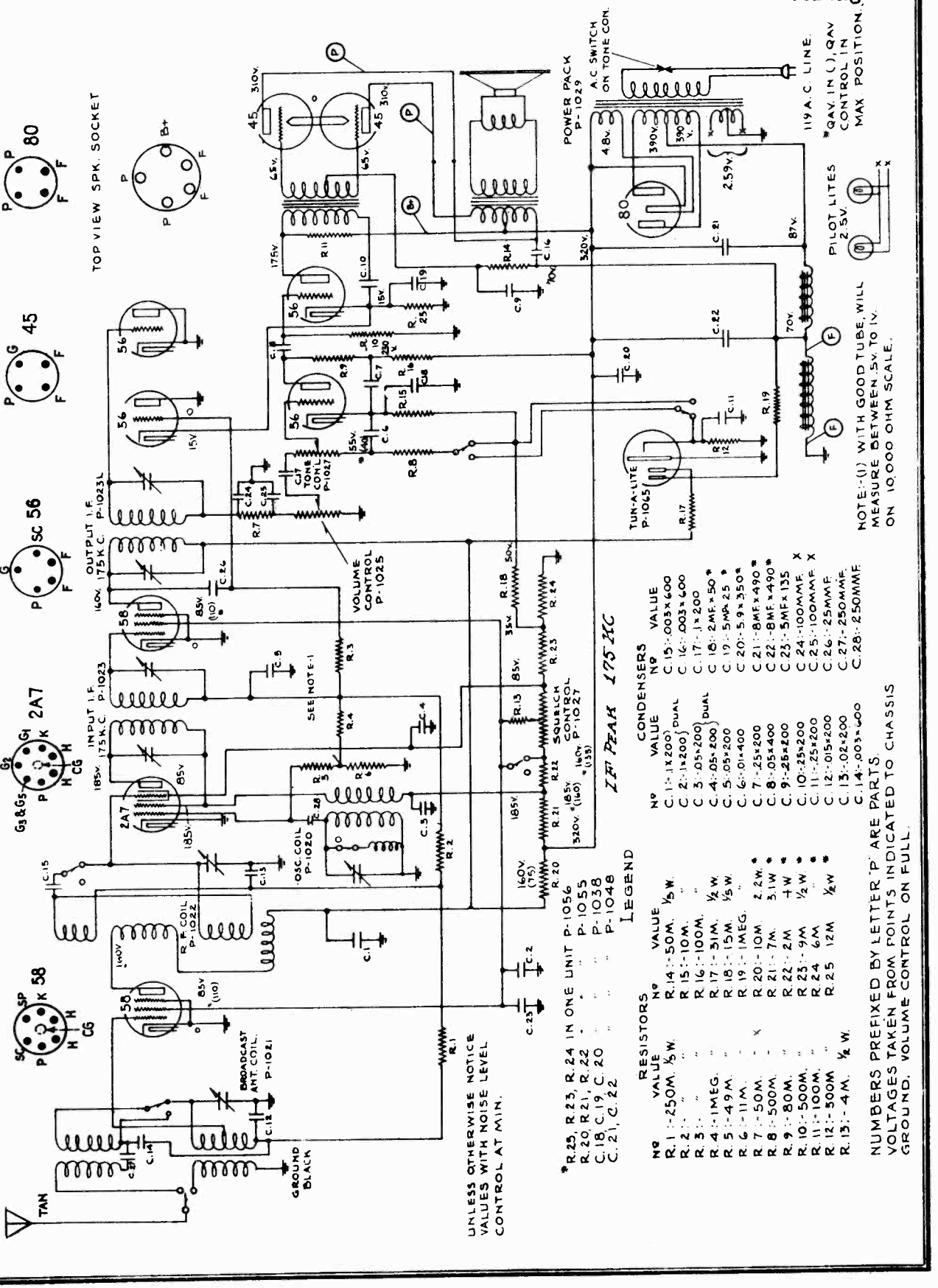
7-Tube A. C. All Wave

3-Band High Fidelity Superheterodyne Receiver

MODEL 1050
Schematic

GAMBLE-SKOGMO, INC.

MODEL 1050
Schematic
Voltage



RESISTORS

No	Value
R.1	250M. ½W.
R.2	" "
R.3	" "
R.4	1MEG. "
R.5	49M. "
R.6	11M. "
R.7	50M. " *
R.8	500M. "
R.9	80M. "
R.10	500M. "
R.11	100M. "
R.12	500M. "
R.13	4M. ½W.
R.14	50M. ½W.
R.15	10M. "
R.16	100M. "
R.17	31M. ½W.
R.18	15M. "
R.19	1MEG. "
R.20	10M 2.2W. *
R.21	7M. 3.1W. *
R.22	2M +W. *
R.23	9M ½W. *
R.24	6M " *
R.25	12M ½W. *

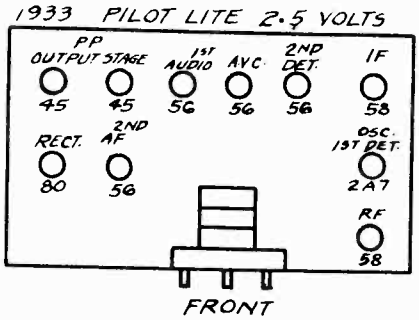
CONDENSERS

No	Value
C.1	.1×200
C.2	.1×200 DUAL
C.3	.05×200 DUAL
C.4	.05×200
C.5	.05×200
C.6	.01×400
C.7	.25×200
C.8	.05×400
C.9	.25×200
C.10	.25×200
C.11	.25×200
C.12	.015×200
C.13	.02×200
C.14	.003×600
C.15	.003×600
C.16	.003×600
C.17	.1×200
C.18	2MF×50 *
C.19	5MA.25 *
C.20	5.9×350 *
C.21	8MF×490 *
C.22	8MF×490 *
C.23	5MF×135
C.24	100MMF. X
C.25	100MMF. X
C.26	25MMF.
C.27	250MMF.
C.28	250MMF.

NUMBERS PREFIXED BY LETTER 'P' ARE PARTS.
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND. VOLUME CONTROL ON FULL.

MODEL 1050
Socket
Alignment
Notes

GAMBLE-SKOGMO, INC.



SERVICE MANUAL TEN TUBE SUPERHETERODYNE WITH A.V.C., SQUELCH AND SHORT WAVE

105-115 Volts Alternating Current, 50-60 Cycles, 105 Watts. 530-1720 Kilocycles - 1700-4500 Kilocycles.

SERVICE NOTES

Should it be at any time necessary to rebalance this set, the correct proceedure is as follows:

1. Volume and tone controls on full during all alignment.
2. Squelch switch in "no squelch" position (counter-clockwise (left) rotation) during all alignment.
3. Adjust variable squelch control on rear flange of chassis to maximum counter-clockwise (left) position.
4. Set variable condenser in minimum capacity position (plates open) at the start of all aligning.

I.F. ALIGNMENT

The intermediate frequency of model 1050 is 175 kilocycles, and is aligned as follows:

1. Connect oscillator (set at 175 kilocycles) to I.F. grid (second 58 tube) and adjust both trimmers of second I.F. transformer (underneath chassis) to resonance (maximum deflection on an output meter connected across the primary of the speaker input transformer).
2. Connect oscillator output to converter grid (2A7 tube) and adjust both trimmers of first I.F. transformer to resonance. Under no conditions touch the trimmers of the second I.F. transformer after adjusting them (see No. 1).

The four trimmers of the two I.F. transformers are all adjusted from the bottom of the chassis (one nut and one screw adjustment on each I.F. transformer trimmer).

BROADCAST BAND ALIGNMENT

Wave changing switch in clockwise (right) position.

1. Connect an oscillator in series with a 200 mmfd. condenser to the Tan (antenna) lead and Black (ground) lead. With the oscillator set at 1720 kilocycles and the variable condenser at its minimum position (extreme right of its rotation), adjust trimmer of oscillator (rear) section to resonance.
2. Change oscillator to 1400 kilocycles, rotate variable to this frequency and adjust R.F. and antenna trimmers (center and front trimmers respectively) to resonance. Do not touch the oscillator trimmer.
3. Check tracking at the following points only: 1200-1000-800-600-534 kilocycles. NOTE: This receiver will be slightly out of track at 534 kilocycles - do not bend plates in an attempt to track it at this frequency. Rotor plates of condensers should not be bent, except if absolutely necessary, and then only on the center and front sections.

SHORT WAVE BAND ALIGNMENT

Wave changing switch in counter-clockwise (left) position.

1. The frequency range of this short wave band is approximately 1700 to 4500 kilocycles.
2. Peak short wave antenna coil to resonance with oscillator set at 1720 kilocycles by slipping primary.
3. Check for sensitivity at the following frequencies only: 1720 and 3700 kilocycles - under no conditions touch trimmers or plates of variable condenser while checking short wave band.

Tun-a-lite. VISUAL TUNING CHECK

The visual tuning indicator (tun-a-lite tube) is mounted horizontally on the front of the variable condenser assembly and its operation in this respect can be checked as follows:

1. Normally there will be a small continuous glow in the base of the tube when no signal is being received.
2. With a strong oscillator input at 1000 kilocycles, the tun-a-lite should glow to approximately the end of the bulb, varying slightly with different tun-a-lites. If the glow "travel" is short, or none at all, remove the tun-a-lite tube and check its socket connections and contacts. If the tube still fails to indicate satisfactorily, replace the tube.

SQUELCH CHECK

The tun-a-lite tube is also used for noise suppression between stations. Its operation can be checked as follows:

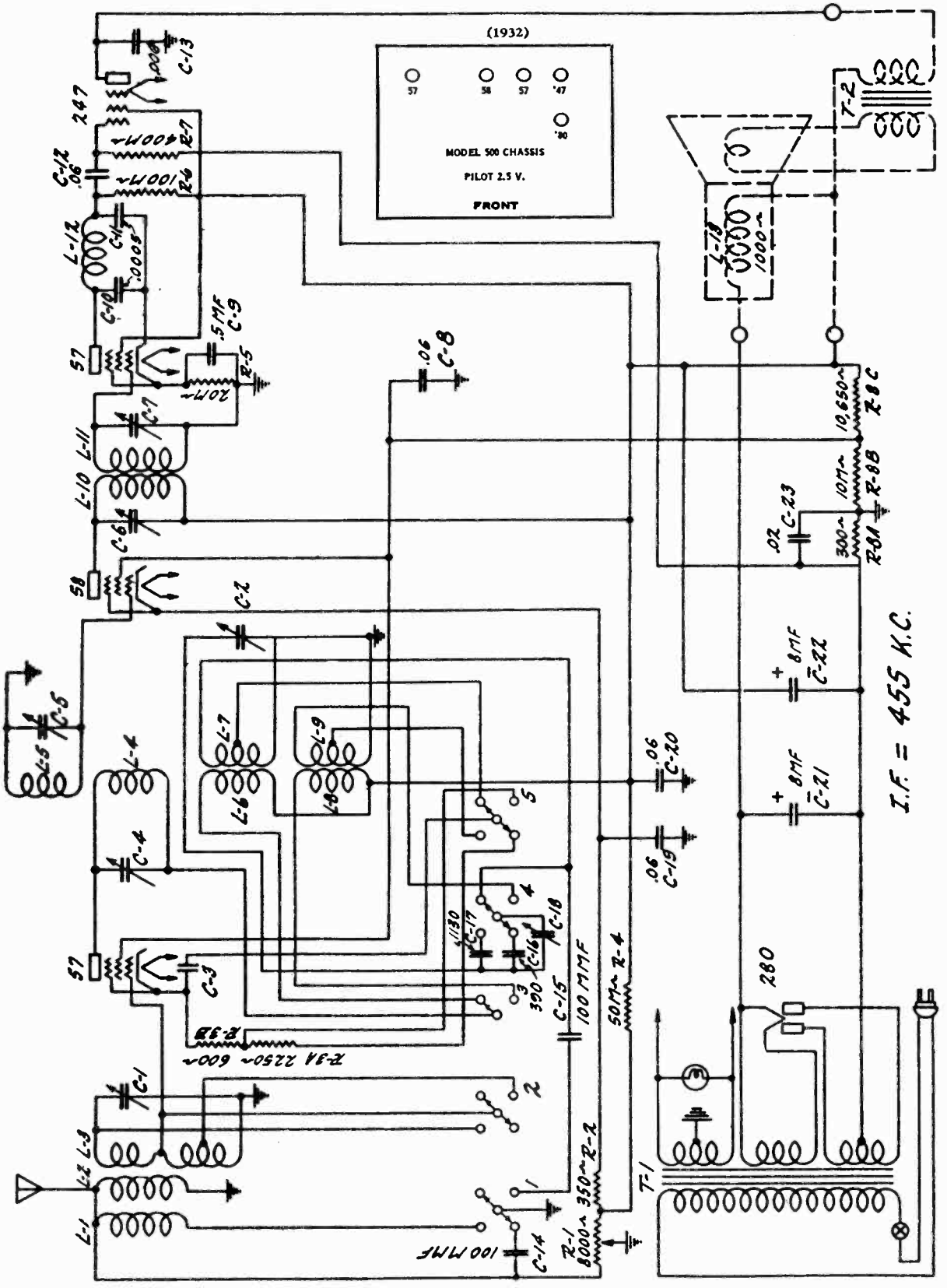
1. Squelch switch adjusted to squelch (clockwise (right) position).
2. Disconnect oscillator, connect antenna, tune set to a position where no signal is received. Noise level at this position should be quite high.
3. Rotate set screw of squelch control on rear flange of chassis, and at some point the noise should cease and the set sound "dead", indicating that the tun-a-lite is squelching and eliminating between station noise.

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

Condenser shaft to which pointer is attached is rotated by means of a celluloid dial attached to the condenser shaft and a bronze friction drive assembly, to which is attached the selector knob. Should this drive ever slip or become rough, it can be adjusted for smooth operation by sliding the bronze washer drive assembly either closer to the variable shaft or farther away from it in the slot in which it is mounted, to insure smooth operation.

MODEL 2078-D
Schematic
Socket

GAMBLE-SKOGMO, INC.



"CORONADO" Model 2078D

Dual-Wave Super-Heterodyne

ALIGNMENT

The necessity for realignment of the receiver circuits will usually be indicated by a lack of sensitivity accompanied by poor selectivity, but realignment should not be attempted until all other causes for this same condition, such as defective tubes, poor antenna installation, partially shorted condensers or loose connections at some point in the chassis, have been investigated.

Aligning Intermediate Condensers — Place the receiver in operation with the band selector switch in the broadcast position. Connect the output lead from the signal generator to the control grid connection of the 57 first detector tube and place the signal generator in operation at 455 K. C.

The oscillator coil must be shorted out by grounding the lead from the tap on the secondary. This is the white lead which comes through the porcelain base of the oscillator and I. F. assembly. This lead terminates at a lug on a vertically mounted bakelite terminal strip. Connect the jumper from this lug to the ground.

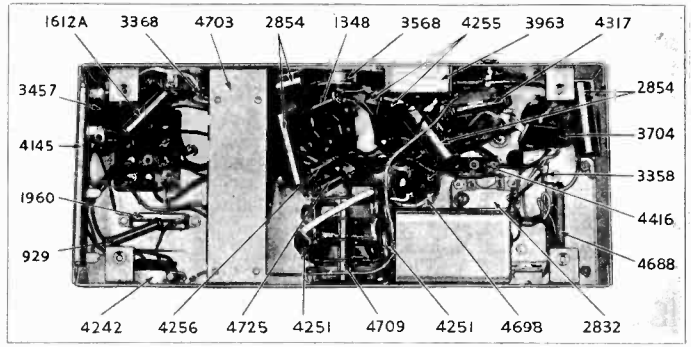
Then set the signal generator for a signal of 600 K. C. and turn the tuning condenser rotor until the output is at maximum. The next step is to adjust the oscillator 600 K. C. trimmer condenser. The adjusting screw for this condenser is between the tuning condenser and intermediate frequency shield on top of the chassis. To correctly adjust this oscillator 600 K. C. trimmer it will be necessary to turn the screw to several different positions using a non-metalic screw driver. At every position of this adjusting screw turn the tuning condenser rotor until maximum output is obtained. For each position of the adjusting screw there will be a maximum output and the correct position of the adjusting screw is the setting at which the deflection of the output indicating meter is the greatest.

Next set the signal generator again for a 1400 K. C. signal and check the adjustment of the tuning condenser trimmers at this frequency for the maximum output. Then set the signal generator for a signal of 1000 K. C. and turn the tuning condenser rotor until the output indicating meter shows maximum deflection. Then bend the slotted rotor plate sections of each tuning condenser bank which are last in mesh, in or out until maximum output is obtained. Tune in a signal at 750 K. C. and then at 600 K. C. and follow the same procedure, bending the rotor plate sections last in mesh until maximum output is obtained. Do not change the setting of the oscillator 600 K. C. trimmer in any way after it has once been set as indicated above.

After the foregoing adjustments are carefully made with the receiver in operation in the broadcast band, the same adjustments will be correct for operation of the receiver in the short wave band and no further adjustments are necessary to obtain maximum efficiency of operation on short wave signals.

The intermediate condenser adjusting screws on the first I. F. transformer are reached from the bottom of the chassis. The tuning condensers of this transformer are mounted on the porcelain base of the oscillator I. F. assembly and the adjusting screws protrude through this base. The intermediate condenser adjustments on the second I. F. transformer mounted on top of the chassis are both accessible from above the chassis and adjustment is made by means of the screw and nut on the top of the I. F. transformer. Turning the screw varies the capacity of the I. F. secondary trimmer and turning the nut changes the capacity of the I. F. primary trimmer. Adjust all four intermediate condensers until maximum output is obtained on the output meter. After all four have been adjusted the first time go over them again and check the setting for maximum output.

Aligning R. F. and Oscillator Condensers— The R. F. and oscillator condensers are adjusted with the receiver in operation in the broadcast band and the signal input from the signal generator should be made to the antenna post. Adjust the signal generator for a signal of exactly 1400 K. C. Then turn the tuning condenser rotor until the pointer is at exactly 1400 on the dial scale. Then adjust the two trimmers on the tuning condenser for maximum output adjusting the oscillator trimmer first (trimmer nearest front of chassis). Turn the screws up or down until greatest deflection on output indicating meter is obtained.



PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Part No.	DESCRIPTION	No. Used in Set	List Price Each
4257	Bakelite Knob, Large	2	.30
4258	Bakelite Knob, Small	1	.20
4267	Speaker Socket — 4 Contact	1	.25
4282	Pilot Light Socket with Leads	1	.20
4317	Resistor, 20,000 Ohm Carbon, 1 Watt	1	.40
4376	Tube Shield Assembly	1	.40
4416	Horizontal Insulated Terminal	1	.02
1688	Resistor, 600 - 2250 Ohm Candohm	1	.35
4698	Oscillator Coil, Short Wave	1	.50
4703	Dual 8 Mfd. Filter Condenser with Mounting Bracket and Leads	1	3.50
4704*	Oscillator — I. F. Assembly Complete with Shield Can	1	2.30
4705	Antenna Transformer	1	1.50
4709	Band Selector Switch Assembly with 100 Mmf., 390 Mmf., 1130 Mmf. Condenser, and all wires	1	4.50
4710	Tuning Condenser Assembly	1	4.50
4712	Drive Disc and Dial Chart	1	.50
4725	Condenser, 1130 Mmf.	1	.30
4803	2nd I. F. Transformer complete with Shield Can	1	1.60
115	Pilot Light Lamp	1	$ .25
678	Ground Binding Post	1	.15
701	Tube Socket — 280	1	.35
861	Attachment Cord and Plug	1	.65
929	Resistor, 50,000 Ohm Carbon, 1 Watt	1	.45
962	Grid Cap Only	3	.02
1348	Resistor, 100,000 Ohm Carbon, 1 Watt	1	.50
1612A	Condenser, .006 Mfd., 400 Volt	1	.50
1960	Resistor, 350 Ohm, Candohm	1	.30
2333	Antenna Binding Post	1	.20
2757	Tube Socket — 247	1	.35
2832	Trimmer Condenser, 600 K. C.	1	.40
2854	Condenser, .06 Mfd., 400 Volt	4	.40
3358	Vertical Insulated Terminal	4	.04
3368	Resistor, 400,000 Ohm Carbon, .1 Watt	1	.40
3457	Condenser, .02 Mfd., 500 Volt	1	.30
3568	Detector Plate Choke Assembly	1	.60
3704	Condenser, .002 Mfd., 500 Volt	1	.40
3963	Condenser, .5 Mfd. Bypass	1	.70
4110	Power Transformer, 105 - 125 Volts, 60 cycles	1	6.00
4111	Power Transformer, 105 - 125 Volts, 25 cycles	1	8.00
4117	Tube Socket — 57	2	.25
4118	Tube Socket — 58	1	.25
4145	Resistor, 300 - 10,000 - 10,650 Ohm Candohm	1	.80
4159	Tube Shield Cover Plate	1	.05
4165	Dial Drive Assembly	1	.25
4242	Volume Control, 0 - 8000 Ohm with Power Switch	1	1.60
4251	Condenser, 100 Mmf.	2	.25
4255	Condenser, 500 Mmf.	2	.25
4256	Condenser, 390 Mmf.	1	.30
4265	6" Electrodynamic Speaker with Input Transformer	1	7.50
4734	Cone Head Assembly for 4265 Speaker	1	2.75
4735	Field Coil for 4265 Speaker	1	2.25
4736	Input Transformer for 4265 Speaker	1	2.25
4737	Speaker Plug, 4 Prong	1	.30

Volume Control at Maximum—Switch in Broadcast Position

REFERENCE POINT—CHASSIS

Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	Defect
Antenna Post	21	8000 0	Open L-2 Shorted C-14
1st Detector Control Grid	3	1.3 Open	Shorted C-1 or Trimmer Open L-8
1st Detector Cathode	2,850	Open .4	Open R-3 Shorted C-3
1st Detector Screen Grid	8,500	0 10,000	Shorted C-8 Open R-8C
1st Detector Plate	14,400	18.5 50,000	Shorted C-20 Open R-8B or R-8C
I. F. Control Grid	28	Open 0	Open L-4 Shorted C-5
I. F. Cathode	350	Open 0	Open R-2 Shorted C-19
I. F. Plate	14,000	20 50,000 Open	Shorted C-20 Open R-8B or R-8C Open R-4 or L-10
2nd Detector Control Grid	20	0 Open	Shorted C-7 Open L-11
2nd Detector Cathode	20,000	0 Open	Shorted C-9 Open R-5
2nd Detector Screen Grid	14,000	Open 0 300 1,300	Open R-4 or R-8 Shorted C-20 Shorted C-22 Shorted C-21
2nd Detector Plate	114,000	Open 150,000 120,650 20,000	Open R-6 Open R-8 Open R-4 Shorted C-10 or C-11
Audio Control Grid	400,300	Open	Open R-7 or R-8A
Audio Screen Grid	14,200	20,650 0 50,000	Open R-4 Shorted C-20 Open R-8B or R-8C
Audio Plate	14,900	0 50,000 Open	Shorted C-13 Open R-8B or R-8C Open Pri. T-2
Rectifier Either Plate	600	300 Open	Shorted C-23 Open Secondary T-2 or Open R-8A
Rectifier Either Filament	15,000	Open 300 1,300	Open L-13 or R-8 Shorted C-21 Shorted C-22

—VOLTAGES AT SOCKETS

LINE VOLTAGE 115—VOLUME CONTROL AT MAXIMUM

Type of Tube	*Position of Tube*	*Function*	*"A" Volts*	*"B" Volts*	*Control Grid "C" Volts*	*Screen Grid Volts*	*Screen Grid Current M. A*	*Cathode Volts*	*Plate M A*	*Grid Test M A*
57	1	1st Det. & Osc.	2.15	245	4.3-5.9(1)	100	.6	4.3-5.9(1)	.95	2.0
58	2	I. F.	2.15	240	3.0	100	1.5	3.0	6.6	10.4
57	3	2nd Det.	2.15	166	9.0	235	.1	9.0	.35	.45
247	4	Audio	2.15	215	17.0(2)	240	8.0		30.	48.
280	5	Rect.	4.6						30. Per Plate	

(1) Varies with frequency setting of dial approximately as shown.
(2) Measured across 300 ohm section of voltage divider resistor.

REFERENCE POINT—B (AUDIO SCREEN CONTACT)

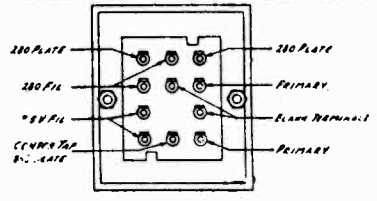
Measurement Point	Correct Reading (Ohms)	Incorrect Reading (Ohms)	
1st Detector Screen Grid	10,650	Open	Open R-8C
1st Detector Plate	18.5	2 Open	Shorted C-4 Open L-4 or L-6
I. F. Plate	20	Open 0	Open L-10 Shorted C-6
2nd Detector Screen Grid	0	Open	Open Connection
2nd Detector Plate	100,070	Open	Open R-6 or L-12
Audio Plate	700	Open	Open Pri. T-2
Rectifier Plate	14,800	Open	Open R-8 or Sec. T-1
Rectifier Filament	1,000	Open	Open L-13

MISCELLANEOUS

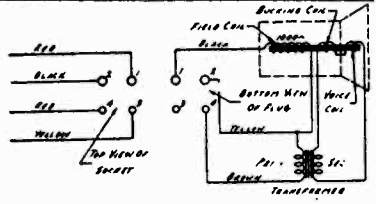
2nd Detector Plate to Audio Grid	Open	70	Shorted C-12
2nd Detector Plate to 2nd Detector Cathode	170,000	0 70	Shorted C-10 Shorted C-11
Rectifier Plate to Plate	600	Open	Open Secondary T-1
Rectifier Filament to Filament	Very Low	Open	Open Fil Winding T-1
Between Filament Contacts of Other Sockets	Very Low	Open	Open Heater Winding
Across A. C. Plug	9	Open	Open Pri. T-1
Across Secondary T-2 (Unsolder Voice Coil Lead)	.8	Open	Open Sec. T-2
Across Voice Coil	1.6	Open	Open Voice Coil
Across C-15	Open	0	Shorted C-15
Chassis to Common Connection C-16 and C-17	Open	0	Shorted C-2 or Trimmer
Stator C-2 to Cathode 1st Detector	Open	2,854	Shorted C-10 or C-18

BAND SELECTOR SWITCH IN SHORT WAVE POSITION

Chassis to Antenna Binding Post	3.5	4 21	Open L-2 Open L-1
Chassis to Control Grid 1st Detector	1.6	0	Shorted C-1 or Trimmer
Chassis to Cathode 1st Detector	600	Open .3	Open R-3B or L-9 Shorted C-3
Audio Screen to 1st Detector Plate	18	Very Low Open	Shorted C-4 Open L-4 or L-8



Power Transformer Terminals

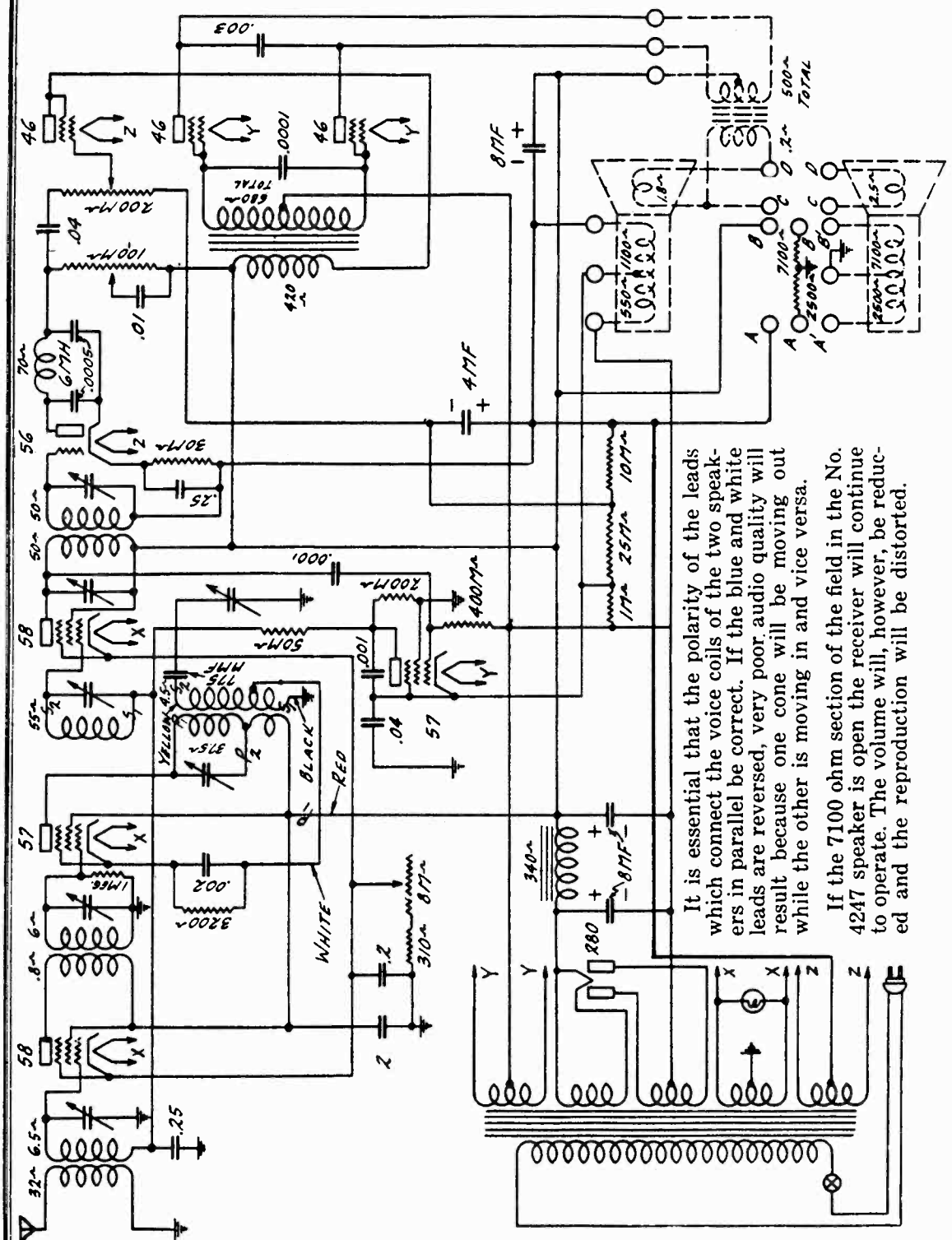


Electrodynamic Speaker and Connections.

MODEL 2090
Schematic
Notes

GAMBLE-SKOGMO, INC.

CONNECT A TO A AND B TO B FOR SINGLE SPEAKER.
CONNECT A' TO A, B' TO B, C TO C AND D TO D FOR
DUAL SPEAKERS.



It is essential that the polarity of the leads which connect the voice coils of the two speakers in parallel be correct. If the blue and white leads are reversed, very poor audio quality will result because one cone will be moving out while the other is moving in and vice versa.

If the 7100 ohm section of the field in the No. 4247 speaker is open the receiver will continue to operate. The volume will, however, be reduced and the reproduction will be distorted.

"CORONADO" Model 2090

Super-Heterodyne Receivers

No. 900 Chassis

CIRCUIT

The complete circuit consists of an R.F. amplifier, an Oscillator-1st detector unit in which the local signal is generated and combined with the R.F. signal to form the intermediate or beat frequency, the I.F. amplifier, the 2nd detector or demodulator, the AVC and "Q" Control, the audio stages, and the power system from which the required voltages are obtained.

An R.F. amplifier or similar circuit is necessary because of the tendency of the Super-Heterodyne towards image or double frequency response. Image response is due to the fact that two different R.F. signals can be combined with the oscillator signal at the same time to form the intermediate or beat frequency. One of the R.F. signals is above the oscillator signal by an amount equal to the intermediate frequency and the other R.F. signal is below the oscillator signal by the same amount.

In the No. 900 chassis is included the Quiet Automatic Volume Control (Q.A.V.C.) This is a sensitivity control working in conjunction with the AVC tube to provide quiet operation of the receiver whether or not it is tuned to a station. Control of the receiver sensitivity is obtained by means of a variable biasing resistor in the cathode circuit of the R.F. and I.F. tubes making it possible to adjust the sensitivity of the receiver to a point below the noise level prevailing at the point of reception.

A type 56 tube is used as the 2nd detector or demodulator tube. This detector is of the bias type, the bias voltage being obtained from the drop established by the plate current flowing through the 30,000 ohm resistor in the cathode circuit of the tube. The grid return of this tube is brought to the low potential end of the biasing resistor.

A low-pass filter consisting of a 6-millihenry choke and two 500 Mmf. condensers is placed in the plate circuit of the 2nd detector to prevent I.F. voltage from being applied to the grid of the 46 1st audio or "Driver" tube. This filter offers a very high impedance to intermediate frequency but allows audio frequency to pass readily.

The 2nd detector is coupled to the driver stage by means of resistance coupling, the 100,000 ohm tone blender resistor providing the necessary impedance so that the audio voltage is developed across it and impressed upon the grid of the 46 driver tube through the .04 Mfd. coupling condenser.

A .01 Mfd. condenser is connected between the lower end of the tone blender resistor and the movable arm. As the movable arm is moved so that the .01 Mfd. condenser shunts more of the resistor, the impedance of the plate circuit to high audio frequencies is lowered and less high frequency voltage is impressed upon the grid of the driver tube. The tonal output of the receiver is varied accordingly.

A 200,000 ohm variable resistor is connected as a potentiometer in the grid circuit of the 46 driver tube and serves to control the volume of the receiver. One end of this resistor is connected to the .04 Mfd. coupling condenser and the other end to the source of the grid bias voltage for the 46 driver tube. The grid of this tube is connected to the movable arm. As the position of the movable arm is changed, the A.F. voltage impressed on the grid of the 46 driver tube is varied, thus controlling the volume.

The outer grid of the 46 tube is connected to the plate and the tube functions as a low impedance audio amplifier. Bias voltage for this tube is obtained by using a portion of the voltage drop across the 1100 ohm section of the speaker field. The drop across this section is 45 volts and by means of a voltage dividing system consisting of a 10,000 ohm resistor and a 25,000 ohm resistor in series across the 1100 ohm section, the proper bias voltage of 19 volts is applied to the inner grid of the tube, through the 200,000 ohm volume control resistor. The grid biasing system is bypassed by a 4 mfd. dry electrolytic condenser which completes the audio circuit to the tube and avoids the degenerative effect which would be present if the audio frequencies were forced to flow through the biasing system.

The driver stage is transformer coupled to the two 46 tubes which are used in the Class "B" output amplifier. Owing to the fact that current flows in the grid circuits of these tubes during the time the positive half of the cycle is applied to the dual-grid connection, it is necessary to utilize a specially designed audio transformer with a low impedance secondary. If this is not done the audio wave applied to the dual-grids of the tubes will be distorted due to voltage drop in the transformer secondary winding caused by the grid current.

No grid bias voltage is applied to the dual-grids of the 46 tubes as the plate impedance is very high due to the dual-grid connection. The plate current is practically at cut-off, being only 5 MA at no signal.

A 3000 Mmf. condenser is connected between the plates of these tubes and acts as a bypass for high audio frequency harmonics.

A type 57 tube is used as an automatic volume control in this chassis. Grid bias voltage for this tube is obtained by using the voltage drop across the 550 ohm section of the speaker field which is shunted by a 1000 ohm resistor. The plate voltage is developed across the 1100 ohm section of the speaker field and the 7100 ohm section of the Candohm shunt resistor. The AVC controls the signal strength after it has been picked up by the antenna by varying the bias voltage on the 58 R.F. and I.F. tubes. The grid circuits of the tubes are connected through a 50,000 ohm resistor to the plate of the AVC tube. The cathodes of the R.F. and I.F. tubes are connected to ground through the "Q" control and 310 ohm biasing resistor. The 200,000 ohm resistor in the plate circuit of the 57 AVC tube is also connected to ground and when a signal of sufficient magnitude to overcome the initial D.C. bias on the AVC tube is applied to its control grid through the 100 Mmf. coupling condenser, current will flow in the plate circuit, establishing a voltage drop across the 200,000 ohm resistor. This voltage adds to the bias voltage already applied to the grids of the R.F. and I.F. tubes by the drop across the "Q" control and 310 ohm resistor and decreases the sensitivity of the receiver in proportion to the strength of the signal being received.

Previous Super-Heterodyne receivers operated noisily when tuning from one station to another. This was due to the action of the AVC tube in allowing the receiver to operate at maximum sensitivity when no station signal was applied to the receiver. As the Super-Heterodyne is a very sensitive receiver its operation is naturally noisy under such conditions. In the No. 900 chassis a variable resistor is placed in series with the fixed biasing resistor in the cathode circuit of the R.F. and I.F. tubes. This makes possible the manual variation of the sensitivity of the receiver. In practice this 8,000 ohm resistor or "Q" control is adjusted to the point where local interference or static is reduced to an unobjectionable minimum when the receiver is not tuned to a station. This adjustment will make stations which are below the noise level inaudible and may introduce slight fading in the reception of stations whose signal strength goes below the noise level at times but in any case such stations cannot be received with any degree of satisfaction as their signal strength is no greater than the noise level prevailing at the point of reception.

The power system consists of the conventional power transformer, full wave rectifier, filter choke and filter condensers. The speaker field serves as an additional choke as well as a part of the voltage dividing system. The voltage dividing system which provides proper plate, and screen voltages for the different tubes is completed through a 9600 ohm resistor which is tapped at 2500 ohms.

The R.F. amplifier reduces this form of interference by selecting and amplifying the desired signal, at the same time attenuating unwanted signals. Additional freedom from image response is obtained by the selection of a high intermediate frequency.

The R.F. amplifier is a stage of tuned radio frequency coupled to the antenna and ground by a high impedance primary coil. The primary winding is resonant to a frequency below the broadcast band permitting the use of varying antenna lengths without disturbing the alignment. The secondary of this transformer is tuned by the first section of the three-gang tuning condenser. The 2nd R.F. or detector transformer which couples the plate circuit of the 58 R.F. tube to the grid circuit of the 57 1st detector is also inductively coupled. The secondary of this transformer is tuned by the second section of the three-gang tuning condenser.

The grid bias voltage for the 58 R.F. amplifier is variable and depends upon two factors, the current flowing in the plate circuit of the AVC and the position at which the "Q" control is set. Referring to Fig. 2, it will be seen that the resistance in the cathode circuit of the 58 R.F. and I.F. tubes will vary between 310 and 8,310 ohms depending upon the setting of the "Q" control. The voltage drop established by the plate and screen currents flowing through this resistance is applied to the grids of these tubes and is the grid bias voltage at low signal strengths. When higher signal strengths are applied, the AVC will draw plate current, setting up a voltage drop across the 200,000 ohm AVC plate resistor which will add to the voltage drop across the 310 ohm resistor and the section of the "Q" control between this resistor and the movable arm of the control.

The first 57 tube functions both as an oscillator and as the 1st detector. Referring to Fig. 2, there are four coils shown to the right of this tube, all of these coils being in an inductive relation. These coils and the two I.F. tuning condensers make up the Oscillator-1st I.F. Assembly, the wiring of which is shown in Fig. 4.

The tuned circuit P_1, P_2 is resonant at a frequency of 262 K.C. Circuit S_1, S_2 (at the top) is also resonant at this frequency. The two coils P_1, P_2 and S_1, S_2 are the primary and secondary respectively of the first I.F. transformer. Circuit P_1, P_2, P_1 constitutes the primary of the oscillator and circuit S_1, S_2, (below) the secondary. Circuit S_1, S_2, the oscillator secondary, is tuned by the third section of the three-gang tuning condenser and is always resonant at a frequency of 262 K.C. above the frequency to which the R.F. circuits are tuned.

A surge of energy fed into the secondary of the oscillator, inductively, causes this circuit to begin to oscillate at its resonant frequency of 262 K.C. above the radio frequency. This oscillator frequency is fed back through the tap in the secondary coil into the grid circuit of the 1st detector. There the oscillator signal is amplified and fed inductively through the primary system in the plate circuit of the tube back into the secondary, thus sustaining the oscillations at the frequency to which the oscillator secondary circuit is tuned.

The first 57 tube also functions as the 1st detector or mixer and is of the bias type. Bias voltage for this tube is established by the plate and screen currents flowing through the 3,200 ohm resistor in the cathode circuit. This resistor is bypassed by a .002 Mfd. condenser. The bias voltage is influenced to a slight extent by the oscillatory current and will vary within a small range, depending on the frequency to which the receiver is tuned.

There are two frequencies present in the grid circuit of the 57 1st detector. One is the radio frequency and the other is the oscillator frequency which is always 262 K.C. above the radio frequency. This results in the beat or intermediate frequency being present in the plate circuit of the tube. Since circuit P_1, P_2, the primary of the first I.F. transformer, is resonant at 262 K.C., the maximum I.F. voltage will be developed across this circuit. This voltage is then induced in the secondary of the first I.F. transformer, S_1, S_2, the latter circuit also being tuned to 262 K.C.

In order to provide satisfactory tracking with the R.F. and 1st detector tuned circuits, the oscillator is provided with a 1400 K.C. trimmer condenser and a 775 Mmf. series condenser. The 1400 K.C. trimmer condenser is located on top of the tuning condenser and is connected across the oscillator tuning condenser. The 775 Mmf. series condenser is connected between the tuning condenser and the oscillator secondary coil.

The I.F. amplifier provides the high degree of sensitivity and selectivity for which the Super-Heterodyne is noted. The tuned circuits in the primary and secondary of both I.F. transformers afford a high degree of selectivity. High amplification is obtained by using the high mutual conductance 58 tube in a low frequency circuit which permits great amplification without instability.

Bias voltage for the I.F. amplifier tube is the same as the bias voltage for the 58 R.F. tube.

The I.F. transformers are small universal wound coils mounted on tubing. The I.F. tuning condensers are of the same type as the R.F. trimmer condensers and use mica dielectric. The coil tubing and the condensers are mounted on porcelain bases and are enclosed in aluminum cans located on top of the chassis. The adjusting screws of the four I.F. tuning condensers are reached from the bottom of the chassis.

CONDENSER ALIGNMENT

In the No. 900 chassis the R.F. and oscillator trimmer condensers are located on the variable tuning condenser assembly, one on each section. The tube shield cover plate extends over the top of the tuning condenser but need not be removed during readjustment of the trimmers as access to these is given by three circular holes in the cover plate. These trimmers are used to adjust the alignment at the high frequency end of the receiver.

There are also four I.F. trimmer condensers and in order to correct any misalignment of the I.F. transformers it is necessary to remove the chassis from the cabinet. The I.F. trimmer adjusting screws are located on the under side of the chassis subpanel and protrude through the porcelain bases of the I.F. transformers. The adjusting screws of the I.F. transformer trimmers as well as the R.F. trimmers should not be tampered with or changed unless it is apparent that they are out of adjustment. The I.F. trimmers are used to adjust the I.F. transformer circuits to 262 K.C.

An accurately calibrated signal generator and an output indicating meter are essential in order to align the R.F. and I.F. circuits correctly. This signal generator must provide a signal at the broadcast frequencies of from 550 to 1500 K.C. and an intermediate frequency signal at 262 K.C. The broadcast band signals of the signal generator must be accurately known as the dial scale of the receiver is calibrated in kilocycles and the alignment of the gang tuning condenser must be made at definite frequencies in order to have the pointer at the correct location on the scale for the various frequencies. The intermediate frequency signal of the signal generator must also be accurate in order to align the I.F. circuits at 262 K.C.

The companies manufacturing test equipment including Weston-Jewell Electrical Instruments Company, Radio Products Company and Supreme Instruments Corporation have combination R.F. and I.F. signal generators, suitable for servicing this chassis, available to the Radio Trade, which have incorporated in them copper oxide meters for reading the receiver output. The output meter is connected across the voice coils of the speaker or across the primary of the speaker input transformer if it is of sufficient range. The output meter should always be used for alignment as the method of alignment by using the ear to determine maximum output is essentially inaccurate.

During all of the following alignment procedure a "dummy" 57 tube (one which has one filament prong removed) should be inserted in the AVC socket. This will remove any possibility of AVC action which would make the determination of the output peak very difficult. Alignment should never be attempted without any tube in the AVC socket as the lack of the tube capacity in the circuits will cause an incorrect alignment to be made. Attenuate the signal generator output to as low a value as will give a satisfactory reading on the output meter. This will eliminate the possibility of overloading the 2nd detector.

Aligning Intermediate Condensers—It is essential that the I.F. transformers be correctly tuned for maximum deflection on the output meter before the R.F. and oscillator circuits can be correctly aligned. Connect the lead from the signal generator to the control grid of the 57 1st detector. The tube shield should be in position and the chassis grounded but the tube shield cover may be removed to facilitate making the control grid connection. A small battery clip on the signal generator lead makes for convenience in making this connection. Connect the ground lead of the signal generator to the ground post on the back of the chassis. The oscillator must be shorted out by grounding the lead from the tap on the secondary. This can be done conveniently by connecting a jumper from ground to the lug on the 3200 ohm resistor at the end which connects to the oscillator-I.F. assembly.

Then adjust the four intermediate frequency condenser screws until maximum output is obtained on the output meter. After all four of them have been adjusted the first time, go over them again and check the setting for maximum output.

Aligning R.F. and Oscillator Condensers—For adjusting the R.F. and oscillator condensers, the signal input should be made to the antenna post on the back of the receiver chassis.

Loosen the drive plate set screws and turn the tuning condenser rotor until the rotor plates are fully meshed with the stator plates. Turn the drive plate until the dial pointer is directly over the lowest frequency mark. Then tighten one set screw.

Set the signal generator for a signal of 1400 K.C. and turn the drive plate until the pointer

MODEL 2090 GAMBLE-SKOGMO, INC.

Alignment, Part 2
Socket, Voltage
Speaker Connections
Notes, Transformer Data

is directly over the 1400 K.C. mark. Adjust the three trimmers at this frequency for maximum output, adjusting the oscillator trimmer first (trimmer nearest back of chassis).

Set the signal generator for a signal of 600 K.C. and tune the receiver exactly to this signal. Carefully note the dial mark which is under the pointer. If the pointer is not at 600 K.C. on the dial loosen the drive plate set screw and adjust the dial pointer until it is set on the other side of the 600 K.C. mark an amount equal to one-half the frequency difference between the former setting and 600 K.C., being careful not to move the tuning condenser rotor during this change. For instance, if the dial pointer was at 580 K.C. when the 600 K.C. signal was tuned in, it should be moved to read 610 K.C. If the 600 K.C. signal was tuned in at 610 K.C. on the dial, the pointer should be moved to read 595 K.C. Then tighten the drive plate set screw lightly.

Set the signal generator again for a frequency of 1400 K.C. and adjust the tuning condenser so that the dial pointer is at 1400 K.C. on the dial. Readjust the trimmer condensers until maximum output is obtained on the output meter.

Recheck the calibration at 600 K.C. for maximum output. The dial reading should now be correct but in case it is still off slightly, the foregoing procedure should be gone through again. When maximum output is obtained with the pointer at 600 K.C. on the dial tighten both drive plate set screws tightly, taking care that the rotor shaft does not slip.

Then set the signal generator for signals of 1000, 750 and 600 K.C. and check the two R.F. condensers for resonance. Bend the slotted rotor plate sections of each of these two condensers which are last in mesh, in or out until maximum output is obtained. Do not adjust the oscillator condenser slotted rotor plate sections (condenser nearest back of chassis)

ISOLATION OF DEFECTS

The signal generator described in the preceding section provides a convenient and simple method of locating and isolating defects in the R.F. and I.F. circuits. This method consists of introducing a signal into the grid circuit of each tube starting with the 2nd detector and working on to the R.F. stage.

First set the signal generator for a signal of 262 K.C. and connect the ground lead of the signal generator to the ground post of the chassis. Touch the signal lead from the signal generator to the grid contact of the 2nd detector socket. It will, of course, be necessary to have the chassis removed from the cabinet for this test. If the receiver is in good condition from the 2nd detector on through the audio stages the signal will be reproduced at the loudspeaker.

Next connect the signal generator to the grid of the 58 I.F. tube. If the receiver is in operating condition from the I.F. tube through the output stage the signal will be heard at the speaker. Check the magnitude of the output with the output meter and, in order to determine if it is sufficient, make the same test on another receiver of the same type which is known to be in good working order. Then connect the signal generator lead to the grid of the 57 1st detector, ground the oscillator tap and read the output. If signal output is obtained it is an indication that the circuit through the 1st I.F. transformer, but not including the oscillator, is in good order.

Next set the signal generator for a signal in the broadcast band and connect the signal generator lead to the grid of the 57 1st detector. Remove the grounding lead from the oscillator tap. A deflection should be read on the output meter when the receiver is tuned to the frequency of the generator signal. This indicates that the chassis starting with the 1st detector and including the oscillator is in good condition. Then, still using the R.F. signal, connect the signal generator lead to the grid of the 58 R.F. tube. If the receiver is in good order starting with the R.F. tube, a deflection will be had on the output meter. If such is the case, the trouble can only be in the antenna input transformer.

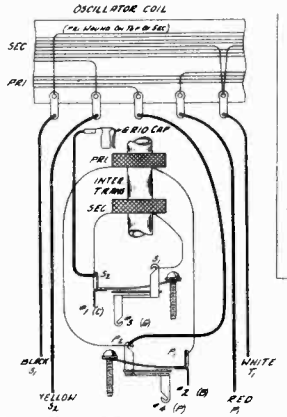
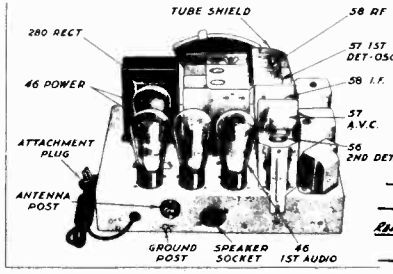


Fig. 4—Wiring Diagram, Osc. and I.F. Assembly



ANTENNA AND 1st DETECTOR TRANSFORMERS

The antenna and 1st detector transformers are matched at the factory in sets of two and should it be necessary to replace one of these it is desirable from the standpoint of efficient operation of the receiver to replace both of them. To replace only one transformer may result in a loss of performance unless the one replaced is of the correct value.

The two transformers are contained in shielding cans under the chassis subpanel. It is not necessary to remove these cans in order to replace the transformers. Unscrew and remove the screw holding the transformer mounting bracket to the subpanel. Bring the transformer out as far as the leads will permit and unsolder the leads to the transformer terminal lugs. Next put the new transformer in position and solder the leads to the lugs. Then replace the screw holding the transformer mounting bracket to the subpanel. After the two transformers have been installed, realign the tuning condensers in accordance with the instructions in the section on "Alignment."

OSCILLATOR AND 1st I.F. ASSEMBLY

The oscillator and I.F. assembly is made up in one compact unit contained in a shielding can. As explained in the article on the circuit, this unit has four coils, all in inductive relation. The primary and secondary of the intermediate frequency transformer in this unit are small universal wound coils. The primary is under the oscillator coil form, while the secondary is mounted in a lower position on the standard. The oscillator is wound on a coil form placed at the top of the unit. The primary winding is on top of the secondary. At the bottom of the unit on the porcelain base are the two I.F. tuning condensers. Complete wiring of the unit is shown in Fig. 4. The unit is carefully adjusted at the factory before assembly in the receiver. If it becomes defective in any way other than a break in the wiring connections which can readily be repaired, it is suggested that the whole unit be replaced rather than attempt replacement of the component parts.

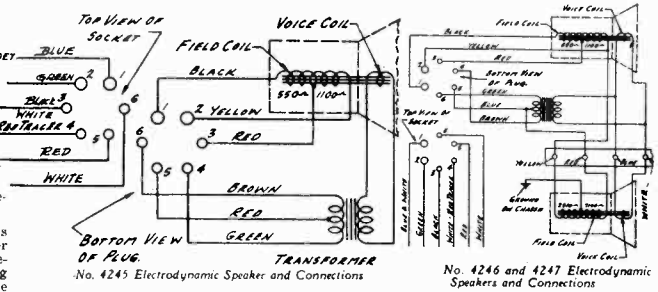
To replace this assembly, unsolder the leads to the lugs on the porcelain base and unsolder the four leads extending through the base. Remove the two nuts from the studs extending through the chassis subpanel, after which the assembly may be removed. The new assembly may then be put on and the leads soldered in.

If the oscillatory current is too high, grid current may flow in the 57 1st detector and 58 I.F. grid circuits. Grid current in the case of the 58 will manifest itself as a decrease in volume after the "Q" control has been increased past a certain setting. Grid current in the case of the 57 will manifest itself in weak action and as a whistle with no signal under certain conditions. The causes of oscillation being too strong are 3200 ohm biasing resistor being too low in value, .002 Mfd. bypass condenser being too high in value, too many turns on oscillator primary and oscillator primary wound low on coil with respect to the secondary, or a 57 1st detector tube which has a characteristic high plate current.

If the oscillations are too weak, this manifests itself as a flutter, usually at low frequencies. In extreme cases, oscillation may cease entirely, causing inoperation of the receiver at all frequencies. Weak oscillations are caused by the reverse of the conditions mentioned above; namely, 3200 ohm biasing resistor being too high in value, .002 Mfd. bypass condenser being too low in value, too few turns on oscillator primary, oscillator primary wound too high on the coil with respect to the secondary, or a low emission 57 1st detector tube.

BYPASS CONDENSERS

The correct testing of bypass condensers of the paper dielectric type for open or short circuits is of the utmost importance. This may be accomplished by using a direct reading ohmmeter. The application of the test prods to the condenser under test will cause a momentary deflection of the meter (the extent of the deflection depending upon the capacity of the condenser and the voltage used with the ohmmeter and in general, the larger the capacity the greater the deflection) after which the meter needle will drop back to infinity if the condenser is in good electrical condition. In the event the condenser circuit is open, there will be no deflection on the meter. A shorted condenser, on the other hand, will give a full scale deflection or zero resistance reading. A leaky condenser will give a partial reading depending upon the extent of the leak or the internal resistance. Bypass condensers of very small capacity in the order of .05 Mfd. or .002 Mfd. or less cannot be successfully tested by this method except for a shorted or leaky condition and if a condenser of this type is suspected of being open, simple trial replacement is the best procedure.

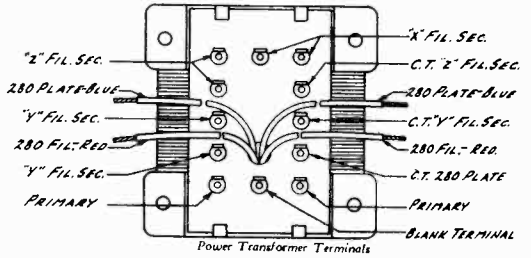


No. 4245 Electrodynamic Speaker and Connections

No. 4246 and 4247 Electrodynamic Speakers and Connections

FLUTTERING OR MOTORBOATING

The tube shield and cover must be on, otherwise motorboating may result. Still other causes are open or defective grid circuits or open bypass condensers. Fluttering is very often due to I.F. oscillation and the causes for such a condition should be investigated in line with the information given in the section on "Oscillation."



Power Transformer Terminals

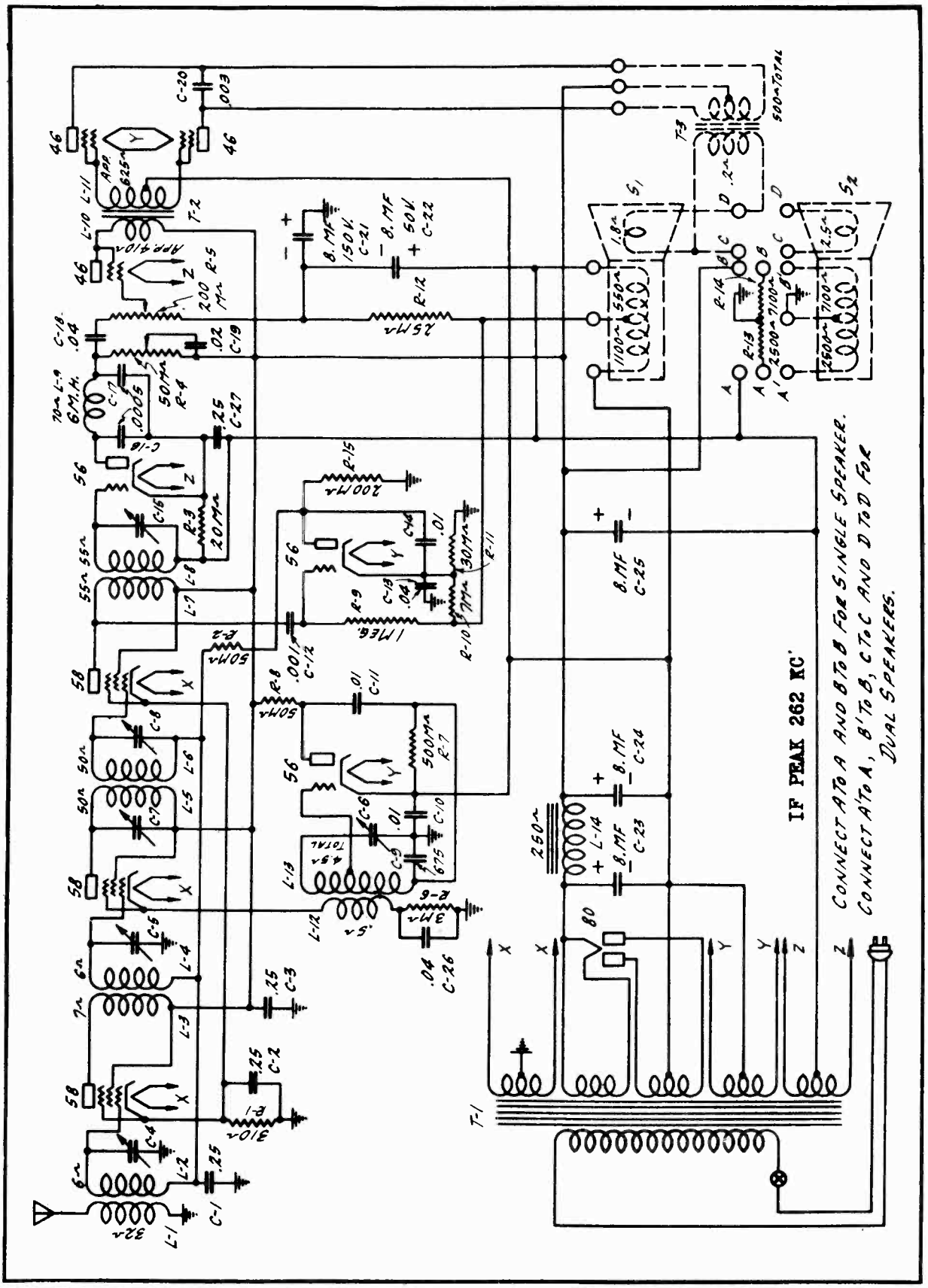
No. 2090 CHASSIS —VOLTAGES AT SOCKETS—LINE VOLTAGE 115
VOLUME CONTROL AT MAXIMUM—"Q" CONTROL AT MAXIMUM

Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Cathode Volts	Plate MA	Grid Test MA
58	1	R.F.	2.25	125	5.0(1)	125	1.7	5.0	6.0	10.0
57	2	1st Det	2.25	125	5.0(1)	125	.3(5)	5.0(5)	1.2(5)	2.0
58	3	I.F.	2.25	125	5.0(1)	125	1.7	5.0	6.0	10.0
57	4	AVC	2.25	100(3)	24.0(4)	145	0	24.0	0	0
56	5	2nd Det.	2.25	150	12.0			12.0	.4	.5
46	6	Driver	2.25	215	19.0(2)				25.0	30.0
46	7	Power	2.25	320					5.0(6)	13.0
46	8	Power	2.25	320					5.0(6)	13.0
280	9	Rect.	4.8						41 Per Plate	

(1) Measured from movable arm of "Q" control to ground. Reads 26 volts with "Q" control at minimum.
(2) Values read with analyzer plug in socket. Actual values different as analyzer prevents oscillator from oscillating.
(3) Measured with 600,000 Ohm Meter.
(4) Measured across 1000 Ohm Resistor.
(5) Measured across 10,000 Ohm Carbon Voltage Divider Resistor.
(6) Plate current at no signal. At full output plate current is 60 to 70 MA.

GAMBLE-SKOGMO, INC.

MODELS 2092,2094
Schematic



MODELS 2092,2094
Voltage,Alignment
Notes,Change

GAMBLE-SKOGMO, INC.

No. 2094 CHASSIS —VOLTAGES AT SOCKETS—LINE VOLTAGE 115
VOLUME CONTROL AT MAXIMUM

Type of Tube	Position of Tube	Function	"A" Volts	"B" Volts	Control Grid "C" Volts	Screen Volts	Screen Current MA	Cathode Volts	Plate Current MA	Grid Test MA
58	1	R.F.	2.35	125	.3(1)	125	1.3	5.0	5.6	9.6
58	2	1st Det	2.35	115	5.0(2)	115	.6	10.0	2.9	3.5
58	3	I.F.	2.35	125	.3(1)	125	1.3	5.0	5.6	9.6
56	4	2nd Det.	2.30	170	12.0			12.0	.6	.6
46	5	Driver	2.25	215	18.0(3)				18.0	21.0
56	6	Osc.	2.30	130	7-15(4)			0(4)	3.7	3.8
56	7	AVC	2.25	60(5)	2.0(6)			85.0	0	0
46	8	Class B	2.25	310	0				6.0(7)	13.0
46	9	Class B	2.25	310	0				6.0(7)	13.0
280	10	Rect.	4.2						41 Per Plate	

(1) Actual Voltage measured across 310 ohm biasing resistor—5.0 Volts.
(2) Actual Voltage measured across 3,000 ohm bias resistor—10 Volts.
(3) Read with Volume Control at minimum.
(4) Varies as shown with frequency. Actual voltage measured across 500,000 ohm bias resistor—15 to 35 Volts.
(5) Actual Voltage measured across 30,000 ohm voltage divider resistor—92 Volts.
(6) Actual Voltage measured across 7,000 ohm voltage divider resistor—22 Volts.
(7) Plate current at no signal.

Remove the 56 oscillator tube during I.F. alignment.

Alignment of the R.F. and oscillator circuits is made at 1400 K.C. by means of the trimmer condensers mounted on the main tuning condenser. These should be adjusted to give maximum output on a 1400 K.C. oscillator signal with the receiver dial indicator set exactly at 1400. When maximum output has been obtained the oscillator is next set for a signal of 600 K.C. and the receiver tuned to this signal. The dial reading should then be 600 but, if it is not exact, may be corrected by loosening the set screws which hold the drive disc and turning the disc until correct reading is obtained. Alignment at 1400 K.C. will then have to be repeated.

OSCILLATION

A common cause of oscillation is open bypass condensers and these should be checked by simple trial replacement. Coupling between I.F. grid and plate leads may cause the trouble and these leads should be separated and pushed close to the chassis. Too great R.F. gain in the receiver may cause instability or oscillation and is corrected by removing four or five turns from the primary of the 1st detector transfomer. This should not be done, however, until all other causes of oscillation have been investigated.

DISTORTION

Distorted reproduction may be brought about by defective tubes and in any case of distortion these should be checked first. An inoperative 46 output tube will especially cause distortion due to harmonics in the output of the good tube not being balanced out by the other tube. Leaky or open bypass condensers may also cause distortion.

The connections to the voice coil of one speaker being reversed will cause a very noticeable distortion and these should be checked at the terminal strip. Open field windings in either speaker will allow the receiver to continue operation but at reduced volume and with some distortion.

At low volume, distortion may be caused by a tone control rheostat having a resistance higher than the normal value of 50,000 ohms. Other resistors which will bring about distortion if they are high in value are the 20,000 ohm 2nd detector bias resistor and the 7,000 ohm resistor in the voltage dividing circuit which provides grid bias for the AVC tube. In case of distortion at low volume, therefore, these resistors should be checked with an ohmmeter and replaced if not within normal 10% limits.

EXCESSIVE HUM

Excessive hum may be brought about by an open filter condenser or by an open circuit in one half of the 280 plate winding of the power transformer.

Heater-cathode shorts in the 56 or 58 tubes will cause the hum to be higher than normal and new tubes should be tried in any case of excessive hum. Certain 46 tubes, when used in the driver stage, will produce a hum much greater than normal and the tube in this socket should be inter-changed with the other two 46 tubes in the receiver.

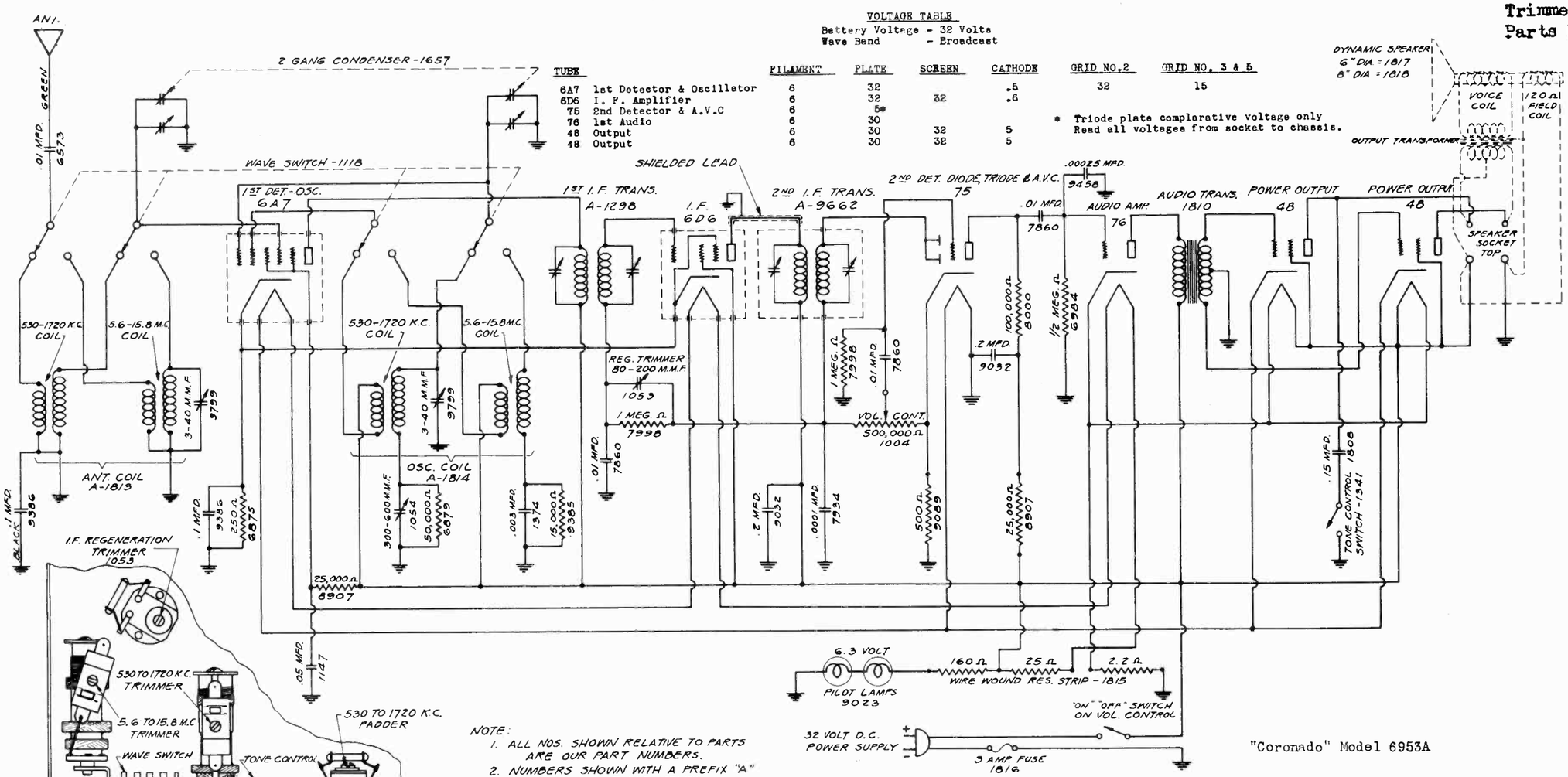
Shorted turns in the filter choke or 1,650 ohm speaker field will cause the receiver to hum as will various shorts, opens or grounds at different points in the chassis.

CHASSIS No. 2092

Chassis No. 2092 is practically the same as chassis No. 2094, except that it is designed for single speaker operation. A speaker having a 1,650 ohm field is used with this chassis and a tapped wire wound resistor is substituted for the field of the second speaker.

GAMBLE-SKOGMO, INC.

MODEL 6953-A
Schematic, Voltage
Trimmers, Notes
Parts List



LOCATION OF PADDERS & TRIMMERS IN LEFT HAND (FRONT) BOTTOM OF CHASSIS

VOLTAGE TABLE
Battery Voltage - 32 Volts
Wave Band - Broadcast

TUBE		FILAMENT	PLATE	SCREEN	CATHODE	GRID NO.2	GRID NO. 3 & 5
6A7	1st Detector & Oscillator	6	32		.5	32	15
6D6	I. F. Amplifier	6	32	32	.6		
75	2nd Detector & A.V.C	6	5*				
76	1st Audio	6	30				
48	Output	6	30	32	5		
48	Output	6	30	32	5		

* Triode plate comparative voltage only
Read all voltages from socket to chassis.

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

"Coronado" Model 6953A

The power plug attached to the end of the power cord must be inserted correctly in the 32 volt power supply outlet or receptacle, otherwise the set will not operate. If after inserting the plug and turning the receiver on the set does not operate after approximately two minutes, remove the plug and turn it half way around and reinsert it in the power receptacle.

FUSE: A 3 ampere fuse is located on the back of the chassis adjacent to the speaker plug and protects the receiver from damage should a defect occur in the set or if it is connected to the improper power supply. Continued burning out of fuses on the proper power supply is indicative of some defect and the receiver shou be referred to your dealer for examination. THE WARRANTY IS VOID IF THE RECEIVER IS OPERATED WITH THE FUSE SHORTED OUT OR WITH A FUSE LARGER THAN 3 AMPERES.

ANTENNA: Always make the antenna as long as possible consistent with satisfactory selectivity. In most installations an antenna from 35 to 75 feet in length including lead-in will be ample. In isolated communities where distant daylight reception is desired it may be necessary to increase this so as to obtain good satisfactory daylight reception. As considerable radio interference (static noise) may be picked up when the generator is charging the battery if the aerial or lead-in are run parallel to the 32 volt power lines, the aerial and the lead-in should always be placed as far away from the 32 volt lighting lines as possible. This is not a reflection on the receiver nor does it indicate a defect, as the interference is caused by the generator. Some plant generators have built-in traps which effectively eliminate this interference. The aerial should be connected to the green lead coming out at the rear of the chassis.

GROUND: It is important that a good ground be used. A good ground clamp should be attached to a cold water pipe, or if no cold water pipe is available an iron pipe driven in the ground three or four feet in a place where it is moist will be satisfactory. Connect the ground to the black lead coming out at the rear of the chassis.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

PART NUMBER		LIST PRICE	PART NUMBER		LIST PRICE
1813	Antenna Coil	$1.63	1148	.5 Mfd. 200 Volt Condenser	$ .55
1814	Oscillator Coil	1.63	9032	.2 Mfd. 200 Volt Condenser	.23
1298	First I.F. Transformer	2.05	9386	.1 Mfd. 200 Volt Condenser	.19
9662	Second I. F. Transformer	2.05	1147	.05 Mfd. 200 Volt Condenser	.17
1810	Audio Transformer	1.75	6573	.01 Mfd. 200 Volt Condenser	.17
1657	Two Gang Variable Condenser	4.00	1808	.15 Mfd. 200 Volt Condenser	.17
1106	Drive Disc with Hub	.30	7860	.01 Mfd. 400 Volt Condenser	.17
1641	Calibrated Dial (Calibration No. 1653) with Frame and Gasket	.50	1815	Resistor Strip	.95
	Glass for above Dial	.35	1333	18,000 Ohm 1/2 Watt Resistor	.19
1744	Calibrated Dial (Calibration No. 1745) with Frame and Gasket	.48	7998	1 Meg Ohm 1/3 Watt Resistor	.19
	Glass for above Dial	.35	6984	500,000 Ohm 1/3 Watt Resistor	.19
9023	6.3 Volt .15 Ampere Pilot Light	.19	8907	25,000 Ohm 1/3 Watt Resistor	.19
1118	Wave Switch	.75	6879	50,000 Ohm 1/3 Watt Resistor	.19
9799	Trimmer Condenser	.15	9385	15,000 Ohm 1/3 Watt Resistor	.19
1053	Padding Condenser	.50	8000	100,000 Ohm 1/3 Watt Resistor	.19
1054	Padding Condenser	.55	9089	500 Ohm 1/3 Watt Resistor	.19
1004	Volume Control and Off and On Switch	1.24	6875	250 Ohm 1/3 Watt Resistor	.19
1341	Tone Control Switch	.39	1179	Large Knob	.16
1548	Fuse Block Receptacle	.25	1180	Small Knob with Dot	.17
1816	3 Ampere Fuse	.12	1206	Escutcheon Plete marked "Foreign and Broadcast"	.13
7934	.0001 Mfd. Moulded Condenser	.21	1207	Escutcheon Plate marked "On and Off"	.13
9458	.00025 Mfd. Moulded Condenser	.21	1817	6" Dynamic Speaker	7.25
1374	.003 Mfd. Moulded Condenser	.21	1818	8" Dynamic Speaker	9.00

GAMBLE-SKOGMO, INC.

MODEL 6953-A
Alignment

SERVICE NOTES
for the
SIX TUBE SUPERHETERODYNE RECEIVER
TWO BAND
1720 to 530 Kilocycles
15.8 to 5.6 Megacycles
THIRTY-TWO VOLT

This receiver is designed for operation on 32 volt battery plants only and must not be used on battery plants of a higher rated voltage than 32 volts without a voltage regulator. If the rating is higher than 32 volts consult your dealer, who will supply the proper voltage regulator.

ALIGNMENT PROCEDURE: Realignment of this receiver should never be necessary unless one of the oscillator, antenna, or RF coils has been replaced. Lack of sensitivity, selectivity, and poor tone quality may be due to any one or a combination of causes such as weak or defective tubes or speaker, inadequate or excessively long antenna, open or grounded bias resistor, bypass condenser, etc. Under no circumstances should realignment be attempted until all other possible sources have been first thoroughly investigated and have been definitely proven not to be the cause. If an IF tube is replaced it is advisable to realign the IF amplifier particularly if the replacement tube is one of a different manufacture than the one in the receiver. It is important when aligning to carefully follow the procedure in the order given, otherwise the receiver will lack sensitivity and the dial calibration will be incorrect. IT IS IMPERATIVE THAT AN ACCURATELY CALIBRATED OSCILLATOR BE USED WITH SOME TYPE OF OUTPUT MEASURING DEVICE.

INTERMEDIATE ALIGNMENT:

1. Connect the high side of the oscillator output to the control grid of the 6A7 tube. Leave the grid cap disconnected and connect a 1 meg ohm resistor from the modulator grid to the chassis base. Connect the ground side of the oscillator to the receiver ground lead.

2. Set the test oscillator frequency to 465 kilocycles (this must be accurate).

3. Align the first intermediate transformer by turning one of the trimmer screws up and down (increasing and decreasing capacity) until maximum reading is obtained on the output meter, after which adjust the other trimmer screw of the same transformer for maximum sensitivity.

4. Adjust the other intermediate transformers in the same manner.

NOTE: Two types of intermediate transformer trimmers have been used in this receiver. One type has two parallel holes in the top of the shield, one for each trimmer. The other type has a brass hex nut for adjusting one trimmer, the other intermediate trimmer being adjusted with the trimmer screw located inside of the brass hex nut. Regardless of which type trimmer is used the procedure is the same.

5. Adjust the IF regeneration trimmer located underneath the chassis for maximum 465 kilocycle signal sensitivity. If adjustment of this trimmer causes the receiver to oscillate always adjust to a point where oscillation just stops, and then back off 1/8 turn.

TO ALIGN THE VARIABLE CONDENSER: It is important when aligning the gang condenser and padding and trimmer condensers to follow the procedure given carefully, otherwise the receiver will be insensitive and the dial calibration will be incorrect. The two coils located on the underside of the chassis which have trimmer condensers mounted on them will be referred to by their function as indicated on the circuit diagram.

1. Connect the high output side of the test oscillator through a .00025 Mfd. condenser to the set antenna lead and the ground to the set ground.

2. Place the band selector switch for operation on the 15.8 to 5.6 megacycle band, tune the receiver to EXACTLY 14 MEGACYCLES on the dial, and set the test oscillator frequency to EXACTLY 14 MEGACYCLES. THEN BRING IN THE 14 MEGACYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING THE TRIMMER CONDENSER LOCATED ON TOP OF THE OSCILLATOR SECTION OF THE GANG CONDENSER. Looking at the front of the receiver the oscillator section is the rear section of the gang condenser. When adjusting this trimmer two peaks, the fundamental and the image peak, will be noticed. CARE MUST BE TAKEN SO THAT THE FUNDAMENTAL PEAK AND NOT THE IMAGE PEAK IS USED FOR ALIGNING THE RECEIVER AT 14 MEGACYCLES. First back off the trimmer to minimum capacity, next screw down the trimmer (add capacity) until the first peak, which is the fundamental and the one you are to use, is tuned in. If the trimmer is screwed down beyond the point where this first peak is received the incorrect image peak will be tuned in. When the first peak has been located adjust the trimmer to bring in the 14 megacycle signal to maximum output. After completing this adjustment always check to see if the proper peak has been used. To do this leave the test oscillator frequency at 14 megacycles, increase the output of the test oscillator and then tune the receiver dial to approximately 13 megacycles. Vary the receiver dial slightly to the right and left of 13 megacycles and if the fundamental peak was used in aligning at 14 megacycles the test oscillator signal will be heard at approximately 13 megacycles on the receiver dial. If it is not possible to receive the signal then the fundamental peak was not used and the 14 megacycle adjustment of the trimmer on top of the oscillator section of the gang condenser must be gone over and properly adjusted.

3. Set the band selector switch for operation on the broadcast band (1720-530 K.C.) adjust the test oscilletor frequency to EXACTLY 1400 KILOCYCLES and the receiver dial to EXACTLY 1400 KILOCYCLES. THEN BRING IN THE 1400 KILOCYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING THE 1720-530 KILOCYCLE TRIMMER (see circuit diagram) mounted on one of the coils located underneath the chassis. Next adjust the trimmer located on the front section of the gang condenser for maximum 1400 kilocycle signal sensitivity.

4. Leave the band selector switch for operation on the broadcast band (1720-530 K.C.), tune the receiver dial and set the test oscillator frequency to approximately 600 kilocycles. While rocking the gang condenser slightly to the right and left adjust the 1720-530 kilocycle padder condenser which is located on and accessible through the small hole in the front of the chassis, for maximum sensitivity.

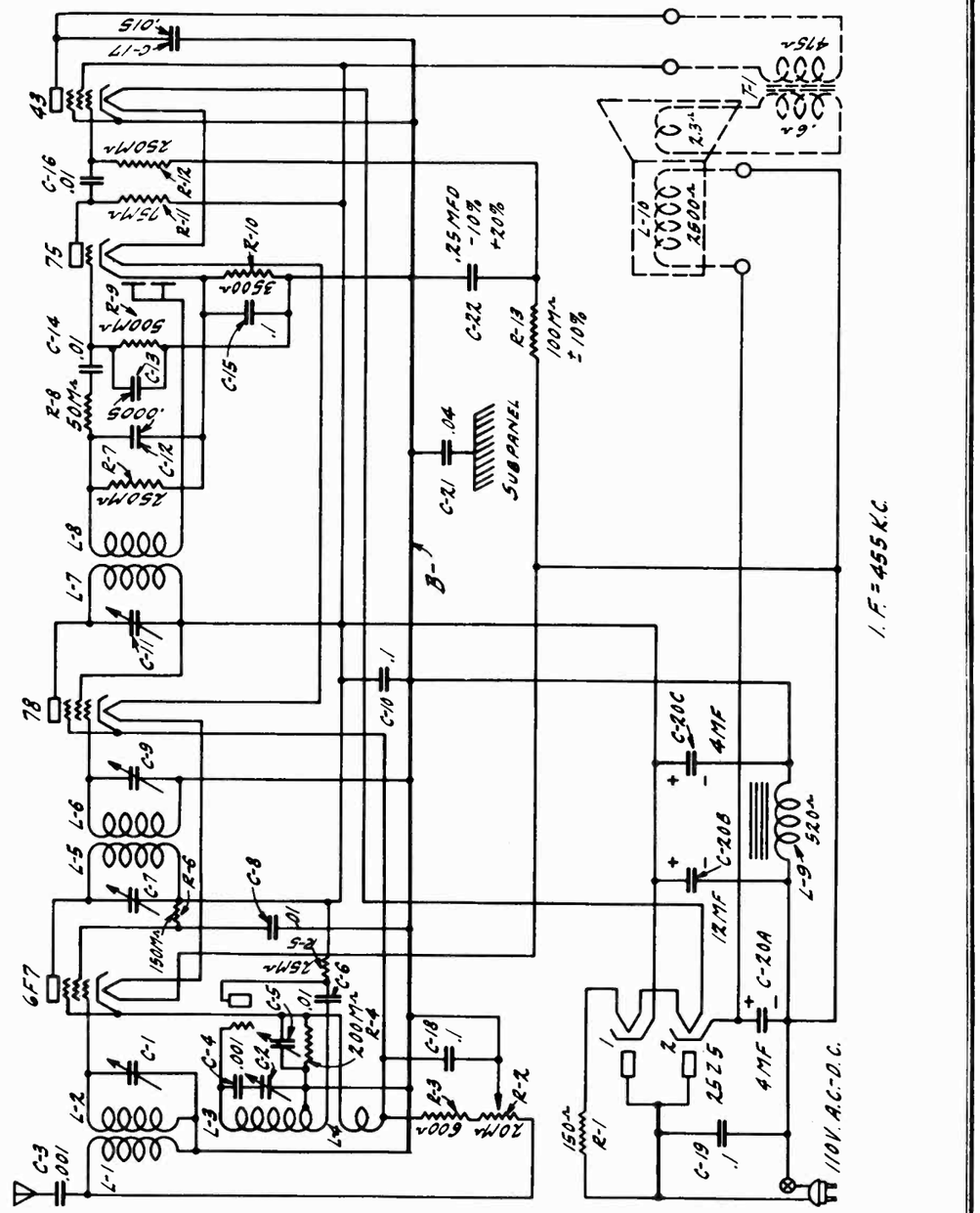
5. Recheck the 1400 kilocycle signal adjustment.

6. Place the band selector switch for operation on the short wave 15.8 to 5.6 megacycle band, set the test oscillator frequency to EXACTLY 14 MEGACYCLES and tune the receiver to EXACTLY 14 MEGACYCLES. While rocking the gang condenser slightly to the right and left adjust the 5.6 to15.8 megacycle trimmer (see circuit diagram) mounted on one of the coils underneath the chassis.

This completes the alignment and it is recommended that all the adjustments be gone over again, as generally it will be found that improved results can be obtained if this is done. Assuming that all tubes and component parts of the set are okeh, then extreme inaccuracies in the dial calibration, low sensitivity, and poor selectivity are indications that the alignment procedure has not been followed.

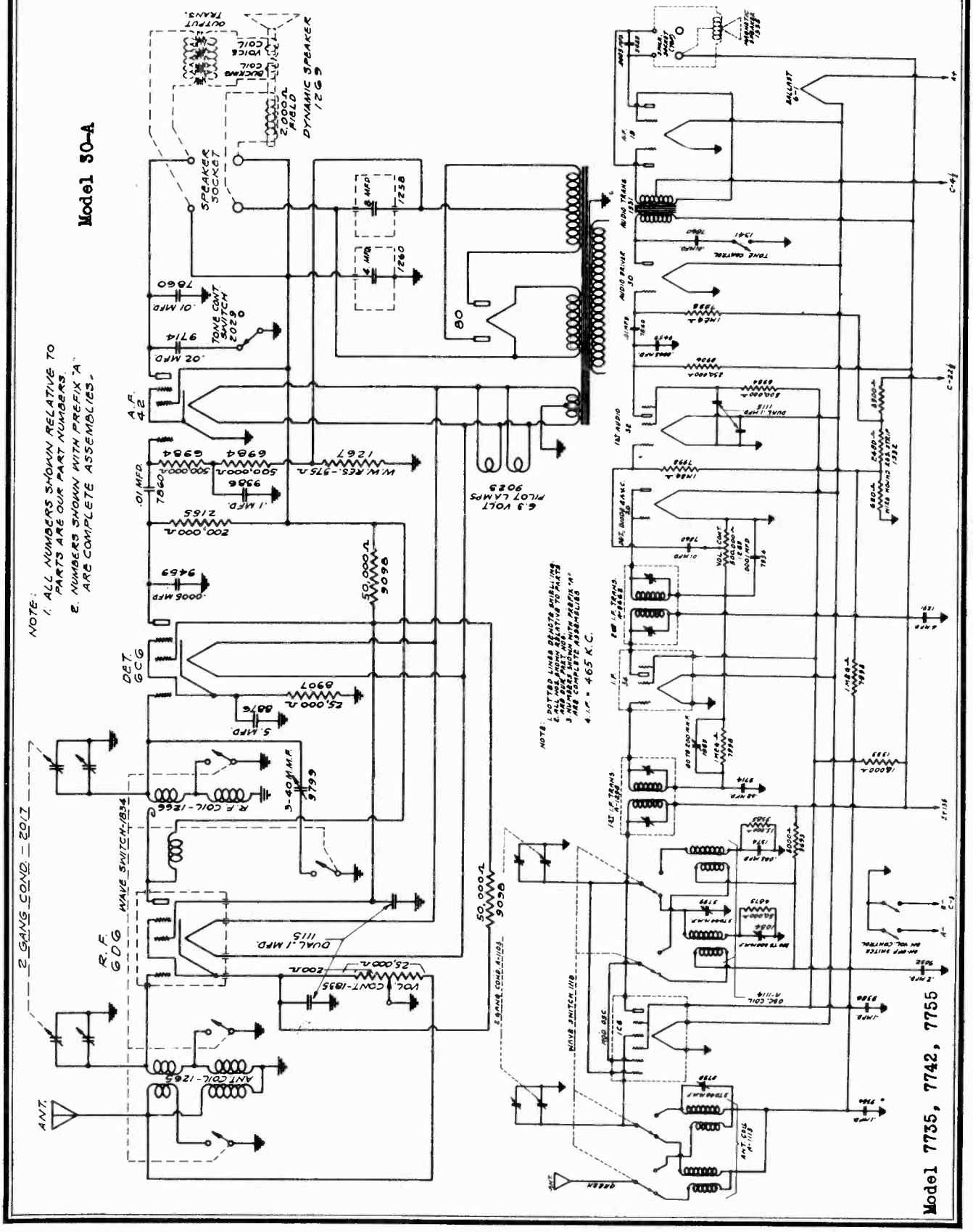
MODEL 3128
Schematic

GAMBLE-SKOGMO, INC.



GAMBLE-SKOGMO, INC.

MODEL 30-A
MODELS 7735, 7742
7755
Schematics



MODELS 7735,7742
7756
Alignment,Voltage
Parts List

GAMBLE-SKOGMO, INC.

SERVICE NOTES
FOR THE
BATTERY OPERATED
SEVEN TUBE SUPERHETERODYNE RECEIVER

ALIGNMENT PROCEDURE: FOR PROPERLY ALIGNING EITHER THE INTERMEDIATE TRANSFORMER OR THE GANG CONDENSER IT IS NECESSARY THAT AN ACCURATELY CALIBRATED TEST OSCILLATOR BE USED WITH SOME TYPE OF OUTPUT MEASURING DEVICE.

INTERMEDIATE ALIGNMENT:

1. CONNECT THE HIGH SIDE OF THE TEST OSCILLATOR OUTPUT TO THE CONTROL GRID OF THE 106 TUBE LEAVING THE GRID CAP DISCONNECTED. CONNECT THE GROUND SIDE OF THE TEST OSCILLATOR TO THE RECEIVER CHASSIS.

2. SET THE TEST OSCILLATOR FREQUENCY TO 465 KILOCYCLES (THIS MUST BE ACCURATE).

3. ALIGN THE FIRST INTERMEDIATE TRANSFORMER BY TURNING ONE OF THE TRIMMER SCREWS UP AND DOWN UNTIL MAXIMUM READING IS OBTAINED ON THE OUTPUT METER, AND THEN ADJUST THE OTHER TRIMMER SCREW OF THE SAME TRANSFORMER FOR MAXIMUM SENSITIVITY.

4. ADJUST THE SECOND INTERMEDIATE TRANSFORMER IN THE SAME MANNER.

NOTE: TWO TYPE INTERMEDIATE TRANSFORMER TRIMMERS HAVE BEEN USED IN THIS RECEIVER. ONE TYPE HAS TWO PARALLEL HOLES IN THE TOP OF THE SHIELD, ONE FOR EACH TRIMMER. THE OTHER TYPE HAS A BRASS HEX NUT FOR ADJUSTING ONE TRIMMER, THE OTHER INTERMEDIATE TRIMMER BEING ADJUSTED WITH THE SCREW LOCATED INSIDE OF THE BRASS HEX NUT. REGARDLESS OF WHICH TYPE TRIMMER IS USED THE PROCEDURE IS THE SAME.

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

1. CONNECT THE HIGH OUTPUT SIDE OF THE TEST OSCILLATOR TO THE RECEIVER ANTENNA LEAD AND THE GROUND TO THE CHASSIS.

2. PLACE THE BAND SELECTOR SWITCH FOR OPERATION ON THE SHORT WAVE BAND, TUNE THE RECEIVER TO EXACTLY 15 MEGACYCLES ON THE DIAL, AND SET THE TEST OSCILLATOR FREQUENCY TO EXACTLY 15 MEGACYCLES. THEN TUNE IN THE 15 MEGACYCLE SIGNAL BY ADJUSTING THE TRIMMER MOUNTED ON TOP OF THE OSCILLATOR SECTION OF THE GANG CONDENSER TO MAXIMUM OUTPUT. LOOKING AT THE FRONT OF THE RECEIVER THE OSCILLATOR SECTION IS THE REAR SECTION OF THE GANG CONDENSER.

3. SET THE BAND SELECTOR SWITCH FOR OPERATION ON THE BROADCAST BAND, ADJUST THE TEST OSCILLATOR FREQUENCY TO 1400 KILOCYCLES AND SET THE RECEIVER DIAL TO EXACTLY 1400 KILOCYCLES. NEXT, BRING IN THE 1400 KILOCYCLE SIGNAL TO MAXIMUM OUTPUT BY ADJUSTING THE TRIMMER LOCATED UNDERNEATH AND NEAR THE CENTER FRONT OF THE CHASSIS.

4. AFTER MAKING THIS ADJUSTMENT TUNE THE DIAL TO 1720 KILOCYCLES AND SET THE TEST OSCILLATOR FREQUENCY TO 1720 KILOCYCLES. IF THE 1720 KILOCYCLE SIGNAL CANNOT BE RECEIVED REDUCE THE 1400 KILOCYCLE TRIMMER CAPACITY UNTIL THE 1720 KILOCYCLE SIGNAL IS BROUGHT IN.

5. NEXT, SET THE RECEIVER DIAL AND TEST OSCILLATOR TO EXACTLY 1400 KILOCYCLES, AND ADJUST THE TRIMMER LOCATED ON THE FRONT SECTION OF THE GANG CONDENSER FOR MAXIMUM SENSITIVITY.

6. LEAVE THE BAND SELECTOR SWITCH FOR OPERATION ON THE BROADCAST BAND, TUNE THE RECEIVER, AND SET THE TEST OSCILLATOR TO APPROXIMATELY 600 KILOCYCLES. THEN ADJUST THE 600 KILOCYCLE PADDING CONDENSER, WHICH IS LOCATED ON AND ACCESSIBLE THROUGH THE SMALL HOLE IN THE FRONT OF THE CHASSIS, FOR MAXIMUM SENSITIVITY. AS THIS ADJUSTMENT IS QUITE CRITICAL IT IS NECESSARY TO ROCK THE CONDENSER SLIGHTLY TO THE RIGHT AND LEFT TO FIND THE POINT OF GREATEST SENSITIVITY.

7. PLACE THE BAND SELECTOR SWITCH FOR OPERATION ON THE SHORT WAVE BAND, ADJUST THE TEST OSCILLATOR FREQUENCY TO EXACTLY 15 MEGACYCLES AND SET THE RECEIVER DIAL TO 15 MEGACYCLES. TURN THE RECEIVER ON ITS BACK WITH THE DIAL UP AND ADJUST THE TRIMMER, WHICH IS MOUNTED ON THE TOP OF THE COIL UNDERNEATH AND NEAR THE RIGHT HAND SIDE OF THE CHASSIS, FOR MAXIMUM OUTPUT. BE SURE TO ROCK THE CONDENSER SLIGHTLY TO THE RIGHT AND LEFT WHEN MAKING THIS ADJUSTMENT.

THIS COMPLETES THE ALIGNMENT PROCEDURE. IT IS RECOMMENDED THAT ALL OF THE ADJUSTMENTS BE GONE OVER AGAIN. GENERALLY IT WILL BE FOUND THAT IMPROVED RESULTS CAN BE OBTAINED IF THIS IS DONE.

VOLTAGE TABLE
"A" BATTERY - 3 VOLT DRY CELL
"B" BATTERY - 3 45 VOLT "B" BATTERIES
"C" BATTERY - 1 22½ VOLT BATTERY

TUBE	FILAMENT	PLATE	SCREEN	GRID NO. 2	GRID NO. 3 AND 5
106 OSCILLATOR & 1ST DETECTOR	2.1	135		115	67½
30 SECOND DETECTOR	2.1				
34 INTERMEDIATE FREQUENCY	2.1	135	67½		
32 1ST AUDIO	2.1	37.5*	20*		
30 DRIVER	2.1	135			
19 OUTPUT	2.1	135 EACH PLATE			

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

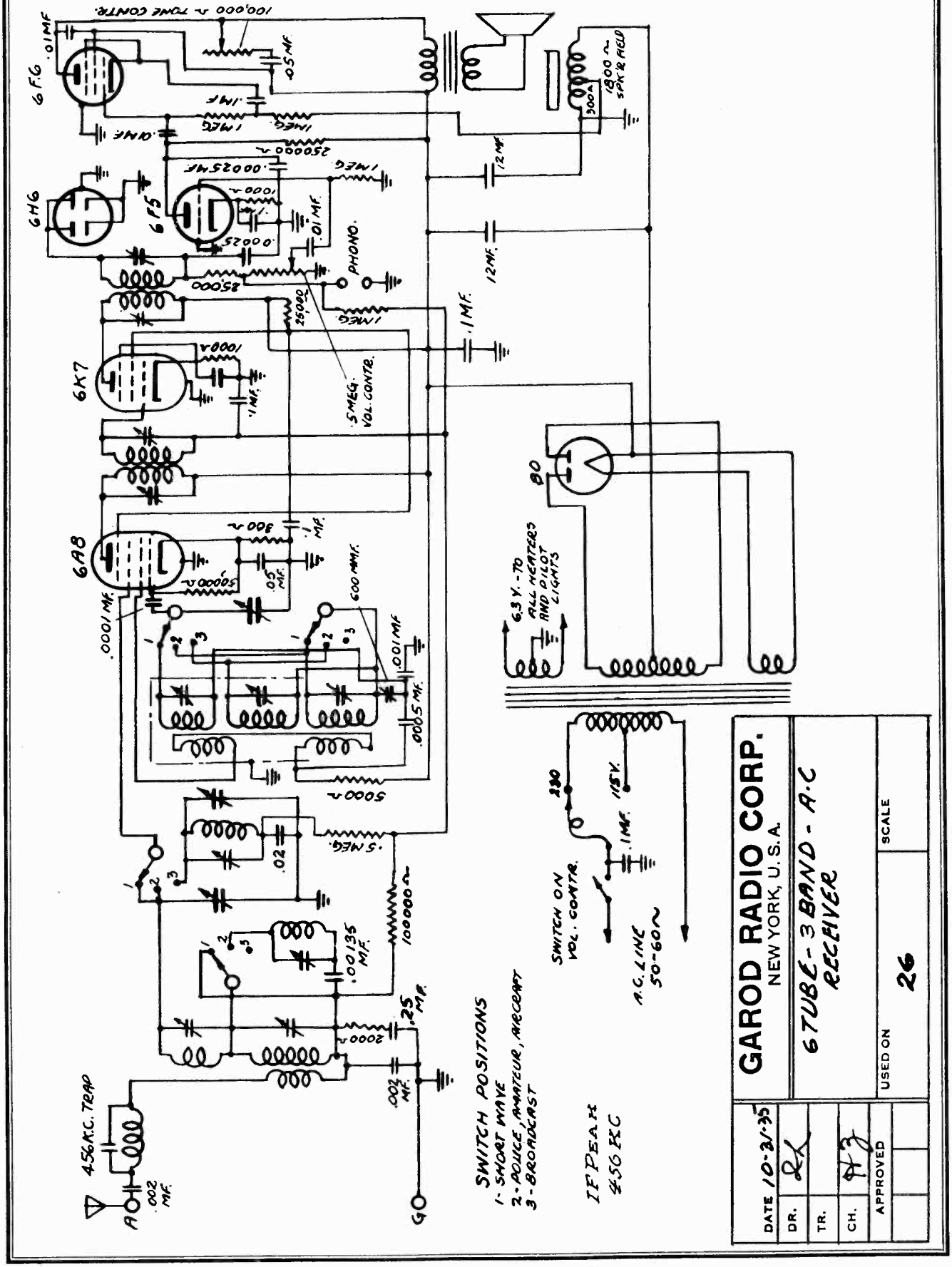
TOTAL "B" DRAIN - .023 AMPERES
TOTAL "A" DRAIN - .620 AMPERES

PART NUMBER		LIST PRICE	PART NUMBER		LIST PRICE
1113	ANTENNA COIL	$1.63	1103	TWO GANG CONDENSER USED WITH EARLY TYPE DIAL	$3.93
1114	OSCILLATOR COIL	1.63	1657	TWO GANG CONDENSER USED WITH AEROPLANE TYPE DIAL	4.00
1298	1ST I. F. TRANSFORMER	2.05			
9662	2ND I. F. TRANSFORMER	2.05	1106	DRIVE DISC WITH METAL HUB	.32
1331	AUDIO TRANSFORMER	1.40	1641	CALIBRATED DIAL (CALIBRATION #1371) WITH FRAME AND GASKET	.50
1291	4 MFD. WET ELECTROLYTIC CONDENSER	.85			
1115	DUAL .1 MFD. 200 VOLT CONDENSER	.35	1641	CALIBRATED DIAL (CALIBRATION #1653) WITH FRAME AND GASKET	.50
7860	.01 MFD. 400 VOLT CONDENSER	.17			
9032	.2 MFD. 200 VOLT CONDENSER	.23	1744	CALIBRATED DIAL (CALIBRATION #1405) WITH FRAME AND GASKET	.50
9459	.0005 MFD. MICA MOULD CONDENSER	.21			
7934	.0001 MFD. MICA MOULD CONDENSER	.21	1744	CALIBRATED DIAL (CALIBRATION #1745) WITH FRAME AND GASKET	.50
1374	.003 MFD. MICA MOULD CONDENSER	.21			
1332	WIRE WOUND RESISTOR STRIP	.35		GLASS FOR ABOVE DIALS	.35
7998	1 MEG OHM 1/3 WATT RESISTOR	.19	1206	ESCUTCHEON PLATE MARKED FOREIGN AND BROADCAST	.13
6984	500,000 OHM 1/3 WATT RESISTOR	.19	1207	ESCUTCHEON PLATE MARKED ON AND OFF	.13
8906	250,000 OHM 1/3 WATT RESISTOR	.19	1361	TUBE SHIELD	.15
6879	50,000 OHM 1/3 WATT RESISTOR	.19	9988	TUBE SHIELD	.11
1335	SPEAKER	6.25	1053	PADDING CONDENSER	.50
1118	WAVE SWITCH	.75	1054	PADDING CONDENSER	.55
1333	18,000 OHM 1/2 WATT RESISTOR	.19	9799	TRIMMER CONDENSER	.15
9693	5,000 OHM 1/3 WATT RESISTOR	.19	6-1	VOLTAGE REGULATOR TUBE	3.00
8907	25,000 OHM 1/3 WATT RESISTOR	.19	1179	KNOB, LARGE	.15
1292	6 CONDUCTOR BATTERY CABLE	.68	1180	KNOB, SMALL WITH DOT	.17
1289	VOLUME CONTROL WITH D. P. S. T. SWITCH	1.24	9758	KNOB, SMALL	.14
1341	TONE CONTROL SWITCH	.40	1370	TUNING DIAL EARLY TYPE	.30

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 26
Schematic

GAROD RADIO CORP.



GAROD RADIO CORP. NEW YORK, U.S.A.	6 TUBE - 3 BAND - A.C RECEIVER	SCALE
	USED ON 26	

DATE 10-3-35	DR.	TR.	CH.	APPROVED

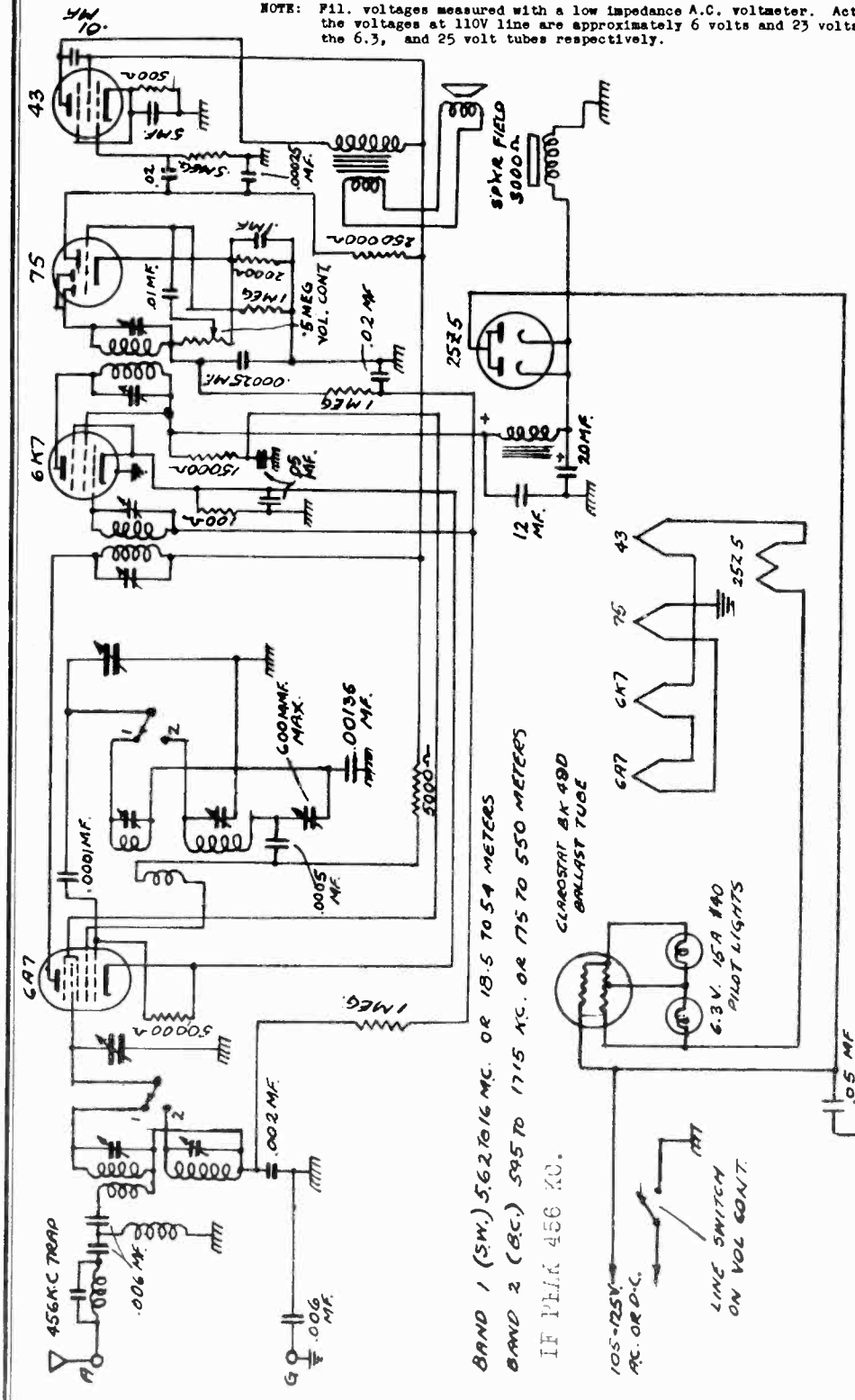
MODEL 60
Schematic
Voltage
Alignment

GAROD RADIO CORP.

VOLTAGE TABLE

TUBE	FUNCTION	H'T'R	PLATE	SC.GR	CATH.	OSC.PL.
6A7	det.-osc.	4.5	100.2	65.0	---	90.0
6K7	i.f. ampl.	4.3	100.2	100.0	---	----
75	diode det. and 1st audio	4.4	40.0	---	---	----
43	audio outp.	20.2	94.0	100.0	12.3	----
25Z5	rectifier	21.0	114.0	---	---	----

NOTE: Fil. voltages measured with a low impedance A.C. voltmeter. Actually, the voltages at 110V line are approximately 6 volts and 23 volts for the 6.3, and 25 volt tubes respectively.



I.F. ADJUSTMENT - The signal generator is set at 456 kc. The "hot" lead from the signal generator is connected to the grid cap on the 1st detector (6A7) tube, the clip having first been removed from the tube cap. The ground lead is connected to the receiver chassis. The oscillator section (front) of the gang tuning condenser is short-circuited and the volume control turned on full. The i.f. trimmers are then adjusted for maximum gain in the receiver. These trimmers are located on top of the i.f. transformer shield cans, which are situated in the rear of the chassis. The one towards the right is the 1st. i.f. transformer and the left one is the 2nd i.f. transformer.

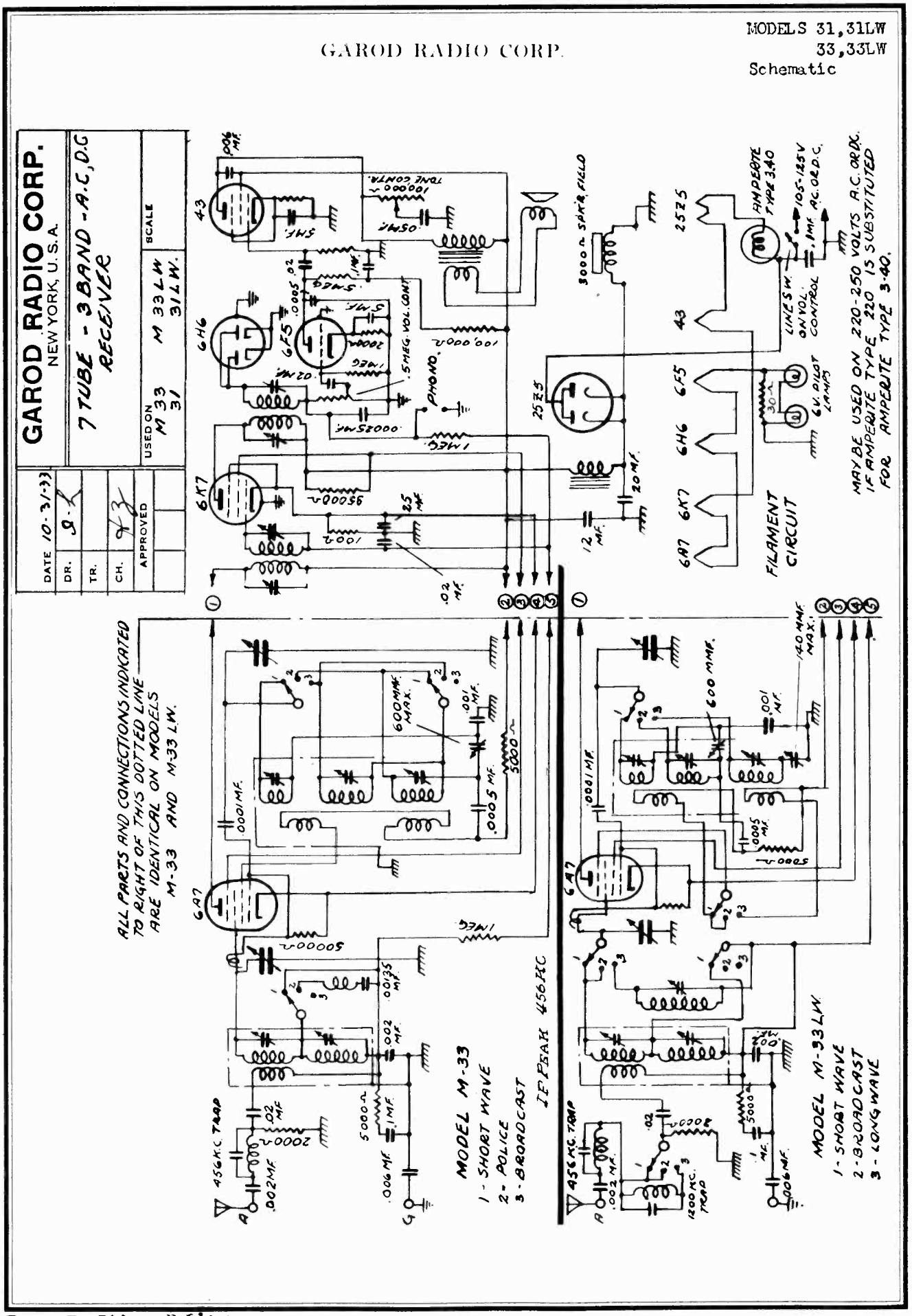
15 MEGACYCLE ADJUSTMENT - The short-circuit is removed from the oscillator condenser and the grid clip replaced in its normal position on the cap of the 6A7 tube. The "hot" lead from the signal generator is connected to the antenna lead of the receiver and the ground lead to the ground of the receiver. With the volume control set at maximum and a minimum input signal from the signal generator, the band switch is turned to the left and the receiver dial set at 15 mc. The oscillator trimmer is adjusted so as to bring the signal in at this setting. The oscillator coil is underneath the chassis and is located directly under the variable gang condenser. The short wave trimmer is over the short wave winding (Heavy spaced wire). After the oscillator is set, the antenna trimmer is adjusted for maximum output as indicated by the output meter. (Again the S. W. antenna trimmer is located over the heavy spaced winding on the antenna coil, and is accessible from the top of the chassis). There are no other adjustments on this band.

1400 KC KILOCYCLE ADJUSTMENT Turn the Wave Band Switch to the right. Set the signal generator to 1400 kc. and turn the dial pointer to correspond to this frequency. Adjust the oscillator trimmer for this band so that the signal is received exactly at this setting. (This trimmer is located over the close-wound fine winding on the oscillator coil). Adjust the Broadcast antenna trimmer for maximum output as described previously, (this trimmer is over the small 5 section winding and is accessible from the top).

600 KC PADDER ADJUSTMENT - With all connections as above, the signal generator is set at 600 KC and the signal tuned in on the dial. The padder for this frequency is found on the front sub-panel of the receiver, directly under the dial. This padder should be adjusted for maximum response of the receiver, while the tuning condenser is rocked slightly back and forth. The 1400 kc adjustment should then be rechecked.

GAROD RADIO CORP.

MODELS 31, 31LW
33, 33LW
Schematic



MODELS 32, 32LW
Schematic

GAROD RADIO CO.

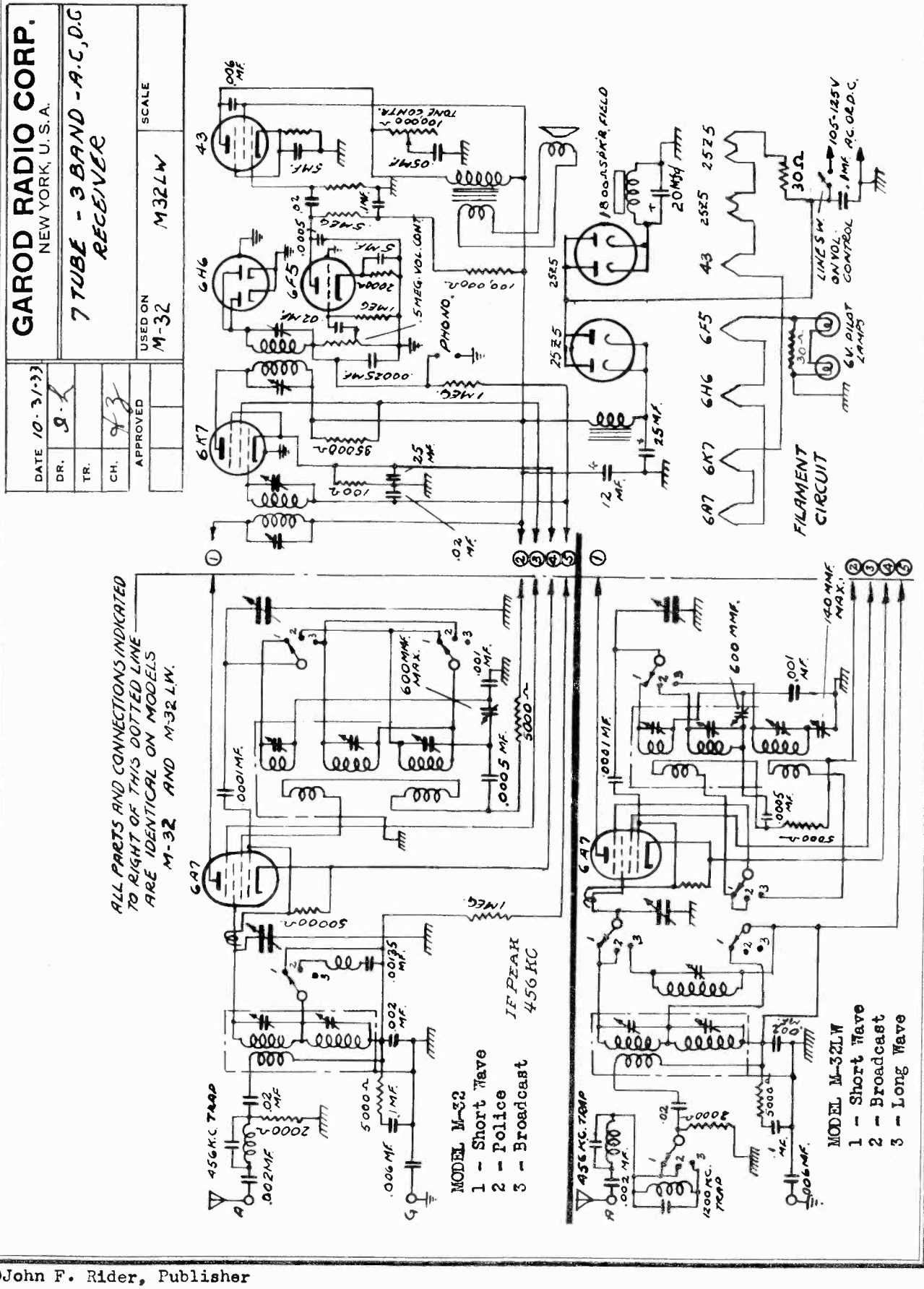
GAROD RADIO CORP.
NEW YORK, U.S.A.

7 TUBE - 3 BAND - A.C. D.G. RECEIVER

USED ON M-32

SCALE M32LW

DATE 10-3/-33
DR. G.
TR.
CH.
APPROVED



GAROD RADIO CO.

MODELS 31,31LW,32,32LW
33,33LW
Alignment,Voltage

SERVICE NOTES FOR THE MODEL 33, 33LW, 31, 31LW, 32, 32LW
7 TUBE 3 BAND A.C.-D.C. SUPERHETERODYNE RECEIVERS

ALIGNMENT PROCEDURE

Realignment of this receiver should not be attempted unless all other possible causes of faulty operation have first been thoroughly investigated. An accurately calibrated signal generator which will cover the various wave-bands, and an output meter for indicating the effects of adjustments, are required.

MODEL 33LW, 31LW, 32LW

I.F.ADJUSTMENT - The signal generator is set at 456 kc. The "hot" lead from the signal generator is connected to the grid cap on the 1st detector (6A7) tube, the clip having first been removed from the tube cap. The ground lead is connected to the receiver gnd. post. The oscillator section (front) of the gang tuning condenser is short-circuited and the volume control turned on full. The i.f. trimmers are then adjusted for maximum gain in the receiver. These trimmers are located on top of the i.f. transformer shield cans, which are situated in the rear of the chassis, to the left. The one nearest the front is the 1st i.f. transformer and the rear one is the 2nd i.f. transformer.

16 MEGACYCLE ADJUSTMENT - The short-circuit is removed from the oscillator condenser and the grid clip replaced in its normal position on the cap of the 6A7 tube. The "hot" lead fron the signal generator is connected to the antenna post of the receiver and the ground lead to the ground post of the receiver. With the volume control set at maximum and a minimum input signal from the signal generator, the band switch is set at position no. 1 and the receiver dial set at 16 mc. The oscillator trimmer is adjusted s as to bring the signal in at this setting. This trimmer is found on the side of the oscillator coil shield can which is located directly in front of the i.f. transformers. The upper trimmer is the one for this wave-band. After the oscillator is adjusted, the antenna trimmer is adjusted for maximum output. This is found on the front of the antenna coil can which is directly in front of the 6A7 tube. The lower trimmer is the one for this band. There are no other adjustments on this band.

1400 KILOCYCLE ADJUSTMENT - With the receiver and signal generator both set at 1400 kc. the procedure outlined above is repeated. The trimmers are adjusted for maximum gain of the receiver. These trimmers are located on the coil shield cans; the oscillator trimmer for this band is the bottom one on the oscillator can; the detector trimmer, is the upper one on the detector or antenna coil can. The 600 kc. padder is on the front sub-panel.

600KC PADDER ADJUSTMENT - With all connections as above, the signal generator is set at 600KC and the signal tuned in on the dial. The paddor for this frequency is found on the front sub-panel of the receiver, directly under the wave band switch. This padder should be adjusted for maximum response of the receiver, while the tuning condenser is rocked slightly back and forth. The 1400 kc adjustment should then be rechecked.

LONG WAVE ADJUSTMENT - With the receiver and signal generator both set at 325 kc. the procedure outlined above is repeated. The trimmers are located on the left side panel of the chassis; the one towards the rear is the oscillator trimmer, and the one near the front is the antenna trimmer. The series padder for this band is located in the lower left hand corner of the front sub-panel.

MODEL 31 - 32 - 33

The alignment procedure for the Model 32 - 32LW is exactly the same as for the model 33LW, 31LW except for the location of the trimmers, and the designation of the bands. These are as follows:

Short wave band - Oscillator trimmer is the upper one on the oscillator coil can.
Antenna trimmer is the lower one on the antenna coil can.
No series padder.

Broadcast band - Oscillator trimmer is the lower one on the antenna coil can.
Antenna trimmer is the upper one on the antenna coil can.
600 kc. series padder is on the top of the chassis directly in front of the oscillator coil.

Police band -- Trimmers are on the left side panel of the chassis. The one towards the rear is the oscillator shunt trimmer; the one towards the front is the antenna shunt trimmer.

NOTE: These bands must be aligned in the sequence shown.

VOLTAGE TABLE

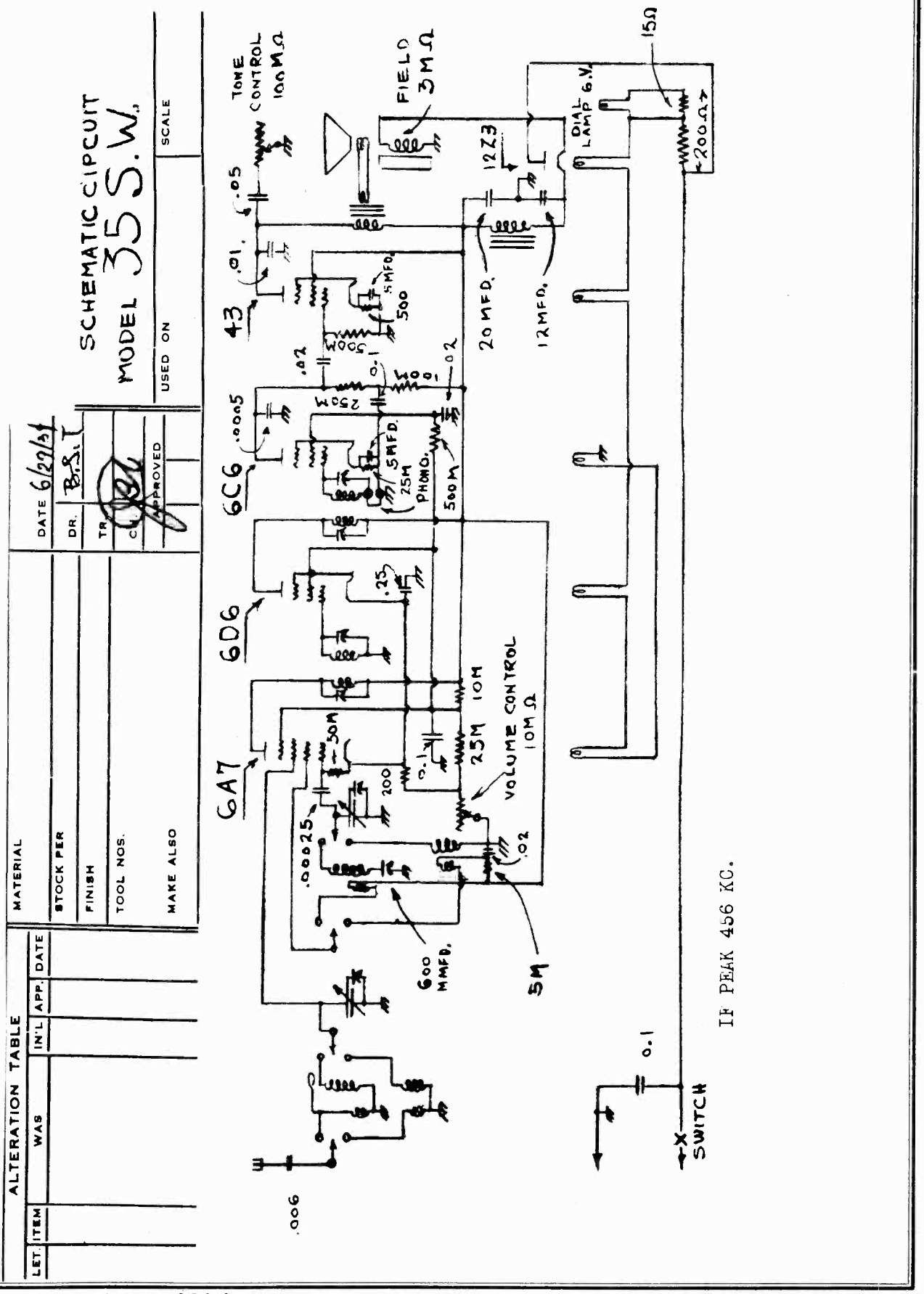
TUBE	FUNCTION	H'T'R	PLATE	SC.GR	CATH.	OSC.PL.
6A7	det.-osc.	4.5	100.2	47.0	---	90.0
6K7	i.f. ampl.	4.3	100.2	47.0	---	---
6H6	diode det.	4.5	---	---	---	---
6F5	1st audio	4.4	40.0	---	---	---
43	audio outp.	20.2	94.0	100.0	12.3	---
25Z5	rectifier	21.0	114.0	---	---	---

NOTE: Fil. voltages measured with a low impedance AC-voltmeter. Actually, the voltages at 110V line are approximately 6 volts and 23 volts for the 6, 3, and 2 volt tubes respectively.

Model 32 exactly same as Model 31, but 600 kc. padder is located on the left front of the chassis. Model 32LW same as 31LW.

MODEL 35SW
Schematic

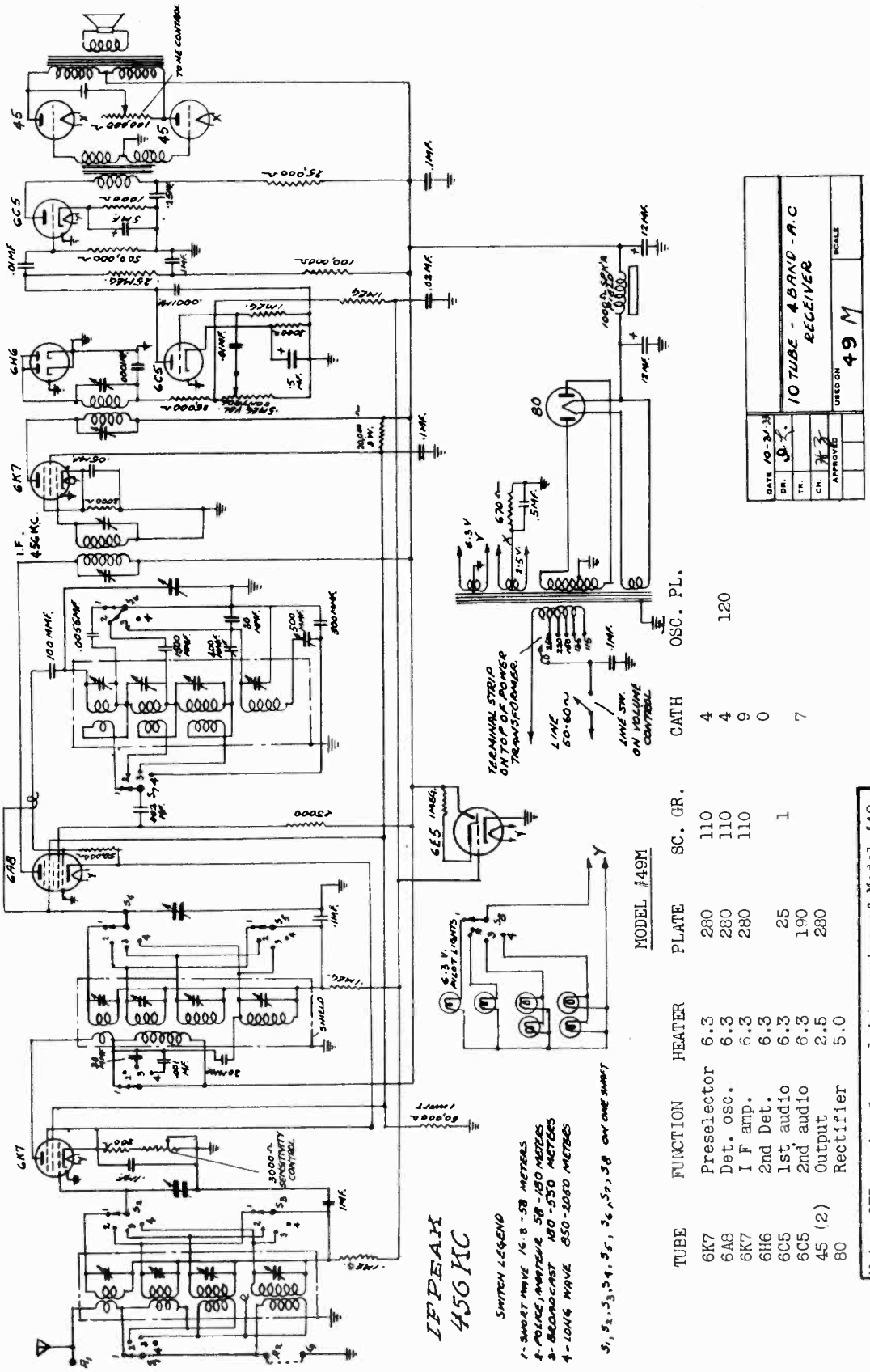
GAROD RADIO CO.



GAROD RADIO CORP. (New Co.)

MODELS 49,49M
Schematic
Voltage

MODELS #49M, #49M "F" CONSOLE, and #49M "P" COMBINATION



MODEL #49M

TUBE	FUNCTION	HEATER	PLATE	SC. GR.	CATH	OSC. PL.
6K7	Preselector	6.3	230	110	4	
6A8	Det. osc.	6.3	280	110	4	120
6K7	I F amp.	6.3	280	110	9	
6H6	2nd Det.	6.3			0	
6C5	1st audio	6.3	25	1		
6C5	2nd audio	6.3	190		7	
45 (2)	Output	2.5	280			
80	Rectifier	5.0				

Note: 6E5 used only on later series of Model #49.

All voltages except filament, are measured from socket terminals to chassis and with a 1000 Ohms per volt voltmeter. The set must be in operation and the sensitivity control in its maximum clockwise position.

Filament voltages are taken from filament prong to filament prong at tube socket and measured with a low impedance AC voltmeter.

MODELS 49,49M
Alignment
Socket, Trimmers

GAROD RADIO CORP.

SERVICE NOTES FOR THE MODEL 49M
10 TUBE 4 BAND A.C. SUPERHETERODYNE RECEIVER
ALIGNMENT PROCEDURE

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 to the grid of the first detector (6A7). 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 the i.f. transformer shield cans in the rear of the chassis to the right and rear of the gang condenser.

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 as the 18 mc calibration point, with the volume control on full and the signal generator adjusted for minimum input. The antenna preselector and first detector trimmers are then adjusted in the order named for maximum output. These trimmers are located on the tops of the shield cans at the left side of the chassis; reading from front to back, these coils are as follows: 1. antenna preselector; 2. first detector; 3. oscillator. It will be noted that there are four trimmers on each of these coils. The adjustment screw for the trimmer in the front left hand corner of each is painted red. This denote the trimmer for the no. 1 band.

5 MC. ADJUSTMENT - With the band selector switch in position for operation on band no. 2. and the receiver and signal generator both set at 5 mc. the procedure outlined above is repeated. The oscillator trimmer is found on the rear coil can, and is located to the right of the red painted trimmer. The antenna preselector and interstage coil trimmers are located in the same positions on the corresponding shield cans.

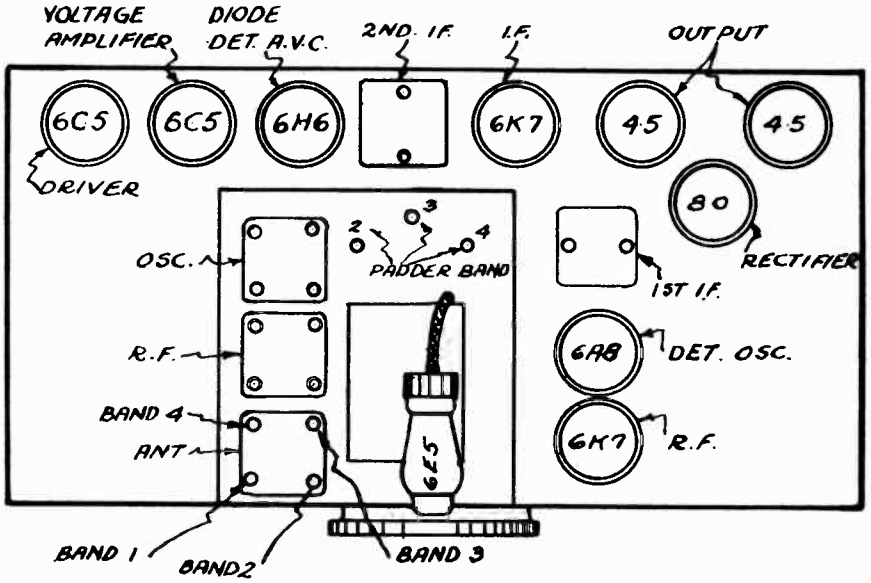
The signal generator is set at 1.7 mc. and the signal tuned in on the dial. The padder condenser for this band is adjusted for maximum gain while the gang tuning condenser is rocked slightly to the right and left. The 5 mc. adjustment should then be rechecked. The 1.7 mc. Padder is located on the sub-base on which the gang tuning condenser is mounted and is the left hand one at the group of three found here.

1400 KC. ADJUSTMENT - The band selector switch is set in position for operation on the no. 4 band. The receiver and signal generator are both set at 1400 kc. and the procedure outlined above is repeated. The oscillator trimmer is found on the rear coil can, and is located diagonally opposite the red painted trimmer. The other trimmers for this band are located in similar positions on the corresponding coil cans.

The signal generator is set at 600 kc. and the signal tuned in on the dial. The padder condenser for this band is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 1400 kc. adjustment should then be rechecked. The 600 kc. padder is located on the sub-panel on which the gang tuning condenser is mounted and is the center of the three located at this point.

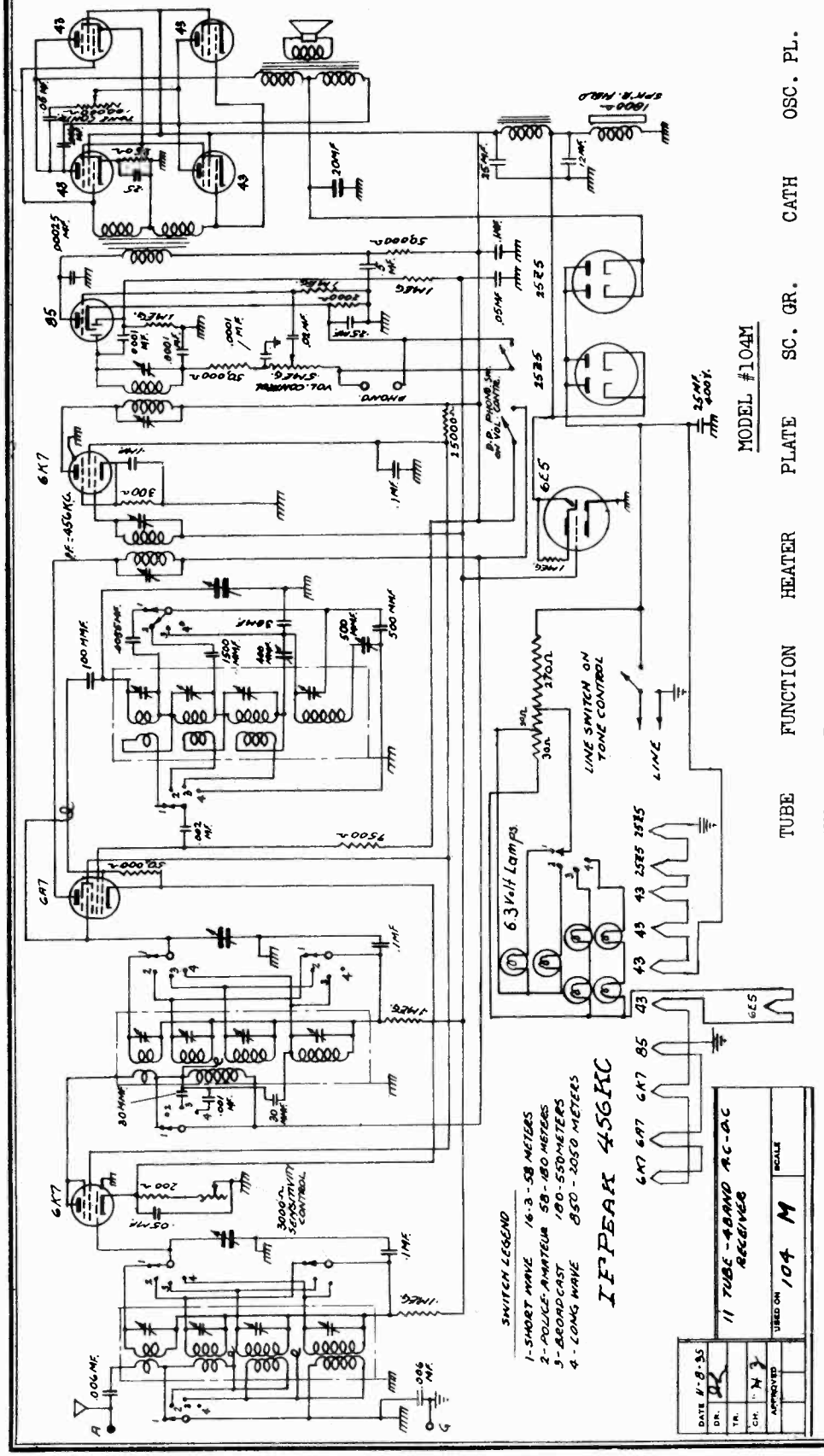
340 KC. ADJUSTMENT - The band selector switch is set in position for operation on band no. 4. The receiver and generator are both tuned to 340 kc. and the procedure outlined above is repeated. The oscillator trimmer is located on the rear coil can. It is the one directly behind the trimmer marked in red. The other trimmers for this band are located in similar positions on the corresponding shield cans.

The signal generator is set at 150 kc. and the signal is tuned in on the dial. The padder condenser for this band is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 340 kc. adjustment should then be rechecked. The 150 kc. padder is located on the sub-panel on which the tuning condenser is mounted and is the right hand one of this group.



GAROD RADIO CORP.

MODELS 104,104M
Schematic
Voltage



MODEL #104M

TUBE	FUNCTION	HEATER	PLATE	SC. GR.	CATH	OSC. PL.
6K7	Preselector	4.5	95	95	1.75	
6A7	Det. osc.	4.5	95	55	1.75	80
6K7	I F amp.	4.5	95	55	1.0	
85	2nd det. and 1st audio	4.5	40		2.0	
43 (4)	Audio output	21	120		15	
25Z5	Rectifier	21			120	

Note: 6E5 used only in later series of Model #104

All voltages except filament, are measured from socket terminals to chassis and with a 1000 Ohms per volt voltmeter. The set must be in operation and the sensitivity control in its maximum clockwise position.

Filament voltages are taken from filament prong to filament prong at tube socket and measured with a low impedance AC voltmeter.

SERVICE NOTES FOR THE MODEL 104M
11 TUBE 4 BAND A.C.-D.C. SUPERHETERODYNE RECEIVER
ALIGNMENT PROCEDURE

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 to the grid of the first detector (6A7). 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 the i.f. transformer shield cans to the right and rear of the gang condenser.

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 input. The antenna preselector and first detector trimmers are then adjusted in the order named for maximum output. These trimmers are located on the tops of the shield cans at the left side of the chassis; reading from front to back, these coils are as follows: - 1. antenna preselector; 2. first detector; 3. oscillator. It will be noted that there are four trimmers on each of these coils. The adjustment screw for the trimmer in the front left hand corner of each is painted red. This denotesthe trimmer for the no. 1. band.

5 MC. ADJUSTMENT - With the band selector switch in position for operation on band no. 2. and the receiver and signal generator both set at 5 mc. the procedure outlined above is repeated. The oscillator trimmer is found on the rear coil can, and is located to the right of the red painted trimmer. The antenna preselector and interstage coil trimmers are located in the same positions on the corresponding shield cans.

The signal generator is set at 1.7 mc. 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 5 mc. adjustment should then be rechecked. The 1.7 mc. Padder is located on the subbase on which the gang tuning condenser is mounted and is the left hand one at the group of three found here.

1400 KC. ADJUSTMENT - The band selector switch is set in position for operation on the no. 3. band. The receiver and signal generator are both set at 1400 kc. and the procedure outlined above is repeated. The oscillator trimmer is found on the rear coil can, and is located diagonally opposite the red painted trimmer. The other trimmers for this band are located in similar positions on the corresponding coil cans.

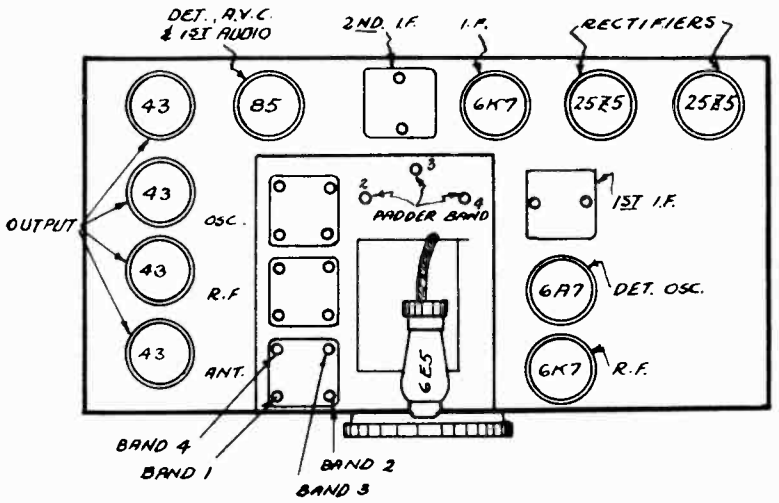
CURRENT: This receiver operates on either alternating or direct current of any frequency.

VOLTAGE: Any line voltage from 105-135 volts may be used, without necessity of any adjustments. An adapter for 210-240 volt operation is available and can be supplied at an additional cost.

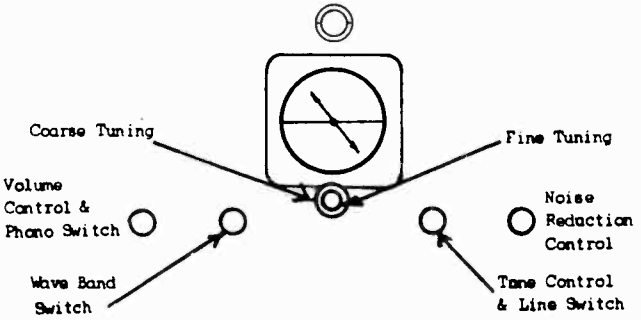
The signal generator is set at 600 kc. and the signal tuned in on the dial. The padder condenser for this band is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 1400 kc. adjustment should then be rechecked. The 600 kc. padder is located on the sub-panel on which the gang tuning condenser is mounted and is the center of the three located at this point.

340 KC. ADJUSTMENT - The band selector switch is set in position for operation on band no. 4. The receiver and generator are both tuned to 340 kc. and the procedure outlined above is repeated. The oscillator trimmer is located on the rear coil can. It is the one directly behind the trimmer marked in red. The other trimmers for this band are located in similar positions on the corresponding shield cans.

The signal generator is set at 150 kc. and the signal is tuned in on the dial. The padder condenser for this band is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 340 kc. adjustment should then be rechecked. The 150 kc. padder is located on the sub-panel on which the tuning condenser is mounted and is the right hand one of this group.

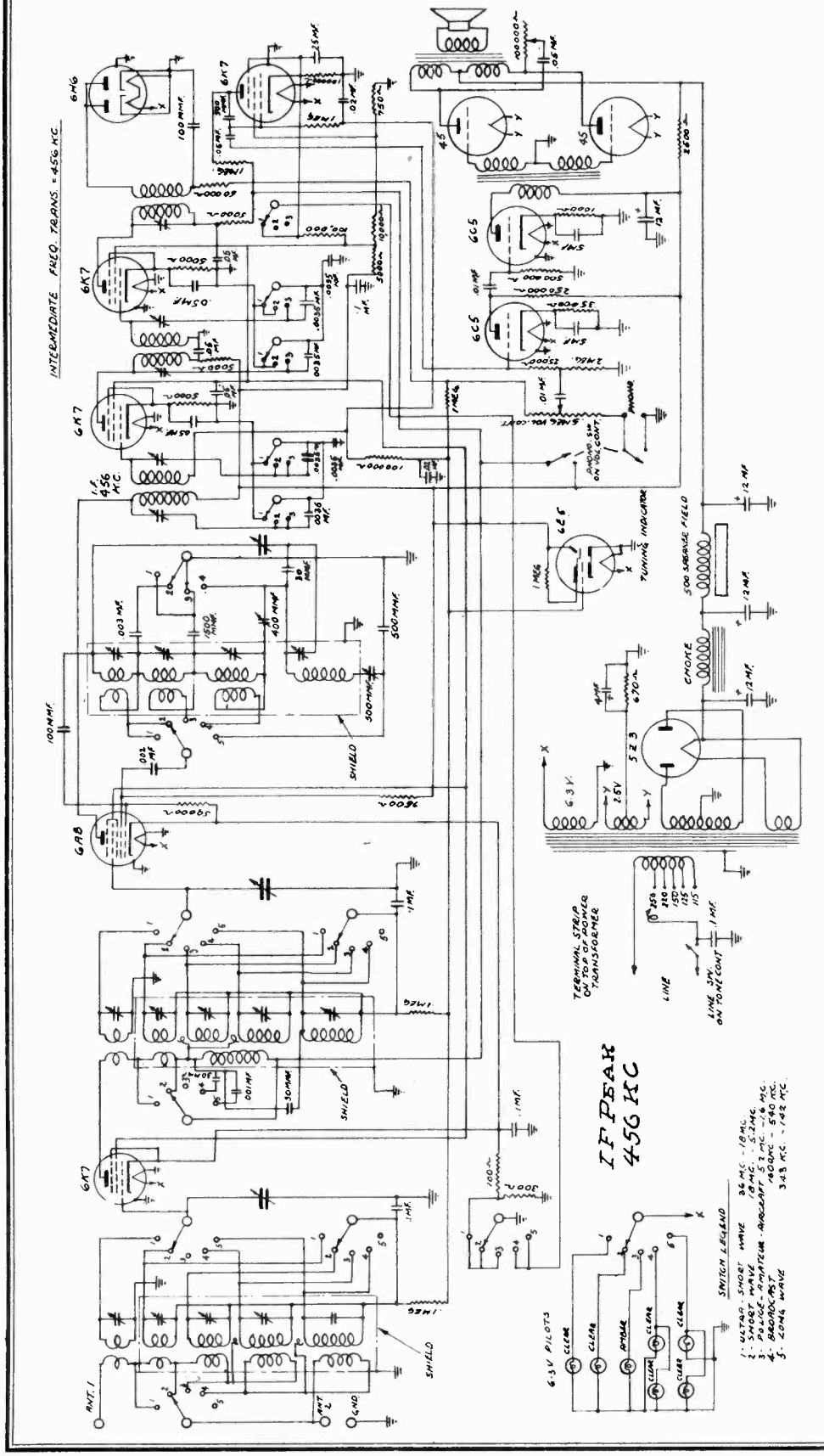


MODELS #104M, #104M "F" CONSOLE, and #104M "P" COMBINATION



GAROD RADIO CORP.

MODELS 511-A, 511-G
511-P
Schematic
Voltage



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DR.	
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APPROVED	

12 TUBE S BAND A.C. RECEIVER

DESIGN 511-A SCALE

TUBE	FUNCTION	HEATER	PLATE	CATHODE	SCREEN	SUPPRESSOR	OSC. PLATE
6K7	R.F. Amp.	6.3	210	5	110	5	
6A8	det. osc.	6.3	210	5	110		175
6K7	1st I.F.	6.3	205	13	110	13	
6K7	2nd I.F.	6.3	190	9	110	9	
6H6	det.	6.3	0	0			
6C5	1st audio	6.3	110	8			
6C5	driver	6.3	205	8			
45's	audio output	2.5	320	55			
6K7	N S ?	6.3	5	0	7	0	
5z3	Rectifier	5.0		420			

All voltages except filament measured with 1,000 Ohms per volt meter from socket to chassis with band switch in broadcast position, and fidelity switch in selective position.

SERVICE NOTES FOR THE MODEL 511A
12 TUBE 5 BAND A.C.-D.C. SUPERHETERODYNE RECEIVER
ALIGNMENT PROCEDURE

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 avc action will tend to nullify the variations in output as the trimmers are adjusted. A surer method is to make the avc tube inoperative. This may be done by shorting return of RF trimmers to ground.

I.F. ADJUSTMENT - The signal generator is set at 456 kc. and is connected to the grid of the first detector (6A7). 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 the i.f. transformer shield cans in the rear of the chassis. The third i.f. transformer has only one trimmer. This is the one at the left rear of the chassis. The other two transformers have two trimmers each.

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 freqdency of 18 mc. with the selector switch in position for band no. 2. 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 input. The antenna preselector and first detector trimmers are then adjusted in the order named for maximum output. These trimmers are located on the tops of the shield cans at the left side of the chassis; reading from front to back, these coils are as follows: 1. antenna preselector; 2. first detector; 3. oscillator. It will be noted that there are four trimmers on each of these coils. The adjustment screw for the trimmer in the front left hand corner of each is painted red. This denotes the trimmer for the no. 2 band.

36 MEGACYCLE ADJUSTMENT - With the band switch in position for the no. 1 band, the receiver and signal generator are both set at 36 mc. and the procedure outlined above is repeated. There is no oscillator trimmer for this band, a harmonic from the no. 2 band of the oscillator being used. The trimmer for the preselector stage is located on the underside of the chassis near the front and center. The first detector or interstage trimmer is located behind the band selector switch, also on the underside of the chassis.

5 MC. ADJUSTMENT - With the band selector switch in position for operation on band no. 3. and the receiver and signal generator both set at 5 mc. the procedure outlined above is repeated. The oscillator trimmer is found on the rear coil can, and is located to the right of the red painted trimmer. The antenna preselector and interstage coil trimmers are located in the same positions on the corresponding shield cans

The signal generator is set at 1.7 mc. 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 5 mc. adjustment should then be rechecked. The 1.7 mc. Padder is located on the sub-base on which the gang tuning condenser is mounted and is the left hand one at the group of three found here.

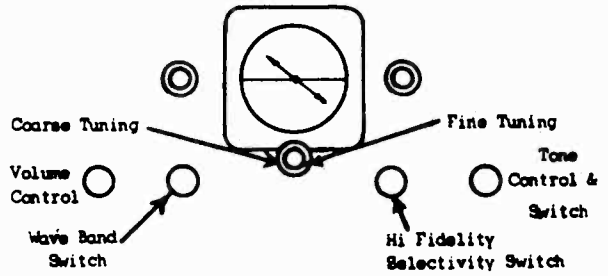
1400 KC. ADJUSTMENT - The band selector switch is set in position for operation on the no. 4 band. The receiver and signal generator are both set at 1400 kc. and the procedure outlined above is repeated. The oscillator trimmer is found on the rear coil can, and is located diagonally opposite the red painted trimmer. The other trimmers for this band are located in similar positions on the corresponding coil cans.

The signal generator is set at 600 kc. and the signal tuned in on the dial. The padder condenser for this band is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 1400 kc. adjustment should then be rechecked. The 600 kc. padder is located on the sub-panel on which the gang tuning condenser is mounted and is the center of the three located at this point.

340 KC. ADJUSTMENT - The band selector switch is set in position for operation on band no. 4. The receiver and generator are both tuned to 340 kc. and the procedure outlined above is repeated. The oscillator trimmer is located on the rear coil can. It is the one directly behind the trimmer marked in red. The other trimmers for this band are located in similar positions on the corresponding shield cans.

The signal generator is set at 150 kc. and the signal is tuned in on the dial. The padder condenser for this band is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 340 kc. adjustment should then be rechecked. The 150 kc. padder is located on the sub- panel on which the tuning condenser is mounted and is the right hand one of this group.

MODELS #511 "A" and #511 "G" CONSOLE and #511 "P" COMBINATION
HIGH FIDELITY RECEIVERS

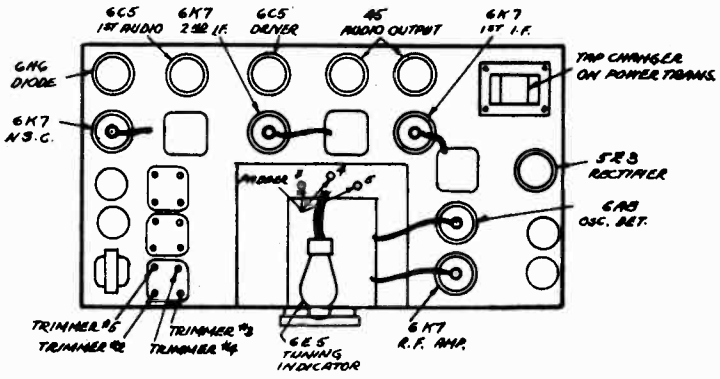


INSTRUCTIONS FOR INSTALLATION AND OPERATION

CURRENT: This receiver operates on AC (Alternating Current) only, on frequencies from 50 to 60 cycles.

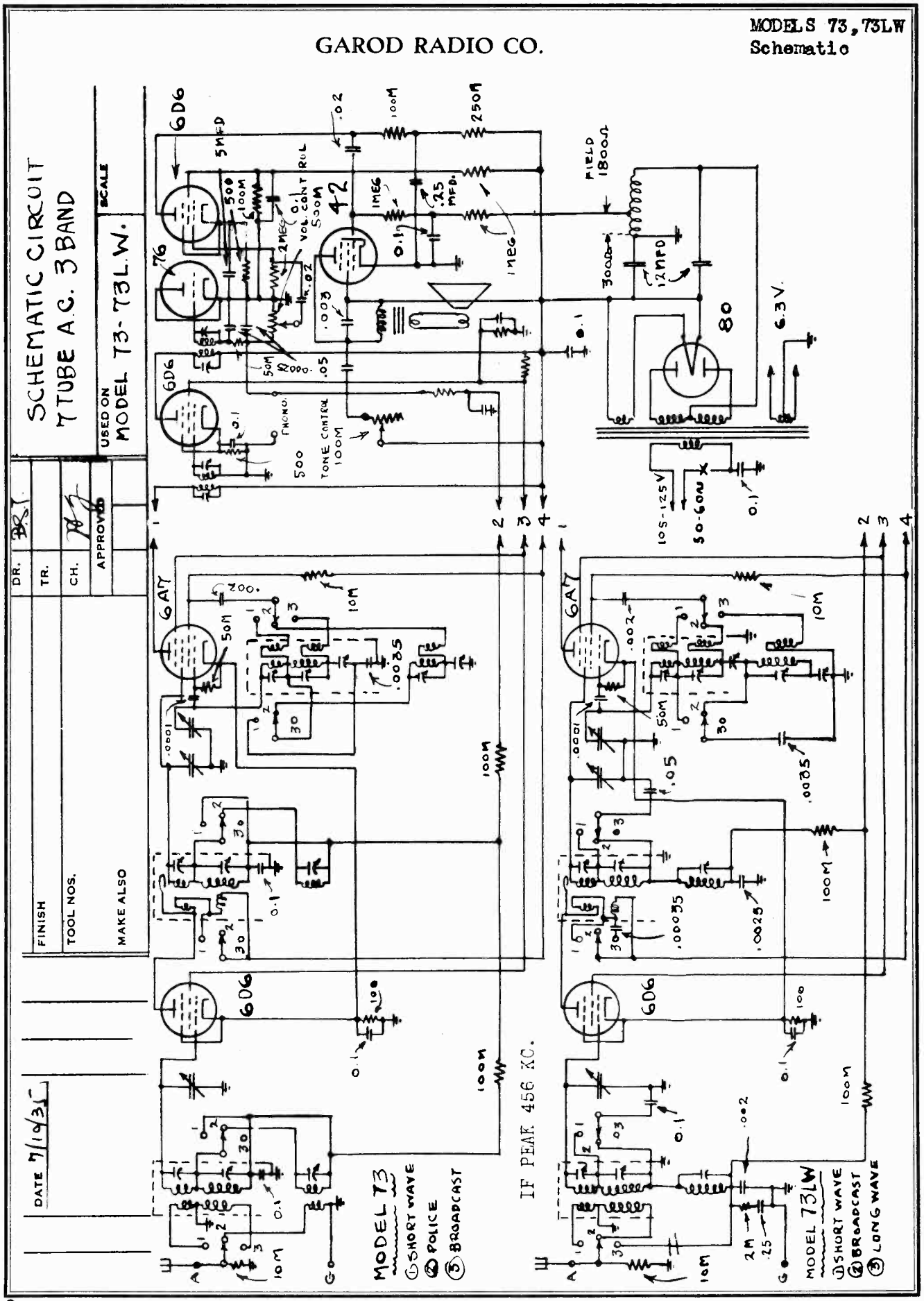
VOLTAGE: Any line voltage from 105 to 260 volts may be used. This model is equipped with a universal Transformer, with five taps marked as follows:- 110, 135, 150, 220, 250. Access to this tap changer is obtained by lifting off the box-like black cover on top of the transformer. The lug attached to the flexible lead is then moved to the point which corresponds most nearly to the line voltage available. The cover is then snapped back into place. Unless otherwise specified, the receiver is always connected to the 110 volt tap (suitable for 105 to 125 volts). Before inserting the line plug, be sure to ascertain what the line voltage is and connect to the correct tap.

PHONOGRAPH OPERATION: When the radio volume control is turned all the way to "OFF" position the phonograph pickup automatically connected into circuit. Turn motor switch ON, and the phonograph is ready for operation. Phonograph volume is regulated by means of a separate control located in the base of the phonograph pickup arm. The tone of the phonograph reproduction may be controlled in the same way as for radio operation.



GAROD RADIO CO.

MODELS 73, 73LW
Schematic



MODEL 514
Alignment
Voltage

GAROD RADIO CORP.

SERVICE NOTES FOR THE MODEL 514
14 TUBE 5 BAND A.C.-D.C. SUPERHETERODYNE RECEIVER

ALIGNMENT PROCEDURE

I.F.ADJUSTMENT - The signal generator is set at 456 kc. and is connected to the grid of the first detector (6A7). 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 the i.f. transformer shield cans in the rear of the chassis. The third i.f. transformer has only one trimmer. This is the one at the left rear of the chassis. The other two transformers have two trimmers each.

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. 2. The oscillator trimmer condenser is adjusted so that the 18 mc signal is tuned in exactly as the 18 mc calibration point, with the volume control on full and the signal generator adjusted for minimum input. The antenna preselector and first detector trimmers are then adjusted in the order named for maximum output. These trimmers are located on the tops of the shield cans at the left side of the chassis; reading from front to back, these coils are as follows: - 1. antenna preselector; 2. first detector; 3. oscillator. It will be noted that there are four trimmers on each of these coils. The adjustment screw for the trimmer in the front left hand corner of each is painted red. This denote the trimmer for the no. 2 band.

36 MEGACYCLE ADJUSTMENT - With the band switch in position for the no. 1 band, the receiver and signal generator are both set at 36 mc. and the procedure outlined above is repeated. There is no oscillator trimmer for this band, a harmonic from the no. 2 band of the oscillator being used. The trimmer for the preselector stage is located on the underside of the chassis near the front and center. The first detector or interstage trimmer is located behind the band selector switch, also on the underside of the chassis.

5.2 MC. ADJUSTMENT - With the band selector switch in position for operation on band no. 3. and the receiver and signal generator both set at 5.2 mc. the procedure outlined above is repeated. The oscillator trimmer is found on the rear coil can, and is located to the right of the red painted trimmer. The antenna preselector and interstage coil trimmers are located in the same positions on the corresponding shield cans.

The signal generator is set at 1.7 mc. 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 5.2 mc. adjustment should then be rechecked. The 1.7 mc. Padder is located on the sub-base on which the gang tuning condenser is mounted and is the left hand one at the group of three found here.

1400 KC. ADJUSTMENT - The band selector switch is set in position for operation on the no. 4 band. The receiver and signal generator are both set at 1400 kc. and the procedure outlined above is repeated. The oscillator trimmer is found on the rear coil can, and is located diagonally opposite the red painted trimmer. The other trimmers for this band are located in similar positions on the corresponding coil cans.

The signal generator is set at 600 kc. and the signal tuned in on the dial. The padder condenser for this band is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 1400 kc. adjustment should then be rechecked. The 600 kc. padder is located on the sub-panel on which the gang tuning condenser is mounted and is the center of the three located at this point.

340 KC. ADJUSTMENT - The band selector switch is set in position for operation on band no. 4. The receiver and generator are both tuned to 340 kc. and the procedure outlined above is repeated. The oscillator trimmer is located on the rear coil can. It is the one directly behind the trimmer marked in red. The other trimmers for this band are located in similar positions on the corresponding shield cans.

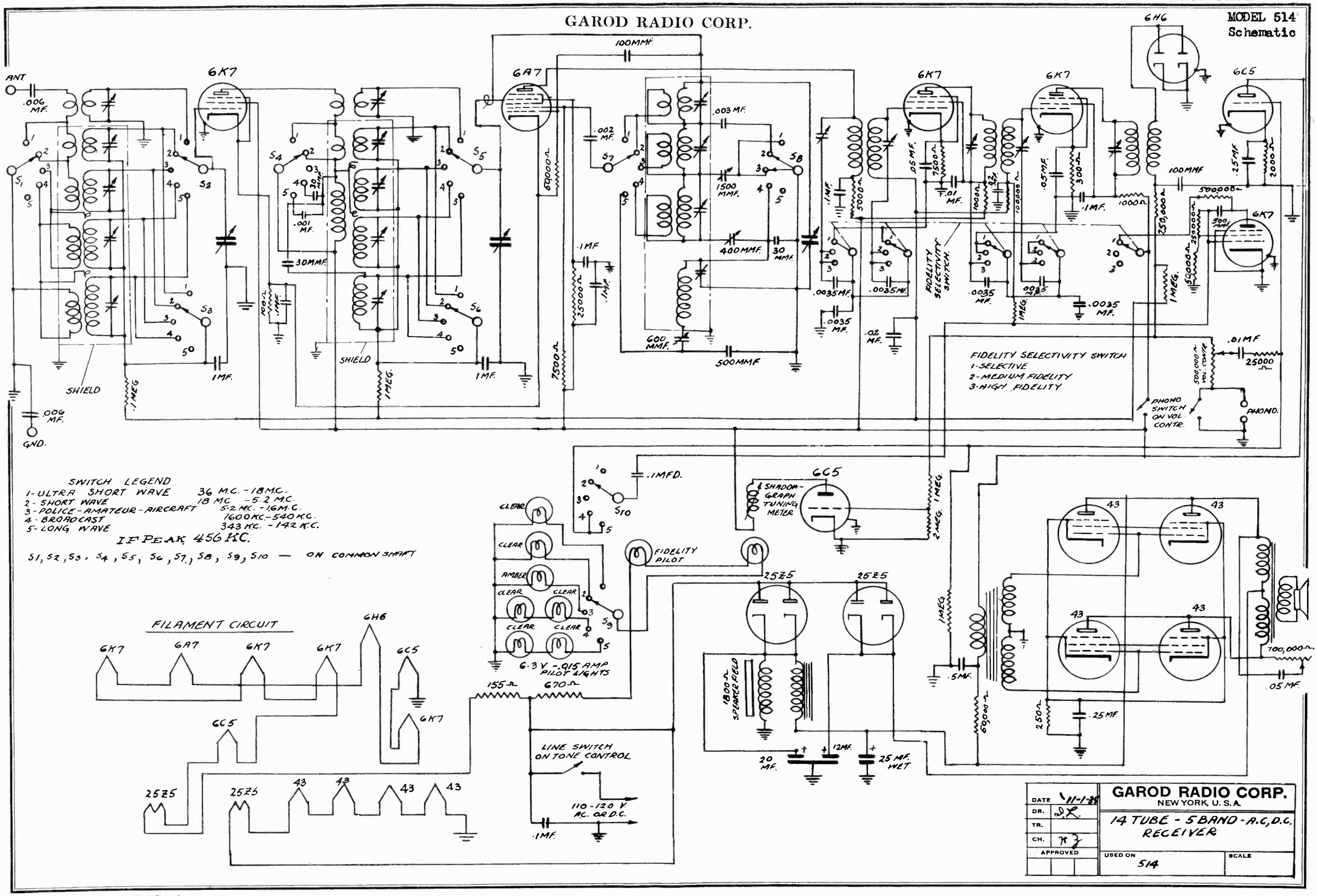
The signal generator is set at 140 kc. and the signal is tuned in on the dial. The padder condenser for this band is adjusted for maximum response while the gang tuning condenser is rocked slightly to the right and left. The 340 kc. adjustment should then be rechecked. The 140 kc. padder is located on the sub-panel on which the tuning condenser is mounted and is the right hand one of this group.

VOLTAGE TABLE

TUBE	FUNCTION	HEATER	SCR.	SUPPR.	OSC.PL.	CATH.	PLATE
6K7	Preselector	5.1	98.0	1.2		1.2	98.0
6A7	det.-osc.	4.8		100.0	78.0	1.2	196.0
6K7	1st. i.f.	5.0	187.0	8.0		8.0	187.0
6K7	2nd i.f.	5.3	187.0	2.2		2.2	187.0
6H6	diode det. avc						
6C5	1st audio	5.2				1.6	50.0
43							
43	audio output	21.0	98.0	14.0		14.0	120.0
43							
43							
6C5	Shadowgraph control	4.8					92.0
2525							
2525	rectifiers	24.0					112.0
6K7	N.S.C.	5.2					

GAROD RADIO CORP.

MODEL 514
Schematic



SWITCH LEGEND

1-ULTRA SHORT WAVE	36 M.C. - 18 MC.	
2-SHORT WAVE	18 MC. - 5.2 MC.	
3-POLICE-AMATEUR-AIRCRAFT	5.2 MC. - 1.6 M.C.	
4-BROADCAST	1600 KC. - 540 K.C.	
5-LONG WAVE	343 KC. - 142 K.C.	

IF PEAK 456 KC.

S1, S2, S3, S4, S5, S6, S7, S8, S9, S10 — ON COMMON SHAFT

FILAMENT CIRCUIT

DATE	11-1-38
DR.	BDX.
TR.	
CH.	
APPROVED	

GAROD RADIO CORP.
NEW YORK, U. S. A.

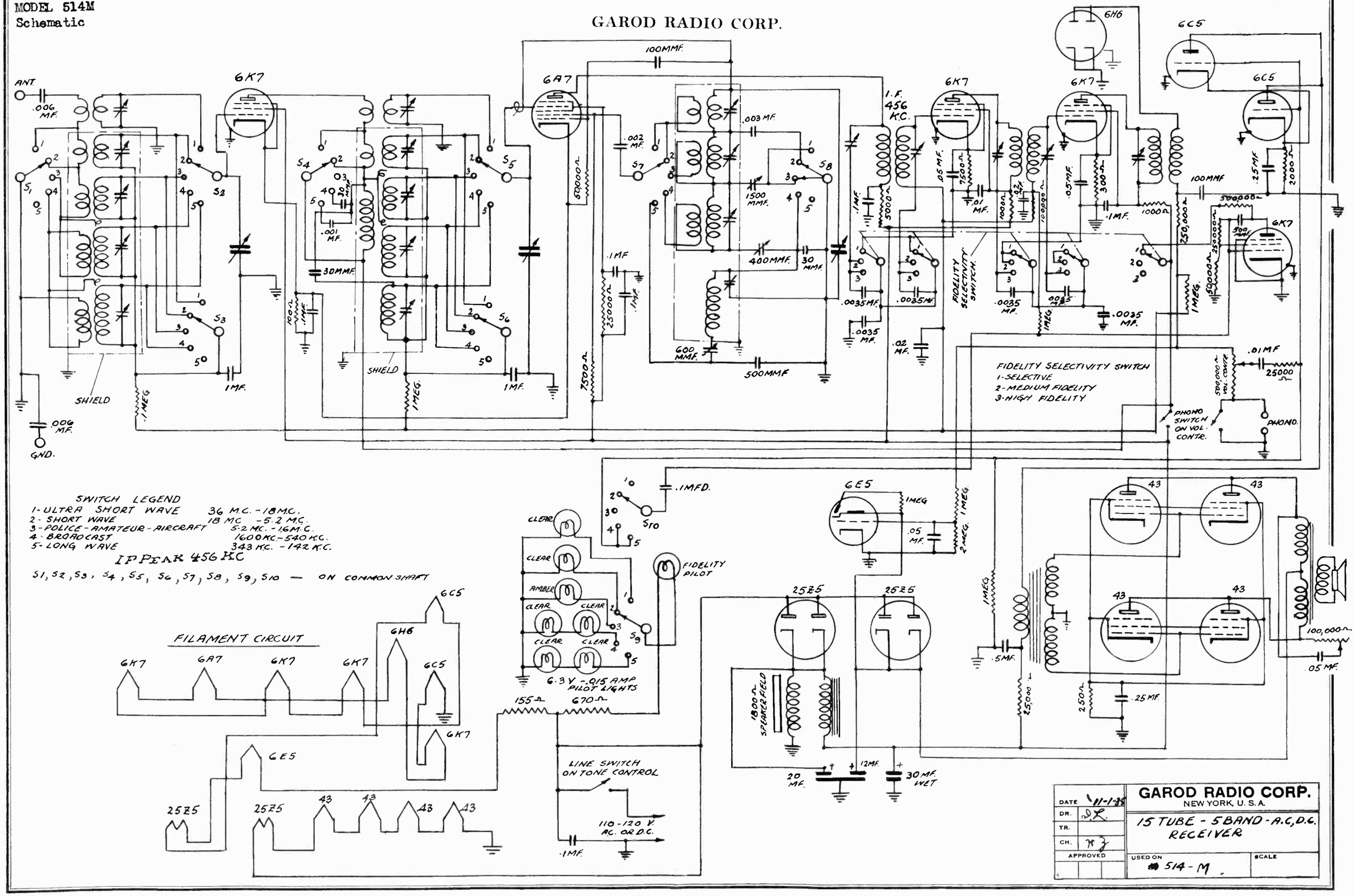
14 TUBE - 5 BAND - A.C, D.C. RECEIVER

USED ON 514

SCALE

MODEL 514M
Schematic

GAROD RADIO CORP.



SWITCH LEGEND

1 - ULTRA SHORT WAVE	36 M.C. - 18 M.C.
2 - SHORT WAVE	18 M.C. - 5.2 M.C.
3 - POLICE - AMATEUR - AIRCRAFT	5.2 M.C. - 1.6 M.C.
4 - BROADCAST	1600 KC - 540 KC.
5 - LONG WAVE	343 KC. - 142 K.C.

IF PEAK 456 KC

S1, S2, S3, S4, S5, S6, S7, S8, S9, S10 — ON COMMON SHAFT

FILAMENT CIRCUIT

DATE	11-1-35
DR.	DK.
TR.	
CH.	HJ
APPROVED	

GAROD RADIO CORP.
NEW YORK, U. S. A.

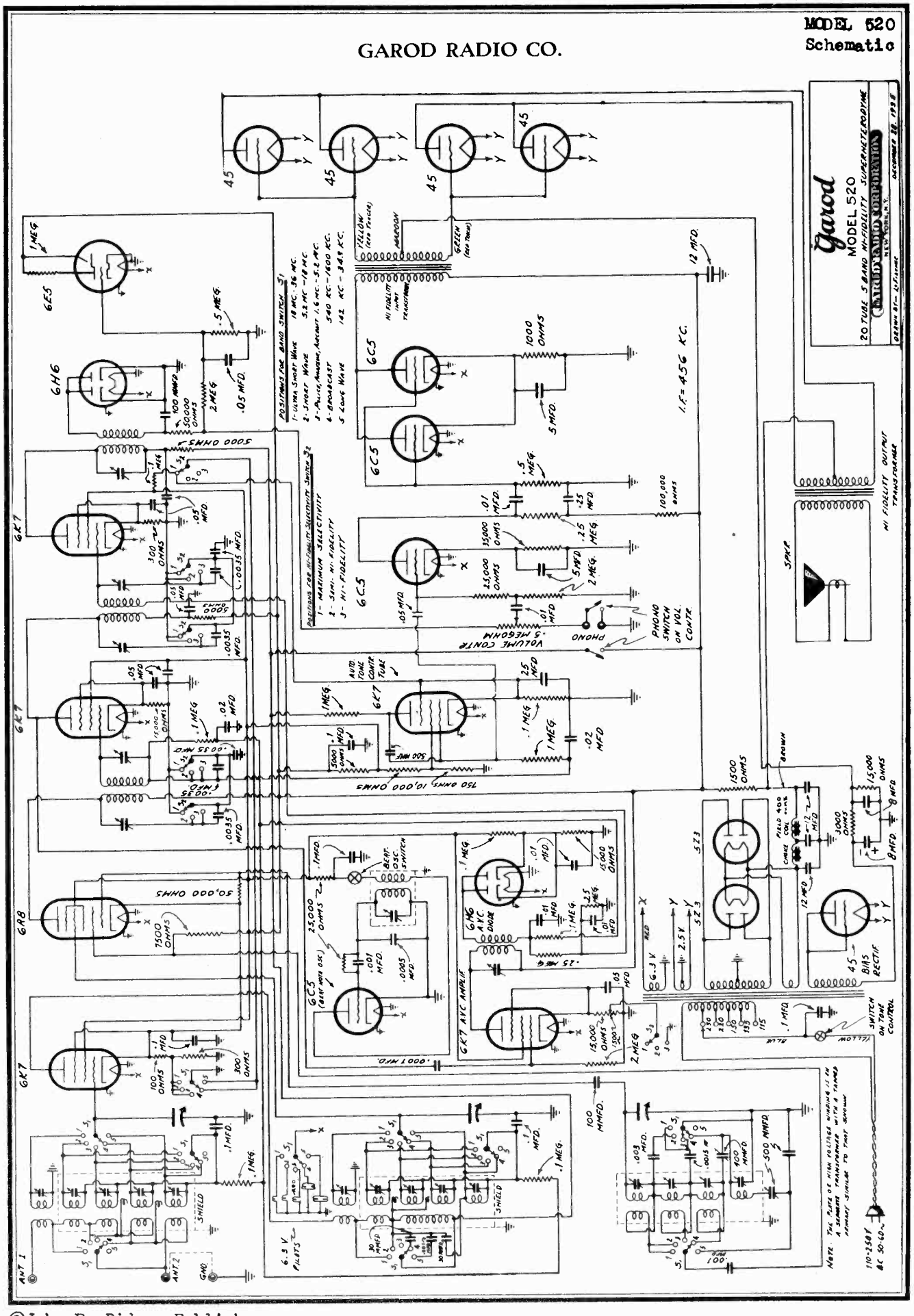
15 TUBE - 5 BAND - A.C, D.C. RECEIVER

USED ON 514 - M

SCALE

GAROD RADIO CO.

MODEL 520
Schematic



MODEL 520
Alignment
Voltage, Socket
Trimmers

GAROD RADIO CORP. (New Co.)

TOP VIEW OF CHASSIS SHOWING LOCATION OF ALIGNING TRIMMERS

1 BAND TRIMMERS UNDER CHASSIS

TOP VIEW OF CHASSIS SHOWING LOCATION OF TUBES

AUDIO OUTPUT AND RECTIFIER TUBES ARE IN POWER SUPPLY CHASSIS.

VOLTAGE TABLE

TUBE	FUNCTION	H.T.R	PLATE	SCR.GR.	SUPPR.GR.	CATH.	OSC.PL.
6K7	preselector	6	250	95	5	5	---
6A8	det.-osc.	6	250	95	---	5	220
6K7	1st i.f. amp.	6	200	95	10	10	---
6K7	2nd i.f. amp.	6	225	95	A	A	---
6H6	diode det.	6	---	---	---	0	---
6C5	1st audio	6	90	---	---	7	---
6C5	driver	6	250	---	---	9	---
6C5							
45's	audio output	2.2	290	---	---		---
6K7	A.T.C.	6	10	7	0	0	---
6H6	a.v.c. diode	6	---	---	---	10	---
6K7	a.v.c. amp.	6	250	95	9	9	---
6E5	tuning indicator	6	250 (target)	---	---	0	---
5Z3	rectifier	4.3	---	---	---	---	---
5Z3							
45	grid bias rectifier	2.2	75	---	---	---	---

All voltages measured between socket terminals and chassis. The Antenna is disconnected. The band switch is in the Broadcast position. The High Fidelity switch is in the "Selective" position. The voltmeter resistance is 250,000 ohms when measuring plate or screen potentials; and 30,000 ohms when measuring cathode and suppressor potentials. Line voltage: 115 volts. Power consumption: 200 watts.

20 TUBE 5 BAND A.C. HIGH FIDELITY SUPERHETERODYNE RECIEVER.

CIRCUIT

The receiver consists of two separate units, one the power supply and audio output stage and the other the tuned stages and control unit.

Visual tuning is obtained by means of the 6E5 cathode-ray tuning indicator. Resonance is indicated when the darkened area of this tube is narrowest; that is, when the green illuminated area is greatest.

The beat oscillator, used for c.w. reception and for beat note tuning, makes use of a type 6C5 tube.

For power supply, two transformers are used. The plate supply transformer is a separate unit and is tapped for 115, 175, 150, 220 and 250 volts. The filament supply transformer is similarly tapped, and contains all three filament windings, as well as the grid bias winding. Two type 5Z3 tubes are used for rectification, in a full wave parallel connection. Grid bias is obtained by means of a type 45 tube connected as a half-wave rectifier and fed by a separate winding on the filament transformer. The speaker field is connected in the filter circuit.

ALIGNMENT PROCEDURE

Realignment of this receiver should not be attempted except by an experienced serviceman and only after all other possible causes of faulty operation have first been thoroughly investigated. An accurately calibrated signal generator which will cover the necessary wave bands is required. Either a suitable output meter or the cathode-ray tuning indicator may be used for indicating the effects of adjustments. It is necessary, in all of the ensuing procedure, that the signal generator be attenuated as much as possible.

I.F. ADJUSTMENT - The i.f. transformers are housed in the polished metal shield on the chassis. The location of these transformers is indicated in the accompanying diagram. The trimers are on the tops of the transformer cans. The first and second i.f. transformers have two trimmers each and the detector coupling transformer has only one trimment. These trimmers are adjusted at 456 kc. for maximum gain. In making this adjustment, the oscillator (rear) section of the tuning condenser should be short-circuited and the signal generator connected between the grid cap of the 6A8 and the ground post of the receiver. The selectivity switch should of course be in the high selectivity position.

SHORT WAVE BAND - With the output from the signal generator connected across the aerial and ground terminals of the receiver, and the volume control in position for maximum volume, the oscillator trimmer for this band is adjusted for maximum response as indicated by the 6E5. This adjustment must be made with the dial set at exactly 17 mc., otherwise the calibration will be off. The series padder for this band should then be adjusted by setting the signal generator at a frequency of 5.5 megacycles and tuning the signal in on the receiver. The tuning condenser is rotated slightly back and forth as the padder screw is adjusted for maximum output. The 17 mc. adjustment should then be re-checked. If the dial calibration is off, the procedure should be repeated again.

ULTRA SHORT WAVE BAND - The trimmers for this band are adjusted at 36 megacycles in the manner described above. They are located on the under side of the chassis and are not shown on the chassis layout diagram. There are only two trimmers for this band, the oscillator operating on harmonics of the short wave band.

POLICE BAND ADJUSTMENT - The trimers for this band are adjusted at 4.8 megacycles in the manner described and the series padder at 1.7 mc. exactly as indicated in the SHORT WAVE BAND ADJUSTMENT procedure.

BROADCAST BAND - The adjustments for this band are as described above. The trimmers are adjusted at 1400 kc. and the padder at 600 kc.

LONG WAVE BAND - The adjustments for this band are made in the prescribed manner, the trimmers being adjusted at 340 kc. and the padder at approximately 150 kc.

A.V.C. AMPLIFIER ADJUSTMENT - The a.v.c. has a separate amplifier which is tuned as follows: The signal generator is set at 1400 kc. and the signal tuned in on the receiver, as indicated by the minimum opening in the 6E5 beam. The a.v.c. trimmer is then adjusted to give the WIDEST opening in the beam. The receiver is then carefully retuned and the adjustment repeated.

BEAT NOTE OSCILLATOR ADJUSTMENT - A weak unmodulated signal from the signal generator is tuned in on the receiver as indicated by the minimum opening in the 6E5 beam. The beat oscillator switch is then turned on. An audible note should be heard whose pitch may be varied by adjusting the screw on the small square can on the left side of the chassis. This should be so adjusted that when the station is tuned in exactly, no beat is heard (zero beat). If no beat note is audible when first turned on, rotation of this same screw should bring in the note.

GENERAL ELECTRIC CO.

MODELS A-52, A-55
Schematic, Voltage
Socket, Trimmers

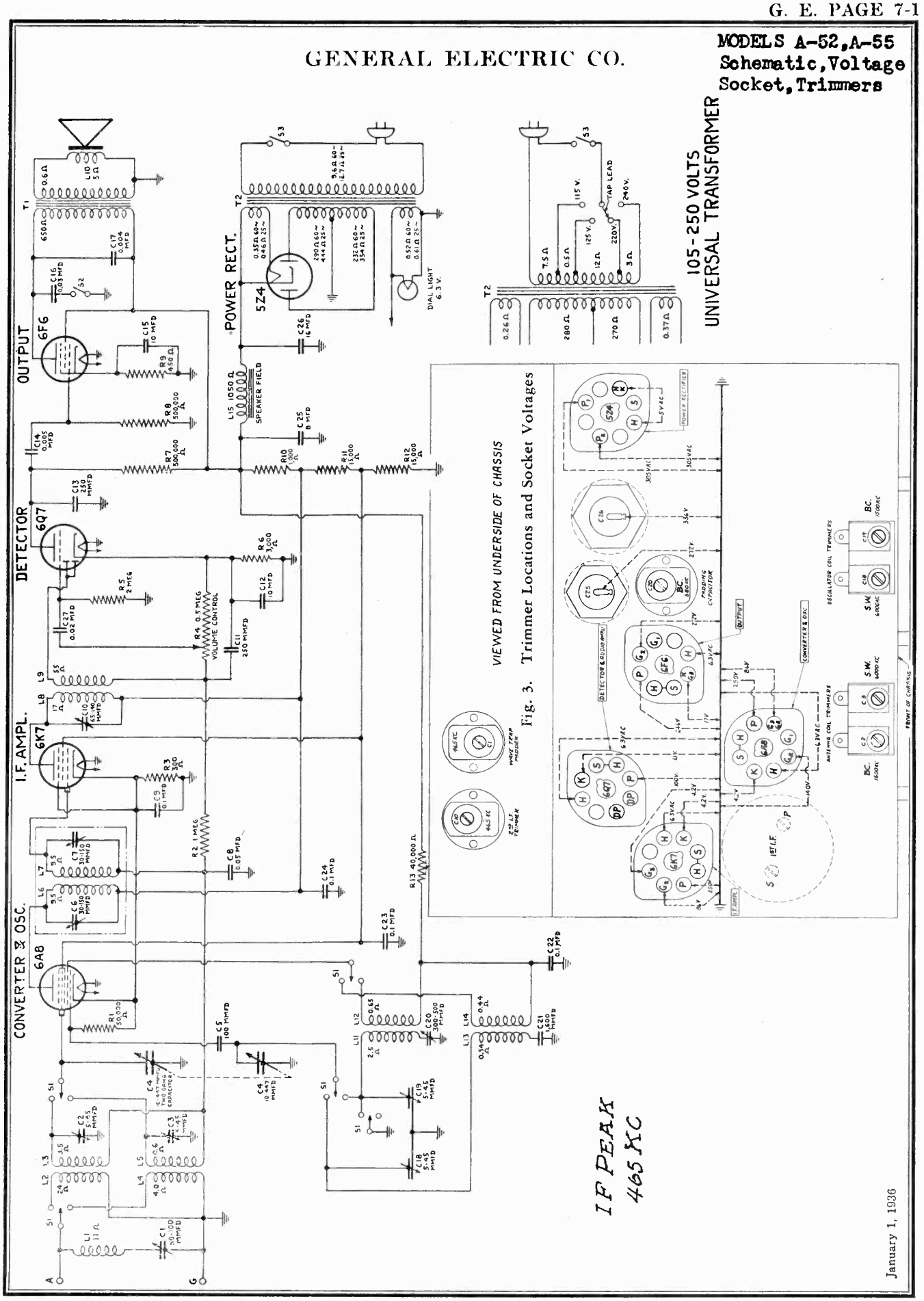
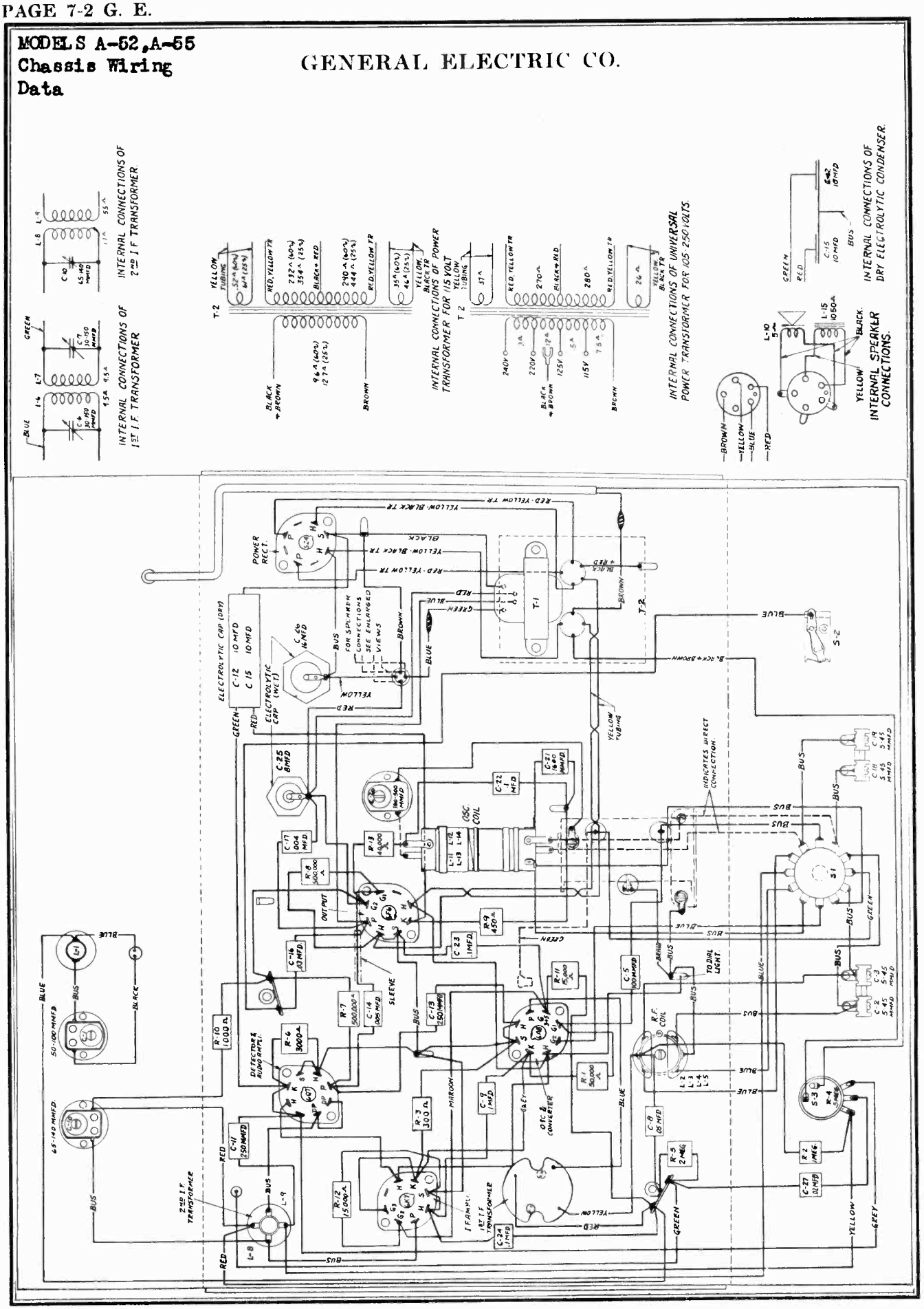


Fig. 3. Trimmer Locations and Socket Voltages

MODELS A-52, A-55
Chassis Wiring Data

GENERAL ELECTRIC CO.



MODELS A-52 AND A-55

SERVICE DATA

Dimensions	Model A-52	Model A-55
Height	15½ in.	37⅛ in.
Width	11⅞ in.	20⅝ in.
Depth	7¼ in.	11⅜ in.
Weight Packed	19 lb.	44 lb.

Electrical Specifications

Rating Label	Power Supply—Volts	Frequency—Cycles	Power—Watts
A	115	50–60	70
C	115	25–60	75
V	105–120 200–230	40–60	75
	115–130 220–250		

Tuning Frequency Range

Broadcast ..... 540–1720 kc
Short-wave ..... 2.3–7.0 mc
Tuning Control Drive Ratio: 5:1

Electrical Power Output

Undistorted ..... 1.75 watts
Maximum ..... 5 watts

Loudspeaker—Electrodynamic

Cone: Model A-52—8-in. Type.
Model A-55—9-in. Type.
Cone Coil Impedance: 5 ohms at 400 cycles.

Tubes

Oscillator and Converter	6A8 Pentagrid Converter.
I.F. Amplifier	6K7 Triple-Grid Super-Control Amplifier.
Detector, AVC and First Audio Amplifier	6Q7 Duo-Diode High-mu Triode.
Audio Power Amplifier	6F6 Power Amplifier Pentode.
Rectifier	5Z4 Full-Wave Rectifier
Dial Lamp	MAZDA No. 46.

DESCRIPTION OF ELECTRICAL CIRCUIT

The signal from the antenna is applied to the control grid of the 6A8 tube through the R.F. coil, the secondary of which is tuned to the incoming signal by the rear section of the main tuning condenser. In the 6A8 tube the incoming signal is combined with the local oscillator signal which is 465 kc. higher in frequency. The local signal is generated by the oscillator section of this tube, and the proper frequency difference is maintained throughout the tuning range by the front section of the tuning condenser in conjunction with the oscillator coil and padding capacitors.

The combination of the two signals produces the intermediate frequency of 465 kc. This particular frequency is chosen to reduce image response and improve short-wave performance. The intermediate frequency amplifier consists of a 6K7 tube and two transformers, the first of which has both primary and secondary tuned.

The second transformer is unshielded and has the primary tuned to 465 kc. The secondary is self-resonant to 465 in conjunction with its associated circuit capacities.

The output of the I.F. amplifier is rectified by the diode section of the 6Q7 tube, providing automatic control bias as well as detection. The audio frequency voltage developed across R-4 is applied through C-27 to the grid of the triode section of this tube from the variable arm of R-4 which constitutes the volume control of the receiver. The d-c voltage developed across R-4 is applied to the control grids of the 6A8 and 6K7 tubes for automatic volume control.

The output of the 6Q7 amplifier section is resistance coupled to the grid of the 6F6 power amplifier pentode. The plate circuit of the 6F6 is suitably matched to the loudspeaker by means of a step-down output transformer.

The tone control circuit consists of a .03 mfd. capacitor which is connected from the plate of the 6F6 tube to ground through the tone control switch. When it is desired to reduce the high frequency output of the receiver the tone control switch is closed by turning the tone control knob to the right.

Plate and grid voltages for all tubes are supplied by the power supply system employing a 5Z4 full-wave rectifier tube and utilizing the loudspeaker field as a filter reactor which together with a suitable network of resistors and capacitors supplies the required voltages and filtering action.

ALIGNMENT PROCEDURE

Before making any adjustments to the R.F. circuits, it is wise to determine the correctness of the existing alignment. This may be done by supplying a signal from the test oscillator to the receiver and inserting a "tuning wand" into the antenna coil. The "tuning wand" consists of a bakelite rod having a brass cylinder attached to one end, and a small core of finely divided iron compacted into the opposite end. By inserting the brass cylinder end into the antenna coil, the inductance is lowered, increasing its resonant frequency. Inserting the iron-filled end into the coil raises its inductance, lowering its resonant frequency. If the circuits are in exact alignment, inserting either end of the tuning wand in the coil will result in a decrease in output. When an increase in signal is obtained with the iron-filled end of the wand at the 1500 kc. point or the 6.0-mc. point, a decrease in resonant frequency of that circuit by increasing the antenna trimmer capacity is indicated. When an increase in signal is obtained with the brass cylinder, a decrease in antenna trimmer capacity is indicated. In the event that the brass cylinder end causes an increase in output at the 580-kc. point when inserted in the antenna coil, it is necessary to increase the oscillator padder capacity, meanwhile rocking the tuning dial. An increase in output, resulting from inserting the iron-filled end, indicates a decrease in oscillator padder capacity.

ALIGNMENT FREQUENCIES

I. F.	Broadcast	Short-wave
465 kc.	580 kc. 1500 kc.	6000 kc.

In order to properly align this receiver, it will be necessary to have the following service tools:

1. Test Oscillator capable of producing the above alignment frequencies.
2. Non-metallic alignment screwdriver.
3. Output meter.

Trimmer locations as well as socket voltages are illustrated in Fig. 3.

(1) I.F. Alignment

The I.F. amplifier should be tuned to 465 kc.; set the test oscillator dial at this frequency. Set the volume control at maximum and short-circuit the antenna and ground leads. Tune the receiver to a point where no signal comes in and ground the chassis.

Connect the test oscillator output between the 6A8 converter tube control grid and the chassis. Connect the output meter across the cone coil of the speaker and adjust the oscillator output until a small deflection is observed in the output meter.

The three I.F. trimmers are adjusted in the following sequence:

1. Primary trimmer on second I.F. transformer.
2. Secondary trimmer on first I.F. transformer.
3. Primary trimmer on first I.F. transformer.

Throughout all adjustments the output should be maintained at a low level by decreasing the test oscillator output as the various stages are brought in line. After these adjustments have been made the same procedure should be repeated as a final check. The I.F. alignment will then be complete.

(2) Wave Trap Alignment

With the test oscillator still tuned to 465 kc. connect its output terminals to the antenna and ground leads of the receiver. Increase the output from the test oscillator until a reading is obtained on the output meter. Then adjust the wave trap trimmer for minimum output.

This adjustment may be changed slightly in actual operation if it is necessary to tune out a code station which is not exactly at 465 kc. This is done by adjusting the wave trap trimmer with the receiver connected to antenna and ground until the offending signal is reduced to a minimum. This adjustment should always be made with the frequency band switch in the broadcast position and with no station tuned in so that extraneous signals may not interfere with the adjustment.

(3) R.F. Alignment

The R.F. and oscillator transformers are aligned at 580, 1500, and 6000 kc. With the tuning condenser plates fully meshed, line up the pointer and dial by adjusting the dial set screws so that the line at the extreme end of the dial is indicated.

BROADCAST BAND

With the band switch in the clockwise position, set the tuning dial to 1500 kc. Set the test oscillator at 1500 kc. and, have its output connected to the antenna and ground leads of the receiver. Adjust the oscillator trimmer for the broadcast band for maximum output. Next, set the R.F. trimmer for maximum output, taking care that the output from the test oscillator is not high enough to overload any part of the set. After these adjustments, tune the set and the test oscillator to 580 kc. Adjust the broadcast padding capacitor for maximum output while rocking the tuning condenser back and forth until maximum output is obtained. The dial setting after this adjustment may not agree exactly with the frequency, but this is not important.

To complete the broadcast band line-up, repeat the adjustment at 1500 kc. as before.

Short-Wave Band

With the frequency band switch in the counterclockwise position, set the receiver dial to 6.0 mc. Set the test oscillator at 6000 kc. and adjust the short-wave oscillator trimmer for maximum output. Next, set the short-wave R.F. trimmer for maximum output. Repeat these adjustments a second time. After aligning the S.W. band, turn the test oscillator to approximately 6930 kc. with the receiver dial still at 6 mc. Increase the test oscillator output until a signal is heard in the neighborhood of 6930 kc. This is the image frequency and if the set has been properly aligned the sensitivity at this point will be much less than at 6000 kc. In the event the image frequency cannot be found, the alignment should be rechecked at 6.0 mc. It will be noticed that the oscillator trimmer will have two positions at which the signal will give maximum output. The position which gives the lower trimmer capacitance obtained by turning the trimmer screw counterclockwise is the proper adjustment.

When these adjustments have been completed the receiver will be in alignment.

RECEIVER ASSEMBLIES

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Stock No.	Description	List Price
RB-024	BOARD—Terminal Board (On Rear Part of Chassis Floor)	$0.10
RB-025	BOARD—Terminal Board (Front Corner Under 1st I.F.)	.10
RB-123	BRACKET—Dial Light and Indicator Bracket	.15
RC-022	CAPACITOR—.004 mfd., 400 Volt Paper (C-17)	.25
RC-029	CAPACITOR—.005 mfd., 400 Volt Paper (C-14)	.30
RC-046	CAPACITOR—.02 mfd., 200 Volt Paper (C-27)	.25
RC-072	CAPACITOR—.05 mfd., 200 Volt Paper (C-8)	.25
RC-083	CAPACITOR—.03 mfd., 400 Volt Paper (C-17)	.25
RC-096	CAPACITOR—.1 mfd., 200 Volt Paper (C-9, C-23)	.30
RC-123	CAPACITOR—.1 mfd., 400 Volt Paper (C-22, C-24)	.35
RC-235	CAPACITOR—100 mmfd., Mica (C-5)	.25
RC-258	CAPACITOR—250 mmfd., Mica (C-11, C-13)	.25
RC-348	CAPACITOR—1600 mmfd., Mica (C-21)	.35
RC-403	CAPACITOR—8 mfd., 350 Volt Wet Electrolytic (C-25)	1.00
RC-409	CAPACITOR—16 mfd., 390 Volt W.t Electrolytic (C-26)	1.25
RC-511	CAPACITOR—Twin 10 mfd., 25 Volt Dry Electrolytic (Gr. C-12, Rd. C-15)	.80
RC-604	CAPACITOR—Twin Trimmer R.F. and Osc. 5-45 mmfd. (C-2 and C-3, C-18 and C-19)	.45
RC-608	CAPACITOR—300-500 mmfd., Oscillator Padder (C-20)	.45
RC-609	CAPACITOR—50-100 mmfd., Wave Trap Trimmer Capacitor (C-1)	.40
RC-610	CAPACITOR—63-140 mmfd., 2nd I.F. Trimmer (C-10)	.40
RC-706	CONDENSER—Two Gang Tuning Condenser (C-4)	3.30
RC-858	CORD—Power Cord and Plug	.65
RC-959	CLAMPS—Mounting Clamp for C-12 and C-15, pkg. of 5	.25
RD-019	DIAL—Dial and Hub	.55
RE-007	ESCUTCHEON—Dial Escutcheon	.50
RF-007	FOOT—Felt Cabinet Foot, pkg. of 4	.15
RG-001	GRID CAP—Pkg. of 5	.10
RK-001	KNOB—Control Knobs, pkg. of 5	.50
RL-113	COIL—R.F. Coil (L-2, L-3, L-4, L-5)	1.25
RL-214	COIL—Oscillator Coil (L-11, L-12, L-13, L-14)	.90
RL-600	COIL—Wave Trap Coil (L-1)	.60
RR-036	RESISTOR—50,000 ohms, ½ Watt Carbon (R-1), pkg. of 5	.70
RR-039	RESISTOR—3,000 ohms, ½ Watt, Carbon (R-8), pkg. of 5	.50
RR-064	RESISTOR—500,000 ohms, ½ Watt, Carbon (R-6), pkg. of 5	.60
RR-065	RESISTOR—500,000 ohms, ½ Watt, Carbon (R-7), pkg. of 5	.65
RR-067	RESISTOR—1 megohm, ½ Watt, Carbon (R-2), pkg. of 5	.70
RR-068	RESISTOR—2 megohm, ½ Watt, Carbon (R-5), pkg. of 5	.60
RR-158	RESISTOR—1,000 ohms, ½ Watt, Carbon (R-10), pkg. of 5	.55
RR-189	RESISTOR—40,000 ohms, ½ Watt, Carbon (R-13), pkg. of 5	.80
RR-235	RESISTOR—15,000 ohms, 1 Watt, Carbon (R-12), pkg. of 5	$1.00
RR-278	RESISTOR—15,000 ohms, 2 Watt, Carbon (R-11)	.35
RR-324	RESISTOR—300 ohms, ½ Watt, Flexible (R-3), pkg. of 5	.80
RR-339	RESISTOR—450 ohms, 1 Watt, Flexible (R-9), pkg. of 5	.70
RS-200	SOCKET—Eight Pin Tube Socket, pkg. of 5	.75
RS-206	SOCKET—Dial Light Socket	.15
RS-313	SWITCH—Tone Control Switch (S-2)	.30
RS-314	SWITCH—Frequency Band Switch (S-1)	.80
RT-054	TRANSFORMER—Power Transformer—105/125 Volt, 50-60 Cycles (T-2)	5.60
RT-055	TRANSFORMER—Power Transformer—105/125 Volt; 25-60 Cycles (T-2)	8.30
RT-056	TRANSFORMER—Power Transformer—105/130; 200/250 Volt, 40-60 Cycles (T-2)	7.00
RT-215	TRANSFORMER—First I.F. Transformer Assembled (L-8, L-7, C-6, C-7)	2.00
RT-216	TRANSFORMER—Second I.F. Transformer Coils (L-8, L-9)	.85
RT-400	TRANSFORMER—Output Transformer (T-1)	1.10
RV-008	VOLUME CONTROL—500,000 Ohm Potentiometer and Power Switch (R-4 S-3)	1.10
RW-101	WASHER—Felt Spacing Washer for Control Shafts, pkg. of 10	.45
RX-009	SCREW ASSEMBLY—Chassis Mounting Screw Assembly, pkg. of 3	.25
RX-011	SCREW ASSEMBLY—Tuning Condenser, Mounting Assembly, pkg. of 4	.40

SPEAKER ASSEMBLY A-52

RC-905	CONE—8-in. Type Speaker-Cone, and Cone Coil (L-10)	1.25
RP-012	PLUG—Female Speaker Plug	.20
RP-013	PLUG—Male Speaker Plug	.20
RS-023	SPEAKER—8-in. Type Reproducer, Complete	6.80
RX-010	SCREW ASSEMBLY—Speaker Mounting Rosette Screws, Nuts and Washers, set of 4	.25

SPEAKER ASSEMBLY A-55

RC-906	CONE—9-in. Type Speaker Cone and Coil (L-10)	1.35
RP-012	PLUG—Female Speaker Plug	.20
RP-013	PLUG—Male Speaker Plug	.20
RS-024	SPEAKER—9-in. Type Reproducer, Complete	6.95
RX-012	SCREW ASSEMBLY—Speaker Mounting Bolts and Washer, set of 2	.10

AC-DC SUPERHETERODYNE

MODEL A-54

Physical Specifications

Model	A-54
Height	9⅜ in.
Width	14 in.
Depth	7 in.
Weight Packed	16 lb.

Electrical Specifications

Power Supply—Volts	Frequency Cycles on A.C.	Power Watts
105–130 A.C. or D.C.	25-133	60 max.

Tuning Frequency Range

Broadcast	540-1720 kc.
Short-wave	2.3-7.0 mc.
Tuning Control Drive Ratio:	5:1

Electrical Power Output

Undistorted	0.4 watt
Maximum	1.1 watts

Loud-speaker—Electrodynamic

Cone: 6½ in. type
Cone Coil Impedance 5.5 ohms at 400 cycles.

Tubes

Oscillator and Converter	6A8 Pentagrid Converter.
I.F. Amplifier	6K7 Triple-Grid Super-Control Amplifier.
Detector, AVC and First Audio Amplifier	6Q7 Duo-Diode High-mu Triode.
Audio Power Amplifier	25A6 Power Amplifier Pentode.
Rectifier	25Z6 Rectifier.
Dial Lamp	Mazda No. 46.

DESCRIPTION OF ELECTRICAL CIRCUIT

The signal from the antenna is applied to the control grid of the 6A8 tube through the R.F. transformer, the secondary of which is tuned to the incoming signal by the rear section of the main tuning condenser. In the 6A8 tube the incoming signal is combined with the local oscillator signal which is 465 kc. higher in frequency. The local signal is generated by the oscillator section of this tube, and the proper frequency difference is maintained throughout the tuning range by the front section of the tuning condenser in conjunction with the oscillator coils and padding capacitors.

The combination of the two signals produces the intermediate frequency of 465 kc. This particular frequency is chosen to reduce image response and improve short-wave performance. The intermediate frequency amplifier consists of a 6K7 tube and two transformers, both of which have tuned primaries and secondaries.

The output of the I.F. amplifier is rectified by the diode section of the 6Q7 tube, providing automatic volume control bias as well as detection. The audio frequency voltage developed across R-7 is applied through C-18 to the grid of the triode section of this tube from the variable arm of R-7 which constitutes the volume control of the receiver. The D.C. voltage developed across R-7 is applied to the control grids of the 6A8 and 6K7 tubes for automatic volume control.

The output of the 6Q7 amplifier section is resistance coupled to the grid of the 25A6 power amplifier pentode. The plate circuit of the 25A6 is suitably matched to the loud-speaker by means of a step-down output transformer.

The tone control circuit consists of a .05-mfd. capacitor which is connected from the plate of the 25A6 tube to "B-" lead through the tone control switch. When it is desired to reduce the high frequency output of the receiver the tone control switch is closed by turning the tone control knob to the right.

When the receiver is used on alternating current, plate and grid voltages and loud-speaker field current are supplied by a 25Z6 rectifier tube and its associated filter circuits. Each section of the 25Z6 tube acts as a separate half-wave rectifier, one for speaker field current, and one for plate and grid voltages, and each section has its own filter circuit.

When the receiver is used on a D.C. supply the 25Z6 rectifier tube remains in the circuit and serves two purposes. If the power cord should be plugged in with incorrect polarity, the 25Z6 tube protects the filter condensers from damage. On correct D.C. polarity the 25Z6 tube aids the filter circuits in smoothing the supply, thus minimizing line noise.

The heaters of all tubes and the dial light with its shunt ballast resistor (the 30-ohm section of R12) are all in series and are furnished current from the power line through a dropping resistor (the 150-ohm section of R12).

Note that the chassis is not connected directly to either the ground lead or to the power supply, but is by-passed to the "B-" lead by various condensers.

ALIGNMENT PROCEDURE

Before making any adjustments to the R.F. circuits, it is wise to determine the correctness of the existing alignment. This may be done by supplying a signal from the test oscillator to the receiver and inserting a "tuning wand" into the antenna coil. The "tuning wand" consists of a bakelite rod having a brass cylinder attached to one end, and a small core of finely divided iron compacted into the opposite end. By inserting the brass cylinder end into the antenna coil, the inductance is lowered, increasing its resonant frequency. Inserting the iron-filled end into the coil raises its inductance, lowering its resonant frequency. If the circuits are in exact alignment, inserting either end of the tuning wand in the coil will result in a decrease in output. When an increase in signal is obtained with the iron-filled end of the wand at the 1500-kc. point or the 6.0-mc. point, a decrease in resonant frequency of that circuit by increasing the antenna trimmer capacity is indicated. When an increase in signal is obtained with the brass cylinder, a decrease in antenna trimmer capacity is indicated. In the event that the brass cylinder end causes an increase in output at the 580-kc. point when inserted in the antenna coil, it is necessary to increase the oscillator padder capacity, meanwhile rocking the tuning dial. An increase in output, resulting from inserting the iron-filled end, indicates a decrease in oscillator padder capacity.

ALIGNMENT FREQUENCIES

I.F.	Broadcast	Short-wave
465 kc.	580 kc. 1500 kc.	6000 kc.

In order to properly align this receiver, it will be necessary to have the following service tools:

1. Test Oscillator capable of producing the above alignment frequencies.
2. Non-metallic alignment screwdriver.
3. Output meter.

Trimmer locations as well as socket voltages are illustrated in Fig. 3.

(1) *I.F. Alignment*

The I.F. amplifier should be tuned to 465 kc.; set the test oscillator dial at this frequency. Set the volume control at maximum and short-circuit the antenna and ground leads. Tune the receiver to a point where no signal comes in.

Connect the test oscillator output between the 6A8 converter tube grid (with the grid cap on) and the chassis. Connect the output meter across the cone coil of the speaker and adjust the oscillator output until a small deflection is observed in the output meter.

The four I.F. trimmers are adjusted in the following sequence:

1. Secondary trimmer on second I.F. transformer.
2. Primary trimmer on second I.F. transformer.
3. Secondary trimmer on first I.F. transformer.
4. Primary trimmer on first I.F. transformer.

Throughout all adjustments the output should be maintained at a low level by decreasing the test oscillator output as the various stages are brought in line. After these adjustments have been made, the same procedure should be repeated as a final check. The I.F. alignment will then be complete.

(2) *R.F. Alignment*

The R.F. and oscillator transformers are aligned at 580, 1500, and 6000 kc. With the tuning condenser plates fully meshed, line up the pointer and dial by adjusting the dial set screws so that the line at the extreme end of the dial is indicated.

(a) *Broadcast Band*

With the band switch in the clockwise position, set the tuning dial to 1500 kc. Set the test oscillator at 1500 kc. and adjust the oscillator trimmer for the broadcast band for maximum output. Next, set the R.F. trimmer for maximum output, taking care that the output from the test oscillator is not high enough to overload any part of the set. After these adjustments, tune the set and the test oscillator to 580 kc. Adjust the broadcast padding capacitor for maximum output while rocking the tuning condenser back and forth until maximum output is obtained. The dial setting after this adjustment may not agree exactly with the frequency, but this is not important.

To complete the broadcast band line-up, repeat the adjustment at 1500 kc. as before.

(b) *Short-wave Band*

With the frequency band switch in the counterclockwise position, set the receiver dial to 6.0 mc. Set the test oscillator at 6000 kc. and adjust the short-wave oscillator trimmer for maximum output. Next, set the short-wave R.F. trimmer for maximum output. Repeat these adjustments a second time. After aligning the S. W. band, turn the test oscillator to approximately 6930 kc. with the receiver dial still at 6.0 mc. Increase the test oscillator output until a signal is heard in the neighborhood of 6930 kc. This is the image frequency and if the set has been properly aligned the sensitivity at this point will be much less than at 6000 kc. In the event the image frequency cannot be found, the alignment should be rechecked at 6.0 mc. It will be noticed that the oscillator trimmer will have two positions at which the signal will give maximum output. The position which gives the lower trimmer capacitance obtained by turning the trimmer screw counterclockwise is the proper adjustment.

When these adjustments have been completed the receiver will be in alignment.

REPLACEMENT PARTS

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

Stock No.	Description	List Price
RB-021	BOARD—Terminal Board (Under 1st I.F. Transformer)	$0.10
RB-022	BOARD—Terminal Board (On Sub Chassis Partition)	.10
RB-023	BOARD—Terminal Board (On Chassis rear wall)	.10
RB-122	BRACKET—Dial Light Bracket and Indicator	.25
RC-024	CAPACITOR—.005 mfd., 200 V. Paper (C32), pkg of 5	.75
RC-037	CAPACITOR—.01 mfd., 250 V. A.C. Paper (C31), pkg. of 5	.75
RC-040	CAPACITOR—.01 mfd., 400 V. Paper (C27)	.25
RC-058	CAPACITOR—.03 mfd., 200 V. Paper (C18, C24)	.25
RC-072	CAPACITOR—.05 mfd., 200 V. Paper (C10)	.25
RC-091	CAPACITOR—.05 mfd., 400 V. Paper (C14, C26)	.30
RC-096	CAPACITOR—.1 mfd., 200 V. Paper (C19)	.30
RC-098	CAPACITOR—.1 mfd., 440 V. Paper (C20, C21)	.30
RC-110	CAPACITOR—.15 mfd., 200 V. Paper (C11)	.30
RC-136	CAPACITOR—.25 mfd., 200 V. Paper (C15)	.30
RC-235	CAPACITOR—100 mmfd., Moulded Mica (C5)	.25
RC-258	CAPACITOR—250 mmfd., Moulded Mica (C23, C22)	.25
RC-348	CAPACITOR—1600 mmfd., Mica (C9)	.35
RC-516	CAPACITOR—7 and 10 mfd., 150 and 25 volts Dry Electrolytic (C30, C25)	1.50
RC-524	CAPACITOR—25 and 16 mfd., 150 V. Dry Electrolytic (C28, C29)	2.50
RC-604	CAPACITOR—Twin Trimmer 5-45 mmfd. (C1, C2, or C6, C8)	.45
RC-608	CAPACITOR—Osc. Padder 300-500 mmfd. (C7)	.45
RC-705	CONDENSER—Two Gang Tuning Condenser 10-447 mmfd. (C3, C4)	3.25
RC-857	CORD—Power Cord and Plug	.50
RD-018	DIAL—Dial Scale and Hub	.55
RF-004	FOOT—Chassis Mounting Foot	.15
RF-007	FOOT—Felt Foot (Pkg. of 4)	.15
RG-001	GRID CAP—Pkg. of 5	.10
RK-001	KNOB—Walnut, Black, or Bronze Control Knob (Pkg. of 5)	.50
RL-113	COIL—R.F. Coil (L1, L2, L3, L4)	1.25
RL-214	COIL—Osc. Coil (L5, L6, L7 L8)	.90
RL-302	COIL—Filter Reactor (L15)	1.35
RP-030	PLATE—Asbestos Plate	.10

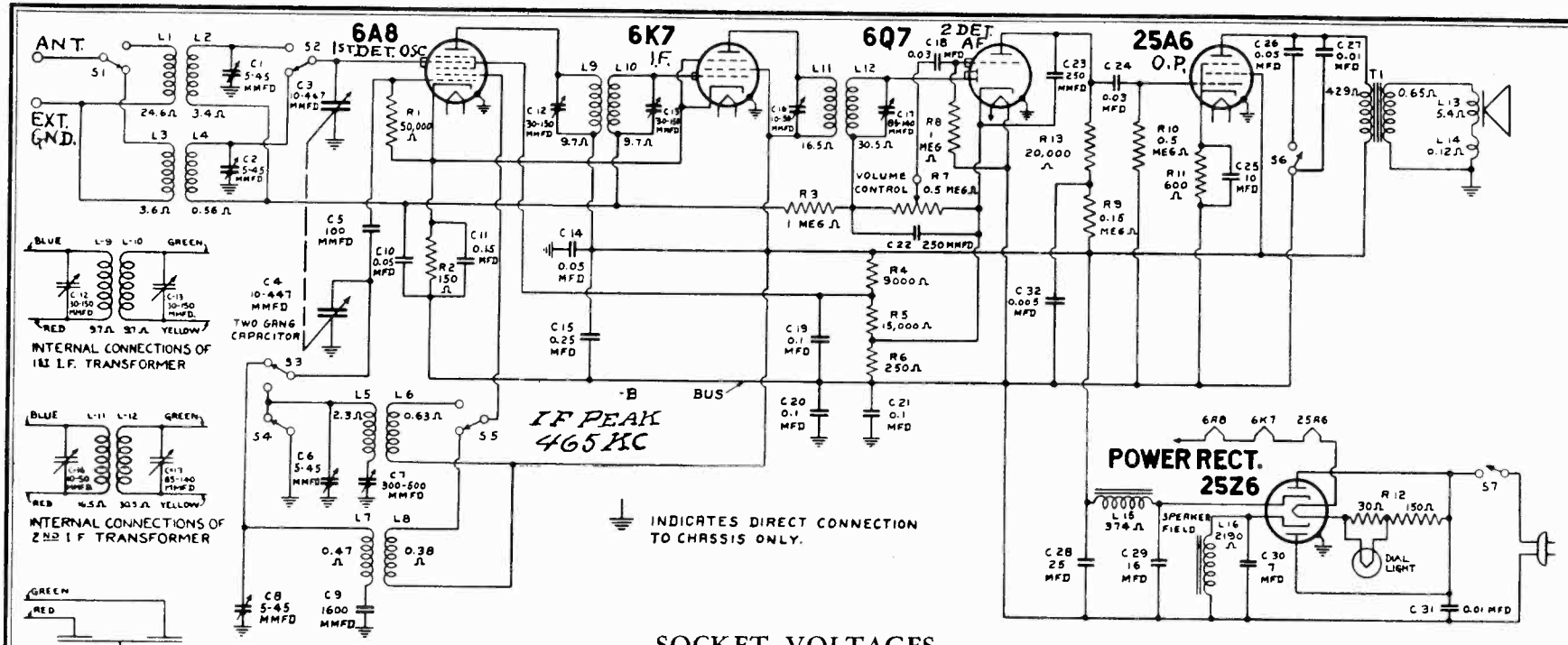
Stock No.	Description	List Price
RR-005	RESISTOR—150 ohms Carbon (R2), pkg. of 5	$0.60
RR-025	RESISTOR—20,000 ohms ½ Watt Carbon (R13), pkg of 5	.60
RR-033	RESISTOR—250 ohms 1½ Watt Carbon (R6), pkg of 5	.60
RR-035	RESISTOR—50,000 ohms ½ Watt Carbon (R1), pkg. of 5	.70
RR-054	RESISTOR—150,000 ohms ½ Watt Carbon (R9), pkg. of 5	.60
RR-064	RESISTOR—500,000 ohms ½ Watt Carbon (R10), pkg. of 5	.60
RR-067	RESISTOR—1 megohm ½ Watt Carbon (R3, R8), pkg. of 5	.70
RR-154	RESISTOR—600 ohms ½ Watt Carbon (R11), pkg. of 5	.80
RR-182	RESISTOR—9000 ohms ½ Watt Carbon (R4), pkg. of 5	.75
RR-186	RESISTOR—15,000 ohms ½ Watt Carbon (R5), pkg. of 5	.75
RR-703	RESISTOR—Two-in-one Resistor 150 and 30 ohms (R12)	.60
RS-156	SHIELD—Sub Chassis Partition	.45
RS-200	SOCKET—Eight Pin Tube Socket (Pkg. of 5)	.75
RS-311	SWITCH—Band Switch (S1, S2, S3, S4, S5)	.75
RS-312	SWITCH—Tone Control Switch (S6)	.45
RT-213	TRANSPORMER—First I.F. Transformer Assembled (L9, L10, C12, C13)	1.90
RT-214	TRANSPORMER—Second I.F. Transformer Assembled (L11, L12, C16, C17)	1.50
RT-408	TRANSPORMER—Output Transformer (T1)	2.20
RV-007	VOLUME CONTROL—500,000 ohm Potentiometer and Power Switch (R7, S7)	1.05
RW-101	WASHER—Felt Spacing Washer for Control Shafts (Pkg. of 10)	.45
RX-005	SCREW ASSEMBLY—Chassis Mounting Screws and Cushion (Pkg. of 3)	.25
RX-010	SCREW ASSEMBLY—Speaker Mounting Screw Assembly, (Pkg. of 4)	

SPEAKER ASSEMBLY

RC-904	CONE—6½ in. type Cone and Coil (L13)	$1.00
RP-012	PLUG—Female Speaker Plug	.20
RP-013	PLUG—Male Speaker Plug	.20
RS-022	SPEAKER—6½ in. Type Reproducer Complete	6.25

GENERAL ELECTRIC CO.

MODEL A-54
Schematic
Voltage
Transformer Data

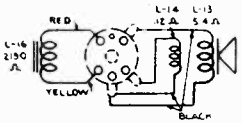


INTERNAL CONNECTIONS OF 1st I.F. TRANSFORMER

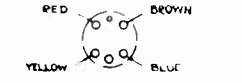
INTERNAL CONNECTIONS OF 2ND I.F. TRANSFORMER

INTERNAL CONNECTIONS OF DRY ELECTROLYTIC CONDENSER

INTERNAL CONNECTIONS OF DRY ELECTROLYTIC CONDENSER



INTERNAL CONNECTIONS OF SPEAKER



CABLE PLUG VIEWED FROM CABLE SIDE

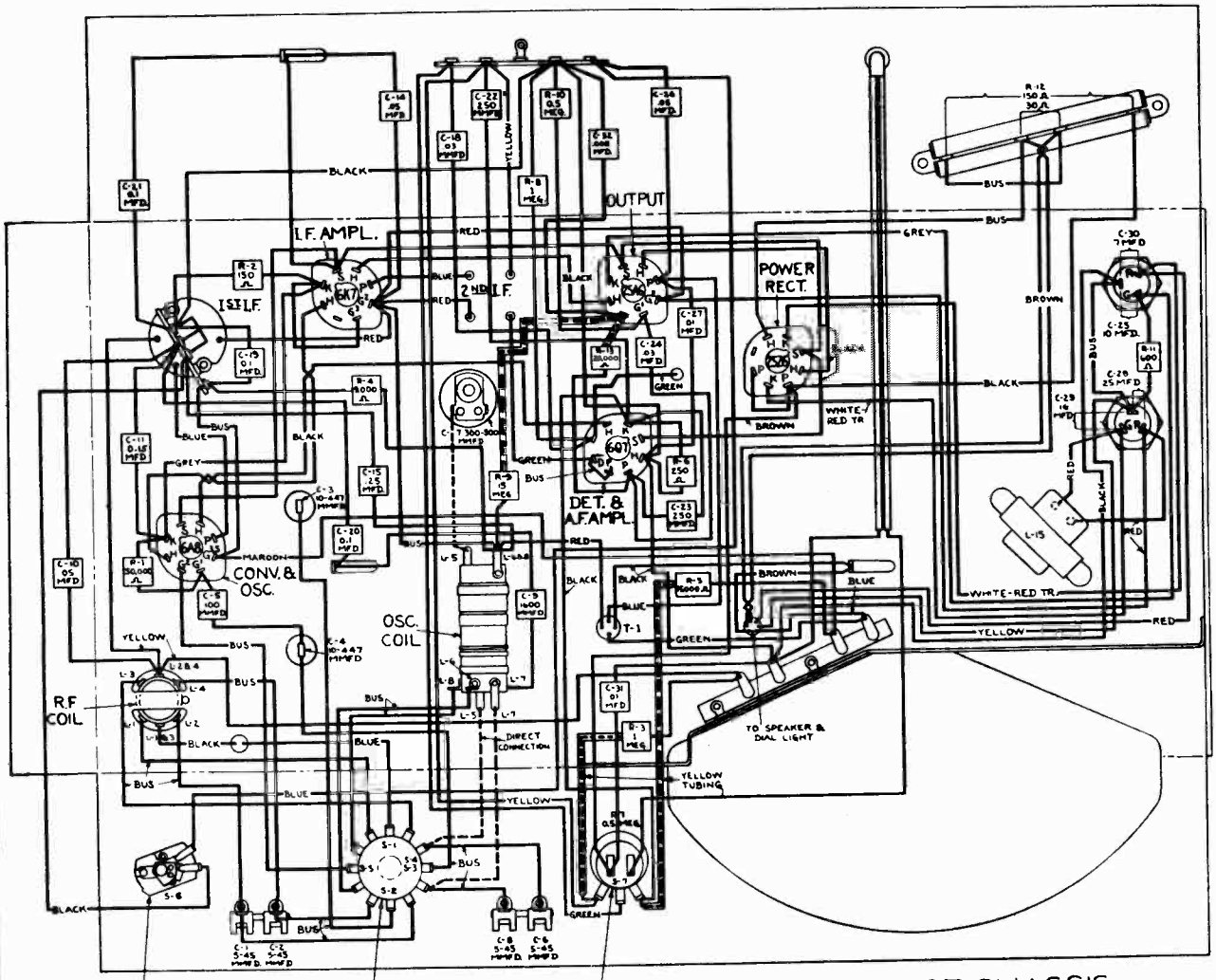
SOCKET VOLTAGES

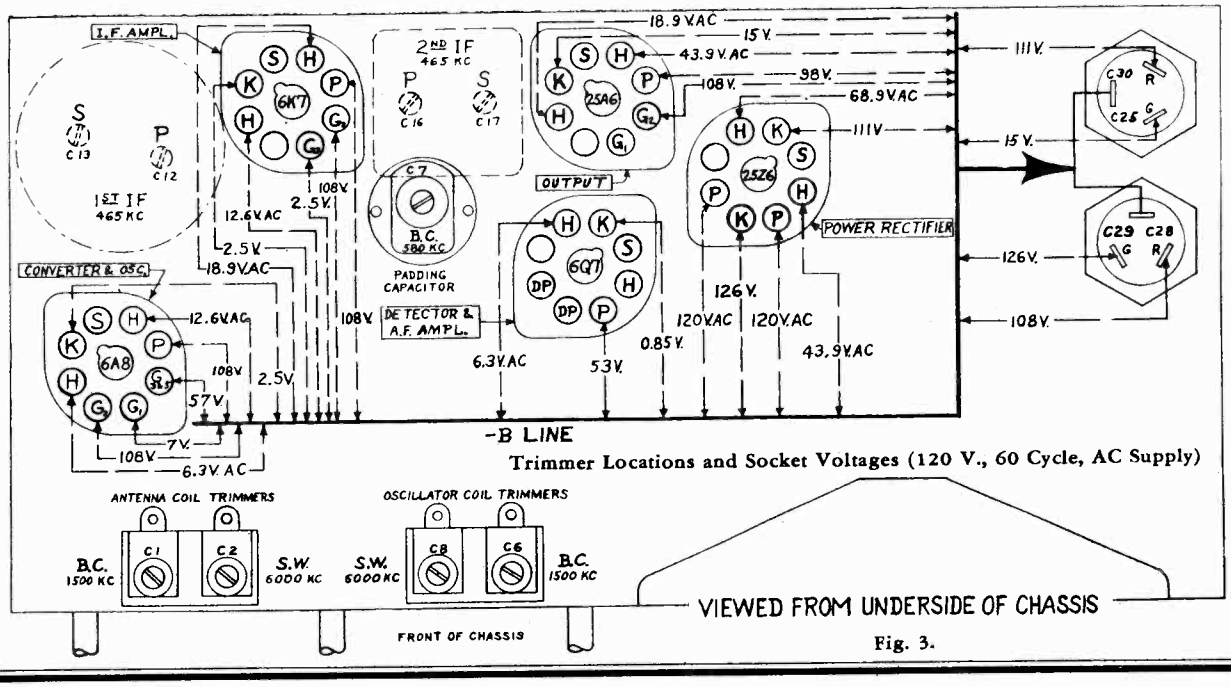
Power Supply	CATHODE TO "−B" VOLTS D.C.		SCREEN GRID TO "−B" VOLTS D.C.		PLATE TO "−B" VOLTS D.C.		PLATE CURRENT M.A. D.C.		HEATER VOLTS	
	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC
6A8 Converter	2.5	2.3	57	51	108	93	1.4	1.1	6.3	6.3
Oscillator					108	93	1.9	1.6		
6K7 I.F. Amplifier	2.5	2.3	108	93	108	93	9.4	8.2	6.3	6.3
6Q7 Detector and A.F. Amplifier	0.9	0.85			53	46	0.2	0.18	6.3	6.3
25A6 Pwr. Amplifier	15	12.8	108	93	98	86	19.4	17.3	25	25
25Z6 Rectifier, "+B"	126	109			(120 A.C.)	120	46	48.5	25	25
Spkr. Field	111	109				120	44	47		

Measured at 120 volts 60 cycles or 120 volts D.C. supply. Dial 1000 kc. No signal input. Voltmeter 1000 ohms per volt; measurements taken on highest scale giving accurate readable deflection. For 25-cycle supply, reduce above values of plate and grid voltages about 5 per cent, except speaker field voltage, which is reduced approximately 18 per cent from its 60-cycle value.

MODEL A-54
Chassis Wiring
Socket, Trimmers

GENERAL ELECTRIC CO.



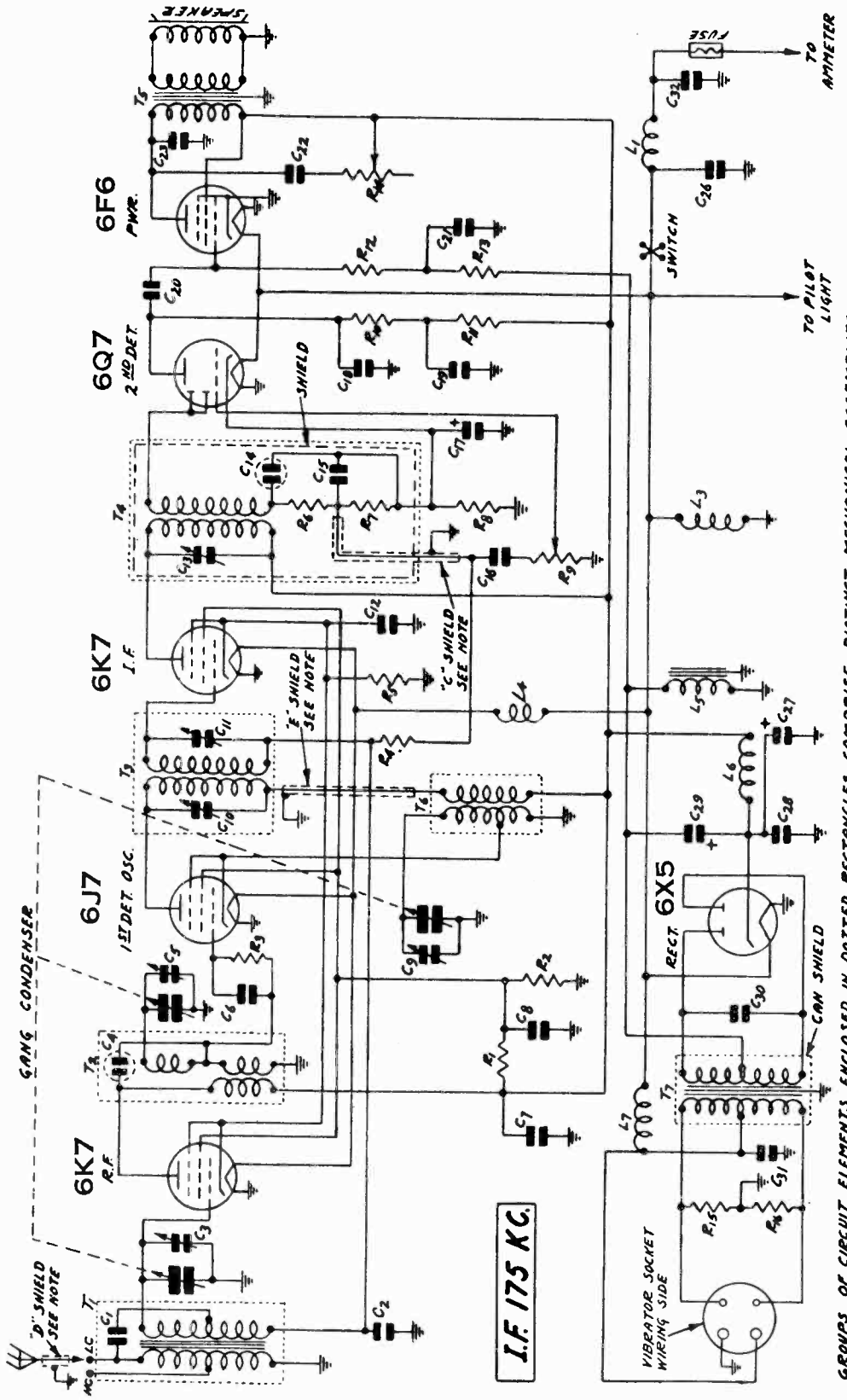


Trimmer Locations and Socket Voltages (120 V., 60 Cycle, AC Supply)

Fig. 3.

GENERAL ELECTRIC CO.

MODEL N-60
Schematic



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

C 1 10 mmf.
C 2 .05 mf. 180 V.
C 3 Gang Trimmer
C 4 40 mmf.
C 5 Gang Trimmer
C 6 35 mmf.
C 7 .10 mf. 360 V.
C 8 .10 mf. 180 V.
C 9 Gang Trimmer
C10 70-150 mmf. } Dual
C11 70-150 mmf. }
C12 .10 mf. 180 V.
C13 70-150 mmf.
C14 250 mmf.
C15 250 mmf.
C16 .01 mf. 360 V.
C18 250 mmf.
C19 .10 mf. 360 V.
C20 .01 mf. 360 V.
C21 .25 mf. 180 V.
C22 .02 mf. 600 V.
C23 .002 mf. 600 V.
C26 2000 mmf.
C28 2000 mmf.
C30 .0075 mf. 1600 V.
C31 .50 mf. 180 V.
C32 2000 mmf.
C17 4.0 mf. 25 V. } Electrolytic
C27 5.0 mf. 350 V. } Block
C29 8.0 mf. 350 V. }

R 1 17000 ohm 1.0 W.
R 2 20000 ohm .5 W.
R 3 .50 Megohm .2 W.
R 4 1.0 Megohm .2 W.
R 5 350 ohm .2 W.
R 6 50000 ohm .2 W.
R 7 500000 ohm .2 W.
R 8 6000 ohm .2 W.
R 9 2.0 Megohm Vol. Control
R10 150000 ohm .2 W.
R11 50000 ohm .2 W.
R12 .50 Megohm .2 W.
R13 100000 ohm .2 W.
R14 150000 ohm Tone Control
R15 50 ohm .5 W.
R16 50 ohm .5 W.

T 1 Antenna Trans.
T 2 R.F. Inter. Trans.
T 3 1st I.F. Trans.
T 4 2nd I.F. Trans.
T 5 Output Trans.
T 6 Osc. Inductor
T 7 Power Trans.

L 1 Motor Noise Reactor
L 3 Speaker Field 5.3 ohm
L 4 Filament Reactor
L 5 Filter Reactor
L 6 "B" Reactor
L 7 Vibrator Reactor

Feb. 1936

6 Tube Automobile Radio — MODEL N-60

SPECIFICATIONS

Power Consumption	7.0 Amperes at 6.0 Volts
Power Output (Undistorted)	3 Watts
Power Output (Maximum)	4 Watts
Tuning Frequency Range	530 to 1650 KC
Intermediate Frequency	175 KC
Speaker	6 inch Dynamic

Circuit

This model is a 6 tube automobile receiver covering the standard wave band. It has a tuning range as shown in the specifications above. The signal is fed through an antenna transformer with tuned secondary into a 6K7 tube which functions as an R.F. amplifier. The output of this tube is fed through another R.F. transformer with tuned secondary into a 6J7 tube which functions as the first detector and oscillator. The oscillating circuit is tuned by the oscillator section of the gang condenser and is always resonant at a frequency 175 KC above the frequency to which the R.F. circuits are tuned.

One stage of I.F. amplification is employed using a 6K7 tube. The primary and secondary of the first I.F. transformer and the primary of the second I.F. transformer are tuned by small trimmer condensers

A 6Q7 dual diode-triode tube functions as a diode 2nd detector, AVC tube and a one stage audio amplifier. AVC voltage is applied to the control grid circuits of the 6K7 R.F. and I.F. tubes. The manual volume control varies the audio voltage applied to the grid of the 6Q7 tube.

In the output stage a 6F6 tube is employed. A dynamic reproducer is used.

The vibrator in the power unit interrupts the current through the primary of the power transformer. The use of a vibrating interrupter in the primary circuit and a high ratio transformer results in the application of high voltage AC to the rectifier tube plates. The 6X5 full wave rectifier tube, filter choke, and filter condensers convert this high voltage AC into high voltage DC for the plate and screen circuits.

Alignment and Calibration

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

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

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

I. F. Adjustment

Set the signal generator for a signal of 175 KC.

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

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

Short out the oscillator section of the tuning condenser.

Set the volume control at the maximum position.

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

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

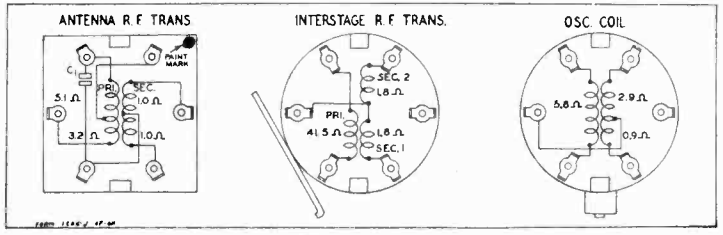


Fig. 3—R. F. and Oscillator Coil Base Terminal Arrangement and D. C. Resistance of Windings

1650 KC Adjustment

Set the signal generator for 1650 KC.

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

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

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

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

1400 KC. Adjustment

Set the signal generator for 1400 KC.

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

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

Do not change the setting of the oscillator trimmer.

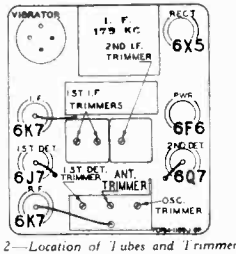


Fig. 2—Location of Tubes and Trimmers

D. C. Resistance of Windings

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

Code	Winding	D. C. Resistance in Ohms
T1	Antenna Coil	
	Primary Winding	
	Long Portion	5.1
	Short Portion	3.2
	Secondary Winding—Either Portion	1.0
T2	R. F. Coil (Interstage R. F.)	
	Primary Winding	41.5
	Secondary Winding	
	No. 1	1.6
	No. 2	1.8
T3	1st I. F. Transformer	
	Primary Winding	88.0
	Secondary Winding	87.0
T4	2nd I. F. Transformer	
	Primary Winding	43.0
	Secondary Winding	48.2
T5	Dynamic Speaker	
	Output Transformer	
	Primary	416.6
	Secondary	Small
L3	Speaker Field	5.3
	Speaker Voice Coil	Small
T6	Oscillator Coils	
	Grid Coil	
	Long Portion	2.9
	Short Portion	0.9
	Plate Coil	5.8

Adjusting Antenna Trimmer

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

Calibrating the Receiver

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

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

VOLTAGES AT SOCKETS

Antenna Disconnected — Battery 6 Volts Under Load

Type of Tube	Function	Across Heater	Plate to Ground	Screen to Ground	Cathode to Ground	Cathode Current M. A.
6K7	R. F. Amp.	5.6	230	100	4.6	8.0
6J7	1st Det. Osc.	5.6	230	100	0	2.8
6K7	I. F. Amp.	5.6	230	100	4.6	8.0
6Q7	2nd Det.	5.8	100(1)		1.6	0.4
6F6	Power	5.8	220	240	18.0(2)	29.0
6X5	Rectifier	5.8				53.0

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

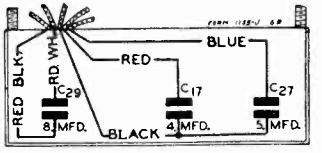
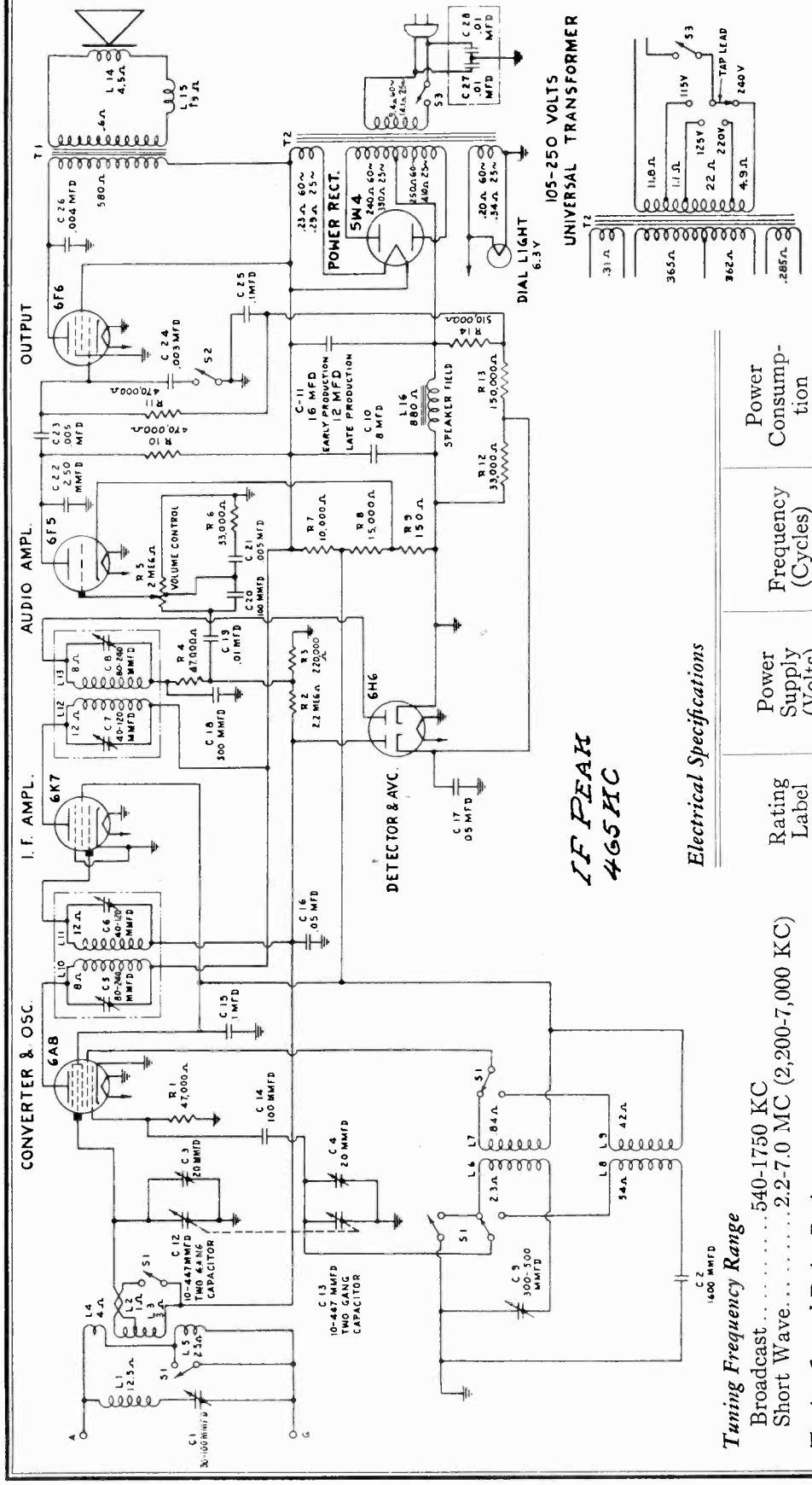


Fig. 4—Condenser Block—Internal Wiring

Code	Winding	D. C. Resistance in Ohms
T7	Power Transformer	
	Primary Winding	
	Center Tap to Inside	Small
	Center Tap to Outside	Small
	Secondary Winding	
	Center Tap to Inside	200.0
	Center Tap to Outside	200.0
L1	"A" Line Reactor	Small
L4	Filament Reactor	.22
L5	Power Reactor	300.0
L6	R. F. "B" Plate Reactor	4.0
L7	Vibrator Filter Reactor	Small

GENERAL ELECTRIC CO.

MODELS E-61, E-62, E-68
Schematic, Data



Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115	50–60	70
C	115	25–60	70
V	105–130 and 200–250	40–60	75

NOTE: Taps on universal transformers (rating "V") are accessible by removing the cap cover mounted on the top of the transformer. Schematic and wiring diagrams of the universal transformer are shown in Figures 1 and 2, respectively.

Tuning Frequency Range
Broadcast.....540-1750 KC
Short Wave.....2.2-7.0 MC (2,200-7,000 KC)

Tuning Control Drive Ratio
Single Speed.....5 to 1

Electrical Power Output
Undistorted.....2.0 Watts
Maximum.....5.0 Watts

Loud-speaker—Electrodynamic
Cone Model E-61...8 in.
Model E-62...6½ in.
Model E-68...12 in.
Cone Coil Impedance at 400 Cycles
6½ in. Speaker...3.3 ohms
8 and 12 in. Speaker..5.5 ohms

MODELS E-61, E-62, E-68
Chassis Wiring,
Circuit Data, Coil Data

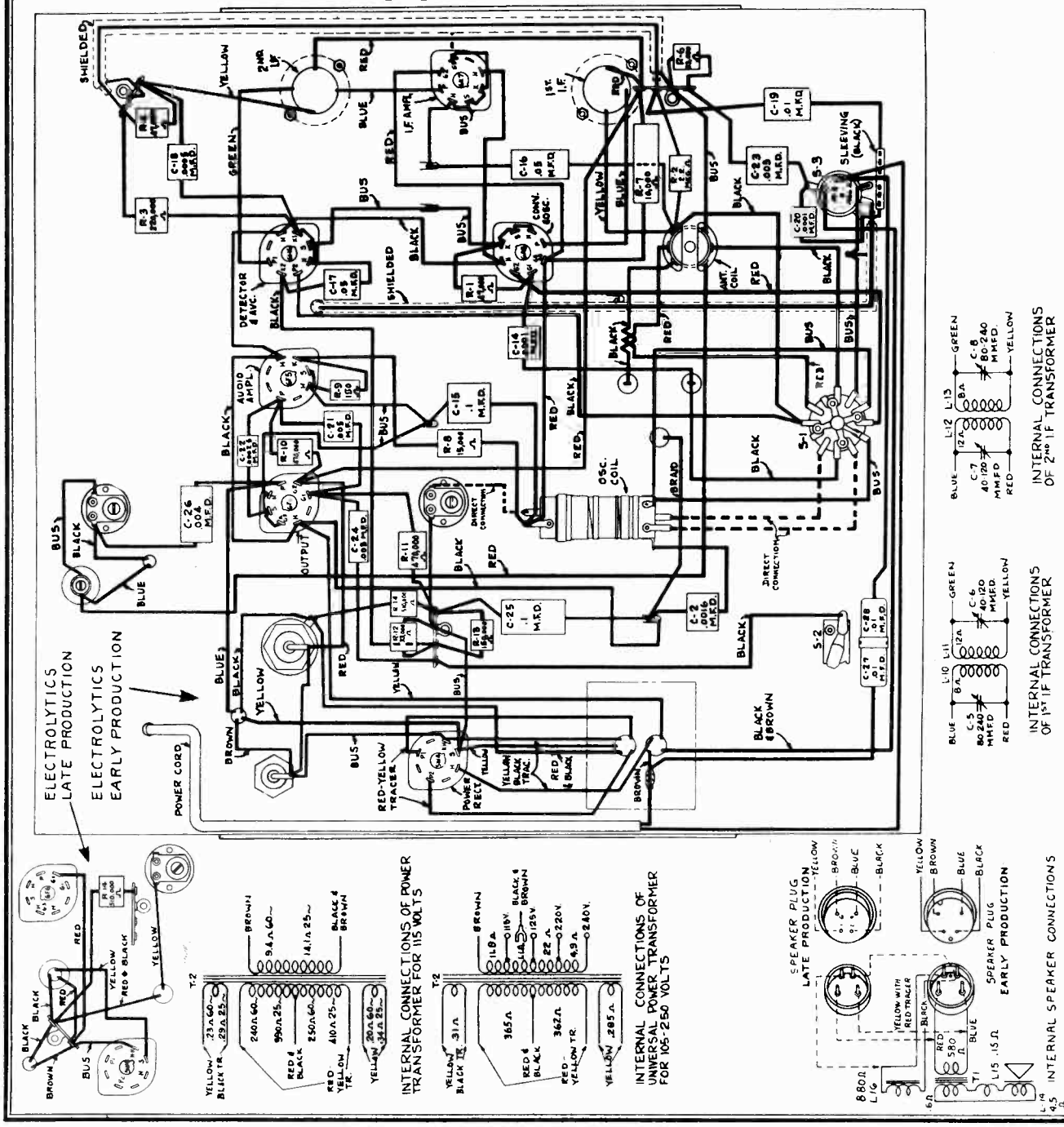
GENERAL ELECTRIC CO.

DESCRIPTION OF ELECTRICAL CIRCUIT

Models E-61, E-62 and E-68 employ six metal envelope tubes in a superheterodyne circuit giving the excellent selectivity and sensitivity inherent in this type circuit. Ample undistorted output is obtained through diode detection and two high gain audio amplifier stages.

The signal from the antenna is applied to the control grid of the 6A8 tube through the R. F. coil, the secondary of which is tuned to the incoming signal by the rear section of the main tuning condenser. In the 6A8 tube the incoming signal is combined with the local oscillator signal which is 465 KC higher in frequency. The local signal is generated by the oscillator elements of this tube, and the proper frequency difference is maintained throughout the tuning range by the front section of the main tuning condenser in conjunction with the oscillator coil and padding capacitors.

The combination of the two signals produces the intermediate frequency of 465 kilocycles. This particular intermediate frequency is chosen to reduce image response and improve short-wave performance. The intermediate frequency amplifier consists of a 6K7



tube and two I. F. transformers, each with two tuned circuits. An I. F. wave trap is provided across the antenna and ground terminals to eliminate interfering signals of the intermediate frequency.

The output of the I. F. amplifier is applied to one plate of the 6H6 diode rectifier, which is a combined detector, initial bias and automatic volume control tube. The direct-current component of the rectified signal, through one diode of the 6H6, produces a voltage drop across R-3. This voltage drop provides automatic bias for the converter and I. F. amplifier tubes and so gives automatic volume control action. The other diode of the 6H6 provides an initial bias for the tubes on the automatic volume control circuit under conditions of little or no signal. This initial bias diode, under conditions of small signal, draws current which flows through resistors R-2 and R-3. The resulting voltage is the required minimum operating bias for the controlled tubes. Upon receiving signals above the level of the initial bias, the initial bias diode stops drawing current and the automatic volume control diode takes over the controlling bias.

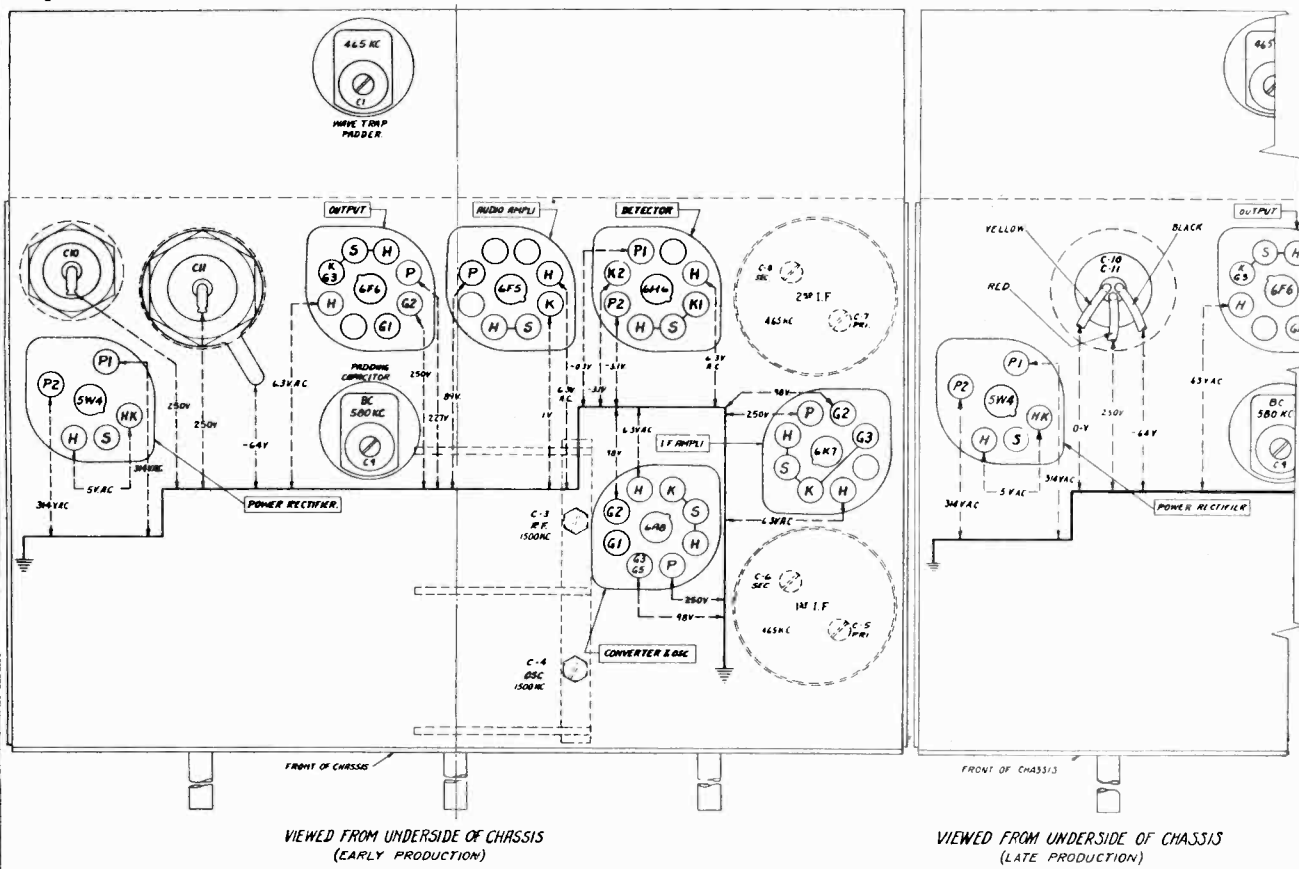
The manual volume control, R-5, selects the amount of audio signal applied to the grid of the 6F5 audio amplifier tube, and this regulates the output of the receiver. The output of the 6F5 tube is resistance coupled to the grid of the 6F6 power amplifier pentode. The plate circuit of the 6F6 is suitably matched to the loud-speaker by means of a step-down output transformer.

The tone control circuit consists of a .003 mfd. capacitor, connected in series with a two point grounding switch, S-2, in the grid circuit of the 6F6 power pentode. When it is desired to reduce the high frequency output of the receiver, the switch, S-2, is turned to its counterclockwise grounding position.

Plate and grid voltages for all tubes are supplied by the power supply system employing a 5W4 full-wave rectifier tube which, together with a suitable network of resistors and capacitors, supplies the required voltages and filtering action.

ALIGNMENT FREQUENCIES

I. F.	Broadcast	Wave Trap
465 KC	580 KC	465 KC
	1500 KC	



Measured at 125 volts supply. No signal input. Volume control maximum. Voltmeter 1000 ohms per volt; measurement taken on highest scale giving accurate readable deflection.

Fig. 3. Trimmer Locations and Socket Voltages

MODELS E-61, E-62 AND E-68

REPLACEMENT PARTS

RECEIVER ASSEMBLIES

RB-040	BOARD—Terminal Board Near Osc. Padder	$0.10
RB-041	BOARD—Terminal Board on Rear Chassis Wall	.10
RB-134	BRACKET—Dial Light Bracket	.15
RB-135	BRACKET—Dial Support Bracket	.15
RC-014	CAPACITOR—.003 mfd. 200 V Paper (C-24)	.25
RC-018	CAPACITOR—.004 mfd. 600 V Paper (C-26)	.30
*RC-024	CAPACITOR—.005 mfd. 200 V Paper (C-21)	.25
*RC-029	CAPACITOR—.005 mfd. 400 V Paper (C-23)	.30
*RC-034	CAPACITOR—.01 mfd. 200 V Paper (C-19)	.25
*RC-072	CAPACITOR—.05 mfd. 200 V Paper (C-16, C-17)	.25
*RC-096	CAPACITOR—.1 mfd. 200 V Paper (C-15, C-25)	.30
RC-235	CAPACITOR—100 mmfd. Mica (C-14, C-20)	.25
RC-261	CAPACITOR—250 mmfd. Mica (C-22)	.25
RC-298	CAPACITOR—500 mmfd. Mica (C-18)	.30
*RC-348	CAPACITOR—1600 mmfd. Mica (C-2)	.35
*RC-403	CAPACITOR—8 mfd. 350 V Wet Electrolytic (C-10)	1.00
RC-413	CAPACITOR—16 mfd. 375 V Wet Electrolytic (C-11)	1.25
RC-567	CAPACITOR—12 mfd. 350 V and 8 mfd. 300 V Dual Dry Electrolytic (C-10, C-11) (Late Prod.)	1.90
*RC-608	CAPACITOR—Osc. Padder Capacitor (C-9)	.40
*RC-609	CAPACITOR—Wave Trap Trimmer (C-1) (50-100 mmfd)	.40
RC-709	CONDENSER—2 Gang Tuning Condenser (C-12, C-13)	3.25
RC-753	CAPACITOR—.01–.05 mfd. 250 V Paper (C-27, C-28)	.40
RC-815	CABLE—Dial Drive Cable (Pkg. of 5)	.50
*RC-858	CORD—Power Cord and Plug	.65
RD-030	DRUM—Condenser Drive Drum	.25
RD-031	DIAL SCALE	.20
*RF-004	FOOT—Chassis Mounting Foot	.15
*RG-001	GRID CAP—Control Grip Clip (Pkg. of 5)	.10
*RK-004	KNOB—Control Knob (Without Dot.) (Pkg. of 5)	.40
RK-005	KNOB—Frequency Band Switch Knob (With Dot.) (Pkg. of 5)	.50
RL-120	COIL—R. F. Coil (L-2, L-3, L-4, L-5)	1.10
RL-222	COIL—Oscillator Coil (L-6, L-7, L-8, L-9)	.90
RL-602	COIL—Wave Trap Coil (L-1, C-1)	.50
RP-041	POINTER—Dial Scale Pointer	.10
RP-042	PULLEY—Dial Cable Pulley (Pkg. of 2)	.15
*RQ-039 (RR-005)	RESISTOR—150 ohms ¼ watt (R-9) (Pkg. of 5)	.60
RQ-095	RESISTOR—35,000 ohms ¼ watt (R-6, R12) (Pkg. of 5)	.60
RQ-099	RESISTOR—47,000 ohms ¼ watt (R-1, R-4) (Pkg. of 5)	.60
*RQ-111 (RR-054)	RESISTOR—150,000 ohms ¼ watt (R-13) (Pkg. of 5)	.70
RQ-115	RESISTOR—220,000 ohms ¼ watt (R-3) (Pkg. of 5)	.70
RQ-123	RESISTOR—470,000 ohms ¼ watt (R-10, R-11) (Pkg. of 5)	.70
RQ-124	RESISTOR—510,000 ohms ¼ watt (R-14) (Pkg. of 5)	.70
RQ-139	RESISTOR—2.2 megohms ¼ watt (R-2) (Pkg. of 5)	.70
*RQ-487 (RR-235)	RESISTOR—15,000 ohms 1 watt (R-8) (Pkg. of 5)	1.00
RQ-683	RESISTOR—10,000 ohms 2 watt (R-7)	.35
RR-904	REFLECTOR—Dial Light Reflector	.15
RS-162	SHIELD—Chassis End Shield (E-61 only)	.20
RS-163	SHIELD—Chassis End Shield (E-68 Only)	$0.25
*RS-200	SOCKET—8 Pin Tube Socket (Pkg. of 5)	.75
*RS-204	SOCKET—5 Pin Tube Socket (Pkg. of 5)	.75
RS-321	SWITCH—Tone Control Switch (S-2)	.30
RS-322	SWITCH—Frequency Band Change Switch (S-1)	.75
RS-415	SPRING—Spring Bracket Supporting Cable Pulley (Pkg. of 2)	.10
RS-423	SPRING—Knob Spring (Push-on Type) (Pkg. of 10)	.25
RT-067	TRANSFORMER—Power Transformer 115 V. 50-60 cycles. "A" Rating	4.00
RT-068	TRANSFORMER—Power Transformer 115 V. 25-60 cycles. "C" Rating	8.15
RT-069	TRANSFORMER—Universal Power Transformer. 105-130, 200-250 V., 40-60 cycles.	8.50
RT-220	TRANSFORMER—1st I.F. Transformer Complete with Trimmers (L-10, L-11), (C-5 C-6)	1.75
RT-221	TRANSFORMER—2nd I.F. Transformer Complete with Trimmers (L-12, L-13) (C-7, C-8)	1.80
RV-013	VOLUME CONTROL—Volume Control and Power Switch (R-5, S-3)	1.10
RW-104	WINDOW—Dial Window	.15
*RW-101	WASHER—Felt Washer for Control Shafts (Pkg. of 10)	.45
*RW-103	WASHER—Insulating Washer for Mounting 16 mfd. Electrolytic (Pkg. of 10)	.20
RX-015	SCREW ASSEM.—Chassis Mounting Screw Assembly (3 Screws, 6 Washers)	.10
RX-016	MOUNTING ASSEM.—3 Screws and 3 Cushions for Mounting Tuning Ccondenser	.30

SPEAKER ASSEMBLIES E-68

RC-910	CONE—12 in. Cone and Voice Coil Gasket (L-14)	$1.45
RC-991	CLAMP—Cone Spider Clamp	.05
*RP-012	PLUG—Female Speaker Plug	.20
RP-040	PLUG—Male Speaker Plug	.20
RP-050	PLUG—Female Speaker Plug (Late Prod.)	.20
RP-051	PLUG—Male Speaker Plug (Late Prod.)	.20
RS-029	SPEAKER—12 in. Reproducer Unit Complete with Transformer (L-14, L-15, L-16, T-1)	9.50
RS-416	SPRING—V.C. Leads Spring (Pkg. of 2)	.10
RT-412	TRANSFORMER—Output Transformer (T-1)	1.25

SPEAKER ASSEMBLIES E-61

RC-909	CONE—8 in. Cone and Voice Coil and Gasket (L-14)	$1.15
RC-990	CLAMP—Cone Spider Clamp	.05
*RP-012	PLUG—Female Speaker Plug	.20
RP-040	PLUG—Male Speaker Plug	.20
RP-050	PLUG—Female Speaker Plug (Late Prod.)	.20
RP-051	PLUG—Male Speaker Plug (Late Prod.)	.20
RS-028	SPEAKER—8 in. Reproducer Unit Complete with Transformer (L-14 L-15, L-16, T-1)	7.25
RS-416	SPRING—V.C. Leads Spring (Pkg. of 2)	.10
RT-412	TRANSFORMER—Output Transformer (T-1)	1.25

SPEAKER ASSEMBLIES E-62

RC-911	CONE—6½" Cone and Voice Coil and Gasket (L-14)	$0.90
*RP-012	PLUG—Female Speaker Plug	.20
RP-040	PLUG—Male Speaker Plug	.20
RP-050	PLUG—Female Speaker Plug (Late Prod.)	.20
RP-051	PLUG—Male Speaker Plug (Late Prod.)	.20
RS-036	SPEAKER—6½" Reproducer Unit Complete with Transformer (L-14, L-15, L-16, T-1)	3.75
RT-416	TRANSFORMER—Output Transformer (T-1)	1.25

* Indicates part also used on 1936 "A" line of receivers.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

SOCKET VOLTAGES

Tube No.		Plate to Ground Volts D-c	Screen Grid to Ground Volts D-c	Cathode to Ground Volts D-c	Cathode Current M.A.	Heater Volts A-c
6A8	Oscillator	98	...	0	...	...
	Converter	250	98	...	12.0	6.3
6K7 I. F. Amplifier		250	98	0	9.0	6.3
6H6 Detector and AVC		...	...	0	...	6.3
6F5 Audio Amplifier		*89	...	1.0	0.3	6.3
6P6 Output		227	250	0	36.0	6.3
5W4 Power Rectifier		628/314 RMS	...	250	64.0	5.0

Measured at 115 volts supply. No signal input. Volume control maximum. Voltmeter 1000 ohms per volt; measurements taken on highest scale giving accurate readable deflection.
* Supply voltage minus drop in load resistor, measured on 1000 volt scale.

ALIGNMENT PROCEDURE

The receiver should first be allowed to run for fifteen minutes in order to reach its approximate normal operating temperature. Before making any adjustments, it is wise to determine the correctness of the existing alignment. This may be done by supplying a signal to the receiver from the test oscillator at the alignment frequency and inserting a "Tuning Wand" into the coil involved. The "Tuning Wand" consists of a rod of insulating material having a ring of nonmagnetic metal attached to one end, and a small core of finely divided iron compacted into the opposite end. By inserting the metal ring end into the center of the R. F. coil, the inductance of this coil is lowered, increasing its resonant frequency. Inserting the iron-filled end into the coil raises its inductance, lowering its resonant frequency. If the R. F. circuits are in exact alignment, inserting either end of the tuning wand into the coil will result in a decrease in output. When an increase of signal is obtained with the iron-filled end of the wand, a decrease in resonant frequency of that circuit by increasing its trimmer capacity is indicated. When an increase of signal is obtained with the metal ring, a decrease in trimmer capacity is indicated.

Changes Indicated by Wand

Wand	Signal	Trimmer Adjustment Required
Metal Ring	Decrease	None
Iron Filings	Decrease	
Metal Ring	Increase	Decrease capacity
Iron Filings	Decrease	
Metal Ring	Decrease	Increase capacity
Iron Filings	Increase	

In order to align these receivers properly it is necessary to have available:

1. A modulated test oscillator capable of producing the above alignment frequencies.
2. An output indicator, such as a high resistance a-c voltmeter with a maximum scale reading of 3 to 5 volts, or a neon lamp indicator.
3. An alignment tool consisting of an insulating shaft with a small screwdriver blade.

The location of all alignment trimmer capacitors, as well as socket voltages, is shown in Fig. 3.

1. I. F. Alignment

Set the frequency band switch of the receiver to the broadcast position and turn the volume control to maximum (extreme clockwise position). Tune the receiver to some point above 1500 KC so that no signal is heard, short-circuiting the antenna and ground terminals if necessary, and ground the chassis.

Remove the control grid clip from the 6A8 tube and connect the test oscillator output between chassis and the dome terminal of the 6A8 tube. The I. F. amplifier is tuned to 465 KC; set the oscillator dial at this frequency. Make sure that a d-c path exists between the output terminals of the test oscillator; if an ohmmeter does not show continuity between the test oscillator terminals, connect a resistor of fairly high resistance between the 6A8 dome terminal and chassis to provide a d-c grid return path.

Connect the output meter across the cone coil of the speaker and adjust the test oscillator output control so that, with the volume control at maximum, a small indication is observed on the output indicator.

Adjust the secondary trimmer of the second I. F. transformer until a peak output reading is obtained. Maintaining a small output indication, adjust next the primary trimmer of the second I. F. transformer for maximum output. Continue this procedure, adjusting the secondary trimmer of the first I. F. transformer, and lastly, the primary trimmer of the first I. F. transformer. After completing this procedure, repeat it a second time for final alignment. The I. F. alignment will then be complete.

During both I. F. and R. F. alignments, the test oscillator signal should be maintained at the lowest level that will give a good output indication, keeping the receiver volume control at maximum and adjusting the test oscillator output control to give the required indication.

1. I. F. Wave Trap Alignment

After completion of the I. F. alignment, with the test oscillator still set on 465 KC, apply this frequency to the antenna post of the receiver through a dummy antenna. This dummy antenna consists of a 400 ohm resistor in series with a 250 mmfd. capacitor and should be connected in series between the test oscillator output and the receiver antenna post. With the 465 KC signal applied to the receiver antenna post, adjust the I. F. Wave Trap trimmer for minimum output indication.

2. R. F. Alignment

The R. F. and Oscillator trimmers are aligned at 580 and 1500 KC. First of all, check the position of the dial pointer. To do this, rotate the gang condenser to the maximum capacity position, i.e., plates fully meshed. While in this position, align the pointer with the last black line on the scale by loosening the dial drum set screws and rotating the drum on the gang shaft. Make sure the antenna and ground terminals of the receiver are not short-circuited and connect to them the output of the test oscillator, preferably using the dummy antenna described above between the test oscillator and the receiver antenna terminal. Connect the output indicator across the speaker cone coil.

Broadcast 540-1750 Kc

Set the frequency band switch to the broadcast position. Tune the test oscillator to 1500 KC and set the dial pointer on the receiver to this frequency. Adjust the broadcast oscillator trimmer on the front section of the gang condenser for maximum output, keeping the receiver volume control at its extreme clockwise position and adjusting the test oscillator output to maintain a small reading on the output indicator. When optimum adjustment on the broadcast oscillator trimmer is obtained, adjust the broadcast R. F. trimmer on the rear section of the gang for maximum output.

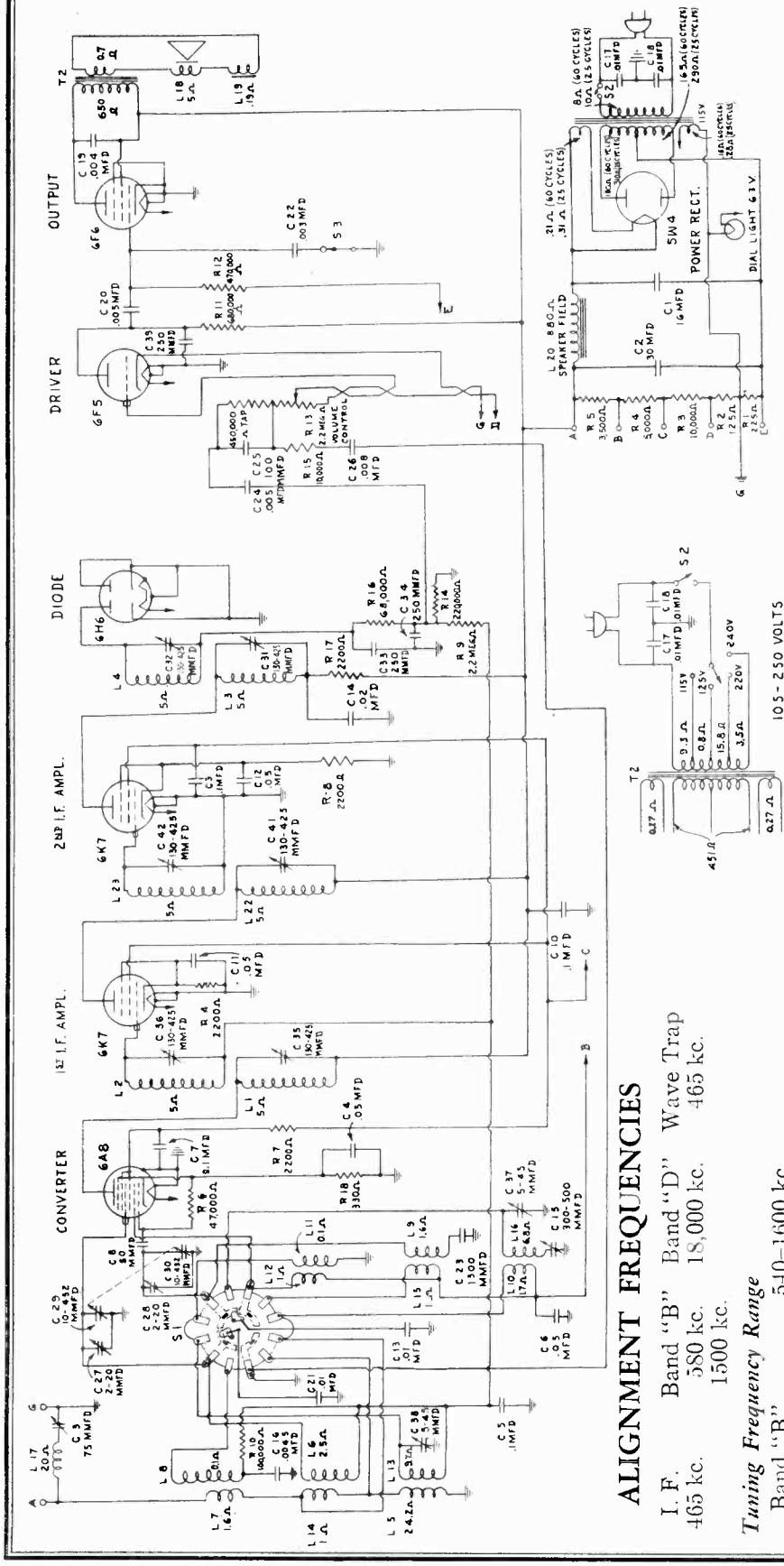
Now set the test oscillator at 580 KC and tune the receiver to that frequency. Slowly, rocking the tuning condenser back and forth through the signal, adjust the 580 KC padding capacitor for maximum output. When this has been done, return to 1500 KC on the receiver and test oscillator and recheck the alignment at that frequency for maximum output. The broadcast band should now be in alignment.

Short Wave—2.2—7.0 M.C. (2,200-7,000 Kc)

No separate short wave trimmers are provided on this receiver. The correct adjustment of the broadcast band at 580 and 1500 KC automatically aligns the short wave band.

GENERAL ELECTRIC CO.

MODELS E-71, E-72, E-76
Schematic, Data



ALIGNMENT FREQUENCIES

I. F.	Band "B"	Band "D"	Wave Trap
465 kc.	580 kc.	18,000 kc.	465 kc.
	1500 kc.		

Tuning Frequency Range

Band "B"	540–1600 kc.
Band "C"	1560–5800 kc.
Band "D"	5.6–18.0 mc. (5,600–18,000 kc.)

Tuning Control Drive Ratio

Fast Tuning	8 to 1
Vernier Tuning	40 to 1

Electrical Power Output

Undistorted	2.5 watts
Maximum	5.0 watts

Loud-speaker—Electrodynamic

Cone: Model E-71	8 in.
Model E-72	8 in.
Model E-76	12 in.
Cone Coil Impedance	5.5 ohms at 400 cycles

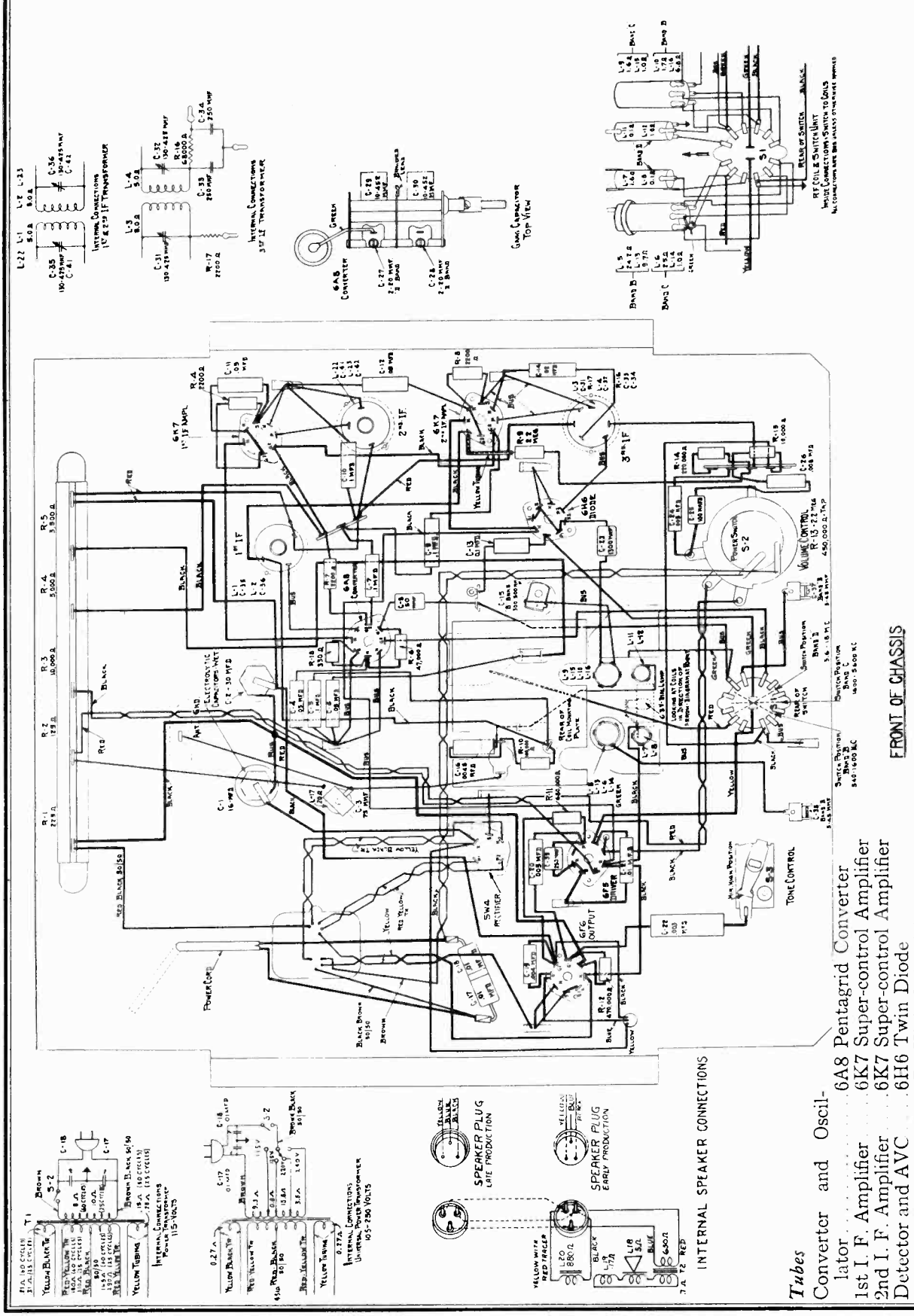
Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115	50–60	75
C	115	25–60	75
V	105–130 and 200–250	40–60	80

NOTE: Taps on universal transformers (Rating "V") are accessible by removing the cap cover mounted on the top of the transformer. Schematic and wiring diagrams of the universal transformer are shown in Fig. 1 and 2, respectively.

MODELS E-71, E-72, E-76
Chassis Wiring
Transformer Data

GENERAL ELECTRIC CO.



Tubes

Converter and Oscillator	6A8 Pentagrid Converter
1st I F. Amplifier	6K7 Super-control Amplifier
2nd I. F. Amplifier	6K7 Super-control Amplifier
Detector and AVC	6H6 Twin Diode
Audio Amplifier	6F5 High Gain Triode
Output	6F6 Power Amplifier Pentode
Power Rectifier	5W4 Full-wave Rectifier
Dial Lamp	Mazda No. 46

SUPERHETERODYNE

ALL-WAVE RADIO RECEIVERS

SERVICE DATA

Physical Specifications

Model	E-71	E-72	E-76
Height	18⅛ in.	11 3/16 in.	38½ in.
Width	13 in.	21 in.	23½ in.
Depth	9 5/16 in.	9 in.	10 1/16 in.
Weight packed	27 lbs.	27 lbs.	54 lbs.

DESCRIPTION OF ELECTRICAL CIRCUIT

Models E-71, E-72, and E-76 employ seven metal envelope tubes to perform the above functions in a superheterodyne circuit, giving the excellent selectivity and sensitivity inherent in this type circuit. The "B" and "C" band coils are wound on a common form, while the "D" band coils have individual forms. Ample undistorted output is obtained through diode detection and two audio amplifier stages.

The signal from the antenna is applied to the control grid of the 6A8 converter tube through the antenna coil, the secondary of which is tuned to the incoming signal by the rear section of the main tuning condenser. The secondary of the coil for the band next lower in frequency to the one in use is short-circuited through a capacitor to prevent absorption of energy at its resonant frequency which falls in the next higher band. (NOTE.—On the schematic diagram, Fig. 1, the center portion of the wave band switch supporting the two shorting lugs rotates simultaneously with the four contact pins.) In the 6A8 tube the incoming signal is combined with the local oscillator signal which is 465 kc. different in frequency. The local signal is generated by the oscillator elements of this tube and the proper frequency difference is maintained throughout the tuning range by the front section of the main tuning condenser in conjunction with the oscillator coil and padding capacitors.

The combination of the signal frequency with the local oscillator frequency in the converter tube produces the intermediate frequency of 465 kilocycles. This particular intermediate frequency is chosen to reduce image response and improve short-wave performance. The intermediate frequency amplifier consists of two 6K7 tubes and three transformers, each with two tuned circuits.

The output of the I. F. amplifier is applied to the 6H6 diode rectifier, which is a combined detector and automatic volume control tube. The direct current component of the rectified signal produces a voltage drop across R-14. This voltage drop provides automatic bias for the R. F. and I. F. amplifier and converter tubes and so gives automatic volume control action. Full automatic bias voltage is applied to the pentagrid converter tube and to the first I. F. amplifier tube. The second I. F. tube is operated on self bias, obtained by the drop through R-8. This enables the second I. F. tube to provide maximum power to the 6H6 diode rectifier.

MODELS E-71, E-72 AND E-76

The manual volume control, R-13, selects the amount of audio signal applied to the grid of the 6F5 audio amplifier tube and this regulates the output of the receiver. The output of the 6F5 tube is resistance coupled to the grid of the 6F6 power amplifier pentode. The plate circuit of the 6F6 is suitably matched to the loud-speaker by means of a step-down output transformer.

The tone control circuit consists of a .003-mfd. capacitor connected in series with a grounding switch S-3 in the grid circuit of the 6F6 output tube. When it is desired to reduce the high frequency output of this receiver the switch S-3 is closed to ground.

Plate and grid voltages for all tubes are supplied by the power supply system employing a 5W4 full-wave rectifier tube which, together with a suitable network of resistors and capacitors, supplies the required voltages and filtering action.

1. I. F. Alignment

Set the frequency band switch of the receiver to Band "B," short-circuit the antenna and ground terminals and tune the receiver to some point where no signal is heard. Set the volume control at its maximum position and ground the chassis.

The I. F. amplifier is tuned to 465 kc.; set the test oscillator dial at this frequency. Connect the test oscillator output between the converter tube (6A8) control grid and chassis. Connect the output meter across the cone coil of the speaker and adjust the test oscillator output control so that, with the receiver volume control at maximum, a small deflection is observed on the output meter. During both I. F. and R. F. alignment, the test oscillator signal should be maintained at the lowest level that will give a good readable output indication.

Adjust the secondary trimmer of the third I. F. transformer until a maximum output reading is obtained. Maintain a small deflection on the output meter throughout alignment by adjusting the test oscillator output. Next, adjust the primary trimmer of the third I. F. transformer for maximum output. Continue this procedure, adjusting the secondary and primary trimmers, respectively, of the second I. F. transformer. The secondary trimmer of the first I. F. transformer may then be adjusted and, lastly, the primary trimmer of the first I. F. transformer. After completing this procedure, repeat it a second time for final alignment. The I. F. alignment will then be complete.

I. F. Wave Trap Alignment

After completion of the I. F. alignment, with the test oscillator still set on 465 kc., apply this frequency to the antenna post of the receiver through a dummy antenna. This dummy antenna consists of a 400-ohm resistor in series with a 250-mmfd. capacitor and should be connected in series between the test oscillator output and the receiver antenna post. With the 465-kc. signal applied to the receiver antenna post, adjust the I. F. Wave Trap trimmer for *minimum* output indication.

2. R. F. Alignment

First of all, check the position of the dial pointer. To do this, rotate the gang condenser to the maximum capacity position, i.e., plates fully meshed. While in this position, align the pointer with the last black line on the scale by loosening the dial drum set screws and rotating the drum on the gang shaft. Make sure the antenna and ground terminals of the receiver are not short-circuited and connect to them the output of the test oscillator, preferably using the dummy antenna described above between the test oscillator and the receiver antenna terminal. Connect the output indicator across the speaker cone coil.

"D" Band (5.6-18.0 mc.)

Because of the R. F. circuit used in this receiver, the "D" band must be aligned first. Set the frequency band switch to the "D" band position by rotating it to its most clockwise position. Tune the test oscillator to 18,000 kc. (18 mc.) and set the dial pointer on the receiver at this frequency. Adjust the "D" band oscillator trimmer, located on the front section of the gang condenser, for maximum output. (NOTE.—The oscillator operates on the *low* frequency side of the incoming signal; therefore adjust the trimmer until the second oscillator peak is reached as the trimmer is *increased* in capacity. A check for the correctness of this adjustment may be made by rotating the gang to the 17,070 kc. calibration mark. If, with increased input from the test oscillator, no signal is detected, the correct oscillator peak has been used.) Keep the receiver volume control at its extreme clockwise position and adjust the test oscillator output to maintain a small reading on the output indicator.

When the optimum adjustment on the oscillator trimmer has been obtained, adjust the "D" band antenna trimmer on the rear section of the gang for maximum output while rocking the tuning condenser through the signal.

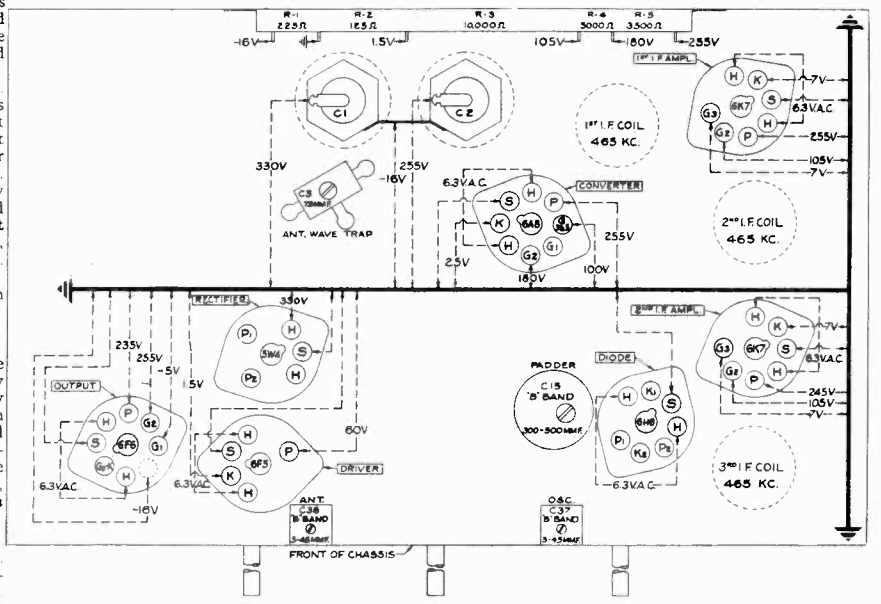
"C" Band (1.56-5.80 mc.)

No separate trimmers are provided for adjustment of this band. The correct adjustment of the "D" band and "B" band automatically aligns the "C" band. The adjustment procedure for the "B" band follows immediately.

"B" Band (540-1600 kc.)

Set the frequency band switch to the broadcast position. Rotate the gang condenser until the dial pointer indicates the 1500 kc. calibration point, and adjust the test oscillator to this frequency. The "B" band trimmers are located underneath the chassis. (See Fig. 2.) Adjust the broadcast oscillator trimmer for maximum output. This trimmer is the one nearest the volume control. When the oscillator has been peaked, adjust the antenna trimmer for maximum output. Here again, as pointed out previously, it is necessary to maintain a small R. F. input from the test oscillator to avoid erratic action of the output indicator due to automatic volume control action.

Now set the test oscillator at 580 kc. and tune the receiver to that frequency. Slowly, rocking the tuning condenser back and forth through the signal, adjust the 580-kc. padding capacitor for maximum output. When this has been done, return to 1500 kc. on the receiver and test oscillator and recheck the alignment at that frequency for maximum output. The broadcast band should now be in alignment.



VIEWED FROM UNDERSIDE OF CHASSIS

Fig. 3. Trimmer Location & Socket Voltages

MODELS E-71, E-72, E-76
Parts List

GENERAL ELECTRIC CO.

Stock No.	Description	List Price
*RB-026	BOARD—Antenna & Ground Terminal Board	$0.10
RB-040	BOARD—Terminal Board Near Oscill. Padder	.10
RB-044	BOARD—Terminal Board on Front Wall near Volume Control	.10
RB-134	BRACKET—Dial Light Bracket	.15
*RC-024	CAPACITOR—.005 mfd., 200 volt, Paper (C-24)	$0.25
*RC-029	CAPACITOR—.005 mfd., 400 volt, Paper (C-20)	.30
*RC-034	CAPACITOR—.01 mfd., 200 volt, Paper (C-21)	.25
RC-036	CAPACITOR—.008 mfd., 200 volt, Paper (C-26)	.25
*RC-072	CAPACITOR—.05 mfd, 200 volt, Paper (C-4, C-11, C-12)	.25
*RC-080	CAPACITOR—.02 mfd., 400 volt, Paper (C-14)	.25
*RC-091	CAPACITOR—.05 mfd., 400 volt, Paper (C-6)	.30
*RC-096	CAPACITOR—.1 mfd., 200 volt, Paper (C-5, C-13)	.30
*RC-123	CAPACITOR—.1 mfd., 400 volt, Paper (C-7, C-9, C-10)	.35
RC-218	CAPACITOR—50 mmfd., Mica (C-8)	.25
RC-235	CAPACITOR—100 mmfd., Mica (C-25)	.25
RC-261	CAPACITOR—250 mmfd., Mica (C-33, C-34, C-39)	.25
*RC-344	CAPACITOR—1300 mmfd., Mica (C-23)	.35
*RC-412	CAPACITOR—30 mfd., 280 volt, Wet Electrolytic (C-2)	1.20
RC-413	CAPACITOR—16 mfd., 340 volt, Wet Electrolytic (C-1)	1.25
*RC-608	CAPACITOR—Oscillator Padder, 300-500 mmfd. (C-15)	.40
RC-618	CAPACITOR—Trimmer Capacitor (On Lower Front Wall) (C-37, C-38)	.25
RC-710	CONDENSER—Two-gang Tuning Condenser, 10-452 mmfd. (C-29, C-30)	3.60
RC-754	CAPACITOR—Line Capacitor, .01-.01 mfd., 250 volt A.C. (C-17, C-18)	.40
RC-815	CABLE—Dial Cable, Pkg. of 5	.50
*RC-854	CORD—Power Cord and Plug	.60
RD-030	DRUM—Condenser Drive Drum	.40
RD-032	DIAL—Dial Scale	.30
RD-034	DRIVE—Condenser Drive	1.10
RF-010	FOOT—Chassis Mounting Foot	.30
*RG-001	GRID CAP—Control Grid Cap, Pkg. of 5	.10
*RK-004	KNOB—Control Knob (Without Dot), Pkg. of 5	.40
*RK-005	KNOB—Control Knob (With Dot), Pkg of 5	.50
RL-121	COIL—R.F. Coil Band D (L-7, L-8)	.75
RL-122	COIL—R.F. Coil Band B and C (L-5, L-13; L-6, L-14)	1.10
RL-223	COIL—Osc. Coil Band D (L-11, L-12)	.70
RL-224	COIL—Osc. Coil Band B and C (L-9, L-15; L-10, L-16)	1.00
RP-042	PULLEY—Dial Pulley, Pkg. of 2	.25
RP-045	POINTER—Dial Pointer and Guide	.10
RP-046	PLATE—R.F. Coil Unit End Plate with Shield	.25
RQ-047	RESISTOR—330 ohms, ¼ watt, Carbon (R-18), Pkg. of 5	.60
RQ-067	RESISTOR—2200 ohms, ¼ watt, Carbon (R-4, R-7, R-8), Pkg. of 5	.60
*RQ-083 (RR-021)	RESISTOR—10,000 ohms, ¼ watt, Carbon (R-15), Pkg. of 5	.60
RQ-099	RESISTOR—47,000 ohms, ¼ watt, Carbon (R-6), Pkg. of 5	.60
RQ-103	RESISTOR—68,000 ohms, ¼ watt, Carbon (R-16), Pkg. of 5	.60
*RQ-107 (RR-050)	RESISTOR—100,000 ohms, ¼ watt, Carbon (R-10), Pkg. of 5	.70
RQ-115	RESISTOR—220,000 ohms, ¼ watt, Carbon (R-14), Pkg. of 5	.70
RQ-123	RESISTOR—470,000 ohms, ¼ watt, Carbon (R-12), Pkg. of 5	.70
RQ-127	RESISTOR—680,000 ohms, ¼ watt, Carbon (R-11), Pkg. of 5	.70
RQ-139	RESISTOR—2.2 megohms, ¼ watt, Carbon (R-9), Pkg. of 5	.70
RR-716	RESISTOR—Tapped Bleeder Resistor (R-1, R-2, R-3, R-4, R-5)	.90
RB-135	BRACKET—Dial Support Bracket	$0.15
RC-014	CAPACITOR—.003 mfd., 200 volt, Paper (C-22)	.25
RC-017	CAPACITOR—.0045 mfd., 200 volt, Paper (C-16)	.25
RC-018	CAPACITOR—.004 mfd., 600 volt, Paper (C-19)	.30
RR-905	REFLECTOR—Dial Light Reflector	$0.15
RS-136	SHIELD—1st and 2nd I.F. Shield Can	.20
RS-137	SHIELD—3rd I.F. Shield Can	.20
RS-164	SHIELD—Chassis End Shield (E-76 only)	.30
*RS-200	SOCKET—8 Pin Tube Socket, Pkg. of 5	.75
*RS-204	SOCKET—5 Pin Tube Socket, Pkg. of 5	.75
RS-321	SWITCH—Tone Control Switch (S-3)	.30
RS-323	SWITCH—Band Change Switch (S-1)	1.25
RS-415	SPRING—Spring Bracket Supporting Cable Pulley, Pkg. of 2	.10
RS-423	SPRING—Knob Spring (Push-on type), Pkg. of 10	.25
RS-858	SCREWS—Set Screws for Dial Drive Drum, Pkg. of 10	.10
RT-074	TRANSFORMER—Power Transformer, 115 volts, 50-60 cycles (T-1)	4.50
RT-075	TRANSFORMER—Power Transformer, 115 volts, 25-60 cycles (T-1)	8.35
RT-076	TRANSFORMER — Universal Power Transformer, 105-130 volts and 200-250 volts, 40-60 cycles (T-1)	8.50
RT-223	TRANSFORMER—1st and 2nd I.F. Transformer (Complete) (L-1, L-2; C-35, C-36) (L-22, L-23; C-41, C-42)	1.50
RT-224	TRANSFORMER—3rd I.F. Transformer (Complete) (L-3, L-4; C-31, C-32)	1.75
RV-014	VOLUME CONTROL—Volume Control and Power Switch, 2.2 meg. Total Res. (R-13, S-2)	1.15
RW-005	WINDOW—Dial Window	.15
*RW-101	WASHER—Felt Washers for Control Shafts, Pkg. of 10	.45
*RW-102	WASHER—Insulating Washer for Mounting Electrolytic Cap, Pkg. of 10	.20
RW-400	WAVE TRAP COMPLETE—(L-17, C-3)	.80
RX-016	MOUNTING ASSEMBLY—Screws and Cushions for Mounting Tuning Condenser	.30

SPEAKER ASSEMBLIES E-71 AND E-72

RC-909	CONE—8-in. Cone and Voice Coil and Gasket (L-18)	1.15
RC-990	CLAMP—Cone Spider Clamp	.05
*RP-012	PLUG—Female Speaker Plug	.20
RP-044	PLUG—Male Speaker Plug	.20
RP-052	PLUG—Female Speaker Plug (Late Production)	.20
RP-053	PLUG—Male Speaker Plug (Late Production)	.20
RS-030	SPEAKER—8-in. Reproducer Unit Complete with Transformer (L-18, L-19, L-20, T-2)	7.40
RS-416	SPRING—V.C. Leads Spring, Pkg. of 2	.10
RT-413	TRANSFORMER—Output Transformer T-2)	1.30

SPEAKER ASSEMBLIES E-76

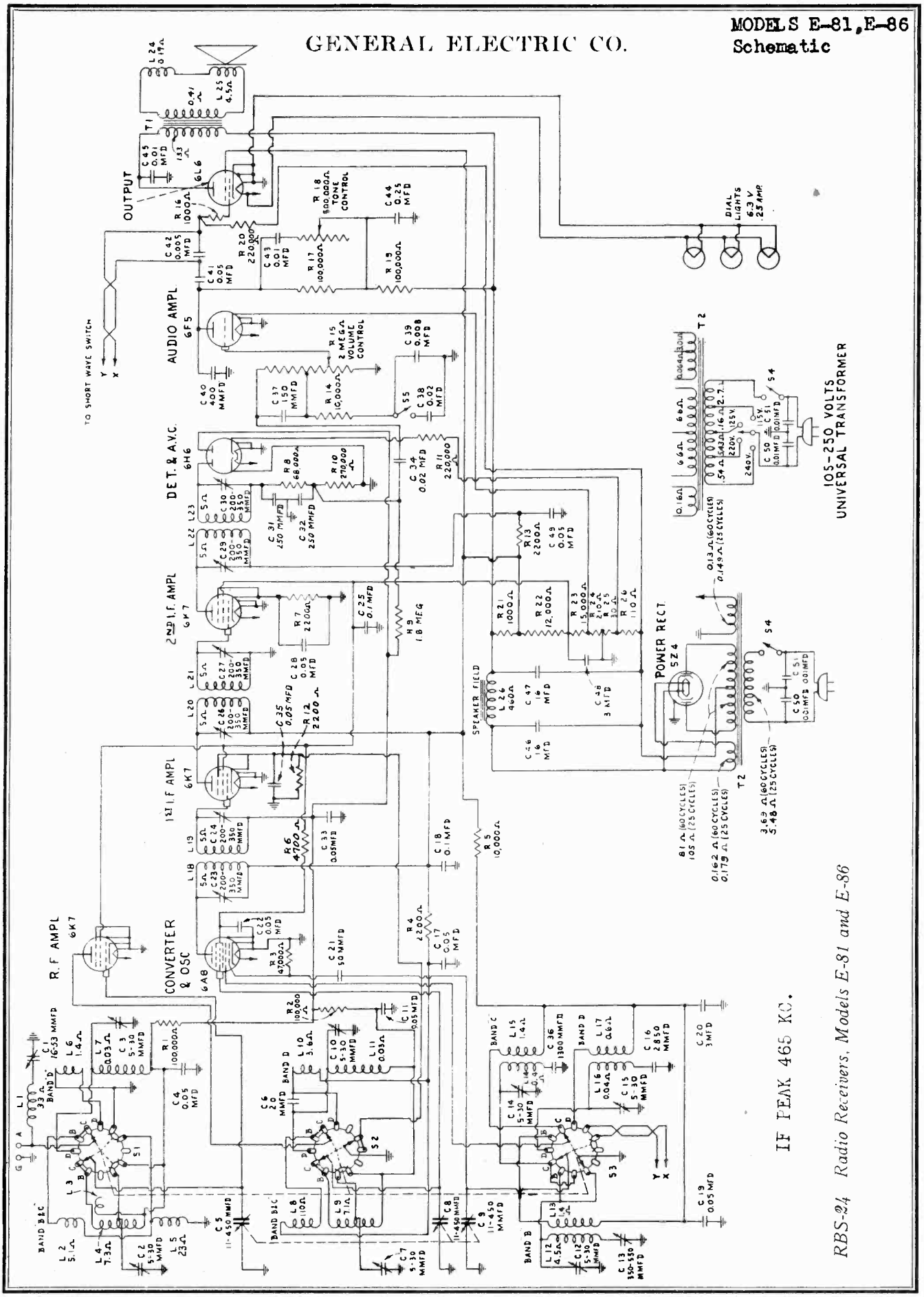
RC-910	CONE—12-in. Cone and Voice Coil and Gasket (L-18)	1.45
RC-991	CLAMP—Cone Spider Clamp	.05
*RP-012	PLUG—Female Speaker Plug	.20
RP-044	PLUG—Male Speaker Plug	.20
RP-052	PLUG—Female Speaker Plug (Late Production)	.20
RP-053	PLUG—Male Speaker Plug (Late Production)	.20
RS-031	SPEAKER—12-in. Reproducer Unit Complete with Transformer (L-18, L-19, L-20, T-2)	9.80
RS-416	SPRING—V.C. Leads Spring, Pkg. of 2	.10
RT-413	TRANSFORMER—Output Transformer (T-2)	1.30

* Indicates part also used on 1936 "A" line receivers.

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

GENERAL ELECTRIC CO.

MODELS E-81, E-86
Schematic

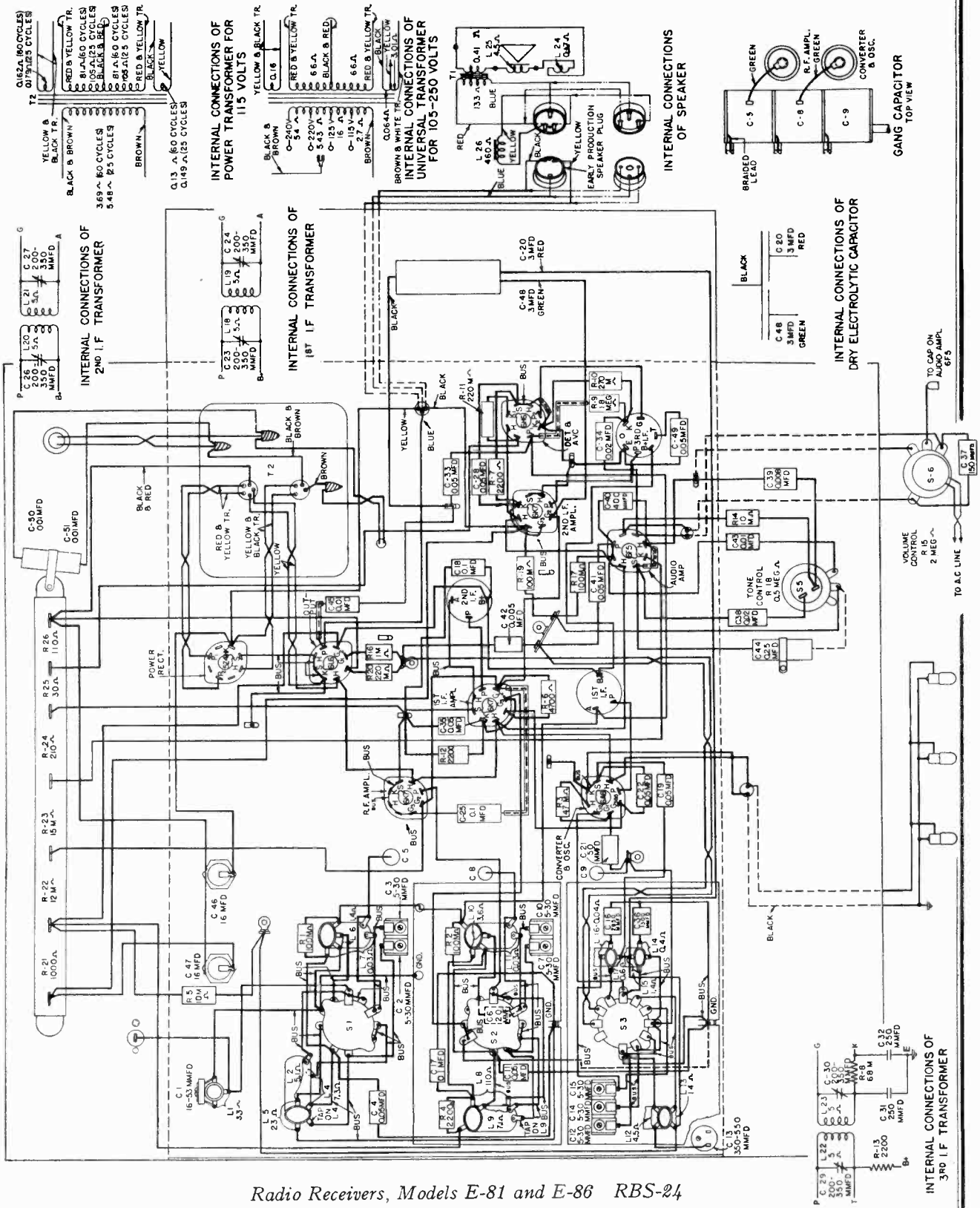


RBS-24 Radio Receivers, Models E-81 and E-86

IF PEAK 465 KC.

MODELS E-81, E-86
Chassis Wiring

GENERAL ELECTRIC CO.



Radio Receivers, Models E-81 and E-86 RBS-24

ALL-WAVE RECEIVERS

SUPERHETERODYNE August, 1936 (5M)

MODELS E-81 AND E-86

Physical Specifications

Model	E-81	E-86
Height	19¾ in.	39 in.
Width	15¾ in.	24 in.
Depth	11⅜ in.	11⅛ in.
Weight packed	38 lb	63 lb

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115	50–60	100
C	115	25–60	100
V	105–130 and 200–250	40–60	105

NOTE—Taps on universal transformers (Rating "V") are accessible by removing the cap cover on the top of the transformer.

Tuning Frequency Range

Band "B"	540–1680 kc.
Band "C"	1680–6000 kc.
Band "D"	6.0–18.0 mc. (6,000–18,000 kc.)

Tuning Control Drive Ratio

Fast Tuning	8 to 1
Vernier Tuning	40 to 1

Electrical Power Output

Undistorted	6.5 watts
Maximum	14.0 watts

Loud-speaker—Electrodynamic

Cone: Model E-81..... 8 inch
Model E-86.....12 inch
Cone Coil Impedance at 400 cycles.....5.5 ohms

Tubes

R. F. Amplifier....6K7 Triple-grid Super-control Amplifier
Converter and
Oscillator.....6A8 Pentagrid Converter
First
I. F. Amplifier....6K7 Triple-grid Super-control Amplifier
Second
I. F. Amplifier....6K7 Triple-grid Super-control Amplifier
Detector and AVC..6H6 Twin Diode
Audio Amplifier....6F5 High Gain Triode
Output.....6L6 Beam Power Amplifier Tetrode
Power Rectifier.....5Z4 Full-wave Rectifier
Dial Lamps.....MAZDA No. 46

DESCRIPTION OF ELECTRICAL CIRCUIT

Models E-81 and E-86 employ eight metal envelope tubes in a superheterodyne circuit, giving the excellent sensitivity and selectivity inherent in this type circuit. The radio frequency section of this eight-tube chassis utilizes a novel type of construction known as the "Junior Sentry Box." This type construction permits using extremely short connecting leads and isolates each radio frequency circuit in its own particular shielded section. Separate groups of coils are used for each band in the oscillator section. The antenna and R. F. sections are composed of two coils, a separate coil for the "D" band and a composite coil for the "B" band and "C" band. Operation on the "C" band is obtained by shorting out a section of the antenna and R. F. "B" band coils.

The signal from the antenna is applied to the control grid of the 6K7 R. F. amplifier tube through the antenna coil, the secondary of which is tuned to the incoming signal by the rear section of the main tuning condenser. The antenna coil, for bands "B" and "C," contains two primary coils connected for operation on the "B" band; however, when the band switch is turned to the "C" band position, the lower primary coil, L-5, is shorted out. The high frequency trimming adjustment, for the "B" band antenna and R. F. stages, is accomplished by two adjustable trimmers connected from the "C" band tap on each coil to ground. The capacity coupling coil, L-3, acts only on the "C" band and its function is similar to that of a fixed antenna stage trimmer for that band.

The amplified radio frequency signal is impressed upon the signal control grid of the 6A8 converter tube through the R. F. coil, the secondary of which is tuned to the signal frequency by the center section of the main tuning condenser. In the 6A8 tube, the incoming signal is combined with the local oscillator signal which is 465 kc. different in frequency. The local signal is generated by the oscillator elements of this tube and the proper frequency difference is maintained throughout the tuning range by the front section of the main tuning condenser in conjunction with the oscillator coils and padding capacitors.

The combination of the signal frequency with the local oscillator frequency in the 6A8 converter tube produces the intermediate frequency of 465 kilocycles. This particular intermediate frequency is chosen to reduce image response and improve short-wave performance.

The intermediate frequency amplifier consists of a two-stage cascade section composed of three I. F. transformers and two 6K7 amplifier tubes. Each I. F. transformer has two tuned circuits. The first I. F. amplifier 6K7 is operated on both self bias and on AVC for the broadcast band, since its grid return connects to the AVC bus. On the two short-wave bands the self bias resistor is shorted out by one of the band switch sections and this tube receives only AVC bias. The second I.F. amplifier 6K7 tube operates on self bias for all bands. This enables the second I.F. tube to provide maximum power to the 6H6 diode rectifier.

The output of the I.F. amplifier is applied to one plate of the 6H6 diode rectifier, which is a combined second detector, initial bias and automatic volume control tube. The direct current component of the rectified signal, through one diode of this tube, produces a voltage drop across resistor R-10. This voltage drop provides automatic bias for the R. F. amplifier, converter and the first I.F. amplifier, and thus gives automatic volume control action. The other diode of the 6H6 provides an initial bias for the tubes on the AVC circuit under conditions of little or no signal. This initial bias diode, under conditions of small signal, draws current which flows through resistors R-9 and R-10. The resulting voltage is the required minimum operating bias for the tubes on the AVC circuit. Upon receiving signals above the level of the initial bias, the initial bias diode stops drawing current and the automatic volume control diode takes over the controlling bias.

The audio frequency present across R-10 is impressed upon the volume control R-15 through capacitor C-34. The movable arm on the volume control selects the amount of audio signal applied to the control grid of the 6F5 audio amplifier tube and thus regulates the output of the receiver. Across the volume control, R-15, is placed a compensating network of capacitors and a resistor. The music-speech switch is found in this circuit, and when closed places capacitor C-38 in shunt with C-39, which results in the accentuation of the low audio frequencies. The output of the 6F5 audio tube is resistance coupled to the grid of the 6L6 beam power tetrode. The plate circuit of the 6L6 is suitably matched to the electrodynamic loudspeaker by means of a step-down output transformer.

The tone control is found in the plate circuit of the 6F5 first audio tube and consists of capacitor C-43 in series with a variable resistor R-18 across the 6F5 plate resistor R-17. Cutting out resistance in R-18 lessens the treble response of the receiver. Between the plate of the 6F5 first audio tube and the grid of the 6L6 tetrode output tube are found two capacitors in series, C-41 and C-42. The smaller capacitor, C-42, is shorted out by the wave band switch for operation on the broadcast band. On the two short-wave bands it is left in the circuit to attenuate the low frequency response and thereby lessen the tendency toward microphonic howl.

Plate and grid voltages for all tubes are supplied by the power supply system employing a 5Z4 full-wave rectifier tube; which, together with a suitable network of resistors and capacitors, supplies the required voltages and filtering action.

ALIGNMENT PROCEDURE

The receiver should first be allowed to run for fifteen minutes to reach its approximate normal operating temperature. Before making any adjustments, it is wise to determine the correctness of the existing alignment. This may be done by supplying a signal from the test oscillator to the receiver and inserting a "Tuning Wand" into the coil involved. The tuning wand consists of a rod of insulating material having a ring of nonmagnetic metal attached to one end, and a small core of finely divided iron compacted into the opposite end. By inserting the metal ring end into the center of a particular coil the inductance of the coil is lowered, increasing its resonant frequency. Inserting the iron-filled end into the coil raises its inductance, lowering its resonant frequency. If the circuits are in exact alignment, inserting either end of the tuning wand in any coil will result in a decrease in output. When an increase in signal is obtained with the iron-filled end of the wand, a decrease in resonant frequency of that circuit by increasing its trimmer capacity is indicated. When an increase in signal is obtained with the metal ring, a decrease in trimmer capacity is indicated.

Changes Indicated by Wand

Wand	Signal	Trimmer adjustment required
Metal ring	Decrease	None
Iron filings	Decrease	
Metal ring	Increase	Decrease capacity
Iron filings	Decrease	
Metal ring	Decrease	Increase capacity
Iron filings	Increase	

Alignment Frequencies

I.F.	Band "B"	Band "C"	Band "D"
465 kc.	580 kc.	5220 kc.	18,000 kc.
	1500 kc.		

In order to align this receiver properly, it is necessary to have available the following test equipment:

1. A modulated test oscillator with frequencies available of 465, 580, 1500, 5220, and 18,000 kc.
2. An output indicator, such as a high resistance a-c. voltmeter with a maximum scale reading of 3 to 5 volts, or a neon lamp indicator.
3. An alignment tool consisting of an insulating shaft with a small screwdriver blade.
4. A tuning wand.

The location of all trimmer capacitors is shown in Fig. 3.

1. I. F. Alignment

Set the frequency band switch of the receiver to Band "D," short circuit the antenna and ground terminals and tune the receiver to some point near maximum tuning condenser capacity where no signal is heard. Set the volume control at its maximum position and ground the chassis.

The I. F. amplifier is tuned to 465 kc.; set the test oscillator so as to produce a signal at this frequency. Connect the test oscillator output between the top grid terminal of the 6K7 2nd I. F. tube and the chassis using a .05-mfd. capacitor (RC-072) in series with the oscillator output lead to the top grid connection. First remove the grid lead connecting to the same point from the 2nd I. F. transformer. Provide a path for grid bias by connecting a 10,000-ohm resistor (RQ-083) between grid cap and top grid terminal of tube.

Connect the output meter across the voice coil of the speaker and adjust the test oscillator output control so that, with the receiver volume control at maximum, a small deflection is observed in the output meter. During both I. F. and R. F. alignment, the test oscillator signal should be maintained at the lowest level that will give a good readable output indication.

Adjust the secondary trimmer of the third I. F. transformer until a maximum output reading is obtained. Maintain a small deflection on the output meter throughout alignment by adjusting the test oscillator output. Next, adjust the primary trimmer of the third I. F. transformer for maximum output. This transformer is then adjusted and should not require readjustment when aligning transformers ahead of it.

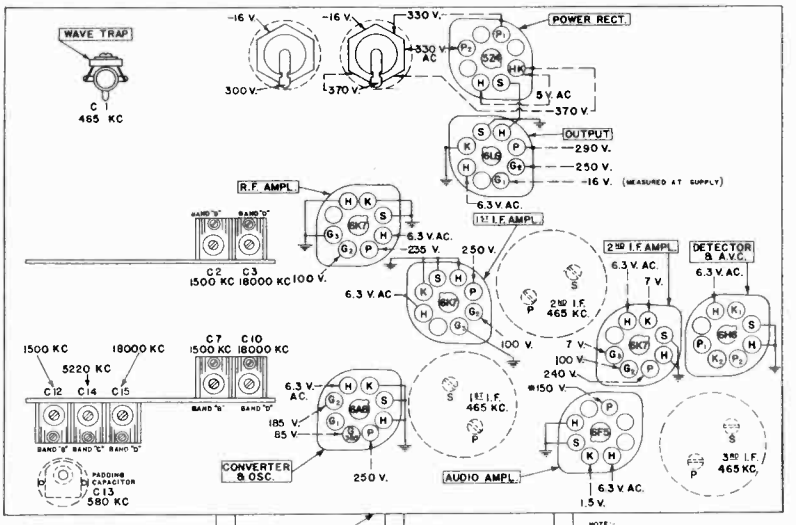


Fig. 3. Trimmer Location and Socket Voltages

Transfer the test oscillator connections to the top grid terminal of the 6K7 1st I. F. tube, replace the grid lead on 2nd I. F. tube and reduce the output of the test oscillator as low as possible consistent with obtaining an easily readable indication on the output meter. Adjust secondary and primary trimmers respectively on the 2nd I. F. transformer until maximum deflection of the output meter is obtained.

Transfer the test oscillator connections to the top grid terminal of the 6A8 converter tube and replace the grid cap connection on the 6K7 1st I. F. tube. It will probably be found desirable to set the tone control for minimum high response and to reduce the volume control setting to lessen noise reproduced due to the extremely high sensitivity of this receiver. Again adjust the test oscillator output to as low a value as will allow accurate adjustment. Adjust secondary and primary trimmers respectively on the 1st I.F. transformer until maximum deflection on the output meter is obtained.

I. F. alignment is now complete.

2. *I. F. Wave Trap Alignment*

Set the band switch to Band "B" and tune receiver to about 1000 kc. With the test oscillator still set at 465 kc. remove the shorting connections between antenna and ground terminals and apply this signal to the antenna terminal through a dummy antenna consisting of a 400-ohm resistor and 250-mmfd. capacitor in series. With the 465 kc. signal applied to the antenna terminal, adjust the I. F. Wave Trap Trimmer for *minimum* output indication.

3. *R. F. Alignment*

First check the position of the dial pointer by rotating the tuning condenser to maximum capacity position, i.e., plates fully meshed. At this position, the pointer should coincide with the end mark at the left-hand end of the scale. If it does not, it may be set by loosening the dial drum set screws and rotating the drum on the tuning condenser shaft. Hold the tuning condenser rotor while doing this, to prevent its rotating. Tighten the two set screws after the pointer is correctly set.

Band "B" (540-1680 Kc.)

Set the test oscillator for operation at 1500 kc. and connect its output to the antenna terminal of the receiver through the dummy antenna described under I. F. Wave Trap Alignment. Tune the receiver until the pointer is at 1500 on the scale. Set the tone control for minimum high response and reduce the volume control setting so as to avoid excessive noise response. Adjust the Band "B" oscillator, R. F., and antenna trimmers respectively (C-12, C-7, and C-2, Fig. 3) to give maximum deflection on the output meter. Maintain the test oscillator output at the lowest level which will give an easily readable output indication.

Now set the test oscillator at 580 kc., and tune the receiver to resonance with this signal. Adjust the 580 kc. padding capacitor, C-13, rocking the tuning condenser back and forth through resonance as the padding capacitor is adjusted and note the deflection of the tuning meter each time the receiver is tuned through resonance. Leave the padding capacitor at the setting which gives greatest deflection.

Retune the receiver to 1500 kc., and set the test oscillator for this frequency. Check the alignment by again adjusting the Band "B" oscillator, R. F. and antenna trimmers for maximum deflection on the tuning meter.

Band "C" (1680-6000 Kc.)

No trimmers are provided for alignment of the R. F. and antenna transformers in Band "C" of these receivers. Correct tracking between R. F. and antenna transformers is obtained by the action of the capacity coil, L-3, and between oscillator and the other tuned circuits by means of the adjustable oscillator trimmer C-14 and the fixed padding capacitor, C-54.

Turn the band switch to Band "C." Set the test oscillator at 5220 kc. and tune the receiver to resonance at this frequency. Adjust the Band "C" oscillator trimmer, C-14, for maximum output indication on the tuning meter, rocking the tuning condenser back and forth through resonance while making this adjustment.

Band "D" (6.0-18.0 Mc.)

Turn the band switch to Band "D." Set the test oscillator at 18,000 kc. (18.0 mc.) and tune the receiver until the pointer coincides with the 18.0 mc. mark. Adjust the Band "D" oscillator trimmer, C-15, to give maximum output indication. It will probably be found that there will be two settings of the oscillator trimmer that will give an output response. The lower capacity setting of the trimmer is the one that should be used. To be sure that correct adjustment has been obtained, tune for the image signal at 17.07 mc. with the test oscillator set at 18.0 mc. It may be necessary to increase the test oscillator output to obtain response at this point.

Retune the receiver to 18.0 mc. and adjust Band "D" antenna and R. F. trimmers, respectively (C-3 and C-10), for maximum output indication. When adjusting the R. F. trimmer, C-10, rock the tuning condenser back and forth through resonance as in the 580-kc. padding capacitor adjustment.

Alignment of the receiver is now complete.

VISUAL ALIGNMENT OF I.F.

In order to realize to full advantage the performance built into these receivers at the factory, circuit alignment using cathode ray oscilloscope equipment is much to be preferred. The oscilloscopic method is particularly advantageous in aligning the I.F. tuned circuits.

For visual alignment it is necessary to vary the frequency of an unmodulated test oscillator signal over a range extending on both sides of the peak frequency. This variation must take place in synchronism with the horizontal traverse of the cathode ray beam on its screen. The frequency modulator must, therefore, provide means for synchronizing the periodic test frequency variation with the cathode ray horizontal deflection circuit. The test oscillator may advantageously have facilities for audio frequency amplitude modulation of a fixed radio frequency test signal, as well as for frequency modulation, but audio modulation is not required for visual I. F. alignment.

Instead of an output meter across the speaker voice coil, the vertical plates of the cathode ray tube are connected across the load resistor of the diode rectifier. With the frequency modulator in operation, in conjunction with the test oscillator, the resonance curve of the circuit under test will be then shown on the screen.

Preliminary Procedure

For visual alignment, adjust the receiver controls and connect the test oscillator as outlined in the section entitled "I. F. Alignment" under "ALIGNMENT PROCEDURE." Connect the vertical deflecting plates of the cathode ray tube across the diode rectifier load resistor, R-10. The location of this resistor is clearly shown in Fig. 2.

Place the oscilloscope in operation as an output indicator and proceed as outlined in the section entitled, "I. F. Alignment."

Alignment Adjustments

Adjust the oscilloscope so that the luminescent spot on the cathode ray screen traces a horizontal line across the screen. Now place the frequency modulator and test oscillator in operation to give an unmodulated radio frequency signal varying from one side to the other of 465 kc. Adjust the oscilloscope and test oscillator controls to show a single overall resonance curve of the signal I.F. channel on the cathode ray tube screen. Do not change the test oscillator setting thereafter.

To align the I.F. transformers, follow in sequence the same procedure outlined in the sections under "ALIGNMENT PROCEDURE" describing this operation. Instead of aligning for maximum output on an output indicator, the object should be to make the curve symmetrical. If the sweep circuit is so arranged that two symmetrically reversed curves appear on the screen, the curves should be made to coincide by adjusting the I.F. trimmer capacitors.

Visual R.F. alignment may be carried out in the same general manner as above by applying a suitable frequency-modulated signal between the antenna and ground terminals of the receiver and connecting the cathode ray vertical deflecting plates across the diode rectifier load resistor.

REPLACEMENT PARTS

*Indicates part also used on 1936 "A" line receivers.

RECEIVER ASSEMBLIES

*RB-008	BOARD—Terminal Board Double-lug	$0.10
*RB-009	BOARD—Terminal Board Single-lug	.15
*RB-029	BOARD—Antenna Ground Terminal Board	.10
RB-139	BRACKET—Gang Condenser Mounting Brackets	.15
*RC-024	CAPACITOR—.005 mfd., 200 V Paper (C-42)	.25
*RC-034	CAPACITOR—.01 mfd., 200 V Paper (C-43)	.25
RC-036	CAPACITOR—.008 mfd., 200 V Paper (C-39)	.25
RC-042	CAPACITOR—.01 mfd., 1000 V Paper (C-45)	.30
*RC-046	CAPACITOR—.02 mfd., 200 V Paper (C-31, C-38)	.25
*RC-072	CAPACITOR—.05 mfd., 200 V Paper (C-4, C-11, C-22, C-28, C-33, C-35)	.25
*RC-091	CAPACITOR—.05 mfd., 400 V Paper (C-17, C-19, C-41, C-46)	.30
*RC-096	CAPACITOR—.1 mfd., 200 V Paper (C-25)	.30
*RC-123	CAPACITOR—.1 mfd., 400 V Paper (C-18)	.35
RC-152	CAPACITOR—.25 mfd., 400 V Paper (C-44)	.40
*RC-205	CAPACITOR—20 mmfd Mica (C-6)	.35
*RC-210	CAPACITOR—50 mmfd Mica (C-21)	.25
RC-242	CAPACITOR—150 mmfd. Mica (C-37)	.25
*RC-258	CAPACITOR—250 mmfd. Mica (C-31, C-32)	.25
RC-291	CAPACITOR—400 mmfd. Mica (C-40)	.30
*RC-344	CAPACITOR—1300 mmfd. Mica (C-36)	.35
RC-380	CAPACITOR—2850 mmfd. Mica (C-16)	.50
RC-414	CAPACITOR—16 mfd., 380 V Wet Electrolytic (C-46)	1.25
*RC-415	CAPACITOR—16 mfd., 300 V Wet Electrolytic (C-47)	$1.10
RC-563	CAPACITOR—3 mfd., 350 V, 3 mfd., 150 V. Dry Elec. (C-20, C-48)	1.20
RC-619	CAPACITOR—Oscillator Padder Capacitor 350-550 mmfd. (C-13)	.35
RC-620	CAPACITOR—Twin Trimmers; antenna and R. F. Bands B & D (C-2, C-3; C-7, C-10)	.40
RC-621	CAPACITOR—Triple Trimmers; oscillator bands, B, C, & D (C-12, C-14, C-15)	.60
RC-711	CONDENSER—Gang Tuning Condensers (incl. drive) 11-450 mmfd. (C-5, C-8, C-9)	4.75
RC-755	CAPACITOR—Line Capacitors	.40
RC-816	CABLE—Speaker Cable (Complete)	.50
RC-860	CORD—Power Cord	.65
RC-992	CUSHION—Gang Condenser Mounting Cushion (Pkg. of 3)	.10
RE-011	ESCUTCHEON—Escutcheon Plate (with mtg. screw)	1.25
*RP-002	PO?T—Chassis Mounting Foot	.20
*RG-001	GRID CAP—Control Grid Clip (Pkg. of 5)	.10
RG-101	GASKET—Escutcheon Felt Gasket	.10
RG-102	GASKET—Escutcheon Rubber Gasket	.20
*RK-004	KNOB—Control Knob (Push-on) (Pkg. of 5)	.40
RL-017	COIL—Antenna Coil Band B & C (L-2, L-3, L-4, L-5)	1.15
RL-018	COIL—Antenna Coil Band D (L-6, L-7)	.75
RL-123	COIL—R. F. Coil Band B & C L-8, L-9)	1.10
RL-124	COIL—R. F. Coil Band D (L-10, L-11)	.75
RL-225	COIL—Oscillator Coil Band B (L-12, L-13)	.85
RL-226	COIL—Oscillator Coil Band C (L-14, L-16)	.85
RL-227	COIL—Oscillator Coil Band D (L-16, L-17)	.85
*RQ-059 (RR-014)	RESISTOR—1000 ohm, ½ watt Carbon (R-16) (Pkg. of 5)	.70
RQ-067	RESISTOR—2200 ohm, ½ watt Carbon (R-4, R-7, R-12, R-13) (Pkg. of 5)	$0.60
RQ-075	RESISTOR—4700 ohm, ½ watt Carbon (R-6) (Pkg. of 5)	.60
*RQ-083 (RR-021)	RESISTOR—10,000 ohm, ½ watt Carbon (R-14) (Pkg. of 5)	.60
RQ-099	RESISTOR—47,000 ohm, ½ watt Carbon (R-3) (Pkg. of 5)	.60
RQ-103	RESISTOR—68,000 ohm, ½ watt Carbon (R-8) (Pkg. of 5)	.60
*RQ-107 (RR-050)	RESISTOR—100,000 ohm, ½ watt Carbon (R-1, R-2, R-17, R-19) (Pkg. of 5)	.70
RQ-115	RESISTOR—220,000 ohm, ½ watt Carbon (R-11, R-20) (Pkg. of 5)	.70
RQ-117	RESISTOR—270,000 ohm, ½ watt Carbon (R-10) (Pkg. of 5)	.70
RQ-137	RESISTOR—1.8 Meg. ½ watt Carbon (R-9) (Pkg. of 5)	.70
*RQ-283 (RR-183)	RESISTOR—10,000 ohm ½ watt Carbon (R-5) (Pkg. of 5)	.70
RR-717	RESISTOR—Candohm Tapped Bleeder Resistor (R-21, R-22, R-23, R-24, R-25, R-26)	1.00
RS-136	SHIELD—1st & 2nd I.F. Coil Shield Can	.20
RS-137	SHIELD—3rd I.F. Coil Shield Can	.20
*RS-200	SOCKET—8 Pin Tube Socket (Pkg. of 5)	.75
*RS-204	SOCKET—5 Pin Tube Socket (Pkg. of 5)	.75
RS-324	SWITCH—Band Change Switch (S-1, S-2, S-3)	.75
RS-423	SPRING—Knob-spring (Push-on type) Pkg of 10	2.75
RT-087	TRANSFORMER—Power Transformer 115 V. 50/60 cycles (T-2)	.25
RT-088	TRANSFORMER—Power Transformer 115 V. 25/60 cycles (T-2)	5.80
RT-089	TRANSFORMER—Universal Power Transformer 105/130, 200/250 V. 40/60 cycles (T-2)	10.06
RT-223	TRANSFORMER—1st and 2nd I.F. Transformer (Complete) (L-18, L-19; C-23, C-24) (L-20, L-21; C-26, C-27)	10.25
RT-224	TRANSFORMER—3rd I.F. Transformer (Complete) (L-22, L-23; C-29, C-30)	1.50
RT-710	TONE CONTROL—Tone Control and Speech Clarifier Switch (R-18, S-5)	1.75
RV-015	VOLUME CONTROL—Volume Control and Power Switch (R-15, S-4)	1.00
RW-006	WINDOW—Escutcheon Window	1.25
RW-401	WAVE TRAP—Wave Trap Coil Assembly (Complete) (L-1, C-1)	.50

8 IN. SPEAKER ASSEMBLY E-81

RC-909	CONE—8-in. Type Cone and Voice Coil (Gasket incl.)	.90
RC-990	CLAMP—8-in. Cone Spider Clamp and Screw	1.15
*RP-012	PLUG—Female Speaker Plug	.05
RP-044	PLUG—Male Speaker Plug	$0.20
RP-052	PLUG—Female Speaker Plug (Late Prod.)	.20
RP-053	PLUG—Male Speaker Plug (Late Prod.)	.20
RS-032	SPEAKER—8-in. Type Speaker (complete with Output Transformer) (L-24, L-25, L-26, T-1)	7.55
RS-416	SPRING—Voice Coil Leads Spring (Pkg. of 2)	.10
RT-414	TRANSFORMER—Output Transformer (T-1)	1.40

12 IN. SPEAKER ASSEMBLY E-86

RC-910	CONE—12-in. Type Cone and Voice Coil (Gasket incl.)	1.45
RC-991	CLAMP—12-in. Cone Spider Clamp and Screw	.05
*RP-012	PLUG—Female Speaker Plug	.20
RP-044	PLUG—Male Speaker Plug	.20
RP-052	PLUG—Female Speaker Plug (Late Prod.)	.20
RP-053	PLUG—Male Speaker Plug (Late Prod.)	.20
RS-033	SPEAKER—12-in. Type Speaker (complete with Output Transformer) (L-24, L-25, L-26, T-1)	10.00
RS-416	SPRING—Voice Coil Leads Spring (Pkg. of 2)	.10
RT-414	TRANSFORMER—Output Transformer (T-1)	1.40

DIAL MECHANISM

RB-136	BRACKET—Band Switch Operating Shaft Bracket (35)	.10
RB-137	BRACKET—Dial Mask and Reflector Box Support Bracket (26)	.20
RB-138	BRACKET—Dial Lamp Bracket (20)	.90
RB-511	BOX—Dial Mask and Reflector Box (2)	.50
RC-817	CABLE—Drive Cable (Pkg. of 5) (10)	.40
RC-818	CABLE—Band Change Cable (Pkg. of 5) (12)	.40
RC-993	CUSHION—Rubber Buffer Cushion (Dial) (Pkg. of 2) (29)	.10
RC-994	CAP—Scale Cap (Free End) (37)	.10
RC-995	CAP—Scale Cap (Pulley End) (38)	.10
RD-035	DIAL—"Slide-Rule" Dial Scale	.65
RD-036	DRIVE—Tuning Condenser Reduction Drive (39)	1.10
RG-006	GEAR—Band Switch Drive Gear (40)	.15
RG-007	GEAR—Band Switch and Dial Operating Gear (41)	.20
RP-047	POINTER—Dial Pointer Pkg. of 5 (11)	.25
RP-048	PULLEY—Gang Drive Pulley (14)	.35
RP-049	PULLEY—Drive Cord Idler Pulley (4)	.15
RS-417	SPRING—Dial Scale Spring (7)	.05
RS-418	SPRING—Gang Drive Pulley Spring (16)	.05
RS-807	SUPPORT—Dial Scale Spring Support (8)	.10
RS-907	SHAFT—Band Switch Drive Gear Shaft (36)	.15

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

SOCKET VOLTAGES

		Cathode to Ground Volts D.C.	Screen Grid to Ground Volts D.C.	Plate to Ground Volts D.C.	Cathode Current M.A.	Heater Volts A.C.
6K7 R. F. Amplifier		....	100	235	8.0	6.3
6A8	Oscillator	....	....	185	10.3	6.3
	Converter	....	85	250		
6K7 1st I. F. Amplifier		†	100	250	8.0	6.3
6K7 2nd I. F. Amplifier		7	100	240	3.1	....
6H6 Detector and AVC		....	....	....	....	6.3
6F5 Audio Amplifier		1.5	....	*150	0.6	6.3
6L6 Output		**	250	290	63.5	6.3
5Z4 Power Rectifier		354 D. C.	....	660/330 R.M.S.	100.0	5.0

Measured at 115 volts supply. No signal input. Volume control maximum. Voltmeter 1000 ohms per volt; measurements taken on highest scale giving accurate readable deflection.
†Shorted to gnd. on "C" & "D" Bands.
*Supply volts minus drop in load resistor.
**Bias on control grid −16.0 volts.

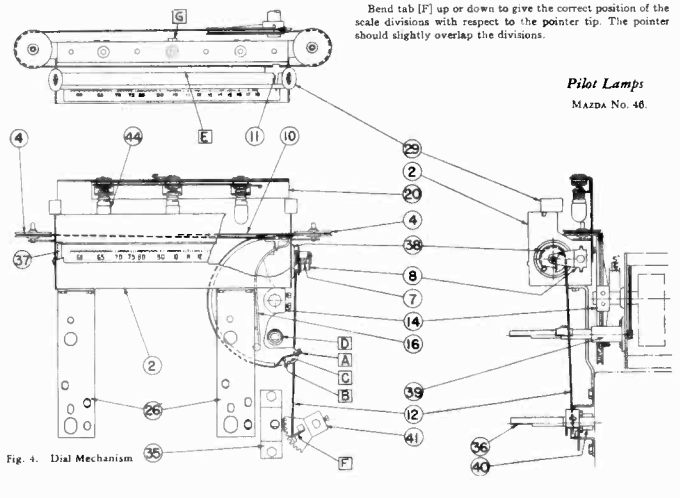


Fig. 4. Dial Mechanism

ADJUSTMENT OF DIAL MECHANISM

To Replace Drive Cable

Remove the drive cable to be replaced. Referring to Fig. 4, rotate drive wheel (14) counterclockwise until condenser plates are open. Place the end of the cable having an eyelet in slot [A]. Thread cable as shown making sure cable passes *over* pin [B], and runs along the *correct* grooves, the looped end hooking over spring (16). Check the position of the drive wheel on the condenser shaft making sure that the cable coming off the right-hand idler pulley lines up with the grooves in the drive pulley. Also, as the condenser plates become fully closed, the drive wheel (14) should just touch the bushing [D] of the tuning shaft (39). With the drive wheel in this position place the pointer on rail [E] and, with the tip of the pointer on the extreme left-hand scale division, crimp pointer tab onto the drive cable.

To Adjust Pointer for Scale Calibration

Three positions of the dial pointer cable are provided to adjust the pointer up or down scale. The position shown on Fig. 4, with the cable over pin [B] is the medium position. By changing the cable to the position between pins [H] and [C] the pointer may be moved *down* scale. The cable position below pin [C] moves the pointer *up* scale from the medium position.

To Replace Dial Scale

Remove the band change cable (12). Then remove the end support (8) held by a single self-tapping screw and withdraw the scale assembly from the housing. Replace the end caps on the new scale and re-assemble. Before attaching band change cable (12) to the gear (41), the spring (7) should be given two full turns to give the proper tension to the cable.

To Adjust Rotation of Scale

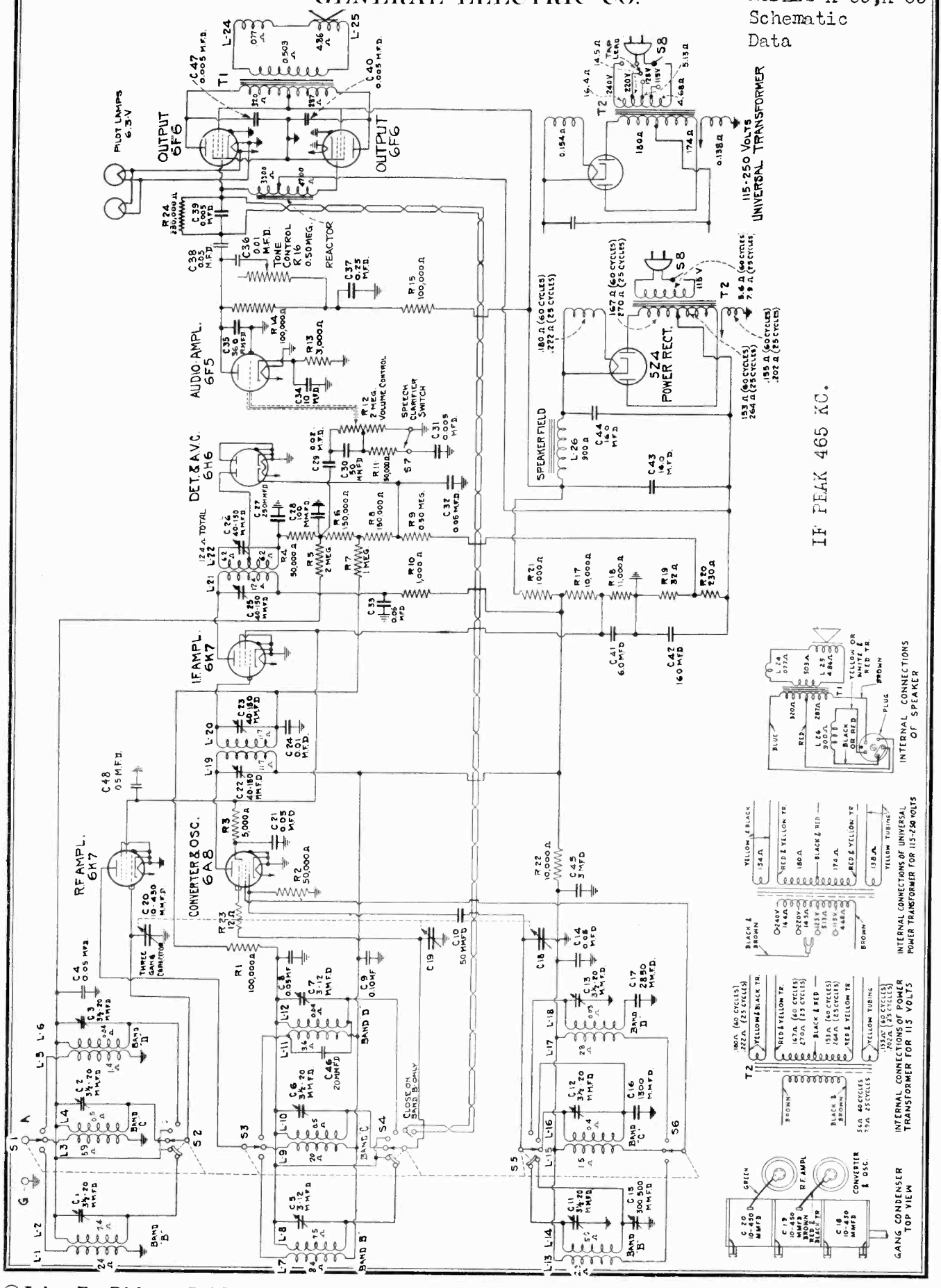
Bend tab [F] up or down to give the correct position of the scale divisions with respect to the pointer tip. The pointer should slightly overlap the divisions.

Pilot Lamps

MAZDA No. 46.

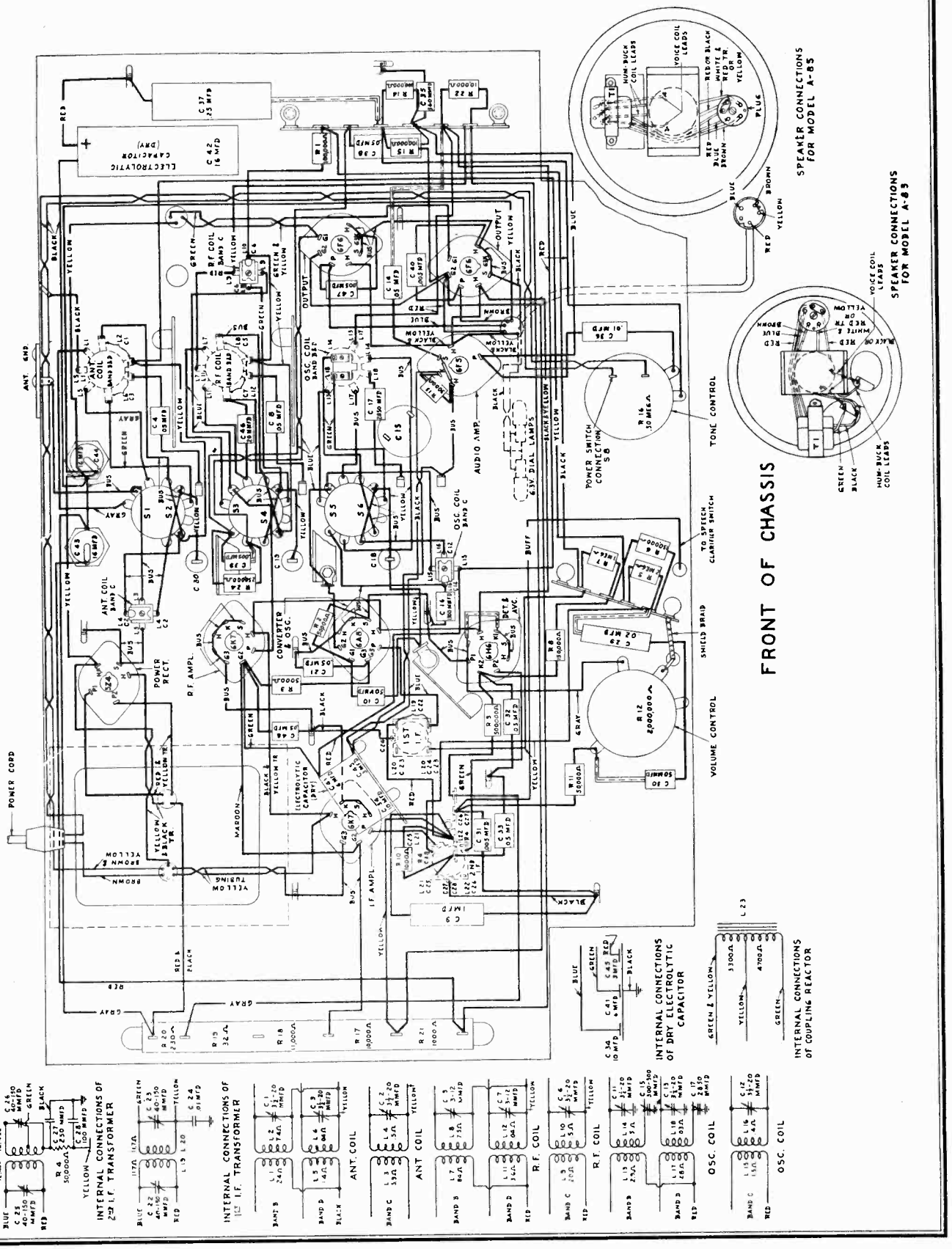
GENERAL ELECTRIC CO.

MODELS A-83, A-85
Schematic
Data



MODELS A-83, A-85
Chassis Wiring
Coil Data

GENERAL ELECTRIC CO.



SERVICE DATA

Physical Specifications

Model	A-83	A-85
Height	20⅞ in.	40⅜ in.
Width	14⅝ in.	23⅝ in.
Depth	11¹⁄₁₆ in. (Knobs project beyond)	11½ in. (Knobs project beyond)
Weight packed	40 lb.	70 lb.

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115	50–60	100
C	115	25–60	105
V	105–130 and 200–250	40–60	105

NOTE: Taps on universal transformers (Rating "V") are accessible by removing the cap cover mounted on the top of the transformer. Schematic and wiring diagrams of the universal transformer are shown in Fig. 1 and 2, respectively.

Tuning Frequency Range

Band "B"	540–1720 kc
Band "C"	1.72–5.8 mc (1720–5800 kc)
Band "D"	5.8–18.0 mc (5800–18,000 kc)

Tuning Control Drive Ratio

Past Tuning	5½ to 1
Vernier Tuning	55 to 1

Electrical Power Output

Undistorted	6 watts
Maximum	11 watts

Loud-speaker—Electrodynamic

Cone Model A-83 9 in. type.
Model A-85 11 in. type.
Cone Coil Impedance: 5 ohms at 400 cycles

Tubes

R. F. Amplifier.....6K7 Triple-grid Super-control Amplifier
Converter and Oscillator.....6A8 Pentagrid Converter
I. F. Amplifier.....6K7 Triple-grid Super-control Amplifier
Detector and AVC..6H6 Twin Diode
Audio Amplifier....6F5 Detector Amplifier Triode
Output.....2—6F6 Power Amplifier Pentodes
Power Rectifier.....5Z4 Full-wave Rectifier
Dial Lamps.....MAZDA No. 46

DESCRIPTION OF ELECTRICAL CIRCUIT

Models A-83 and A-85 employ eight metal envelope tubes to perform the above functions in a superheterodyne circuit, giving the excellent selectivity and sensitivity inherent in this type circuit. Separate groups of coils are used for each frequency band. Ample undistorted power output is obtained through use of diode detection and a push-pull power amplifier final audio stage.

The signal from the antenna is applied to the control grid of the 6K7 R. F. amplifier tube through the antenna coil, the secondary of which is tuned to the incoming signal by the rear section of the main tuning condenser. The secondary of the coil for the band next lower in frequency to the one in use is short-circuited by the band switch to prevent absorption of energy at its resonant frequency which falls in the next higher band.

The amplified radio frequency signal is impressed on the control grid of the 6A8 converter and oscillator tube through the R. F. coil, the secondary of which is tuned to the signal frequency by the center section of the main tuning condenser. In the 6A8 tube the incoming signal is combined with the local oscillator signal which is 465 kc higher in frequency. The local signal is generated by the oscillator elements of this tube and the proper frequency difference is maintained throughout the tuning range by the front section of the main tuning condenser in conjunction with the oscillator coil and padding capacitors.

The combination of the signal frequency with the local oscillator frequency in the converter tube produces the intermediate frequency of 465 kilocycles. This particular intermediate frequency is chosen to reduce image response and improve short-wave performance. The intermediate frequency amplifier consists of a 6K7 tube and two transformers, each with two tuned circuits.

The output of the I. F. amplifier is applied to the 6H6 diode rectifier, which is a combined detector and automatic volume control tube. The direct current component of the rectified signal produces a voltage drop across R-6 and R-8. This voltage drop provides automatic bias for the R. F. and I. F. amplifier and converter tubes and so gives automatic volume control action. Full automatic bias voltage is applied to the R. F. amplifier tube, while half this voltage is applied to the converter tube and I. F. amplifier, which handle a somewhat larger signal voltage than the R. F. amplifier.

Condenser C-29 couples the audio signal to the volume control (R-12) and to the speech clarifier network (C-30, C-31, R-11). When switch S7 is open the frequency response is correct for music, while closing this switch raises the level of certain frequencies and renders speech extremely understandable. The amount of signal impressed on the control grid of the 6F5 audio amplifier tube is selected by the variable arm on the volume control, this in turn determining the output of the receiver.

The output of the 6F5 tube is capacitively coupled to the coupling reactor (L23) which gives a balanced excitation to the 6F6 push-pull power amplifier. The tone control consisting of R-16 and C-36 is connected across the 6F5 plate resistor. Cutting out resistance in R-16 lessens the treble response of the receiver.

The 6F6 tubes are connected in pentode and their plate circuit is suitably matched to the dynamic speaker by a step-down transformer T1.

Plate and grid voltages for all tubes are supplied by the power supply system employing a 5Z4 full-wave rectifier tube which, together with a suitable network of resistors and capacitors, supplies the required voltages and filtering action.

ALIGNMENT PROCEDURE

The receiver should first be allowed to run for fifteen minutes in order to reach its approximate normal operating temperature. Before making any adjustments, it is wise to determine the correctness of the existing alignment. This may be done by supplying a signal at the alignment frequency from the test oscillator to the receiver and inserting a "Tuning Wand" into the coil involved. The "Tuning Wand" consists of a bakelite rod having a brass cylinder attached to one end, and a small core of finely divided iron compacted into the opposite end. By inserting the brass cylinder end into the center of a particular coil, through the opening provided in the top of the shield, the inductance of the coil is lowered, increasing its resonant frequency. Inserting the iron-filled end into the coil raises its inductance, lowering its resonant frequency. If the circuits are in exact alignment, inserting either end of the tuning wand in any coil will result in a decrease in output. When an increase in signal is obtained with the iron-filled end of the wand, a decrease in resonant frequency of that circuit by increasing its trimmer capacity is indicated. When an increase in signal is obtained with the brass cylinder, a decrease in trimmer capacity is indicated.

Changes Indicated by Wand

Wand	Signal	Trimmer Adjustment Required
Brass cylinder	Decrease	None
Iron filings	Decrease	
Brass cylinder	Increase	Decrease capacity
Iron filings	Decrease	
Brass cylinder	Decrease	Increase capacity
Iron filings	Increase	

Fig. 3 shows the location of the antenna, R. F., and oscillator coils for each of the three frequency bands of Model A-83 and A-85 receivers.

ALIGNMENT FREQUENCIES

I. F.	Band "B"	Band "C"	Band "D"
465 kc	580 kc 1500 kc	5220 kc	18,000 kc

In order to align these receivers properly, it is necessary to have available the following test equipment:

1. A modulated test oscillator with frequencies available of 465, 580, 1500, 5220 and 18,000 kc.
2. An output indicator, such as a high resistance a-c voltmeter with a maximum scale reading of 3 to 5 volts, or a neon lamp output indicator.
3. An alignment tool consisting of an insulating shaft with a small screw-driver blade.
4. A tuning wand.

The location of all trimmer capacitors, as well as socket voltages to chassis, is shown in Fig. 4.

1. I. F. Alignment

In order to maintain proper bias voltage during I. F. alignment, the test oscillator should be connected to the 6A8 converter tube control grid through a .01-mfd. (or larger) capacitor. The normal grid cap connection should be removed and a 25,000-ohm to 50,000-ohm resistor connected between it and the 6A8 control grid. The ground side of the test oscillator may then be connected directly to the chassis.

Set the frequency band switch of the receiver to Band "B", short-circuit the antenna and ground terminals and tune the receiver at some point above 1500 kc so that no signal is heard. Set the volume control at its maximum position and ground the chassis.

The I. F. amplifier is tuned to 465 kc; set the test oscillator dial at this frequency. Connect the output meter across the cone coil of the speaker and adjust the test oscillator output control so that, with the receiver volume control at maximum, a small deflection is observed in the output meter. During both I. F. and R. F. alignment, the test oscillator signal should be maintained at the lowest level that will give a good readable output indication.

Adjust the secondary trimmer of the second I. F. transformer until a maximum output reading is obtained. Maintain a small deflection on the output meter throughout alignment by adjusting the test oscillator output. Next, adjust the primary trimmer of the second I. F. transformer for maximum output. Continue this procedure, adjusting the secondary trimmer of the first I. F. transformer and lastly the primary trimmer of the first I. F. transformer. After completing this procedure, repeat it a second time for final alignment. The I. F. alignment will then be complete.

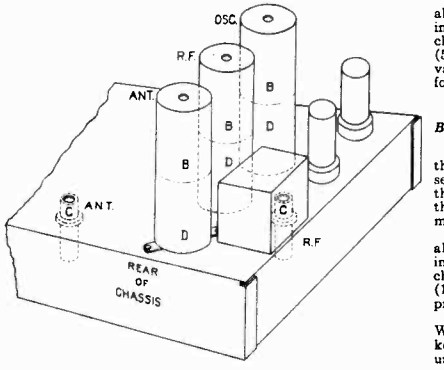


Fig. 3. Coil Locations

2. R. F. Alignment

Band "B" requires four trimmer adjustments, while Band "C" and Band "D" each require three adjustments. Care should be taken to adjust only the trimmers of the band under test. Check the position of the dial pointer as outlined in the section on adjustment of the dial mechanism. Make sure the antenna and ground terminals of the receiver are not short-circuited and connect to them the output from the test oscillator, preferably using a dummy antenna of 250 mmfd. in series with 200 ohms between the test oscillator and receiver antenna terminal. Connect the output indicator across the speaker cone coil.

Band "B"—540-1720 kc

Set the frequency band switch to the position where the dial indicates the above range. Tune the test oscillator to 1500 kc and set the dial pointer on the receiver to this frequency. Adjust the Band "B" oscillator trimmer for maximum output, keeping the receiver volume control at its extreme clockwise position and adjusting the test oscillator output to maintain a small reading on the output indicator. When optimum adjustment on the Band "B" oscillator trimmer is obtained, adjust the Band "B" R. F. and antenna trimmers for maximum output.

Now tune the test oscillator to 580 kc and set the receiver to that frequency. Slowly rocking the tuning condenser back and forth through the signal, adjust the 580 kc padding capacitor for maximum output. When this has been done, return to 1500 kc on the receiver and test oscillator and recheck the alignment for maximum output. Band "B" should now be in alignment.

Band "C"—1.72–5.8 mc (1720–5800 kc)

Set the band switch to the position where the dial indicates the above range. Tune the test oscillator to 5220 kc and set the dial pointer on the receiver to this frequency. Adjust the Band "C" oscillator trimmer for maximum output, using the first peak obtained when increasing the capacitance from minimum to maximum.

Check for the image signal which should be received at about 4290 kc on the receiver dial. It should be necessary to increase input to the receiver from the test oscillator for this check. Retune the receiver to the correct scale reading (5220 kc) and reduce the test oscillator output to its previous value. Then adjust the Band "C" R. F. and antenna trimmers for maximum output.

Band "D"—5.8–18.0 mc (5800–18,000 kc)

Set the band switch to the position where the dial indicates the above range. Tune the test oscillator to 18,000 kc and set the dial pointer on the receiver to this frequency. Adjust the Band "D" oscillator trimmer for maximum output, using the first peak obtained when increasing the capacitance from minimum to maximum.

Check for the image signal which should be received at about 17070 on the receiver dial. It may be necessary to increase input to the receiver from the test oscillator for this check. Retune the receiver to the correct scale reading (18,000 kc) and reduce the test oscillator output to its previous value.

Reduce the capacitance of the R. F. trimmer to a minimum. While slowly rocking the tuning condenser through the 18,000 kc point, increase the Band "D" R. F. trimmer capacitance until a maximum response point is obtained. The Band "D" antenna trimmer should next be peaked. It is not necessary to rock the tuning condenser while making this last adjustment.

MODELS A-83, A-85
Socket, Trimmers
Voltage, Dial Data
Parts List

GENERAL ELECTRIC CO.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE
REPLACEMENT PARTS

Stock No.	Description	List Price
RB-009	BOARD—Terminal Board Single-lug Pkg. 4	$0.10
RB-023	BOARD—Terminal Board under 2nd I. F. Trans	.10
RB-026	BOARD—Antenna Ground Terminal Board	.10
RB-027	BOARD—Terminal Board on Front Wall beside Band Switch	.10
RB-028	BOARD—Terminal Board on Side Wall Under 6F6's	.15
RB-124	BRACKET—Speech Clarifier Switch Bracket Pkg. 5	.10
RB-200	BRACE—Dial Opening Brace (A-83 only)	.30
RC-023	CAPACITOR—.005 mfd. 600 V. Paper (C-40, C-47)	.25
RC-024	CAPACITOR—.005 mfd. 200 V. Paper (C-31)	.25
RC-029	CAPACITOR—.005 mfd. 400 V. Paper (C-39)	.25
RC-034	CAPACITOR—.01 mfd. 200 V. Paper (C-24)	.25
RC-040	CAPACITOR—.01 mfd. 400 V. Paper (C-36)	.25
RC-046	CAPACITOR—.02 mfd. 200 V. Paper (C-29)	.25
RC-072	CAPACITOR—.05 mfd. 200 V. Paper (C-4, C-8, C-21, C-32, C-48)	.25
RC-091	CAPACITOR—.05 mfd. 400 V. Paper (C-14, C-33, C-38)	.30
RC-123	CAPACITOR—1 mfd. 400 V. Paper (C-9)	.35
RC-151	CAPACITOR—.25 mfd. 400 V. Paper (C-37)	.40
RC-205	CAPACITOR—20 mmfd. Mica (C-46)	.25
RC-210	CAPACITOR—50 mmfd. Mica (C-10, C-30)	.25
RC-235	CAPACITOR—100 mmfd. Mica (C-28)	.25
RC-258	CAPACITOR—250 mmfd. Mica (C-27)	.25
RC-281	CAPACITOR—360 mmfd. Mica (C-35)	.30
RC-344	CAPACITOR—1300 mmfd. Mica (C-16)	.35
RC-359	CAPACITOR—2850 mmfd. Mica (C-17)	.50
RC-406	CAPACITOR—16 mfd. 480 V. Wet Electrolytic (C-44)	1.20
RC-415	CAPACITOR—16 mfd. 390 V. Wet Electrolytic (C-43)	1.10
RC-525	CAPACITOR—3 mfd. 350 V., 6 mfd. 150 V., 10 mfd. 25 V., Dry Electrolytic (C-34, C-41, C-45)	2.00
RC-526	CAPACITOR—16 mfd. 25 V. Dry Electrolytic (C-42)	.90
RC-808	CAPACITOR—Oscillator Padder Capacitor 300-800 mmfd. (C-15)	.40
RC-611	CAPACITOR—Twin Trimmers Cap. Osc. Band B&D (C-11, C-13)	.40
RC-612	CAPACITOR—Twin Trimmers R. F. Band B&D (C-5, C-7)	.80
RC-613	CAPACITOR—Twin Trimmers Ant. Band B&D (C-1, C-3)	.80
RC-614	CAPACITOR—Ant. R. F. or Osc. Band C Trimmer Capacitor (C-2, C-8, or C-12)	.20
RC-615	CAPACITOR—1st and 2nd I. F. Trimmer Capacitors (C-22, C-23, or C-25, C-26)	.50
RC-707	CONDENSER—Three Gang Tuning 10-450 mmfd. (C-18, C-19, C-20)	4.40
RC-854	CORD—Power Cord	.60
RC-976	CUSHION—Condenser Mounting Cushion Pkg. of 3	.10
RE-005	ESCUTCHEON	.80
RF-002	FOOT—Chassis Mounting Foot White Rubber	.20
RF-008	FOOT—Chassis Mounting Foot Red Rubber	.20
RG-001	GRID CAP—Pkg. 5	.10
RK-004	KNOB—Control Knob Pkg. of 5	.40
RL-012	COIL—Ant. Coil Only Band B&D (L-1, L-2, L-5, L-6)	1.25
RL-013	COIL—Antenna Coil Only Band C (L-3, L-4)	.70
RL-114	COIL—R. F. Coil Only Band B&D (L-7, L-8, L-11, L-12)	1.45
RL-115	COIL—R. F. Coil Only Band C (L-9, L-10)	.75
RL-215	COIL—Oscillator Coil Band B&D (L-13, L-14, L-17, L-18)	1.10
RL-216	COIL—Oscillator Coil Only Band C (L-15, L-16)	.65
RL-303	REACTOR—Interstage Coupling Reactor	4.10
RL-405	COIL—1st I. F. Transformer Coil (L-19, L-20)	1.35
RL-406	COIL—2nd I. F. Transformer Coil (L-21, L-22)	1.35
RN-001	NUT—Escutcheon Nut, Pkg. 10	.45
RP-014	PLATE—Escutcheon Mounting Plate, Pkg. 2	.25
RR-014	RESISTOR—1000 ohm ½ watt Carbon (R-10), Pkg. 5	.70
RR-016	RESISTOR—5000 ohm ½ watt Carbon (R-3), Pkg. 5	.70
RR-035	RESISTOR—50,000 ohm ½ watt Carbon (R-21, R-11), Pkg. 5	.70
RR-038	RESISTOR—50,000 ohm ½ watt carbon (R-4), Pkg. 5	.70
RR-039	RESISTOR—3000 ohm ½ watt Carbon (R-13), Pkg. 5	.70
RR-049	RESISTOR—100,000 ohm ½ watt Carbon (R-1, R-14, R-15), Pkg. 5	.70
RR-054	RESISTOR—150,000 ohm ½ watt Carbon (R-6, R-8), Pkg. 5	.70
RR-062	RESISTOR—250,000 ohm ½ watt Carbon (R-24), Pkg. 5	.70
RR-067	RESISTOR—1 megohm ½ watt Carbon (R-7), Pkg. 5	.70
RR-068	RESISTOR—2 megohm ½ watt Carbon (R-5), Pkg. 5	.60
RR-183	RESISTOR—10,000 ohms ½ W. Carbon (R-22), Pkg. 5	$0.70
RR-308	RESISTOR—6A8 Grid Lead Resistor 12 ohms (R-23)	.10
RR-706	RESISTOR—Candohm Tapped Bleeder Resistor (R-21, R-17, R-18, R-19, R-20)	.90
RR-707	RESISTOR—500,000 ohm ½ watt Carbon (R-9), Pkg. 5	.60
RS-122	SHIELD—Ant. R. F. or Osc. Coil Can	.25
RS-123	SHIELD—1st I. F. Shield Can	.30
RS-124	SHIELD—2nd I. F. Shield Can	.30
RS-157	SHIELD—Small Partition Shield for Band Switch, Pkg. 2	.10
RS-158	SHIELD—Large Partition Shield for Band Switch, Pkg. 2	.20
RS-159	SHIELD—Shield Plate Near Volume Control	.10
RS-160	SHIELD—Shield Plate Supporting Dry Electrolytic Cap.	.15
RS-200	SOCKET—Eight Pin Socket, Pkg. 5	.75
RS-315	SWITCH—Band Change Switch (S-1 to S-6 incl.)	2.65
RS-316	SWITCH—Speech Clarifier Switch (S-7)	.15
RT-084	TRANSFORMER—Power Transformer 105-125 V. 50/60 cycles (T-2)	6.40
RT-085	TRANSFORMER—Power Transformer 105-125 V. 25/60 cycles (T-2)	
RT-086	TRANSFORMER—Universal Power Transformer 105/130/200/250 V. 40-60 cycles (T-2)	
RT-217	TRANSFORMER—1st I. F. Transformer complete	2.00
RT-218	TRANSFORMER—2nd I. F. Transformer complete	2.50
RT-705	TONE CONTROL—.5 megohm Tone Control and Power Switch (R-16, S-8)	.95
RV-009	VOLUME CONTROL—2 megohms (R-12)	.80
RW-002	WINDOW—Dial Window	.15
RW-101	WASHER—Felt Washer for Control Shafts, Pkg. 10	.45
RW-102	WASHER—Insulating Washer for Mounting Electrolytics, Pkg. 4	.10
RX-013	SCREW ASSEMBLY—Chassis Mounting Screw Assembly	.10
	SPEAKER ASSEMBLY A-83	
RB-029	BOARD—Speaker Terminal Board, Pkg. 2	.10
RC-906	CONE—9 in. Type Cone and Voice Coil (gaskets incl.)	1.35
RP-012	PLUG—Female Speaker Plug	.20
RP-032	PLUG—Male Speaker Plug	.25
RS-026	SPEAKER—9 in. Type Reproducer Complete	8.25
RT-409	TRANSFORMER—Output Transformer (T-1)	1.80
	SPEAKER ASSEMBLY A-85	
RC-908	CONE—11 in. Type Cone and Voice Coil (Gasket incl.)	1.15
RP-012	PLUG—Female Speaker Plug	.20
RP-032	PLUG—Male Speaker Plug	.25
RS-025	SPEAKER—11 in. Type Speaker Complete	10.70
RT-409	TRANSFORMER—Output Transformer (T-1)	1.80
	DIAL MECHANISM	
RB-117	BRACKET—Dial Lamp Bracket	.25
RC-805	CABLE—Drive Cable, Pkg. of 5	.80
RC-856	CORD—Drive Cord Pkg. of 5	.65
RC-954	CAP—Scale Cap Assembly (Gear end)	.10
RC-955	CAP—Scale Cap (Free End)	.10
RC-958	CUSHION—Rubber Buffer Cushions Pkg. 2	.10
RD-006	DRIVE—Automatic Vernier Reduction Drive	1.00
RD-013	DRUM—Drive Drum Assembly	.35
RD-020	DIAL—Dial Scale	.65
RD-024	DIAL—Tubular Dial Scale and Drive Mechanism Complete	4.00
RF-200	FASTENER—Dial Scale End Fastener Pkg. of 10	.10
RG-002	GEAR—Dial Gear Assembly	.15
RG-200	GUIDE—Dial Pointer Guide, Pkg. 5	.15
RP-003	POINTER—Dial Pointer Pkg. of 2	.15
RP-004	PULLEY—Drive Cord Idler Pulley Pkg. of 2	.10
RP-031	PLATE—Dial Mounting Plate Assembly	1.15
RS-401	SPRING—Drum Spring Pkg. of 2	.20
RS-403	SPRING—Dial Spring Pkg. of 2	.10
RS-900	SHAFT—Shaft and Gear Assembly with Washers	.15
RT-802	TOGGLE—Toggle Assembly	.35

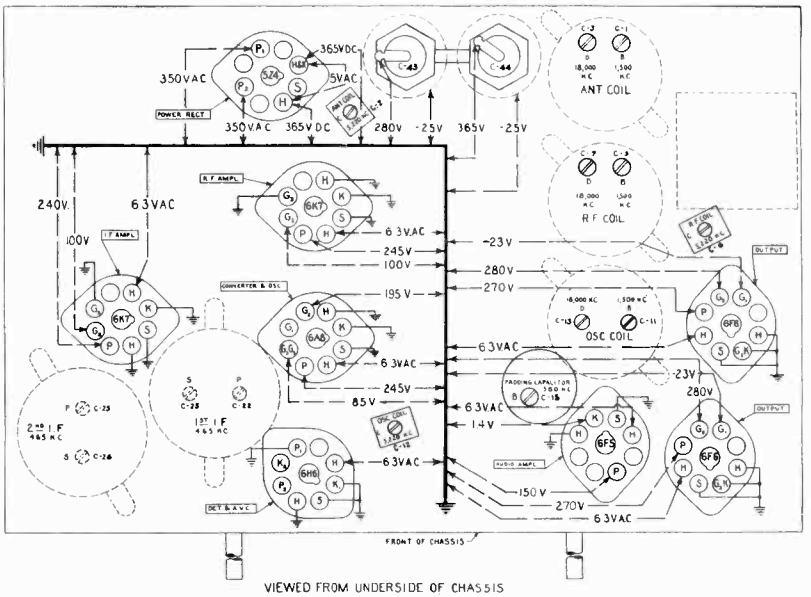


Fig. 4. Trimmer Locations and Socket Voltages

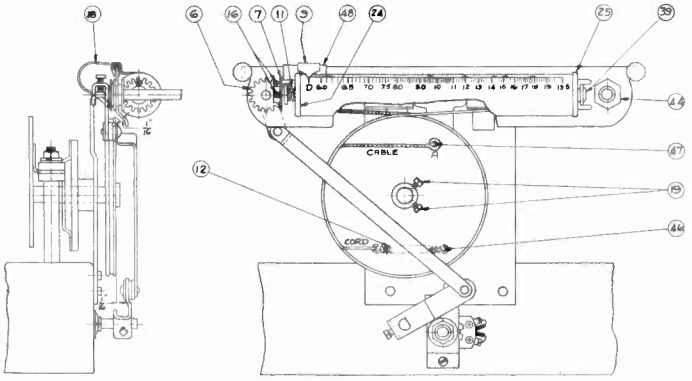


Fig. 5. Dial Mechanism

DIAL MECHANISM ADJUSTMENTS

The dial mechanism is rigidly mounted to the chassis. The tuning condenser is mounted by means of rubber cushions and bushings at points of support. The dial pointer, station selector knob, and tuning condenser drive drum are interconnected by means of the drive cord and drive cable; the frequency band switch, the cylindrical dial scale and switch knob, by gear and toggle assemblies.

1. Position of Drum on Condenser Shaft

With set screws (19) loosened and tuning condenser plates fully engaged, place the drum in the position as shown in Fig. 5 so that drum spring (12) is approximately horizontal, and the top rim of the drum is $\frac{1}{8}$ in. away from the mounting plate. Guide (48) should stop at equal distances from each end of the mounting plate slot.

2. Removing and Replacing Scale

Pry out fastener (39), and remove the scale by lowering that end below the ear and taking the scale out of cap assembly (24), holding parts (24), (11), and (7) in place. Replace, locating tabs of caps (24) and (25) in slots of scale. Replace fastener (39).

3. Locating Scale

Loosen the two gear set screws (16). Rotate the scale upward until there is slight tension on spring (11) with the pointer indicating on the Band "D" scale. With the frequency band switch in the Band "D" position, place gear (7) in mesh with the gear on part (6) and tighten the two set screws (16).

4. Replacing Drive Cord

The position of the dial scale pointer with respect to the tuning condenser drum is held fixed by means of a special metal braid cable connecting the drum with the guide (48). Tension is maintained on the cable through the drum spring (12) and drive cord. To replace either the drive cable or the drive cord, remove the dial scale for convenient access to guide (48). Unhook spring (12) from tab (46) to release tension. Unhook the cable or cord from guide (48) and unwind from the pulleys and drum. To replace the cable, rethread to agree with Fig. 5 and rehook drum spring (12) as shown.

5. Replacing Reduction Drive

To replace the reduction drive, unhook spring (12), loosening the drive cord. Unscrew palnut (44) and remove drive. Replace with new drive and rehook drive cord.

6. Replacing Toggle Assembly

Loosen the two set screws holding the toggle mechanism on the band change switch and on shaft (6). Replace with new assembly, setting lower lever arm $\frac{1}{8}$ in. away from the condenser drive drum as shown in Fig. 5 and tighten set screw on frequency band switch shaft. Rotate shaft (6) clockwise until there is slight tension on spring (11) with the scale in the Band "D" position. Place upper lever arm in shaft and tighten set screw.

7. Setting Scale Pointer

The scale pointer is soldered to the slider. To set the pointer mechanically, turn the tuning condenser rotor so that the plates are fully engaged, and solder the pointer to indicate the extreme left-hand line on the Band "D" scale as shown in Fig. 5.

8. Replacing Dial Lamp

Take hold of terminals of lamp bracket and push up until lamps protrude above the opening in reflector (18). Lamps may then be replaced in socket clips. After replacing lamps, slide the socket mounting bracket back into the mounting clip.

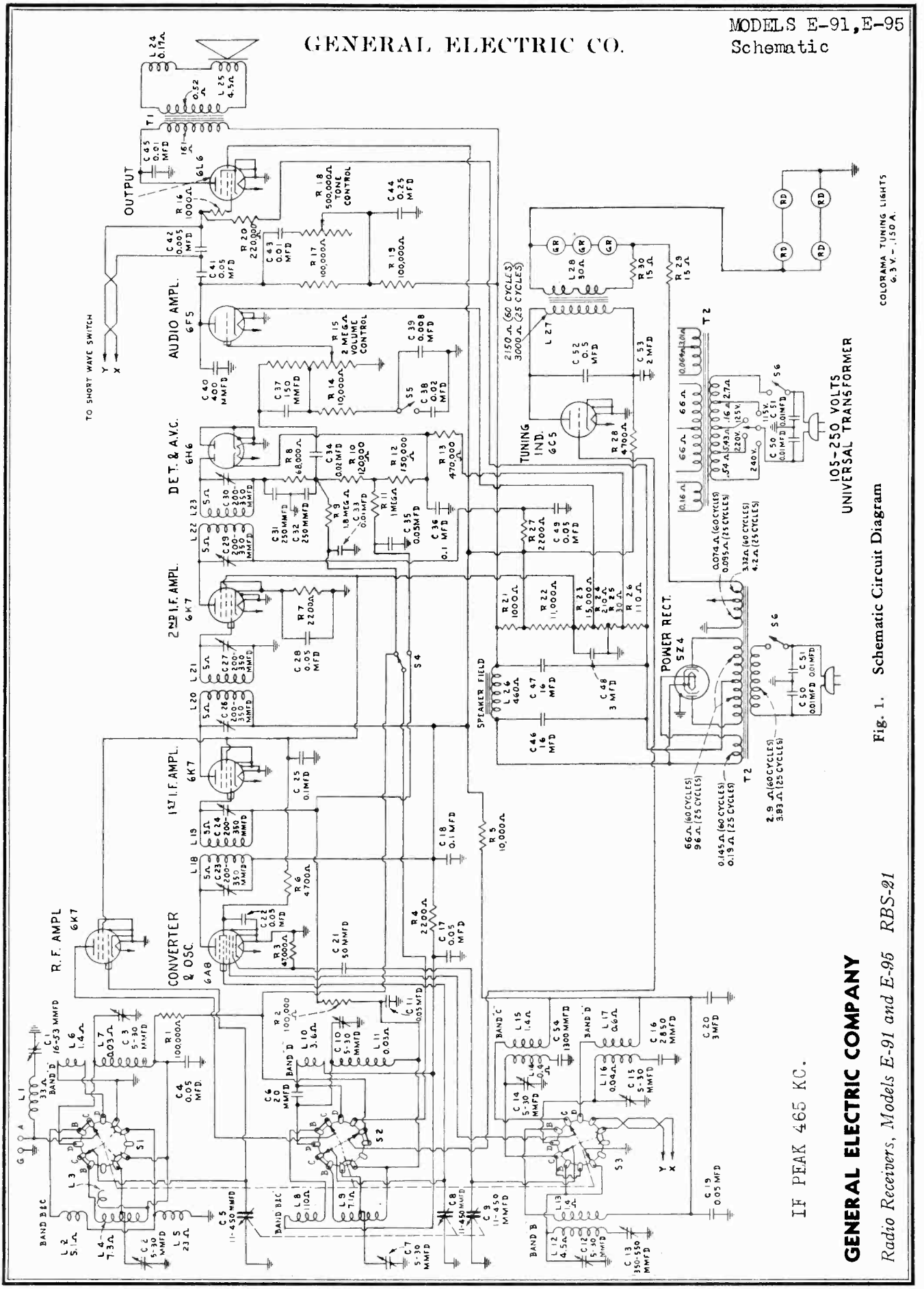


Fig. 1. Schematic Circuit Diagram

MODELS E-91, E-95
Chassis Wiring
Coil Data

GENERAL ELECTRIC CO.

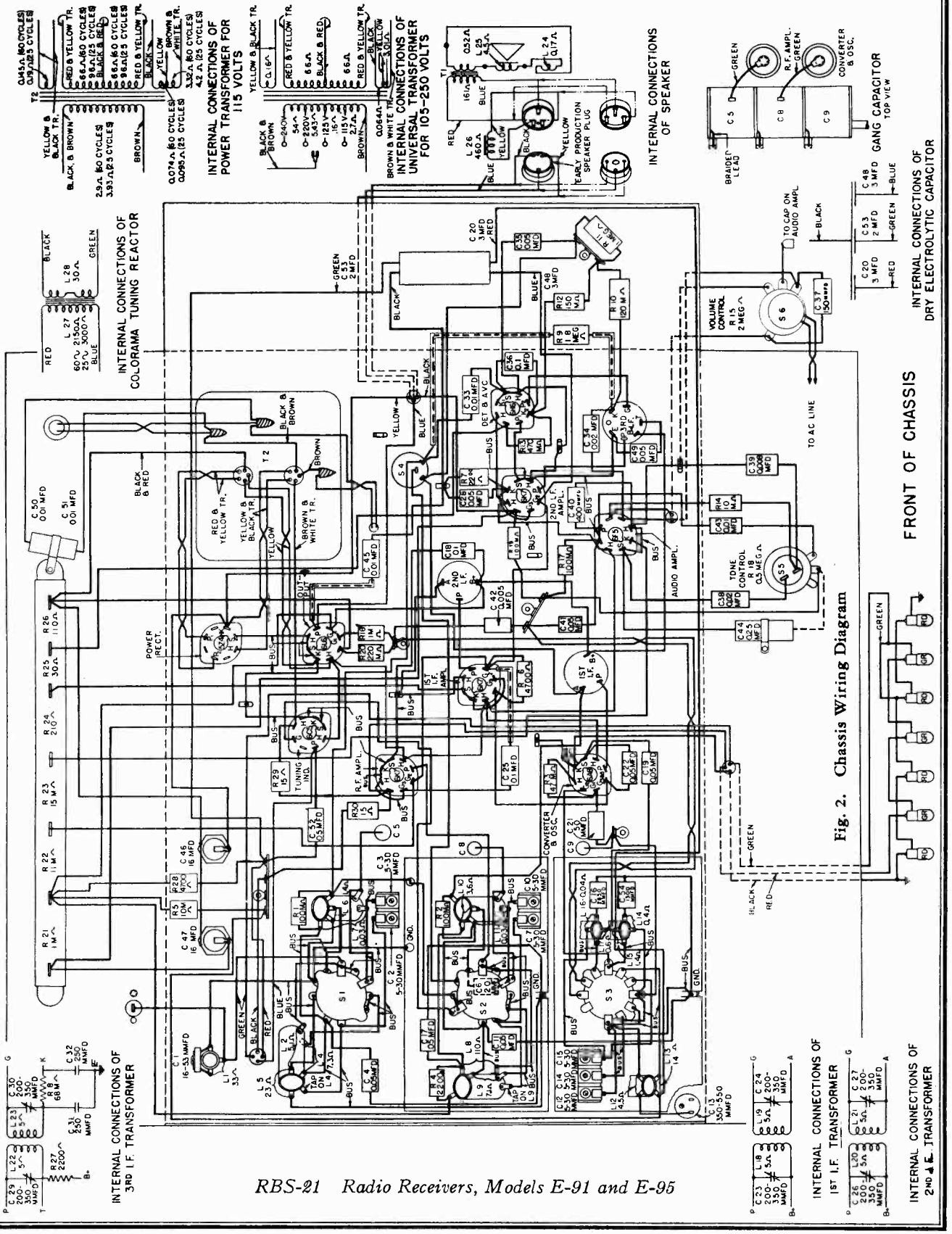


Fig. 2. Chassis Wiring Diagram

ALL-WAVE RECEIVERS

SUPERHETERODYNE

MODELS E-91 AND E-95

SERVICE DATA

Physical Specifications

Model	E-91	E-95
Height	20½ in.	39½ in.
Width	15⅝ in.	25½ in.
Depth	11¼ in.	12½ in.
Weight packed	42 lb	67 lb

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115	50–60	105
C	115	25–60	105
V	105–130 and 200–250	40–60	110

NOTE—Taps on universal transformers (Rating "V") are accessible by removing the cap cover on the top of the transformer.

Tuning Frequency Range

Band "B" . . . . . 540-1680 KC
Band "C" . . . . . 1680-5000 KC
Band "D" . . . . . 6.0-18.0 MC (6,000-18,000 KC)

Tuning Control Drive Ratio

Fast Tuning . . . . . 8 to 1
Vernier Tuning . . . . . 40 to 1

Electrical Power Output

Undistorted . . . . . 6.5 watts
Maximum . . . . . 14.0 watts

Loud-speaker—Electrodynamic

Cone: Model E-91 . . . . . 8 in.
Model E-95 . . . . . 12 in.
Cone Coil Impedance . . . . . 5.5 ohms at 400 cycles

Tubes

R. F. Amplifier . . . . 6K7 Triple-grid Super-control Amplifier
Converter and Oscillator . . . . . 6A8 Pentagrid Converter
1st I. F. Amplifier . . 6K7 Triple-grid Super-control Amplifier
2nd I. F. Amplifier . 6K7 Triple-grid Super-control Amplifier
Detector and AVC . 6H6 Twin Diode
Audio Amplifier . . . 6P5 High Gain Triode
Output . . . . . 6L6 Beam Amplifier Tetrode
Colorama Control . . 6C5 Low Gain Triode
Rectifier . . . . . 5Z4 Full-wave Rectifier
Dial Lamps . . . . . 6.3 V—0.15 A. (4 red and 3 green)

DESCRIPTION OF ELECTRICAL CIRCUIT

Models E-91 and E-95 employ nine metal envelope tubes in a superheterodyne circuit, giving the excellent sensitivity and selectivity inherent in this type circuit. The radio frequency section of this nine-tube chassis utilizes a novel type of construction known as the "Junior Sentry Box." This construction permits the use of extremely short connecting leads and isolates each radio frequency circuit in its own particular shielded section. Separate groups of coils are used for each band in the oscillator section. The antenna and R. F. sections are composed of two coils, a separate coil for the "D" band and a composite coil for the "B" band and "C" band. Operation on the "C" band is obtained by shorting out a section of the antenna and R. F. "B" band coils.

The signal from the antenna is applied to the control grid of the 6K7 R. F. amplifier tube through the antenna coil, the secondary of which is tuned to the incoming signal by the rear section of the main tuning condenser. The antenna coil, for bands "B" and "C," contains two primary coils both connected for operation on the "B" band; however, when the band switch is turned to the "C" band position, the lower primary coil, L-5, is shorted out. The high frequency trimming adjustment for the "B" band antenna and R. F. stage is accomplished by two adjustable trimmers connected from the "C" band tap on each coil to ground. The capacity coupling coil L-3 acts only on the "C" band and its function is similar to that of a fixed antenna stage trimmer for that band.

The amplified radio frequency signal is impressed upon the control grid of the 6A8 converter tube through the R. F. coil, the secondary of which is tuned to the signal frequency by the center section of the main tuning condenser. In the 6A8 tube, the incoming signal is combined with the local oscillator signal which is 465 KC different in frequency. The local signal is generated by the oscillator elements of this tube and the proper frequency difference is maintained throughout the tuning range by the front section of the main tuning condenser in conjunction with the oscillator coils and padding capacitors.

The combination of the signal frequency with the local oscillator frequency in the 6A8 converter tube produces the intermediate frequency of 465 kilocycles. This particular intermediate frequency is chosen to reduce image response and improve short-wave performance.

The intermediate frequency amplifier consists of a two-stage cascade section composed of three I. F. transformers and two 6K7 amplifier tubes. Each I. F. transformer has two tuned circuits. Initial bias for the 6K7 R. F. amplifier, the 6A8 converter, and the 6K7 first I. F. amplifier is supplied by returning the diode rectifier load resistor to a negative voltage supply of approximately 3 volts on the main bleeder resistor. The second I. F. amplifier 6K7 tube operates on self bias for all bands. This enables the second I. F. tube to provide maximum power to the 6H6 diode rectifier.

The output of the I. F. amplifier is applied to one plate of the 6H6 diode rectifier, which is a combined second detector and automatic volume control tube. The direct current component of the rectified signal, through one diode of this tube, produces a voltage drop across resistors R-10 and R-12. This voltage drop provides automatic bias for the R. F. amplifier, converter and the first I. F. amplifier, and thus gives automatic volume control action. Full automatic bias voltage is applied to the R. F. amplifier tube, while a portion of this voltage, from the junction of resistors R-10 and R-12, is applied to the converter and 1st I. F. amplifier which handle a somewhat larger signal voltage than the R. F. amplifier.

This same automatic bias voltage is used to control the Colorama tuning tube. Switch S-4 makes it possible to apply either full or partial voltage to the tube, thereby allowing control of the color indication in accordance with prevailing receiving conditions. A complete description of Colorama tuning is given in a later paragraph.

The audio frequency present across R-10 and R-12 is impressed upon the volume control R-15 through capacitor C-34. The movable arm on the volume control selects the amount of audio signal applied to the control grid of the 6P5 audio amplifier tube and thus regulates the output of the receiver. Across the volume control R-15 is placed a compensating network of capacitors and a resistor. The music-speech switch is found in this circuit, and when closed places capacitor C-38 in shunt with C-39, which removes the bass compensation. The output of the 6P5 audio tube is resistance coupled to the grid of the 6L6 beam power tetrode. The plate circuit of the 6L6 is suitably matched to the electrodynamic loud-speaker by means of a step-down output transformer.

The tone control is found in the plate circuit of the 6P5 first audio tube and consists of capacitor C-43 in series with a variable resistor R-18 across the 6P5 plate resistor R-17. Cutting out resistance in R-18 lessens the treble response of the receiver. Between the plate of the 6P5 first audio tube and the grid of the 6L6 tetrode output tube are found two capacitors in series, C-41 and C-42. The smaller capacitor, C-42, is shorted out by the wave band switch for operation on the broadcast band. On the two short-wave bands it is left in the circuit to attenuate the low frequency response and thereby lessen the tendency toward microphonic howl.

Plate and grid voltages for all tubes are supplied by the power supply system employing a 5Z4 full-wave rectifier tube which, together with a suitable network of resistors and capacitors, supplies the required voltages and filtering action.

COLORAMA TUNING

These receivers are equipped with Color Tuning, a novel method which indicates approach to resonance by means of a change of color of the light illuminating the tuning scale.

The colored light is produced by a group of four red-stained pilot bulbs and a group of three green stained bulbs behind the scale. At zero signal strength the red group is at full brilliance and the green invisibly dim. As the signal increases from zero, the red gets dimmer and the green brighter over a broad range until at extreme signal strength the green is fully bright and the red below visibility through the dial. Hence, as a station is tuned-in the color changes smoothly, and the maximum change in the green direction is an indication of resonance.

Weak stations will produce a small color change and strong stations a larger change. The difference in signal strength, between the weakest and the strongest station likely to be listened to, has been found to be so great in different localities that the receivers have been equipped with a two-position sensitivity range switch for "sensitive" and "insensitive" settings of the color tuning. The switch is located near the power transformer on the chassis and may be reached from the rear of the cabinet. In the sensitive position, the weakest station to which the user can listen comfortably, above the general noise level, will shift the color to neutral white at resonance. Stronger stations give resonant points at bright greens. In localities near a relatively large group of high-powered stations and having a high noise level, such as Chicago and New York, the range switch must be thrown to the insensitive position when standard outdoor antennas are used, or else the color will be fixed green over so wide a band that resonance cannot be accurately found. The difference in sensitivity is about twenty to one. On short wave bands the band switch connects the color tuning to the sensitive setting and the switch on the chassis is inoperative. This is because practically all the short-wave signals are relatively weak. The insensitive setting is used only on the 540-1680 KC band.

There is a group of four red and a group of three green pilot bulbs behind the scale. These are controlled by a Saturable Reactor in a circuit which is shown in the schematic diagram, Fig. 1. The saturable reactor is controlled by a D. C. coil which decreases its reactance smoothly from a high-value at no D. C. to a very low value at maximum D. C. The saturable reactor acts very much like a dimming rheostat except that it is controlled by the D. C. plate current of a 6C5 tube used solely for that purpose. This tube receives for its bias a portion of the A.V.C. voltage of the set so that at no signal the bias is nearly zero. At this point, the plate current is at maximum; therefore, the red is brightest and the green invisibly dim.

SOME THINGS WHICH MAY AFFECT THE OPERATION OF COLOR TUNING ARE AS FOLLOWS:

Seven colored bulbs are used to give good diffusion of color over the scale; but if one of the seven fails it unbalances the whole group and should be replaced immediately. The lamp socket assembly may be removed by reaching into the rear of the cabinet, pulling the lamp socket assembly up on its guides and drawing it partly out. A shipping screw, which should be removed when the set is unpacked, may need to be removed the first time. There is enough slack in connecting wires to allow the assembly to be drawn forward. When the socket assembly has been drawn far enough out for unscrewing the bulbs turn on the power switch and replace the bulbs which do not glow. All will not be bad as each group is in series (green) or series parallel (red). Take care the wires do not foul the tuning mechanism when the assembly is replaced. The colored lamps used for replacement *MUST ALL BE 6.3 VOLTS, 0.15 AMPERE LAMPS.* No other size will work.

If the red is unusually dim on no signal and the colored bulbs are all good, try removing the antenna. Next try replacing the 6C5 Colorama tube or replace the rectifier. Sometimes the antenna noise level is so high that it dims the red like a signal. If the tubes in the set become weak, or the set is out of alignment, or for any other reason loses its sensitivity, the color tuning will appear insensitive.

ALIGNMENT PROCEDURE

The receiver should first be allowed to run for fifteen minutes in order to reach its approximate normal operating temperature. Before making any adjustments, it is wise to determine the correctness of the existing alignment. This may be done by supplying a signal from the test oscillator to the receiver and inserting a "Tuning Wand" into the coil involved. The "Tuning Wand" consists of a rod of insulating material having a ring of nonmagnetic metal attached to one end, and a small core of finely divided iron compacted into the opposite end. By inserting the metal ring end into the center of a particular coil, the inductance of the coil is lowered, increasing its resonant frequency. Inserting the iron-filled end into the coil raises its inductance, lowering its resonant frequency. If the circuits are in exact alignment, inserting either end of the tuning wand in any coil will result in a decrease in output. When an increase in signal is obtained with the iron-filled end of the wand, a decrease in resonant frequency of that circuit by increasing its trimmer capacity is indicated. When an increase in signal is obtained with the metal ring, a decrease in trimmer capacity is indicated.

Changes Indicated by Wand

Wand	Signal	Trimmer adjustment required
Metal Ring	Decrease	None
Iron filings	Decrease	
Metal Ring	Increase	Decrease capacity
Iron filings	Decrease	
Metal Ring	Decrease	Increase capacity
Iron filings	Increase	

Alignment Frequencies

I. F.	Band "B"	Band "C"	Band "D"	Wave Trap
465 kc	580 kc 1500 kc	5220 kc	18,000 kc	465 kc

In order to align this receiver properly, it is necessary to have available the following test equipment:

1. A modulated test oscillator with frequencies available of 465, 580, 1500, 5220 and 18,000 Kc.
2. An output indicator, such as a high resistance a-c voltmeter with a maximum scale reading of 3 to 5 volts, or a neon lamp indicator.
3. An alignment tool consisting of an insulating shaft with a small screwdriver blade.
4. A tuning wand.

The location of all trimmer capacitors, as well as socket voltages to chassis, is shown in Fig. 3.

1. I. F. Alignment

Set the frequency band switch of the receiver to Band "D", short circuit the antenna and ground terminals and tune the receiver to some point near maximum tuning condenser capacity where no signal is heard. Set the volume control at its maximum position and ground the chassis.

The I. F. amplifier is tuned to 465 Kc; set the test oscillator so as to produce a signal at this frequency. Connect the test oscillator output between the top grid terminal of the 6K7 2nd I. F. tube and the chassis using a .05 mfd. Capacitor (RC-072) in series with the oscillator output lead to the top grid connection, after first removing the grid lead connecting to the same point from the 2nd I. F. transformer. Provide a path for grid bias by connecting a 10,000 ohm resistor (RQ-083) between grid cap and top grid terminal of tube.

Connect the output meter across the voice coil of the speaker and adjust the test oscillator output control so that, with the receiver volume control at maximum, a small deflection is observed on the output meter. During both I. F. and R. F. alignment, the test oscillator signal should be maintained at the lowest level that will give a good readable output indication.

Adjust the secondary trimmer of the third I. F. transformer until a maximum output reading is obtained. Maintain a small deflection on the output meter throughout alignment by adjusting the test oscillator output. Next, adjust the primary trimmer of the third I. F. transformer for maximum output. This transformer is then adjusted and should not require readjustment when aligning transformers ahead of it.

Transfer the test oscillator connections to the top grid terminal of the 6K7 1st I. F. tube, replace the grid lead on 2nd I. F. tube, and reduce the output of the test oscillator as low as possible consistent with obtaining an easily readable indication on the output meter. Adjust secondary and primary trimmers respectively on the 2nd I. F. transformer until a maximum deflection on the output meter is obtained.

Transfer the test oscillator connections to the top grid terminal of the 6A8 converter tube and replace the grid cap connection on the 6K7 1st I. F. tube. It will probably be found desirable to set the tone control for minimum high response, and to reduce the volume control setting, to lessen the noise reproduced due to the extremely high sensitivity of this receiver. Again adjust the test oscillator output to as low a value as will allow accurate adjustment. Adjust secondary and primary trimmers respectively on the 1st I. F. transformer until maximum deflection on the output meter is obtained.

The I. F. alignment is now complete.

2. I. F. Wave Trap Alignment

Set the band switch to Band "B" and tune the receiver to about 1000 Kc. With the test oscillator still set at 465 Kc., remove the shorting connections between antenna and ground terminals and apply this signal to the antenna terminal through a dummy antenna consisting of a 400 ohm resistor and 250 mmfd. capacitor in series. With the 465 Kc. signal applied to the antenna terminal, adjust the I. F. Wave Trap Trimmer for *minimum* output indication.

3. R. F. Alignment

First check the position of the dial pointer by rotating the tuning condenser to maximum capacity position, i.e., plates fully meshed. At this position, the pointer should coincide with the end mark at the left-hand end of the scale. If it does not, it may be set by loosening the dial drum set screws and rotating the drum on the tuning condenser shaft. Hold the tuning condenser rotor while doing this, to prevent its rotating. Tighten the two set screws after the pointer is correctly set.

Band "B" (540-1680 Kc.)

Set the test oscillator for operation at 1500 Kc. and connect its output to the antenna terminal of the receiver through the dummy antenna described under I. F. Wave Trap Alignment. Tune the receiver until the pointer is at 1500 on the scale. Set the tone control for minimum high response and reduce the volume control setting so as to avoid excessive noise response. Adjust the Band "B" oscillator, R. F., and antenna trimmers respectively (C-12, C-7 and C-2, Fig. 3) to give maximum deflection on the output meter. Maintain the test oscillator output at the lowest level which will give an easily readable output indication.

Now set the test oscillator to 580 Kc. and tune the receiver to resonance with this signal. Adjust the 580 Kc. padding capacitor, C-13, rocking the tuning condenser back and forth through resonance as the padding capacitor is adjusted and note the deflection of the tuning meter each time the receiver is tuned through resonance. Leave the padding capacitor at the setting which gives greatest deflection.

Retune the receiver to 1500 Kc. and reset the test oscillator for this frequency. Check the alignment by again adjusting the Band "B" oscillator, R. F. and antenna trimmers for maximum deflection on the tuning meter.

Band "C" (1680-6000 Kc.)

No trimmers are provided for alignment of the R. F. and antenna transformers in Band "C" of these receivers. Correct tracking between R. F. and antenna transformers is obtained by the action of the capacity coil, L-3, and between oscillator and the other tuned circuits by means of the adjustable oscillator trimmer C-14 and the fixed padding capacitor, C-54.

Turn the band switch to Band "C". Set the test oscillator at 5220 Kc. and tune the receiver to resonance at this frequency. Adjust the Band "C" oscillator trimmer, C-14, for maximum output indication on the tuning meter, rocking the tuning condenser back and forth through resonance while making the adjustment.

Band "D" (6.0-18.0 Mc.)

Turn the band switch to Band "D". Set the test oscillator at 18,000 Kc. (18.0 Mc.) and tune the receiver until the pointer coincides with the 18.0 mark. Adjust the Band "D" oscillator trimmer, C-15, to give maximum output indication. It will probably be found that there will be two settings of the oscillator trimmer that will give an output response. The lower capacity setting of the trimmer is the one that should be used. To be sure that correct adjustment has been obtained, tune for the image signal at 17.07 Mc. with the test oscillator set at 18.0 Mc. It may be necessary to increase the test oscillator output to obtain response at this point.

Retune the receiver to 18.0 Mc. and adjust band "D" antenna and R. F. trimmers, respectively (C-3 and C-10) for maximum output indication. When adjusting the R. F. trimmer, C-10, rock the tuning condenser back and forth through resonance as in the 580 Kc. padding capacitor adjustment.

Alignment of the receiver is now complete.

SOCKET VOLTAGES

Tube No.		Cathode to Ground Volts D.C.	Screen Grid to Ground Volts D.C.	Plate to Ground Volts D.C.	Cathode Current M.A.	Heater Volts A.C.
6K7 R. F. Amp.		† . . .	100	235	8.0	6.3
6A8	Oscillator	. . .	. . .	185	10.3	6.3
	Converter	† . . .	85	250		
6K7 1st I. F. Amp.		† . . .	100	250	8.0	6.3
6K7 2nd I. F. Amp.		7.0	100	240	3.1	6.3
6H6 Detector & AVC.		. . .	. . .	. . .	. . .	6.3
6P5 Audio Amplifier		1.5	. . .	*150	0.3	6.3
6L6 Output		** . . .	250	290	63.5	6.3
6C5 Colorama Control		. . .	. . .	180	9.5	6.3
5Z4 Power Rectifier		360 D.C.	. . .	670/335 R.M.S.	110.0	5.0

Measured at 115 volts supply. No signal input. Volume control maximum. Voltmeter 1000 ohms per volt; measurements taken on highest scale giving accurate readable deflection.
* Supply voltage minus drop in load resistor. ** Grid bias at source—16 volts.
† Grid bias at source—3.3 volts.

VISUAL ALIGNMENT OF I.F.

In order to realize to full advantage the performance built into these receivers at the factory, circuit alignment using cathode ray oscilloscope equipment is much to be preferred. The oscilloscopic method is particularly advantageous in aligning the I. F. tuned circuits.

For visual alignment it is necessary to vary the frequency of an unmodulated test oscillator signal over a range extending on both sides of the peak frequency. This variation must take place in synchronism with the horizontal traverse of the cathode ray beam on its screen. The frequency modulator must, therefore, provide means for synchronizing the periodic test frequency variation with the cathode ray horizontal deflection circuit. The test oscillator may advantageously have facilities for audio frequency amplitude modulation of a fixed radio frequency test signal, as well as for frequency modulation, but audio modulation is not required for visual I. F. alignment.

Instead of an output meter across the speaker voice coil, the vertical plates of the cathode ray tube are connected across the load resistor of the diode rectifier. With the frequency modulator in operation in conjunction with the test oscillator, the resonance curve of the circuit under test will be then shown on the screen.

Preliminary Procedure

For visual alignment, adjust the receiver controls and connect the test oscillator as outlined in the section entitled "I. F. Alignment" under "ALIGNMENT PROCEDURE." Connect the vertical deflecting plates of the cathode ray tube across the diode rectifier load resistor, which in these receivers consists of R-10 and R-12 in series. The location of these resistors is clearly shown in Fig. 2.

Place the oscilloscope in operation as an output indicator and proceed as outlined in the section entitled "I. F Alignment."

Alignment Adjustments

Adjust the oscilloscope so that the luminescent spot on the cathode ray screen traces a horizontal line across the screen. Now place the frequency modulator and test oscillator in operation to give an unmodulated radio frequency signal varying from one side to the other of 465 Kc. Adjust the oscilloscope and test oscillator controls to show a single overall resonance curve of the I. F channel on the cathode ray tube screen. Do not change the test oscillator setting thereafter.

To align the I. F. transformers, follow in sequence the same procedure outlined in the sections under "ALIGNMENT PROCEDURE" describing this operation. Instead of aligning for maximum output on an output indicator, the object should be to make the curve symmetrical. If the sweep circuit is so arranged that two symmetrically reversed curves appear on the screen, the curves should be made to coincide by adjusting the I. F. trimmer capacitors.

Visual R. F. alignment may be carried out in the same general manner as above by applying a suitable frequency-modulated signal between the antenna and ground terminals of the receiver and connecting the cathode ray vertical deflecting plates across the diode rectifier load resistors.

ADJUSTMENT OF DIAL MECHANISM

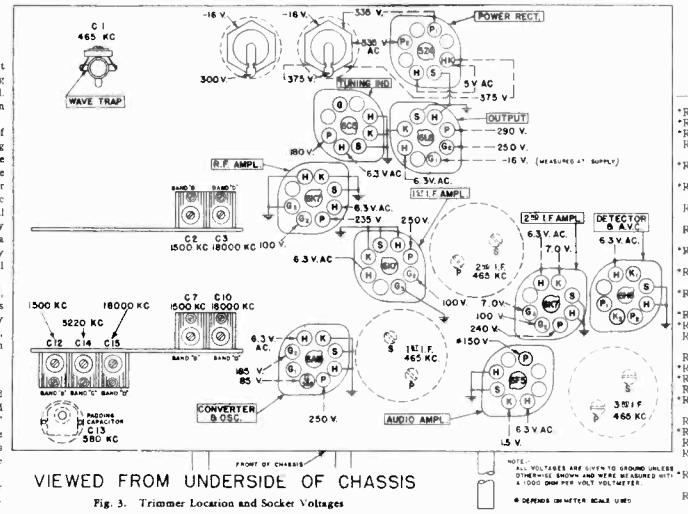
The dial mechanism (Fig. 4) is rigidly mounted to the chassis by means of two brackets and four self-tapping screws. The dial pointer is operated by means of an "automatic vernier" reduction drive unit, mounted on the gang condenser, and connected to the gang rotor by a set of anti-backlash gears. Motion imparted to the gang condenser rotor is transmitted through a series of pulleys and an interconnecting cable to the dial pointer slider which is supported on a rail above the dial scale.

To Mount Escutcheon

Care should be taken to use a well ground screw driver of proper size to fasten the screws in the escutcheon plate. Holes have been jigged in the cabinet front panel to insure the proper location of the escutcheon with respect to the scale housing.

To Replace Drive Cable

Remove the defective drive cable to be replaced. Rotate the drive wheel (14) counter-clockwise until the gang condenser plates are fully open. Place the end of the cable having an eyelet in slot [A]. Thread the cable as shown in Fig. 4, making certain that the cable passes *over* the pin [B] and runs along the *correct* grooves, the looped end hooking over the tension spring (16). Check the position of the drive wheel (14) on the condenser shaft to make sure that the cable coming off the right hand idler pulley lines up with the groove in the drive pulley. Also, as the condenser plates become fully meshed, the drive wheel (14) should just meet the bushing [D] of the reduction drive unit (39). With the drive wheel in this position, place the pointer on the rail [E] and, with the tip of the pointer (11) on the extreme left band dial scale division, crimp the pointer tab on the drive cable.



VIEWED FROM UNDERSIDE OF CHASSIS

Fig. 3. Trimmer Location and Socket Voltages

To Adjust Pointer for Scale Calibration

Three positions of the dial pointer cable are provided on the drive wheel (14) to adjust the dial pointer up or down scale. The position shown in Fig. 4 with the cable over pin [B] is the medium position. Changing the cable to the position between pins [B] and [C] moves the pointer down scale. The position below the pin [C] moves the pointer up scale from the medium position.

To Replace Scale

Remove the band change cable (12) by unhooking it from the fork [F] on gear (41). Remove the end support bracket (8) held by a single self-tapping screw and withdraw the scale assembly from its housing. Replace the end caps (37) and (38) on the new scale and reassemble. Before reattaching the band change cable to the fork [F] the tension spring (7) should be given two full turns to provide proper tension for the cable.

To Adjust Rotation of Scale

The forked tab [F] may be bent up or down to give the correct position of the scale divisions with respect to the dial pointer. The pointer tip should slightly overlap the scale divisions.

To Change Dial Lamps

Make certain that the shipping screw [G] has been removed before attempting to remove the dial lamp bracket. Lift up the lamp bracket from the tabs under which it is clipped. Care should be taken that the lamp leads do not put an undue strain upon the drive cable. With the lamp bracket laid back horizontally, the lamps may be replaced. When the lamp bracket is reinserted, care should be exercised to avoid having the lamp leads foul the gang mechanism.

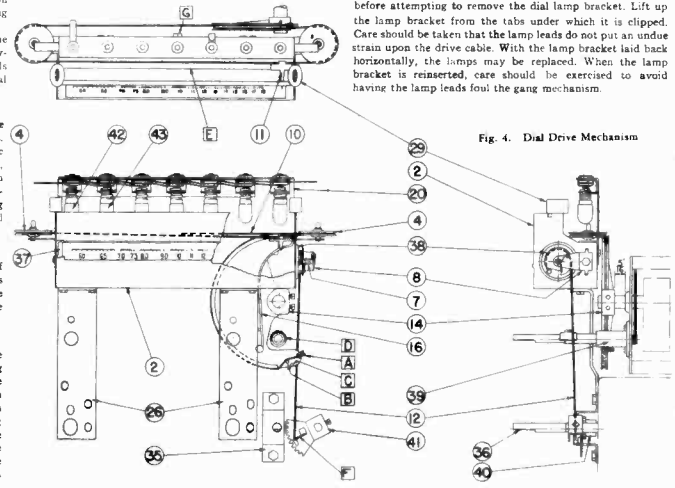


Fig. 4. Dial Drive Mechanism

REPLACEMENT PARTS

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Stock No.	Description	List Price
*RB-008	BOARD—Terminal Board Double-lug	$0.10
*RB-009	BOARD—Terminal Board Single-lug	.15
*RB-026	BOARD—Antenna Ground Terminal Board	.10
RB-139	BRACKET—Gang Condenser Mounting Brackets	.15
*RC-024	CAPACITOR—.005 mfd., 200 V. Paper (C-42)	.25
*RC-034	CAPACITOR—.01 mfd., 200 V. Paper (C-34, C-35, C-43)	.25
RC-036	CAPACITOR—.008 mfd., 200 V. Paper (C-39)	.25
RC-042	CAPACITOR—.01 mfd., 1000 V. Paper (C-45)	.30
*RC-040	CAPACITOR—.02 mfd., 200 V. Paper (C-34, C-38)	.25
*RC-072	CAPACITOR—.05 mfd., 200 V. Paper (C-4, C-11, C-22, C-28, C-38)	.25
*RC-091	CAPACITOR—.05 mfd., 400 V. Paper (C-17, C-19, C-41, C-49)	.30
*RC-096	CAPACITOR—.1 mfd., 200 V. Paper (C-25)	.30
*RC-123	CAPACITOR—.1 mfd., 400 V. Paper (C-18)	.35
RC-152	CAPACITOR—.25 mfd., 400 V. Paper (C-44)	.40
RC-156	CAPACITOR—.5 mfd., 100 V. Paper (C-52)	.45
*RC-205	CAPACITOR—20 mmfd. Mica (C-6)	.35
*RC-210	CAPACITOR—50 mmfd. Mica (C-2)	.25
RC-242	CAPACITOR—150 mmfd. Mica (C-37)	.25
*RC-258	CAPACITOR—250 mmfd. Mica (C-31, C-32)	.25
RC-291	CAPACITOR—400 mmfd. Mica (C-40)	.35
*RC-344	CAPACITOR—1300 mmfd. Mica (C-54)	.45
RC-360	CAPACITOR—2850 mmfd. Mica (C-16)	.50
RC-414	CAPACITOR—16 mfd., 380 V. Wet Electrolytic (C-46)	1.25
*RC-415	CAPACITOR—16 mfd., 300 V. Wet Electrolytic (C-47)	1.10
RC-562	CAPACITOR—3 mfd., 350 V; 2 mfd., 350 V; 3 mfd., 150 V; Dry Electrolytic (C-20, C-33, C-48)	1.25
RC-619	CAPACITOR—Oscillator Padder Capacitor 350-550 mmfd. (C-13)	.35
RC-620	CAPACITOR—Twin Trimmers, Ant. & R.F. Bands B & D (C-2, C-3, C-7, C-10)	.40
RC-621	CAPACITOR—Triple Trimmers; Oscillator Bands B, C & D (C-12, C-14, C-15)	.60
RC-711	CONDENSER—Gang Tuning Condenser (without trimmers, including drive) 11-450 mmf. (C-5, 8, 9)	4.75
RC-755	CAPACITOR—Line Capacitors .01-.01 mfd. 250 V AC, Paper (C-50, C-51)	.40
RC-816	CABLE—Speaker Cable (Complete)	.50
RC-860	CORD—Power Cord	.65
RC-992	CUSHION—Gang Condenser Mounting Cushion (Pkg. of 3)	.10
RE-011	ESCUTCHEON—Escutcheon Plate (with Mtg. Screws)	1.25
*RP-002	FOOT—Chassis Mounting Foot	.20
*RG-001	GRID CAP—Control Grid Clip, (Pkg. of 5)	.10
RG-101	GASKET—Escutcheon Felt Gasket	.10
RG-102	GASKET—Escutcheon Rubber Gasket	.20
*RK-004	KNOB—Control Knob (Push-on) (Pkg. of 5)	.40
RL-017	COIL—Antenna Coil Band B & C (L-2, L-3, L-4, L-5)	1.15
RL-018	COIL—Antenna Coil Band D (L-6, L-7)	.75
RL-123	COIL—R.F. Coil Band B & C (L-8, L-9)	1.10
RL-124	COIL—R.F. Coil Band D (L-10, L-11)	.75
RL-225	COIL—Oscillator Coil Band B (L-12, L-13)	.85
RL-226	COIL—Oscillator Coil Band C (L-14, L-15)	.85
RL 227	COIL—Oscillator Coil Band D (L-16, L-17)	.85
RL-310	REACTOR—"Colorama Tuning" Saturable Reactor, 60 Cycles (L-27, L-28)	3.00
RL-311	REACTOR—"Colorama Tuning" Saturable Reactor, 25-60 Cycles (L-27, L-28)	3.00
*RQ-059 (RR-014)	RESISTOR—1000 ohm, ¼ Watt Carbon (R-16) (Pkg. of 5)	.70
*RQ-067 (RR-013)	RESISTOR—2000 ohm, ¼ Watt Carbon (R-4, R-7, R-27) (Pkg. of 5)	.70
RQ-075	RESISTOR—4700 ohm, ¼ Watt Carbon (R-8) (Pkg. of 5)	$0.60
*RQ-083 (RR-021)	RESISTOR—10,000 ohm ¼ Watt Carbon (R-14) (Pkg. of 5)	.60
RQ-099	RESISTOR—47,000 ohm, ¼ Watt Carbon (R-3, R-13) (Pkg. of 5)	.60
RQ-103	RESISTOR—68,000 ohm, ¼ Watt Carbon (R-8) (Pkg. of 5)	.60
*RQ-107 (RR-050)	RESISTOR—100,000 ohm, ¼ Watt Carbon (R-1, R-2, R-10, R-17, R-19) (Pkg. of 5)	.70
*RQ-111 (RR-054)	RESISTOR—150,000 ohm ¼ Watt Carbon (R-12) (Pkg. of 5)	.70
RQ-115	RESISTOR—220,000 ohm, ¼ Watt Carbon (R-20) (Pkg. of 5)	.70
*RQ-131 (RR-067)	RESISTOR—1 Meg., ¼ Watt Carbon (R-11) (Pkg. of 5)	.70
RQ-137	RESISTOR—1.8 Meg., ¼ Watt Carbon (R-9) (Pkg. of 5)	.70
RQ-275	RESISTOR—4700 ohm, ½ Watt Carbon (R-28) (Pkg. of 5)	.70
*RQ-283 (RR-183)	RESISTOR—10,000 ohm, ½ Watt Carbon (R-5) (Pkg. of 5)	.70
RR-330	RESISTOR—15 ohm, 2 Watt, Flexible (R-29) (Pkg. of 5)	.85
RR-331	RESISTOR—15 ohm, 1 Watt, Flexible (R-30) (Pkg. of 5)	.75
RR-718	RESISTOR—Candohm Tapped Bleeder Resistor (R-21, 22, 23, 24, 25, 26)	1.00
RS-136	SHIELD—1st & 2nd I. F. Coil Shield Can	.20
RS-137	SHIELD—3rd I. F. Coil Shield Can	.20
*RS-200	SOCKET—8 Pin Tube Socket (Pkg. of 5)	.75
RS-204	SOCKET—5 Pin Tube Socket (Pkg. of 5)	.75
RS-324	SWITCH—Band Change Switch (S-1, S-2, S-3)	2.75
RS-325	SWITCH—"Colorama" Sensitivity Switch	.50
RS-423	SPRING—Knob Spring, "Push-on" type, (Pkg. of 10)	.25
RT-089	TRANSFORMER—Universal Power Transformer 105/130 200/250 V 40/60 Cycles (T-2)	10.25
RT-091	TRANSFORMER—Power Transformer 115 V 50/60 Cycles (T-2)	5.95
RT-092	TRANSFORMER—Power Transformer 115 V 25/60 Cycles (T-2)	10.95
RT-223	TRANSFORMER—1st & 2nd I.F. Transformer (Complete) (L-18, L-19, C-23, C-24) (L-20, L-21, C-26, C-27)	1.50
RT-224	TRANSFORMER—3rd I.F. Transformer (Complete) (L-22, L-23, C-29, C-30)	1.75
RT-710	TONE CONTROL — Tone Control and Speech Clarifier Switch (R-18, S-5)	1.00
RV-015	VOLUME CONTROL—Volume Control and Power Switch (R-15, S-4)	1.25
RW-006	WINDOW—Escutcheon Window	.50
RW-401	WAVE TRAP—Wave Trap Coil Assembly (Complete) (L-1, C-1)	.90

8" SPEAKER ASSEMBLY E-91

RC-909	CONE—8-in. Type Cone and Voice Coil (Gasket Included)	$1.15
RC-990	CLAMP—8-in. Cone Spider Clamp and Screw	.05
*RP-012	PLUG—Female Speaker Plug	.20
RP-044	PLUG—Male Speaker Plug	.20
RP-052	PLUG—Female Speaker Plug (Late Prod.)	.20
RP-053	PLUG—Male Speaker Plug (Late Prod.)	.20
RS-034	SPEAKER—8-in. Type Speaker (Complete with Output Transformer) (L-24, L-25, L-26 T-1)	8.00
RS-416	SPRING—Voice Coil Leads Spring (Pkg. of 2)	.10
RT-415	TRANSFORMER—Output Transformer (T-1)	1.75

12" SPEAKER ASSEMBLY E-95

RC-910	CONE—12-in. Type Cone and Voice Coil (Gasket Incl.)	$01.45
RC-991	CLAMP—12-in. Cone Spider Clamp and Screw	.05
*RP-012	PLUG—Female Speaker Plug	.20
RP-044	PLUG—Male Speaker Plug	.20
RP-052	PLUG—Female Speaker Plug (Late Prod.)	.20
RP-053	PLUG—Male Speaker Plug (Late Prod.)	.20
RS-035	SPEAKER—12-in. Type Speaker (Complete with Output Transformer) (L-24, L-25, L-26, T-1)	10.50
RS-416	SPRING—Voice Coil Leads Spring (Pkg. of 2)	.10
RT-415	TRANSFORMER—Output Transformer T-1	1.75

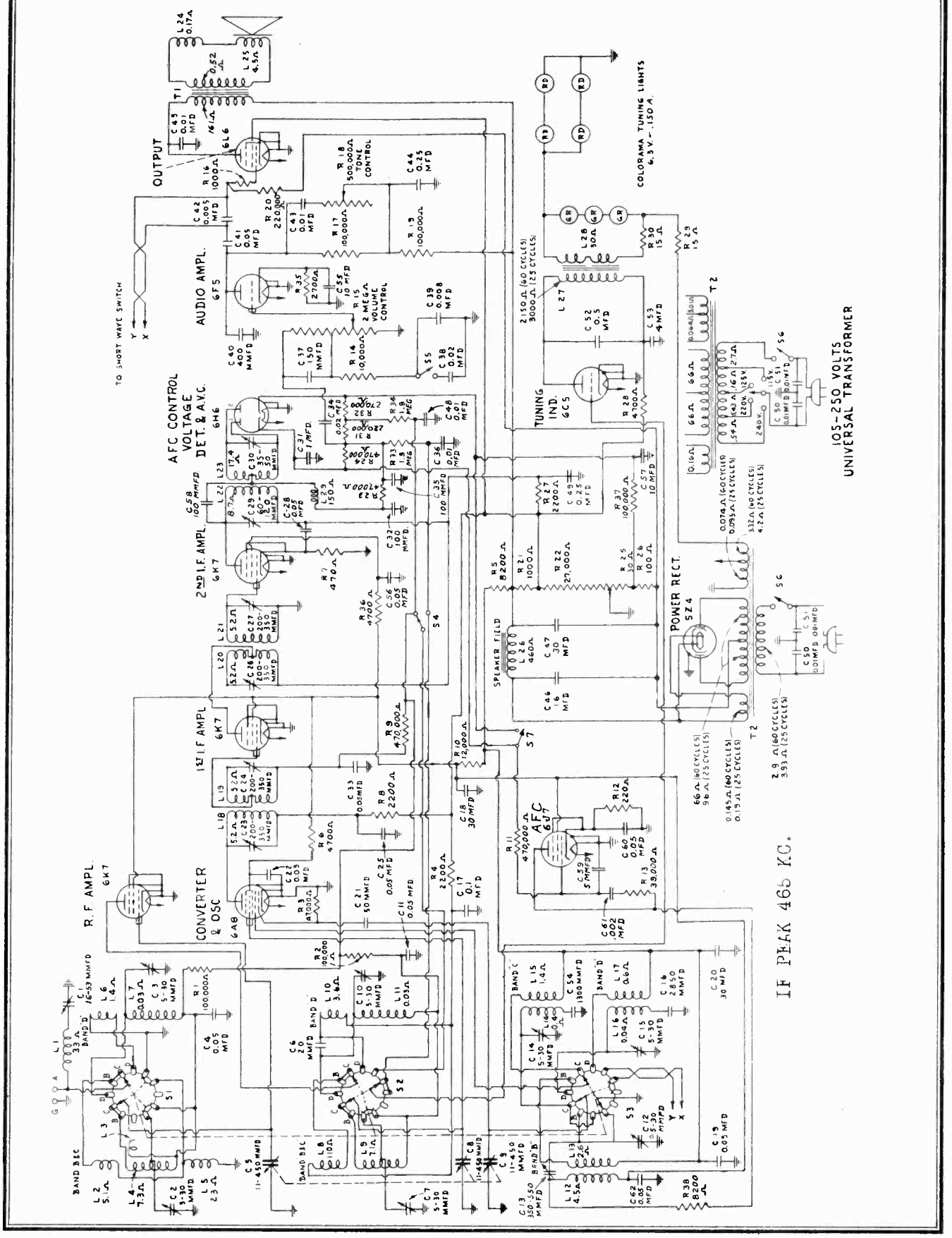
DIAL MECHANISM

RB-136	BRACKET—Band Switch Operating Shaft Bracket (35)	$0.10
RB-137	BRACKET—Dial Mask and Reflector Box Support Bracket (26)	.20
RB-140	BRACKET—Dial Lamp Bracket (20)	1.10
RB-511	BOX—Dial Mask and Reflector Box (2)	.50
RC-817	CABLE—Drive Cable (Pkg. of 5) (10)	.40
RC-818	CABLE—Band Change Cable (Pkg. of 5) (12)	$0.40
RC-993	CUSHION—Rubber Buffer Cushion (Dial) (Pkg. of 2) (29)	.10
RC-994	CAP—Scale Cap (Free End) (37)	.10
RC-995	CAP—Scale Cap (Pulley End) (38)	.10
RD-036	DRIVE—Tuning Condenser Reduction Drive (39)	1.10
RD-037	DIAL—"Slide Rule" Dial Scale	.65
RG-006	GEAR—Band Switch Drive Gear (40)	.15
RG-007	GEAR—Band Switch and Dial Operating Gear (41)	.20
RL-908	LAMP—"Colorama Tuning" Green Lamp (Pkg. of 10) (43)	1.50
RL-909	LAMP—"Colorama Tuning" Red Lamp (Pkg. of 10) (42)	1.50
RP-047	POINTER—Dial Pointer, (Pkg. of 5) (11)	.25
RP-048	PULLEY—Gang Drive Pulley (14)	.35
RP-049	PULLEY—Drive Cord Idler Pulley (14)	.15
RS-147	SPRING—Dial Scale Spring (7)	.05
RS-418	SPRING—Gang Drive Pulley Spring (16)	.05
RS-607	SUPPORT—Dial Scale Spring Support (8)	.10
RS-907	SHAFT—Band Switch Drive Gear Shaft (36)	.15

*Indicates part also used on 1936 "A" line receivers.

GENERAL ELECTRIC CO.

MODELS E-101, E-105
E-106
Schematic



MODELS E-101, E-105
E-106
Chassis Wiring
Coil Data

GENERAL ELECTRIC CO.

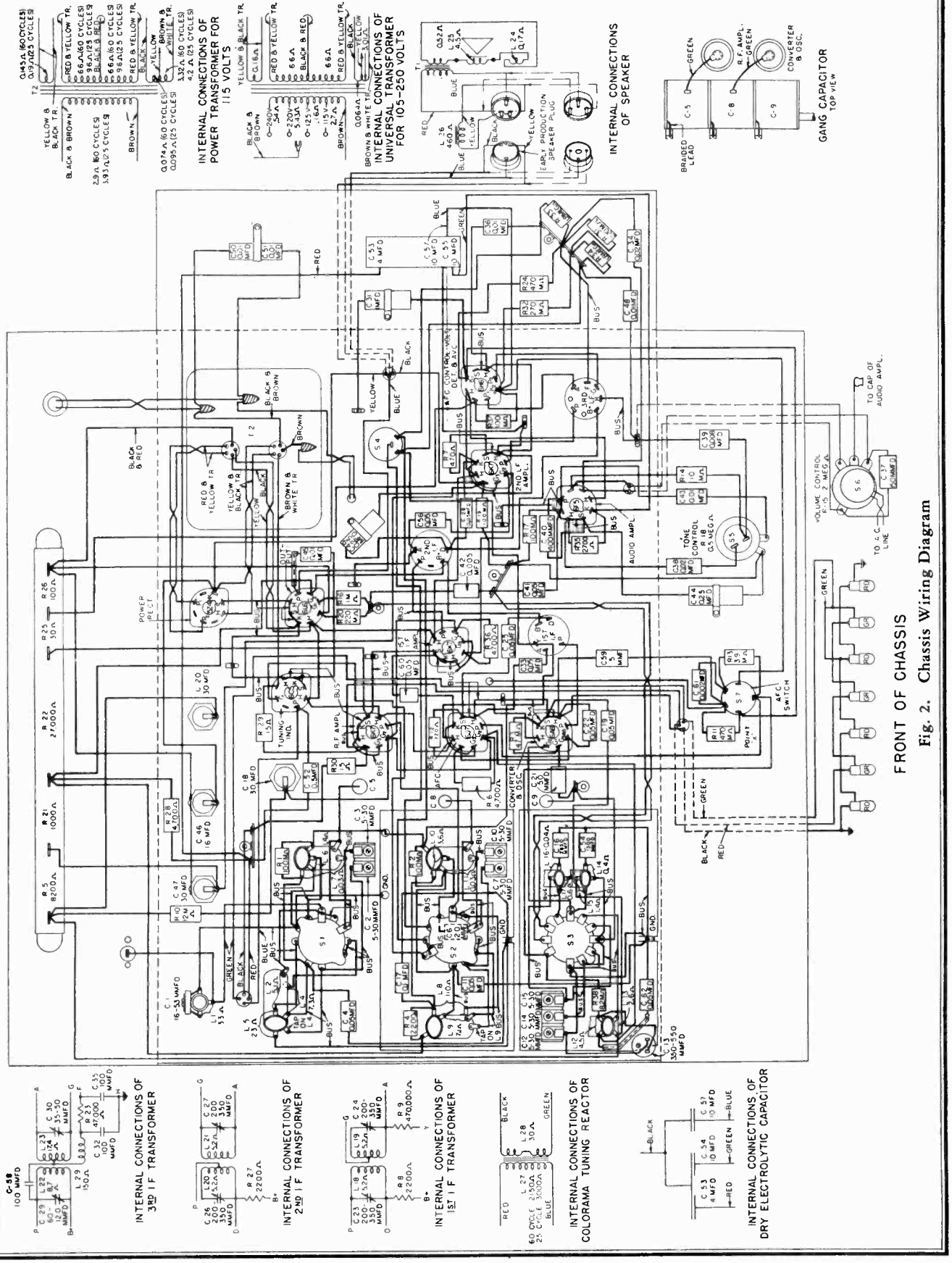


Fig. 2. Chassis Wiring Diagram

GENERAL ELECTRIC CO.

MODELS E-101, E-105 E-106

Circuit Data Alignment, Dial Data Visual Alignment

SERVICE DATA

Physical Specifications

	E-101	E-105	E-106
Model			
Height	20½ in.	40 in.	42⅛ in.
Width	15⅝ in.	25 in.	27¼ in.
Depth	9⅛ in.	11¼ in.	14⅞ in.
Weight packed	45 lbs.	72 lbs.	89 lbs.

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	115	50–60	110
C	115	25–60	110
V	105–130 and 200–250	40–60	115

NOTE—Taps on universal transformers (Rating "V") are accessible by removing the cap cover on the top of the transformer.

Tuning Frequency Range

Band "B"	540–1680 kc.
Band "C"	1680–6000 kc.
Band "D"	6.0–18.0 mc. (6,000–18,000 kc.)

Tuning Control Drive Ratio

Fast Tuning	8 to 1
Vernier Tuning	40 to 1

Electrical Power Output

Undistorted	6.5 watts
Maximum	14.0 watts

Loud-speaker—Electrodynamic

Cone: Model E-101	8-inch
Model E-105	12-inch
Model E-106	12-inch
Cone Coil Impedance at 400 cycles	5.5 ohms

Tubes

R. F. Amplifier	6K7 Triple-grid Super-control Amplifier
Converter and Oscillator	6A8 Pentagrid Converter
First I. F. Amplifier	6K7 Triple-grid Super-control Amplifier
Second I. F. Amplifier	6K7 Triple-grid Super-control Amplifier
Detector AVC and APC Bias Supply	6H6 Twin Diode
Audio Amplifier	6F5 High Gain Triode
Output	6L6 Beam Power Amplifier Tetrode
Colorama Control	6C5 Low Gain Triode
APC Control	6J7 Triple-grid Amplifier
Rectifier	6Z4 Full-wave Rectifier
Dial Lamps	6.3 V.–0.15 A. (4 red and 3 green)

DESCRIPTION OF ELECTRICAL CIRCUIT

Models E-101, E-105 and E-106 employ ten metal envelope tubes in a superheterodyne circuit, giving the excellent sensitivity and selectivity inherent in this type circuit. The radio frequency section of this ten-tube chassis utilizes a novel type of construction known as the "Junior Sentry Box." This type construction permits using extremely short connecting leads and isolates each radio frequency circuit in its own particular shielded section. Separate groups of coils are used for each band in the oscillator section. The antenna and R. F. sections are composed of two coils, a separate coil for the "D" band and a composite coil for the "B" band and "C" band. Operation on the "C" band is obtained by shorting out a section of the antenna and R. F. "B" band coil.

The signal from the antenna is applied to the control grid of the 6K7 R. F. amplifier tube through the antenna coil, the secondary of which is tuned to the incoming signal by the rear section of the main tuning condenser. The antenna coil, for bands "B" and "C," contains two primary coils connected for operation on the "B" band; however, when the band switch is turned to the "C" band position, the lower primary coil, L-5, is shorted out. The high frequency trimming adjustment for the "B" band antenna and R. F. stage is accomplished by two adjustable trimmers connected from the "C" band tap on each coil to ground. The capacity coupling coil, L-3, acts only on the "C" band and its function is similar to that of a fixed antenna stage trimmer for that band.

The amplified radio frequency signal is impressed upon the signal control grid of the 6A8 converter tube through the R. F. Coil, the secondary of which is tuned to the signal frequency by the center section of the main tuning condenser. In the 6A8 tube, the incoming signal is combined with the local oscillator signal which is 465 kc. different in frequency. The local signal is generated by the oscillator elements of this tube and the proper frequency difference is maintained throughout the tuning range by the front section of the main tuning condenser in conjunction with the oscillator coils and padding capacitors.

The combination of the signal frequency with the local oscillator frequency in the 6A8 converter tube produces the intermediate frequency of 465 kilocycles. This particular intermediate frequency is chosen to reduce image response and improve short-wave performance.

The intermediate frequency amplifier consists of a two-stage cascade section composed of three I. F. transformers and two 6K7 amplifier tubes. Both primary and secondary windings of the I. F. transformers are tuned, and are made resonant at a frequency of 465 kilocycles. The second I. F. amplifier 6K7 tube is operated on *self* bias for all bands. This enables the second I. F. tube to deliver maximum power to the 6H6 diode rectifier.

The output of the I. F. amplifier is applied to the 6H6 diode rectifier, which is a combined second detector, automatic volume control, and automatic frequency control bias supply tube. The secondary of the third I. F. transformer is center-tapped providing the push-pull connection to the 6H6 diode plates necessary to secure the variable grid bias for the 6J7 automatic frequency control tube. This automatic frequency control feature is completely described in a following paragraph. One diode of the 6H6 twin-diode tube is used to detect the modulated signal furnished by the I. F. amplifier. The audio frequency developed by this action is transferred to the audio frequency system for amplification and reproduction. The D.C. voltage resulting from detection is used for automatic volume control action and for the operation of the colorama tuning tube. The diode load resistor consists of R-24, R-31 and R-32 in series. The D.C. voltage developed across R-32 is applied as automatic control grid bias to the R. F. converter and first I. F. amplifier tubes. Initial bias for these tubes is supplied by returning the diode load resistor to a negative voltage supply of approximately 3 volts on the main bleeder resistor.

Automatic bias voltage developed across R-31 and R-32 is used to control the Colorama Tuning tube. Switch S-4 makes it possible to apply full or partial voltage to the tube, thereby allowing control of the color indication in accordance with prevailing receiving conditions. A complete description of Colorama Tuning is given in a later paragraph.

The audio frequency present across R-31 and R-32 is impressed upon the volume control, R-15, through capacitor C-34. The movable arm on the volume control selects the amount of audio signal applied to the control grid of the 6F5 audio amplifier tube and thus regulates the output of the receiver. Across the volume control, R-15, is placed a network of capacitors and a resistor. The music-speech switch is found in this circuit, and when closed removes the bass compensation. The output of the 6F5 audio tube is resistance coupled to the grid of the 6L6 beam power tetrode. The plate circuit of the 6L6 is suitably matched to the electro-dynamic loud-speaker by means of a step-down output transformer.

The tone control is found in the plate circuit of the 6F5 first audio tube and consists of capacitor C-43 in series with a variable resistor R-18 across the 6F5 plate resistor R-17. Cutting out resistance in R-18 lessens the treble response of the receiver. Between the plate of the 6F5 first audio tube and the grid of the 6L6 tetrode output tube are found two capacitors in series, C-41 and C-42. The smaller capacitor, C-42, is shorted out by the wave band switch for operation on the broadcast band. On the two short-wave bands it is left in the circuit to attenuate the low frequency response and thereby lessen the tendency toward microphonic howl.

Plate and grid voltages for all tubes are supplied by the power supply system employing a 5Z4 full-wave rectifier tube which, together with a suitable network of resistors and capacitors, supplies the required voltages and filtering action.

Automatic Frequency Control

These receivers employ automatic frequency control (AFC) which is a device for automatically controlling the oscillator frequency in such a way that, although the receiver is not exactly tuned to the signal being received, the correct intermediate frequency will still be produced. This control of the oscillator frequency is secured by means of the 6J7 AFC tube, so connected to the oscillator that it draws a lagging current from the tank circuit and thus gives the effect of a shunt inductance. Variation of the D.C. grid bias on the 6J7 control tube will affect the mutual conductance of the tube, thereby changing the amount of lagging current drawn from the oscillator tank with a consequent effect of variation of the amount of shunt inductance connected across the oscillator coil. This alters the total inductance in the oscillator tuned circuit and changes its resonant frequency.

Grid bias for the 6J7 control tube, which will vary in accordance with the amount of detuning of the receiver, is obtained from the 6H6 diode rectifier operating in conjunction with its special I. F. transformer. This control voltage is the difference between the drop across resistor R-24, the load resistance for one diode section of the 6H6 diode rectifier, and the drop across resistors R-31 and R-32, which constitute the load resistance for the other diode section. When the receiver is correctly tuned to the incoming signal, the intermediate frequency produced will be 465 kc. which is the resonant frequency of the tuned circuit feeding the 6H6 diode rectifier. Under this condition each diode plate receives equal signal voltage and the D.C. voltage drops across the load resistors will be equal, giving no change in grid bias on the 6J7 control tube. If the receiver is so tuned that the intermediate frequency produced is above 465 kc., the signal voltage applied to diode plate No. 2 will exceed that applied to diode plate No. 1. In this case, the D.C. voltage drop across load resistor R-31 and R-32 will be larger than that across load resistor R-24 and a resultant voltage will be produced which will increase the 6J7 AFC tube grid bias, lowering the mutual conductance of the tube and causing it to draw less lagging current from the oscillator tank. This is the same effect as would be produced by increasing the amount of shunt inductance across the oscillator coil and the oscillator frequency is thereby lowered by the amount necessary to compensate for the detuning. The opposite takes place when the receiver is tuned so as to produce an intermediate frequency below 465 kc. Diode plate No. 1 then receives more signal voltage than diode plate No. 2 and the resultant voltage developed across the load resistance is such as to decrease the grid bias on the 6J7 AFC tube. This causes a larger current to be drawn from the oscillator tank circuit, which in effect is the same as a decrease in shunt inductance with its consequent increase in oscillator frequency to overcome the detuning.

ALIGNMENT PROCEDURE

The receiver should first be allowed to run for fifteen minutes in order to reach its approximate normal operating temperature. Before making any adjustments, it is wise to determine the correctness of the existing alignment. This may be done by supplying a signal to the receiver from the test oscillator at the alignment frequency and inserting a "Tuning Wand" into the coil involved. The tuning wand consists of a rod of insulating material having a ring of non-magnetic metal attached to one end, and a small core of finely divided iron compacted into the opposite end. By inserting the metal ring end into the center of the R. F. coil, the inductance of this coil is lowered, increasing its resonant frequency. Inserting the iron-filled end into the coil raises its inductance, lowering its resonant frequency. If the R. F. circuits are in exact alignment, inserting either end of the tuning wand into the coil will result in a decrease in output. When an increase of signal is obtained with the iron-filled end of the wand, a decrease in resonant frequency of that circuit by increasing its trimmer capacity is indicated. When an increase of signal is obtained with the metal ring, a decrease in trimmer capacity is indicated.

Changes Indicated by Wand

Wand	Signal	Trimmer Adjustment Required
Metal Ring	Decrease	None
Iron Pilings	Decrease	
Metal Ring	Increase	Decrease capacity
Iron Pillings	Decrease	
Metal Ring	Decrease	Increase capacity
Iron Pilings	Increase	

ALIGNMENT FREQUENCIES

I.F.	Band "B"	Band "C"	Band "D"	Wave Trap
465 kc.	580 kc. 1500 kc.	5220 kc.	18,000 kc.	465 kc.

In order to align these receivers properly it is necessary to have available:

1. A modulated test oscillator capable of producing the above alignment frequencies.
2. An output indicator, such as a high resistance a-c voltmeter with a maximum scale reading of 3 to 5 volts, or a neon lamp indicator.
3. An alignment tool consisting of a fiber shaft screwdriver.
4. A tuning wand.

To realize the full advantage of the performance built into these receivers at the factory, circuit alignment using cathode ray oscilloscope equipment is much to be preferred. The oscilloscopic method is particularly advantageous in aligning the I. F. tuned circuits.

The location of all alignment trimmer capacitors, as well as socket voltages, is shown in Fig. 3.

1. Visual Alignment of I. F.

For visual alignment it is necessary to vary the frequency of an unmodulated test oscillator signal over a range extending on both sides of the peak frequency. This variation must take place in synchronism with the horizontal traverse of the cathode ray beam on its screen. The frequency modulator must, therefore, provide means for synchronizing the periodic test frequency variation with the cathode ray horizontal deflection circuit. The test oscillator may advantageously have facilities for audio frequency amplitude modulation of a fixed radio frequency test signal, as well as for frequency modulation, but audio modulation is not required for visual I. F. alignment.

Instead of an output meter across the speaker voice coil, the vertical plates of the cathode ray tube are connected across the load resistor of the diode rectifier. With the frequency modulator in operation in conjunction with the test oscillator, the resonance curve of the circuit under test will be then shown on the screen.

Set the tuning dial indicator at the low end of the broadcast band to some point where no signal is received since an extraneous signal might interfere with the aligning process. The volume control should be in an "off," or nearly "off" position. Apply a frequency modulated signal to the grid of the 1st I. F. amplifier tube through a .05-mfd. (RC-072) capacitor leaving the grid cap in place. Connect the vertical plates of the oscilloscope between ground and the junction point between R-24 and R-31, which are the diode load resistors, and with the AFC switch in the "off" position proceed to align the primary and secondary of the 2nd I. F. and the APC I. F. transformers.

The object should be to make the two curves coincide with each other at the top and throughout their length with the maximum amplitude obtainable. This will require that all four I. F. trimmers be adjusted in the usual manner *excepting the AFC secondary (hexagonal nut) trimmer which must be adjusted for minimum amplitude* before the curves will coincide properly. Fig. 4 gives the appearance of the curve when the alignment adjustments have been completed satisfactorily thus far. Apply the same frequency modulated input to the grid of the converter (6A8) tube through a .05-mfd. capacitor as before. Adjust the primary and secondary of the 1st I. F. transformer until the curves coincide as before and have the appearance of Fig. 4.

A further adjustment of the AFC secondary (hexagonal nut) trimmer is necessary in order to complete the I. F. alignment satisfactorily. Apply the *same* signal to the grid of the second I. F. amplifier tube. Unsolder the ground end of C-31 and connect the vertical deflecting plates of the oscilloscope between ground and the 6H6 cathode prong No. 8. Since the cathode prong is inaccessible this connection can be made at the AFC switch contact marked "Point X" on the parts layout, Fig. 2.

Carefully adjust the AFC secondary trimmer until a curve is obtained which is similar to that shown in Fig. 5. Correct adjustment is made when the two sides of the curve are symmetrical and intersect exactly at the axis. No adjustment of the other I. F. trimmers should be made at this time.

2. I. F. Wave Trap Alignment

Set the band switch to Band "B" and tune receiver to about 1000 kc.

With the test oscillator still set at 465 kc. apply this signal to the antenna terminal through a dummy antenna consisting of a 400-ohm resistor and 250-mmfd. capacitor in series. With the 465 kc. signal applied to the antenna terminal, adjust the I. F. Wave Trap Trimmer for *minimum* output indication.

3. R. F. Alignment

First check the position of the dial pointer by rotating the tuning condenser to maximum capacity position, i.e., plates fully meshed. At this position, the pointer should coincide with the end mark at the left-hand end of the scale. If it does not, it may be set by loosening the dial drum set screws and rotating the drum on the tuning condenser shaft. Hold the tuning condenser rotor while doing this, to prevent its rotating. Tighten the two set screws after the pointer is correctly set. During R. F. alignment the AFC switch must be set in its "Off" (counterclockwise) position.

Band "B" (540-1680 Kc.)

Set the test oscillator for operation at 1500 kc. and connect its output to the antenna terminal of the receiver through the dummy antenna described under I. F. Wave Trap Alignment. Tune the receiver until the pointer is at 1500 on the scale. Set the tone control for maximum high response and reduce the volume control setting so as to avoid excessive noise response. Adjust the Band "B" oscillator, R. F., and antenna trimmers respectively (C-12, C-7, and C-2, Fig. 3) to give maximum deflection on the output meter. Maintain the test oscillator output at the lowest level which will give an easily readable output indication.

Now set the test oscillator at 580 kc. and tune the receiver to resonance with this signal. Adjust the 580 kc. padding capacitor, C-13, rocking the tuning condenser back and forth through resonance as the padding capacitor is adjusted and note the deflection of the tuning meter each time the receiver is tuned through resonance. Leave the padding capacitor at the setting which gives greatest deflection.

Retune the receiver to 1500 kc. and set the test oscillator for this frequency. Check the alignment by again adjusting the Band "B" oscillator, R. F. and antenna trimmers for maximum deflection on the tuning meter.

Band "C" (1680-6000 Kc.)

No trimmers are provided for alignment of the R. F. and antenna transformers in Band "C" of these receivers. Correct tracking between R. F. and antenna transformers is obtained by the action of the capacity coil, L-3, and between oscillator and the other tuned circuits by means of the adjustable oscillator trimmer, C-14, and the fixed padding capacitor, C-54.

Turn the band switch to Band "C." Set the test oscillator at 5220 kc., and tune the receiver to resonance at this frequency. Adjust the Band "C" oscillator trimmer, C-14, for maximum output indication on the tuning meter, rocking the tuning condenser back and forth through resonance while making this adjustment.

Band "D" (6.0-18.0 Mc.)

Turn the band switch to Band "D." Set the test oscillator at 18,000 kc. (18.0 mc.) and tune the receiver until the pointer coincides with the 18.0 mark. Adjust the Band "D" oscillator trimmer, C-15, to give maximum output indication.

It will probably be found that there will be two settings of the oscillator trimmer that will give an output response. The lower capacity setting of the trimmer is the one that should be used. To be sure that correct adjustment has been obtained, tune for the image signal at 17.07 mc. with the Test Oscillator set at 18.0 mc. It may be necessary to increase the test oscillator output to obtain response at this point.

Retune the receiver to 18.0 mc. and adjust Band "D" antenna and R. F. trimmers, respectively (C-3 and C-10) for maximum output indication. When adjusting the R. F. trimmer, C-10, rock the tuning condenser back and forth through resonance as in the 580 kc. padding capacitor adjustment.

4. I. F. Alignment with Output Meter

Although the use of the cathode-ray oscillograph for alignment purposes is to be preferred, it is possible to make the I. F. adjustments with reasonable accuracy using a 465 kc. signal generator and output meter.

Place a modulated signal of 465 kc. on the grid of the last I. F. (6K7) tube with the volume control set at maximum and the AFC switch turned off. Place a low range A.C. voltmeter or other output indicator across the voice coil of the loud-speaker. Adjust the output of the signal generator so that an indication of not more than two or three volts is obtained on the output meter.

Adjust and readjust the primary trimmer for maximum output and *the secondary for minimum output*. This latter adjustment will be very broad. Apply the signal input to the grid of the 1st I. F. (6K7) tube and adjust both primary and secondary trimmers for maximum output, reducing the input as necessary to obtain approximately the same output indication as before. Apply the signal input to the grid of the converter (6A8) tube and adjust both primary and secondary trimmers for maximum output indication in the same manner as before.

It is now necessary to make a fine adjustment of the secondary trimmer of the last I. F. (AFC) transformer, which is as follows. Without changing the frequency of the signal generator, place the input lead on the rubber insulation of the converter (6A8) grid lead. This will provide a small signal input through the capacity between the leads. Increase the attenuator setting if necessary to make the output audible. If the signal generator is provided with a means of removing the modulation, this should be done. However, the adjustment may be carried out satisfactorily even with a modulated generator signal.

Now tune in any broadcast signal in the usual manner and tune carefully for zero beat between this carrier and the 465 kc. signal generator. It may be necessary to use a short antenna or to remove it entirely if the station is a strong local. Throw the AFC on and adjust the last I. F. secondary (AFC) trimmer by ear for zero beat. This adjustment is very critical and must be made with great care. When the adjustment is properly made, there will be no appreciable change from zero beat as the AFC switch is thrown off and on. This completes the alignment of the I. F. and AFC circuits.

The alignment of the oscillator and R. F. circuits may be carried out in the usual manner. However, the APC switch must remain in the off position.

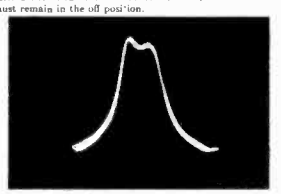


Fig. 4. Overall I. F. Curve

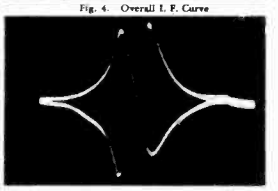


Fig. 5. APC Adjustment Curve

ADJUSTMENT OF DIAL MECHANISM

The dial mechanism (Fig. 6) is rigidly mounted to the chassis by means of two brackets and four self-tapping screws. The dial pointer is operated by means of an "automatic vernier" reduction drive unit, mounted on the gang condenser, and connected to the gang rotor by a set of anti-backlash gears. Motion imparted to the gang condenser rotor is transmitted through a series of pulleys and an interconnecting cable to the dial pointer slider which is supported on a rail above the dial scale.

To Mount Escutcheon

Care should be taken to use a well-ground screw driver of proper size to fasten the screws in the escutcheon plate. Holes have been jigged in the cabinet front panel to insure the proper location of the escutcheon with respect to the scale housing.

To Replace Pointer and Drive Cable

Remove the defective pointer or drive cable to be replaced. Rotate the drive wheel (14) counterclockwise until the gang condenser plates are fully open. Place the end of the cable having an eyelet in slot [A]. Thread the cable as shown in Fig. 4, making certain that the cable passes over the pin [B] and runs along the *correct* grooves, the looped end hooking over the tension spring (16). Check the position of the drive wheel (14) on the condenser shaft to make sure that the cable coming off the right-hand idler pulley lines up with the grooves in the drive pulley. Also, as the condenser plates become fully meshed, the drive wheel (14) should just meet the bushing [D] of the reduction drive unit (30). With the drive wheel in this position, place the pointer on the rail [E] and, with the tip of the pointer (11) on the extreme left-hand dial scale division, crimp the pointer tab on the drive cable.

To Insert "Personalizer Strip"

The "Personaliser Strip" designed for use in these receivers is marked E-10. To install the strip, remove the holder from its mounting clips and slide the paper slip and metallic frame out of the celluloid cover. Replace the paper slip with a "Personaliser Strip" suitable for the locality in which the receiver will be operated and reassemble. Care should be taken to avoid scratching the back of the "Personalizer Strip" when sliding the strip and metallic frame back into the celluloid cover.

MODELS E-101, E-105
E-106

GENERAL ELECTRIC CO.

Socket, Trimmers
Voltage, Parts List
Colorama Tuning

REPLACEMENT PARTS

Stock No.	Description	List Price
	CHASSIS ASSEMBLY	
*RB-008	BOARD—Terminal Board Double-lug	$0.10
*RB-009	BOARD—Terminal Board Single-lug	.15
*RB-026	BOARD—Antenna Ground Terminal Board	.10
RB-045	BOARD—Terminal Board Four-lug	.15
RB-139	BRACKET—Gang Condenser Mounting Brackets	.15
*RC-024	CAPACITOR—.005 Mfd., 200 V. Paper (C-42)	.25
*RC-034	CAPACITOR—.01 Mfd., 200 V. Paper (C-36, C-43, C-48)	.25
RC-036	CAPACITOR—.008 Mfd., 200 V. Paper (C-39)	.25
RC-042	CAPACITOR—.01 Mfd., 1000 V. Paper (C-45)	.30
*RC-046	CAPACITOR—.02 Mfd., 200 V. Paper (C-34, C-38)	.25
*RC-072	CAPACITOR—.05 Mfd., 200 V. Paper (C-4, C-11, C-19, C-22, C-28, C-33, C-56, C-80)	.25
*RC-091	CAPACITOR—.05 Mfd., 400 V. Paper (C-25, C-41, C-62)	.30
*RC-123	CAPACITOR—1 Mfd., 400 V. Paper (C-17)	.35
RC-152	CAPACITOR—.25 Mfd., 400 V. Paper (C-44, C-49)	.40
RC-156	CAPACITOR—.5 Mfd., 100 V. Paper (C-52)	.45
RC-200	CAPACITOR—1 Mfd., 100 V. Paper (C-31)	.60
RC-201	CAPACITOR—5 mmfd., Mica (C-59)	.35
*RC-205	CAPACITOR—20 mmfd., Mica (C-6)	.35
*RC-210	CAPACITOR—50 mmfd., Mica (C-21)	.25
RC-235	CAPACITOR—100 mmfd., Mica (C-32, C-35, C-58)	.25
RC-242	CAPACITOR—150 mmfd., Mica (C-37)	.25
RC-291	CAPACITOR—400 mmfd., Mica (C-40)	.30
*RC-344	CAPACITOR—1300 mmfd., Mica (C-54)	.35
*RC-349	CAPACITOR—2000 mmfd., Mica (C-61)	.40
RC-360	CAPACITOR—2850 mmfd., Mica (C-16)	.50
RC-414	CAPACITOR—16 Mfd., 380 V. Wet Electrolytic (C-46)	1.25
RC-423	CAPACITOR—30 Mfd., 100 V. Wet Electrolytic (C-18)	.90
RC-424	CAPACITOR—30 Mfd., 200 V. Wet Electrolytic (C-20)	1.10
RC-425	CAPACITOR—30 Mfd., 300 V. Wet Electrolytic (C-47)	1.25
RC-561	CAPACITOR—4 Mfd. 350 V., 10 Mfd., 25 V., 10 Mfd., 25 V. Dry Electrolytic (C-53, C-55, C-57)	1.75
RC-620	CAPACITOR—Twin Trimmers, Antenna & R. F. Bands B & D (C-2, C-3) (C-7, C-10)	.40
RC-621	CAPACITOR—Triple Trimmers, Oscillator Bands B, C & D (C-12, C-14, C-15)	.60
RC-622	CAPACITOR—Oscillator Padder Capacitor 350-550 mmfd. (C-13)	.40
RC-711	CONDENSER—Gang Tuning Condensers (Without trimmers, including drive) (C-5, C-8, C-9)	4.75
RC-755	CAPACITOR—Line Capacitor (C-50, C-51) .01-.01 Mfd., 250 V. A.C. Paper	.40
RC-816	CABLE—Speaker Cable (Complete)	.50
RC-860	CORD—Power Cord	.65
RC-992	CUSHION—Gang Condenser Mounting Cushion (Pkg. of 3)	.10
RE-012	ESCUTCHEON—Escutcheon Plate (with Mtg. Scws.)	1.25
*RF-002	FOOT—Chassis Mounting Foot	.20
*RG-001	GRID CAP—Control Grid Clip (Pkg. of 5)	.10
RG-102	GASKET—Escutcheon Rubber Gasket	.20
RG-103	GASKET—Escutcheon Felt Gasket	$0.10
*RK-004	KNOB—Control Knob (Push-on) (Pkg. of 5)	.40
RL-017	COIL—Antenna Coil, Band B & C (L-2; L-3, L-4, L-5)	1.15
RL-018	COIL—Antenna Coil, Band D (L-6, L-7)	.75
RL-123	COIL—R. F. Coil, Band B & C (L-8, L-9)	1.10
RL-124	COIL—R. F. Coil, Band D (L-10, L-11)	.75
RL-226	COIL—Oscillator Coil, Band C (L-14, L-15)	.85
RL-227	COIL—Oscillator Coil, Band D (L-16, L-17)	.85
RL-228	COIL—Oscillator Coil, Band B (L-12, L-13)	.85
RL-310	REACTOR—"Colorama Tuning" Saturable Reactor, 60 Cycles (L-27, L-28)	3.00
RL-311	REACTOR—"Colorama Tuning" Saturable Reactor, 25/60 Cycles (L-27, L-28)	3.00
RQ-043	RESISTOR—220 ohm, ½ Watt Carbon (R-12) (Pkg. of 5)	.60
RQ-051	RESISTOR—470 ohm, ½ Watt Carbon (R-7) (Pkg. of 5)	.60
*RQ-059 (RR-014)	RESISTOR—1000 ohm, ½ Watt Carbon (R-16) (Pkg. of 5)	.70
RQ-067	RESISTOR—2200 ohm, ½ Watt Carbon (R-4, R-8, R-27) (Pkg. of 5)	.60
RQ-069	RESISTOR—2700 ohm, ½ Watt Carbon (R-35) (Pkg. of 5)	.60
RQ-075	RESISTOR—4700 ohm, ½ Watt Carbon (R-6, R-30) (Pkg. of 5)	.60
RQ-081	RESISTOR—8200 ohm, ½ Watt Carbon (R-38) (Pkg. of 5)	.60
*RQ-083 (RR-021)	RESISTOR—10,000 ohm, ½ Watt Carbon (R-14) (Pkg. of 5)	.60
RQ-097	RESISTOR—39,000 ohm, ½ Watt Carbon (R-13) (Pkg. of 5)	.60
RQ-099	RESISTOR—47,000 ohm, ½ Watt Carbon (R-3, R-23) (Pkg. of 5)	.60
*RQ-107 (RR-050)	RESISTOR—100,000 ohm, ½ Watt Carbon (R-1, R-2, R-17, R-19, R-37) (Pkg. of 5)	.70
RQ-115	RESISTOR—220,000 ohm, ½ Watt Carbon (R-20, R-31) (Pkg. of 5)	.70
RQ-117	RESISTOR—330,000 ohm, ½ Watt Carbon (R-32) (Pkg. of 5)	.70
RQ-123	RESISTOR—470,000 ohm, ½ Watt Carbon (R-9, R-11, R-24) (Pkg. of 5)	.70
RQ-137	RESISTOR—1.8 Meg., ½ Watt Carbon (R-33, R-34) (Pkg. of 5)	.70
RQ-275	RESISTOR—4700 ohm, ½ Watt Carbon (R-28) (Pkg. of 5)	.70
RQ-485	RESISTOR—12,000 ohm, 1 Watt Carbon (R-10) (Pkg. of 5)	.75
RR-330	RESISTOR—15 ohm, 2 Watt Flexible (R-29) (Pkg. of 5)	.85
RR-331	RESISTOR—15 ohm, 1 Watt Flexible (R-30) (Pkg. of 5)	.75
RR-719	RESISTOR—Candohm Tapped Bleeder Resistor (R-8, 21, 22, 25, 26)	1.10
RS-138	SHIELD—1st and 2nd I. F. Coil Shield Can	.20
RS-139	SHIELD—3rd I. F. Coil Shield Can	.20
*RS-200	SOCKET—8 Pin Tube Socket (Pkg. of 5)	.75
*RS-204	SOCKET—5 Pin Tube Socket (Pkg. of 5)	.75
RS-324	SWITCH—Band Change Switch (S-1, S-2, S-3)	2.75
RS-325	SWITCH—"Colorama" Sensitivity Switch (S-4)	.50
RS-326	SWITCH—Automatic Frequency Control Switch (S-7)	.50
RS-423	SPRING—Knob Spring. "Push-on" type (Pkg. of 10)	.25
RT-089	TRANSFORMER—Universal Power Transformer 105/130 200/250 V. 40/60 Cycles (T-2)	10.25
RT-091	TRANSFORMER—Power Transformer 115 V. 50/60 Cycles (T-2)	$5.95
RT-092	TRANSFORMER—Power Transformer 115 V. 25/60 Cycles (T-2)	10.95
RT-225	TRANSFORMER—1st I. F. Transformer (Complete) (L-18, 19) (C-23, 24)	2.10
RT-226	TRANSFORMER—2nd I. F. Transformer (Complete) (L-20, 21) (C-26, 27)	2.10
RT-227	TRANSFORMER—3rd I. F. Transformer (Complete) (L-22, 23, 29) (C-29, 30)	4.15
RT-710	TONE CONTROL—Tone Control and Speech Clarifier Switch (R-18, S-5)	1.00
RV-015	VOLUME CONTROL—Volume Control and Power Switch (R-15, S-6)	1.25
RW-007	WINDOW—"Personalizer Strip" Window (Celluloid)	.10
RW-008	WINDOW—Escutcheon Window	.50
RW-401	WAVE TRAP—Wave Trap Coil Assembly (L-1, C-1)	.90
	8 IN. SPEAKER ASSEMBLY E-101	
RC-909	CONE—8-in. Type Cone and Voice Coil (Gasket Included) (L-25)	1.15
RC-990	CLAMP—8-in. Cone Spider Clamp and Screw	.05
*RP-012	PLUG—Female Speaker Plug	$0.20
RP-044	PLUG—Male Speaker Plug	.20
RP-052	PLUG—Female Speaker Plug (Late Prod.)	.20
RP-053	PLUG—Male Speaker Plug (Late Prod.)	.20
RS-034	SPEAKER—8-in. Type Speaker (Complete with Output Transformer) (L-24, 25, 26, T-1)	8.00
RS-416	SPRING—Voice Coil Leads Spring (Pkg. of 2)	.10
RT-415	TRANSFORMER—Output Transformer (T-1)	1.75
	12 IN. SPEAKER ASSEMBLY E-105, E-106	
RC-910	CONE—12-in. Type Cone and Voice Coil (Gasket Included) (L-25)	1.45
RC-991	CLAMP—12-in. Cone Spider Clamp and Screw	.05
*RP-012	PLUG—Female Speaker Plug	$0.20
RP-044	PLUG—Male Speaker Plug	.20
RP-052	PLUG—Female Speaker Plug (Late Prod.)	.20
RP-053	PLUG—Male Speaker Plug (Late Prod.)	.20
RS-035	SPEAKER—12-in. Type Speaker (Complete with Output Transformer) (L-24, 25, 26, T-1)	10.50
RS-416	SPRING—Voice Coil Leads Spring (Pkg. of 2)	.10
RT-415	TRANSFORMER—Output Transformer (T-1)	1.75
	DIAL MECHANISM	
RB-136	BRACKET—Band Switch Operating Shaft Bracket (35)	.10
RB-137	BRACKET—Dial Mask and Reflector Box Support Bracket (26)	.20
RB-140	BRACKET—"Colorama" Dial Lamp Bracket (Less Lamps) (20)	1.10
RB-512	BOX—Dial Mask and Reflector Box (2)	.80
RC-817	CABLE—Drive Cable (Pkg. of 5) (10)	.40
RC-818	CABLE—Band Change Cable (Pkg. of 5) (12)	.40
RG-993	CUSHION—Rubber Buffer Cushion (Dial) (Pkg. of 2) (29)	.10
RC-994	CAP—Scale Cap (Free End) (37)	.10
RC-995	CAP—Scale Cap (Pulley End) (38)	.10
RD-036	DRIVE—Tuning Condenser Reduction Drive (39)	1.10
RD-037	DIAL—"Slide-Rule" Dial Scale (6)	.65
RF-800	FRAME—"Personalizer Strip" Frame	.10
RG-096	GEAR—Band Switch Drive Gear (40)	.15
RG-007	GEAR—Band Switch and Dial Operating Gear (41)	.20
RL-908	LAMP—"Colorama Tuning" Green Lamp (Pkg. of 10) (43)	1.50
RL-909	LAMP—"Colorama Tuning" Red Lamp (Pkg. of 10) (42)	1.50
RP-047	POINTER—Dial Pointer (Pkg. of 5) (11)	.25
RP-048	PULLEY—Gang Drive Pulley (14)	.35
RP-049	PULLEY—Drive Cord Idler Pulley (4)	.15
RS-417	SPRING—Dial Scale Spring (7)	.05
RS-418	SPRING—Gang Drive Pulley Spring (16)	.05
RS-607	SUPPORT—Dial Scale Spring Support (8)	.10
RS-907	SHAFT—Band Switch Drive Gear Shaft (36)	.15

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

SOCKET VOLTAGES

Tube No.	Cathode to Ground Volts D.C.	Screen Grid to Ground Volts D.C.	Plate to Ground Volts D.C.	Cathode Current M.A.	Heater Volts A.C.
6K7 R. F. Amp	†	95	250	6.8	6.3
6A8 Oscillator	3.0	85	200	9.8	6.3
6A8 Converter	†	90	250		
6K7 1st I. F. Amp.	†	95	240	6.3	6.3
6K7 2nd I. F. Amp.	3.0	85	240	6.7	6.3
6H6 Detector & AVC.					6.3
6P5 Audio Amplifier	1.3		*150	0.6	6.3
6L6 Output	**	280	290	68.5	6.3
6C5 Colorama Control	†		185	10.0	6.3
6J7 AFC Control	30	95	85	1.6	6.3
5Z4 Power Rectifier	364 D.C.		680/340 R.M.S.	120.0	5.0

Measured at 115 volts supply. No signal input. Volume control maximum. Voltmeter 1000 ohms per volt; measurements taken on highest scale giving accurate readable deflection.
* Supply voltage minus drop in load resistor.
† Grid bias at source—3.3 volts.

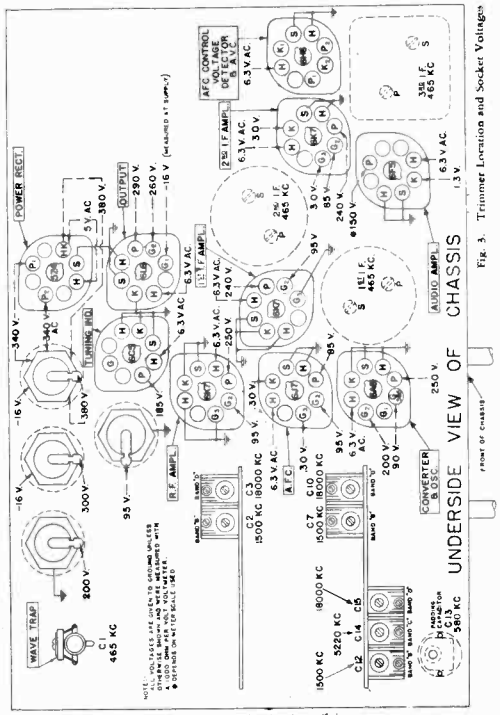


Fig. 3. Trimmer Location and Socket Voltages

NOTE: For other Dial Mechanism adjustment notes, see data on Model E-91.

Colorama Tuning

These receivers are equipped with Color Tuning, a novel method which indicates the approach to resonance by means of a change in the color of the light illuminating the tuning scale.

The colored light is produced by a group of four red-stained pilot bulbs and a group of three green-stained bulbs behind the scale. At zero signal strength the red group is at full brilliance and the green invisibly dim. As the signal increases from zero, the red gets dimmer and the green brighter over a broad range until at extreme signal strength the green is fully bright and the red below visibility through the dial. Hence, as a station is tuned in the color changes smoothly, and the maximum change in the green direction is an indication of resonance.

Weak stations will produce a small color change and strong stations a larger change. The difference in signal strength between the weakest and the strongest station likely to be listened to, has been found to be so great in different localities that the receivers have been equipped with a two-position sensitivity range switch for "sensitive" and "insensitive" settings of the color tuning. The switch is located on the chassis near the power transformer and may be reached from the rear of the cabinet. In the sensitive position, the weakest station to which the user can listen comfortably above the general noise level, will shift the color to neutral white at resonance. Stronger stations give resonant points at bright greens. In localities near a relatively large group of high-powered stations and having a high noise level, such as Chicago and New York, the range switch must be thrown to the insensitive position when standard out-door antennas are used, or else the color will be a fixed green over so wide a band that resonance cannot be accurately found. The difference in sensitivity is about twenty to one. On short-wave bands the band switch connects the color tuning to the sensitive setting and the switch on the chassis is inoperative. This is because practically all the short-wave signals are relatively weak. The insensitive setting is used only on the 540-1680 kc. band.

There is a group of four red and a group of three green pilot bulbs behind the scale. These are controlled by a Saturable Reactor, L-27 and L-28, in a circuit which is shown in the schematic diagram, Fig. 1. The saturable reactor is controlled by a D.C. coil which decreases its reactance smoothly from a high value at no D.C. to a very low value at maximum D.C. The saturable reactor acts very much like a dimming rheostat except that it is controlled by the D.C. plate current of a 6C5 tube used solely for that purpose. This tube receives for its bias a portion of the AVC voltage of the set so that at no signal the bias is nearly zero. At this point, the plate current is at maximum; therefore, the red is brightest and the green invisibly dim.

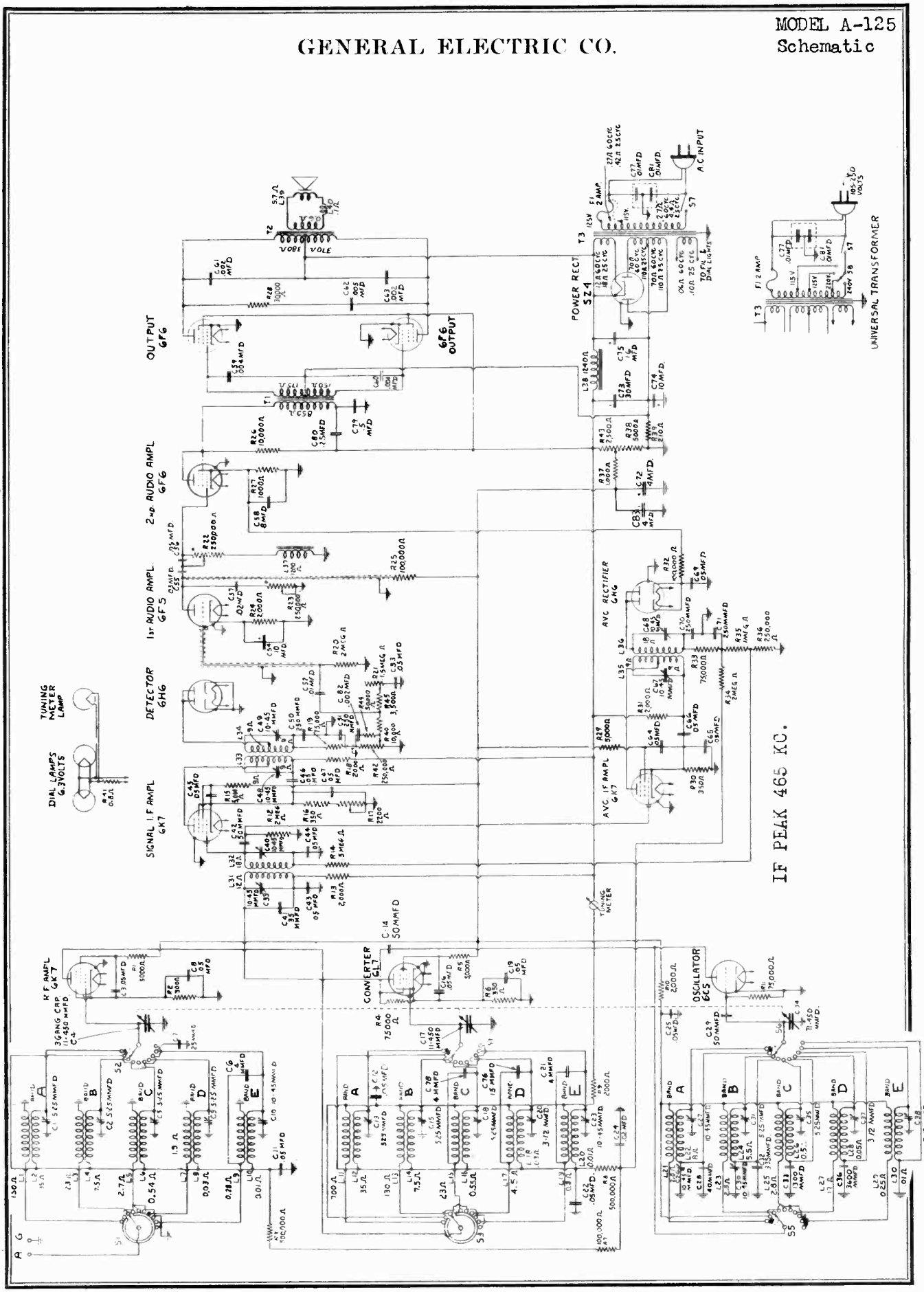
Some things which may affect the operation of color tuning are as follows:

Seven colored bulbs are used to give good diffusion of color over the scale; but if one of the seven fails it unbalances the colored lamps used for replacement *must be 6.3 volts 0.15 ampere lamps.* No other size will work.

If the red is unusually dim on no signal and the colored bulbs are all good, try removing the antenna. Next try replacing the 6C5 colorama tube, or replace the rectifier. Sometimes the antenna noise level is so high that it dims the red colon like a signal. If the tubes in the set become weak, or the set is out of alignment, or the set for any other reason loses sensitivity the color tuning will appear insensitive.

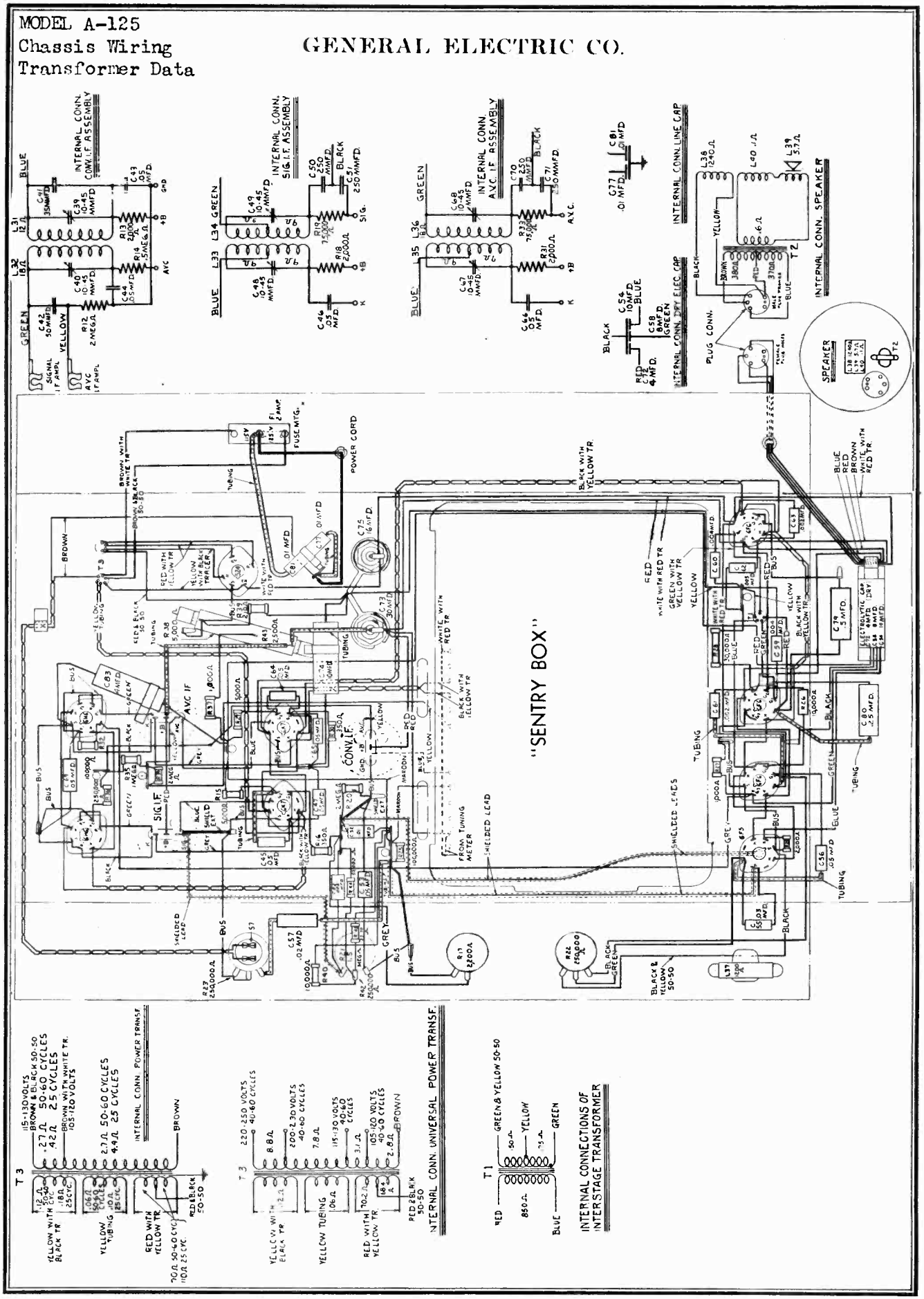
GENERAL ELECTRIC CO.

MODEL A-125
Schematic



MODEL A-125
Chassis Wiring
Transformer Data

GENERAL ELECTRIC CO.



GENERAL ELECTRIC CO.

MODEL A-125
"Sentry Box"
Chassis Wiring

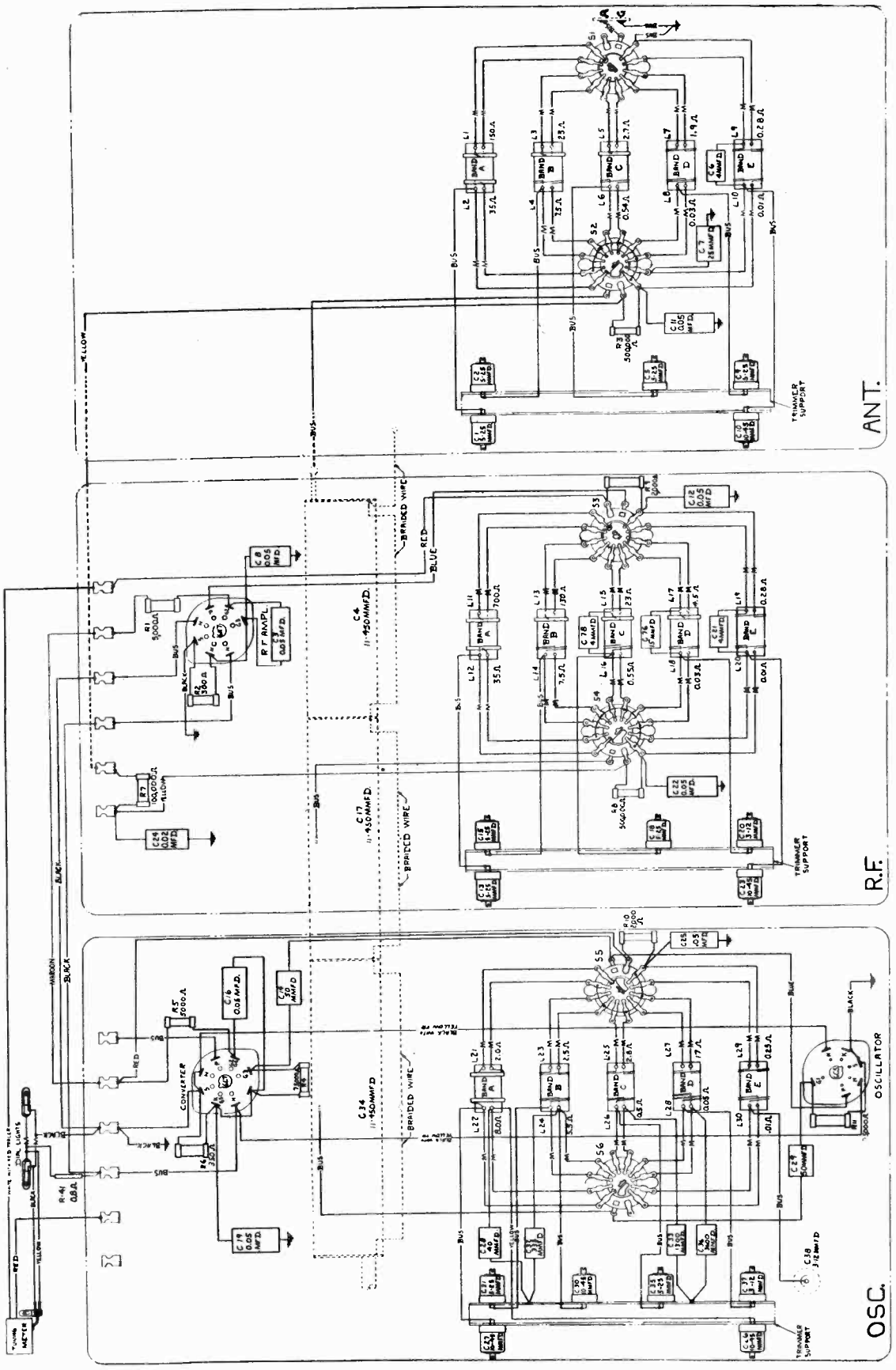
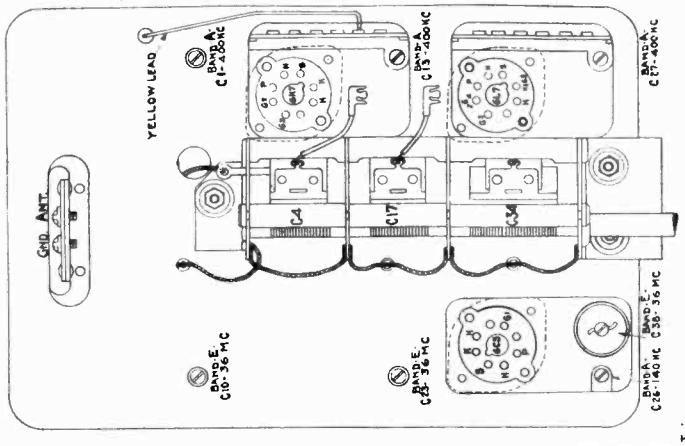


Fig. 4. "Sentry Box" Wiring Diagram

MODEL A-125
Socket, Trimmers
Voltage
Dial Mechanism

GENERAL ELECTRIC CO.



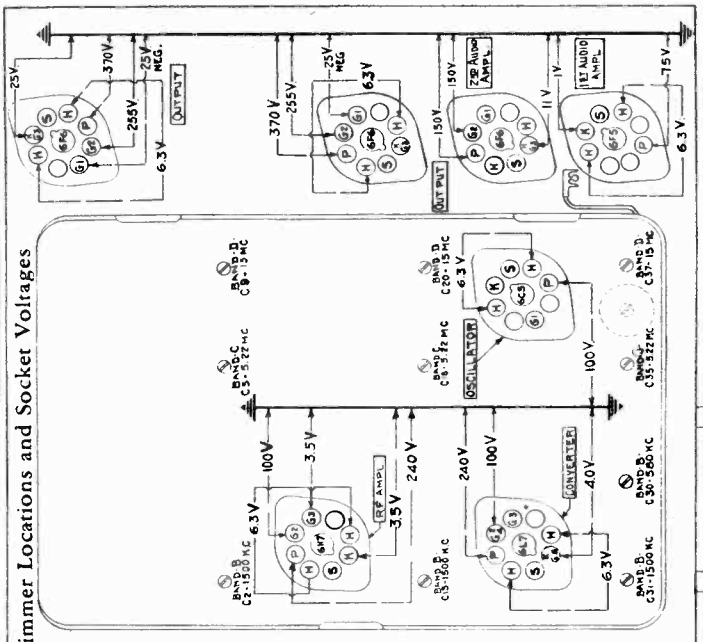
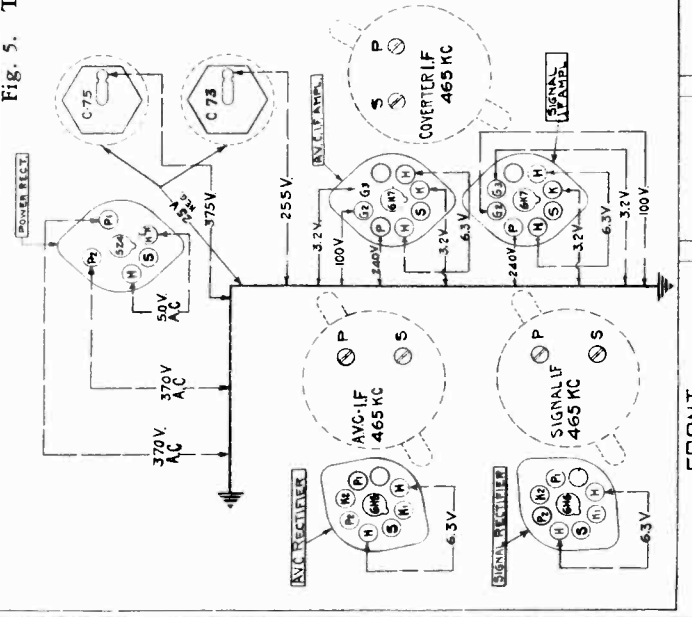
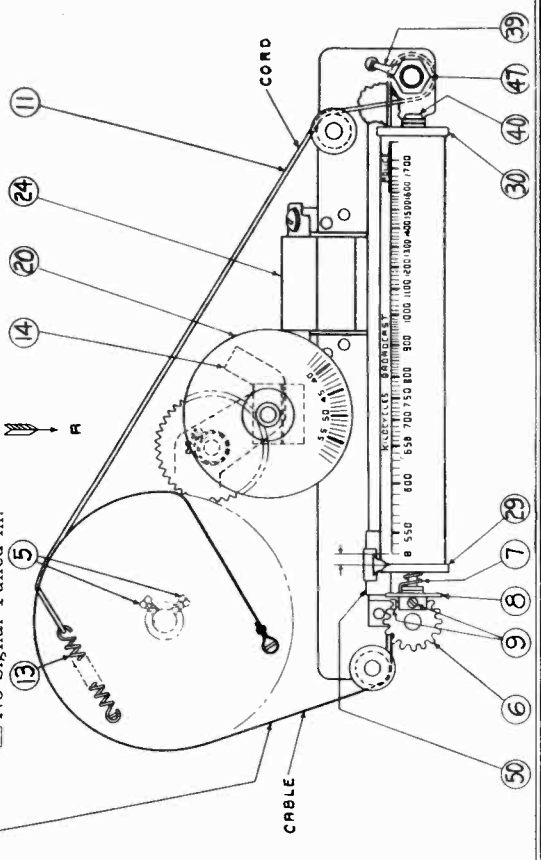


Fig. 5. Trimmer Locations and Socket Voltages



Fuse in 125 Volt Clip—125 Volts A.C Line
Controls at Maximum Volume and Sensitivity
No Signal Tuned in.



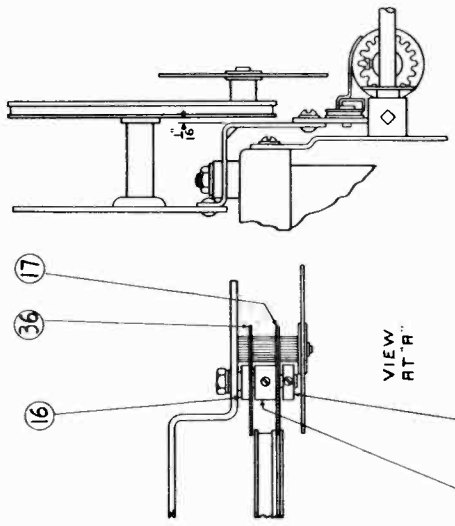


Fig. 8. Dial Mechanism

MODEL A-125
ALL-WAVE RADIO RECEIVER

WITH ULTRA HIGH-FREQUENCY AND EXTENDED LONG-WAVE BANDS

SERVICE DATA

Physical Specifications

Model	A-125
Height	41⅞ in.
Width	26 in.
Depth	13⅞ in.
Weight Packed	122 lbs.

Electrical Specifications

Rating Label	Power Supply (Volts)	Frequency (Cycles)	Power Consumption (Watts)
A	105–130	50–60	125
C	105–130	25–60	135
V	105–130 and 200–250	40–60	135

NOTE: Taps on universal transformers (Rating "V") are accessible by removing the cap cover on the top of the transformer. Schematic and wiring diagrams of the universal transformer are shown in Figs. 2 and 3 respectively.

Tuning Frequency Range

Band A	140–410 kc
Band B	540–1740 kc
Band C	1.74–5.6 mc (1740–5600 kc)
Band D	5.6–18.0 mc (5600–18,000 kc)
Band E	18.0–40.0 mc (18,000–40,000 kc)

Tuning Control Drive Ratio

Fast Tuning Drive Ratio 5½ to 1
Slow Tuning Drive Ratio 55 to 1
Precision Tuning Indicator Ratio 12 to 1

Tuning Meter

Shadow Type D.C. milliammeter—indicates R.F. amplifier plate current

Electrical Power Output

Undistorted	8.0 watts
Maximum	15.0 watts

Loudspeaker—Electrodynamic

Cone: 10¼ in. overall, 9¼ in. effective diameter
Cone coil impedance: 5 ohms at 400 cycles

Tubes

R.F. Amplifier	6K7 Triple-grid Super-control Amplifier
Converter	6L7 Converter Amplifier Hexode
Oscillator	6C5 Detector Amplifier Triode
I.F. Signal Amplifier	6K7 Triple-grid Super-control Amplifier
I.F. AVC Amplifier	6K7 Triple-grid Super-control Amplifier
Detector	6H6 Twin Diode
AVC Rectifier	6H6 Twin Diode
First Audio Amplifier	6F5 High-mu Triode
Second Audio Amplifier	6F6 Power Amplifier Pentode (Triode Connected)
Output (Push-pull Class A)	Two 6F6 Power Amplifier Pentodes (Class A)
Power Rectifier	5Z4 Full-wave Rectifier
Dial Lamps (Three)	MAZDA No. 46

DESCRIPTION OF ELECTRICAL CIRCUIT

Model A-125 employs twelve metal envelope tubes in a superheterodyne circuit, giving the excellent sensitivity and selectivity inherent in this type circuit. Separate groups of coils are used for each frequency band, all radio frequency coils being housed in the "Sentry Box" unit, together with their associated band switches, capacitors, resistors, and tube sockets. This type of construction permits using extremely short connecting leads and isolates each radio frequency circuit in its own shielded compartment. Permanence of alignment adjustments is assured through use of the new sealed, air-dielectric "Permaliner" trimmer capacitors in all tuned circuits. Sturdy chassis construction, including a removable base shield, insures rigidity of parts and freedom from microphonic vibration.

The signal from the antenna is applied to the control grid of the 6K7 R.F. amplifier tube through the antenna coil, the secondary of which is tuned to the incoming signal by the rear section of the main tuning condenser. The secondaries of the antenna, R.F. and oscillator coils for the band next lower in frequency to the one in use are short-circuited by the band switch to prevent absorption of energy at their resonant frequencies, which fall in the next higher band. The primaries of all antenna and R F. coils not in use are short-circuited by the band switch.

The amplified radio frequency signal is impressed upon the signal control grid of the 6L7 hexode converter tube through the R.F. coil, the secondary of which is tuned to the signal frequency by the center section of the main tuning condenser. The 6L7 hexode is a new type tube designed for improved superheterodyne conversion efficiency in conjunction with a separate oscillator tube. In the 6L7, two separate control grids are shielded from each other and each acts independently upon the electron stream. Coupling effects between the signal and oscillator control grids are very small, making possible high gain and stable oscillator outputs at high frequencies and effectively reducing interaction between tuned circuits in the receiver.

The superheterodyne oscillator signal is generated by the 6C5 oscillator tube, its frequency being maintained 465 kc above the incoming signal frequency by the front section of the main tuning condenser in conjunction with the oscillator coil and padding capacitors. The oscillator section of the main tuning condenser, although of the same capacity as the other two sections, is larger physically to permit wider spacing of the plates, thereby reducing the possibility of microphonic feedback howl. The oscillator output is coupled to the oscillator grid of the 6L7 tube, where it is combined with the signal frequency to produce the intermediate frequency of 465 kilocycles. This particular intermediate frequency is chosen to reduce image response and improve short-wave performance.

The converter I.F. (intermediate frequency) transformer, consisting of two tuned circuits, transfers the I.F. output from the converter tube to the control grids of the 6K7 signal I.F. amplifier tube and the 6K7 AVC (automatic volume control) I.F. amplifier tube. Separate I.F. channels are used for signal amplification and automatic volume control. The sensitivity of the receiver is controlled by a variable resistor in the cathode circuit of the 6K7 signal I.F. amplifier which varies the amplification in that circuit upon manipulation of the sensitivity control. By controlling sensitivity in the I.F. circuit, better signal-to-noise ratio is obtained at reduced sensitivity, and changing the setting of the sensitivity control does not affect the tuning meter, which is in the R.F. amplifier plate circuit.

The output from the signal I.F. amplifier tube is coupled to the 6H6 diode detector through the signal I.F. transformer. Both primary and secondary coils of this transformer are tuned and each coil is tapped for connection to its respective tube to reduce the load imposed on the tuned circuit and thereby improve selectivity and sensitivity.

In the 6H6 tube the signal is rectified, the audio frequency component producing a corresponding voltage drop across the R-42 section of the manual volume control. This is a dual control, the second or lo-note compensation section (R-21) acting with capacitors C-53 and C-82 and resistors R-40, R-44 and R-45 to preserve proper balance between high and low audio frequencies as the volume is changed. The manual volume control selects the amount of audio signal applied through coupling capacitor C-52 to the grid of the 6F5 first audio amplifier tube and thus controls the output of the receiver. The treble tone control, consisting of variable resistor R-23 in series with capacitor C-57, is connected from the 6F5 plate to chassis ground. Load resistor R-25 and blocking capacitor C-55 couple the 6F5 plate to the grid of the 6F6 second audio amplifier tube, the plate and screen grid of which are connected together externally for triode operation. The bass tone control circuit, consisting of variable resistor R-22, capacitor C-56, and reactor L-37, is connected between the second audio grid and chassis ground.

The second audio amplifier is coupled to the grids of the 6F6 push-pull output pentodes through a special resistance-capacity network utilizing the bridge principle to reduce residual hum to a minimum, and working into the primary of the push-pull audio input transformer. This transformer has a step-down ratio from primary to each half of the secondary, giving good regulation on signal peaks when power is delivered to the push-pull output pentode grids. The plate circuits of the output pentodes are suitably matched to the loud-speaker by means of a step-down push-pull output transformer.

Signal for automatic volume control is amplified by the 6K7 AVC I.F. amplifier tube, the plate circuit of which is connected to a tap on the primary coil of the AVC I.F. transformer. Both primary and secondary of this transformer are tuned, the 6H6 AVC rectifier being connected across the entire secondary. The selectivity of the AVC I.F. channel is slightly less than that of the signal I.F. channel. This is desirable to avoid distortion and overloading as stations are being tuned in. An initial negative voltage of about 11 volts, obtained from the cathode bias resistor of the second audio amplifier, is maintained on the plates of the AVC rectifier tube. This gives delayed AVC action, which prevents attenuation of weak signals and gives a flat AVC characteristic on strong signals. Through the use of dual-channel, delayed AVC, the output of the receiver will not vary more than a few per cent over variations in signal input of 100,000 to 1. The d-c drop across R-35 and R-36 due to the rectified signal supplies full automatic bias to the R.F. amplifier and converter tubes, while partial automatic bias, from R-36 only, is applied to the signal I.F. amplifier. The tuning meter is in the plate circuit of the R.F. amplifier tube and indicates the plate current of this tube, which reaches a minimum as a signal is tuned in when the automatic bias applied to the tube is maximum.

Plate and grid voltages for all tubes are supplied by the power supply system employing a 5Z4 full-wave rectifier, which with a suitable network of resistors and capacitors, supplies the required voltages and filtering action.

ALIGNMENT PROCEDURE

Alignment Frequencies

I.F.	Band "A"	Band "B"	Band "C"	Band "D"	Band "E
465 kc	400 kc 145 kc	1500 kc 580 kc	5220 kc	16,000 kc	36,000 kc

In order to align this receiver properly, it is necessary to have available the following test equipment:

1. A modulated test oscillator with the above alignment frequencies available. In case 36,000 kc (36 mc) is not directly available, the second harmonic of 18,000 kc usually will be found strong enough for alignment purposes. The test oscillator calibration points for all alignment frequencies should be checked at the time of using. A reliable check by the zero beat method may be obtained against known controlled frequencies such as broadcast station frequencies and their harmonics.
2. An output indicator, such as a high resistance a-c voltmeter with a maximum scale reading of 3 to 5 volts, or a neon lamp indicator.
3. An alignment tool consisting of an insulating shaft with a small screw-driver blade.
4. A tuning wand.

The location of all trimmer capacitors is shown in Fig. 5. *It should be noted that on "Permaliner" trimmer capacitors, used throughout this receiver, clockwise rotation of the adjusting screw decreases capacity, while counterclockwise rotation increases capacity.*

1. I.F. Alignment Adjustments

First, turn on the test oscillator and let it run at approximately 465 kc for a short time in order to reach a state of equilibrium and to reduce frequency drift to a minimum. The I.F. alignment adjustment is not easily made without oscillograph equipment. Moreover, the AVC channel alignment requires removal of the chassis from the cabinet and removal of the base shield. (Removal of the base shield does not, however, affect any of the circuits.) There is also the danger that the frequency of the test oscillator will be much farther from 465 kc than the receiver's I.F. peak, even after long service. Unless the test oscillator frequency can be given a precision check at the time of using, it is better not to shift the I.F. peak frequency of the receiver at all, unless bad alignment is definitely indicated.

Each of the three I.F. transformers has two air-dielectric "Permaliner" trimmer capacitors. The secondary of the converter I.F. transformer delivers signal to two separate I.F. channels, the signal channel and the AVC channel, which must be aligned independently.

Signal I.F. Channel

Set the frequency band switch of the receiver to Band "B." Short-circuit the antenna and ground terminals, tune the receiver to some point above 1500 kc so that no signal is heard, and ground the chassis.

Connect the test oscillator output between the connected grid clip of the 6L7 converter tube and the receiver chassis. Connect the output indicator across the cone coil of the loudspeaker. Turn on the receiver and set the volume and sensitivity controls to maximum (extreme clockwise position). Place the test oscillator in operation and adjust the test oscillator dial near 465 kc to give a response. Reduce the input from the test oscillator until only a slight output registers on the output indicator across the speaker cone coil. The input should be kept at such a low level that temporary removal of the 6H6 AVC rectifier tube makes no appreciable difference in output.

Before touching the receiver trimmers, adjust the *test oscillator* for maximum response. Then after an interval of a few minutes, check for oscillator drift and be sure of equilibrium. Note the exact final setting of the test oscillator dial so it may be duplicated if necessary. This setting is likely to be very close to 465 kc and should be used without touching the oscillator dial again for the I.F. adjustment following, unless bad misalignment is definitely evident; in this case the most accurate known test oscillator setting may be used.

Alignment adjustments should be made in the following sequence:

1. Signal I.F. Transformer.

Remove the test oscillator connection from the grid of the 6L7 tube and attach it to the connected grid clip of the 6K7 signal I.F. amplifier tube. Adjust each of the two signal I.F. trimmers in turn. There is some interaction between two trimmers of the same transformer, so that these alternate adjustments should be repeated several times until a maximum output is obtained. Do not touch these trimmers again.

2. AVC I.F. Transformer.

After alignment of the signal I.F. transformer is finished, remove the 6H6 detector tube, thereby rendering the signal channel inoperative. The AVC channel may temporarily be substituted for alignment purposes in the following way:

Remove the base pan shield. With a .02 mfd capacitor (Stock No. RC-046), connect the yellow wire from the AVC I.F. transformer to the corresponding signal I.F. transformer terminal from which a shielded lead goes to the volume control, where connection is most readily made. The AVC rectifier tube has delay bias voltage which should be temporarily removed by connecting its cathode to ground. Then adjust each of the two AVC I.F. trimmers alternately several times until a maximum output is obtained, which should be somewhat greater than that of the signal channel. The peak, however, being rather broad when properly trimmed, may be somewhat difficult to obtain. Do not touch the AVC I.F. trimmers again.

3. Converter I.F. Transformer.

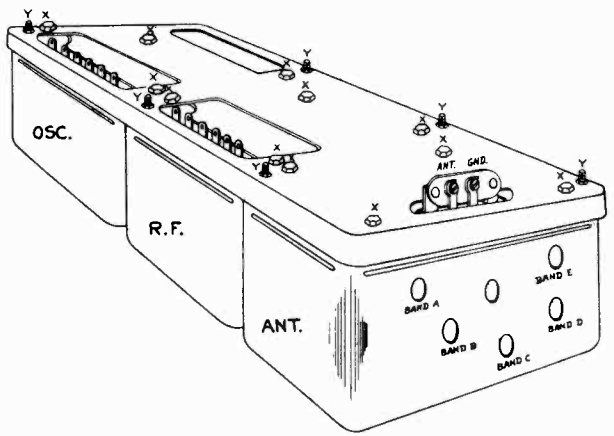
After alignment of the signal I.F. transformer *and* the AVC I.F. transformer is finished, restore the test oscillator connection to the grid clip of the 6L7 converter tube and replace the 6H6 detector tube. Adjust each of the two converter I.F. trimmers alternately several times until a maximum output is obtained. Do not touch these trimmers again.

Restore all original connections and replace the base pan shield; this complete the I.F. alignment.

2. *R.F. "Sentry Box" Alignment Adjustments*

Bands "A" and "B" each require four trimmer adjustments, while Bands "C," "D," and "E" each require only three. Take care to adjust only the trimmers under test. Connect the test oscillator to the antenna and ground terminals and place the receiver in operation with the output indicator across the speaker cone coil. A standard "dummy antenna," for connection between the test oscillator and the receiver antenna terminal, is a capacitor of 250 mmfd. (Stock No. RC-258) in series with a resistor of 200 ohms; a condenser at least *must* be used, having some such small value of capacitance. Before any alignment the position of the pointer should be checked. This position should just be to the left of the extreme left-hand scale mark on the Band "B" scale for maximum capacitance position of the main tuning condenser (plates fully engaged). In cases where the pointer is seriously off calibration at 1000 kc after alignment, the pointer should be reset with a soldering iron to be accurate at that point. The entire "Sentry Box" alignment procedure should then be repeated.

The Oscillator, Converter Input, and Antenna Compartments of the Sentry Box are conveniently referred to as "OSC," "R.F." and "ANT," respectively, thereafter. Fig. 6 shows Sentry Box Coil Locations and Compartment Assemblies. Before making any adjustments, it is wise to determine the correctness of the existing alignment. This may be done by supplying a signal from the test oscillator to the receiver, *at the alignment frequencies only*, and inserting a "Tuning Wand" into the coil involved. The "Tuning Wand" consists of a rod of insulating material having a ring of non-magnetic metal attached to one end, and a small core of finely divided iron compacted into the opposite end. By inserting the metal ring into the center of a particular coil through the openings provided in the "Sentry Box" compartment shields, the inductance of that coil is lowered, increasing its resonant frequency. If the circuits are in exact alignment, inserting either end of the tuning wand in any coil will result in a decrease in output. When an increase in signal is obtained with the iron-filled end of the wand, a decrease in resonant frequency of that circuit by increasing its trimmer capacity is indicated. When an increase in signal is obtained with the metal ring, a decrease in trimmer capacity is indicated.



REAR VIEW OF SENTRY BOX

Fig. 6. "Sentry Box" Coil Locations and Assembly

Changes Indicated by Wand

Wand	Signal	Trimmer adjustment required
Metal Ring	Decrease	None
Iron Filings	Decrease	
Metal Ring	Increase	Decrease Capacity
Iron Filings	Decrease	
Metal Ring	Decrease	Increase Capacity
Iron Filings	Increase	

Band "A" (140-410 KC)

Set the band change switch to the position where the scale indicates the above range. This will be at the extreme counterclockwise position of the band change switch knob.

Tune the test oscillator to 400 kc, set the pointer at 400 kc on the receiver, and adjust the Band "A" OSC, R.F. and ANT trimmers for maximum output. If necessary, reduce input from the test oscillator so that the signal reaching the speaker is kept at a low or moderate level.

Next tune the oscillator to 145 kc. Keep slowly rocking the tuning knob through the point of resonance, at the same time adjusting the 145-kc padding trimmer, until the highest peak of output is secured.

"Noise" alignment may be substituted when the preceding adjustment is nearly finished, in cases where there is a steady output of very loud pickup noise at the lower end of the scale. With the pointer at 145 kc on the receiver and the test oscillator removed, simply adjust the 145-kc padding trimmer only until a peak in the noise output is obtained. This should result in the same trimmer setting as in the preceding paragraph.

The interaction between the trimmer adjustments at each end of the scale makes it necessary to repeat the adjustments alternately until both are correct. This may require two or three adjustments each. *The last adjustment* must always be made at the high frequency end of the scale. This completes the adjustment of this Band; do not touch these trimmers again.

Band "B" (540-1740 KC)

Set the band change switch to the position where the scale indicates the above range.

Tune the test oscillator to 1500 kc, set the pointer at 1500 kc on the receiver, and adjust the Band "B" OSC, R.F. and ANT trimmers for maximum output, reducing input to maintain a low or moderate signal.

Next tune the oscillator to 580 kc. Keep slowly rocking the tuning knob through the point of resonance, at the same time adjusting the Band "B" padding trimmer, until the highest peak of output is secured.

The interaction between the trimmer adjustments at each end of the scale makes it necessary to repeat the adjustments alternately until both are correct. This may require two or Three adjustments each. *The last adjustments must always be made at the high frequency end of the scale.* This completes the adjustment of this Band; do not touch these trimmers again.

Band "C" (1.74-5.6 MC)

Set the band change switch to the position where the scale indicates the above range.

Tune the test oscillator to 5.22 mc, set the pointer at 5.22 mc on the receiver, and adjust the Band "C" OSC trimmer for maximum output, reducing input to maintain a low or moderate signal.

Check for the image signal which should be received at about 4.3 mc on the receiver dial. It may be necessary to increase the input to the receiver from the test oscillator for this check.

Retune the receiver to the correct scale reading (5.22 mc) to secure the previous response. Adjust the RF and ANT trimmers now also for maximum output. This completes the alignment of Band "C"; do not touch these trimmers again.

Band "D" (5.6-18 MC)

Set the band change switch to the position where the scale indicates the above range. This position should occasionally be readjusted during subsequent trimmer adjustment, since it is possible to get some signals through on the higher frequencies when the switch is not exactly in position.

Tune the test oscillator to 15 mc, set the pointer at 15 mc on the receiver, and adjust the OSC trimmer for maximum output, leaving it at the *first* peak obtained when increasing it from minimum capacitance by counterclockwise rotation.

Check for the image signal which should be received at about 14.1 mc on the receiver dial. It may be necessary to increase the input to the receiver from the test oscillator for this check.

Reduce the capacitance of the RF trimmer to minimum. Reset the main tuning knob to secure the previous response at 15 mc and, while slowly rocking the knob through this resonance point, increase the R.F. trimmer capacitance until a maximum response is obtained.

Carefully holding the main tuning knob on the peak of resonance at 15 mc, adjust the ANT trimmer for maximum output. This completes the alignment of Band "D"; do not touch these trimmers again.

Band "E" (18-40 MC)

Set the band change switch to the position where the scale indicates the above range. This position should occasionally be readjusted during subsequent trimmer adjustment, since it is possible to get some signals through on the higher frequencies when the switch is not exactly in position.

Tune the test oscillator to 36 mc, set the pointer at 36 mc on the receiver, and adjust the OSC trimmer for maximum output, leaving it at the *first* peak obtained when increasing it from minimum capacitance by counterclockwise rotation.

Check for the image signal which should be received at about 35.1 mc on the receiver dial. It may be necessary to increase the input to the receiver from the test oscillator for this check.

Reduce the capacitance of the R.F. trimmer to minimum. Reset the main tuning knob to secure the previous response at 36 mc and while slowly rocking the knob through this resonance point, increase the R.F. trimmer capacitance until a maximum response is obtained.

Carefully holding the main tuning knob on the peak of resonance at 36 mc, adjust the ANT trimmer for maximum output. This completes the alignment of Band "E"; do not touch these trimmers again.

VISUAL ALIGNMENT OF I.F.

In order to realize to full advantage the performance built into a receiver of this class at the factory, circuit alignment using cathode ray oscilloscope equipment is much to be preferred. The oscilloscopic method is particularly advantageous in aligning the I.F. tuned circuits.

For visual alignment it is necessary to vary the frequency of an unmodulated test oscillator signal over a range extending on both sides of the peak frequency. This variation must take place in synchronism with the horizontal traverse of the cathode ray beam on its screen. The frequency modulator must, therefore, provide means for synchronizing the periodic test frequency variation with the cathode ray horizontal deflection circuit. The test oscillator may advantageously have facilities for audio frequency amplitude modulation of a fixed radio frequency test signal, as well as for frequency modulation, but audio modulation is not required for visual I.F. alignment.

Instead of an output meter across the speaker cone coil, the vertical plates of the cathode ray tube are connected across the load resistor of one of the diode rectifiers of the receiver. With the frequency modulator in operation in conjunction with the test oscillator, the resonance curve of the circuit under test will then be shown on the screen.

Preliminary Procedure

For visual alignment, adjust the receiver controls and connect the test oscillator as outlined in the section entitled "I.F. Alignment Adjustments," under "ALIGNMENT PROCEDURE." Connect the vertical deflecting plates of the cathode ray tube across the volume control (R-42) of the receiver. Place the oscilloscope in operation as an output indicator and proceed as outlined in the section entitled, "Signal I.F. Channel."

Alignment Adjustments

Adjust the oscilloscope so that the luminescent spot on the cathode ray screen traces a horizontal line across the screen. Now place the frequency modulator and test oscillator in operation to give an unmodulated radio frequency signal varying from one side to the other of 465 kc. Adjust the oscilloscope and test oscillator controls to show a single overall resonance curve of the signal I.F. channel on the cathode ray tube screen (Fig. 7A). Do not change the test oscillator setting thereafter.

To align the signal I.F. transformer, follow in sequence the same procedure outlined in the sections under "ALIGNMENT PROCEDURE" describing this operation. Instead of aligning for maximum output on an output indicator, the object should be to make the curve symmetrical. If the sweep circuit is so arranged that two symmetrically reversed curves appear on the screen, the curves should be made to coincide by adjusting the I.F. trimmer capacitors.

After alignment of the signal I.F. transformer is completed, remove the base pan shield. Remove the delay voltage temporarily from the AVC rectifier tube by connecting its cathode to ground. Disconnect the cathode ray vertical deflection plates from R-42 and connect between ground and the terminal to which the yellow lead from the AVC I.F. transformer is connected. Adjust each of the two AVC I.F. trimmers until a symmetrical, flat-topped curve similar to Fig. 7C is obtained.

Restore delay bias to the AVC rectifier by removing the connection from its cathode to ground, and again connect the cathode ray vertical deflection plates across R-42. Connect the test oscillator to the grid clip of the 6L7 converter tube. Adjust the converter I.F. trimmers for symmetrical, overlying curves as shown in Fig. 7A, with maximum height (sensitivity), and minimum width (selectivity). This completes the I.F. alignment.

Visual R.F. alignment may be carried out in the same general manner as above by applying a suitable frequency-modulated signal between the antenna and ground terminals of the receiver and connecting the cathode ray vertical deflecting plates across the receiver volume control.

ADJUSTMENT OF DIAL MECHANISM

The dial mechanism is rigidly mounted at one end to the tuning condenser frame by two removable screws, and anchored to the chassis deck at the other end by a rubber-cushioned nut. The dial pointer, station selector knob, and tuning condenser drive drum are interconnected by means of the drive cord and drive cable; the frequency band switch and cylindrical scale by the switch shaft and the scale gears. The precision tuning indicator assembly is mounted independently by two screws to the tuning condenser frame. The tuning meter is fastened to the dial mechanism mounting plate with two other screws.

1. *Position of Drum on Condenser Shaft*

With set screws (5) loosened and tuning condenser plates fully engaged, place the drum in the position shown in Fig. 8. The drum should be located on the tuning condenser shaft so as to be in line with the drive cord pulleys (1/16 in. from the dial mechanism mounting bracket) and so that, with condenser plates fully engaged, guide (50) occupies the position shown in Fig. 8.

2. *Removing and Replacing Scale*

Pry out fastener (40) and remove the scale by lowering the fastener end below the mounting ear. Take the scale out of cap assembly (29). Replace by placing tabs of caps (29) and (30) in slots of scale. Replace fastener (40).

3. *Removing and Replacing Band Switch Shaft*

To remove the band switch shaft with the "Sentry Box" assembled in place, the dial scale cap and gear must be removed. This is done by removing the cylindrical scale as in paragraph 2. Then loosen set screws (9) and remove cap (29), spring (7), and gear (8).

When replacing the switch shaft, note that the shaft will fit the switch gang slots in only one position; turn the shaft before inserting so that the locating button will pass through the keyed side of the slots. Note also that the brass bearing just behind the switch shaft gear determines the forward position of the gear. Insert the bushing just far enough into the index plate hub so that the shaft gear meshes snugly with the scale gear, then tighten the set screw.

4. *Locating Scale*

Loosen the two gear set screws (9). Rotate the scale backward until there is slight tension on spring (7) with the pointer indicating on the Band "A" scale. With the frequency band switch in the Band "A" position, place gear (8) in mesh with the gear on part (6) and tighten the two set screws (9).

5. *Replacing Drive Cord and Drive Cable*

The position of the dial scale pointer with respect to the tuning condenser drum is held fixed by a special metal braid cable (12) connecting the drum with guide (50). Tension is maintained on the cable through the drum spring (13) and drive cord (11). To replace either the drive cable or the drive cord, remove the dial scale for convenient access to guide (50). Unhook spring (13) from its drum tab to release tension. Unhook the cable or cord from guide (50) and unwind from the pulleys and drum. To replace the cable or cord, rethread to agree with Fig. 8, and rehook drum spring (13) as shown.

6. *Replacing Reduction Drive*

To replace the reduction drive, unhook spring (13), loosening the drive cord. Unscrew nut (47) and remove drive. Replace with new drive and rehook drive cord.

7. *Setting Scale Pointer*

The scale pointer is soldered to the slider (50). To set the pointer mechanically, turn the tuning condenser rotor so that the plates are fully engaged, and solder the pointer to indicate a point 3/32 in. to the left of the extreme left-hand mark on the Band "B" scale.

8. *Replacing Dial Lamps*

The dial lamp sockets are easily accessible by lifting them clear of the dial mechanism. Lamps may then be replaced in their sockets. After replacing lamps, slide the socket clip back onto the mounting bracket. Be sure the sockets are quite clear of other metal parts. The tuning meter lamp is easily replaced by merely unscrewing it from its socket at the rear of the meter.

9. *Replacing Tuning Meter*

In case of damage to or defect within the tuning meter (24), the meter should be replaced rather than an attempt made to repair it. The meter is replaceable as a unit by removing its two mounting screws and unsoldering the meter leads and meter lamp leads.

10. *Precision Tuning Indicator*

The precision tuning indicator dial and gear assembly is illustrated at the left of Fig. 8. This assembly is removable as a unit by removing the two mounting screws which fasten its bracket (14) to the tuning condenser frame. The dial and pinion assembly (20) is held on its shaft by a small horseshoe spring washer which should be pried off to replace this assembly. The drive gear (17) and backlash gear (36) may be removed by loosening the set screws on collars (44) and (45), which hold them in place.

When replacing the complete precision tuning assembly, the tuning condenser plates should be fully disengaged. Refasten the assembly to the tuning condenser frame, but before tightening the mounting screws, and before meshing the drum gear sector with the precision dial drive gear, place an initial tension on the backlash spring (16) by rotating the precision dial about two revolutions clockwise from the position in which the spring holds it when unwound. Maintaining this tension on the backlash spring, mesh the gears and tighten the mounting bolts with the precision dial indicating zero when the horizontal dial pointer indicates the extreme right-hand scale mark on the Band "D" scale.

11. *Electrical Connection of Tuning Mechanism to Chassis*

This is effected by a short length of tinned copper braid with two washer connection lugs. These should be securely screwed down.

METHOD OF SERVICE PROCEDURE—SENTRY BOX

The "Sentry Box" assembly includes the tuning condenser and dial mechanism as well as the coil and switch compartments. The complete unit may be dismounted from the chassis by removing the side-fastening bolts, unscrewing the dial mechanism anchoring nut and unsoldering the leads to the chassis from the terminal strips.

In order to remove the compartment shield cans it is necessary to take out the frequency band switch shaft. With the "Sentry Box" dismounted from the chassis the dial gears may be disengaged and the switch shaft removed merely by lifting the reduction drive end of the dial assembly, allowing the switch shaft gear to pass the dial scale cap shaft. With the "Sentry Box" mounted in place, removal of the switch shaft requires removing the dial scale gear and cap shaft as outlined in the section covering "Adjustment of Dial Mechanism."

Each compartment shield can houses a bracket assembly comprising the coils, band switch and other component parts associated with that particular circuit. With the band switch shaft out, any shield may be easily removed by unscrewing the two mounting stud nuts ("Y", Fig. 6).

In most cases, coils or Permaliner trimmer capacitors may be replaced merely by removing their particular shield can. It is an easy matter, however, to remove each complete bracket assembly by taking out the mounting screws ("X", Fig. 6) and unsoldering the bus or braid connections to the tuning condenser. In the case of the R.F. or oscillator units it will also be necessary to unsolder the external leads to the respective terminal boards of these units.

Permaliner trimmers are replaced by unsoldering the bus lead from the trimmer terminal, and then unsoldering the Permaliner case from its mounting cup. The latter operation may require the use of two soldering irons.

Coils are replaceable by merely unsoldering the coil lugs from the switch lugs. If it is necessary to replace a section of the band switch, however, it will be found expedient to remove the complete bracket and coil assembly for easy access to the switch lugs.

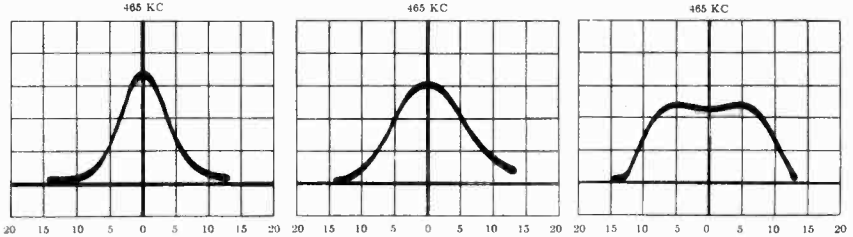


Fig. 7A (Overall Signal I.F.)

Fig. 7B (Signal I.F.)

Fig. 7C (AVC I.F.)

Curves taken with RCA Oscillograph Type TMV-122-B

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL A-125

REPLACEMENT PARTS

RECEIVER CHASSIS ASSEMBLY

Stock No.	Description	List Price
RB-007	BOARD—Fuse Board, Rating "V" Receivers	$0.40
RB-008	BOARD—Terminal Board (Double Terminal)	.10
RB-011	BOARD—Fuse Board, Rating "A" or "C" Receivers	.30
RB-013	BOARD—Terminal Board (Ground and Free Terminal)	.10
RB-018	BOARD—Terminal Board (Single Twin Terminal)	.10
RB-019	BOARD—Terminal Board (Three Terminals)	.10
RB-120	BRACKET—Dial Mechanism Mounting Bracket	.15
RC-011	CAPACITOR—.002 Mfd. 600 Volt (C-61, C-63) Paper Dielectric	.25
RC-013	CAPACITOR—.002 Mfd. 200 Volt (C-82) Paper Dielectric	.25
RC-021	CAPACITOR—.004 Mfd. 400 Volt (C-59, C-60) Paper Dielectric	.25
RC-023	CAPACITOR—.005 Mfd. 600 Volt (C-62) Paper Dielectric	.25
RC-034	CAPACITOR—.01 Mfd. 200 Volt (C-52) Paper Dielectric	.25
RC-072	CAPACITOR—.05 Mfd. 200 Volt (C-45, C-47, C-53, C-56, C-64, C-65, C-69) Paper Dielectric	.25
RC-080	CAPACITOR—.02 Mfd. 400 Volt (C-57) Paper Dielectric	.25
RC-083	CAPACITOR—.03 Mfd. 400 Volt (C-55) Paper Dielectric	.25
RC-136	CAPACITOR—.25 Mfd. 200 Volt (C-80) Paper Dielectric	.30
RC-158	CAPACITOR—.5 Mfd. 200 Volt (C-79) Paper Dielectric	.40
RC-406	CAPACITOR—16 Mfd. 480 Volt (C-75) Wet Electrolytic	1.25
RC-412	CAPACITOR—30 Mfd. 390 Volt (C-73) Wet Electrolytic	1.20
RC-509	CAPACITOR—One 4 Mfd. 250 Volt (C-72); one 8 Mfd. 50 Volt (C-58); one 10 Mfd. 25 Volt (C-54) Dry Electrolytic Pack	1.55
RC-510	CAPACITOR—10 Mfd. 50 Volt (C-74) Dry Electrolytic	.85
RC-518	CAPACITOR—4 Mfd. 250 Volt (C-83) Dry Electrolytic	.90
RC-750	CAPACITOR—Line Capacitor, Two .01 Mfd. (C-77, C-81)	.50
RC-803	CABLE—Speaker Cable	.55
RC-851	CORD—Power Cord with Plug	.60
RC-960	CLAMP—Speaker Cable Clamp	.10
RC-964	CLIP—6P5 Grid Lead Anchoring Clip, Pkg. of 10	$0.20
RE-004	ESCUTCHEON—Dial Escutcheon	1.25
RG-001	GRID CAP—Grid Connection Cap, Pkg. of 5	.10
RI-003	INSULATOR—Escutcheon Shaft Insulator Bushing, Pkg. of 10	.40
RK-002	KNOB—Tuning, Volume, Tone, Sensitivity of Band Switch Knob, Pkg. of 5	.5
RL-300	COIL—Bass Tone Control Choke Coil (L-37)	1.15
RL-900	LEAD—6P5 Shielded Grid Lead	.30
RN-001	NUT—Escutcheon Mounting Nut, Pkg. of 10	.45
RP-002	PLATE—Fuse Cover Plate	.15
RP-014	PLATE—Escutcheon Mounting Plate, Pkg. of 2	.25
RR-007	RESISTOR—350 ohms, ¼ watt (R-16, R-30) Carbon Resistor, Pkg. of 5	.70
RR-013	RESISTOR—2000 ohms, ¼ watt (R-24) Carbon Resistor, Pkg. of 5	.70
RR-015	RESISTOR—5000 ohms, ¼ watt (R-15, R-29) Carbon Resistor, Pkg. of 5	.70
RR-021	RESISTOR—10,000 ohms, ¼ watt (R-40) Carbon Resistor, Pkg. of 5	.70
RR-023	RESISTOR—3500 ohms, ¼ watt (R-45) Carbon Resistor, Pkg. of 5	.70
RR-035	RESISTOR—50,000 ohms, ¼ watt (R-44) Carbon Resistor, Pkg. of 5	.70
RR-049	RESISTOR—100,000 ohms, ¼ watt (R-25, R-32) Carbon Resistor, Pkg. of 5	.70
RR-063	RESISTOR—250,000 ohms, ¼ watt (R-36) Carbon Resistor, Pkg. of 5	.70
RR-068	RESISTOR—2 megohms, ¼ watt (R-20, R-34) Carbon Resistor, Pkg. of 5	.6
RR-138	RESISTOR—1 megohm, ½ watt (R-35) Carbon Resistor, Pkg. of 5	.70
RR-157	RESISTOR—1000 ohms, ½ watt (R-27, R-37) Carbon Resistor, Pkg. of 5	.70
RR-242	RESISTOR—30,000 ohms, 1 watt (R-28) Carbon Resistor, Pkg. of 5	.85
RR-606	RESISTOR—210 ohms, 5 watts (R-39) Vitreous Enamel Wire-wound Resistor	.30
RR-630	RESISTOR—10,000 ohms, 5 watts (R-26) Vitreous Enamel Wire-wound Resistor	.45
RR-702	RESISTOR—Tapped Resistor (R-38, R-43)	1.25
RR-900	REFLECTOR—Dial Lamp Reflector	.15
RS-109	SHIELD—Converter I.F. Transformer Coil Shield	.30
RS-110	SHIELD—Signal or AVC I.F. Transformer Coil Shield	3
RS-153	SHIELD—Base Shield with Mounting Feet	1.5
RS-200	SOCKET—Eight-pin Tube Socket, Pkg. of 5	$0.75
RS-204	SOCKET—Five-pin Tube Socket, Pkg. of 5	.75
RS-801	SENSITIVITY CONTROL—Rheostat 2200 ohms (R-17)	.75
RT-131	TRANSFORMER—Power Transformer (T-3) 50-60 cycles, 105-130 Volts (Rating "A")	7.50
RT-132	TRANSFORMER—Power Transformer (T-3) 25-60 cycles, 105-130 Volts (Rating "C")	10.50
RT-133	TRANSFORMER—Universal Power Transformer (T-3) 40-60 cycles, 105-130, 200-250 Volts (Rating "V")	9.00
RT-206	TRANSFORMER—AVC I.F. Transformer (C-66, C-67, C-68, C-70, C-71, L-35, L-36, R-31, R-33)	2.95
RT-207	TRANSFORMER—Signal I.F. Transformer (C-46, C-48, C-49, C-50, C-51, L-33, L-34, R-18, R-19)	3.10
RT-208	TRANSFORMER—Converter I.F. Transformer (C-39, C-40, C-41, C-42, C-43, C-44, L-31, L-32, R-12, R-13, R-14)	3.30
RT-501	TRANSFORMER—Interstage Audio Transformer (T-1)	2.95
RT-702	TONE CONTROL—Bass Tone Control, Potentiometer 250,000 ohms (R-22)	.95
RT-703	TONE CONTROL—Treble Tone Control, Potentiometer 250,000 ohms (R-23) and Power Switch (S-7)	1.10
RV-004	VOLUME CONTROL—Potentiometer, 250,000 ohms (R-42) and Rheostat 1,500,000 ohms (R-21)	1.30
RW-002	WINDOW—Dial Window	.15
RX-004	SCREW ASSEMBLY—Chassis Mounting Screws and Washers	.10

"SENTRY BOX" ASSEMBLY

RA-002	ASSEMBLY—Antenna Compartment Assembly Complete	10.25
RA-102	ASSEMBLY—R.F. Compartment Assembly Complete	13.75
RA-202	ASSEMBLY—Oscillator Compartment Assembly Complete	16.50
RB-010	BOARD—R.F. or Oscillator Compartment Terminal Board	.10
RB-012	BOARD—Antenna Terminal Board	.15
RB-103	BRACKET—Antenna Bracket Assembly	.75
RB-105	BRACKET—R.F. Bracket Assembly	.95
RB-112	BRACKET—Oscillator Bracket Assembly	1.25
RC-046	CAPACITOR—.02 Mfd. 200 Volt (C-24) Paper Dielectric	.25
RC-072	CAPACITOR—.05 Mfd. 200 Volt (C-3, C-8, C-11, C-16, C-19, C-22, C-25) Paper Dielectric	.25
RC-091	CAPACITOR—.05 Mfd. 400 Volt (C-12) Paper Dielectric	.30
RC-202	CAPACITOR—4 mmfd. (C-6, C-21, C-76, C-78) Mica Dielectric Moulded Case	.25
RC-204	CAPACITOR—15 mmfd. (C-76) Mica Dielectric Moulded Case	.25
RC-207	CAPACITOR—25 mmfd. (C-7) Mica Dielectric Moulded Case	.25
RC-209	CAPACITOR—40 mmfd. (C-28) Mica Dielectric Moulded Case	.25
RC-210	CAPACITOR—50 mmfd. (C-14, C-29) Mica Dielectric Moulded Case	.25
RC-275	CAPACITOR—335 mmfd. (C-32) Mica Dielectric Moulded Case	.30
RC-344	CAPACITOR—1300 mmfd. (C-33) Mica Dielectric Moulded Case	.35
RC-356	CAPACITOR—3600 mmfd. (C-36) Mica Dielectric Moulded Case	.50
RC-602	CAPACITOR—Permaliner Trimmer Capacitor 10-45 mmfd. (C-10, C-23, C-26, C-27, C-30)	.50
RC-603	CAPACITOR—Permaliner Trimmer Capacitor 5-25 mmfd. (C-1, C-2, C-5, C-9, C-13, C-15, C-18, C-31, C-35)	.50
RC-606	CAPACITOR—Permaliner Trimmer Capacitor 3-12 mmfd. (C-20, C-37, C-38)	.50
RC-702	CONDENSER—Three-gang Tuning Condenser (C-4, C-17, C-34)	4.25
RC-953	CUP—Permaliner Trimmer Capacitor Mounting Cup	.10
RG-001	GRID CAP—Grid Connection Cap, Pkg. of 5	.10
RG-100	GUARD—Terminal Strip Guard	.15
RI-002	INDEXING PLATE—Frequency Band Switch Indexing Plate	.80
RL-003	COIL—Antenna Coil, Band A (L-1, L-2)	$1.00
RL-004	COIL—Antenna Coil, Band B (L-3, L-4)	.70
RL-007	COIL—Antenna or R.F. Coil, Band E (L-9, L-10, L-19, L-20)	.55
RL-009	COIL—Antenna Coil, Band C (L-5, L-6)	.70
RL-011	COIL—Antenna Coil, Band D (L-7, L-8)	.65
RL-103	COIL—R.F. Coil, Band A (L-11, L-12)	1.60
RL-104	COIL—R.F. Coil, Band B (L-13, L-14)	.85
RL-110	COIL—R.F. Coil, Band C (L-15, L-16)	.75
RL-112	COIL—R.F. Coil, Band D (L-17, L-18)	.70
RL-203	COIL—Oscillator Coil, Band E (L-29, L-30)	.55
RL-206	COIL—Oscillator Coil, Band B (L-23, L-24)	.65
RL-207	COIL—Oscillator Coil, Band A (L-21, L-22)	.70
RL-212	COIL—Oscillator Coil, Band D (L-27, L-28)	.70
RL-211	COIL—Oscillator Coil, Band C (L-25, L-26)	.75
RR-007	RESISTOR—350 ohms, ¼ watt (R-2, R-6) Carbon Resistor, Pkg. of 5	.70
RR-015	RESISTOR—5000 ohms, ¼ watt (R-1, R-5) Carbon Resistor, Pkg. of 5	.70
RR-041	RESISTOR—75,000 ohms, ¼ watt (R-4, R-11) Carbon Resistor, Pkg. of 5	.70
RR-049	RESISTOR—100,000 ohms, ¼ watt (R-7) Carbon Resistor, Pkg. of 5	.70
RR-064	RESISTOR—500,000 ohms, ¼ watt (R-3, R-8) Carbon Resistor, Pkg. of 5	.60
RR-163	RESISTOR—2000 ohms, ½ watt (R-9, R-10) Carbon Resistor, Pkg. of 5	.70
RR-304	RESISTOR—0.8 ohm, ¼ watt (R-41) Flexible Resistor, Pkg. of 5	.70
RS-106	SHIELD—Oscillator Compartment Shield Can	.90
RS-107	SHIELD—R.F. Compartment Shield Can	.90
RS-108	SHIELD—Antenna Compartment Shield Can	.90
RS-200	SOCKET—Eight-pin Tube Socket, Pkg. of 5	.75
RS-303	SWITCH—Antenna or R.F. Band Switch (S-1, S-2, S-3, S-4)	1.20
RS-306	SWITCH—Oscillator Band Switch (S-5, S-6)	1.20
RX-002	CUSHION ASSEMBLY—Tuning Condenser Mounting Cushions, Nuts and Washers	.10

DIAL MECHANISM ASSEMBLY (See Fig. 8)

RB-108	BRACKET—Dual Lamp Bracket	.55
RB-114	BRACKET—Precision Tuning Indicator Bracket (14)	.15
RB-115	BRACKET—Mounting Bracket Assembly	.50
RC-802	CABLE—Metal Braid Dial Cable (12), Pkg. of 5	.55
RC-856	CORD—Dial Cord (11), Pkg. of 5	.65
RC-954	CAP—Scale Cap Assembly, Gear End (29)	.10
RC-955	CAP—Scale Cap Drive End (30)	.10
RC-961	CLAMP—Dial Pointer Stop Clamp	.20
RC-962	COLLAR—Precision Dial Shaft Collar, External (44)	.15
RC-963	COLLAR—Precision Dial Shaft Collar, Internal (45)	.15
RD-004	DIAL MECHANISM—Dial Mechanism complete	8.75
RD-006	DRIVE—Differential Reduction Drive	1.00
RD-009	DRUM—Tuning Condenser Drive Drum and Gear Assembly	.45
RD-010	DIAL—Precision Dial Assembly (20)	.60
RD-017	DIAL—Cylindrical Dial Scale	.75
RF-200	FASTENER—Dial Fastener (40), Pkg. of 10	.10
RG-002	GEAR—Dial Gear and Set Screws (89)	.15
RG-003	GEAR—Precision Dial Drive Gear (17)	.15
RG-004	GEAR—Precision Dial Backlash Gear (36)	.15
RG-200	GUIDE—Dial Pointer Guide (50), Pkg. of 5	.15
RM-001	METER—Tuning Meter (24)	3.50
RP-003	POINTER—Dial Pointer, Pkg. of 2	.15
RS-401	SPRING—Drum Spring (13), Pkg. of 2	.20
RS-402	SPRING—Precision Dial Backlash Spring (16)	.15
RS-403	SPRING—Dial Scale Spring (7), Pkg. of 2	.10
RS-500	STUD—Precision Dial Gear Stud	.20

SPEAKER ASSEMBLY

RB-008	BOARD—Cone Coil Lead Anchoring Terminal Board	.10
RC-903	CONE—Speaker Cone and Cone Coil (L-39)	1.50
RP-012	PLUG—Speaker Female Plug Connector	.20
RP-015	PLUG—Speaker Male Plug Connector	.20
RR-800	RING—Speaker Cone Clamping Ring, Pkg. of 4 segments	.30
RS-005	SPEAKER—10¼-in. Loud-speaker Complete with Output Transformer (L-38, L-39, L-40)	13.50
RT-407	TRANSFORMER—Output Transformer (T-2)	2.75

"Double-Doublet" Antenna System (No. 9500-A)

for

"All-Wave" Radio Receivers

Description of System

With the advent of "all-wave" radio receivers, the antenna installation became a fundamental rather than incidental problem. Short waves are used primarily because of their ability to travel great distances with relatively low transmitting power. Upon reaching the receiver, therefore, these waves are in general far weaker and fade much more severely than those from stations in the standard broadcast band (540 to 1500 kilocycles). Obviously, the antenna must perform very efficiently in the short-wave spectrum; it must be able to transfer signals to the receiver with negligible loss or *reliable* results will be practically impossible.

Short-wave broadcasting covers a very wide frequency range, being segregated by international agreement into four principal narrow bands located approximately at 19, 25, 31 and 49 meters. For any given length, an antenna will favor certain frequencies and tend to reject others. Antennas of the conventional single-wire type, therefore, are quite unsatisfactory for there is no one length which would operate with any degree of uniformity over the required range. The *double-doublet* antenna system, however, serves the purpose admirably.

As its name implies, this system incorporates two distinct *doublet-type* antennas. The doublets are of different lengths, being tuned to opposite ends of the short-wave broadcast range, and cross-connected so that each compensates for weak points of the other at various intervening frequencies. Signals intercepted by the doublets are fed to the receiver through a balanced, twisted-pair lead-in (hereinafter called the transmission line) and a specially-constructed receiver-coupling transformer. The length of the transmission line and coupling ratio of the transformer are correct to afford proper *electrical matching* for greatest energy transfer.

While natural static is almost negligible in the short-wave spectrum, "man-made" interference is often very severe. Such interference usually is of local origin radiated by the house-wiring or by external electrical apparatus including even the ignition systems of passing automobiles. It is "picked up" mainly by the antenna lead-in and so little or nothing can be done with ordinary types of antennas to prevent annoyance from that source. Doublet antennas, however, are particularly advantageous from a standpoint of noise reduction since the transmission line does not form an active part of the system but serves merely to transfer signals from the doublets to the receiver. In this *double-doublet* system, complete rejection of signals "picked up" along that length is achieved by means of a special shield in the receiver-coupling transformer.

There is yet another consideration involved. With an all-wave receiver, the antenna must not sacrifice performance in the standard broadcast and other low-frequency bands in order to obtain good short-wave reception. At frequencies below 6000 kilocycles, therefore, this antenna system is converted from its *double-doublet* form to one approximating the conventional "T-type" arrangement so that the transmission line acts as part of the effective length. This change-over is performed automatically by an electrical filter circuit built integral with the receiver-coupling transformer.

Installation

Although the design of this *double-doublet* antenna system may appear complicated, the installation is actually very simple. As shown by the main illustration (Figure 1), two fundamental arrangements are possible—that is, either horizontal or vertical suspension. The former is most common and perhaps preferable in that when so arranged, the system exhibits a better signal-to-noise ratio and is highly directional to local pickup. Because of this directional property, the doublets will intercept less and less interference as they are rotated toward a position where the span points toward the source of that interference. The vertical arrangement exhibits no directional effect, but often is advantageous when installation space is restricted.

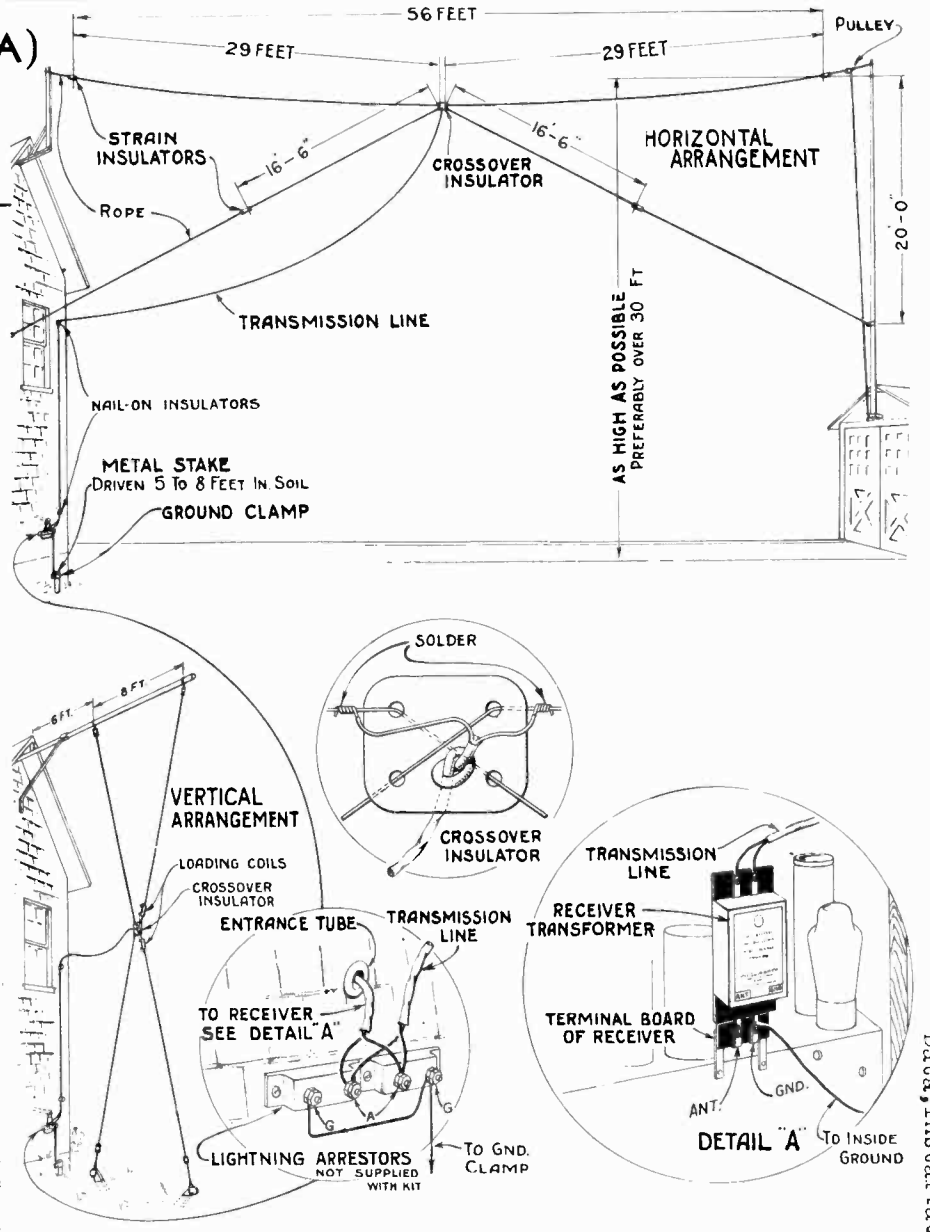


Figure 1—Plan of Installation

GENERAL ELECTRIC CO.

MODEL 9500A
Antenna System
Data, Installation

G. E. PAGE 7-41

Space Requirements

In its horizontal arrangement, the entire antenna system preferably should lie in one vertical plane as illustrated. This of course requires a straightaway span of approximately 56 feet since the halves of that doublet suspended between the uppermost points of support are each 29 feet long. If sufficient ground space for this purpose is not available, the overall span can be shortened to approximately 30 feet through the use of *loading coils*, as shown in Figure 2. By inserting one coil in each half of the higher doublet, its lengths can be made equal to those of the angular doublet (16½ feet), but the original tuning characteristics of the system will be retained. Loading coils are standard accessories procurable through your dealer.

Obviously, ground space also can be conserved by erecting the antenna so that the halves constitute the sides of a "V." Although this arrangement may eliminate the use of loading coils, it is not as satisfactory in performance and necessitates a third support for the system—that is, at the center. With loading coils, the system suffers a slight loss in efficiency only in the region of 31 meters, whereas the "V"-arrangement exhibits a uniform loss throughout the entire short-wave spectrum. This loss becomes larger as the internal angle of the "V" is decreased, reaching approximately 30 per cent at an angle of 90 degrees. An angle of less than 90 degrees should be avoided.

If ground space is very limited, the vertical form of suspension may be desirable. From a practical standpoint, it is improbable that the full antenna span of 56 feet could be employed except in rare cases. By using loading coils, however, the installation should be fairly simple.

Interference Considerations

Short-wave reception is believed by many to be inherently noisy. This assumption is incorrect since static from natural or atmospheric disturbances is much less severe on the short waves than in the standard broadcast band. Noise on these wavelengths is practically always of local origin and can be eliminated or at least greatly reduced with this *double-doublet* antenna system. To obtain the most benefit from its noise-reducing properties, however, the system should be installed with some forethought.

Interference "picked up" by the transmission line cannot affect the receiver. The doublets, therefore, should be erected well remote from sources of interference such as automobile highways, street-railway lines or motor-driven electrical appliances. In some cases, it may be necessary to locate the antenna proper as much as 500 feet distant from the receiver, adding one or more lengths of transmission line as required to the original length. To maintain the correct *electrical matching*, any excess length of transmission line should not be removed unless two or more full lengths have been added. If the required length is less than one or two full lengths, the excess amount should be coiled up neatly at the end nearest the receiver. As this line has a definite known impedance, do not use any random twisted-pair lamp cord for additional length; use only the genuine transmission line sold by your dealer.

Advantage also should be taken of the directional effect of the horizontal arrangement wherever possible. Least interference will be intercepted by the doublets when the span points toward the source of disturbance. This resource will be particularly helpful when the antenna cannot be removed from the field of influence, as in cases where a radio transmitter (such as an amateur station) is operating in the neighborhood.

Set-Up Procedure

Before attempting to set up this *double-doublet* antenna system, the intended plan of assembly should be well understood. First, examine the contents of the kit, referring to the following tabulation and to Figure 1.

Equipment—The following parts are supplied with the kit:

- 2 Rolls stranded antenna wire (each 46½ feet long).
- 1 Roll transmission line (80 feet long).
- 1 Receiver-coupling transformer.
- 2 Links (for coupling transformer).
- 1 Crossover insulator.
- 4 Strain insulators.
- 2 Nail-on insulators.
- 1 Entrance-tube insulator.
- 1 Ground clamp.

Assembly—The two doublet antennas which comprise this system are formed by the two rolls of stranded antenna wire. At the central (crossover) insulator, these wires are crossed to obtain four sections, two for one doublet each 29 feet long and two for the other doublet each 16½ feet long. An extra length of six inches is allowed at each end of the continuous wires for connection to the strain insulator, both (as noted in the preceding paragraph) being 46½ feet long. In threading these wires through the crossover insulator, be careful to have the cross occur on opposite sides of the insulator.

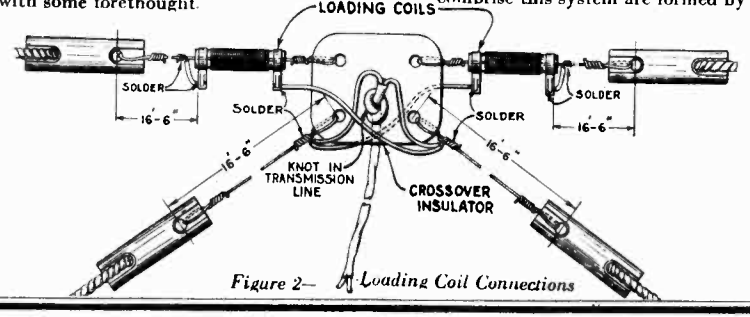


Figure 2— Loading Coil Connections

The transmission line is connected to the antenna wires at the junctions of the 29-foot and 16½-foot sections as shown by the enlarged view of the crossover insulator in Figure 1. A tinned spot has been placed on each roll of wire to denote the intended points of connection. When loading coils are employed, connect those coils and the transmission line in accordance with Figure 2. Use only rosin core solder for joints. Finally, attach the strain insulators and suspension ropes, then hang the system as a unit between the masts or intended points of support.

In the horizontal arrangement, it is important to avoid excessive tension in the wires of the higher doublet as breakage may occur. These wires *must not be stretched tightly* but should be allowed to sag so that the crossover insulator is from six to seven feet below the level of the strain insulators. The amount of sag obviously will be governed by the horizontal distance between the strain insulators and will be correct when the latter distance is adjusted to approximately 56 feet (30 feet if loading coils are employed). As an additional safeguard, some slack also should be left in the wires of the lower or angular doublet.

Connection to Receiver—The opposite end of the transmission line is brought to the receiver, using the nail-on insulators and entrance-tube insulator at points best suited to the installation. If lightning arrestors are desirable or required by local ordinance, two (low-capacity) units should be installed as shown in Figure 1. Simply remove a small strip of insulation from the transmission line conductors at the lightning arrestors, connect the bared portions one to each "antenna" terminal and continue on without cutting the transmission line. The ground terminals of the lightning arrestors are made common and connected (by means of the ground clamp furnished) to a metal stake or pipe driven five to eight feet into the soil.

Fasten the receiver-coupling transformer to the "ANT-GND" terminal board on the receiver chassis, using the two links supplied with the kit. Make certain to install the transformer correctly; the links should be attached to those terminals identified as "ANT" and "GND" at bottom of label on metal cover and the label should face outward from rear of receiver. Connect the end of the transmission line to the two terminals at top of transformer, leaving any additional length coiled up behind receiver. Finally, attach a wire from the "GND" link to a water-pipe in the basement or to the external metal stake if employed. The latter connection should be as short as possible and preferably made with No. 14 or larger, rubber-covered, stranded copper wire.

In receivers having no "ANT-GND" terminal board, fasten the coupling transformer to the cabinet as near as possible to the chassis. To insure most noise elimination, the connection from the "ANT" terminal of the transformer should be made directly to the chassis metal with a wire no longer than one inch. The connection from the "ANT" terminal to the radio-frequency input circuit of the receiver also should be no longer than necessary, but it is more important to avoid close proximity of this wire to dome (grid) clips of the radio tubes.

Replacement Parts

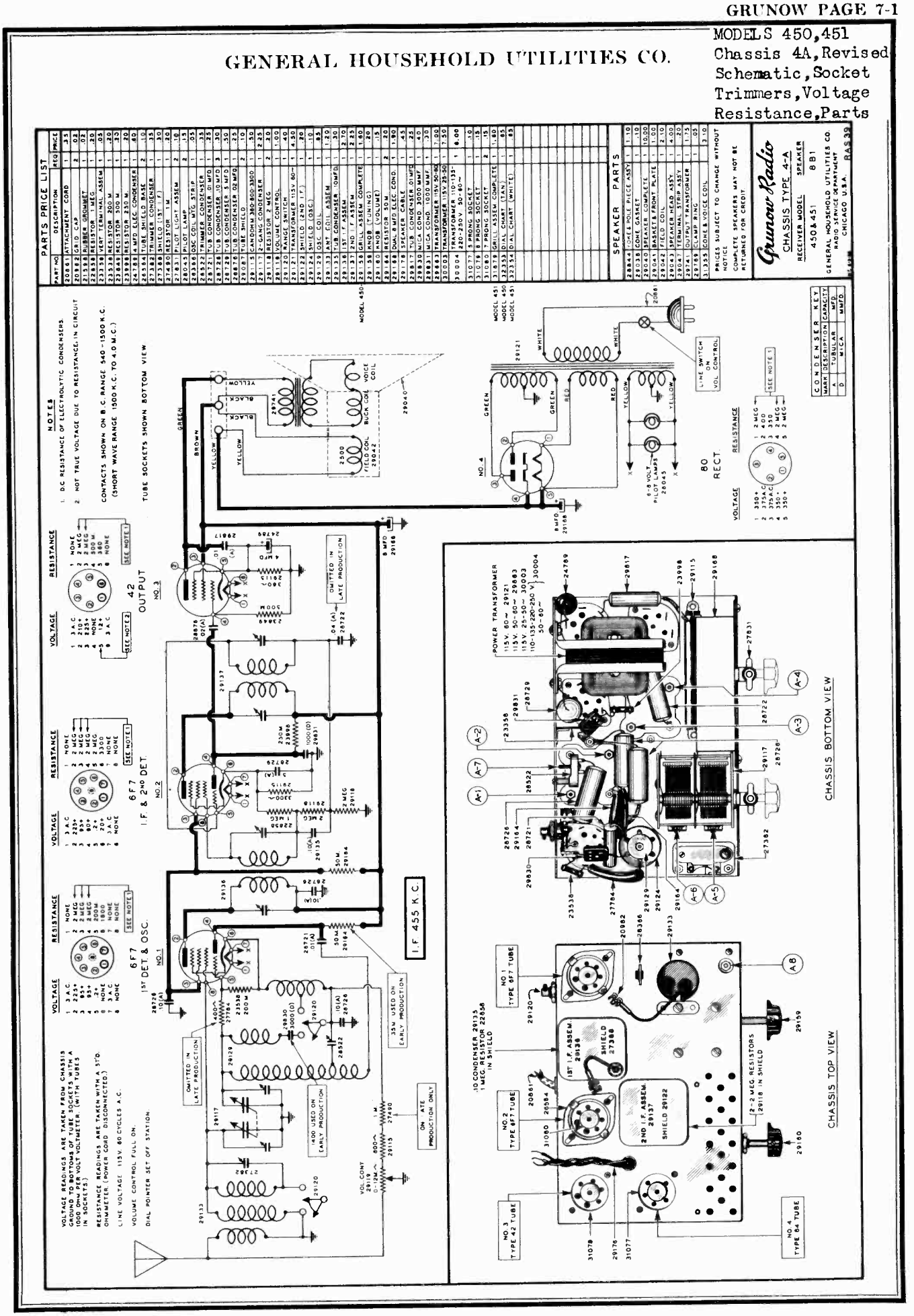
Stock No.	DESCRIPTION	List Price	Stock No.	DESCRIPTION	List Price
4326	Wire (antenna wire consisting of two rolls, each roll 46½ feet long)	$1.16	4759	Transmission line (special lead-in cable—240 feet long)	$10.44
4327	Insulator (antenna crossover insulator)—For replacement purposes only; item to be replaced must be returned with order	.10	4743	Transformer (receiver-coupling transformer)—For replacement purposes only; item to be replaced must be returned with order	2.95
4738	Transmission line (special lead-in cable—80 feet long)	3.48	4753	Link—Connection link—Connects receiver coupling transformer to "Ant-Gnd" terminal board on receiver chassis—Package of 10	.10
4744	Transmission line (special lead-in cable—160 feet long)	6.94	6958	Coils—Doublet loading coils—One pair	.60

Installation Service

Although this *double-doublet* antenna system is not difficult to install, many persons nevertheless prefer to have it erected by an experienced radio serviceman. Such a procedure often is necessary because of physical infirmities, lack of time and various other reasons. Upon request, your dealer or service engineer will make the complete installation at a nominal charge.

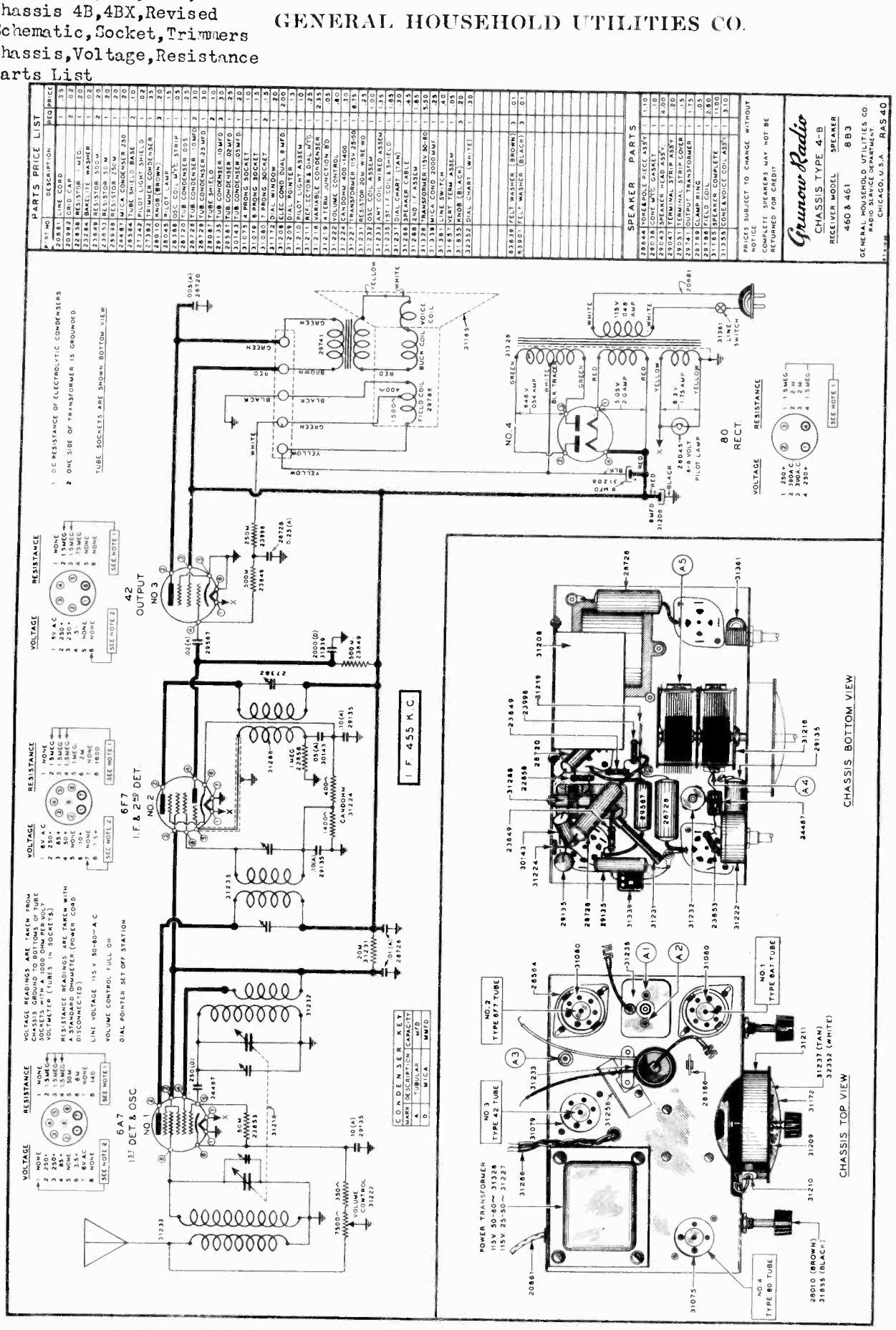
GENERAL HOUSEHOLD UTILITIES CO.

MODELS 450,451
Chassis 4A, Revised
Schematic, Socket
Trimmers, Voltage
Resistance, Parts



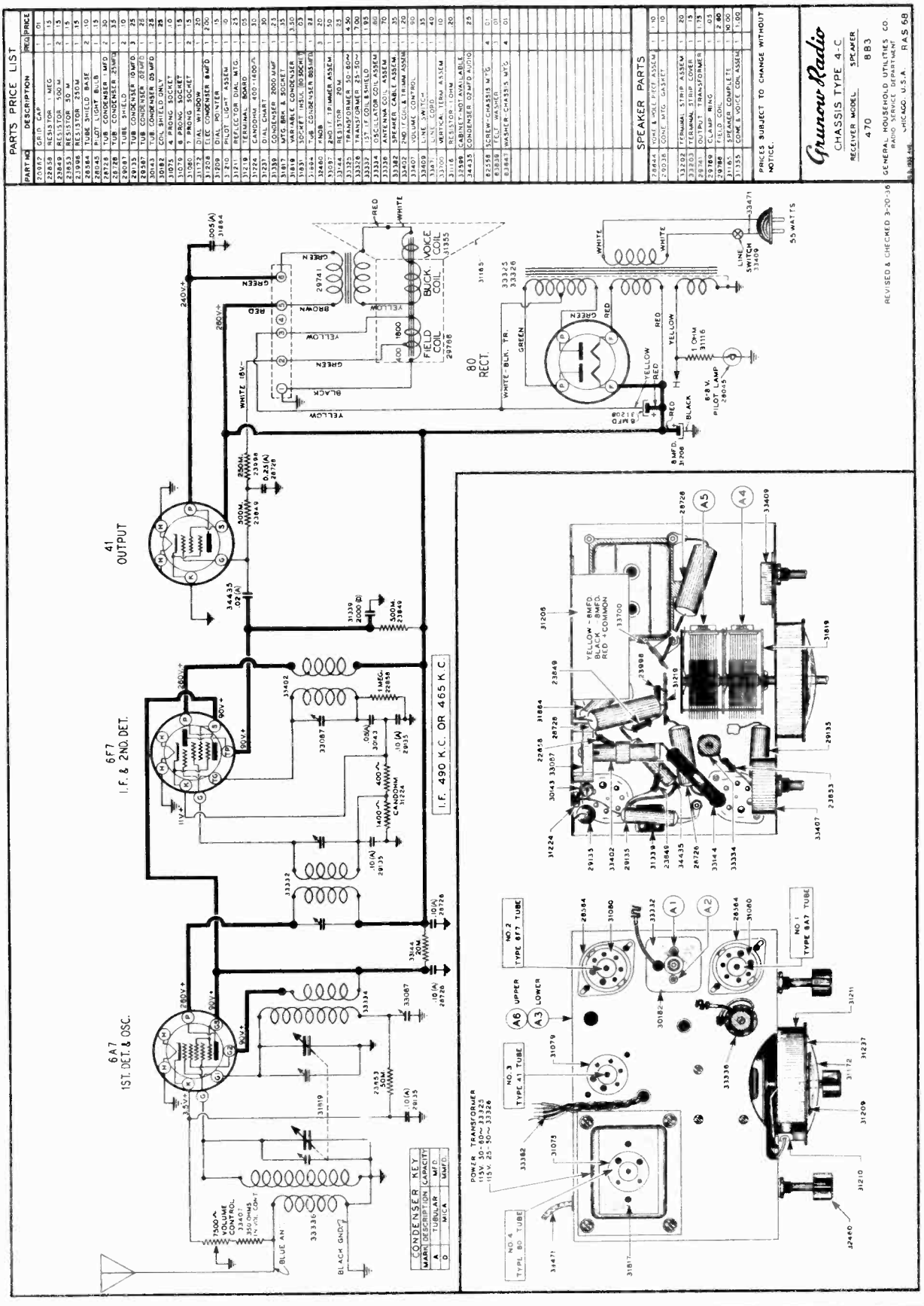
MODELS 460,461,460X,461X
Chassis 4B,4BX,Revised
Schematic,Socket,Trimmers
Chassis,Voltage,Resistance
Parts List

GENERAL HOUSEHOLD UTILITIES CO.



MODEL 470

GENERAL HOUSEHOLD UTILITIES CO. Chassis 4C, Revised Schematic, Socket Trimmers, Chassis, Parts



MODELS 580,581
Chassis 5G,Revised
Socket,Trimmers
Parts List,Notes

GENERAL HOUSEHOLD UTILITIES CO.

PARTS AND PRICE LIST

MODELS 580—581
CHASSIS 5G—5GX—5GZ

Part No.	Description	No. Used	Price
20962	Grid Cap	3	$ .01
23167	20 M Ohms ½ Watt Resistor	1	.20
23538	Resistor 200 M Ohm ½ Watt	2	.15
23849	Resistor 500 M Ohm ¼ Watt	1	.15
23850	Resistor 16 M Ohm 1 Watt	1	.20
23853	Resistor 50 M Ohm ¼ Watt	2	.15
24467	250 MMF Condenser	1	.20
27422	Insulating Washer	1	.02
27784	Resistor 400 Ohm ¼ Watt	2	.15
27831	Pilot Light Socket	2	.10
28045	Pilot Lamp	2	.15
28638	Pointer Screw	1	.02
28717	Condenser .002 Mfd. 700 V Tubular	1	.25
28723	Condenser .05 Mfd. 400 V Tubular	1	.30
28726	Condenser .1 Mfd. 400 Tubular	1	.30
28728	Condenser .25 Mfd. 200 V Tubular	1	.35
28793	Junction Box Connection Assem. 5802-3817 Z Only	1	1.00
29065	Electrolytic Condenser Strap	2	.03
29074	Dual Condenser (50-250 Mmf.	1	.20
29083	Condenser 50 Mmf.	1	.20
29135	Condenser .1 Mfd. 200 V Tubular	3	.25
29164	Resistor 50 M Ohm ½ Watt	1	.15
29256	Tube Shield Base	3	.05
29396	Drive Sleeve	1	.10
29476	Ball Race	1	.35
29485	Drive Shaft Thrust Spring	1	.05
29521	11/32 Ball	2	.02
29522	Spring for Drive String	4	.02
29524	Antenna Binding Post Assembly	1	.10
29551	Window	1	.15
29552	Window Retaining Ring	1	.10
29553	Cabinet Escutcheon	1	.60
29554	Condenser .02 Mfd. 400 V Tubular	2	.25
29567	Escutcheon Retaining Ring	1	.20
29612	Tube Shield Body	3	.15
29832	Reflector Riveted Assembly	1	.50
29833	Reflector Mounting Bracket	1	.15
30053	Dial Light Bracket	1	.10
30054	Terminal Board	2	.10
30092	Drive String & Eyelet Assembly	1	.10
30099	Condenser .05 Mfd. 200 V Tubular	1	.25
30143	Terminal Board (4 Lug)	1	.10
30152	Outer Drive Shaft	1	.35
30172	Inner Drive Shaft	1	.10
30173	Coil Shield & Eyebolt Assem.	2	.25
30182	4-Prong Socket	1	.10
31075	6-Prong Socket	3	.15
31079	7-Prong Socket	1	.15
31080	Drive Shaft Mounting Bracket Assem.	1	.30
31193	Tube Shield Cap	3	.10
31215	Window Gasket	1	.05
31360	Condenser Insulating Shield	1	.10
31424	Drive Drum, Hub and Gear Assem.	1	1.10
31710	Gear Spring	2	.05
31714	Pinion, Gear & Adjusting Plate Assem.	1	.55
31726	Pointer (Hour Hand)	1	.10
31775	Terminal Board	1	.10
31777	Resistor 2 M ¼ Watt	2	.15
31864	Condenser .005 Mfd. 700 V Tubular	1	.25
31868	Condenser .003 Mfd. 700 V Tubular	1	.25
31870	Dial Cord	3	.20
32444	Knob (For Model 580)	1	.20
32465	Knob (For Model 580 Range Switch)	1	.20
32693	Resistor (Model) 3 Watt	2	.15
32858	Mounting Foot Assem.	4	.25
32865	Electrolytic Condenser Strap	1	.04
32987	12 Mfd. 25 V Dry Electrolytic Cond.	1	.75
33022	Power Transf. 25-50 Cycle, 115 V	1	7.00
33025	Power Transf. 110-135-220-250 V. 50-60 Cycle	1	7.00
33039	Power Transf. 50-60 Cycle, 115 V	1	5.00
33045	1st I.F. Coil & Shield Assem.	1	1.75
33049	2nd I.F. Coil & Shield Assem.	1	1.35
33065	Oscillator Padder Condenser	1	.40
33070	Knob for Model 581	3	.20
33071	Knob for Model 581 (Range Switch)	1	.20
33082	Transformer Mounting Spacer	4	.03
33135	Resistor 4 M Ohm 1 Watt	1	.20
33262	Condenser 1065 Mmf.	1	.20
33278	Wave Filter & Condenser Assem.	1	.80
33288	Antenna Coil & Shield Assem.	1	1.65
33292	Shield Cover Only	2	.35
33294	Oscillator Coil & Shield Assem.	1	1.70
33296	Trimmer Assem. (Ant.)	1	.40
33297	Trimmer Assem. (Osc.)	1	.40
33298	Spacer for Trimmers	4	.04
33299	Range Switch	1	1.35
33300	Volume Control	1	1.05
33301	Tone control switch	1	.45
33367	Variable Condenser	1	3.00
33368	Decalcomania—Range Letters	1	.10
33369	Electrolytic Condenser Cathode Terminal	1	.02
33371	Electrolytic Condenser 12 Mfd. 450 V	1	1.20
33372	Electrolytic Condenser 10 Mfd. 250 V	1	.85
33469	Condenser .0058 Mfd. 700 V. Tubular	2	.25
33471	18 Mfd.—300 V. Wet Electrolytic Cond.	1	.90
33853	Attach. Cord	1	.40
34435	Speaker Cable	1	.55
34446	Condenser .02 Mfd. 400V Tubular	1	.25
34466	Condenser .05 Mfd. 400 V Tubular (Audio)	1	.35
34467	Dial Chart	1	.60
34468	Push Pull Pinion Assem.	1	.40
61207	1" x 8-32 Screw (Chassis Mtg.)	4	.01
63011	Set Screw (Drive Sleeve)	2	.03
63014	5/16 x 10-32 Set Screw	2	.02
63838	Felt Washer for Model 581	4	.01
63839	Felt Washer for Model 580	4	.01
63863	Flat Washer (Chassis Mtg.)	4	.01

8B4 SPEAKER PARTS

28844	Yoke & Pole Piece Assem.	1	1.20
28849	Spacer	2	.02
29038	Gasket	1	.10
29041	Basket & Front Plate Assem.	1	1.00
29047	Terminal Strip Assem.	1	.30
29051	Terminal Strip Cover.	1	.10
29052	Terminal Strip Cover Insul.	1	.05
29741	Output Transformer	1	1.75
29769	Clamp Ring	1	.05
31355	Cone & Voice Coil Assem.	1	1.00
31467	8B4 Speaker Complete	1	10.00
31468	Field Coil Assem.	1	3.00

Prices subject to change without notice.

SERVICE DATA

CONTINUITY AND VOLTAGE

Continuity and voltage readings should be taken from the underside of the chassis. The values given on the schematic diagram are average and allow the service man to make a quick check of the chassis constants. The socket layouts given on the schematic diagram show each socket from the underside.

THE RANGE SWITCH

The Range switch is a simple four pole triple throw switch with its contacts in a convenient position over the coil forms allowing operation with very short wire leads.

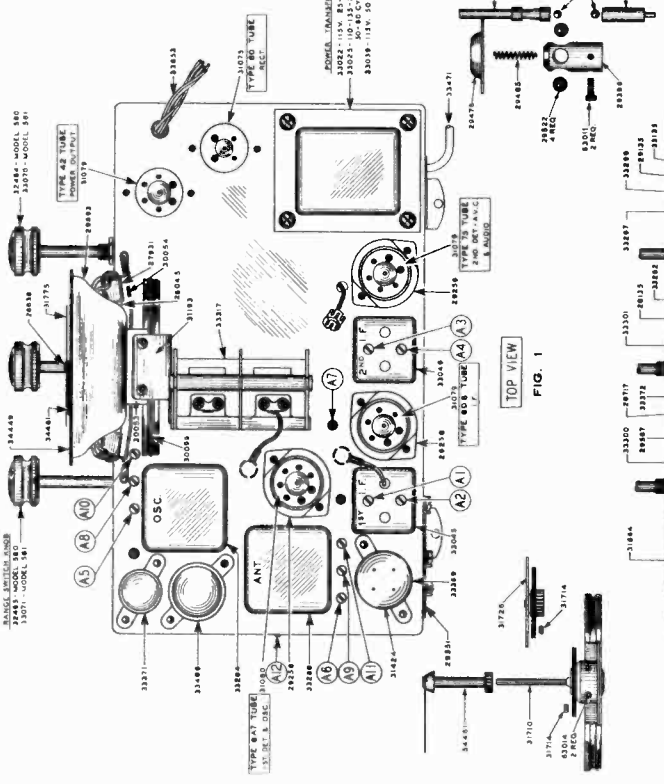


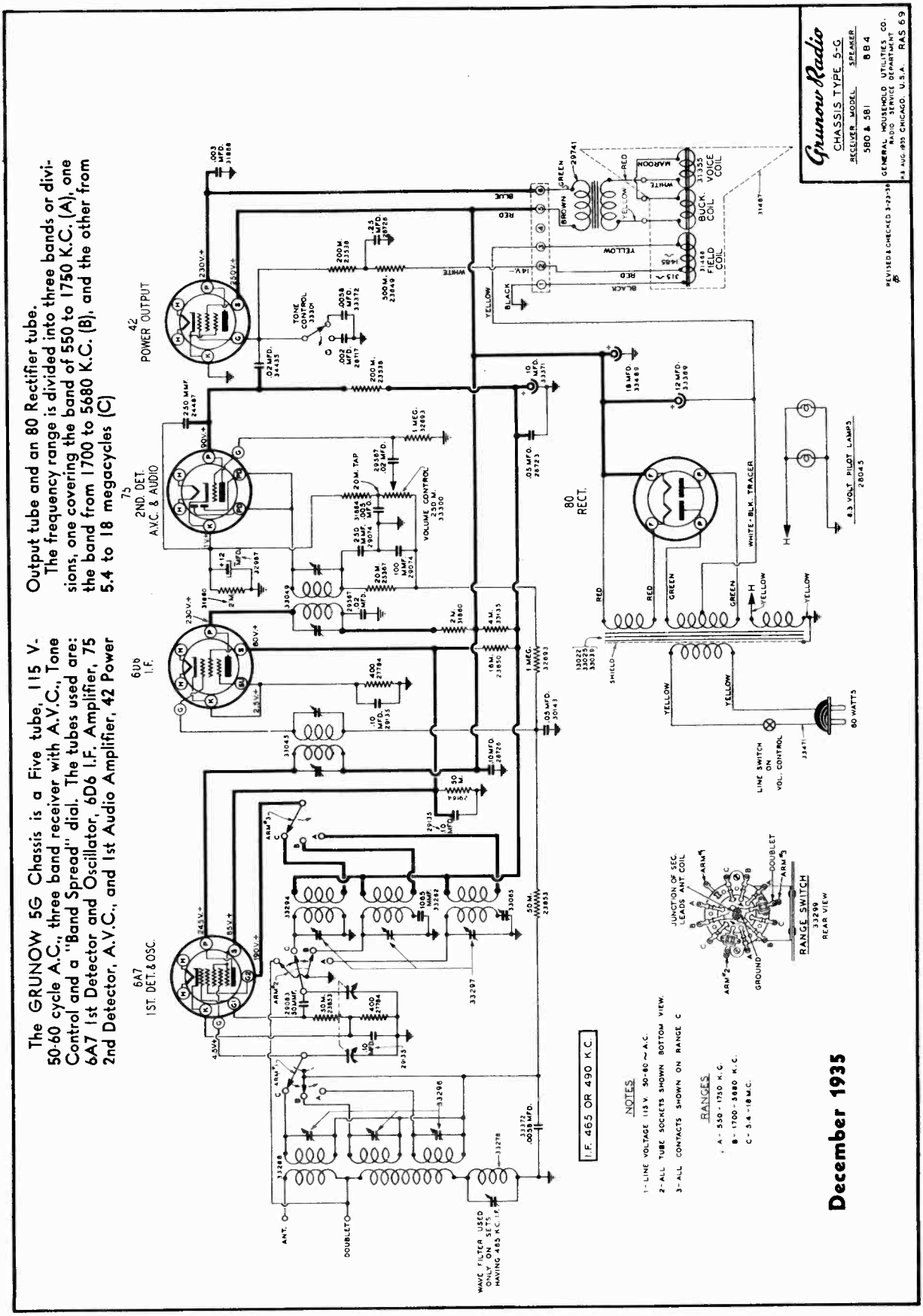
FIG. 1

FIG. 2

GENERAL HOUSEHOLD UTILITIES CO.

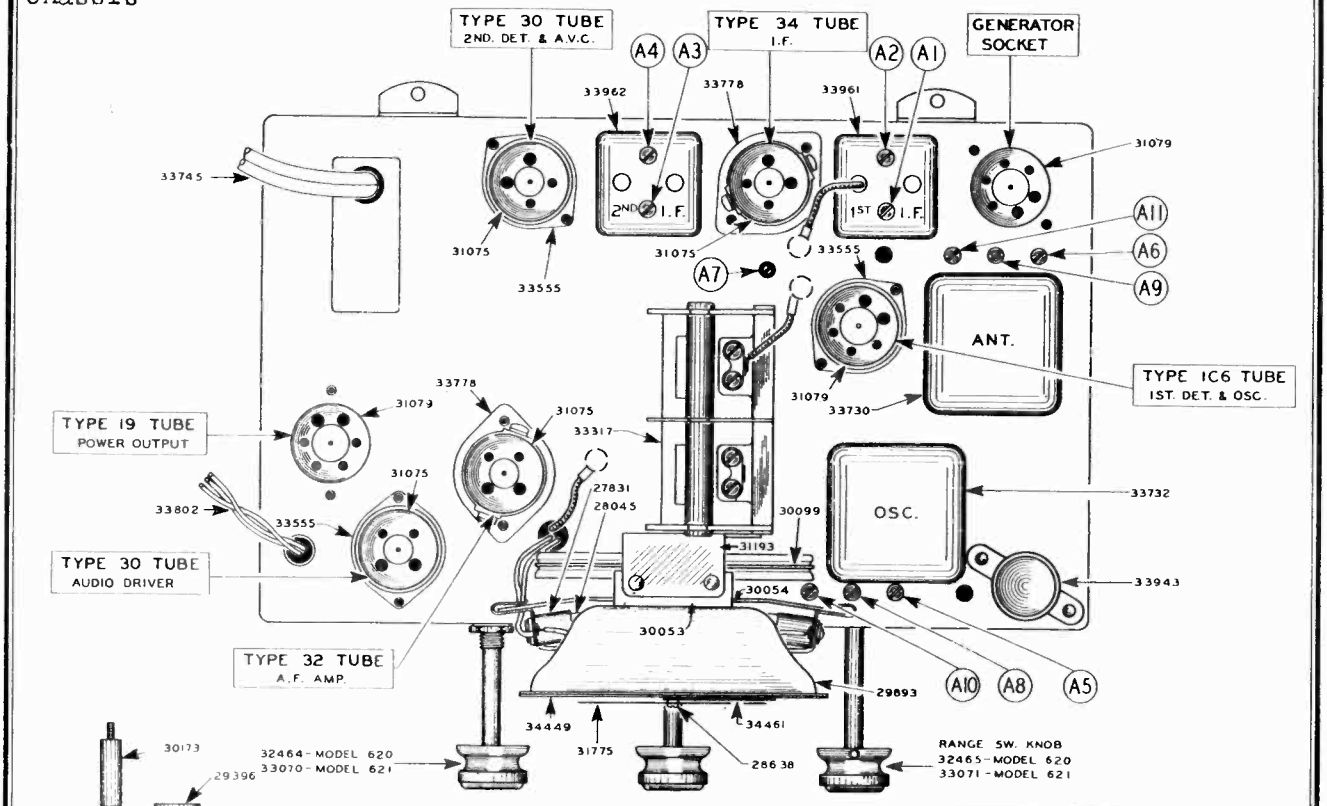
MODELS 580,581
Chassis 5G,Revised
Schematic,Voltage
Notes

The GRUNOW 5G Chassis is a Five tube, 115 V. 50-60 cycle A.C., three band receiver with A.V.C., Tone Control and a "Band Spread" dial. The tubes used are: 6A7 1st Detector and Oscillator, 6D6 I.F. Amplifier, 75 2nd Detector, A.V.C., and 1st Audio Amplifier, 42 Power Output tube and an 80 Rectifier tube. The frequency range is divided into three bands or divisions, one covering the band of 550 to 1750 K.C. (A), one the band from 1700 to 5680 K.C. (B), and the other from 5.4 to 18 megacycles (C)



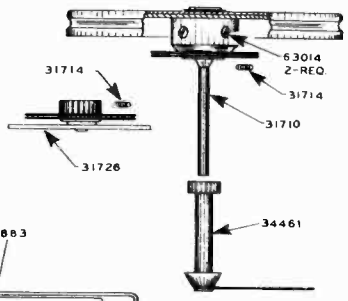
MODELS 620,621
Chassis 6HB
Socket,Trimmers
Chassis

GENERAL HOUSEHOLD UTILITIES CO.



TOP VIEW

FIG. 1



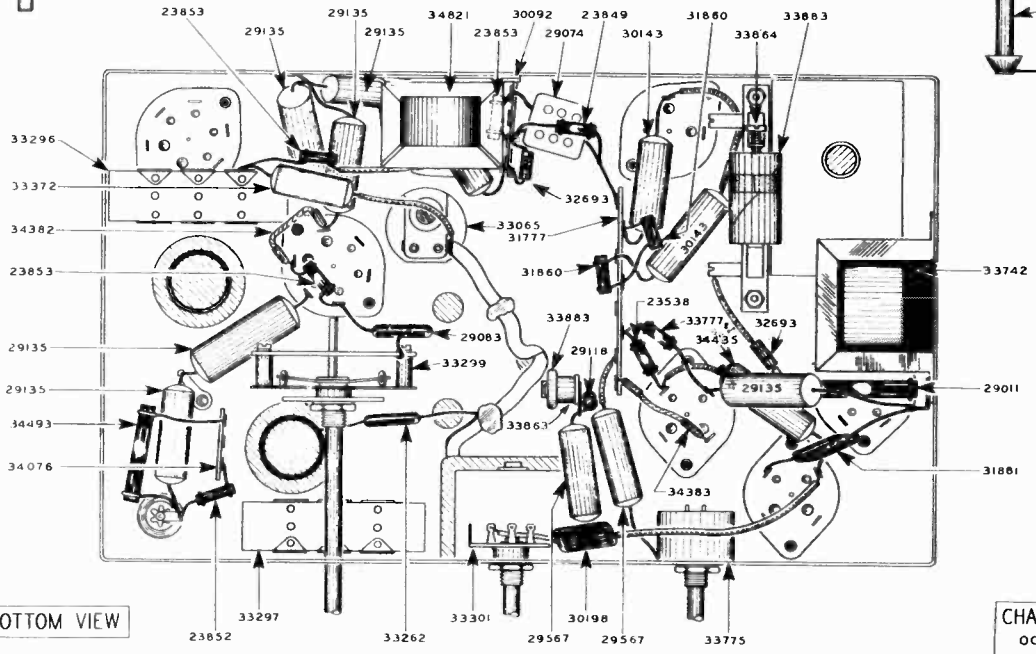


FIG. 2

CHASSIS 6HB
OCT. 1935
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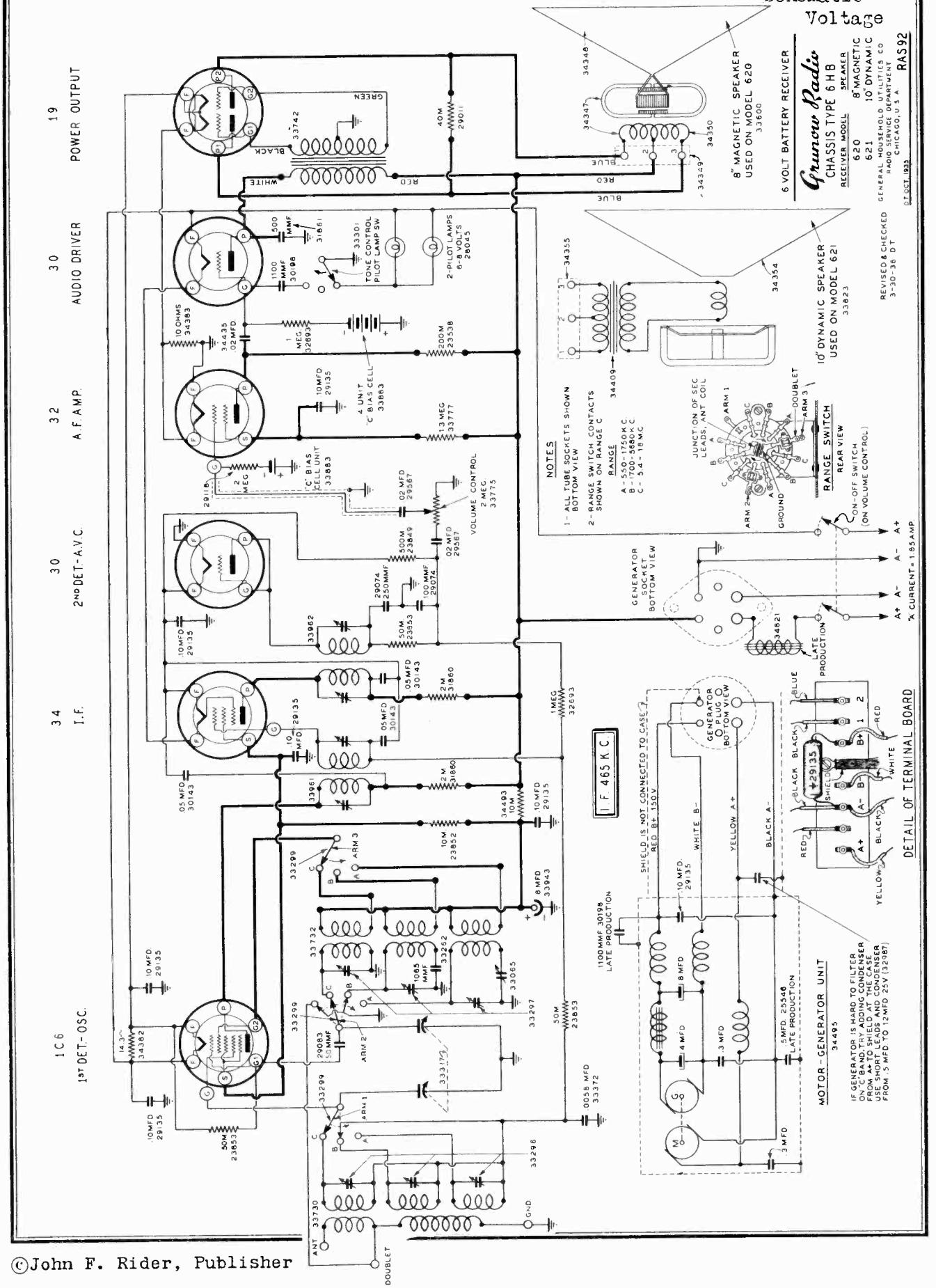
GENERAL HOUSEHOLD UTILITIES CO.

MODELS 620, 621
Chassis 6HB
Schematic
Voltage



MODELS 620, 621
Chassis 6HB
Alignment, Parts

GENERAL HOUSEHOLD UTILITIES CO.

PARTS AND PRICE LIST

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 620—621
CHASSIS 6HB

Part No.	Description	No. Used	Price
20962	Grid Cap	3	$ .01
23538	Resistor 200M Ohm 1/4 Watt	1	.15
23849	Resistor 500M Ohm 1/4 Watt	1	.15
23852	Resistor 10M Ohm 1/4 Watt	1	.15
23853	Resistor 50M Ohm 1/4 Watt	3	.15
25546	Condenser .5 Mfd. Tubular	1	.50
27831	Socket Assembly, Pilot Light	2	.10
27839	Plug (Motor Generator)	1	.35
28045	Lamp, Pilot 6.8 V	2	.15
28638	Pointer Screw (Dial)	1	.02
29011	Resistor 40M Ohm 1-Watt	1	.20
29074	Condenser 100-250 MMF (Mica) (Dual)	1	.30
29083	Condenser 50 MMF (Mica)	1	.20
29118	Resistor 2 Meg. 1/4 Watt	1	.20
29135	Condenser .1 Mfd. 200 V Tubular	6	.25
29396	Drive Sleeve	1	.35
29476	Ball Race	1	.10
29485	Thrust Spring, Drive Shaft	1	.05
29521	Balls, 3/16	2	.02
29522	Balls, 11/32	4	.02
29524	Spring (Drive String)	1	.10
29551	Binding Post, Antenna	1	.10
29552	Window, Dial	1	.15
29553	Ring, Window Retaining	1	.10
29554	Escutcheon	1	.60
29567	Condenser .02 Mfd. 400 V. Tubular	2	.25
29612	Ring, Escutcheon Retaining	1	.20
29893	Reflector Riveted Assem.	1	.50
30053	Mounting Bracket, Reflector	1	.15
30054	Bracket, Dial Light	1	.10
30092	Terminal Board, Junction (4 Lug)	1	.10
30099	Drive String & Eyelet Assem.	1	.10
30143	Condenser .05 Mfd. 200 V Tubular	3	.25
30172	Drive Shaft Outer	1	.35
30173	Drive Shaft, Inner	1	.10
30182	Shield & Eyebolt Assem. (1st & 2nd I.F.)	2	.25
30198	Condenser 1100 MMF (Mica)	1	.25
31075	Socket, 4 Prong	4	.10
31079	Socket, 6 Prong	3	.15
31193	Drive Shaft Bearing Bracket	1	.30
33070	Knob (Model 621)	3	.20
33071	Knob (Range Switch) (Model 621)	1	.20
33262	Condenser 1065 MMF (Mica)	1	.20
33292	Shield & Eyebolt Assem. (Ant. & Osc.)	2	.35
33296	Trimmer Assem. (Red Dot) Ant.	1	.40
33297	Trimmer Assem. Osc.	1	.40
33299	Range Switch	1	1.35
33301	Tone Control & Pilot Light Switch	1	.45
33317	Condenser, Variable	1	3.00
33367	Decalcomania, Range Letters	1	.10
33372	Condenser .0058 Mfd. 700 V Tubular	1	.25
33553	Tube Shield Body	1	.10
33554	Tube Shield Cap	3	.02
33555	Tube Shield Base	3	.02
33585	Tube Shield Body (Short)	2	.10
33730	Antenna Coil & Shield Assembly	1	1.65
33732	Oscillator Coil & Shield Assembly	1	1.70
33742	Transformer, Audio Input	1	1.80
33745	Cable, Assem. Battery, Filament	1	.75
33746	Cable & Plug Assem. (Motor Generator)	1	1.00
33775	Volume Control	1	1.10
33777	Resistor 1.3 Megohm 1/4 Watt	1	.15
33778	Tube Shield Base	2	.02
33779	Tube Shield Body	2	.10
33802	Cable, Speaker	1	.15
33830	Clip Battery Connection	2	.20
33863	Mounting Strip (Grid Cell) (1)	1	.15
33864	Mounting Strip (Grid Cell) (4)	1	.35
33883	Cell, (Grid Bias)	5	.25
33943	Condenser 8 Mfd. 150 V. Wet. Elect.	1	.80
33957	Cable Only (Motor-Generator)	1	.65
33961	1st I.F. Coil & Shield Assem.	1	1.75
33962	2nd I.F. Coil & Shield Assem.	1	1.35
34076	Term. Board Junction (3 Lug)	1	.10
34382	Resistor 14.3 Ohms 1 Watt	1	.20
34383	Resistor 10M Ohms 1/2 Watt	1	.15
34435	Condenser .02 Mfd.—400 V Tubular (Audio)	1	.25
34449	Dial Chart	1	.50
34461	Pointer & Pinion Assem. (Minute Hand)	1	.40
34493	Resistor 10 Ohm 1/2 Watt (Flex.)	1	.20

SERVICE DATA

CONTINUITY AND VOLTAGE

Continuity and voltage readings should be taken from the underside of the chassis. The values given on the schematic diagram are average and allow the service man to make a quick check of the chassis constants. The socket layouts given on the schematic diagram show each socket from the underside.

THE RANGE SWITCH

The Range switch is a simple four pole triple throw switch with its contacts in a convenient position over the coil forms allowing operation with very short wire leads. The 6HB Chassis uses a 4 unit "C" Bias cell in the grid lead of the 30 Audio Driver tube, and a single unit Bias cell in the grid of the 32 A.F. Amplifier tube.

These cells will, in time, have to be replaced, and in so doing, be sure that the carbon (+) side of the cell is connected to the ground side of the cell terminal clip.

An indication of a faulty cell will be distorted tone quality and the quickest check is a substitution of the old cells with new ones. For testing purposes a "C" battery may be used — using a 1½ volt battery in place of the single cell, and a 4½ volt battery in place of the 4 unit cell.

The bias cell has a voltage of about 1.2 volts, but due to their low current output they cannot be measured by any ordinary volt meter.

CIRCUIT ALIGNMENT PROCEDURE

Do not attempt to align the 6HB Chassis without proper equipment. Alignment condensers are shown in the accompanying illustrations, and are numbered in order of procedure.

1. EQUIPMENT:
   (A) Test Oscillator.
   A modulated Oscillator capable of producing signals at the I.F., Broadcast and Short-Wave frequencies is necessary for alignment of the 6H8 Chassis.
   (B) Insulated Screw Driver—(All bakelite or fibre) about 6" long.
   (C) Output Meter.
   This may be any of the standard Output Meters, but should be sufficiently sensitive to provide a good deflection at low signal strength.
   (D) Coupling Means.
   Coupling Condensers of 200 mmf., .25 mfd., and a 400 Ohm resistor should be used when coupling oscillator to receiver during alignment as specified in the procedure.
   (E) The receiver should be aligned in a location free from local interference (interference caused by motors, flashers, automobile ignition, etc.) as high frequency disturbances will cause difficulties when the short wave section is being adjusted. (A screen room is to be recommended.)
2. DIAL SETTING:
   Turn dial knob until condensers are fully meshed. The dial pointer (Hour Hand) should be on the horizontal line of the dial, pointing to 9 and 3 o'clock. The minute hand should be at 12 o'clock or in a vertical position.
3. I. F. ALIGNMENT:
   (A) Connect signal lead of test oscillator to grid of 1C6 (1st Detector tube) through .25 mfd. condenser. Connect the ground lead to the chassis.
   (B) Set Dial Pointer to 1400 K.C. and range switch on position "A".
   (C) Place test Oscillator in operation at 465 K.C. Turn receiver volume control and tone control to maximum.
   (D) Attenuate test Oscillator output to lowest value, consistent with obtaining a readable indication on output meter.
   (E) Adjust four I.F. Trimmers, A1, A2, A3, A4 located on the I. F. Transformers on top of Chassis, Fig. (1), until maximum output is obtained. During alignment, maintain as low a value of signals as will allow obtaining of accurate adjustment.
4. 1400 K.C. ALIGNMENT:
   (A) Connect signal lead of test oscillator through 200 mmf. condenser to Antenna binding post.
   (B) Connect the test oscillator ground lead to the ground connection of chassis.
   (C) Place test oscillator in operation at 1400 K.C.
   (D) Turn dial pointer to 1400 K.C.
   (E) Turn range switch to range "A".
   (F) Adjust broadcast oscillator trimmer A5, Fig. (1), to maximum output.
   (G) Adjust 1st Det. Trimmer (A6), Fig. (1), to maximum output.
5. 600 K.C. ALIGNMENT:
   (A) Place test oscillator in operation at 600 K.C.
   (B) Tune in signal to maximum (this point does not have to be exactly at 600 K.C. dial setting).
   (C) Adjust the 600 K.C. Padding Condenser (A7), Fig. (1), (which is on top of Chassis to the rear of variable condenser) in direction of signal increase. At some time rock the tuning condenser back and forth through resonance while adjusting padding condenser until maximum output is obtained.
6. RECHECK 1400 K.C. ALIGNMENT.
7. 5000 K.C. ALIGNMENT:
   (A) Set range switch at "B".
   (B) Place test Oscillators in operation at 5000 K.C.
   (C) Turn Dial Pointer to 5000 K.C.
   (D) Adjust Set Oscillator Trimmer (A8), Fig. (1), to maximum output.
   (E) Adjust Detector Trimmer (A9) Fig. (1) to maximum output.
8. 18 M.C. ALIGNMENT:
   (A) Connect signal lead of test oscillator through 400 Ohm resistor to Antenna binding post of Chassis.
   (B) Connect the ground lead to ground connection of Chassis.
   (C) Set range switch to range "C" and turn dial pointer to 18 M.C.
   (D) Place test oscillator in operation at 18 M.C.
   (E) Adjust set Oscillator Trimmer (A10), Fig. (1), to maximum output.
   (F) Adjust Detector Trimmer (A11), Fig. (1), to maximum output.
   (G) On the 18 M.C. Oscillator Alignment it will be noted that there are two settings at which the signal will be received. Use the lower of the images for alignment point, that is, the setting giving most capacity or the point at which the trimmer screw is farthest in.

31360	Gasket, Window	1	.05
31710	Drive Drum, Hub & Gear Assem.	1	1.10
31714	Spring (Gear)	2	.05
31726	Pinion Gear & Adjusting Plate Assem.	1	.55
31775	Pointer (Hour Hand)	1	.10
31777	Terminal Board, Junction (8 Lug)	1	.10
31860	Resistor 2M Ohm 1/4 Watt	2	.15
31861	Condenser 500 MMF (Mica)	1	.20
32464	Knob (Mod. 620)	3	.20
32465	Knob (Range Sw.) (Mod. 620)	1	.20
32518	Cabinet (Model 620)	1	
32596	Cabinet (Model 621)	1	
32693	Resistor 1 Meg. Ohm 1/3 Watt (Insul)	2	.15
32858	Mtg. Foot Assy. (Rubber)	4	.25
32865	Clamp, Electrolytic Mtg. (1")	1	.05
33065	Condenser, Osc. Padder 375 MMF	1	.40
34495	Motor Generator & Cable Assem.	1	25.00
34821	"A" Choke (Iron Core)	1	1.15
61207	1" x 8-32 Screws (Chassis Mtg.)	4	.01
63839	Washer, Felt-Knobs	4	.02
63863	Flat Washer—Chassis Mtg.	4	.01

SPEAKER PARTS

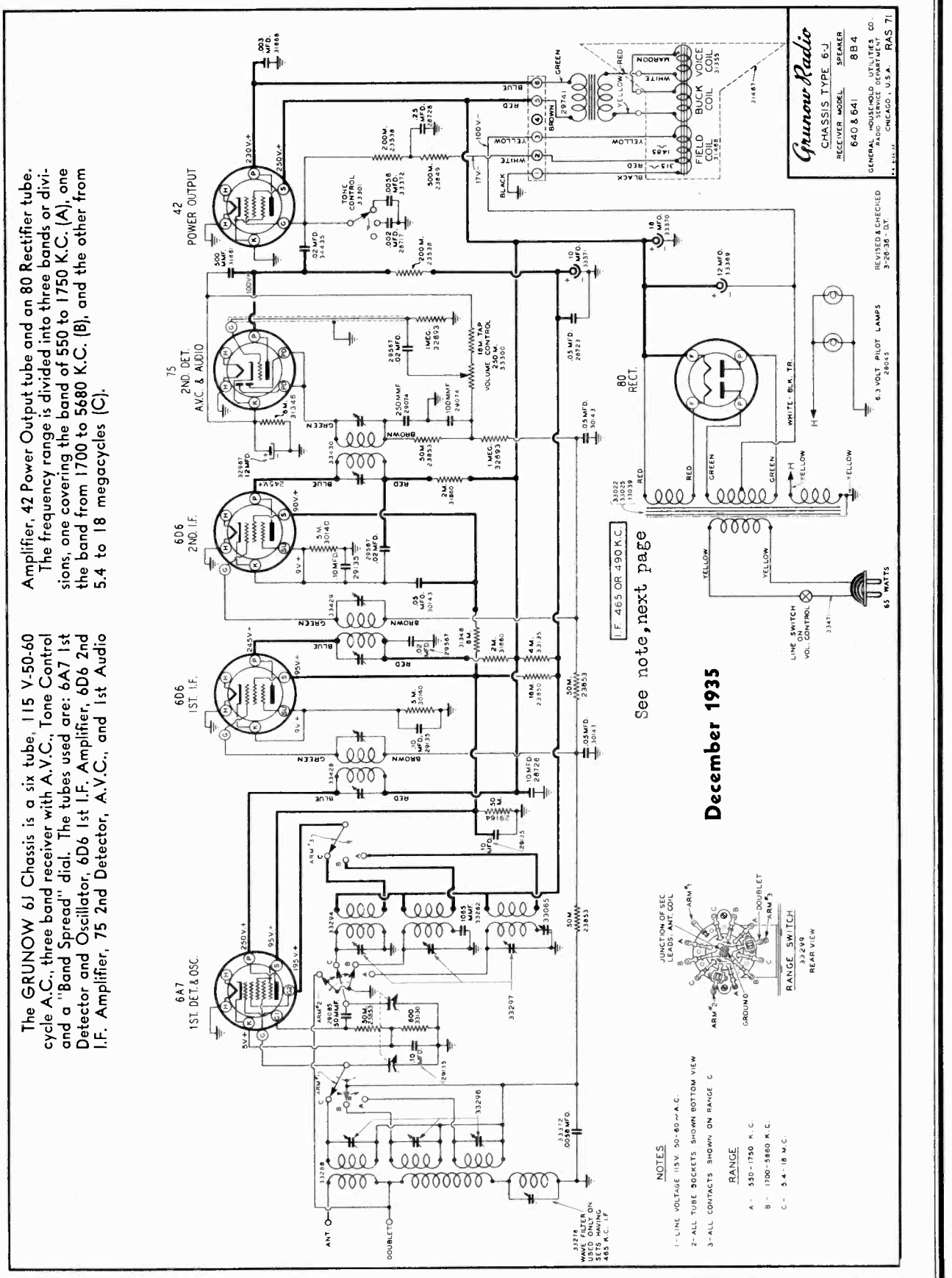
33600	Speaker 8" Magnetic (Model 620)	1	7.75
34347	Motor Drive Assy. with Coil Comp.	1	6.00
34348	Cone & Apex Assy. (620)	1	1.50
34349	Terminal Strip Assy. (620)	1	.15
34350	Motor Coil Only (620)	1	1.50
33823	Speaker 10" P.M. (Mod. 621)	1	12.00
34409	Speaker Transformer (621)	1	2.35
34354	Cone & Voice Coil Assy. (621)	1	3.50
34355	Transformer Terminal Strip	1	.15

GENERAL HOUSEHOLD UTILITIES CO.

MODELS 640,641
Chassis 6J,Revised
Schematic,Voltage

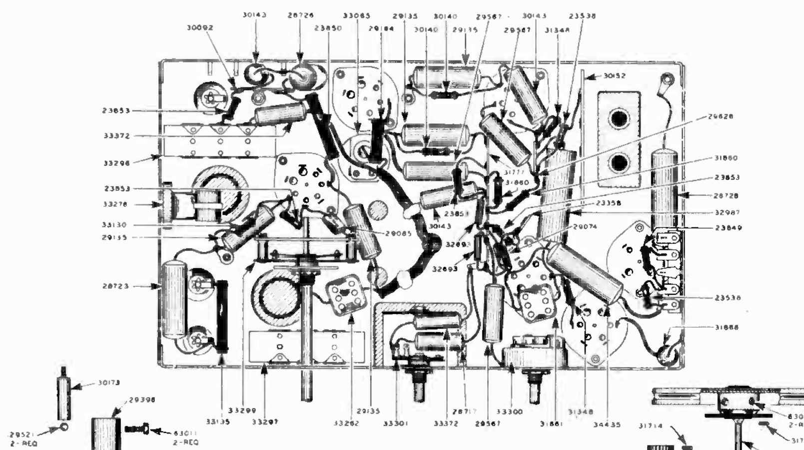
The GRUNOW 6J Chassis is a six tube, 115 V-50-60 cycle A.C., three band receiver with A.V.C., Tone Control and a "Band Spread" dial. The tubes used are: 6A7 1st Detector and Oscillator, 6D6 1st I.F. Amplifier, 6D6 2nd I.F. Amplifier, 75 2nd Detector, A.V.C., and 1st Audio

Amplifier, 42 Power Output tube and an 80 Rectifier tube. The frequency range is divided into three bands or divisions, one covering the band of 550 to 1750 K.C. (A), one the band from 1700 to 5680 K.C. (B), and the other from 5.4 to 18 megacycles (C).

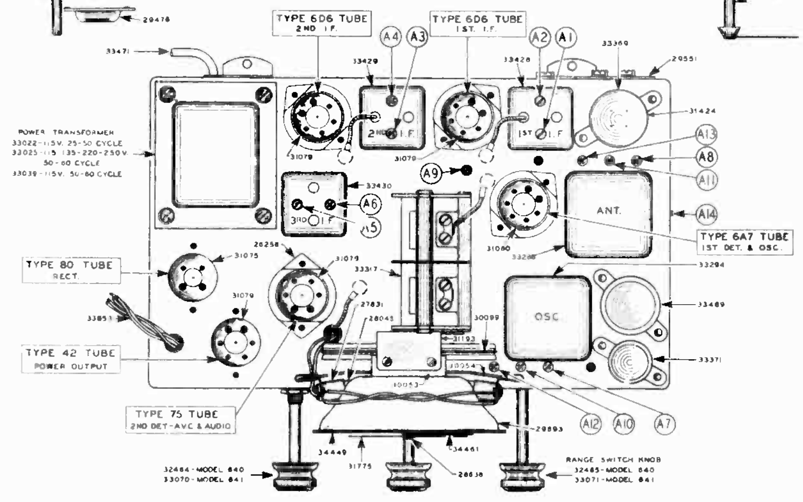


MODELS 640,641
Chassis 6J,Revised Socket,Trimmers Chassis,Notes,Parts

GENERAL HOUSEHOLD UTILITIES CO.



BOTTOM VIEW
FIG. 1



TOP VIEW
FIG. 2

CHASSIS 6J
OCT 1935
RAS 96

NOTE:—

Due to interference caused by commercial code stations in some locations, it has been necessary to use two different I. F. Frequencies on this Receiver, one of 490 K.C. where code interference is in the neighborhood of 455 K.C. and the other where the interfering stations are operating in the 500 K.C. band, an I. F. of 465 K.C. is used.

The I. F. Frequencies of the Receiver is stamped on the rear of the Chassis, and if there is any doubt as to I. F. peaking, it is only necessary to apply a variable I. F. signal to the I. F. Amplifier, and maximum output will indicate resonance or frequency at which the I. F.'s are peaked.

To further overcome this form of interference, sets peaked at 465, also incorporate a wave filter in the Antenna circuit. This filter should be tuned to the same frequency as the I. F. Transformers. Tuning is accomplished after the set has been completely aligned by applying the I. F. Frequency signal through a 200 mmf. condenser to the Antenna binding post of the Receiver, and tuning the wave-filter condenser, (A14) Fig. 1 (located on the right hand side of the Chassis) so that the incoming signal is at MINIMUM output.

In other words, apply a strong 465 K.C. signal to the Receiver Antenna Post through the 200 mmf. Condenser, and tune wave filter so that the output meter indicates minimum.

PARTS AND PRICE LIST

MODELS 640—641
CHASSIS 6J—6JX—6JZ

Part No.	Description	No. Used	Price
20678	Terminal Clip	1	$ .02
20962	Grid Cap	4	.01
23358	Vertical Terminal (1 Lug)	1	.1[illegible]
23538	200 M Ohm 1/4 Watt Resistor	2	.15
23849	500 M Ohm 1/4 Watt Resistor	1	.15
23850	16 M Ohm 1 Watt Resistor	1	.20
23853	50 M Ohm 1/4 Watt Resistor	4	.15
26256	Tube Shield Base	4	.05
27422	Electrolytic Condenser Step Washer	1	.02
27831	Pilot Light Socket	2	.10
28045	Pilot Lamp	2	.15
28638	Pointer Screw	1	.02
28717	.002 700 V. Tubular Condenser	1	.25
28723	.05 Mfd. 400 Volt Tubular Condenser	1	.30
28726	.1 Mfd. 400 Volt Tubular Condenser	1	.30
28728	.25 Mfd. 200 Volt Tubular Condenser	1	.35
28793	Junction Box Connection Assem. 640Z-641Z Only	1	1.00
29065	Electrolytic Condenser Strap	2	.03
29074	100-250 Mmf. Dual Condenser	1	.30
29085	50 Mmf. Condenser	1	.20
29135	.1 Mfd. 200 Volt Tubular Condenser	4	.25
29164	50 M Ohm 1/2 Watt Resistor	1	.15
29209	Speaker Cable Clamp	1	.02
29396	Drive Sleeve	1	.35
29476	Ball Race	1	.10
29485	Drive Shaft Thrust Spring	1	.05
29521	3/16 Ball	2	.02
29522	11/32 Ball	4	.02
29524	Spring (Drive String)	1	.10
29551	Antenna Binding Post Assem.	1	.10
29552	Dial Window	1	.15
29553	Dial Window Retaining Ring	1	.10
29554	Cabinet Escutcheon	1	.60
29567	.02 Mfd. 400 Volt Tubular Condenser	3	.25
29612	Escutcheon Retaining Spring	1	.20
29628	Vertical Terminal (4 Lug)	1	.10
29832	Tube Shield Body	4	.15
29893	Reflector Riveted Assem.	1	.50
30053	Reflector Mounting Bracket	1	.15
30054	Dial Light Bracket	1	.10
30092	Terminal Board	2	.10
30099	Drive String & Eyelet Assem.	1	.10
30140	5 M Ohm 1/4 Watt Resistor	2	.15
30143	.05 Mfd. 200 V Tubular Condenser	3	.25
30152	Terminal Board	1	.10
30172	Outer Drive Shaft	1	.35
30173	Inner Drive Shaft	1	.10
30182	Coil Shield & Eyebolt Assem.	3	.25
31075	4 Prong Socket	1	.10
31079	6 Prong Socket	4	.15
31080	7 Prong Socket	1	.15
31193	Drive Shaft & Bearing Assem.	1	.30
31215	Tube Shield Cap	4	.10
31348	6 M Ohm 1/4 Watt Resistor	2	.15
31360	Dial Window Gasket	1	.05
31424	Condenser Insulating Shield	1	.10
31710	Drive Drum, Hub & Gear Assem.	1	1.10
31714	Spring—Inside Gears	2	.05
31726	Pinion, Gear & Adjustable Plate Assem.	1	.55
31739	Rubber Washer (For Variable Cond. Mtg.)	6	.02
31775	Pointer (Hour Hand)	1	.10
31777	Terminal Board	1	.10
31860	2 M Ohm 1/4 Watt Resistor	2	.15

Part No.	Description	No. Used	Price
31861	500 Mmf. Condenser	1	.20
31868	.003 Mfd. 700 Volt Tubular Condenser	1	.25
32464	Knob (For 640)	3	.20
32465	Knob (For 640) (Range Switch)	1	.20
32693	1 Meg. 1/3 Watt Resistor	2	.15
32858	Mounting Foot Assem.	4	.25
32865	Electrolytic Condenser Strap	1	.04
32987	12 Mfd. 25 V Dry Elect. Condenser	1	.75
33022	Power Transformer 115 V, 25-50 Cycles	1	7.00
33025	Power Transformer 110-135-220-250 V, 50-60 Cycle	1	7.00
33039	Power Transformer 115 V, 50-60 Cycles	1	5.00
33065	Osc. Padder Condenser (375 Mmf.)	1	.40
33070	Knob (For 641)	3	.20
33071	Knob (For 641) (Range Switch)	1	.20
33082	Transformer Mounting Spacer	4	.03
33130	600 Ohm 1/4 Watt Resistor	1	.15
33135	4 M Ohm 1 Watt Resistor	1	.20
33262	1065 Mmf. Condenser	1	.20
33278	Wave Filter & Condenser Assem.	1	.80
33288	Antenna Coil and Shield Assem.	1	1.65
33292	Shield & Eyebolt Assem.	2	.35
33294	Oscillator Coil & Shield Assem.	1	1.70
33296	Antenna Trimmer Assem. (Red Dot)	1	.40
33297	Oscillator Trimmer Assem.	1	.40
33298	Spacer for Trimmer Assem.	4	.04
33299	Range Switch	1	1.35
33300	Volume Control	1	1.05
33301	Tone control switch	1	.45
33317	Variable Condenser	1	3.00
33367	Decalcomania (Range Letters)	1	.10
33368	Elec. Condenser—Cathode Terminal	1	.02
33369	12 Mfd. 450 Volt—Wet Elec. Condenser	1	1.20
33370	18 Mfd. 300 Volt—Wet Elec. Condenser	1	1.00
33371	10 Mfd. 250 Volt—Wet Elec. Condenser	1	.85
33372	.0058 Mfd. 700 V Tubular Condenser	2	.25
33428	1st I.F. Coil & Shield Assem.	1	2.40
33429	2nd I.F. Coil & Shield Assem.	1	2.15
33430	3rd I.F. Coil & Shield Assem.	1	2.00
33469	18 Mfd. 300 Volt—Wet Elec. Condenser	1	.90
33471	Attachment Cord	1	.40
33853	Speaker Cable	1	.55
34435	Condenser .02 Mfd. 400 V Tubular (Audio)	1	.25
34449	Dial Chart	1	.50
34461	Pointer & Pinion Assem. (Minute Hand)	1	.40
61207	1" x 8-32 Screw (Chassis Mtg.)	4	.01
63011	5/16 x 8-32 H. H. Set Screw	2	.02
63014	5/16 x 10-32 Set Screw	2	.02
63839	Felt Washers for Knobs	4	.01
63863	Flat Washers (Chassis Mtg.)	4	.01

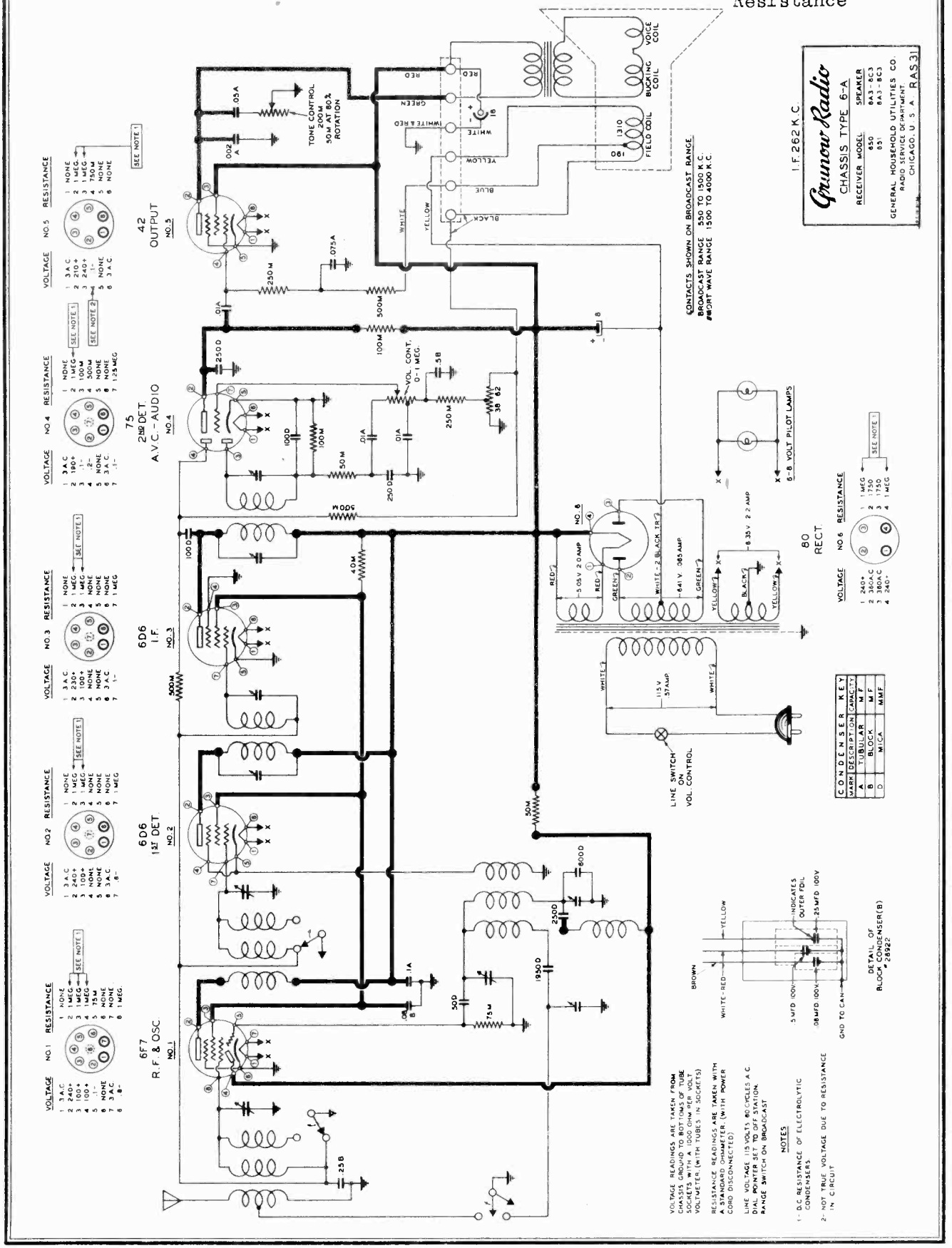
884 SPEAKER

Part No.	Description	No. Used	Price
28844	Yoke & Pole Piece Assem.	1	1.20
28849	Spacer	2	.02
29038	Gasket	1	.10
29041	Basket & Front Plate Assem.	1	1.00
29047	Terminal Strip Assem.	1	.30
29051	Terminal Strip Cover	1	.10
29052	Terminal Strip Cover Insul.	1	.05
29741	Output Transformer	1	1.75
29769	Clamp Ring	1	.05
31355	Cone & Voice Coil Assem.	1	1.00
31457	884 Speaker Complete	1	10.00
31468	Field Coil Assem.	1	3.00

Prices subject to change without notice.

GENERAL HOUSEHOLD UTILITIES CO

MODELS 650,651
Chassis 6A,Revised
Schematic,Voltage
Resistance



MODELS 650,651
Chassis 6A,Revised GENERAL HOUSEHOLD UTILITIES CO.
Socket,Trimmers
Chassis,Alignment

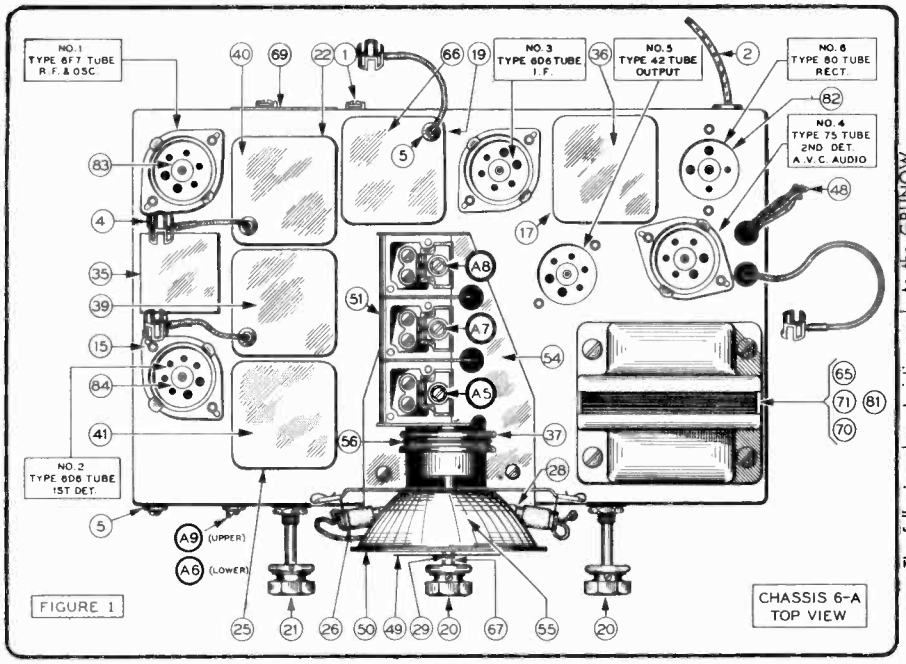


FIGURE 1

The following characteristics apply to the GRUNOW Radio—Chassis 6A:

This model is a 6 tube Super-Hetrodyne Dual Wave (540 to 1500 KC and 1500 to 4200 KC) Receiver using 1-6F7 tube as on R.F. Amplifer and Oscillator, 1-6D6 tube as a 1st Detector, 1-6D6 tube as an I.F. Amplifier, 1-75 tube as a Diode Detector, delayed Automatic Volume Control (AVC) and high gain audio Amplifier. The 42 output tube is a power amplifier pentode and is capable of producing large power output with a relatively small signal input. This tube receives its bias through the voltage drop produced in the tapped speaker field. The rectifier tube is an 80, the output of which is well filtered through the action of the speaker field and the 8 and 18 mfd. electrolytic condensers.

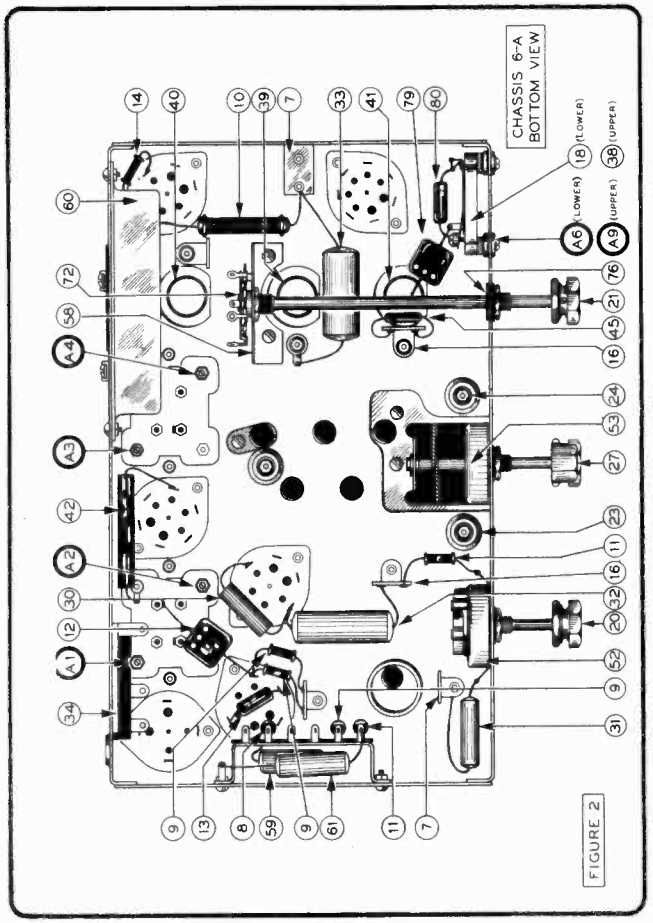


FIGURE 2

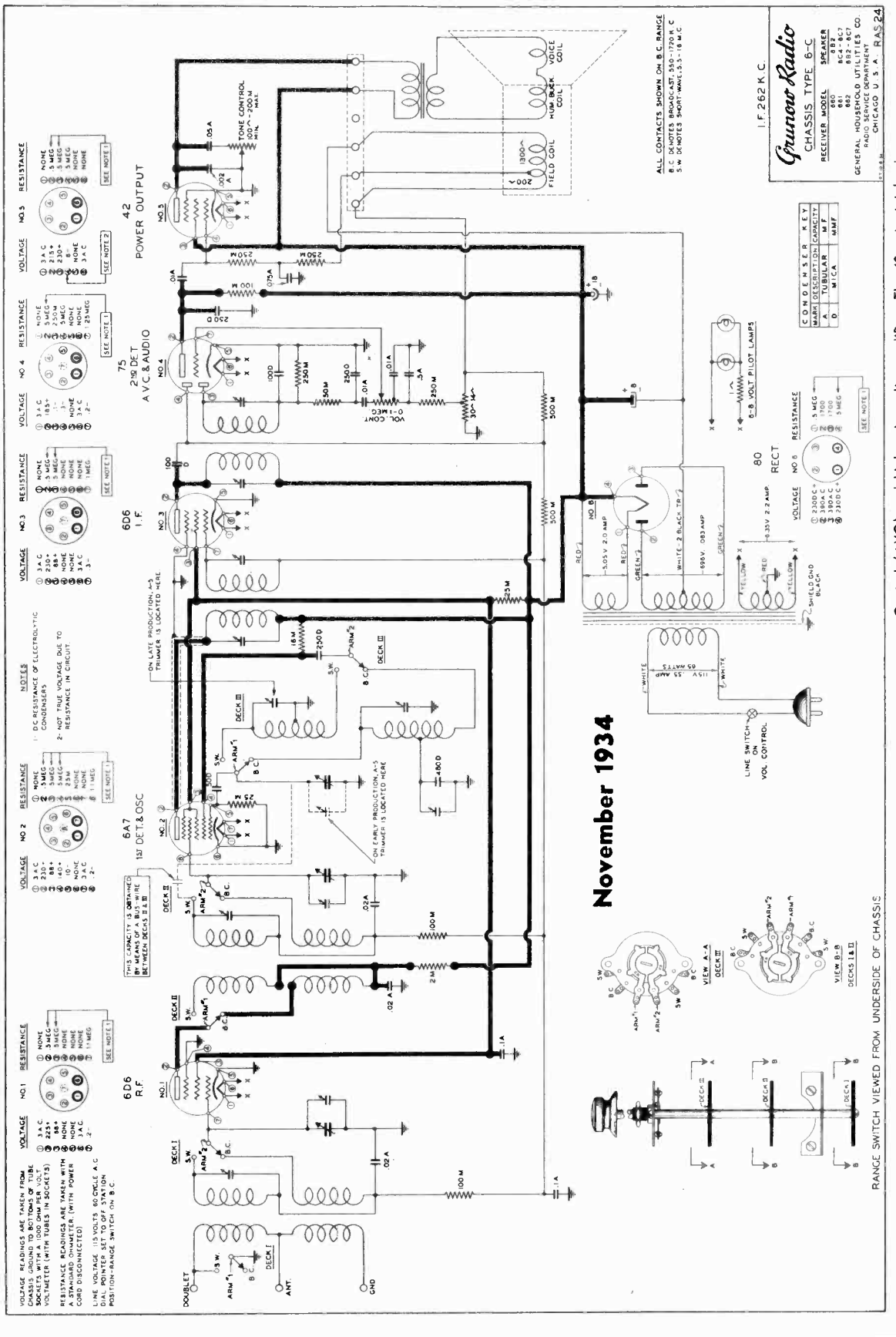
ALIGNMENT PROCEDURE

Do not attempt to align the 6A Chassis without the proper equipment. Alignment condensers are shown in the accompanying illustrations and are numbered in order of procedure.

1. EQUIPMENT.
   a. Test Oscillator.
   A modulated oscillator capable of producing signals at 262 K.C. —600 K.C.—1400 K.C. and 3700 K.C. is necessary for alignment of the 6A Chassis.
   b. Output Meter.
   This may be any of the standard output meters on the market, but should be sufficiently sensitive to provide a good deflection at low signal strength, and should also incorporate an adjustable shunt so that extremely strong signals may be read.
   c. Coupling Means.
   Coupling condensers of 200 Mmf., and .25 Mfd. should be used when coupling oscillator to receiver during alignment as specified in the following paragraphs.
2. DIAL SETTING.
   Turn dial knob until condensers are fully meshed. The dial pointer should be on the horizontal line of the dial.
3. I. F. ALIGNMENT.
   a. Connect signal lead of test oscillator to grid of the 6D6 (first detector tube) through a .25 Mfd. condenser. Connect the ground lead to the Chassis.
   b. Set dial pointer to 1400 K.C. and range switch on counter-clockwise (broadcast) position.
   c. Place test oscillator in operation at 262 K.C. Turn receiver volume control and tone control to maximum.
   d. Attenuate test oscillator output to lowest value consistent with obtaining a readable indication on output meter.
   e. Adjust the four I. F. trimmers, (A1-A2-A3-A4) Fig. 2, located on the underside of chassis, until maximum output is obtained. During alignment maintain as low a value of signal as will allow obtaining of accurate adjustment.
4. 3700 K.C. ALIGNMENT.
   a. Connect signal lead of test oscillator through 200 mmf. condenser to antenna binding post of chassis.
   b. Connect the ground lead to ground terminal of chassis.
   c. Set range switch to S.W. range (clockwise position).
   d. Place test oscillator in operation at 3700 K.C. and set dial pointer on 3700 K.C.
   e. Adjust oscillator trimmer (A5) (front trimmer located on top of variable condenser).
5. 1400 K.C. ALIGNMENT.
   a. Turn range switch counter-clockwise to broadcast position.
   b. Place test oscillator in operation at 1400 K.C. and set dial pointer at 1400 K.C.
   c. Adjust the 1400 K.C. trimmer (A6) located on the front left face of the chassis, the lower of the two at this location.
   d. Adjust the second and third trimmers (A7 and A8) on the top of the variable condenser.
   e. Repeat the 1400 K.C. alignment at least twice.

GENERAL HOUSEHOLD UTILITIES CO.

MODELS 660, 661, 662
Chassis 6C, Revised
Schematic, Voltage
Resistance, Notes



This model is a 6 tube Super Hetrodyne Short Wave (550 to 1740 K.C. and 5.5 to 16.0 M.C.) Receiver using 1-6D6 (Triple-Grid super-control) tube as an R.F. Amplifier, 1-6A7 (Pentagrid converter) tube as a 1st Detector and Oscillator. 1-6D6 (Triple-grid super-control) tube as an I. F. Amplifier. 1-75 (Duplex-diode high mu triode) tube is used as a Diode Detector or Signal Rectifier, delayed Automatic Volume Control (AVC) and high gain audio amplifier. The 42 output tube is a power amplifier pentode and is capable of producing large power output with a relatively small signal input. This tube receives its bias through the voltage drop produced in the tapped speaker field. The rectifier tube is an 80, the output of which is well filtered through the action of the speaker field and the 8 and 18 mfd. electrolytic condensers.

MODELS 660,661,662
Chassis 6C,Revised
Socket,Trimmers
Chassis

GENERAL HOUSEHOLD UTILITIES CO.

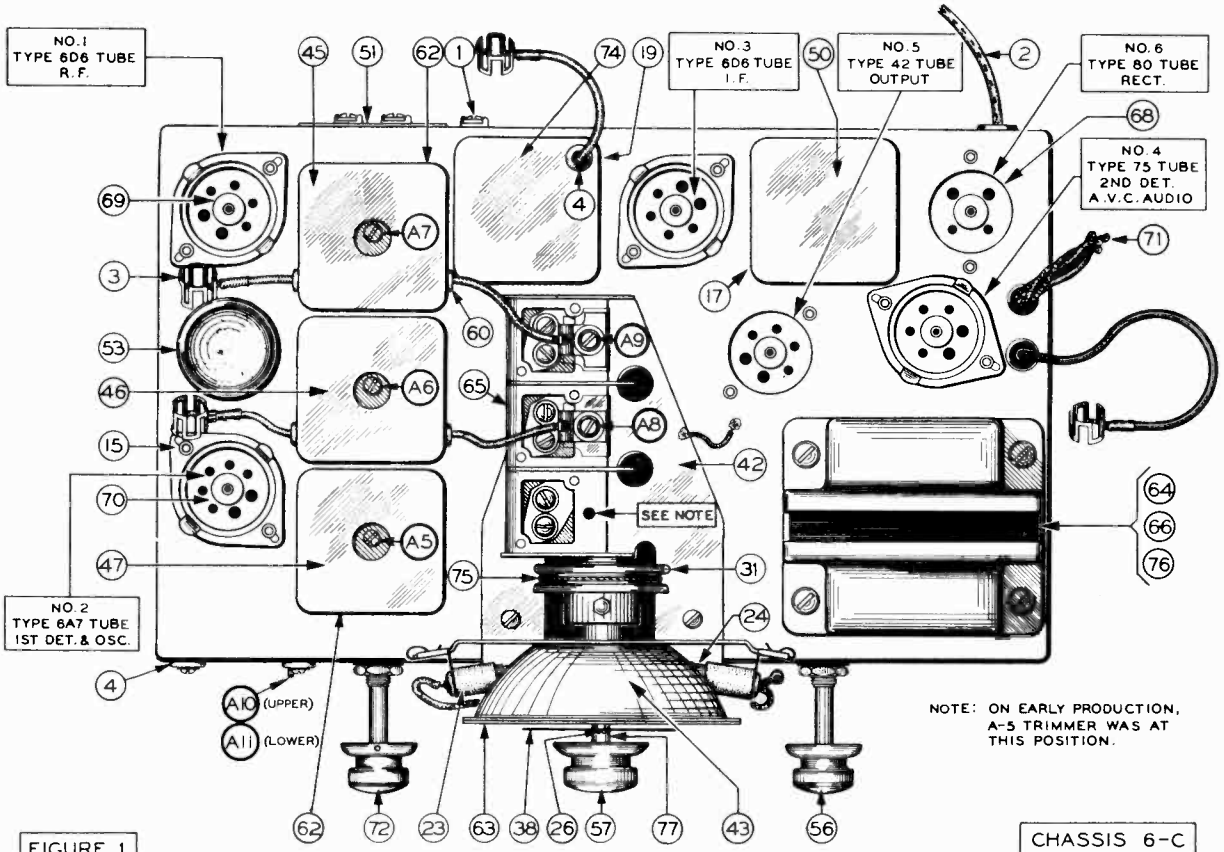


FIGURE 1

CHASSIS 6-C TOP VIEW

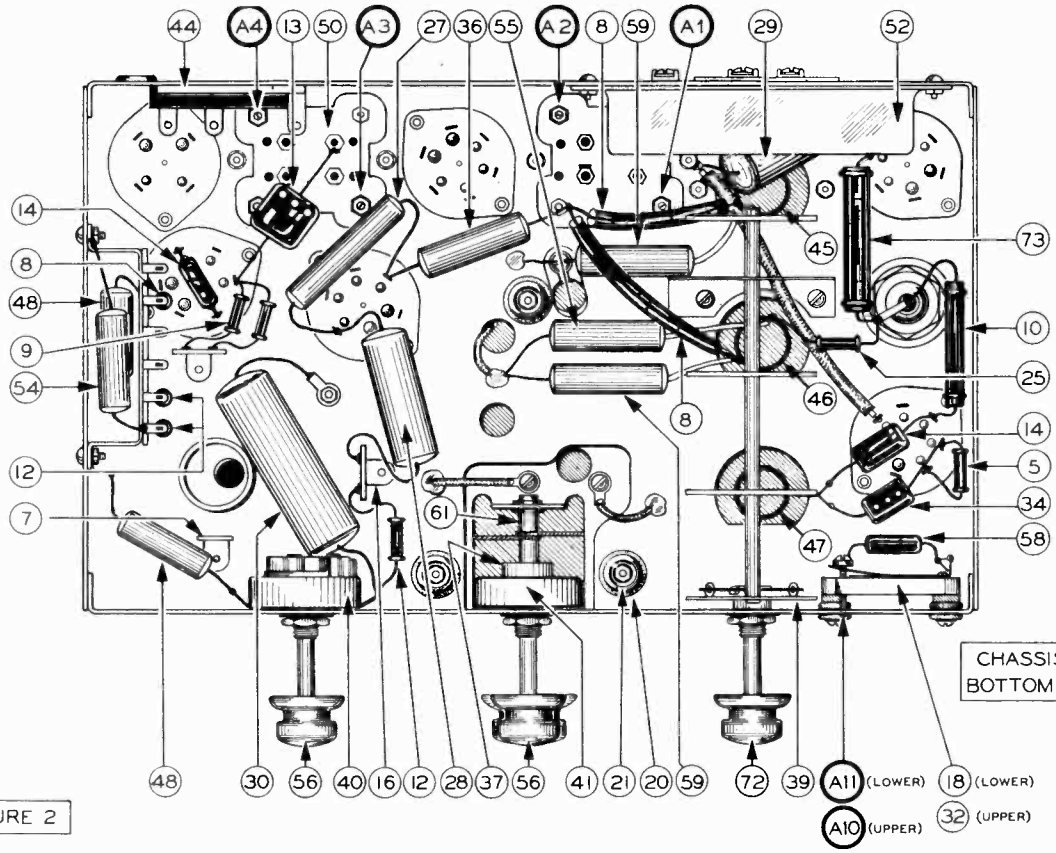
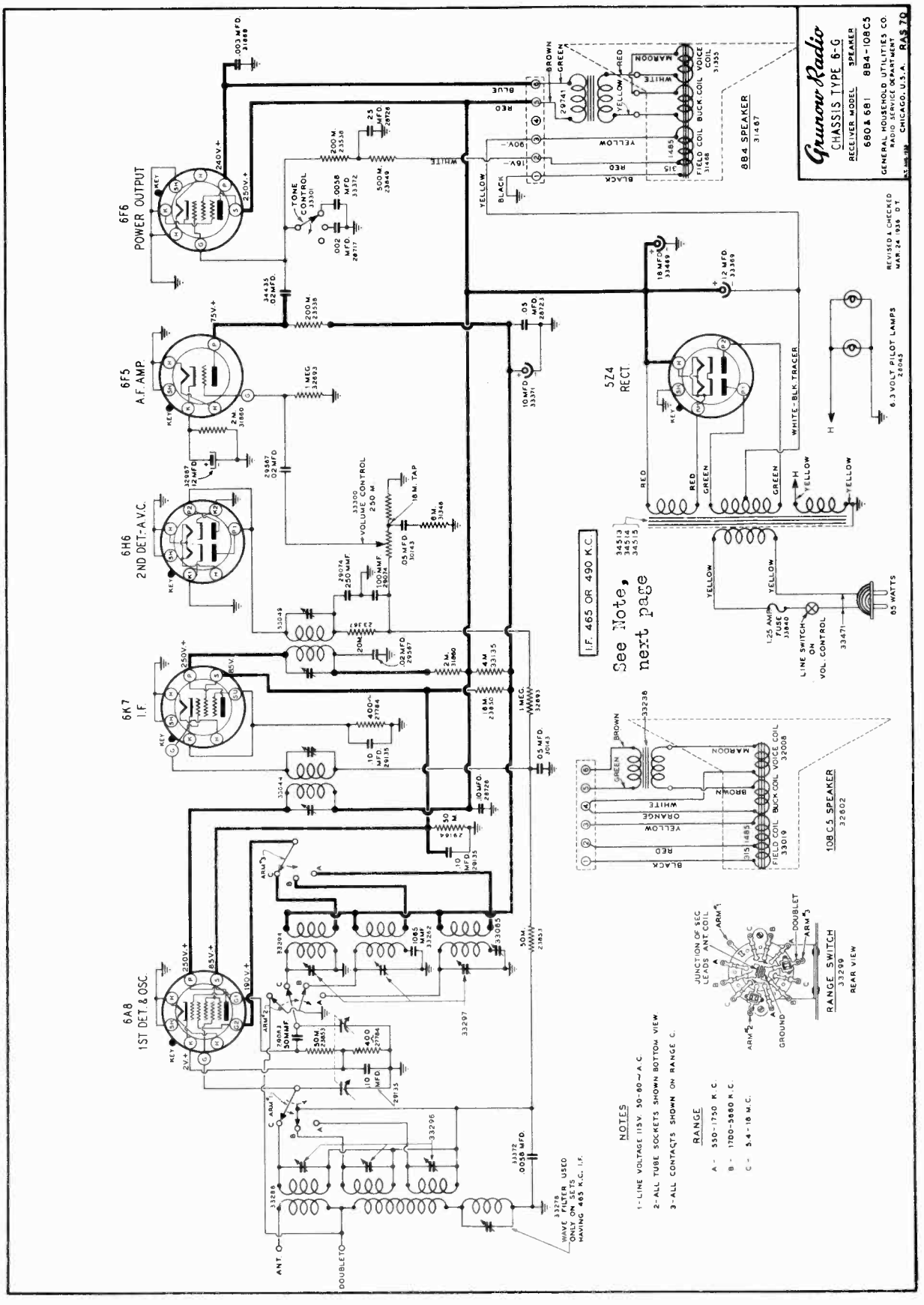


FIGURE 2

CHASSIS 6-C BOTTOM VIEW

GENERAL HOUSEHOLD UTILITIES CO.

MODELS 680, 681
Chassis 6G, Revised
Schematic, Voltage



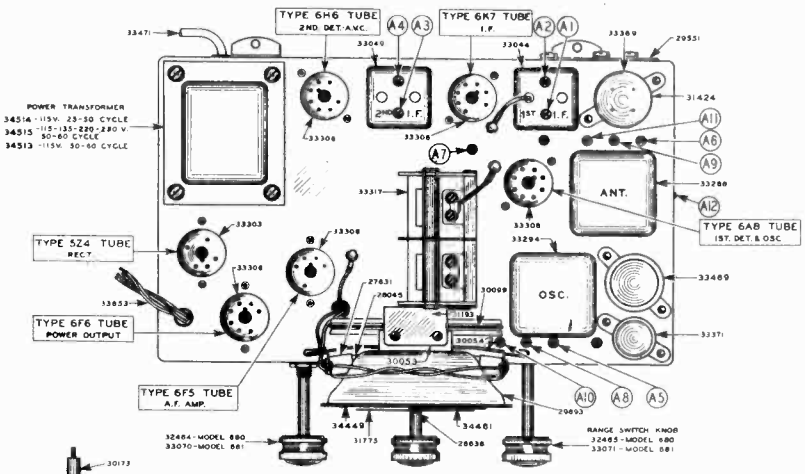


FIG. 1

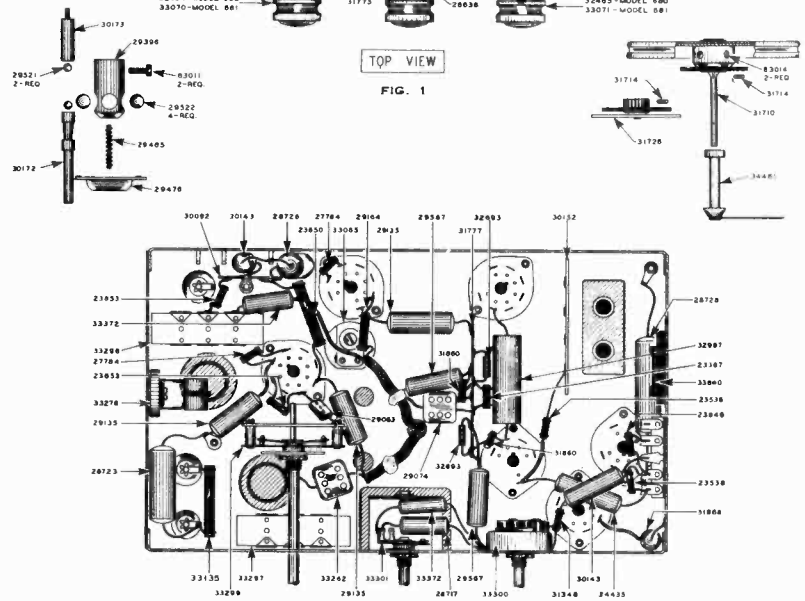


FIG. 2

NOTE:—

Due to interference caused by commercial code stations in some locations, it has been necessary to use two different I. F. Frequencies on this Receiver, one of 490 K.C. where code interference is in the neighborhood of 455 K.C. and the other where the interfering stations are operating in the 500 K.C. band, on I. F. of 465 K.C. is used.

PARTS AND PRICE LIST

MODELS 680—681

CHASSIS 6G—6GX—6GZ

Part No.	Description	No. Used	Price
20678	Terminal Clip	1	$ .02
23367	Resistor 20 M Ohm ¼ Watt	1	.20
23538	Resistor 200 M Ohm ¼ Watt	2	.15
23849	Resistor 500 M Ohm ¼ Watt	1	.15
23850	Resistor 16 M Ohm 1 Watt	1	.20
23853	Resistor 50 M Ohm ½ Watt	2	.15
27422	Insulating washer	1	.02
27784	Resistor 400 Ohm ¼ Watt	2	.15
27831	Pilot Light socket	2	.10
28045	Pilot lamp	2	.15
28638	Pointer screw	1	.02
28717	.002-700 V Tubular Condenser	1	.25
28723	Condenser .05 Mfd. 400 V Tubular	1	.30
28726	Condenser .1 Mfd. 400 V Tubular	1	.30
28728	Condenser .25 Mfd. 200 V Tubular	1	.35
28793	Junction box connection assem. (681Z & 680Z)	1	1.00
29065	Electrolytic Condenser Strap	2	.03
29074	Dual Condenser 100-250 Mmf.	1	.30
29083	Dual Condenser 50 Mmf.	1	.20
29135	Condenser .1 Mfd. 200 V Tubular	3	.25
29164	Resistor 50 M Ohm ½ Watt	1	.15
29209	Speaker cable clamp	1	.02
29396	Drive sleeve	1	.35
29476	Ball race	1	.10
29485	Drive shaft thrust spring	1	.05
29521	3/16 Ball	2	.02
29522	11/32 Ball	4	.02
29524	Spring for Drive String	1	.10
29551	Antenna Binding post assembly	1	.10
29552	Window	1	.15
29553	Window Retaining Ring	1	.10
29554	Cabinet escutcheon	1	.60
29567	Condenser .02 Mfd. 400 V Tubular	2	.25
29612	Escutcheon retaining spring	1	.20
29893	Reflector riveted assembly	1	.50
30053	Reflector mounting bracket	1	.15
30054	Dial Light bracket	1	.10
30092	Terminal board	2	.10
30099	Drive String & Eyelet Assem.	1	.10
30143	Condenser .05 Mfd. 200 V Tubular	2	.25
30152	Junction Terminal Board	1	.10
30172	Outer drive shaft	1	.35
30173	Inner drive shaft	1	.10
30182	Coil shield & eyebolt assem.	2	.25
31193	Drive shaft & Bearing assem.	1	.30
31348	Resistor 6 M Ohm ¼ Watt	1	.15
31360	Window gasket	1	.05
31424	Condenser insulating shield	1	.10
31710	Drive drum, hub and gear assem.	1	1.10
31714	Gear spring	2	.05
31726	Pinion, Gear & Adjusting Plate assem.	1	.55
31739	Rubber Washer for Variable Cond. Mtg.	6	.02
31775	Pointer	1	.10
31777	Terminal Board	1	.10
31860	Resistor 2 M Ohm ¼ Watt	2	.15
31868	Condenser .003 Mfd. 700 V Tubular	1	.25
32464	Knob for Controls Model 680	3	.20
32465	Knob for Range Switch Model 680	1	.20
32693	Resistor 1 Meg. 1/3 W	2	.15
32858	Mounting Foot Assem.	4	.25
32865	Electrolytic Condenser Strap	1	.04
32987	12 Mfd. 25 V—Dry Electrolytic Cond.	1	.75
33044	1st I. F. Coil & Shield Assem.	1	1.80
33049	2nd I. F. Coil & Shield Assem.	1	1.35
33054	Grid Cap	3	.01
33065	Osc. Padder Condenser (375 Mmf.)	1	.40
33070	Knob for 681 Receiver	3	.20
33071	Knob for 681 Receiver (for Range Switch)	1	.20
33082	Transformer mounting spacer	4	.03
33135	Resistor 4 M Ohm 1 Watt	1	.20
33262	Condenser 1065 Mmf.	1	.20
33278	Wave Filter & Condenser Assem.	1	.80
33287	Range Switch Mounting Bracket	1	.05
33288	Antenna Coil & Shield Assem.	1	1.65
33292	Shield & Eyebolt Assem.	2	.35
33294	Oscillator Coil & Shield Assem.	1	1.70
33296	Trimmer assem. (Ant.) (Red Dot)	1	.40
33297	Trimmer Assem. (Osc.)	1	.40
33298	Spacer for trimmers	4	.04
33299	Range Switch	1	1.35
33300	Volume control	1	1.05
33301	Tone control switch	1	.45
33303	5 Prong socket (5Z4)	1	.15
33306	8 Prong socket	5	.15
33317	Variable condenser	1	3.00
33367	Decalcomania—Range letters	1	.10
33368	Electrolytic condenser cathod terminal	1	.02
33369	Electrolytic condenser 12 Mfd. 450 V	1	1.20
33371	Electrolytic condenser 10 Mfd. 250 V	1	.85
33372	Condenser .0058 Mfd. 700 V Tubular	2	.25
33469	Electrolytic condenser 18 Mfd. 300 V	1	1.00
33471	Attachment Cord	1	.40
33837	Fuse Clip	1	.10
33839	Armite Insulator	1	.02
33840	Fuse (1¼ amp. blue)	1	.10
33853	Speaker Cable	1	.55
34449	Dial chart	1	.50
34461	Pointer & Pinion assem.	1	.40
34513	Power Transformer 115 V -50-60 cycle	1	5.00
34514	Power Transformer 115 V -25-50 cycle	1	7.00
34515	Power Transformer 110-135-220-250 V-50-60 cy.	1	7.00
34435	Condenser .02 Mfd. 400 V Tubular (Audio)	1	.35
61207	1 x 8-32 Screw Chassis Mtg.	2	.01
61227	1⅜ x 8-32 Screw Chassis Mtg.	2	.01
63011	5/16 x 8-32 Ht. H. Set Screw	2	.02
63014	5/16 x 10-32 Set Screw	2	.02
63839	Felt Washer	4	.01
63863	Flat Washer (Chassis Mtg.)	4	.01

8B4 SPEAKER

28844	Yoke & Pole Piece Assem.	1	1.20
28849	Spacer	2	.02
29038	Gasket	1	.10
29041	Basket & Front Plate Assem.	1	1.00
29047	Terminal Strip Assem.	1	.30
29051	Terminal Strip Cover	1	.10
29052	Terminal Strip Cover Insulation	1	.05
29741	Output Transformer	1	1.75
29769	Clamp Ring	1	.05
31355	Cone & Voice Coil Assem.	1	1.00
31467	8B4 Speaker	1	10.00
31468	Field Coil Assem.	1	3.00

108-C-5 SPEAKER

20045	Terminal Strip Cover	1	.15
20046	Terminal Strip Cover Insulation	1	.05
27240	Gasket (Cone)	1	.10
32008	Cone & Voice Coil Assem.	1	1.35
32227	Speaker Pot & Pole Piece Assem.	1	1.50
32228	Speaker Clamp	1	.10
32233	Basket & Front Plate Assem.	1	4.00
32602	108 C 5 Speaker Complete	1	12.50
33019	Field Coil Assem.	1	3.50
33238	Output Transformer Assem.	1	2.25

Prices subject to change without notice.

The following is substituted for the 18-mc. alignment in early models.

16 M.C. ALIGNMENT:

(A) Connect signal lead of test oscillator through 400 Ohm resistor to Antenna binding post of Chassis.

(B) Connect the ground lead to ground terminal of Chassis.

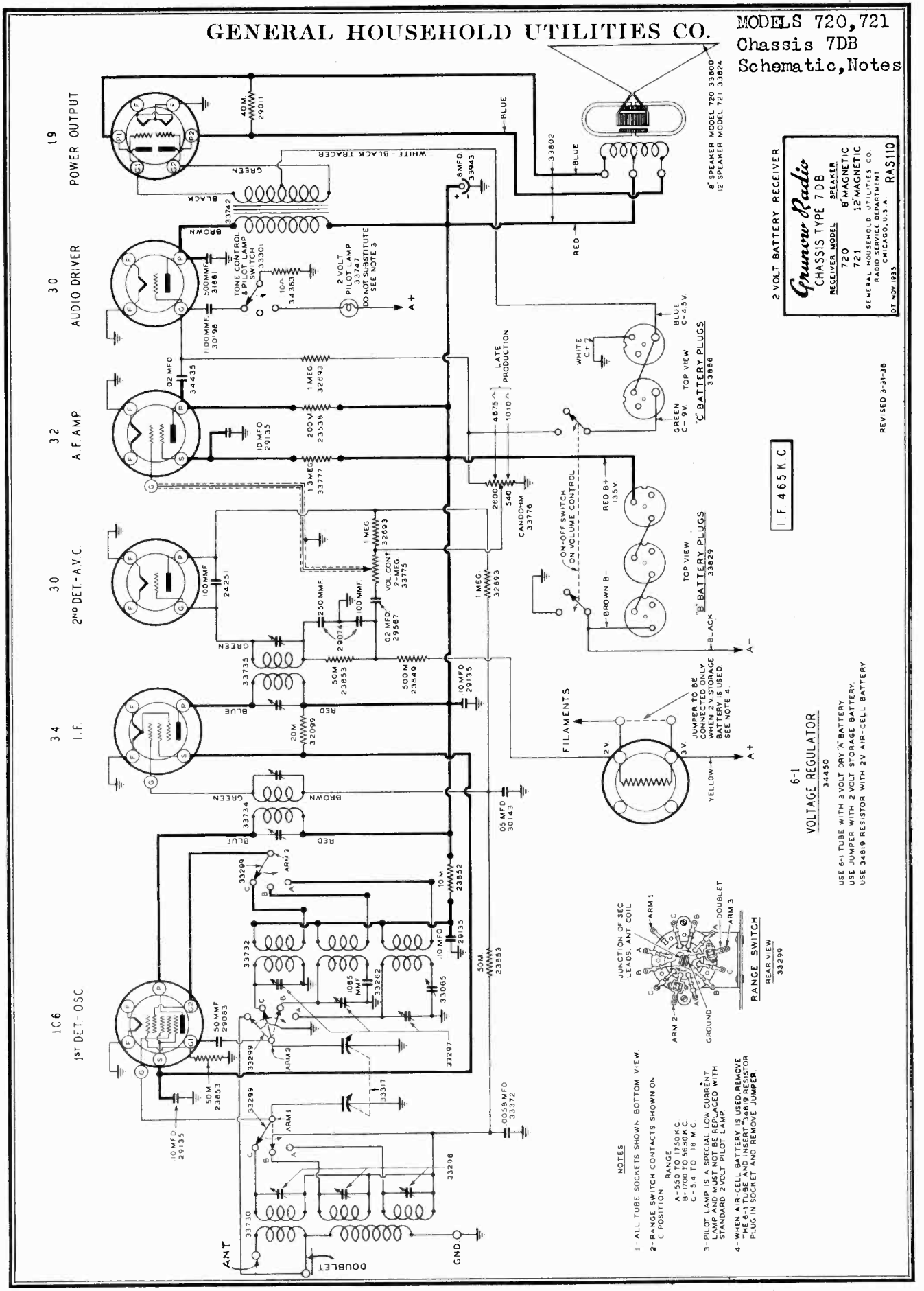
(C) Set range switch to range "C" and turn dial pointer to 16 M.C.

(D) Place test oscillator in operation at 16 M.C.

(E) Adjust set Oscillator Trimmer (A10), Fig. (1), to maximum output.

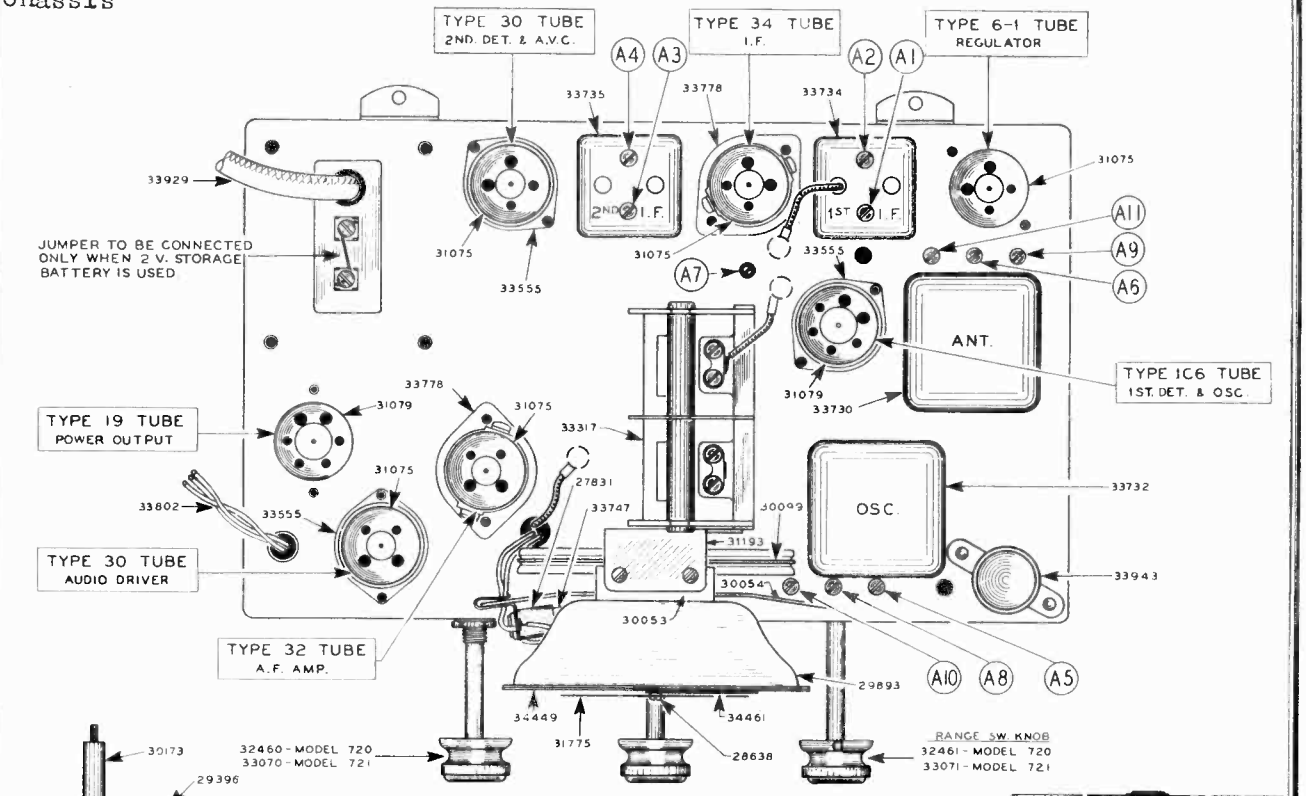
(F) Adjust Detector Trimmer (A11), Fig. (1), to maximum output.

(G) On the 16 M.C. Oscillator Alignment it will be noted that there are two settings at which the signal will be received. Use the lower of the images for alignment point, that is, the setting giving most capacity or the point at which the trimmer screw is farthest in.



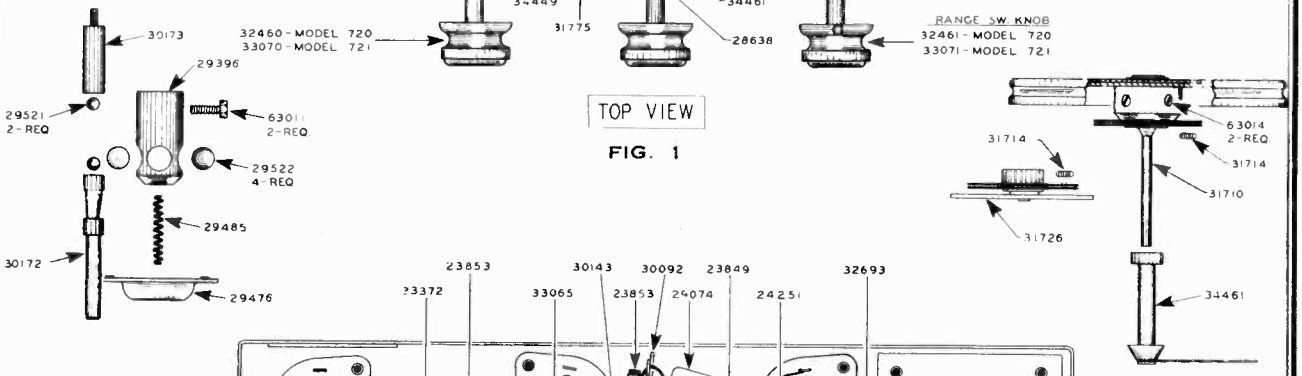
MODELS 720,721
Chassis 7DB
Socket,Trimmers
Chassis

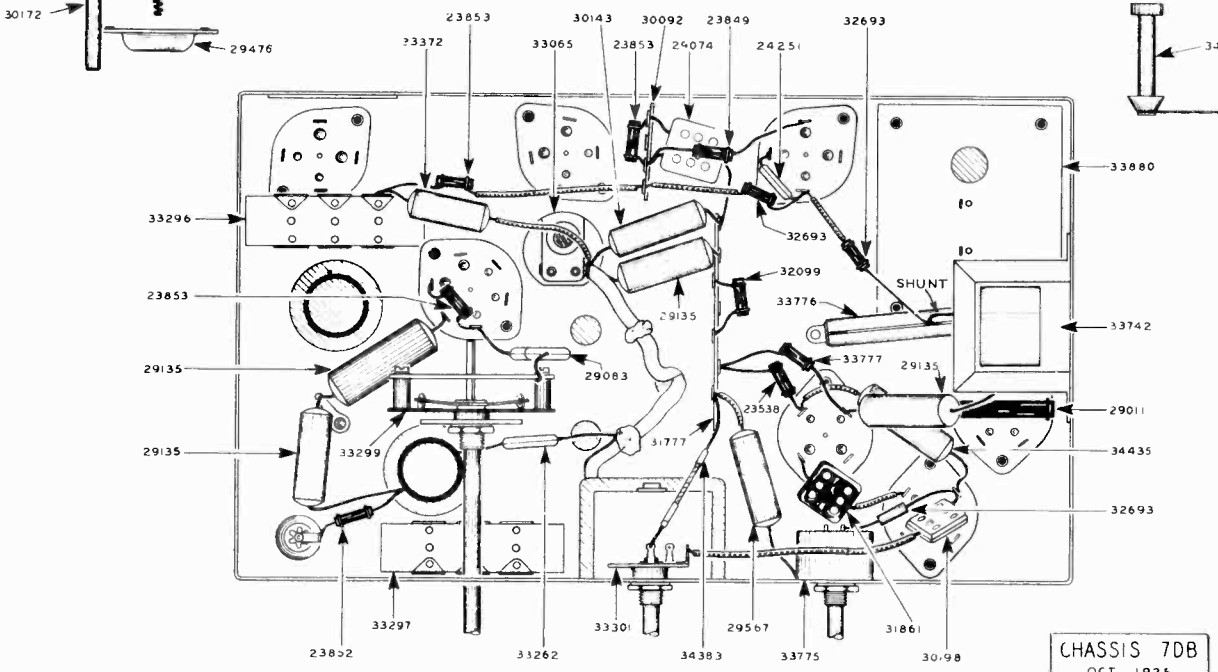
GENERAL HOUSEHOLD UTILITIES CO.



TOP VIEW

FIG. 1





BOTTOM VIEW

CHASSIS 7DB
OCT 1935
RAS 100

FIG. 2

MODELS 720,721
Chassis 7DB
Alignment,Parts

GENERAL HOUSEHOLD UTILITIES CO.

PARTS AND PRICE LIST

MODELS 720-721
CHASSIS 7DB

Part No.	Description	No. Used	Price
20962	Grid Cap	4	$ .01
23538	Resistor 200M Ohm ¼ Watt	1	.15
23849	Resistor 500M Ohm ¼ Watt	1	.15
23852	Resistor 10M Ohm ¼ Watt	1	.15
23853	Resistor 50M Ohm ¼ Watt	3	.15
24251	Condenser 100 MMF (Mica)	1	.15
27831	Socket, Pilot Light Assem.	1	.10
28638	Screw, Dial Pointer	1	.02
29011	Resistor, 40M Ohm 1 Watt	1	20
29074	Condenser, 100-250 MMF (Mica) (Dual)	1	.30
29083	Condenser, 50 MMF (Mica)	1	.20
29135	Condenser .1 MFD. 200 V. Tubular	4	.25
29209	Clamp, Speaker Cable (Model 721)	1	.02
29396	Sleeve, Drive	1	.35
29476	Ball Race	1	.10
29485	Spring, Drive Shaft Thrust	1	.05
29521	Balls, 3/16"	2	.02
29522	Balls, 11/32"	4	.02
29524	Spring, Drive String	1	.10
29551	Binding Post, Antenna	1	.10
29552	Window, Dial	1	.15
29553	Ring, Window Retaining	1	.10
29554	Escutcheon	1	.60
29567	Condenser .02 Mfd. 400 V. Tubular	1	.25
29612	Ring Escutcheon, Retaining	1	.20
29893	Reflector Riveted Assembly	1	.50
30053	Bracket, Reflector Mounting	1	.15
30054	Bracket, Pilot Light Mounting	1	.10
30092	Terminal Board, Junction (4 Lug)	1	.10
30099	Drive String & Eyelet Assem.	1	.10
30143	Condenser .05 Mfd. 200 V. Tubular	1	.25
30172	Drive Shaft Outer	1	.35
30173	Drive Shaft, Inner	1	.10
30182	Shield & Eyebolt Assem. (1st & 2nd I. F.)	2	.25
30198	Condenser 1100 MMF (Mica)	1	.25
31075	Socket, 4 Prong	5	.10
31079	Socket, 6 Prong	2	.15
31193	Drive Shaft Bearing Bracket	1	.30
31360	Gasket, Window	1	.05
31710	Drive Drum, Hub & Gear Assem.	1	1.10
31714	Spring	2	.05
31726	Pinion Gear & Adjusting Plate Assembly	1	.55
31775	Pointer, Hour Hand	1	.10
31777	Terminal Board Junction (8 Lug)	1	.10
31861	Condenser 500 MMF (Mica)	1	.20
32099	Resistor 20M Ohm ¼ Watt	1	.15
32460	Knob (Model 720)	3	.20
32461	Knob (Range Switch) (Model 720)	1	.20
32597	Cabinet (Model 720)	1	
32598	Cabinet (Model 721)	1	
32693	Resistor 1 Meg. Ohm 1/3 W. Insul.	3	.15
32858	Mtg. Foot Assy. Rubber	4	.25
32865	Clamp, Elect. Mtg. (1")	1	.05
33065	Condenser, Osc. Padder 375 MMF	1	.40
33070	Knob (Model 721)	3	.20
33071	Knob (Range Switch) (Model 721)	1	.20
33262	Condenser 1065 MMF (Mica)	1	.20
33292	Shield Eyebolt Assem. (Ant. & Osc.)	2	.35
33296	Trimmer Assem. (Ant.) Red Dot	1	.40
33297	Trimmer Assem. (Osc.)	1	.40
33299	Range Switch	1	1.35
33301	Tone Control Pilot Light Sw.	1	.45
33317	Condenser (Variable)	1	3.00
33367	Decalcomania, Range Letters	1	.10
33372	Condenser .0058 Mfd. 700 V. Tubular	1	.25
33554	Tube Shield Cap	3	.02
33555	Tube Shield Base	3	.02
33585	Tube Shield Body (Short) (1C6 & 30 tubes)	3	.10
33730	Antenna Coil & Shield Assem.	1	1.65
33732	Oscillator Coil & Shield Assembly	1	1.70
33734	1st I.F. Coil & Shield Assem.	1	1.75
33735	2nd I. F. Coil & Shield Assem.	1	1.35
33742	Transformer, Audio Input	1	1.80
33747	Lamp, Pilot (2V—.06 Amp.)	1	.15
33775	Volume Control	1	1.10
33776	Candohm	1	.50
33777	Resistor 1.3 Megohm ¼ Watt	1	.15
33778	Tube Shield Base	2	.02
33779	Tube Shield Body (32 & 34 Types)	2	.10
33802	Cable, Speaker	1	.15
33829	Plug Connector "B"	3	.10
33886	Plug Connector "C"	2	.10
33880	Jumper Term. Board Assy.	1	.25
33929	Cable, Battery	1	1.25
33943	Condenser 8 MFD. 150 V. Wet. Elect.	1	.80
34383	Resistor 10 Ohm ½ Watt. (Flex.)	1	.15
34435	Condenser .02 MFD—400 V. Tubular (Audio)	1	.25
34449	Dial Chart	1	.50
34450	6-1 Amperite Tube	1	1.60
34461	Pointer & Pinion Assembly (Minute Hand)	1	.40
34819	Resistor Plug (for Air Cell)	1	1.00
61207	1 x 8-32 Screw (Chassis Mtg.)	4	.01
63839	Washer, Felt (Under Knobs)	4	.02
63863	Flat Washer (Chassis Mtg.)	4	.01

SPEAKER PARTS

33600	Speaker 8" Magnetic (720)		7.75
34347	Motor Drive Assy. with Coil Comp.		6.00
34348	Cone and Apex Assy. (720)		1.50
34349	Terminal Strip Assy. (720)		.15
34350	Coil Assy. (Motor)		1.50
33824	Speaker 12" Magnetic (721)		9.50
34351	Motor Drive Assy. with Coil Comp. (721)		7.50
34352	Cone and Apex Assy. (721)		3.00
34353	Terminal Cover Assy. (721)		.15
34350	Coil Assy. (Motor)		1.50

Prices subject to change without notice.

SERVICE DATA

CONTINUITY AND VOLTAGE

Continuity and voltage readings should be taken from the underside of the chassis. The values given on the schematic diagram are average and allow the service man to make a quick check of the chassis constants. The socket layouts given on the schematic diagram show each socket from the underside.

THE RANGE SWITCH

The Range switch is a simple four pole triple throw switch with its contacts in a convenient position over the coil forms allowing operation with very short wire leads.

CIRCUIT ALIGNMENT PROCEDURE

Do not attempt to align the 7DB Chassis without proper equipment. Alignment condensers are shown in the accompanying illustrations, and are numbered in order of procedure.

1. EQUIPMENT:

(A) Test Oscillator.

A modulated Oscillator capable of producing signals at the I.F., Broadcast and Short-Wave frequencies is necessary for alignment of the 7DB Chassis.

(B) Insulated Screw Driver—(All bakelite or fibre) about 6" long.

(C) Output Meter.

This may be any of the standard Output Meters, but should be sufficiently sensitive to provide a good deflection at low signal strength.

(D) Coupling Means.

Couplings Condensers of 200 mmf., .25 mfd., and a 400 Ohm resistor should be used when coupling oscillator to receiver during alignment as specified in the procedure.

(E) The receiver should be aligned in a location free from local interference (interference caused by motors, flashers, automobile ignition, etc.) as high frequency disturbances will cause difficulties when the short wave section is being adjusted. (A screen room is to be recommended.)

2. DIAL SETTING:

Turn dial knob until condensers are fully meshed. The dial pointer (Hour Hand) should be on the horizontal line of the dial, pointing to 9 and 3 o'clock. The minute hand should be at 12 o'clock or in a vertical position.

3. I. F. ALIGNMENT:

(A) Connect signal lead of test oscillator to grid of 1C6 (1st Detector tube) through .25 mfd. condenser. Connect the ground lead to the chassis.

(B) Set Dial Pointer to 1400 K.C. and range switch on position "A".

(C) Place test Oscillator in operation at 465 K.C. Turn receiver volume control and tone control to maximum.

(D) Attenuate test Oscillator output to lowest value, consistent with obtaining a readable indication on output meter.

(E) Adjust four I.F. Trimmers, A1, A2, A3, A4 located on the I. F. Transformers on top of Chassis. Fig. (11), until maximum output is obtained. During alignment, maintain as low a value of signals as will allow obtaining of accurate adjustment.

4. 1400 K.C. ALIGNMENT:

(A) Connect signal lead of test oscillator through 200 mmf. condenser to Antenna Connection.

(B) Connect the test oscillator ground lead to the ground connection of chassis.

(C) Place test oscillator in operation at 1400 K.C.

(D) Turn dial pointer to 1400 K.C.

(E) Turn range switch to range "A".

(F) Adjust broadcast oscillator trimmer A5, Fig. (1), to maximum output.

(G) Adjust 1st Det. Trimmer (A6), Fig. (1), to maximum output.

5. 600 K.C. ALIGNMENT.

(A) Place test oscillator in operation at 600 K.C.

(B) Tune in signal to maximum (this point does not have to be exactly at 600 K.C. dial setting).

(C) Adjust the 600 K.C. Padding Condenser (A7), Fig. (1), (which is on top of Chassis to the rear of variable condenser) in direction of signal increases. At same time rock the tuning condenser back and forth through resonance while adjusting padding condenser until maximum output is obtained.

6. RECHECK 1400 K.C. ALIGNMENT.

7. 5000 K.C. ALIGNMENT:

(A) Set range switch at "B".

(B) Place test Oscillators in operation at 5000 K.C.

(C) Turn Dial Pointer to 5000 K.C.

(D) Adjust Set Oscillator Trimmer (A8), Fig. (1), to maximum output.

(E) Adjust Detector Trimmer (A9) Fig. (1) to maximum output.

8. 18 M.C. ALIGNMENT:

(A) Connect signal lead of test oscillator through 400 Ohm resistor to Antenna connection of Chassis.

(B) Connect the ground lead to ground terminal of Chassis.

(C) Set range switch to range "C" and turn dial pointer to 18 M.C.

(D) Place test oscillator in operation at 18 M.C.

(E) Adjust set Oscillator Trimmer (A10), Fig. (1), to maximum output.

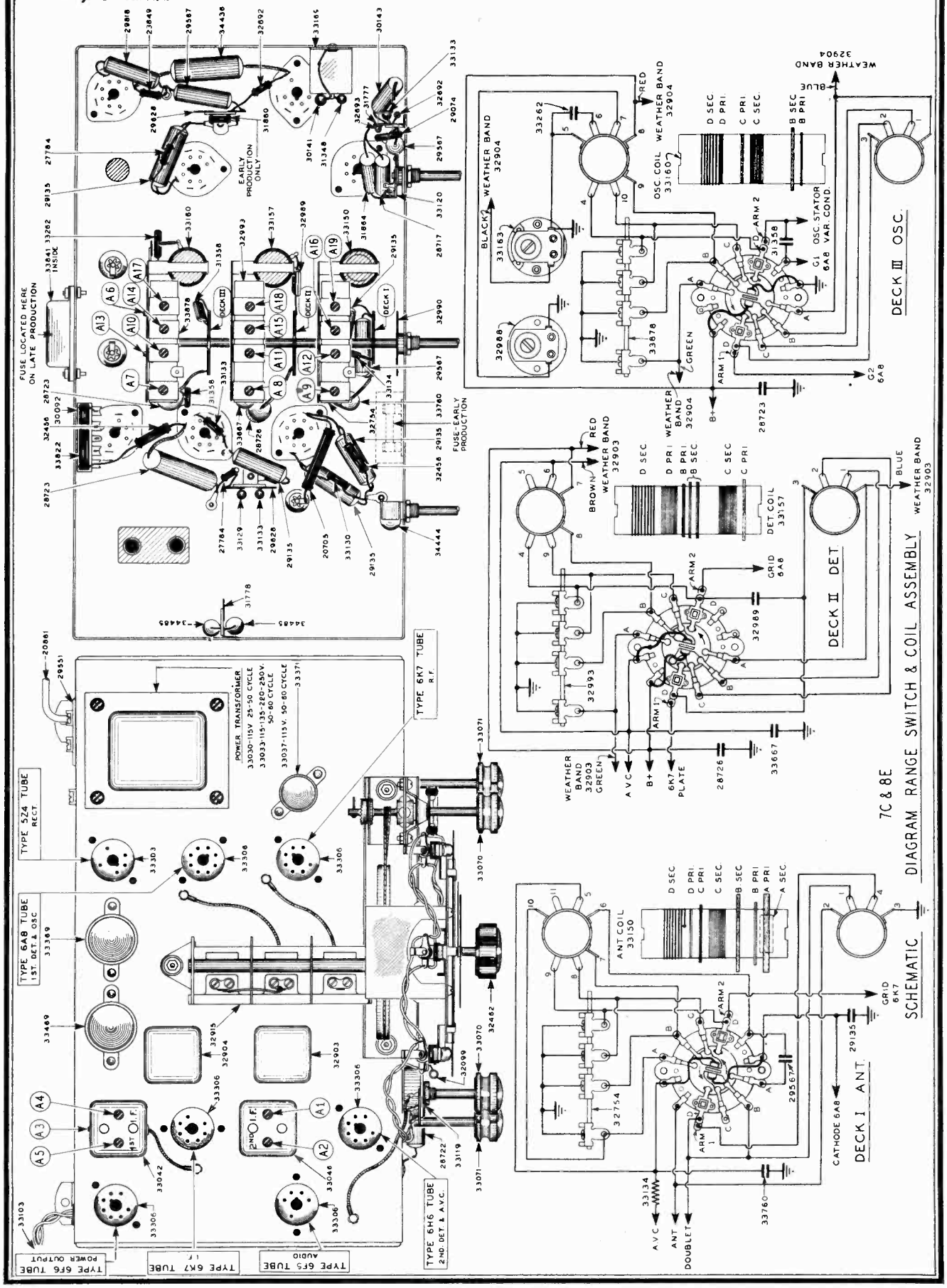
(F) Adjust Detector Trimmer (A11), Fig. (1), to maximum output.

(G) On the 18 M.C. Oscillator Alignment it will be noted that there are two settings at which the signal will be received. Use the lower of the images for alignment point, that is, the setting giving most capacity or the point at which the trimmer screw is farthest in.

MODELS 760,761
Chassis 7C
Socket, Trimmers

GENERAL HOUSEHOLD UTILITIES CO.

Chassis, Switch & Coil Assembly



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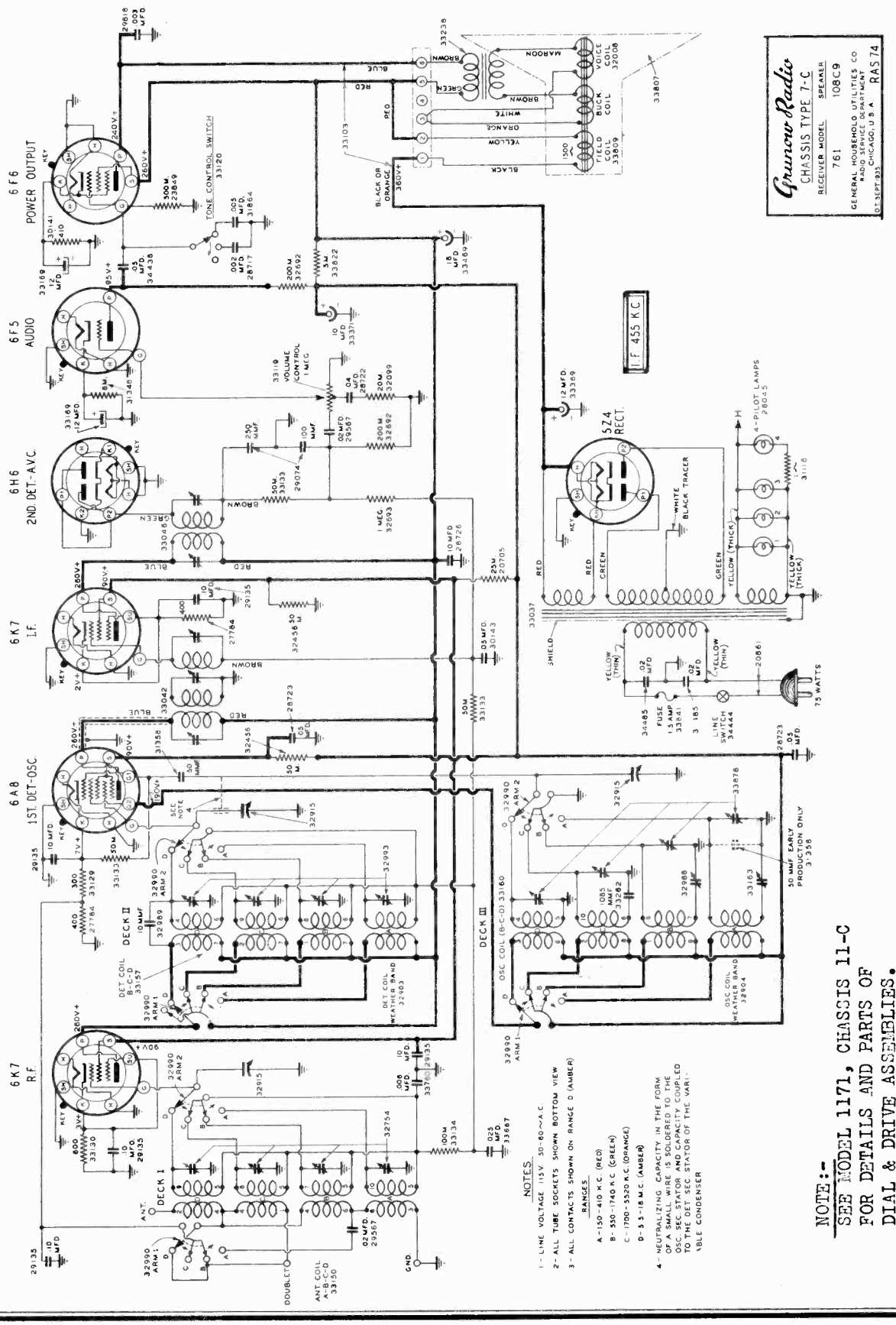
MODELS 760,761
Chassis 7C
Schematic, Voltage



NOTE:-
SEE MODEL 1171, CHASSIS 11-C
FOR DETAILS AND PARTS OF
DIAL & DRIVE ASSEMBLIES.

MODELS 760,761
Chassis 7C
Alignment,Parts

GENERAL HOUSEHOLD UTILITIES CO.

PARTS AND PRICE LIST

Models 760-761 Chassis 7C

PART NUMBERS ARE GIVEN ON THE ILLUSTRATIONS AND THE NUMBERS ARE BROUGHT DOWN IN NUMERICAL ORDER FOR CONVENIENCE

Part No.	Description	No. Used	Price
20705	Resistor, 25 M Ohms 1 Watt	1	$ .20
20861	Line Cord and Plug	1	.40
23538	Resistor, 200 M Ohms 1/4 Watt	2	.15
23849	Resistor, 500 M Ohms 1/4 Watt	1	.15
23853	Resistor, 50 M Ohms 1/4 Watt	2	.15
27784	Resistor, 400 Ohms 1/4 Watt	2	.15
27831	Pilot Light Socket Assembly	3	.10
28045	Pilot Lamp—6-8 Volt	4	.15
28638	Dial Pointer Screw	1	.02
28717	Condenser, .002 Mfd., 700 V. Tubular	1	.25
28722	Condenser, .04 Mfd., 400 V. Tubular	1	.25
28723	Condenser, .05 Mfd., 400 V. Tubular	2	.25
28726	Condenser, .1 Mfd., 400 V. Tubular	1	.30
29074	Condenser, 250-100 Mmf. Mica	1	.30
29135	Condenser, .1 Mfd., 200 Volt Tubular	5	.25
29209	Speaker Cable Clamp	1	.02
29522	Ball 11, 32 (Drive Mechanism)	4	.02
29551	Antenna & Doublet Binding Post	1	.10
29567	Condenser .02 Mfd., 400 Volt Tubular	3	.25
29628	Vertical Terminal Assem.	2	.10
29818	Condenser, .003 Mfd., 700 V. Tubular	1	.25
30092	Terminal Board (4 Terminals)	1	.10
30141	Resistor, 410 Ohms 1 Watt	1	.20
30143	Condenser, .05 Mfd. 200 Volt Tubular	1	.25
30182	Shield—2nd I.F.	1	.25
31116	Resistor, 1 Ohm (Ohmite)	1	.20
31348	Resistor, 6M Ohms 1/4 Watt	1	.15
31358	Condenser, 50 Mmf. Mica	1	.20
31714	Gear Tension Spring	2	.05
31739	Rubber Mtg. Washer (Var. Cond.)	6	.02
31777	Terminal Board	1	.10
31778	Terminal Board	1	.10
31860	Resistor, 2M Ohms 1/4 Watt	1	.15
31864	Condenser, .005 Mfd., 700 V. Tubular	1	.25
32099	Resistor, 20M Ohms 1/4 Watt	2	.15
32456	Resistor, 50M Ohms 1/2 Watt	2	.15
32462	Knob (Range Switch)	1	.30
32592	Cabinet (761)	1	
32624	Baffle (Resonator)	1	2.50
32692	Resistor, 200M Ohms 1/3 Watt (Ins.)	2	.15
32693	Resistor, 1 Megohm 1/3 Watt (Ins.)	1	.15
32754	Trimmer Assem., 4 Gang (Ant. Coil)	1	.50
32858	Mounting Foot Assem. (Rubber)	4	.25
32865	Electrolytic Condenser Strap	3	.05
32879	Cam for Dial Indicator	1	.05
33070	Knob, Vol. Cont. & Sta. Selector	2	.20
33071	Knob, Tone Cont. & Line Switch	2	.20
33072	Cabinet Escutcheon	1	.20
33073	Escutcheon Retaining Spring	1	.20
33074	Dial Window	1	.20
33075	Window Retaining Ring	1	.10
33076	Window Gasket	1	.10
33103	Speaker Cable Assem.	1	.20
33109	Coil Shield (Weather Band)	2	.30
33120	Tone Control Switch	1	.50
33119	Volume Control	1	.90
33129	Resistor, 300 Ohms 1/4 Watt	1	.15
33130	Resistor, 600 Ohms 1/4 Watt	1	.15
33133	Resistor, 50M Ohms, 1/4 Watt	3	.15
33134	Resistor, 100M Ohms, 1/3 Watt	1	.15
33150	Antenna Coil	1	3.60
33157	Detector Coil	1	2.75
33160	Oscillator Coil	1	1.75
33163	W. B. Padder Condenser	1	.35
33169	Condenser, 12 Mfd. Dual 25 V Dry Electrolytic	1	1.00
33179	Band Indicator—Amber	1	.10
33180	Band Indicator—Orange	1	.10
33181	Band Indicator—Red	1	.10
33182	Band Indicator—Green	1	.10
33262	Condenser, 1065 Mmf. Mica	1	.20
33303	5 Prong Socket 5Z4	1	.15
33306	8 Prong Socket	6	.15
33369	Condenser, 12 Mfd., 450 Volt Wet Electrolytic	1	1.20
33371	Condenser, 10 Mfd., 250 Volt Wet Electrolytic	1	.85
33419	Pilot Light Socket Assem.	1	.15
33469	Condenser, 18 Mfd., 300 Volt Wet Electrolytic	1	.90
33618	Tone Control Switch Only	1	1.20
33647	Decalcomania—Gold Dot.	2	.10
33659	Light Shield Cover	1	.10
32880	Shield for Range Switch Coil	1	.75
32903	Det. Coil & Shield (Weather Band)	1	1.35
32904	Osc. Coil & Shield (Weather Band)	1	1.25
32915	Variable Condenser	1	3.70
32917	Condenser Mtg. Foot (Rear)	1	.05
32918	Reflector Bracket Support	1	.10
32919	Drive Drum, Hub & Gear Assem.	1	.75
32924	Sleeve & Gear Assem.	1	.50
32927	Drive Shaft	1	.40
32928	Clutch Pin	1	.10
32930	Drive Mtg. Frame	1	.05
32931	1/8" Ball (Drive Mechanism)	15	.01
32933	Toggle Arm (Drive)	1	.05
32934	Toggle Spring	2	.05
32935	Drive String & Eyelet Assy.	1	.10
32936	Reflector Bracket	1	.05
32937	Pinion, Gear and Adjustable Plate Assem.	1	.70
32940	Pointer Pinion	1	.20
32950	Reflector Mask	1	.25
32952	Dial Frame Welded Assem.	1	.30
32957	Shutter Spring	2	.02
32959	Glass Clock Dial	1	1.40
32963	Dial Chart	1	.60
32966	Shutter	1	.10
32968	Shutter Tension Spring	1	.05
32969	Spring Connecting Link	1	.01
32970	Spacer for Dial Assem.	2	.03
32972	Minute Hand Pointer	1	.10
32978	Drive Spring	1	.10
32982	"Hour" Hand Pointer	1	.10
32986	Light Shield	1	.10
32988	Padder Condenser (Broadcast)	1	.35
32989	Candenser, 10 Mmf. (Mica)	1	.20
32990	Range Switch	1	4.25
32993	Trimmer Assem., 4 Gang (Det. Coil)	1	.50
33030	Power Transformer, 115 Volt, 25-50 Cycle	1	12.00
33033	Power Transformer, 110-135-220-250 Volt, 50-60 Cycle	1	17.00
33037	Power Transformer, 115 Volt, 50-60 Cycle	1	8.00
33042	1st I.F. Coil & Shield Assem.	1	3.50
33046	2nd I.F. Coil & Shield Assem.	1	2.00
33052	Shield 1st I.F.	1	.30
33054	Grid Cap	4	.01
33650	Dial Assembly (Riveted)	1	2.15
33667	Condenser, .025 Mfd. 400 V. Tubular	1	.25
33822	Resistor, 5M Ohms 1 Watt	1	.20
33831	Fuse Clip (Early Production)	1	.10
33834	Terminal Mounting Strip (Single Lug)	1	.10
33837	Fuse Clip Assembly	1	.10
33841	Fuse (1 1/2 Amp.)	1	.50
33878	Trimmer Assem., 4 Gang (Osc. Coil)	1	1.00
34401	Drive Mechanism	1	.35
34436	.05 Mfd., 400 Volt Tubular Cond.	1	.45
34444	Line Switch	1	.10
34469	Fuse Cover	1	.05
34470	Fuse Cover Liner	1	.20
34471	Fuse Clip (Late production)	1	.25
34485	.02 Mfd. 400 V. Moulded Paper Cond.	2	.02
63838	Felt Washer (Knobs)	5	.05
63001	13/32 x No. 10-32 H. H. Set Screw	1	.01
63006	1/4 x 10-32 H. H. Set Screw	2	.02
63928	Felt Washer (Drive Shaft)	1	.01
63863	Flat Washer (Chassis Mtg.)	4	.01
63207	1" x 8-32 Screw (Chassis Mtg.)	4	.02
65337	Eyelet (Dial Assy.)	1	

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

SPEAKER PARTS

TYPE 108C9

Part No.	Description	No. Used	Price
20045	Terminal Strip Cover	1	.15
20047	Terminal Strip	1	.10
27216	Transformer Bracket	1	.20
27240	Cone Mtg. Gasket	1	.10
32008	Cone & Voice Coil Assem.	1	1 35
32227	Pot & Pole Piece Assem.	1	1.50
32228	Speaker Clamp	1	.10
32238	Output Trans.	1	2.25
33232	Basket & Front Plate Assem.	1	2.85
33807	108C9 Speaker Complete	1	16.50
33809	Field Coil	1	2.60

SERVICE DATA

CONTINUITY AND VOLTAGE

Continuity and voltage readings should be taken from the underside of the chassis. The values given on the schematic diagram are average and allow the service man to make a quick check of the chassis constants. The socket layouts given on the schematic diagram show each socket from the underside.

THE RANGE SWITCH

The Range Switch is a simple three deck multiple pole, positive acting switch, used to connect the various coils into their proper circuits, and is designed in such a way that the coils being used are isolated from coils of the two succeeding bands of a lower frequency. In the case of the detector circuit both the higher and lower frequency bands, above and below the circuit selected, are shorted out. This switching arrangement not only selects the proper coils for each band, but grounds the unused section, allowing the receiver to work at maximum sensitivity and selectivity on all four ranges.

The Range Switch and Coil Assembly is shown schematically in figure (3) and it will be noted that deck I (Antenna) is the one toward the front of the chassis, deck II (Detector) in the center position and deck III (Oscillator) toward the rear of the chassis. The diagram shows the exact position of the coil and switch lugs, and little difficulty should be experienced in making any necessary repairs or inspection

CIRCUIT ALIGNMENT PROCEDURE

Do not attempt to align the 7C Chassis without proper equipment. Alignment condensers are shown in the accompanying illustrations, and are numbered in order of procedure — I.F. Condensers on top and side of the I.F. Transformers.

1. EQUIPMENT:

(A) Test Oscillator.

A modulated Oscillator capable of producing signals at the I.F., Broadcast, Short-Wave, and weather Band frequencies is necessary for alignment of the 7C Chassis.

(B) Insulated Screw Driver — (all bakelite or fibre) about 6" long.

(C) Output Meter.

This may be any of the standard Output Meters, but should be sufficiently sensitive to provide a good deflection at low signal strength.

(D) Coupling Means.

Coupling Condensers of 200 mmf., .25 mfd., and a 400 Ohm resistor should be used when coupling oscillator to receiver during alignment as specified in the procedure.

(E) The receiver should be aligned in a location free from local interference (interference caused by motors — flashers — automobile ignition, etc.) as high frequency disturbances will cause difficulties when the short wave section is being adjusted. (A screen room is to be recommended.)

2. DIAL SETTING:

Turn dial knob until condensers are fully meshed. The dial pointer (Hour hand) should be on the horizontal line of the dial, pointing to 9 and 3 o'clock.

The minute hand should be at 12 o'clock or in a vertical position.

3. I.F. ALIGNMENT:

(A) Connect signal lead of test oscillator to grid of 6A8 (1st detector tube) through .25 mfd. condenser. Connect the ground lead to the chassis.

(B) Before any adjustment of circuit constants is attempted, allow the chassis to "heat up" to normal operating temperature. This heating period should take from 20 to 30 minutes and is necessary to allow all coils and condensers to reach their normal temperatures so that when alignment is completed, there will be no inductance or capacity changes due to thermal expansion or contraction.

It is good to remember this heating condition when logging station — that is, do not attempt to log or tune in a station previously logged on a "cold" chassis, as the station being tuned in would "drift" and the calibration on the previously logged station would be incorrect.

(C) Set Dial pointer to 1400 K.C. and range switch on "Green" (No. 2) position.

(D) Place test Oscillator in operation at 455 K.C. Turn receiver volume control and tone control to maximum.

(E) Attenuate test Oscillator output to lowest value, consistent with obtaining a readable indication on output meter.

(F) Adjust the five I.F. Trimmers, A1, A2, A3, A4, A5, located on the I.F. Transformers on top of chassis Fig. (1), until maximum output is obtained. During alignment, maintain as low a value of signal as will allow obtaining of accurate adjustment.

4. 175 K.C. ALIGNMENT:

(A) Connect signal lead of test oscillator through 200 mmf. Condenser to Antenna binding post on Chassis.

(B) Connect the test oscillator ground lead to the ground post of chassis.

(C) Place test oscillator in operation at 175 K.C.

(D) Tune in signal to maximum (this point does not have to be exactly at 175 K.C. dial setting) range switch on "Red" (No. 1) position.

(E) Adjust the 175 K.C. Padding Condenser (A6) Fig. 2 (which is on rear of Chassis) in direction of signal increase. At the same time rock the tuning condenser back and forth through resonance while adjusting padding condenser, until maximum output is obtained.

5. 350 K.C. ALIGNMENT:

(A) Place test oscillator in operation at 350 K.C.

(B) Turn dial pointer to 350 K.C.

(C) Turn range switch to "Red" (No. 1) position.

(D) Adjust "weather Band" oscillator trimmer (A7) Fig. 2, to maximum output.

(E) Adjust Detector Trimmer (A8) Fig. 2, to maximum output.

(F) Adjust Antenna Trimmer (A9) Fig. 2, to maximum output.

6. RECHECK 175 K.C. PADDER CONDENSER — See 4 — above.

7. 1400 K.C. ALIGNMENT:

(A) Place test oscillator in operation at 1400 K.C.

(B) Turn dial pointer to 1400 K.C.

(C) Turn range switch to range "Green" (No. 2) position.

(D) Adjust broadcast oscillator trimmer (A10) Fig. 2, to maximum output.

(E) Adjust 1st Det. Trimmer (A11) Fig. 2, to maximum output.

(F) Adjust Antenna Trimmer (A12) Fig. 2, to maximum output.

8. 600 K.C. ALIGNMENT:

(A) Place test Oscillator in operation at 600 K.C.

(B) Tune in signal to maximum (this point does not have to be exactly at 600 K.C. dial setting.)

(C) Adjust the 600 K.C. Padding Condenser (A13), Fig. 2, which is on rear of Chassis, in direction of signal increases. At same time rock the tuning condenser back and forth through resonance while adjusting padding condenser until maximum output is obtained.

9. RECHECK 1400 K.C. ALIGNMENT: See 7 above.

10. 5000 K.C. ALIGNMENT:

(A) Set range switch to "Orange" (No. 3) position.

(B) Place test Oscillators in operation at 5000 K.C.

(C) Turn dial pointer to 5000 K.C.

(D) Adjust Set Oscillator Trimmer (A14), Fig. 2, to maximum output.

(E) Adjust Detector Trimmer (A15) Fig. 2, to maximum output.

(F) Adjust Antenna Trimmer (A16), Fig. 2, to maximum output.

11. 18 M. C. ALIGNMENT:

(A) Connect signal lead of test oscillator through 400 Ohm resistor to Antenna binding post of Chassis.

(B) Connect the ground lead to ground terminal of Chassis.

(C) Set Range Switch to "Amber" (No. 4) position and turn dial pointer to 18 M.C.

(D) Place Test Oscillator in operation at 18 M.C.

(E) Adjust set oscillator Trimmer (A17) Fig. 2, to maximum output.

(F) Adjust Detector Trimmer (A18) Fig. 2, to maximum output.

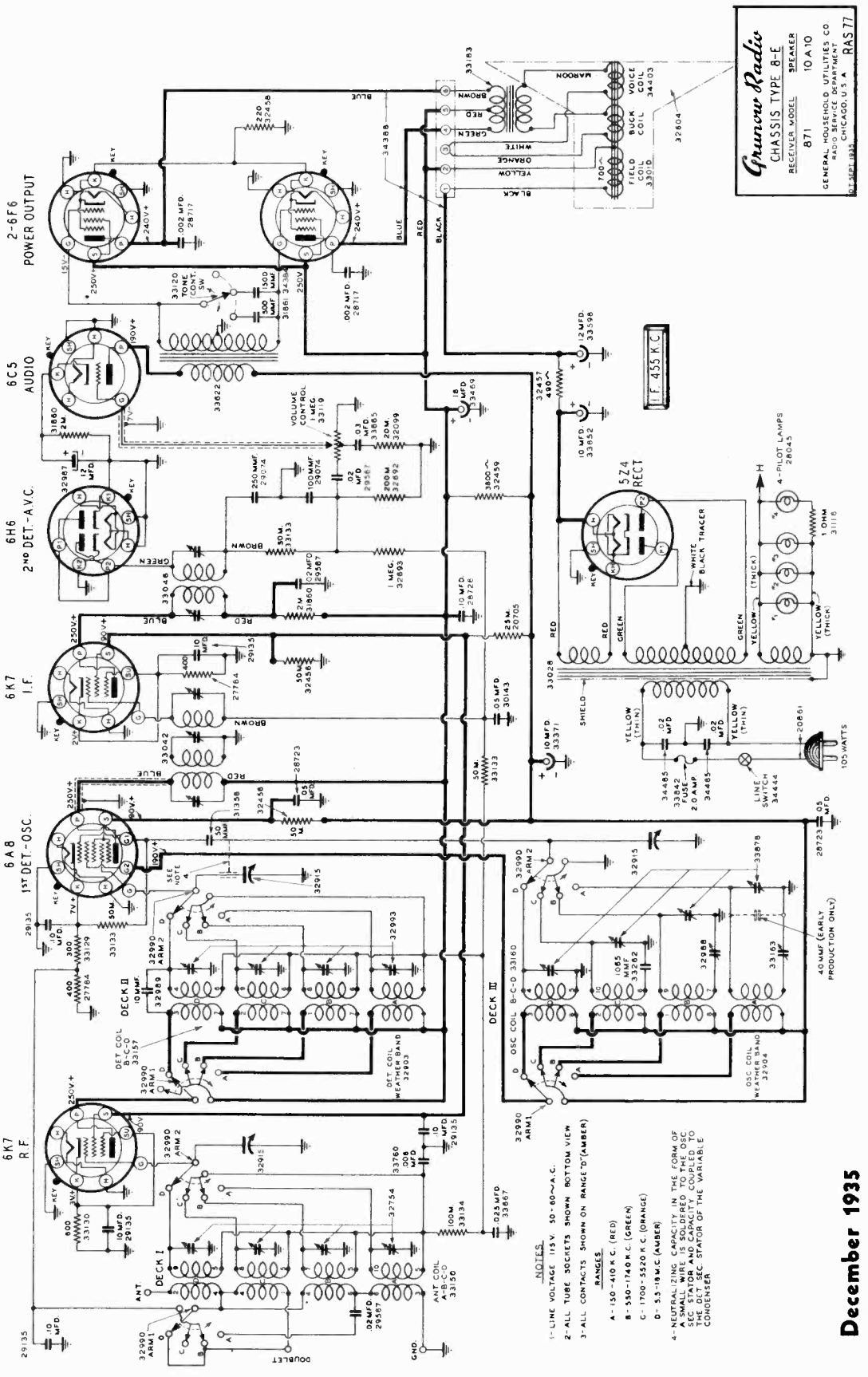
(G) Adjust Antenna Trimmer (A19) Fig. 2, to maximum output.

(H) On the 18 M.C. Oscillator Alignment it will be noted that there are two settings at which the signal will be received. Use the lower of the images for alignment point, that is, the setting giving most capacity or the point at which the trimmer screw is farthest in.

GENERAL HOUSEHOLD UTILITIES CO.

MODEL 871
Chassis 8E
Schematic
Voltage

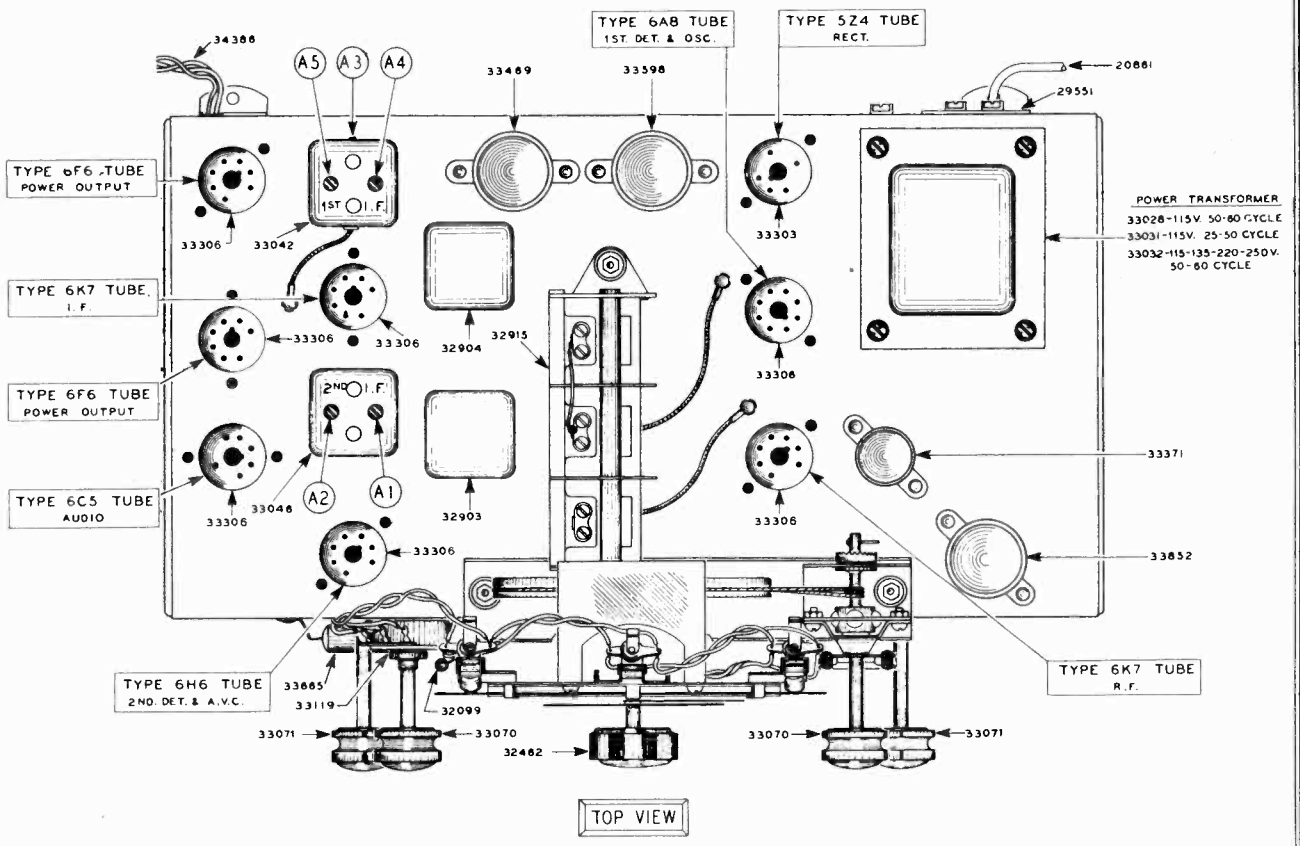
NOTE:-
SEE MODEL 760, CHASSIS 7-C FOR SCHEMATIC OF RANGE SWITCH ASSEMBLY.
SEE MODEL 1171, CHASSIS 11-C FOR DETAILS AND PARTS OF DIAL & DRIVE ASSEMBLIES.



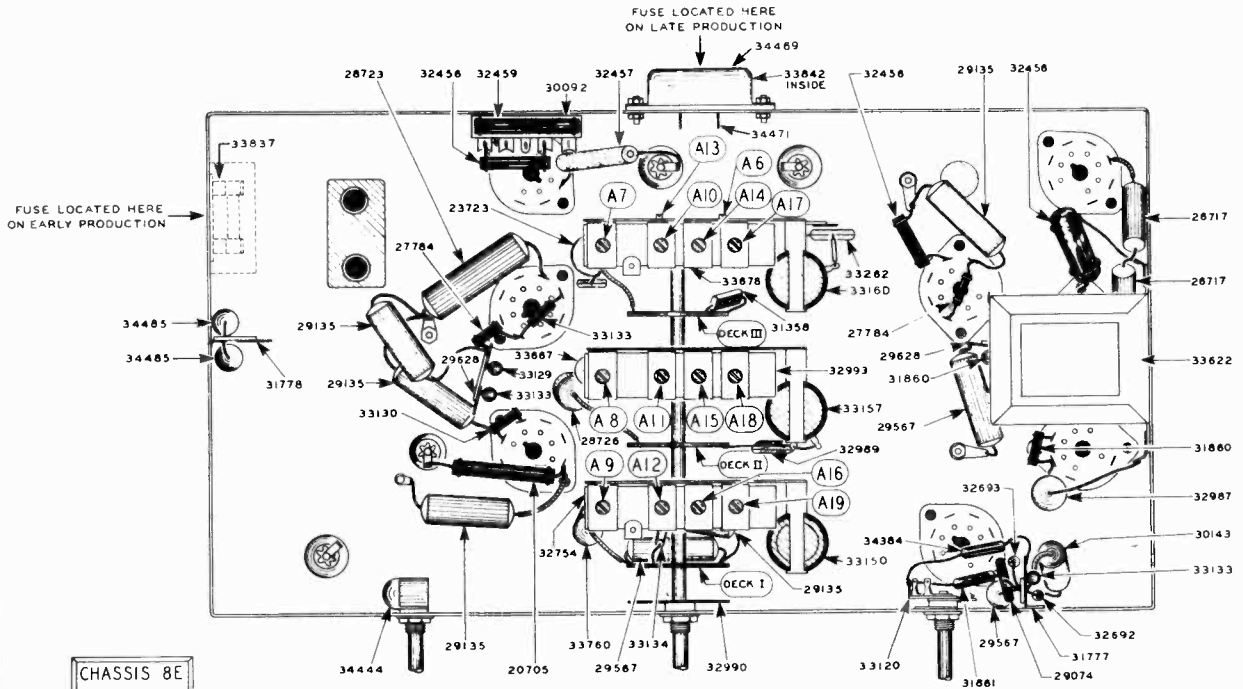
December 1935

MODEL 871
Chassis 8E
Socket, Trimmers
Chassis

GENERAL HOUSEHOLD UTILITIES CO.



TOP VIEW



CHASSIS 8E
NOV. 1935
RAS 102

BOTTOM VIEW

GENERAL HOUSEHOLD UTILITIES-CO.

MODEL 871
Chassis 8E
Alignment
Parts List

SERVICE DATA

CONTINUITY AND VOLTAGE

Continuity and voltage readings should be taken from the underside of the chassis. The values given on the schematic diagram are average and allow the service man to make a quick check of the chassis constants. The socket layouts given on the schematic diagram show each socket from the underside.

THE RANGE SWITCH

The Range Switch is a simple three deck multiple pole, positive acting switch, used to connect the various coils into their proper circuits and is designed in such a way that the coils being used are isolated from coils of the two succeeding bands of a lower frequency. In the case of the detector circuit both the higher and lower frequency bands, above and below the circuit selected, are shorted out. This switching arrangement not only selects the proper coils for each band, but grounds the unused section, allowing the receiver to work at maximum sensitivity and selectivity on all four ranges.

The Range Switch and Coil Assembly is shown schematically in figure (3) and it will be noted that deck I (Antenna) is the one toward the front of the chassis, deck II (Detector) in the center position and deck III (Oscillator) toward the rear of the chassis. The diagram shows the exact position of the coil and switch lugs and little difficulty should be experienced in making any necessary repairs or inspection.

CIRCUIT ALIGNMENT PROCEDURE

Do not attempt to align the 8-E Chassis without proper equipment. Alignment condensers are shown in the accompanying illustration, and are numbered in order of procedure — I.F. Condensers on top and side of the I.F. Transformers.

1. EQUIPMENT:

(A) Test Oscillator.

A modulated Oscillator capable of producing signals at the I.F., Broadcast, Short-Wave, and weather Band frequencies is necessary for alignment of the 8-E Chassis.

(B) Insulated Screw Driver — (all bakelite or fibre) about 6" long.

(C) Output Meter.

This may be any of the standard Output Meters, but should be sufficiently sensitive to provide a good deflection at low signal strength.

(D) Coupling Means.

Coupling Condensers of 200 mmf., .25 mfd., and a 400 Ohm resistor should be used when coupling oscillator to receiver during alignment as specified in the procedure.

(E) The receiver should be aligned in a location free from local interference (Interference caused by motors — flashers — automobile ignition, etc.) as high frequency disturbances will cause difficulties when the short wave section is being adjusted. (A screen room is to be recommended.)

2. DIAL SETTING:

Turn knob until condensers are fully meshed. The dial pointer (Hour hand) should be on the horizontal line of the dial, pointing to 9 and 3 o'clock.

The minute hand should be at 12 o'clock or in a vertical position.

3. I.F. ALIGNMENT:

(A) Connect signal lead of test oscillator to grid of 6A8 (1st detector tube) through .25 mfd. condenser. Connect the ground lead to the chassis.

(B) Before any adjustment of circuit constants is attempted, allow the chassis to "heat up" to normal operating temperature. This heating period should take from 20 to 30 minutes and is necessary to allow all coils and condensers to reach their normal temperatures so that when alignment is completed, there will be no inductance or capacity changes due to thermal expansion or contraction.

It is good to remember this heating condition when logging station — that is, do not attempt to log or tune in a station previously logged on a "cold" chassis, as the station being tuned in would "drift" and the calibration on the previously logged station would be incorrect.

(C) Set Dial pointer to 1400 K.C. and range switch on "Green" (No. 2) position.

(D) Place test Oscillator in operation at 455 K.C. Turn receiver volume control and tone control to maximum.

(E) Attenuate test Oscillator output to lowest value, consistent with obtaining a readable indication on output meter.

(F) Adjust the five I.F. Trimmers, A1, A2, A3, A4, A5, located on the I.F. Transformers on top of chassis Fig. (1), until maximum output is obtained. During alignment, maintain as low a value of signal as will allow obtaining of accurate adjustment.

4. 175 K.C. ALIGNMENT:

(A) Connect signal lead of test oscillator through 200 mmf. Condenser to Antenna binding post on Chassis.

(B) Connect the test oscillator ground lead to the ground post of chassis.

(C) Place test oscillator in operation at 175 K.C.

(D) Tune in signal to maximum (this point does not have to be exactly at 175 K.C. dial setting) range switch on "Red" (No. 1) position.

(E) Adjust the 175 K.C. Padding Condenser (A6) Fig. 2 (which is on rear of Chassis) in direction of signal increase. At the same time rock the tuning condenser back and forth through resonance while adjusting padding condenser, until maximum output is obtained.

5. 350 K.C. ALIGNMENT:

(A) Place test oscillator in operation at 350 K.C.

(B) Turn dial pointer to 350 K.C.

(C) Turn range switch to "Red" (No. 1) position.

(D) Adjust "weather Band" oscillator trimmer (A7) Fig. 2, to maximum output.

(E) Adjust Detector Trimmer (A8) Fig. 2, to maximum output.

(F) Adjust Antenna Trimmer (A9) Fig. 2, to maximum output.

6. RECHECK 175 K.C. PADDER CONDENSER — See 4 — above.

7. 1400 K.C. ALIGNMENT:

(A) Place test oscillator in operation at 1400 K.C.

(B) Turn dial pointer to 1400 K.C.

(C) Turn range switch to range "Green" (No. 2) position.

(D) Adjust broadcast oscillator trimmer (A10) Fig. 2, to maximum output.

(E) Adjust 1st Det. Trimmer (A11) Fig. 2, to maximum output.

(F) Adjust Antenna Trimmer (A12) Fig. 2, to maximum output.

8. 600 K.C. ALIGNMENT:

(A) Place test Oscillator in operation at 600 K.C.

(B) Tune in signal to maximum (this point does not have to be exactly at 600 K.C. dial setting.)

(C) Adjust the 600 K.C. Padding Condenser (A13), Fig. 2, which is on rear of Chassis, in direction of signal increases. At same time rock the tuning condenser back and forth through resonance while adjusting padding condenser until maximum output is obtained.

9. RECHECK 1400 K.C. ALIGNMENT: See 7 above.

10. 5000 K.C. ALIGNMENT:

(A) Set range switch to "Orange" (No. 3) position.

(B) Place test Oscillators in operation at 5000 K.C.

(C) Turn dial pointer to 5000 K.C.

(D) Adjust Set Oscillator Trimmer (A14), Fig. 2, to maximum output.

(E) Adjust Detector Trimmer (A15) Fig. 2, to maximum output.

(F) Adjust Antenna Trimmer (A16), Fig. 2, to maximum output.

11. 18 M. C. ALIGNMENT:

(A) Connect signal lead of test oscillator through 400 Ohm resistor to Antenna binding post of Chassis.

(B) Connect the ground lead to ground terminal of Chassis.

(C) Set Range Switch to "Amber" (No. 4) position and turn dial pointer to 18 M.C.

(D) Place Test Oscillator in operation at 18 M.C.

(E) Adjust set oscillator Trimmer (A17) Fig. 2, to maximum output.

(F) Adjust Detector Trimmer (A18) Fig. 2, to maximum output.

(G) Adjust Antenna Trimmer (A19) Fig. 2, to maximum output.

(H) On the 18 M.C. Oscillator Alignment it will be noted that there are two settings at which the signal will be received. Use the lower of the images for alignment point, that is, the setting giving most capacity or the point at which the trimmer is farthest in.

SPEAKER PARTS

TYPE 10A10

Part No.	Description	No. Used	Price
20010	Speaker Pot & Pole Piece	1	1.15
20041	Speaker Clamp	1	.10
27240	Speaker Gasket	1	.10
32604	10A10 Speaker Complete	1	11.50
33010	Field Coil	1	3.00
33183	Output Trans.	1	2.25
33202	Terminal Strip Assem.	1	.20
33203	Terminal Strip Cover	1	.10
33204	Terminal Strip Cover Insul.	1	.05
33231	Transformer Bracket	1	.10
34403	Cone & V. C. Assem.	1	1.60
33664	Basket & Front Plate Assem.	1	2.85

PARTS AND PRICE LIST

Model 871 Chassis 8E

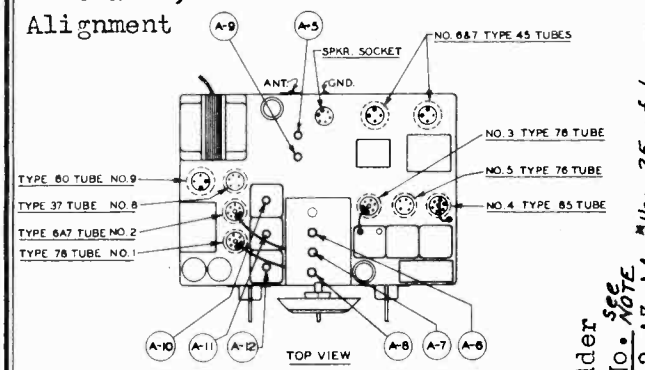
PART NUMBERS ARE GIVEN ON THE ILLUSTRATIONS AND THE NUMBERS ARE BROUGHT DOWN IN NUMERICAL ORDER FOR CONVENIENCE

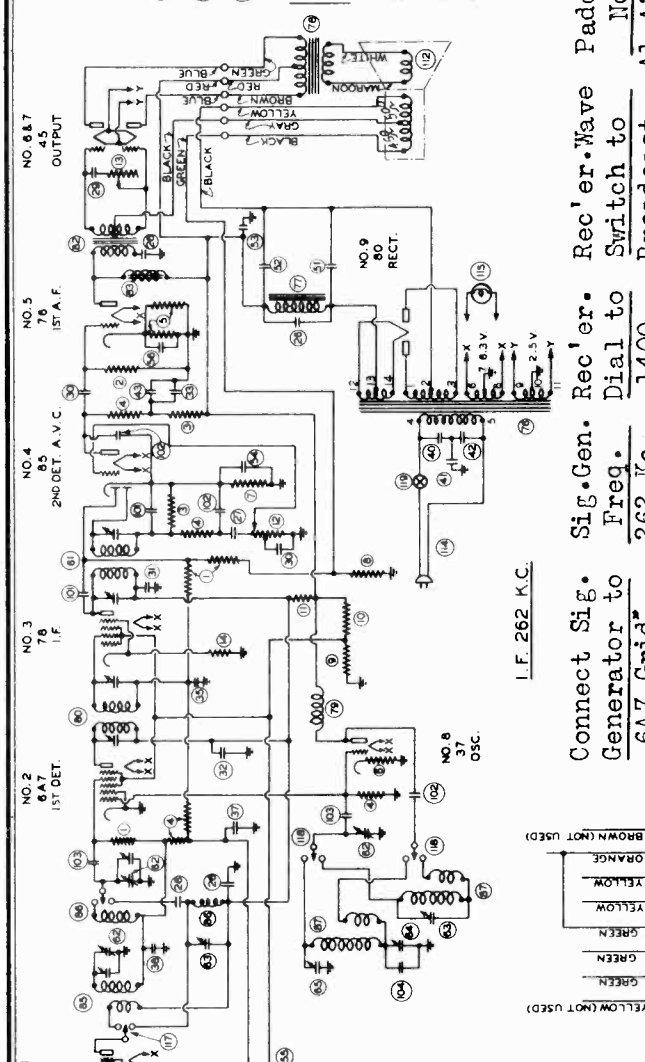
Part No.	Description	No. Used	Price
20705	25 M Ohm 1 Watt Resistor	1	$ .20
20861	Line Cord and Plug	1	.40
23853	50 M Ohm 1/4 Watt Resistor	2	.15
27784	400 Ohm 1/2 Watt Resistor	2	.15
27831	Pilot Light Socket Assem.	3	.10
28045	Pilot Lamp 6.8 Volt	4	.15
28638	Pointer Screw	1	.02
28717	.002 Mfd. 700 V. Tubular Condenser	2	.25
28723	.05 Mfd. 400 V. Tubular Condenser	2	.25
28726	.10 Mfd. 400 V. Tubular Condenser	1	.30
29065	Electrolytic Condenser Clamp	3	.05
29074	100 - 250 Mmf. Condenser (Mica)	1	.30
29135	.10 Mfd. 200 V. Tubular Condenser	5	.25
29209	Speaker Cable Clamp	1	.02
29522	11/32 Ball (Drive Mechanism)	4	.02
29551	Antenna Binding Post Assem.	1	.10
29567	.02 Mfd. 400 V. Tubular Condenser	3	.25
29628	Vertical Terminal Assem. (4 Lugs)	2	.10
30092	Terminal Strip (4 Lugs)	1	.06
30143	.05 Mfd. 200 V. Tubular Condenser	1	.25
30182	2nd I.F. Shield	1	.25
31116	Resistor 1 Ohm (Ohmite)	1	.20
31358	50 Mmf. Condenser (Mica)	1	.20
31637	Condenser Mounting Stud	2	.02
31714	Spring (gear tension)	2	.05
31739	Rubber Mtg. Washer Var. Cond.	6	.02
31777	Terminal Strip (8 Lugs)	1	.10
31778	Junction Terminal Board (4 Lugs)	1	.10
31860	2 M Ohm 1/4 Watt Resistor	2	.15
31861	500 Mmf. Condenser (Mica)	1	.20
32099	20 M Ohm 1/4 Watt Resistor	1	.15
32456	50 M Ohm 1/2 Watt Resistor	2	.15
32457	490 Ohm 6 Watt Resistor	1	.35
32458	220 Ohm 2 Watt Resistor	1	.30
32459	3800 Ohm 1 Watt Resistor	1	.20
32462	Knob (Range Switch)	1	.30
32692	Resistor 200 M Ohms 1/3 Watt Insul.	1	.15
32693	1 Megohm 1/3 Watt Resistor	1	.15
32754	4-Gang Trimmer Assem. (Antenna)	1	.50
32858	Mounting Foot Assem. (Rubber)	4	.25
33031	Power Transformer 115 V—25-50 Cycle (8EX)	1	9.00
33032	Power Transformer 110 V 135-220-250V—50-60 Cycle (8EZ)	1	9.00
33042	1st I.F. Coil & Shield Assem.	1	3.50
33046	2nd I.F. Coil & Shield Assem.	1	2.00
33052	1st I.F. Shield	1	.30
33054	Grid Cap	3	.01
33070	Knob Vol. Control & Station Selec.	2	.20
33071	Knob Tone Control & On-Off Switch	2	.20
33072	Cabinet Escutcheon	1	.20
33073	Escutcheon Retaining Spring	1	.20
33074	Dial Wiedow	1	.20
33075	Window Retaining Ring	1	.10
33076	Window Gasket	1	.10
33109	Coil Shield (W. B.)	2	.30
33119	Volume Control	1	.90
33120	Tone Control Switch	1	.50
33129	300 Ohm 1/4 Watt Resistor	1	.15
33130	600 Ohm 1/4 Watt Resistor	1	.15
33133	50 M Ohm 1/4 Watt Resistor	3	.15
33134	100 M Ohm 1/3 Watt Resistor	1	.15
33150	Antenna Coil	1	3.60
33157	Detector Coil	1	2.75
33160	Oscillator Coil Assem.	1	1.75
33163	Weather Band Padder Condenser	1	.35
33179	Amber Band Indicator	1	.10
33180	Orange Band Indicator	1	.10
33181	Red Band Indicator	1	.10
33182	Green Band Indicator	1	.10
33262	1065 Mmf. Condenser (Mica)	1	.20
33303	5 Prong Socket	1	.15
33306	8 Prong Socket	7	.15
33371	10 Mfd. 250 V Wet Electrolytic Cond.	1	.85
33419	Pilot Light Socket Assem.	1	.15
33467	Decalcomania (Gold Dot)	2	.10
33469	18 Mfd. 300 V Wet Electrolytic Cond.	1	.90
33598	12 Mfd. 450 V Wet Electrolytic Cond.	1	1.10
33622	Audio Input Transformer	1	$3.75
33625	Baffle (Resonator)	1	2.50
32865	Electrolytic Clamp	1	.05
32879	Cam (Shutter)	1	.05
32880	Range Switch and Coil Cover Assem.	1	.75
32903	Detector Coil & Shield Assem.	1	1.35
32904	Oscillator Coil & Shield Assem.	1	1.25
32915	Variable Condenser	1	3.70
32917	Condenser Mtg. Foot (Rear)	1	.05
32918	Reflector Bracket Support	1	.10
32919	Drive Drum, Hub & Gear Assem.	1	.75
32924	Sleeve & Gear Assem.	1	.50
32927	Drive Shaft	1	.40
32928	Clutch Pin	1	.05
32930	Drive Mtg. Frame	1	.05
32931	1/8 Ball (Drive Mechanism)	15	.01
32933	Toggle Arm (Drive)	1	.05
32934	Toggle Spring	2	.05
32935	Drive String	1	.10
32936	Reflector Bracket	1	.05
32937	Pinion Gear & Adjusting Plate Assem.	1	.70
32940	Pointer Pinion	1	.20
32950	Reflector Mask	1	.25
32952	Dial Frame Welded Assem.	1	.30
32957	Shutter Spring	2	.02
32959	Glass Clock Dial	1	1.40
32963	Dial Chart	1	.60
32966	Shutter	1	.10
32968	Shutter Tension Spring	1	.05
32969	Spring Connecting Link	1	.01
32970	Spacer (Dial Mtg.)	2	.03
32972	Minute Hand Pointer	1	.10
32978	Drive Spring	1	.10
32982	Hour Pointer	1	.10
32986	Light Shield	1	.10
32987	Dry Electrolytic Cond. 12 Mfd. 25 V.	1	.75
32988	Broadcast Padder Condenser	1	.35
32989	10 Mmf. Condenser (Mica)	1	.20
32990	Range Switch	1	4.25
32993	4-Gang Trimmer Assem. (Detector)	1	.50
33028	Power Transformer— 115 V—50-60 Cycle	1	7.50
33659	Light Shield Cover	1	.10
33660	Dial Assembly (Riveted)	1	2.15
33665	.03 Mfd. 200 Volt Tub. Condenser	1	.25
33667	.025 Mfd. 400 Volt Tub. Condenser	1	.25
33760	.006 Mfd. 700 Volt Tub. Condenser	1	.25
33837	Fuse Clip Assem. (Early Production)	1	.10
33842	Fuse (2 Amp)	1	.10
33852	10 Mfd. 475 Wet Electrolytic Cond.	1	.95
33878	4 Gang Trimmer Assem. (Osc.)	1	.50
34384	1500 Mmf. Condenser (Mica)	1	.20
34388	Speaker Cable Assem.	1	.20
34401	Drive Mechanism	1	1.00
34444	Line Switch	1	.45
34469	Fuse Cover	1	.10
34470	Fuse Cover Liner	1	.05
34471	Fuse Clip (Late Production)	1	.10
34485	.02 Mfd. 400 V Moulded Paper Condenser	2	.25
61207	1" x 8-32 H. H. M. Screw (Chassis Mtg.)	4	.01
63838	Felt Washers for Control Knob	5	.02
63863	Flat Washer (Chassis Mtg.)	4	.01
63928	Black Felt Washer (Drive)	1	.02
65337	Eyelet for Dial Assembly	1	.02

Prices subject to change without notice.

MODEL 921
Chassis 9C
Schematic, Parts
Alignment

GENERAL HOUSEHOLD UTILITIES CO.





Connect Sig. Generator to 6A7 Grid" Ant. post " "

Sig. Gen. Freq.	Rec'er. Dial to
262 Kc.	1400
1400 Kc.	1400
600 Kc.	600
12 Mc.	12 Mc.

Rec'er. Wave Switch to	Padder No. (See NOTE)
Broadcast	A1, A2, A3, A4
Broadcast	A5, A6, A7, A8
Broadcast	A9
Shortwave	A10, A11, A12

* Use .25-mf dummy antenna.
* Use 400 ω dummy antenna.
NOTE - Adjust in order given

INDICATES OUTER FOIL

DIAGRAM OF BY-PASS CONDENSER #28050

POWER TRANSFORMER CONNECTIONS

RESISTORS

ITEM	PART NO.	DESCRIPTION	NO. REQ.	PRICE
1	23849	500 M Ohms	3	.20
2	23998	250 M Ohms	1	.20
3	23370	100 M Ohms	2	20
4	23853	50 M Ohms	5	20
5	30186	600 M Ohms	2	20
6	27784	400 M Ohms	1	.20
7	27447	4 M Ohms (Candohm	1	.30
8	27447	30 Ohms) Candohm	1	.65
9	27540	275 M Ohms		
10	27540	14 M Ohms Candohm		
11	28302	1 M Ohm Candohm	1	.30
12	27687	Volume Control	1	1.15
13	28316	Tone Control	1	.75
14	27490	1 M Ohms	1	.20

PAPER CONDENSERS

ITEM	PART NO.	DESCRIPTION	NO. REQ.	PRICE
26	28726	.01 Mfd 400 V.	2	.25
27	29453	.004 Mfd 400 V.	1	.25
28	29567	.002 Mfd 400 V.	1	.25
29	28717	.002 Mfd 700 V.	1	.25
30	28720	.005 Mfd 700 V.	2	.30
31		.01 Mfd 300 V.	1	.20
32		.01 Mfd 300 V.	1	
33	28050	.01 Mfd + .005 Mfd	1	2.00
34		.01 Mfd 200 V.	1	
35		.01 Mfd 200 V.	1	
37	27700	.01 Mfd 600 V. (Small	1	.80
38		.01 Mfd 300 V. Can		
40		.01 Mfd 500 V.	1	
41	28043	.01 Mfd 500 V. (Small	1	.80
42		.01 Mfd 500 V. Can	1	
43	28725	.008 Mfd 400 V.	1	

ELECTROLYTIC CONDENSERS

ITEM	PART NO.	DESCRIPTION	NO. REQ.	PRICE
51	27710	6 Mfd 475 V.	1	1.15
52	27711	8 Mfd 475 V.	1	1.10
53	29562	16 Mfd 300 V.	1	1.25
54	27670	8 Mfd 475 V.	1	1.20
55		8 Mfd 475 V.	1	1.20
56	29789	4 Mfd 25 V.	1	.60

TRANSFORMERS & CHOKES

ITEM	PART NO.	DESCRIPTION	NO. REQ.	PRICE
76	27767	Power Transformer	1	10.50
77	28051	Filter Choke	1	2.65
79	29539	R F Choke	1	.60
80	31606	1st I.F. Transformer	1	3.00
81	31607	2nd I.F. Transformer	1	3.00
82	28052	Input Transformer	1	3.00
83	28053	Audio Choke	1	1.75
84	31594	Ant Coil	1	2.75
85	31592	Det Coil	1	1.75
86	31595	B+ Selector	1	1.50
87	31596	Osc Coil	1	2.00

ADJUSTABLE CONDENSERS

ITEM	PART NO.	DESCRIPTION	NO. REQ.	PRICE
82	31625	Variable Cond	1	.750
83	30181	5 Mf. Trimmer	4	.35
84	27542	Osc. Trimmer (600)	1	.60
85	27542	Osc. Trimmer (400)	1	.95
	31624	Var Cond & Drive Assem	1	4.75

MICA CONDENSERS

ITEM	PART NO.	DESCRIPTION	NO. REQ.	PRICE
101	24251	100 Mmf.	2	.15
102	24487	250 Mmf.	3	.20
103	29035	50 Mmf.	3	.20
104	29074	250 Mmf & 100 Mmf	1	.30

SPEAKER PARTS

ITEM	PART NO.	DESCRIPTION	NO. REQ.	PRICE
78	31621	Output Transformer	1	2.00
112	31582	10" Spkr Complete	1	11.50
	27565	Speaker Cable Assem	1	.95
	26256	Tube Shield Base	6	.05
	32228	Spkr. Clamp	1	.10
	20045	Term Strip Cover	1	.15
	20047	Terminal Strip	1	.10
	27240	Cone Mounting Gasket	1	.10
	32006	Cone & Voice Coil Assembly	1	3.10
	31617	Field Coil Assem	1	3.30
	27216	Transformer Bracket	1	.20

MISCELLANEOUS

ITEM	PART NO.	DESCRIPTION	NO. REQ.	PRICE
	31618	Resistor Panel Assem	1	
	31586	Var Cond Cover Assem	1	
	29832	Tube Shield Body	4	.15
	31215	Tube Shield Cap	4	.10
	27455	Tube Shield	1	.15
	28300	Tube Shield	1	.25
	27141	Escutcheon	1	.01
	#5834	Felt Washer 3/4" O.D	1	.01
	27508	Push-on Knob	1	.20
	#3839	Felt Washer 1/2" O.D	3	.01
	27492	Push-on Knob	2	.15
	27667	Set Screw Knob	1	.20

MISCELLANEOUS

ITEM	PART NO.	DESCRIPTION	NO. REQ.	PRICE
	31079	6 Prong Socket	3	.15
	31078	5 Prong Socket	2	.10
	31076	4 Prong Socket	3	.10
	26256	Tube Shield Base	6	.05
	31080	7 Prong Socket	1	.15
	27488	6 Prong Socket (Spkr)	1	.15
	22333	Ant Binding Post Assem	1	.10
	23358	Vert Terminal Assem	1	.05
	31424	Electro Inst Shield	2	
	27478	Ground Term	1	.02
	31205	Electrolytic Instl	1	.05
	31590	Tricle Coil Can	1	.175
	27260	Drive Shaft	1	.05
	27617	Drive Drum & Bushing	1	.50
	27254	Drive Drum Spring	1	.05
	27297	String & Eyelet Assem	1	.10
	27298	Dial Pointer & Brkt	1	.15
	21312	Term Assem	1	.15
		Range Switch Deck I	1	2.50
		" " Deck II		
	31569	" " Deck III	1	
	20461	Line Cord	1	.95
	28045	6.8 v Pilot Light	1	.15
		Line Switch (on Vol Cont)		
	23358	Vert Term Assem	1	.05
	27388	Shield & Eyelet Assem	1	.30
	27283	" " "	1	.35
	28326	Thumb Screw	1	.04
	31611	Dial Chart Assem	1	
	20962	Grid Cap	4	.02

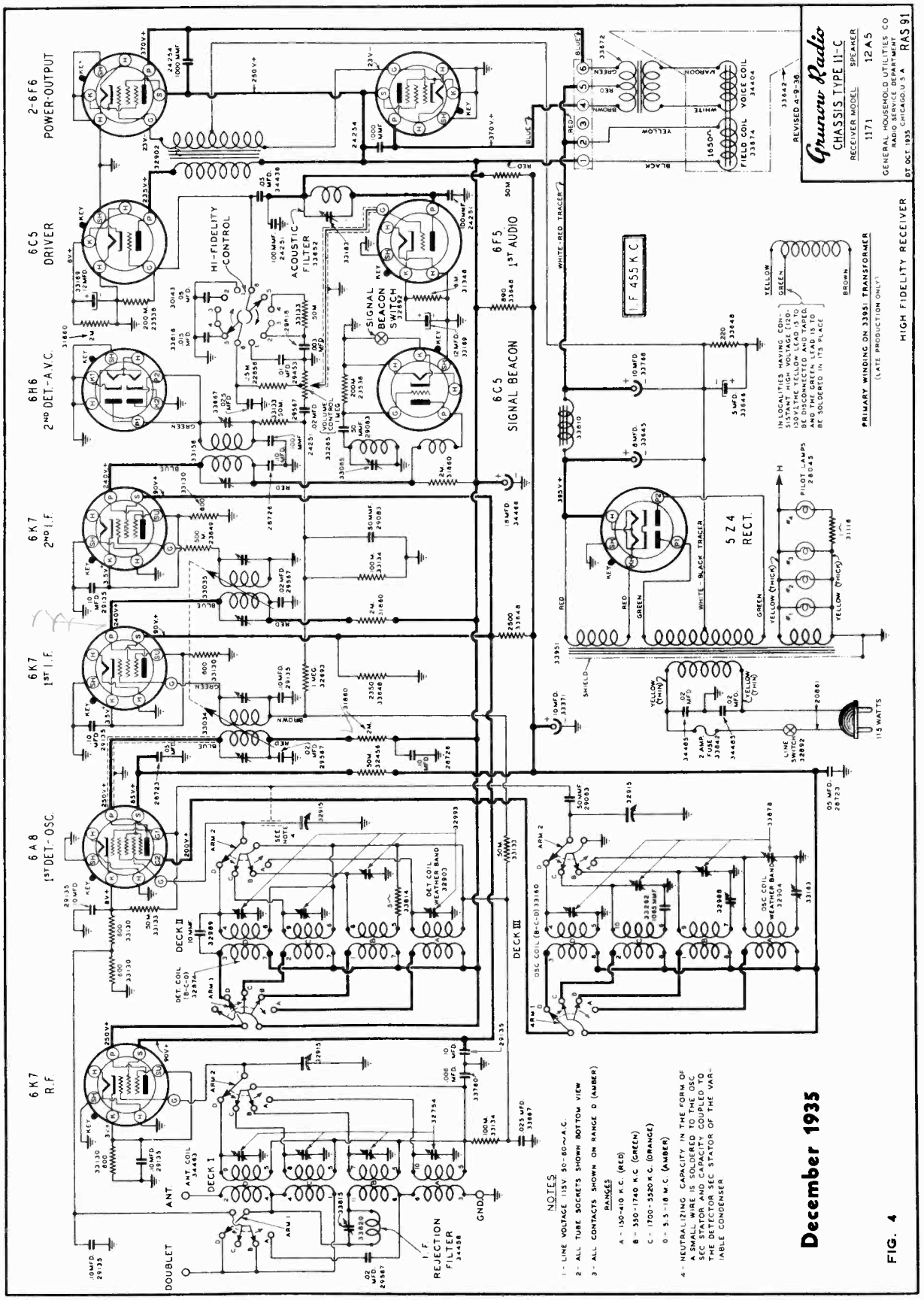
Grunow Radio
CHASSIS TYPE 9-C
RECEIVER MODEL 921 SPEAKER 10AC-4

Note—
Prices subject to change without notice
Complete speakers may not be returned for credit

GENERAL HOUSEHOLD UTILITIES CO.
RADIO SERVICE DEPARTMENT
RAS46 CHICAGO, U.S.A.

GENERAL HOUSEHOLD UTILITIES CO.

MODEL 1171
Chassis 11C
Schematic
Voltage

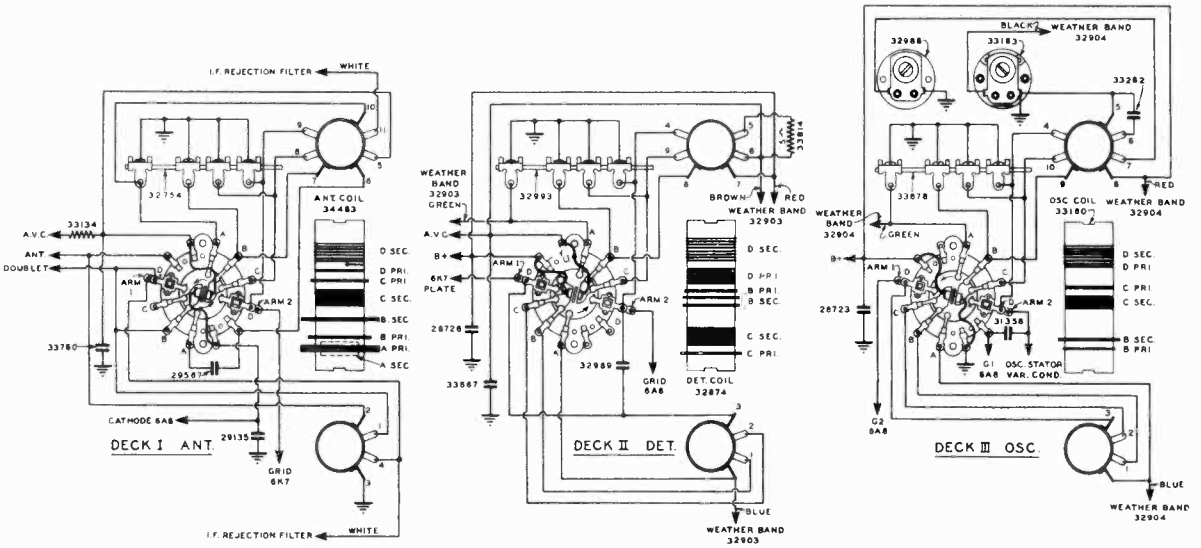


December 1935

FIG. 4

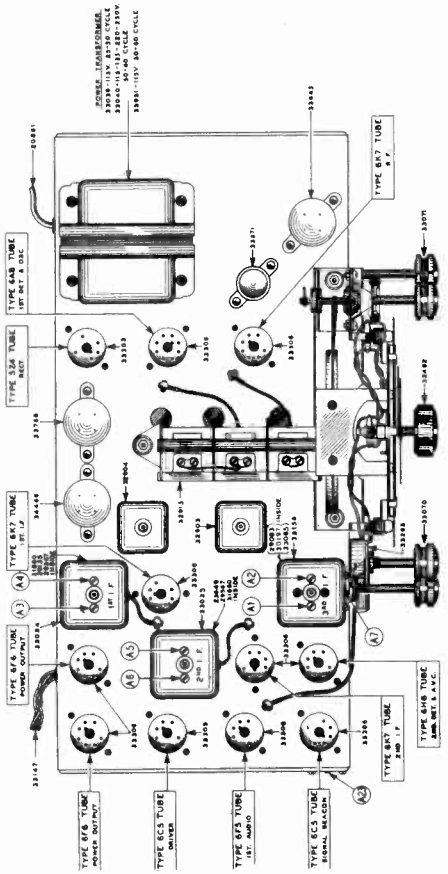
MODEL 1171
Chassis 11C
Socket, Trimmers
Chassis, Switch &
Coil Assembly

GENERAL HOUSEHOLD UTILITIES CO.



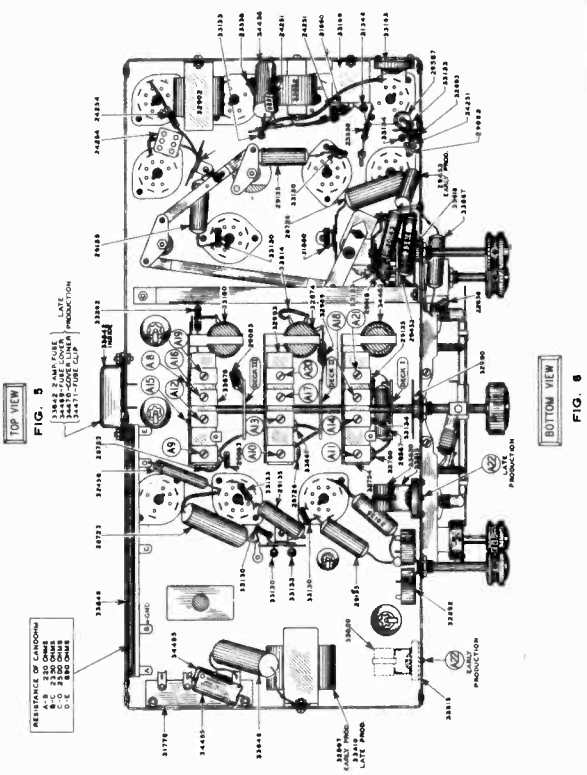
SCHEMATIC DIAGRAM RANGE SWITCH & COIL ASSEMBLY
11C & 12A

FIG. 3



TOP VIEW

FIG. 5



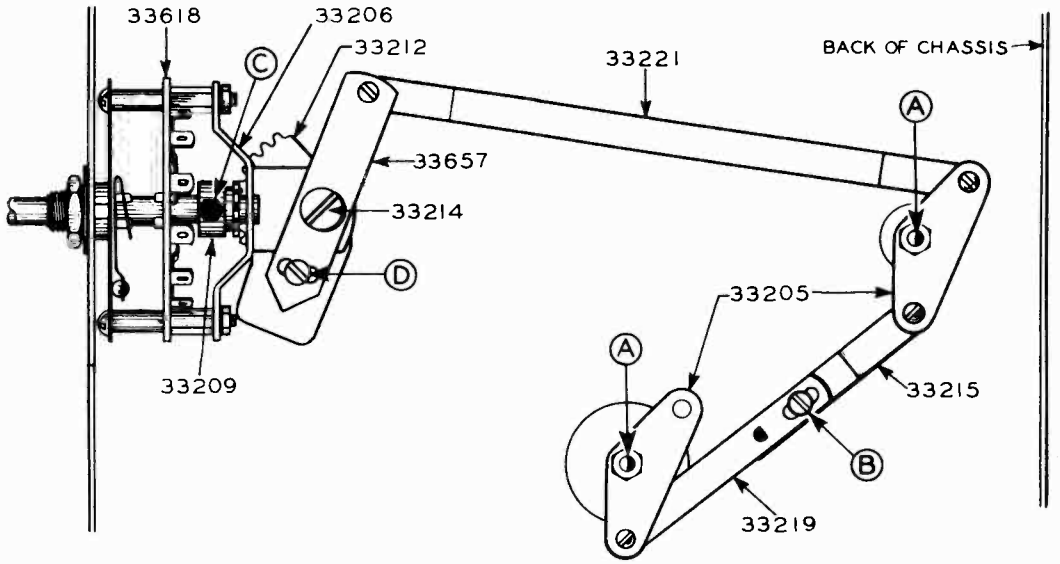
BOTTOM VIEW

FIG. 6

Mechanical Alignment
Parts Details

GENERAL HOUSEHOLD UTILITIES CO.

MODEL 1171
Chassis 11C



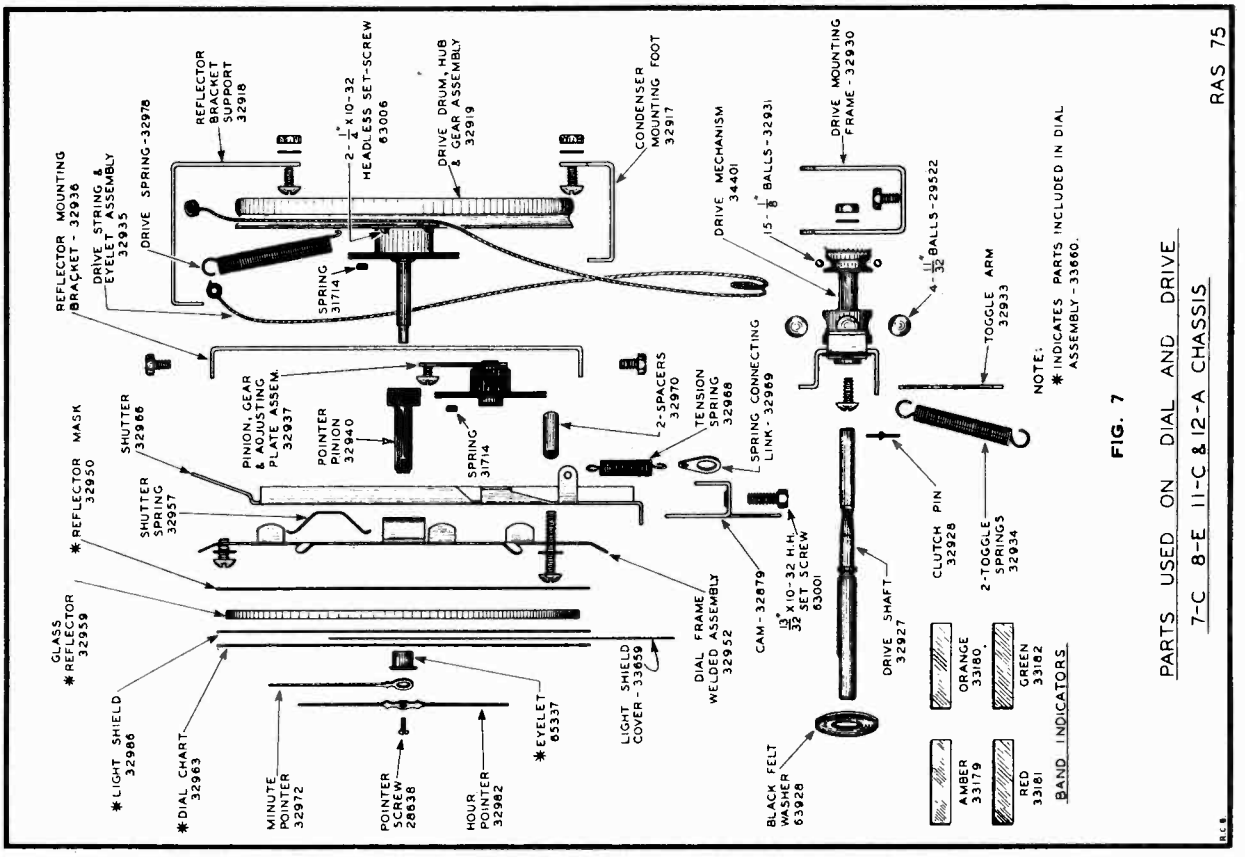
DIRECTIONS FOR MECHANICAL ALIGNMENT OF I.F. TRANSFORMERS

FLATS (A) ON THE VERTICAL SHAFTS SHOULD BE MADE PARALLEL WITH EACH OTHER BY ADJUSTING CONNECTING ARM AT (B). TURN THE HIGH-FIDELITY SWITCH CLOCK-WISE AS FAR AS IT WILL GO, (NO. 6 POSITION). IF THE SWITCH DOES NOT TURN TO NO. 6 POSITION, LOOSEN SET SCREW (C) AND TURN SWITCH WITH GEAR LOOSE. WITH SWITCH IN THIS POSITION, MOVE THE LEVER ARMS SO THAT THE FLATS (A) ARE PARALLEL TO THE BACK OF THE CHASSIS BY ADJUSTING LEVER AT (D). TIGHTEN ALL SCREWS AND BE SURE THE SWITCH COVERS ALL SIX POSITIONS EASILY WITHOUT BINDING. NOW PROCEED WITH ELECTRICAL ALIGNMENT.

DT

FIG. 2

RAS118



CIRCUIT ALIGNMENT PROCEDURE

Do not attempt to align the 11C Chassis without the proper equipment. Alignment condensers are shown in the accompanying illustrations and are numbered in order of procedure—I.F. Condensers on top of the I.F. Transformers.

1. EQUIPMENT:

(A) Test Oscillator.

A modulated Oscillator capable of producing signals at the I.F. Broadcast, Short-Wave, and Weather Band frequencies is necessary for alignment of the 11C Chassis.

(B) Insulated Screw Driver—(all bakelite or fibre) about 6" long.

(C) Output Meter.

This may be any of the standard Output Meters, but should be sufficiently sensitive to provide a good deflection at low signal strength.

(D) Coupling Means.

Coupling Condensers of 200 mmf., .25 mfd., and a 400 Ohm resistor should be used when coupling oscillator to receiver during alignment as specified in the procedure.

(E) The Receiver should be aligned in a location free from local interference (interference caused by motors—flashers—automobile ignition, etc.) as high frequency disturbances will cause difficulties when the short wave section is being adjusted. (A screen room is to be recommended.)

2. DIAL SETTING:

Turn dial knob until condensers are fully meshed. The dial pointer (Hour Hand) should be on the horizontal line of the dial, pointing to 9 and 3 o'clock. The minute hand should be at 12 o'clock or in a vertical position.

3. I.F. ALIGNMENT:

EXPLANATION

The GRUNOW High-Fidelity system is incorporated in this Chassis and the following procedure must be strictly adhered to:

The I.F. circuit of this chassis is known as an "expanded I.F. system." In order to reproduce programs of a "High-Fidelity nature" it is not only necessary to build an audio system capable of reproducing all the notes of the audio-spectrum at a mean output level, but it is also necessary to build a radio-frequency system that will pass signals without cutting off the sidebands. In other words, the selectivity of the receiver must be broad enough to pass all high-fidelity signals when desired—and be so designed that the selectivity may be increased at will, so that nearby powerful transmitting stations will not interfere with other local or distant stations. This variable selectivity is accomplished by changing the mutual inductance in two of the I.F. Transformers—the coupling being changed by means of a control knob on the front of the receiver, which also acts as a tone control.

This control varies the transformer coupling, giving maximum selectivity on position No. 1, and broadest selectivity and highest fidelity on position No. 6.

When aligning the I.F. transformers see that the control is in position (No. 1) of greatest selectivity.

Fig. No. 1 shows a graphical picture of the results obtained, first with the control on No. 1 position, or maximum selectivity, second, on No. 6 position, showing the selectivity of the receiver broadened to its greatest extent, permitting the higher frequency sidebands to be passed through the selective circuit with the result that tone quality is greatly improved.

It will be noted that both peaks (No. 6) are practically the same height, and that both slopes are symmetrical.

The third curve represents a condition wherein the I.F. transformers are NOT properly peaked, and it will be noted that one peak is proportionately too high and the other has been practically lost. This illustration is shown merely as an example of what to expect when the receiver is not properly aligned.

Before any adjustment of circuit constants is attempted, allow the Chassis to "heat up" to normal operating temperature. This heating period should take from 20 to 30 minutes and is necessary to allow all coils and condensers to reach their normal temperatures so that when alignment is completed, there will be no inductance or capacity changes due to thermal expansion or contraction.

It is good to remember this heating condition when logging station—that is, do not attempt to log or tune in a station previously logged on a "cold" chassis, as the station being tuned in would "drift" and the calibration on the previously logged station would be incorrect.

(A) Connect signal lead of test oscillator to grid of 6A8 (1st detector tube) through .25 mfd., condenser. Connect the ground lead to the chassis.

(B) Set dial pointer to 1400 K.C. and range switch on "Green" (No. 2) position.

(C) Place test Oscillator in operation at 455 K.C. Turn receiver volume control to maximum and HI-FIDELITY CONTROL to POSITION No. 1, which is the maximum selectivity position.

(D) Attenuate test Oscillator output to lowest value, consistent with obtaining a readable indication on output meter.

(E) Adjust six I.F. Trimmers, A1, A2, A3, A4, A5, A6, located on the I.F. Transformers on top of Chassis, Fig. (5) until maximum output is obtained. During alignment, maintain as low a value of signal as will allow obtaining of accurate adjustment.

(F) Turn the on and off switch clockwise to the Signal Beacon position.

(G) Adjust Signal Beacon trimmer (A7) Fig. 5, which is located on side of I.F. transformer (near dial) to Zero beat with the 455 K.C. incoming signal.

4. 175 K.C. ALIGNMENT:

(A) Connect signal lead of test Oscillator through 200 mmf. Condenser to Antenna binding post on Chassis.

(B) Connect the test Oscillator ground lead to the ground post of Chassis.

(C) Place test Oscillator in operation at 175 K.C.

(D) PLACE HI-FIDELITY CONTROL IN POSITION NO. 2.

(E) Turn range switch to "Red" (No. 1) position.

(F) Tune in signal to maximum (this point does not have to be exactly at 175 K.C. dial setting.)

(G) Adjust the 175 K.C. Padding Condenser (A8) Fig. 6 (which is on rear of Chassis) in direction of signal increase. At same time rock the tuning condenser back and forth through resonance while adjusting padding condenser until maximum output is obtained.

5. 350 K.C. ALIGNMENT:

(A) Place test Oscillator in operation at 350 K.C.

(C) Turn dial pointer to 350 K.C.

(C) Turn range switch to "Red" (No. 1) position.

(D) Place Hi-Fidelity Control in position No. 2.

(E) Adjust "weather band" oscillator trimmer (A9), Fig. 5, to maximum output.

(F) Adjust Detector Trimmer (A10) Fig. 6 to maximum output.

(G) Adjust Antenna Trimmer (A11), Fig. 6 to maximum output.

6. RECHECK 175 K.C. PADDER CONDENSER—See 4—Above.

7. 1400 K.C. ALIGNMENT:

(A) Place test oscillator in operation at 1400 K.C.

(B) Turn dial pointer to 1400 K.C.

(C) Turn range switch to range "Green" (No. 2) position.

(D) Hi-Fidelity Control remains in No. 2 position.

(E) Adjust broadcast oscillator trimmer (A12) Fig. 6 to maximum output.

(F) Adjust 1st Det. Trimmer (A13) Fig. 6 to maximum output.

(G) Adjust Antenna Trimmer (A14) Fig. 6 to maximum output.

8. 600 K.C. ALIGNMENT:

(A) Place test oscillator in operation at 600 K.C.

(B) Tune in signal to maximum (this point does not have to be exactly at 600 K.C. dial setting).

(C) Adjust the 600 K.C. Padding Condenser (A15), Fig. 6, which is on rear of Chassis, in direction of signal increases. At same time rock the tuning condenser back and forth through resonance while adjusting padding condenser until maximum output is obtained.

9. RECHECK 1400 K.C. ALIGNMENT—See 7—Above.

10. 5000 K.C. ALIGNMENT:

(A) Set Range Switch to "Orange" (No. 3) position.

(B) Place test Oscillators in operation at 5000 K.C.

(C) Turn Dial Pointer to 5000 K.C.

(D) Adjust Set Oscillator Trimmer (A16) Fig. 6 to maximum output.

(E) Adjust Detector Trimmer (A17) Fig. 6 to maximum output.

(F) Adjust Antenna Trimmer (A18) Fig. 6 to maximum output.

11. 18 M.C. ALIGNMENT:

(A) Connect signal lead of test oscillator through 400 Ohm Resistor to Antenna binding post of Chassis.

(B) Connect the ground lead to ground terminal of Chassis.

(C) Set Range Switch to "Amber" (No. 4) position and turn dial pointer to 18 M.C.

(D) Place test Oscillator in operation at 18 M.C.

(E) Adjust set oscillator Trimmer (A19) Fig. 6 to maximum output.

(F) Adjust Detector Trimmer (A20) Fig. 6 to maximum output.

(G) Adjust Antenna Trimmer (A21) Fig. 6 to maximum output.

(H) On the 18 M.C. Oscillator Alignment it will be noted that there are two settings at which the signal will be received. Use the lower of the images for alignment point, that is, the setting giving most capacity or the point at which the trimmer screw is farthest in.

12. ALIGNMENT OF "I.F. REJECTOR FILTER" CIRCUIT:

Due to interference caused by commercial code stations operating on wave lengths near the frequency at which the I.F. amplifiers of this receiver are aligned, an I.F. filter has been incorporated in the antenna circuit to act as a rejector system, thereby lessening the possibility of this form of interference entering the receiver.

The filter should be tuned to the same frequency as the I.F. Transformers, and this operation should be performed after the set has been completely aligned.

(A) Connect signal lead of test oscillator to antenna binding post through a 200 mmf. condenser.

(B) Connect ground lead to ground terminal of chassis.

(C) Set dial pointer to 1400 K.C. and range switch on Green (No. 2) position.

(D) Place test oscillator in operation at 455 K.C.—turn receiver volume control to maximum and Hi-Fidelity control to No. 2 position.

(E) Attenuate test oscillator output so that a fairly strong signal is applied, and tune filter condenser (A22) Fig. (6) so that the output meter indicates a minimum reading.

13. TUNING ACOUSTIC FILTER:

The I.F. system of a Hi-Fidelity receiver is expanded or broadened so that audio frequencies of the higher musical range will be passed through the selective circuits. It is desirous to pass audio frequencies only up to a value of 10,000 cycles, so that the entire musical range may be reproduced, at the same time frequencies above this value must be cut off—so that station noises and atmospheric disturbances are not admitted to the speaker system.

An acoustic filter is incorporated in this chassis, that may be tuned so that frequencies above 10,000 cycles are excluded. This filter is tuned as follows:

(A) After all other adjustments are completed, apply a 10,000 cycle note, produced by an audio oscillator or phonograph frequency record, connecting one of the signal leads to the grids of the 6F5 (1st A.F. tube) and the ground lead to the chassis.

(B) Set Hi-Fidelity control to maximum (No. 6) position.

(C) Attenuate audio signal so as to obtain a good reading on the output meter.

(D) Tune acoustic filter condenser (A23) Fig. (5) until a MINIMUM output is indicated on the output meter.

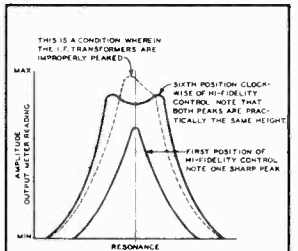


Fig. 1

THE RANGE SWITCH

The Range Switch is a simple three deck multiple pole, positive acting switch, used to connect the various coils into their proper circuits, and is designed in such a way that the coils being used are isolated from coils of the two succeeding bands of a lower frequency. In the case of the detector circuit both the higher and lower frequency bands, above and below the circuit selected, are shorted out. This switching arrangement not only selects the proper coils for each band, but grounds the unused section, allowing the receiver to work at maximum sensitivity and selectivity on all four ranges.

The Range Switch and Coil Assembly is shown schematically in figure (3) and it will be noted that deck I (Antenna) is the one toward the front of the chassis, deck II (Detector) in the center position and deck III (Oscillator) toward the rear of the chassis. The diagram shows the exact position of the coil and switch lugs, and little difficulty should be experienced in making any necessary repairs or inspection.

PARTS AND PRICE LIST

Model 1171 — Chassis 11C

PART NUMBERS ARE GIVEN ON THE ILLUSTRATIONS AND THE NUMBERS ARE BROUGHT DOWN IN NUMERICAL ORDER FOR CONVENIENCE

Part No.	Description	No. Used	Price
20861	Line Cord & Plug	1	.40
22856	Resistor 25M Ohm ½ Watt	1	.15
23538	Resistor 200M Ohm ½ Watt	2	.15
23849	Resistor 500M Ohm ¼ Watt	1	.15
24251	Condenser 100 Mmf. Mica	3	.15
24254	Condenser 1000 Mmf. Mica	2	.20
26933	Spring Washer	1	.01
27422	Electrolytic Step Washer	2	.02
27831	Pilot Lamp Socket Assem.	3	.10
28045	Pilot Lamp (6.8 Volt)	4	.15
28638	Dial Pointer Screw	1	.02
28723	Condenser .05 Mfd. 400 Volt Tubular	2	.25
28726	Condenser .1 Mfd. 400 Volt Tubular	2	.30
29065	Electrolytic Condenser Clamp	3	.05
29083	Condenser—60 Mmf. Mica	3	.20
29136	Condenser .1 Mfd. 200 Volt Tubular	7	.25
29209	Speaker Cable Clamp	1	.02
29483	Condenser .01 Mfd. 400 Volt Tubular	2	.20
29522	Bolt 11/32	4	.02
29551	Antenna & Doublet Binding Post Assem.	1	.18
29667	Condenser .02 Mfd. 400 Volt Tubular	4	.25
29818	Condenser .003 Mfd. 700 Volt Tubular	1	.25
30143	Condenser .05 Mfd. 200 Volt Tubular	1	.25
30197	Condenser 1330 Mmf. (Mica)	1	.25
30512	Spring Washer (Var. I.F.)	8	.01
31116	Resistor—1 Ohm (Ohmite)	1	.20
31348	Resistor 6M Ohm ¼ Watt	1	.15
31424	Condenser Insulating Shield	2	.10
31714	Gear Tension Spring	2	.05
31762	Coil Shield (3rd I.F.)	1	.35
31777	Terminal Board (8 Lug)	1	.10
31778	Terminal Board (4 Lug)	1	.10
31860	Resistor 2M Ohm ½ Watt	4	.15
32456	Resistor 50M Ohm ½ Watt	1	.15
32462	Knob (Range Switch)	1	.30
32693	Resistor 1 Meg. 1/3 Watt (Insul.)	1	.15
32754	4 Gang Trimmer Assem. (Ant. Coil)	1	.50
32858	Mounting Foot Assem. (Rubber)	4	.25
32865	Electrolytic Condenser Strap	1	.05
32874	Detector Coil	1	2.00
32879	Cam (Shutter)	1	.05
32880	Range Switch Cover	1	.75
32892	Line & Signal Beacon Switch	1	1.20
32897	Filter Choke Assem. (Early Production—Use only with Power Trans. No. 33036)	1	2.60
32902	Input Audio Transformer	1	5.00
32903	Detector Coil & Shield (Weather Band)	1	1.35
32904	Oscillator Coil & Shield Assem. (Weather Band)	1	1.25
32915	Variable Condenser	1	3.70
32917	Condenser Mtg. Foot (Rear)	1	.05
32918	Reflector Bracket Support	1	.10
32919	Drive Drum, Hub & Gear Assem.	1	.75
32927	Drive Shaft	1	.40
32928	Clutch Pin	1	.05
32929	Fulcum Bracket	1	.10
32930	Drive Mtg. Frame	1	.05
32931	¼" Ball	15	.01
32933	Toggle Arm (Drive)	1	.05
32934	Toggle Spring	2	.05
32935	Drive String & Eyelet Assem.	1	.10
32936	Reflector Bracket	1	.05
32937	Pinion, Gear & Adj. Plate Assem.	1	.70
32940	Pointer Pinion	1	.20
32950	Reflector Mask	1	.25
32952	Dial Frame Welded Assem.	1	.30
32957	Shutter Spring	2	.02
32959	Glass Clock Dial	1	1.40
32963	Pyralin Dial	1	.60
32966	Shutter	1	.10
32968	Shutter Tension Spring	1	.05
32969	Spring Connecting Link	1	.01
32970	Dial Assem. Spacer	2	.03
32972	Minute Hand Pointer	1	.10
32978	Drive Spring	1	.10
32982	Hour Hand Pointer	1	.10
32986	Light Shield	1	.10
32988	Broadcast Padder Condenser	1	.35
32989	Condenser 10 Mmf. Mica	1	.20
32990	Range Switch	1	4.25
32993	4 Gang Trimmer Assem. (Det. Coil)	1	.50
33034	1st I.F. Variable Transf. & Shield	1	3.75
33035	2nd I.F. Variable Transf. & Shield	1	4.25
33036	Power Transf. 115 Volt 50-60 Cycle (Early Production. Use only with Filter Choke No. 32897)	1	8.85
33038	Power Transformer 115 V—25-50 cycle (11CX)	1	11.50
33040	Power Transformer Universal 110-135-220-250—50-60 cycle	1	11.50
33054	Grid Cap	5	.01
33065	Signal Beacon Padder Condenser	1	.40
33070	Knob Vol. Cont. & Station Selector	2	.20
33071	Knob Tone Cont. & Line Switch	2	.20
33072	Cabinet Escutcheon	1	.20
33073	Escutcheon Retaining Spring	1	.20
33074	Dial Window	1	.20
33075	Window Retaining Ring	1	.10
33076	Window Gasket	1	.10
33109	Coil Shield & Bracket Assem. (Weather Band)	2	.30
33130	Resistor 600 Ohm ½ Watt	5	.15
33133	Resistor 50M Ohm ¼ Watt	5	.15
33134	Resistor 100M Ohm 1/3 Watt	2	.15
33147	Speaker Cable Assem.	1	.75
33156	3rd I.F. Trans. & Signal Beacon Assembly	1	3.50
33160	Oscillator Coil	1	1.65
33163	Padder Condenser	1	.35
33169	Condenser 12 Mfd. Dual 25 V Dry Electrolytic	1	1.00
33179	Band Indicator—Amber	1	.10
33180	Band Indicator—Orange	1	.10
33181	Band Indicator—Red	1	.10
33182	Band Indicator—Green	1	.10
33205	Control Arm (Var. I.F.)	2	.05
33206	Gear Mtg. Bracket (Var. I.F.)	1	.05
33209	Pinion & Hub Assem. (Var. I.F.)	1	.30
33212	Drive Gear (Var. I.F.)	1	.15
33214	Roulder Screw (Var. I.F.)	1	.01
33215	Connecting Rod (Var. I.F.)	1	.25
33219	Connecting Rod (Var. I.F.)	1	.25
33221	Connecting Rod (Var. I.F.)	1	.25
33262	Condenser 1085 Mmf. Mica	1	.20
33265	Volume Control	1	.95
33303	5 Prong Socket (5Z4)	1	.15
33306	8 Prong Socket	1	.15
33368	Elec. Condenser Cathode Terminal	2	.02
33371	Condenser 10 Mfd. 250 Volt Wet Electrolytic	1	.85
33419	Pilot Light Socket Assem.	1	.15
33437	Coil Shield (Var. I.F.)	2	.35
33488	Cabinet Only		
33618	Switch (Six Position)	1	1.20
33626	Baffle (Resonator)	1	2.50
33645	Condenser 8 Mfd. 500 Volt Wet Electrolytic	1	1.00
33646	Condenser 5 Mfd. 50 Volt Dry Electrolytic	1	.65
33647	Decalcomania Gold Dot	2	.10
33648	Candohm (5960 Ohms)	1	.45
33652	Acoustic Filter Choke	1	1.00
33657	Adjusting Lever (Var. I.F.)	1	.10
33659	Light Shield Cover	1	.10
33660	Dial Assembly (Riveted)	1	2.15
33667	Condenser .025 Mfd. 400 Volt Tubular	2	.25
33760	Condenser .006 Mfd. 700 Volt Tubular	1	.25
33768	Condenser 10 Mfd. 475 Volt Wet Electrolytic	1	.95
33810	Filter Choke (Late Production—Use only with Power Trans. No. 33951)	1	2.60
33814	Resistor 5 Ohm 1/3 Watt (Fixe.)	1	.15
33815	I.F. Rejector Filter Condenser Only	1	.40
33816	Condenser .015 Mfd. 400 Volt Tubular	1	.25
33820	I.F. Rejector Filter Coil Only	1	.45
33834	Terminal Mtg. Strip (Single Lug)	1	.10
33837	Fuse Clip Assem. (Early Prod.)	1	.10
33842	Fuse (2 Amp.) (Yellow)	1	.10
33878	4 Gang Trimmer Cond. (Osc. Coil)	1	.50
33949	Resistor 10M Ohm 2 Watts	1	.25
33951	Power Trans. (Late Production—Use only with Filter Choke No. 33810)	1	8.85
34401	Drive Mechanism	1	1.00
34436	.05 Mfd. 400 Volt Tubular Condenser	1	.30
34458	I.F. Rejector Filter Coil & Cond. Assem.	1	.80
34463	Ant. Coil Assem.	1	.75
34466	Condenser 18 Mfd. 275 Volt Wet Electrolytic	1	1.50
34469	Fuse Cover (Late Production)	1	.10
34470	Fuse Cover Liner (Late Prod.)	1	.05
34471	Fuse Clip. (Late Prod.)	1	.10
34485	.02—400 Volt Moulded Paper Cond.	2	.25
61207	1" x 8-32 Screw (Chassis Mtg.)	4	.01
63838	Felt Washer (Brown)	5	.02
63863	Flat Washer (Chassis Mtg.)	4	.01
63928	Felt Washer (Black)	1	.02
65337	Eyelet for Dial Assy.	1	.02

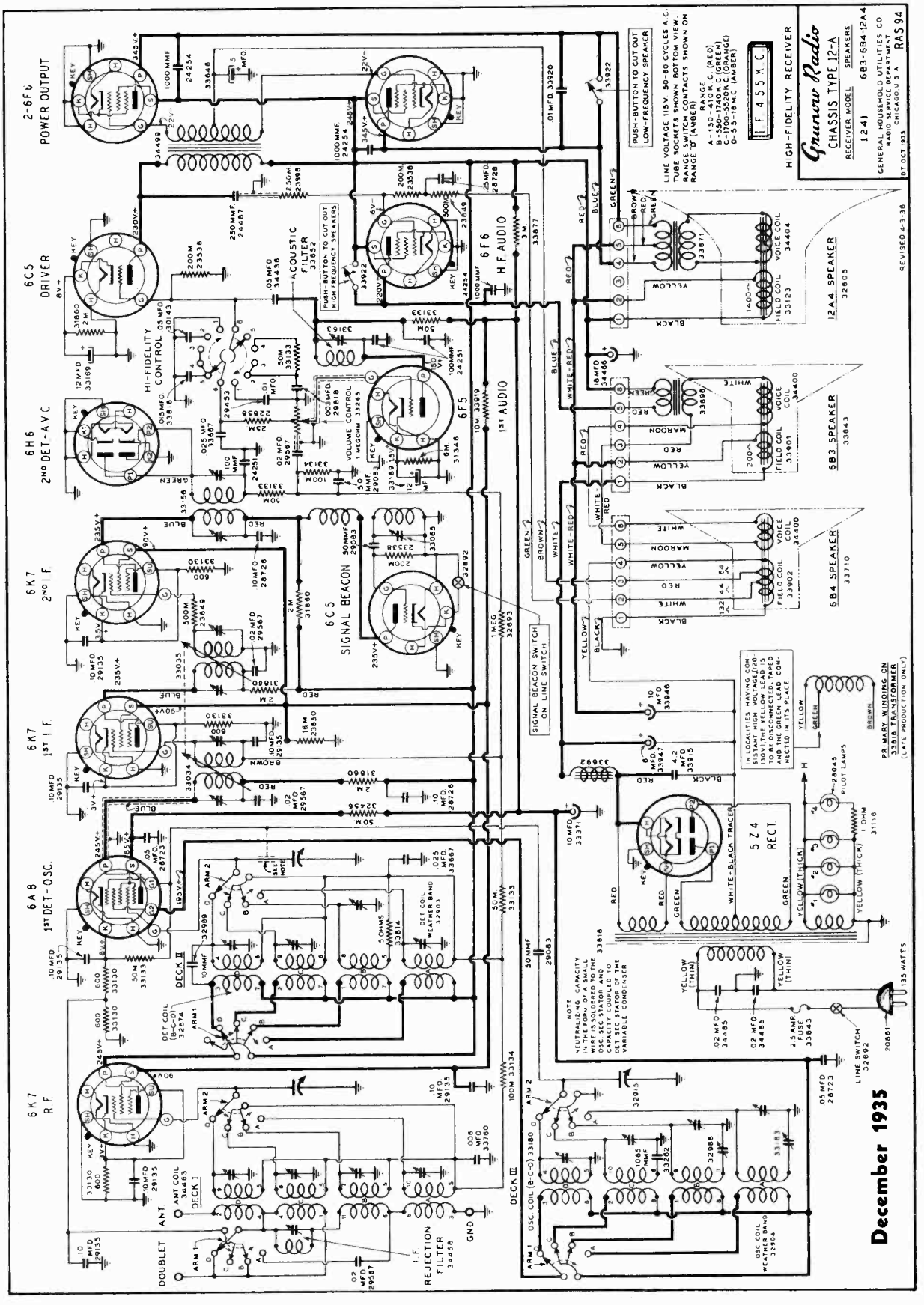
12A5 SPEAKER PARTS

20042	Speaker Clamp	1	.06
20045	Terminal Strip Cover	1	.15
20046	Terminal Strip Cover Insul.	1	.05
20049	Terminal Strip	1	.10
27208	Pot & Pole Piece Assem.	1	1.60
27242	Cone Mounting Gasket	1	.10
31642	12A5 Speaker Complete	1	14.50
33672	Output Transformer	1	2.25
33674	Field Coil Assem.	1	3.00
34404	Cone & Voice Coil Assem.	1	2.00

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

GENERAL HOUSEHOLD UTILITIES CO.

MODEL 1241
Chassis 12A
Schematic, Voltage



MODEL 1241
Chassis 12A
Socket, Trimmers
Chassis

GENERAL HOUSEHOLD UTILITIES CO.

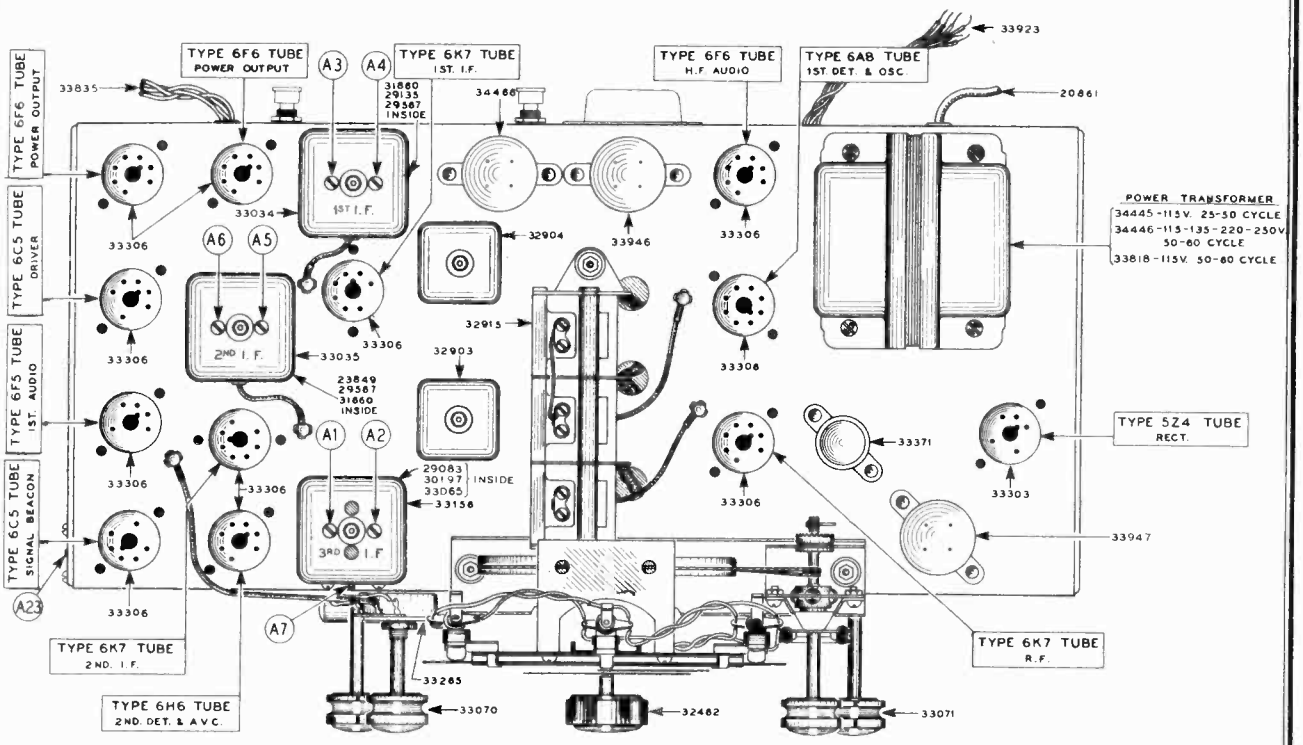


FIG. 5

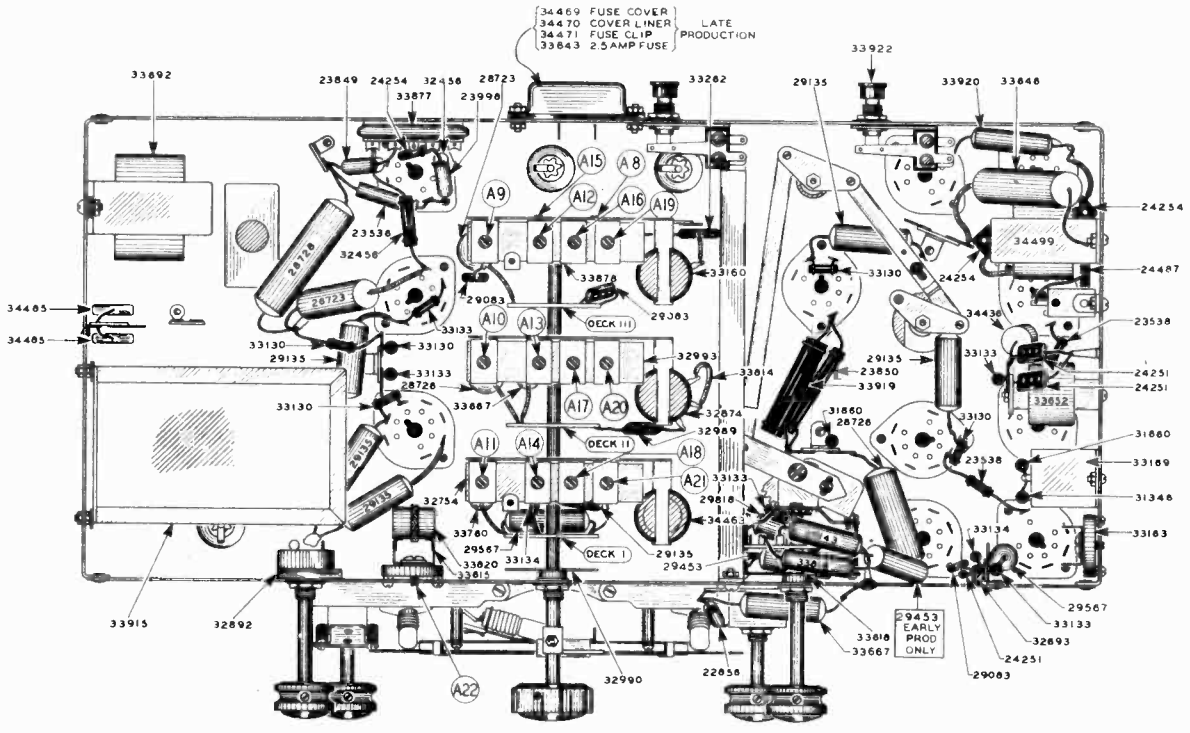


FIG. 6

GENERAL HOUSEHOLD UTILITIES CO.

MODEL 1241
Chassis 12A
Alignment, Notes
Parts List

CIRCUIT ALIGNMENT PROCEDURE

Do not attempt to align the 12A Chassis without the proper equipment. Alignment condensers are shown in the accompanying illustrations and are numbered in order of procedure—I.F. Condensers on top of the I.F. Transformers.

1. EQUIPMENT:

(A) Test Oscillator.

A modulated Oscillator capable of producing signals at the I.F. Broadcast Short Wave, and Weather Band frequencies is necessary for alignment of the 12A Chassis.

(B) Insulated Screw Driver—(all bakelite or fibre) about 6" long.

(C) Output Meter.

This may be any of the standard Output Meters, but should be sufficiently sensitive to provide a good deflection at low signal strength.

(D) Coupling Means.

Coupling Condensers of 200 mmf., 25 mfd., and a 400 Ohm resistor should be used when coupling oscillator to receiver during alignment as specified in the procedure.

(E) The Receiver should be aligned in a location free from local interference (interference caused by motors—floshers—automobile ignition, etc.) as high frequency disturbances will cause difficulties when the short wave section is being adjusted. (A screen room is to be recommended.)

2. DIAL SETTING:

Turn dial knob until condensers are fully meshed. The dial pointer (Hour Hand) should be on the horizontal line of the dial, pointing to 9 and 3 o'clock. The minute hand should be at 12 o'clock or in a vertical position.

3. I.F. ALIGNMENT:

EXPLANATION

The 3-RIUM-5 High-fidelity system is incorporated in this Chassis and the following procedure must be strictly adhered to.

The I.F. circuit of this chassis is known as an "expanded I.F. system." In order to reproduce programs of a "High-Fidelity nature" it is not only necessary to build an audio system capable of reproducing all the notes of the audio-spectrum at a mean output level, but it is also necessary to build a radio-frequency system that will pass signals without cutting off the sidebands. In other words, the selectivity of the receiver must be broad enough to pass all high-fidelity signals when desired—and be so designed that the selectivity may be increased at will, so that nearby powerful transmitting stations will not interfere with other local or distant stations. This variable selectivity is accomplished by changing the mutual inductance in two of the I.F. Transformers—the coupling being changed by means of a control knob on the front of the receiver, which also acts as a tone control.

This control varies the transformer coupling, giving maximum selectivity on position No. 1, and broadest selectivity and highest fidelity on position No. 6.

When aligning the I.F. transformers see that the control is in position (No. 1) of greatest selectivity.

Fig. No. 1 shows a graphical picture of the results obtained, first with the control on No. 1 position, or maximum selectivity, second, on No. 6 position, showing the selectivity of the receiver broadened to its greatest extent, permitting the higher frequency sidebands to be passed through the selective circuit with the result that tone quality is greatly improved.

It will be noted that both peaks (No. 6) are practically the same height, and that both slopes are symmetrical.

The third graph represents a condition wherein the I.F. transformers are NOT properly peaked and it will be noted that one peak is proportionately too high and the other has been practically lost. This illustration is shown merely as an example of what to expect when the receiver is not properly aligned.

Before any adjustment of circuit constants is attempted, allow the Chassis to "heat up" to normal operating temperature. This heating period should take from 20 to 30 minutes and is necessary to allow all coils and condensers to reach their normal temperature so that when alignment is completed, there will be no inductance or capacity changes due to thermal expansion or contraction.

It is good to remember this heating condition when logging stations—that is, do not attempt to log or tune in a station previously logged on a "cold" chassis, as the station being tuned in would drift and the calibration on the previously logged station would be incorrect.

(A) Connect signal lead of test oscillator to grid of 6A8 (1st Detector tube) through 25 mfd., condenser. Connect the ground lead to the chassis.

(B) Set dial pointer to 1400 K.C. and range switch on "Green" (No. 2) position.

(C) Place test Oscillator in operation at 455 K.C. Turn receiver volume control to maximum and HI-FIDELITY CONTROL to POSITION No. 1, which is the maximum selectivity position.

(D) Attenuate test Oscillator output to lowest value, consistent with obtaining a readable indication on output meter.

(E) Adjust six I.F. Trimmers, A1, A2, A3, A4, A5, A6, located on the I.F. Transformers on top of Chassis, Fig. (4) until maximum output is obtained. During alignment, maintain as low a value of signal as will allow obtaining of accurate adjustment.

(F) Turn the on and off switch clockwise to the Signal Beacon position.

(G) Adjust Signal Beacon trimmer (A7) Fig. 4, which is located on side of I.F. transformer (near dial) to Zero beat with the 455 K.C. incoming signal.

4. 178 K.C. ALIGNMENT:

(A) Connect signal lead of test Oscillator through 200 mmf. Condenser to Antenna binding post on Chassis.

(B) Connect the test Oscillator ground lead to the ground post of Chassis.

(C) Place test Oscillator in operation at 178 K.C.

(D) PLACE Hi-FIDELITY CONTROL IN POSITION NO. 2.

(E) Turn range switch to "Red" (No. 1) position.

(F) Tune in signal to maximum (this point does not have to be exactly at 178 K.C. dial setting.)

(G) Adjust the 178 K.C. Padding Condenser (A8) Fig. 5 (which is on rear of Chassis) in direction of signal increase. At some time rock the tuning condenser back and forth through resonance while adjusting padding condenser until maximum output is obtained.

5. 350 K.C. ALIGNMENT:

(A) Place test Oscillator in operation at 350 K.C.

(B) Turn dial pointer to 350 K.C.

(C) Turn range switch to "Red" (No. 1) position.

(D) Place Hi-Fidelity Control in position No. 2.

(E) Adjust "weather band" oscillator trimmer (A9), Fig. 5 to maximum output.

(F) Adjust Detector Trimmer (A10) Fig. 5 to maximum output.

(G) Adjust Antenna Trimmer (A11), Fig. 5 to maximum output.

6. RECHECK 175 K.C. PADDER CONDENSER—See 4—Above.

7. 1400 K.C. ALIGNMENT:

(A) Place test oscillator in operation at 1400 K.C.

(B) Turn dial pointer to 1400 K.C.

(C) Turn range switch to range "Green" (No. 2) position.

(D) Hi-Fidelity Control remains in No. 2 position.

(E) Adjust broadcast oscillator trimmer (A12) Fig. 5 to maximum output.

(F) Adjust 1st Det. Trimmer (A13) Fig. 5 to maximum output.

(G) Adjust Antenna Trimmer (A14) Fig. 5 to maximum output.

8. 600 K.C. ALIGNMENT:

(A) Place test oscillator in operation at 600 K.C.

(B) Tune in signal to maximum (this point does not have to be exactly at 600 K.C. dial setting)

(C) Adjust the 600 K.C. Padding Condenser (A15), Fig. 5, which is on rear of Chassis, in direction of signal increase. At some time rock the tuning condenser back and forth through resonance while adjusting padding condenser until maximum output is obtained.

9. RECHECK 1400 K.C. ALIGNMENT—See 7—Above.

10. 5000 ALIGNMENT:

(A) Set Range Switch to "Orange" (No. 3) position.

(B) Place test Oscillators in operation at 5000 K.C.

(C) Tune Dial Pointer to 5000 K.C.

(D) Adjust Set Oscillator Trimmer (A16) Fig. 8 to maximum output.

(E) Adjust Detector Trimmer (A17) Fig. 8 to maximum output.

(F) Adjust Antenna Trimmer (A18) Fig. 8 to maximum output.

11. 18 M.C. ALIGNMENT:

(A) Connect signal lead of test oscillator through 400 Ohm Resistor to Antenna binding post of Chassis.

(B) Connect the ground lead to ground terminal of Chassis.

(C) Set Range Switch to "Amber" (No. 4) position and turn dial pointer to 18 M.C.

(D) Place test Oscillator in operation at 18 M.C.

(E) Adjust set oscillator Trimmer (A19) Fig. 5 to maximum output.

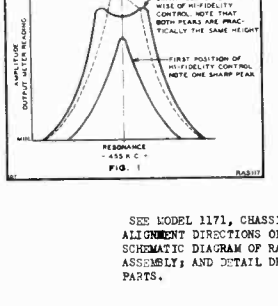
(F) Adjust Detector Trimmer (A20) Fig. 5 to maximum output.

(G) Adjust Antenna Trimmer (A21) Fig. 5 to maximum output.

(H) On the 18 M.C. Oscillator Alignment will be noted that there are two settings at which the signal will be received. Use the lower of the images for alignment point, that is, the setting giving most capacity or the point at which the trimmer screw is farthest in.

12. ALIGNMENT OF "I.F. REJECTOR FILTER" CIRCUIT:

Due to interference caused by commercial code stations operating on wave lengths near the frequency at which the I.F. amplifiers of this receiver are aligned, an I.F. filter has been incorporated in the antenna circuit to act as a rejector system, thereby lessening the possibility of this form of interference entering the receiver.



The filter should be tuned to the same frequency as the I.F. Transformers, and this operation should be performed after the set has been completely aligned.

(A) Connect signal lead of test oscillator to antenna binding post through a 200 mmf. condenser.

(B) Connect ground lead to ground terminal of chassis.

(C) Set dial pointer to 1400 K.C. and range switch on Green (No. 2) position.

(D) Place test oscillator in operation at 455 K.C.—turn receiver volume control to maximum and Hi-Fidelity control to No. 2 position.

(E) Attenuate test oscillator output so that a fairly strong signal is applied, and tune filter condenser (A22) Fig. (4) so that the output meter indicates a minimum reading.

13. TUNING ACOUSTIC FILTER:

The I.F. system of a Hi-Fidelity receiver is expanded or broadened so that audio frequencies of the higher musical range will be passed through the selective circuits. It is desirous to pass audio frequencies only up to a value of 10,000 cycles, so that the entire musical range may be reproduced, at the same time frequencies above this value must be cut off—so that station noises and atmospheric disturbances are not admitted to the speaker system.

An acoustic filter is incorporated in this chassis, that may be tuned so that frequencies above 10,000 cycles are excluded. This filter is tuned as follows:

(A) After all other adjustments are completed, apply a 10,000 cycle note, produced by an audio oscillator or phonograph frequency record, connecting one of the signal leads to the grid of the 6F5 (1st A.F. tube) and the ground lead to the chassis.

(B) Set Hi-Fidelity control to maximum (No. 6) position.

(C) Attenuate audio signal so as to obtain a good reading on the output meter.

(D) Tune acoustic filter condenser (A23) Fig. (4) until a MINIMUM output is indicated on the output meter.

SPEAKER SYSTEM

The 12A Chassis is designed to work into the Grunow triple speaker system. This complete system consists of a dual audio arrangement wherein a two channel audio amplifier is used—one channel comprising a 6F6 tube coupled to two small speakers reproduces the high notes of the musical range and the other channel comprising two types 6F6 tubes in push-pull coupled to a large speaker reproduces the low and middle register of the musical range. If it becomes necessary to replace or change any part of the speaker system, care should be taken to see that the polarity of all transformers, voice coils and tube connections remain as originally connected, otherwise there is a possibility of the speakers working out of "phase," causing one of the speakers to cancel out certain frequency responses of the other.

To determine whether the speakers are in phase—short out the voice coil on the large speaker and reverse the voice coil leads on one of the small speakers, connecting the lead on the small speaker in the position of strongest and best response. Then with the large speaker working with the two small speakers, change the polarity of the large speaker voice coil, connecting it in the position of strongest and best response.

When making this test it is a good idea to have the receiver tuned to a good musical broadcast program.

PARTS AND PRICE LIST

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Model 1241 Chassis 12A

PART NUMBERS ARE GIVEN ON THE ILLUSTRATIONS AND THE NUMBERS ARE BROUGHT DOWN IN NUMERICAL ORDER FOR CONVENIENCE

Part No.	Description	No. Used	Price
20861	Line Cord and Plug	1	$ .40
22856	Resistor 25M Ohm ½ Watt	1	.15
23538	Resistor 200M Ohm ½ Watt	3	.15
23840	Resistor 500M Ohm ½ Watt	2	.15
23850	Resistor 1 Meg. 1 Watt	1	.20
23858	Vertical Terminal Assy. (1 Lug)	1	.10
23998	Resistor 250M Ohm ½ Watt	1	.15
24251	Condenser 100 Mmf. Mica	3	.15
24254	Condenser 1000 Mmf. Mica	3	.20
24487	Condenser 250 Mmf. Mica	3	.20
24933	Spring Washer (Var. I.F.)	3	.01
27422	Electrolytic Insul. Washer	2	.02
27851	Pilot Lamp Socket Assem.	3	.10
28045	Pilot Lamp	4	.15
28638	Dial Pointer Screw	1	.02
28723	Condenser .05 Mfd. 400 Volt Tubular	2	.25
28726	Condenser .1 Mfd. 400 Volt Tubular	2	.30
28728	Condenser .25 Mfd. 200 Volt Tubular	1	.35
29045	Electrolytic Condenser Clamp (1⅛")	3	.05
29083	Condenser 50 Mmf. (Mica)	3	.20
29135	Condenser .1 Mfd. 200 Volt Tubular	7	.25
29209	Speaker Cable Clamp	1	.02
29453	Condenser .01 Mfd. 100 Volt Tubular	2	.20
29522	Bezel (1/32" Dia.)	4	.02
29551	Antenna & Doublet Binding Post Assem.	4	.10
29867	Condenser .02 Mfd. 400 Volt Tubular	4	.25
29818	Condenser .003 Mfd. 700 Volt Tubular	1	.25
30143	Condenser .05 Mfd. 200 Volt Tubular	1	.25
30197	Condenser 1330 Mmf. Mica	1	.25
30512	Spring Washer (Var. I.F.)	1	.01
31116	Resistor 1 Ohm (Ohmite)	1	.20
31348	Resistor 6M Ohm ½ Watt	1	.15
31424	Insulating Shield (Elec. Condenser)	2	.10
31716	Gear Tooth Spring	3	.05
31739	Rubber Mtg. Washer (Var. Cond.)	6	.02
31762	Coil Shield & Eyebolt Assem. (3rd I.F.)	1	.35
31777	Terminal Board (8 Lug)	1	.10
31860	Resistor 2M Ohm ½ Watt	4	.15
32456	Resistor 50M Ohm ½ Watt	1	.15
32462	Knob (Range Switch)	1	.30
32593	1241 Cabinet Only	1	
32693	Resistor 1 Meg. 1/3 Watt (Insul.)	1	.15
32754	4 Gang Trimmer Assem. (Antenna)	1	.50
32858	Mounting Foot Assem. (Chassis Rubber)	4	.25
32865	Electrolytic Condenser Strap (1")	1	.08
32874	Detector Coil	1	2.00
32879	Cam (Selector)	1	.05
32880	Range Switch Cover	1	.75
32892	Line & Signal Beacon Switch	1	.20
32903	Detector Coil & Shield Assem. (W.B.)	1	1.35
32904	Oscillator Coil & Shield Assem. (W. B.)	1	1.25
32918	Variable Condenser	1	3.70
32918	Reflector Bracket Support	1	.10
32919	Drive Drum, Hub & Gear Assem.	1	.75
32924	Sleeve & Gear Assem.	1	.50
32927	Drive Shaft	1	.40
32928	Clutch Pin	1	.08
32929	Fulcrum Bracket (Var. I.F.)	1	.08
32930	Drive Mtg. Frame	1	.05
32931	½" Ball (Drive)	15	.01
32932	"C" Washer (Drive)	1	.01
32933	Toggle Arm (Drive)	1	.05
32934	Toggle Spring	2	.05
32935	Drive String and Eyelet Assy.	1	.10
32936	Reflector Bracket	1	.05
32937	Pinion, Gear & Adj. Plate Assem.	1	.70
32940	Pointer, Pinion	1	.20
32950	Reflector Mask	1	.25
32952	Dial Frame—Welded Assy.	1	.10
32957	Shutter Spring	2	.02
32963	Pyralin Dial	1	.40
32959	Glass Clock Dial	1	1.40
32966	Shutter	1	.10
32968	Shutter Tension Spring	1	.05
32969	Spring Connecting Link	1	.01
32970	Dial Assem. Spacer	2	.03
32972	Minute Hand Pointer	1	.10
32978	Drive Spring	1	.10
32981	Hour Hand Pointer	1	.10
32986	Light Shield	1	.10
32988	Broadcast Padder Condenser	1	.35
32989	Condenser 10 Mmf. Mica	1	.20
32990	Range Switch	1	4.25
32993	4 Gang Trimmer Assem. (Detector)	1	.50
33034	1st I.F. Variable Transf. and Shield Assem.	1	3.75
33035	2nd I.F. Variable Transf. & Shield Assem.	1	4.25
33094	Grid Cap	6	.01
33065	Signal Beacon Padder Condenser	1	.40
33070	Knob (Volume & Station Selector)	2	.20
33071	Knob (Tone & Line Switch)	2	.20
33072	Cabinet Escutcheon	1	.20
33073	Escutcheon Retaining Spring	1	.20
33074	Dial Window	1	.20
33075	Window Retaining Ring	1	.10
33076	Window Gasket	1	.10
33109	Coil Shield & Bracket Assem. (Det. & Osc. Coil)	2	.30
33130	Resistor 600 Ohm ½ Watt	5	.15
33133	Resistor 50M Ohm ½ Watt	1	.15
33134	Resistor 100M Ohm 1/3 Watt	2	.15
33156	3rd I.F. and Signal Beacon Trans. Assy.	1	3.50
33160	Oscillator Coil	1	1.75
33163	Padder Condenser	2	.35
33169	Cond. .2 Mfd. Dual 25 V. Dry Electrolytic	1	1.00
33179	Band Indicator—Amber	1	.10
33180	Band Indicator—Orange	1	.10
33181	Band Indicator—Red	1	.10
33182	Band Indicator—Green	1	.10
33205	Grant Arm (Var. I.F.)	2	.05
33206	Gear Mtg. Bracket (Var. I.F.)	1	.05
33209	Pinion & Hub Assem. (Var. I.F.)	1	.30
33212	Drive Gear (Var. I.F.)	1	.15
33214	Shoulder Screw (Var. I.F.)	1	.01
33215	Connecting Rod (Var. I.F.)	1	.25
33218	Connecting Rod (Var. I.F.)	1	.25
33219	Connecting Rod (Var. I.F.)	1	.25
33221	Connecting Rod (Var. I.F.)	1	.25
33242	Condenser 1065 Mmf. (Mica)	1	.20
33268	Volume Control	1	.95
33279	Terminal Assy. (3 Lug)	1	.10
33303	5 Prong Socket (5Z4)	1	.15
33306	8 Prong Socket	11	.15
33368	Elec. Condenser Cathode Terminal	2	.02
33371	Elec. Condenser 10 Mfd. 250 V.	1	.85
33419	Pilot Light Socket Assem. (Bottom)	1	.15
33437	Coil Shield & Eyebolt Assem. (1F. Variable)	2	.35
33450	Terminal Strip Assem. (1 Lug)	1	.10
33618	Switch (Six Position) (Hi-Fidelity)	1	1.20
33627	Baffle (Resonator)	1	2.50
33646	Condenser 5 Mfd. 50 Volt Dry Electrolytic	1	.65
33647	Decalcomania Gold Dot	2	.10
33652	Acoustic Filter Chute Assem.	1	1.00
33657	Adjusting Lever (Var. I.F.)	1	.10
33659	Light Shield Cover	1	.10
33667	Condenser .025 Mfd. 400 Volt Tubular	2	.25
33760	Condenser .006 Mfd. 700 Volt Tubular	1	.25

SEE MODEL 1171, CHASSIS 11-C FOR MECHANICAL ALIGNMENT DIRECTIONS OF I.F. TRANSFORMERS; SCHEMATIC DIAGRAM OF RANGE AND SWITCH & COIL ASSEMBLY; AND DETAIL DRAWING OF DIAL & DRIVE PARTS.

CONTINUITY AND VOLTAGE

Continuity and voltage readings should be taken from the underside of the chassis. The values given on the schematic diagram are average and allow the service man to make a quick check of the chassis constants. The socket layouts given on the schematic diagram show each socket from the underside.

THE RANGE SWITCH

The Range Switch is a simple three deck multiple pole, positive acting switch, used to connect the various coils into their proper circuits, and is designed in such a way that the coils being used are isolated from coils of the two succeeding bands of a lower frequency. In the case of the detector circuit both the higher and lower frequency bands, above and below the circuit selected, are shorted out. This switching arrangement not only selects the proper coils for each band, but grounds the unused section, allowing the receiver to work at maximum sensitivity and selectivity on all four ranges.

The Range Switch and Coil Assembly is shown schematically in figure (3) of Model 1171, Chassis 11-C and it will be noted that deck I (Antenna) is the one toward the front of the chassis, deck II (Detector) in the center position and deck III (Oscillator) toward the rear of the chassis. The diagram shows the exact position of the coil and switch lugs, and little difficulty should be experienced in making any necessary repairs or inspection.

Part No.	Description	No. Used	Price
33814	Resistor 5 Ohm (Flex.)	1	.15
33815	I.F. Rejector Filter Condenser	1	.45
33816	Condenser .015 Mfd. 400 Volt Tubular	1	.25
33818	Power Transformer (115V-50-60 Cycle)	1	9.00
33820	I.F. Rejector Filter Coil Assy.	1	.40
33835	Speaker Cable (4 Wire)	1	.35
33837	Fuse Clip Assem. (Early)	1	.10
33843	Fuse (2½ Amp.)	1	.10
33877	Resistor 3M Ohm 1 Watt	1	.20
33878	4 Gang Trimmer Condenser (Osc.)	1	.50
33892	Filter Choke Assy.	1	2.40
33915	Filter Condenser Assy. 4-2 Mfd.	1	2.75
33917	Inter. Speaker Cable	1	.35
33919	Resistor 10M Ohm 2 Watt	1	.25
33920	Condenser .01 Mfd. 500 V. Tubular	1	.25
33922	Push Button Switch	2	1.20
33923	Speaker Cable (6 Wire)	1	.35
33946	Condenser 10 Mfd. 500 V. Wet Elec.	1	1.15
33947	Condenser 8 Mfd. 525 V. Wet Elec.	1	1.25
33948	Junction Terminal (1 Lug)	2	.10
33954	Plug Button	1	.05
34401	Drive Mechanism	1	1.00
34436	Condenser .05 Mfd. 400 V. Tubular	1	.35
34445	Power Transformer, 118-V.-25-50 Cycle	1	16.00
34446	Power Transformer, 110-135-220-250 Volt 50-60 Cycles	1	16.00
34458	I.F. Rejector Filter Coil & Condenser Assy.	1	.80
34459	Inter. Speaker Cable Assembly	1	.25
34463	Antenna Coil	1	3.60
34466	Condenser 10 Mfd. 275 V. Wet Elec.	1	1.10
34469	Fuse Cover (Late Production)	1	.10
34470	Fuse Cover Liner (Late Production)	1	.05
34471	Fuse Clip (Late Production)	1	.10
34485	Condenser .02 Mfd. 400 V. (Molded Paper)	2	.25
34499	Input Transformer	1	5.00
63838	Felt Washers (Knob)	5	.02
63928	Felt Washers (Block-Drive)	1	.02
65337	Eyelet for Dial Assem.	1	.02

TYPE 683 SPEAKER

28844	Yoke & Pole Piece Assem.	1	1.20
28854	Cone Gasket	1	.10
28875	Basket & Front Plate Assem.	1	1.00
33202	Term. Strip Assem.	1	.20
33643	683 Speaker Complete	1	8.00
33898	Output Trans.	1	1.75
33901	Field Coil	1	2.00
34400	Cone & Voice Coil Assem.	1	1.00

TYPE 684 SPEAKER

28844	Yoke & Pole Piece Assembly	1	.10
28854	Gasket	1	1.20
28875	Basket & Front Plate Assem.	1	1.00
33202	Terminal Strip Assem.	1	.20
33710	684 Speaker Complete	1	8.00
33715	Trans. Clamp	1	.20
33898	Output Trans.	1	1.75
33902	Field Coil	1	2.10
34400	Cone & Voice Coil Assem.	1	1.00

TYPE 12A4 SPEAKER

20047	Terminal Strip Assem.	1	.10
20048	Terminal Strip Shield	1	.05
27208	Speaker Pot & Pole Piece Assem.	1	1.60
27242	Cone Mtg. Gasket	1	.10
32605	12A4 Speaker Complete	1	14.50
33123	Field Coil Assem.	1	4.25
33671	Output Trans.	1	2.00
34404	Cone & Voice Coil Assem.	1	2.00

MODELS 1291,1297
Chassis 12B, 12W
Socket,Trimmers
Chassis

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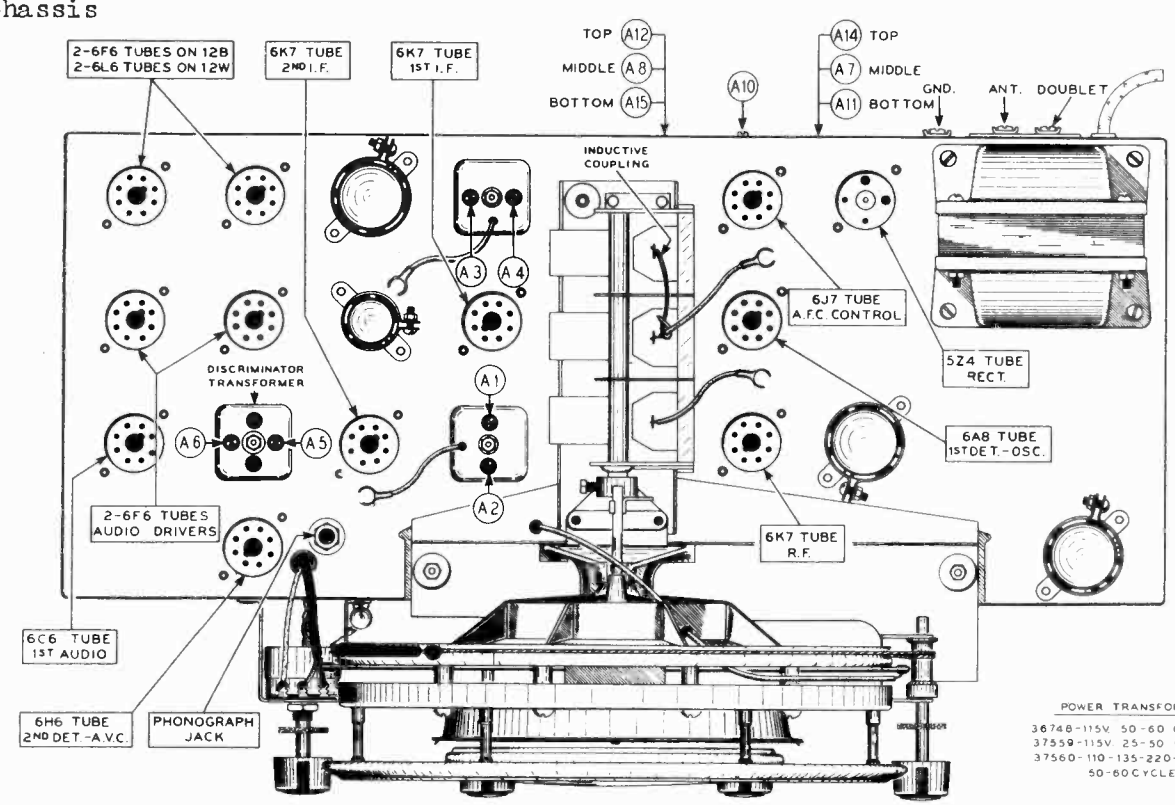
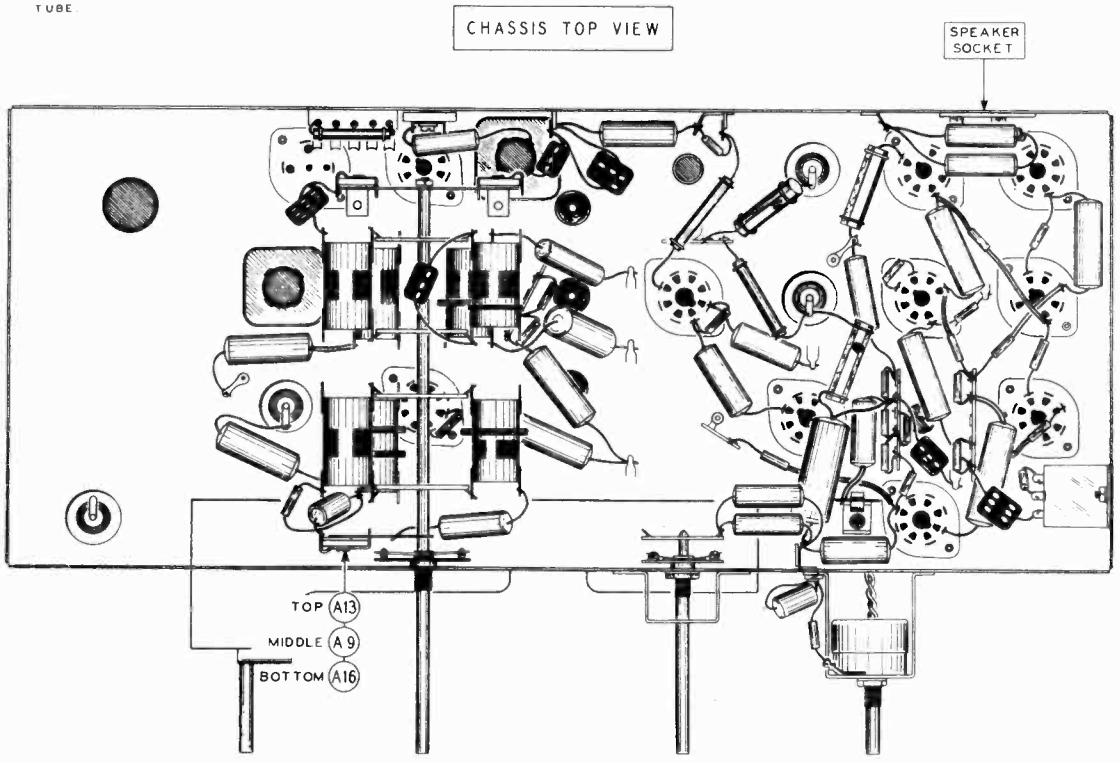


NOTE
ALL TUBE SOCKETS ARE #33306 - EXCEPT RECT TUBE

CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW

CHASSIS 12B & 12W
AUGUST - 1936
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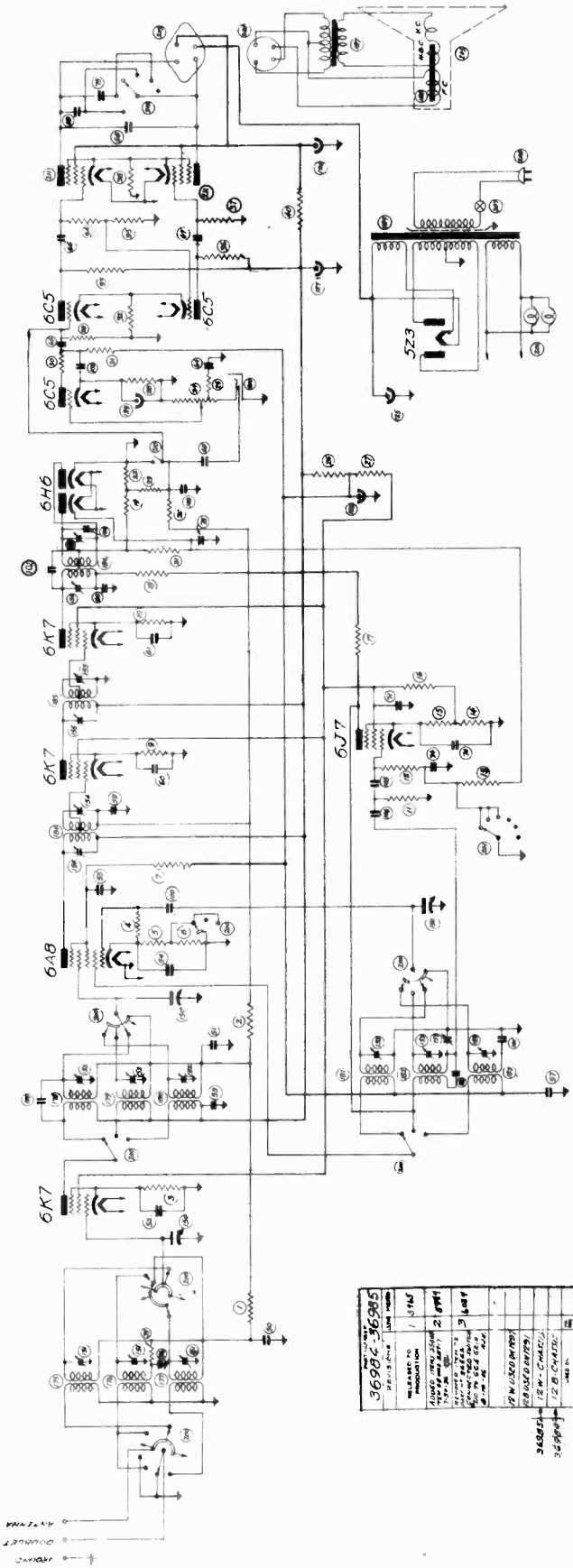
MODELS 1291,1297
Chassis 12B, 12W
Schematic,Parts



GRUNOW RADIO

Model 1291--1297
Chassis 12B--12W

Chassis 12-B and 12W are Teledial Receivers and are identical in mechanical and electrical construction except for the audio system. The 12B has two 6F6 tubes in the output and 12W- 2 6L6 tubes. (See note on schematic diagram) Standard practice should be followed for alignment, Trimmer Condenser locations are covered on the diagram and are numbered in order of their procedure.

Alignment

The same standard equipment required in the alignment of other Grunow short wave receivers should be used with these Chassis, in addition to a Galvanometer, such as the the Weston type 699 with a 200 ohm variable wire wound shunt (200 ohm rheostat) to be used in balancing the discriminator circuit.

1. I. F. Alignment - Set signal generator at 465 K. C., connect signal lead to grid of 6A8 oscillator tube thru .05 mfd. condenser. Connect ground lead to chassis. Align I. F. Trimmers, (A1-A2-A3-A4-A5-A6) to maximum output.

NOTE: When adjusting I. F. Trimmers A5-A6 (Discriminator Transformer) very little response will be indicated on output meter, due to the broad tuning of this transformer.

2. Discriminator Alignment - (A) With signal generator connected as above, connect the 30-0-30 (60-0-60 micro amp.) Galvanometer to the two Cathodes of the 6H6 Discriminator tube. (one side of the meter may go to the chassis ground and the other side to the unground cathode.) (B) Turn Power switch to "Dial" position. (C) Attenuate signal Generator to maximum output being sure the frequency remains at exactly 465 K. C. (D) With an insulated screw driver (no metal) back off trimmer screw of Discriminator Secondary (A5 or A6) (see note) until trimmer is wide open.

NOTE: The Primary and Secondary of the discriminator Transformer may be in the reverse to that shown on the drawing - check this polarity by touching the trimmer screws with a metal screw driver - when the metal comes in contact with the screw on the secondary trimmer the Galvanometer pointer will fluctuate. Use only a NON-METALLIC screw driver for alignment.

(E) Adjust Discriminator primary (A5 or A6) to maximum swing of Galvanometer (either positive or negative) (F) Re-align secondary trimmer to position of zero current. Be sure that signal generator has not changed frequency. Do not readjust Primary trimmer unless the entire operation as above is repeated. (G) Vary the I. F. Frequency (Signal Generator) and make sure that discriminator current falls to zero at exact I. F. resonance. Also check to determine the maximum current either side of resonance, that is, one side of resonance will read maximum positive current and the other side will read maximum negative current. Both sides of resonance should read about the same.

3. 1500 K. C. Alignment - (A) Connect signal lead of signal Generator to thru .002 mfd. condenser to the Antenna Binding post. (B) Place Generator signal at 1500 K. C. (C) Turn Dial pointer to 1500 K. C. (D) Range switch to Broadcast position. (E) Adjust B. C. Oscillator trimmer (A7) to maximum output. (F) Adjust B. C. Interstage Trimmer (A8) to maximum output. (G) Adjust B. C. Antenna Trimmer (A9) to maximum output.

4. 600 K. C. Alignment - (A) Place Generator signal to 600 K. C. (B) Dial pointer to 600 K. C. (C) Adjust Padding Condenser (A10) in direction of signal increase and at same time rock tuning condenser thru resonance to maximum output. Dial setting does not have to be exactly 600 K. C.

5. Recheck 1500 K. C. Alignment. See (3) above.

6. 5000 K. C. Alignment - (A) Connect signal lead to Antenna Binding post thru 400 ohm resistor. (B) Set range switch to Police-Amateur position. (C) Place signal in operation at 5000 K. C. (D) Turn dial pointer to 5000 K. C. (E) Adjust Oscillator trimmer (A11) to maximum output. (F) Adjust Interstage Trimmer (A12) to maximum output. (G) Adjust Antenna Trimmer (A13) to maximum output.

7. 18 Megacycle Alignment - (A) Connect signal lead to Antenna Binding post thru 400 ohm resistor. (B) Set range switch to Foreign Short Wave position. (C) Place signal Generator in operation at 18 M. C. (D) Adjust Oscillator Trimmer (A14) to maximum output. (E) Adjust Interstage Trimmer (A15) to maximum output, while rocking tuning condenser thru resonance. (F) Adjust Antenna Trimmer (A16) to maximum output. On the 18 M. C. Oscillator adjustment, use the lower image for alignment, that is the point where the trimmer screw is farthest in.

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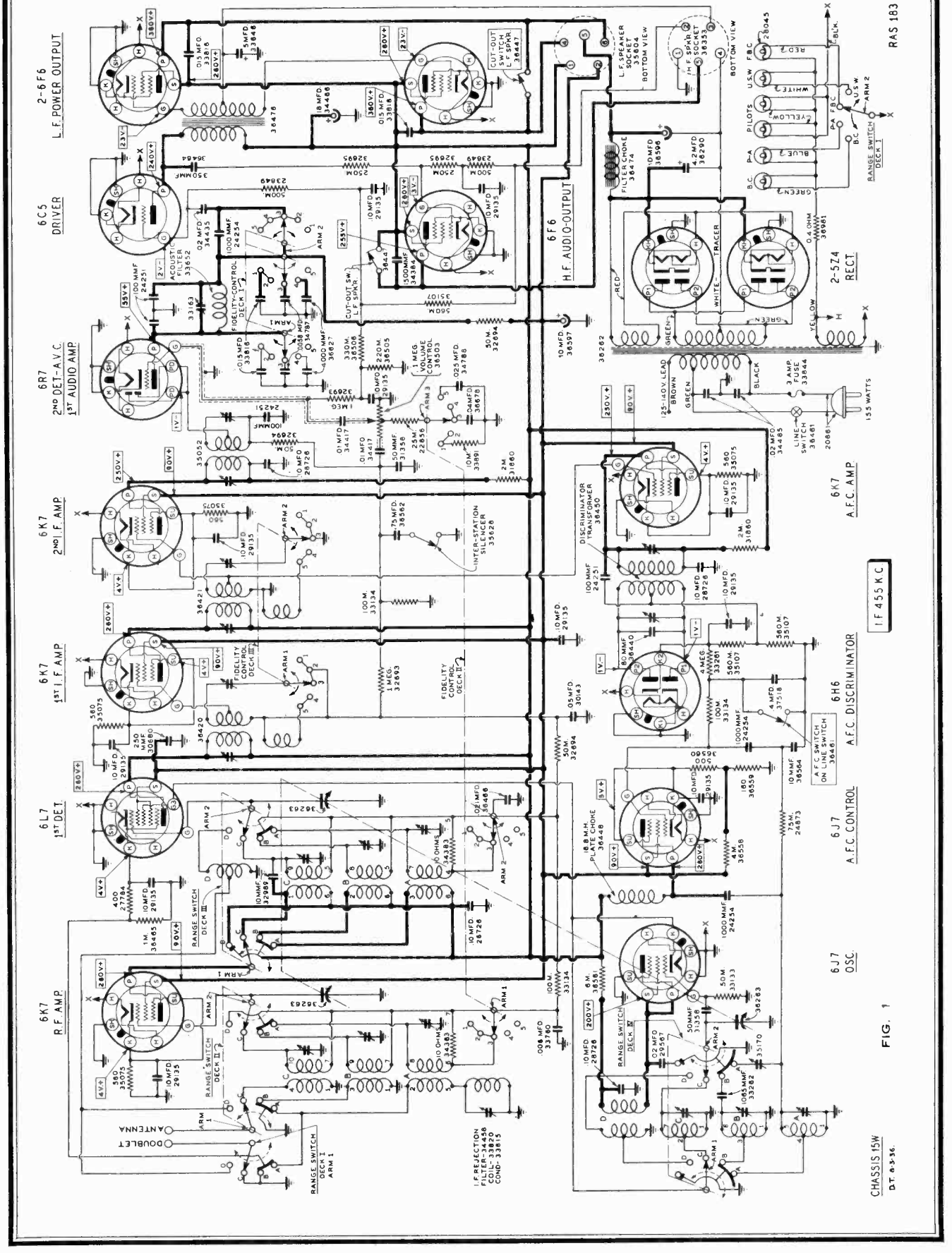
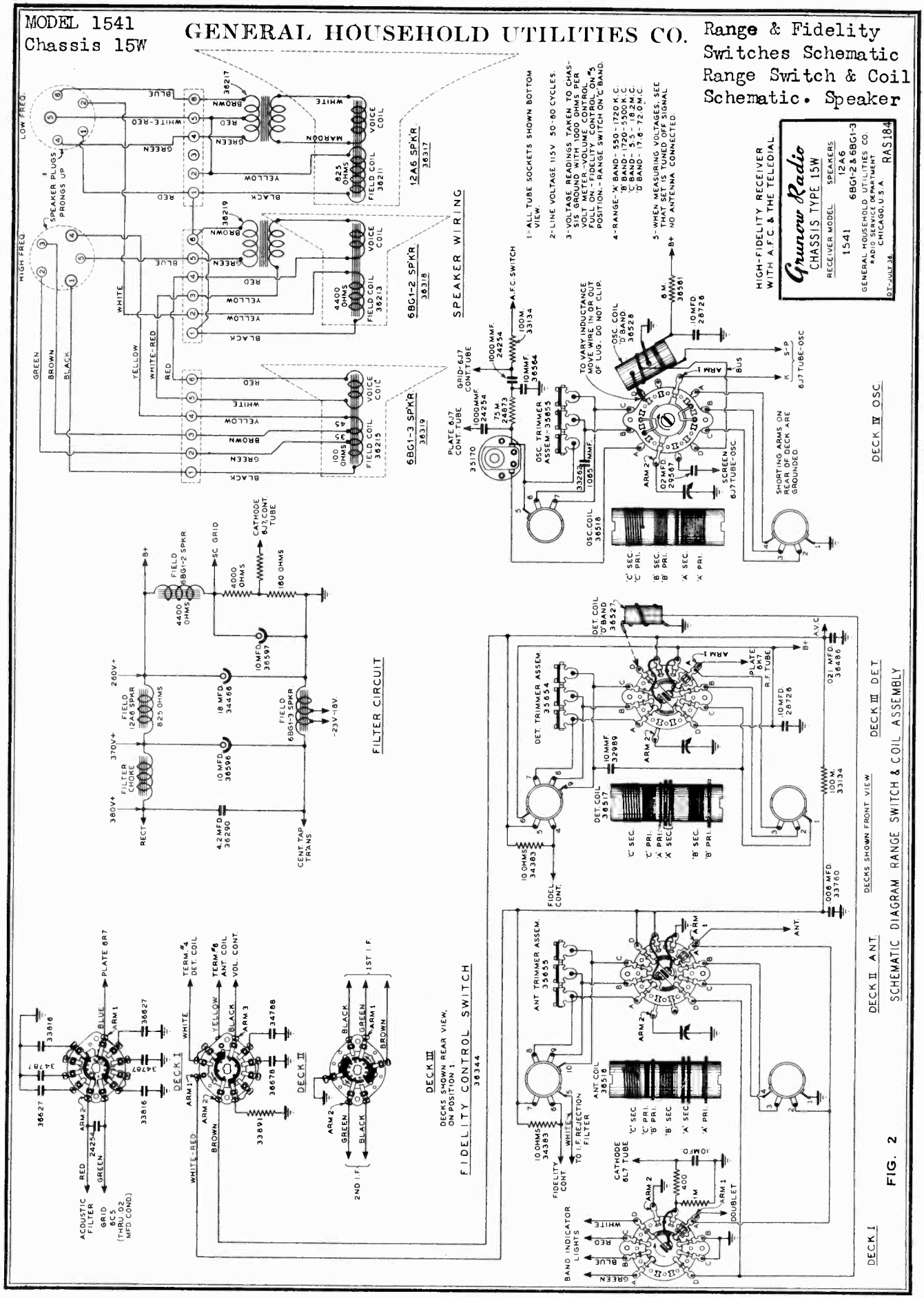
MODEL 1541
Chassis 15W
Schematic





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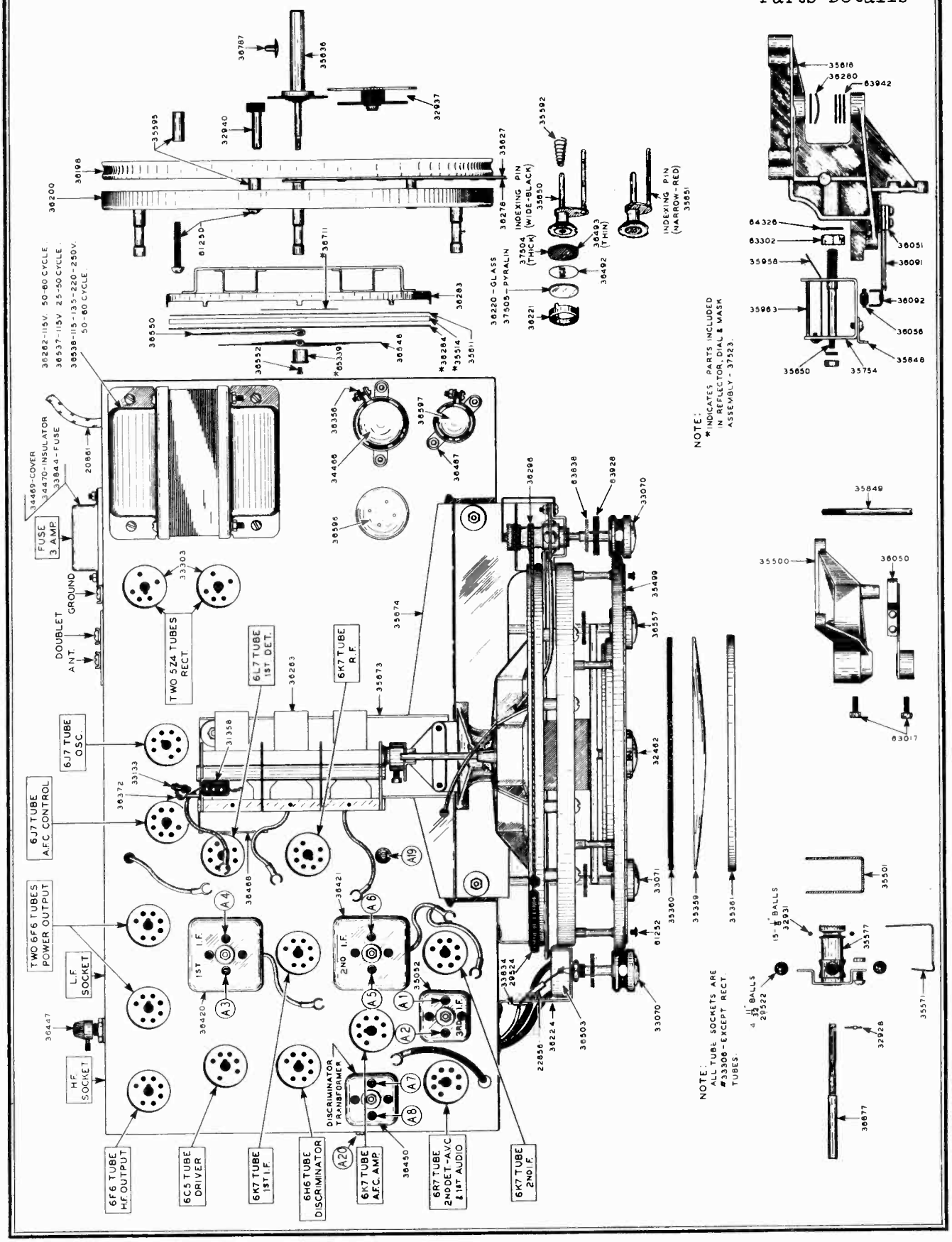
MODEL 1541
Chassis 15W
Socket, Trimmers
Parts Details



MODEL 1541
Chassis 15W
Chassis
Alignment Curves

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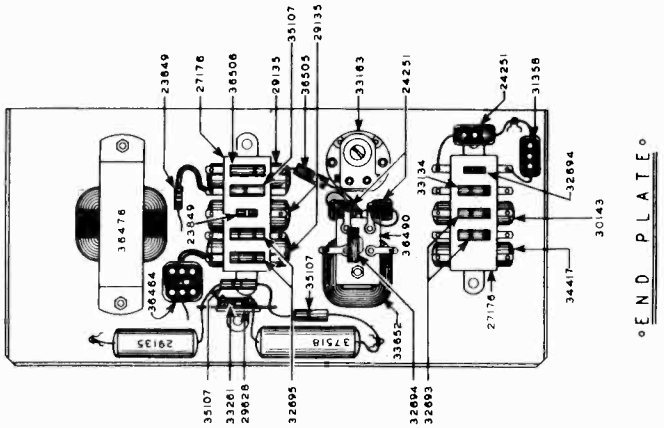
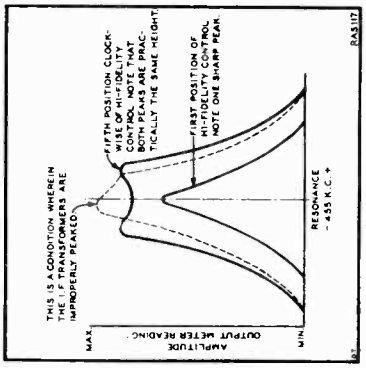
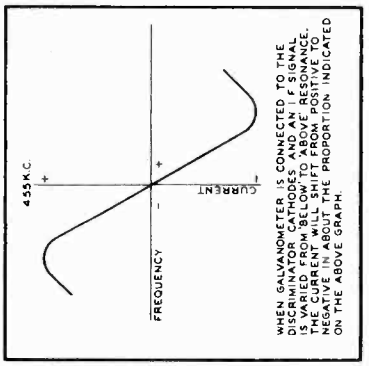
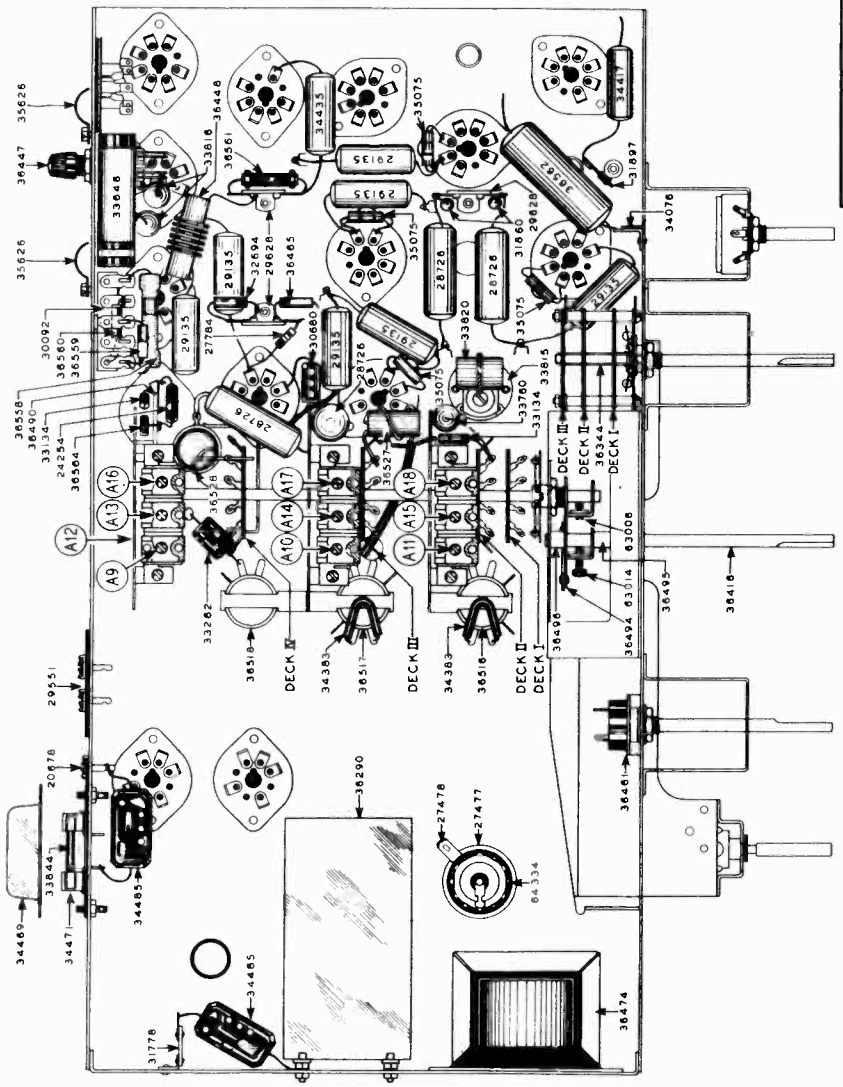








Chassis 15-W

Receiver Model #1541

Speakers 12A6 - 6GB1-2 - 6-GB1-3

GENERAL HOUSEHOLD UTILITIES CO.

MODEL 1541
Chassis 15W
Alignment, Part 1

INTRODUCTION

The Grunow 15-W Chassis is a fifteen Metal tube, 115 Volt, 50-60 cycle A. C., four band receiver with Automatic Volume Control, Variable I. F. system, of Hi-fidelity control, Tone Control, "Band Spread" dial and Automatic Frequency Control with the Teledial. The tubes and their functions are as follows: 1-6K7 R. F. Amplifier, 1-6L7 1st, Detector, 1-6J7 Oscillator, 1-6K7 1st. I. F. Amplifier, 1-6K7 2nd. I. F. Amplifier, 1-6R7 2nd. Detector, A.V.C. and 1st. A. F. Amplifier, 1-6C5 Driver Stage, 1-6F6 H. F. Audio Output, 2-6F6 L. F. Power Output, 1-6K7 Automatic Frequency Control Amplifier, 1-6H6 A. F. C. Discriminator, 1-6J7 A. F. C. Control and 2-5Z4 Rectifiers.

The frequency range is divided into four bands or divisions, one covering the "Standard Broadcast" Band (Green) 550 to 1720 K.C., one the "Police-Amateur" Band (Amber) 1720 to 5500 K.C., one the "Foreign Broadcast" Band (Yellow) 5.5 to 18.20 Megocycles and one the Ultra Short Wave Band (Blue) 17.6 to 72.0 Megocycles.

Continuity and Voltage.

Continuity and voltage readings should be taken from the underside of the chassis. The values given on the schematic diagram are average and allow the service man to make a quick check of the chassis constants. The socket layouts given on the schematic diagram show each socket from the underside.

SERVICE DATE

Speaker System

The 15-W Chassis is designed to work into the Grunow triple speaker system. This complete system consists of a dual audio arrangement wherein a two channel audio amplifier is used- one channel comprising a 6F6 tube coupled to two small speakers reproduces the high notes of the musical range and the other channel comprising two types 6F6 tubes in push-pull coupled to a large speaker reproducer the low and middler register of the musical range. If it becomes necessary to replace or change any part of the speaker system, care should be taken to see that the polarity of all transformers, voice coils and tube connections remain as originally connected, otherwise there is a possibility of the speakers working out of "phase" causing one of the speakers to cancel out certain frequency response of the other.

To determine whether the speakers are in phase- short out the voice coil on the large speaker and reverse the voice coil leads on one of the small speakers, connecting the lead on the small speaker in the position of strongest and best response. Then with the large speaker working with the two small speakers, change the polarity of the large speaker voice coil, connecting it in the position of strongest and best response.

When making this test it is a good idea to have the receiver tuned to a good musical broadcast program.

CIRCUIT ALIGNMENT PROCEDURE

Do not attempt to align the 15-W Chassis without the proper equipment. Alignment condensers are shown in the accompanying illustrations and are numbered in order of procedure- I. F. Condensers on top of the I. F. Transformers.

1. EQUIPMENT

(A) Test Oscillator.

A modulated Oscillator capable of producing signals at the I.F., Broadcast and Short-Wave Band frequencies is necessary for alignment of the 15-W.

(B) Insulated Screw Driver-(all bakelite of fibre) about 6" long.

(C) Output Meter.

This may be any of the standard Output Meters, but should be sufficiently sensitive to provide a good deflection at low signal strength.

(D) Coupling Means.

Coupling Condensers of 200 mmf., .05 mfd., and a 400 Ohm resistor should be used when coupling oscillator to receiver during alignment as specified in the procedure.

(E) Discriminator Meter.

This may be any Galvanometer with sufficient sensitivity to read the current swing of the Discriminator Circuit. A Type #699 Weston Galvanometer or equivalent is recommended. It is further suggested that a variable shunt of approximately 200 ohms (Wire Wound Rheostat) be connected across the Galvanometer until approximate balance is reached. The shunt will also act as a safety device and a "keeper" when the meter is not in actual use.

(F) The Receiver should be aligned in a location free from local interference (interference caused by motors-flashers-automobile ignition, etc.) as high frequency disturbances will cause difficulties when the short wave section is being adjusted. (A screen room is to be recommended.)

2. DIAL SETTING

Turn dial knob until condensers are fully meshed. The dial pointer (Hour Hand) should be on the horizontal line of the dial, pointing to 9 and 3 o'clock. The minute hand should be at 12 o'clock or in a vertical position.

3. I. F. ALIGNMENT:

Explanation

The GRUNOW High-Fidelity system is incorporated in this Chassis and the following procedure must be strictly adhered to:

The I. F. circuit of this chassis is known as an "expanded I. F. system". In order to reproduce programs of a "High-Fidelity nature" it is not only necessary to build an audio system capable of reproducing all the notes of the audio-spectrum at a mean output level, but it is also necessary to build a radio-frequency system that will pass signals without cutting off the sidebands. In other words, the selectivity of the receiver must be broad enough to pass all high-fidelity signals when desired- and be so designed that the selectivity may be increased at will, so that nearby powerful transmitting stations will not interfere with other local or distant stations. This variable selectivity is accomplished electrically in the 15-W chassis by a switch in the I. F. transformer circuit, coupling in two of the I. F. Transformers - the coupling being changed by means of a control knob on the front of the receiver which also acts as a tone control. When aligning the I. F. transformers see that the control is in position (No. 3) of greatest selectivity. Fig. No. 3 shows a graphical picture of the results obtained, first with the control on No. 2 position, or maximum selectivity, second on No. 5 position, showing the selectivity of the receiver broadened to its greatest extent, permitting the higher frequency sidebands to be passed through the selective circuit with the result that tone quality is greatly improved. It will be noted that both peaks (No. 5) are practically the same height and that both slopes are symmetrical. The third graph represents a condition wherein the I. F. transformers are NOT properly peaked, and it will be noted that one peak is proportionately too high and the other has been practically lost. This illustration is shown merely as an example of what to expect when receiver is not properly aligned. Before any adjustment of circuit constants is attempted, allow the Chassis to "heat up" to normal operating temperature. This heating period should take from 20 to thirty minutes and is necessary to allow all coils and condensers to reach their normal temperatures so that when alignment is completed, there will be no inductance or capacity changes due to thermal expansion or contraction. It is good to remember this heating condition when logging station- that is, do not attempt to log or tune in a station previously logged on a "Cold" chassis as the station being tuned in would "drift" and the calibration on the previously logged station would be incorrect.

(A) Connect signal lead of test oscillator to grid of 6L7 (1st Detector tube) through .05 mfd., condenser. Connect the ground lead to the chassis.

(B) See that both loud speaker plugs are firmly in their sockets. Turn Power Switch to "STD." (No. 3) position.

(C) Set dial pointer to 1500 K. C. and range switch on Broadcast position.

(D) Place test Oscillator in operation at 455 K. C. Turn receiver volume control to maximum and HI-FIDELITY CONTROL to POSITION No. 3 which is maximum selectivity position.

(E) Attenuate test Oscillator output to lowest value, consistent with obtaining a readable indication on output meter.

(F) Adjust six I. F. Trimmers, A1, A2, A3, A4, A5, A6, located on the I. F. Transformers on top of Chassis until maximum output is obtained. During alignment, maintain as low a value of signal as will allow obtaining of accurate adjustment.

4. Discriminator Alignment

(A) With the Test Oscillator connected as above connect the 30-0-30 (60-0-60 Micro-Amp.) Galvanometer to the two Cathodes of the 6H6 Discriminator Tube. (one side of the meter may go to the chassis ground and the other side to the Cathode marked K2 on the schematic drawing.)

(B) Turn Power switch to Dial (No. 2) position.

(C) Attenuate Test Oscillator to maximum output being sure that the frequency remains at exactly 455 K. C.

(D) With an insulated screw driver (No Metal) back off trimmer screw of Discriminator Secondary (A7) until trimmer is wide open.

(E) Adjust trimmer (A8)-Discriminator primary to maximum swing of Galvanometer (either positive or negative).

(F) Re-align secondary trimmer (A7) to position of no current (0). Be sure that test oscillator has not been changed and that signal is 455 K. C. Do not readjust Primary trimmer (A8) unless the entire operation as outlined above is repeated.

(G) Vary the I. F. frequency (Test Oscillator) and make sure that discriminator current falls to "0" at exact I. F. resonance. Also check to determine the maximum current either side of resonance, that is, one side of resonance will read maximum positive current and the other side will read maximum negative current. Both sides of resonance should read about the same.

Note - The Primary and secondary of the Discriminator Transformer may be in the reverse to that shown on the drawing - check this polarity by touching the trimmer screws with a metal screw driver. When the metal comes in contact with the

MODEL 1541
Chassis 15W
Alignment, Part 2

GENERAL HOUSEHOLD UTILITIES CO.

screw on the secondary trimmer the Galvanometer pointer will fluctuate. (use only a non-metallic screw driver for alignment.)

5. 1500 K. C. Alignment:

(A) Connect signal lead of test Oscillator through 200 Mmf. Condenser to antenna binding post of chassis, and ground lead to chassis ground.
(B) Place test oscillator in operation at 1500 K. C.
(C) Turn dial pointer to 1500 K. C.
(D) Turn range switch to Broadcast position.
(E) Turn Hi-Fidelity Control to No. 3 position.
(F) Adjust Broadcast oscillator trimmer (A9) to maximum output.
(G) Adjust Detector Trimmer (A10) to maximum output.
(H) Adjust antenna Trimmer (A11) to maximum output.

6. 600 K. C. Alignment:

(A) Place test oscillator in operation at 600 K. C.
(B) Tune in signal to maximum (this point does not have to be exactly at 600 K. C. dial setting).
(C) Adjust the 600 K. C. Padding Condenser (A12) which is on rear of Chassis, in direction of signal increases. At same time rock the tuning condenser back and forth through resonance while adjusting padding condenser until maximum output is obtained.

7. Recheck 1500 K. C. Alignment - see 5 - Above

8. 5000 K. C. Alignment:

(A) Set Range Switch to Police - Amateur position.
(B) Place test Oscillator in operation at 5000 K. C.
(C) Turn Dial Pointer to 5000 K. C.
(D) Adjust Set Oscillator Trimmer (A13) to maximum output.
(E) Adjust Detector Trimmer (A14) to maximum output.
(F) Adjust Antenna Trimmer (A15) to maximum output.

9. 18 M. C. Alignment:

(A) Connect signal lead of test oscillator through 400 Ohm Resistor to Antenna binding post of Chassis.
(B) Connect the ground lead to ground terminal of Chassis.
(C) Set Range Switch to "Foreign Broadcast" position and turn dial pointer to 18 M. C.
(D) Place test Oscillator in operation at 18 M. C.
(E) Adjust set oscillator Trimmer (A16) to maximum output.
(F) Adjust Detector Trimmer (A17) to maximum output.
(G) Adjust Antenna Trimmer (A18) to maximum output.
(H) On the 18 M. C. Oscillator Alignment will be noted that there are two settings at which the signal will be received. Use the lower of the images for alignment point that is, the setting giving most capacity or the point at which the trimmer screw is farthest in.

10. Ultra Short Wave Alignment:

(A) With the Test Oscillator connected as above apply a 30 megocycle signal to the receiver. If Test Oscillator will not reach 30 megocycles use harmonic of 15 megocycles.
(B) Turn dial pointer to 30 M. C.
(C) Turn Range switch to Ultra short Wave position.
(D) The U. S. W. oscillator coil is adjusted by moving the length of the coil winding, sticking thru the lug on the range switch. (See Note Fig. 2, Deck IV OSC.)
(E) The U. S. W. Detector coil is adjusted by moving the turns of wire in and out on the coil form and at the same time rocking the tuning condenser back and forth until maximum output is obtained. The Ultra Short Wave Band should never be adjusted unless tubes are changed or other constants in the circuit have been changed.

11. Alignment of "I.F. Rejector Filter" Circuit:

Due to interference caused by commercial code stations operating on wave lengths near the frequency at which the I. F. amplifiers of this receiver are aligned an I. F. filter has been incorporated in the antenna circuit to act as a rejector system thereby lessening the possibility of this form of interference entering the receiver. The filter should be turned to the same frequency as the I. F. Transformers, and this operation should be performed after the set has been completely aligned.

(A) Connect signal lead of test oscillator to antenna binding post thru a 200 mmf. condenser.
(B) Connect ground lead to ground terminal of chassis.
(C) Set dial pointer to 1500 K. C. and range switch on "Broadcast" position.
(D) Place test oscillator in operation at 455 K. C. - turn receiver volume control to maximum and Hi-Fidelity control to No. 3 position.
(E) Attenuate test oscillator output so that a fairly strong signal is applied, and tune filter condenser (A19) so that the output meter indicates a minimum reading.

12. Tuning Acoustic Filter:

The I. F. system of a Hi-Fidelity receiver is expanded or broadened so that audio frequencies of the higher musical range will be passed through the selective circuits. It is desirous to pass audio frequencies only up to a value of 10,000 cycles, so that the entire musical range may be reproduced at the same time frequencies above this value must be cut off - so that that station noises and atmospheric disturbances are not admitted to the speaker system.

An accoustic filter is incorporated in this chassis, that may be tuned so that frequencies above 10,000 cycles are excluded. This filter is tuned as follows:

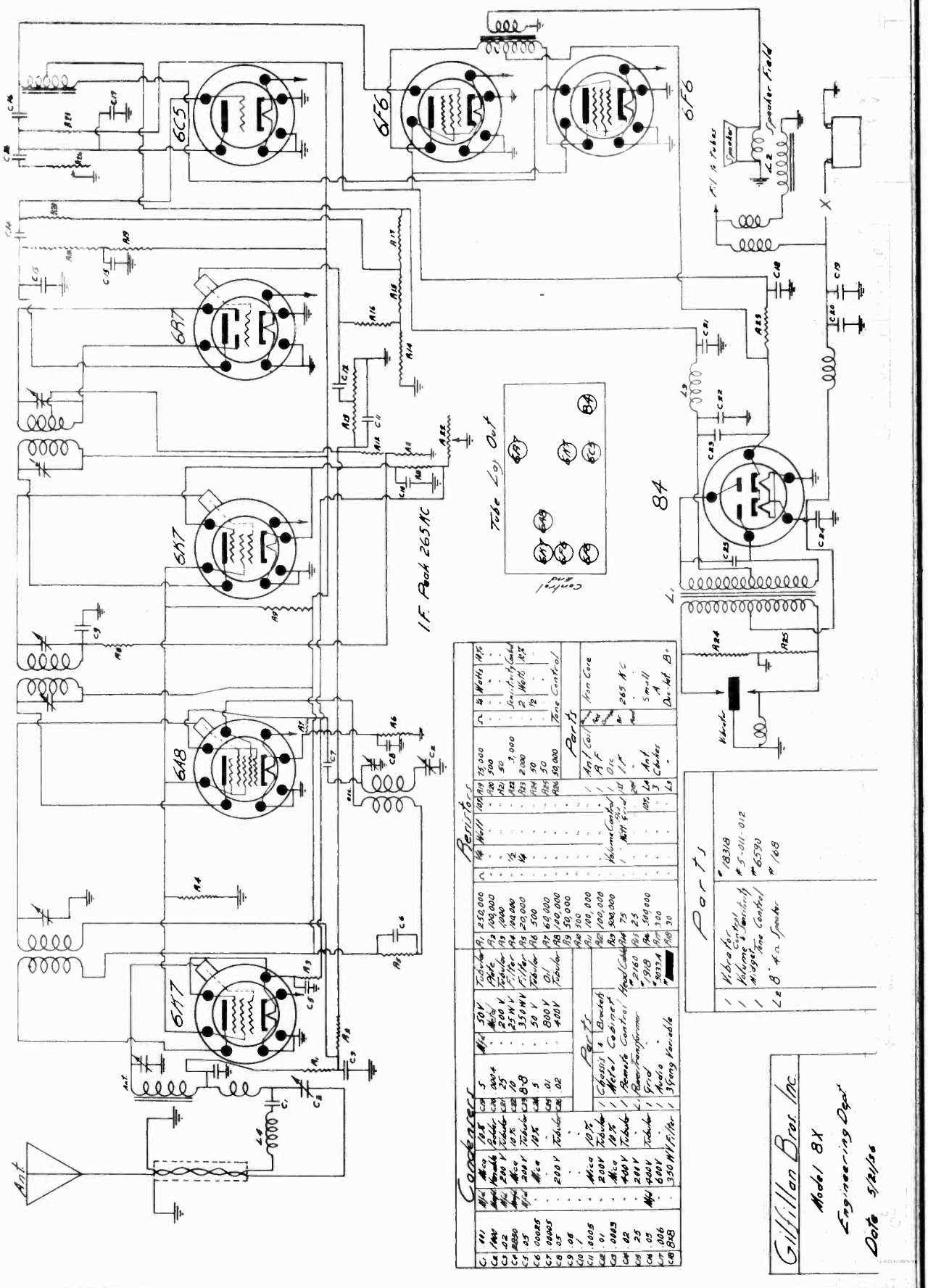
(A) After all other adjustments are completed apply a 10,000 cycle note, produced by an audio oscillator or phonograph frequency record, connecting one of the signal leads to the grid of the 6R7 (1st. A.F. tube) and the ground lead to the chassis.
(B) Set Hi-Fidelity control to maximum (No. 5) position.
(C) Attenuate audio signal so as to obtain a good reading on the output meter.
(D) Tune accoustic filter condenser (A20) until a MINIMUM output is indicated on the output meter.

The Range Switch

The Range Switch is a simple four deck multiple pole, positive acting switch, used to connect the various coils into their proper circuits, and is designed in such a way that the coils being used are isolated from coils of the two succeeding bands of a lower frequency. In the case of the detector circuit both the higher and lower frequency bands, above and below the circuit selected, are shorted out. This switching arrangement not only selects the proper coils for each band, but grounds the unused section, allowing the receiver to work at maximum sensitivity and selectivity on all four ranges. The Range Switch and Coil Assembly is shown schematically in fig. (2) and it will be noted that deck I (Lights) is the one toward the front of the chassis Deck II (Antenna) is the second position, Deck III (Detector) in the center and followed by Deck IV (Oscellator). The diagram shows the exact position of the coil and switch lugs, and little difficulty should be experienced in making any necessary repairs or inspection.

MODEL 8X
Schematic
Socket

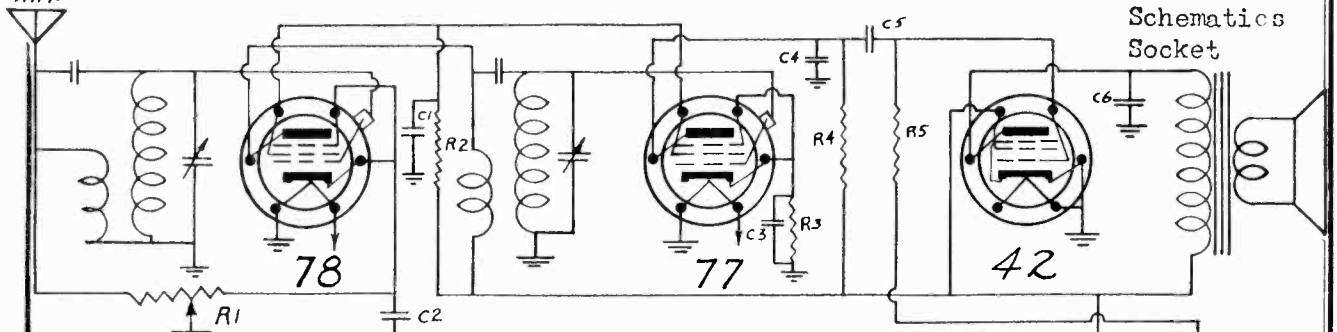
GILFILLAN BROS., INC.



MODEL 402T

GILFILLAN BROS., INC.

MODEL 412T
MODEL 723T-C
Schematics
Socket

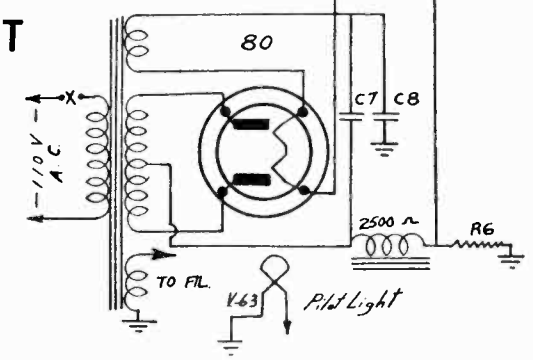


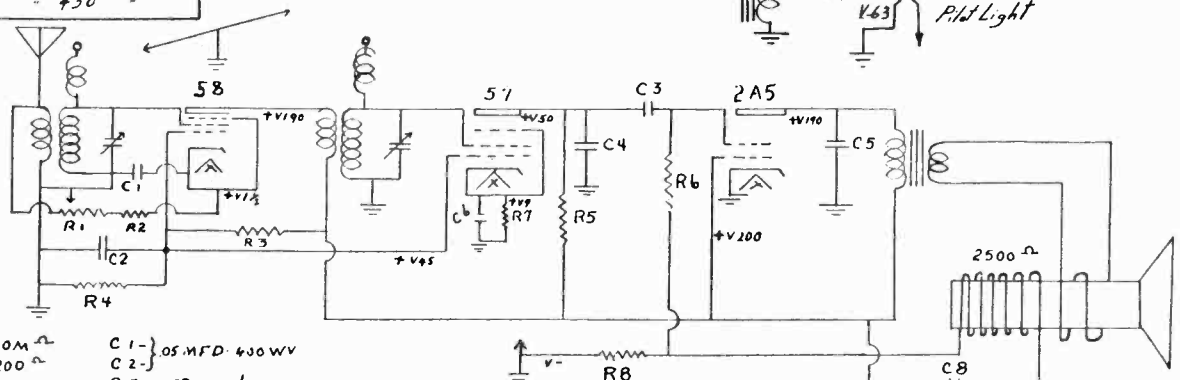
Model 402T

RESISTORS	
R1 - 15000 Ω	Volume Control
R2 - 100,000	- ½ watt carbon
R3 - 25,000	- ½ " "
R4 - 500,000	- ½ " "
R5 - 1 Meg	- ½ " "
R6 - 250	Candohm 2 Watt

CONDENSERS		
C1 - .05 MFD	200	Volts
C2 - .05	200	"
C3 - .25	200	"
C4 - .001	600	"
C5 - .02	400	"
C6 - .01	400	"
C7 - 5	450	"
C8 - 5	450	"

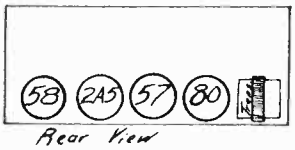
FRONT
Tube Placement
80 42 77 78

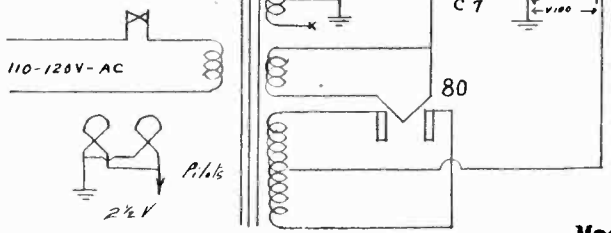




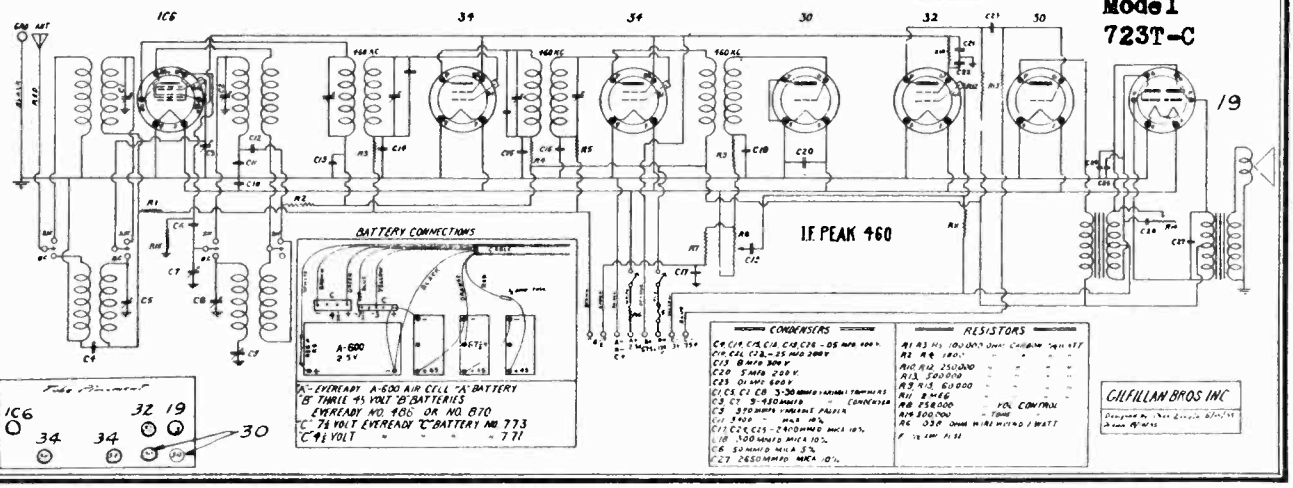
Model 412T

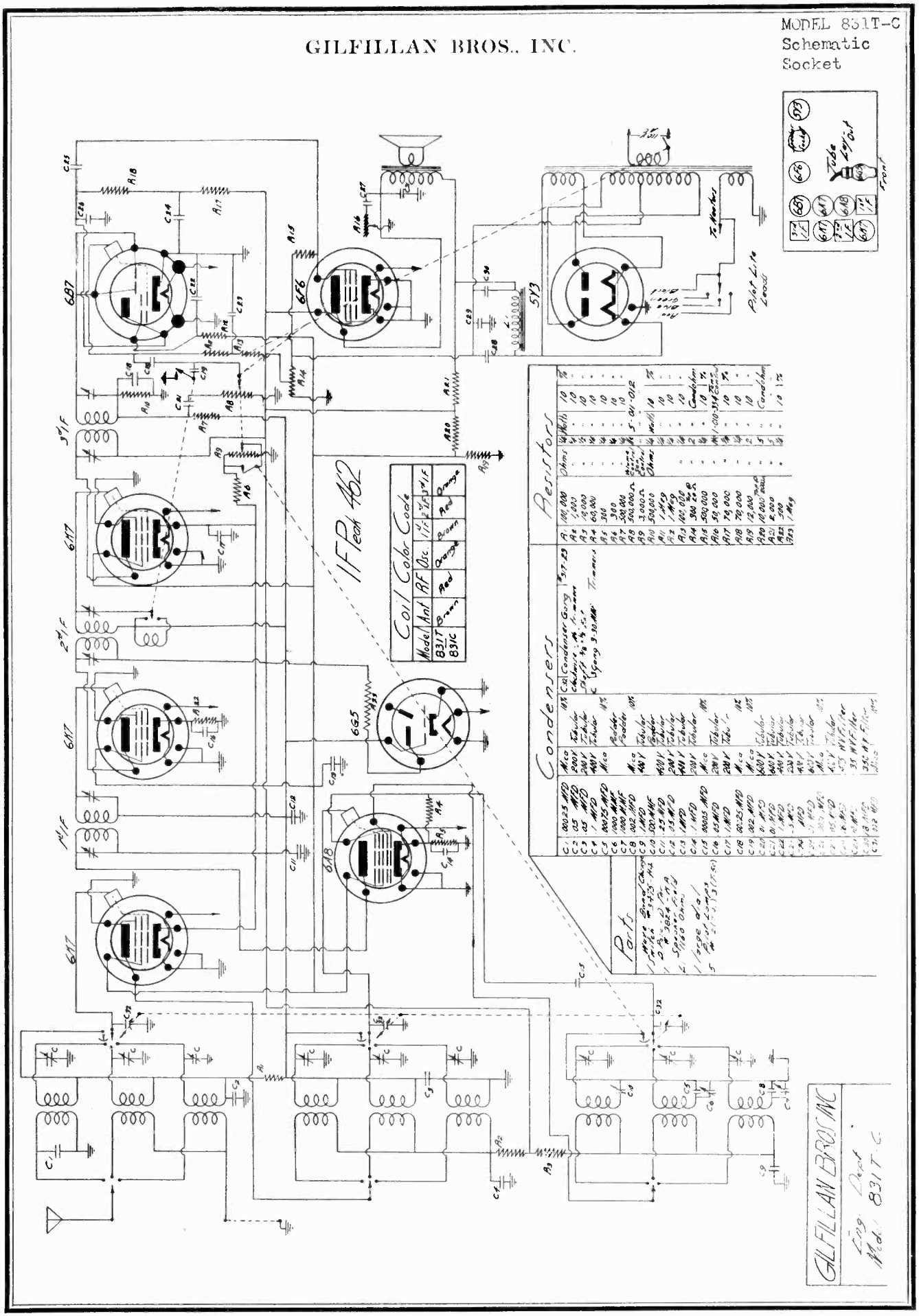
R1 - 10M Ω		C1 - }	.05 MFD 400 WV
R2 - 200 Ω		C2 - }	
R3 - }	100M Ω	C3 - .02	" 600 "
R4 - }		C4 - .0005 MFD	
R5 - }	500M Ω	C5 - .006	" 600 WV
R6 - }		C6 - .25	" 200 WV
R7 - 25M Ω		C7 - 4	" 450 WV
R8 - 400 Ω		C8 - 4	" 450 WV





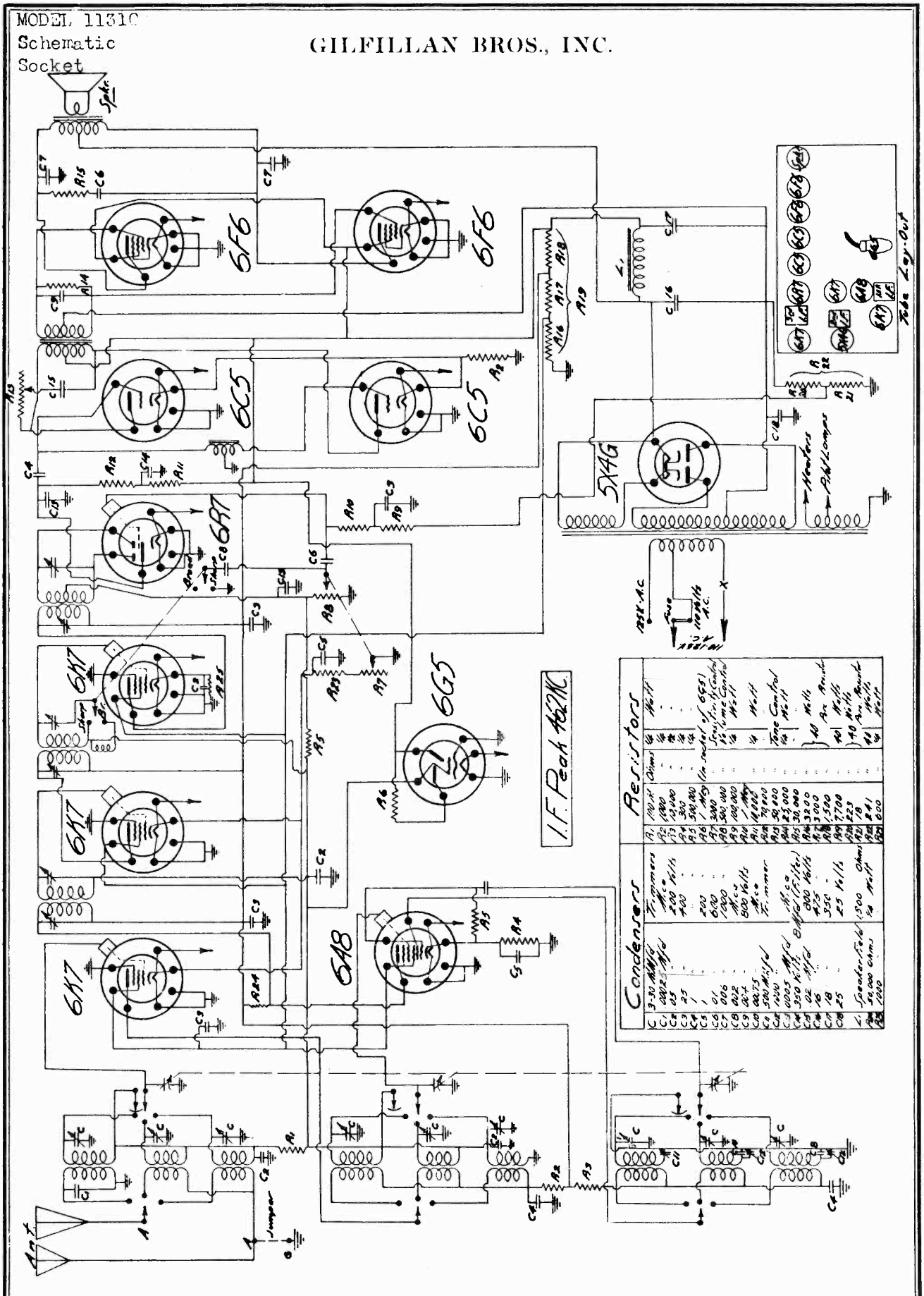
Model 723T-C





MODEL 11310
Schematic
Socket

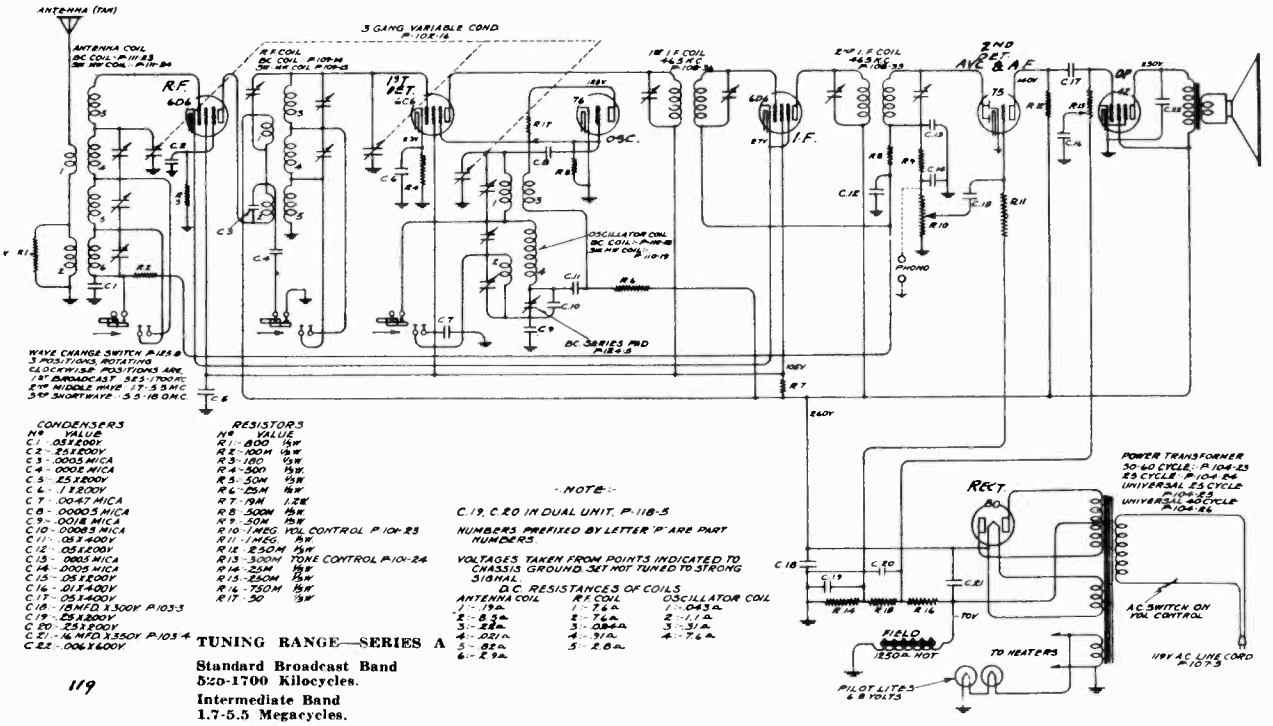
GILFILLAN BROS., INC.



GOODYEAR SERVICE

MODEL 777
Series A & B
Schematics
Voltage

SERIES A



WAVE CHANGE SWITCH P-125-8
3 POSITIONS, ROTATING
CLOCKWISE POSITIONS ARE:
1ST BROADCAST 543-1700 KC
2ND MIDDLE WAVE 1.7-5.5 MC
3RD SHORT WAVE 5.5-18.0 MC

CONDENSERS		RESISTORS	
No	VALUE	No	VALUE
C1	.05 X 200V	R1	800 1/4W
C2	.65 X 200V	R2	100M 1/4W
C3	.0005 MICA	R3	180 1/4W
C4	.0002 MICA	R4	500 1/4W
C5	.25 X 200V	R5	50M 1/2W
C6	.1 X 200V	R6	.25M 1/4W
C7	.0047 MICA	R7	.1M 1.2W
C8	.00025 MICA	R8	.500M 1/2W
C9	.0018 MICA	R9	.5M 1/2W
C10	.00085 MICA	R10	1 MEG VOL CONTROL P-101-23
C11	.05 X 400V	R11	1 MEG A.W.
C12	.05 X 200V	R12	.250M 1/2W
C13	.005 MICA	R13	.300M TONE CONTROL P-101-24
C14	.0005 MICA	R14	.25M 1/2W
C15	.05 X 200V	R15	.250M 1/2W
C16	.01 X 400V	R16	.750M 1/2W
C17	.05 X 400V	R17	50 1/2W
C18	.1 MFD. X 300V. P-103-3		
C19	.25 X 200V		
C20	.25 X 200V		
C21	.1 MFD. X 350V. P-103-4		
C22	.006 X 600V		

NOTE:
C.19, C.20 IN DUAL UNIT, P-118-5
NUMBERS PREFIXED BY LETTER 'P' ARE PART NUMBERS.
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND. SET NOT TUNED TO STRONG SIGNAL.

D.C. RESISTANCES OF COILS

ANTENNA COIL	R.F. COIL	OSCILLATOR COIL
1 - 19Ω	1 - 7.6Ω	1 - .045Ω
2 - 8.3Ω	2 - 7.6Ω	2 - 1.1Ω
3 - 2.8Ω	3 - .084Ω	3 - .31Ω
4 - .021Ω	4 - .91Ω	4 - 7.6Ω
5 - .82Ω	5 - 2.8Ω	
6 - 2.9Ω		

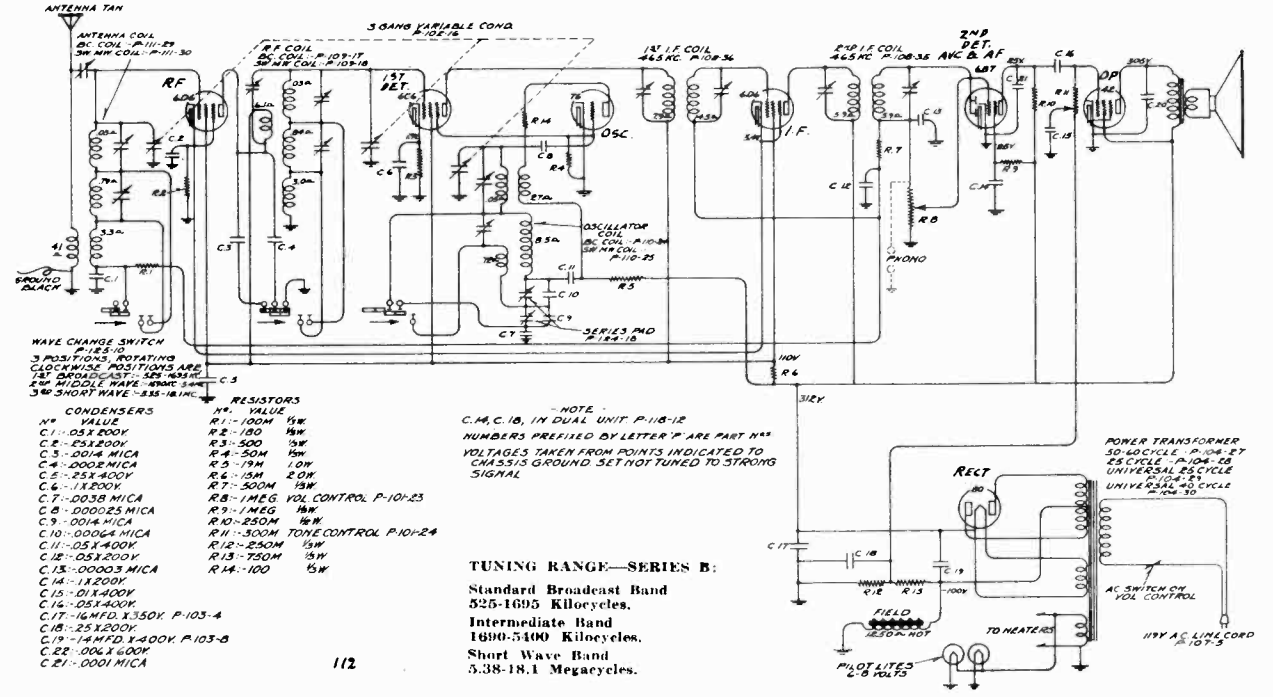
TUNING RANGE—SERIES A

Standard Broadcast Band
520-1700 Kilocycles.
Intermediate Band
1.7-5.5 Megacycles.
Short Wave Band
5.5-18.0 Megacycles.

119

I. F. Frequency — 465 Kilocycles

SERIES B



WAVE CHANGE SWITCH
P-125-10
3 POSITIONS, ROTATING
CLOCKWISE POSITIONS ARE:
1ST BROADCAST 525-1695 KC
2ND MIDDLE WAVE 1.69 MC TO 5.4 MC
3RD SHORT WAVE 5.35-18.1 MC

CONDENSERS		RESISTORS	
No	VALUE	No	VALUE
C1	.05 X 200V	R1	100M 1/2W
C2	.25 X 200V	R2	180 1/4W
C3	.0014 MICA	R3	500 1/2W
C4	.0002 MICA	R4	50M 1/2W
C5	.25 X 400V	R5	19M 1.0W
C6	.1 X 200V	R6	15M 2.0W
C7	.0038 MICA	R7	500M 1/2W
C8	.000025 MICA	R8	1 MEG VOL CONTROL P-101-23
C9	.0014 MICA	R9	1 MEG 1/4W
C10	.00064 MICA	R10	250M 1/4W
C11	.05 X 400V	R11	300M TONE CONTROL P-101-24
C12	.05 X 200V	R12	250M 1/2W
C13	.00003 MICA	R13	750M 1/2W
C14	.1 X 200V	R14	100 1/2W
C15	.01 X 400V		
C16	.05 X 400V		
C17	.1 MFD. X 350V. P-103-4		
C18	.25 X 200V.		
C19	.1 MFD. X 400V. P-103-8		
C22	.006 X 600V.		
C21	.0001 MICA		

NOTE:
C.14, C.18, IN DUAL UNIT P-118-12
NUMBERS PREFIXED BY LETTER 'P' ARE PART NOS.
VOLTAGES TAKEN FROM POINTS INDICATED TO CHASSIS GROUND. SET NOT TUNED TO STRONG SIGNAL

TUNING RANGE—SERIES B:

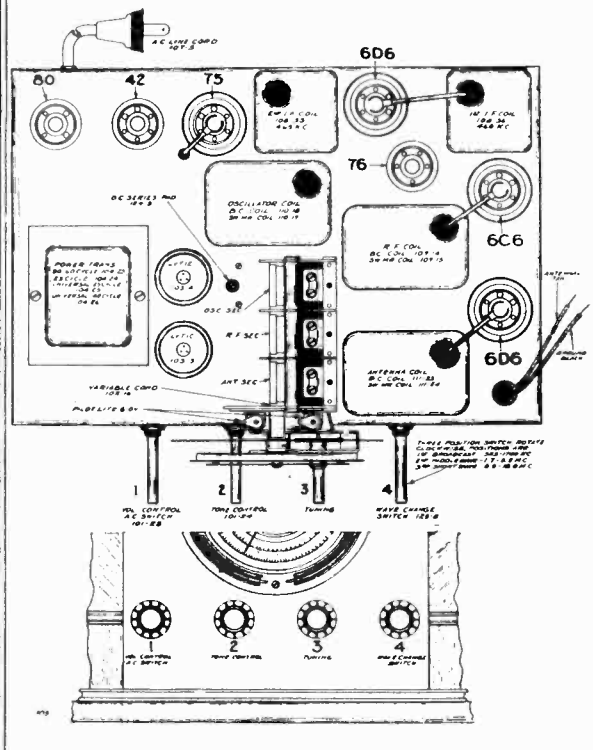
Standard Broadcast Band
525-1695 Kilocycles.
Intermediate Band
1690-5400 Kilocycles.
Short Wave Band
5.38-18.1 Megacycles.

112

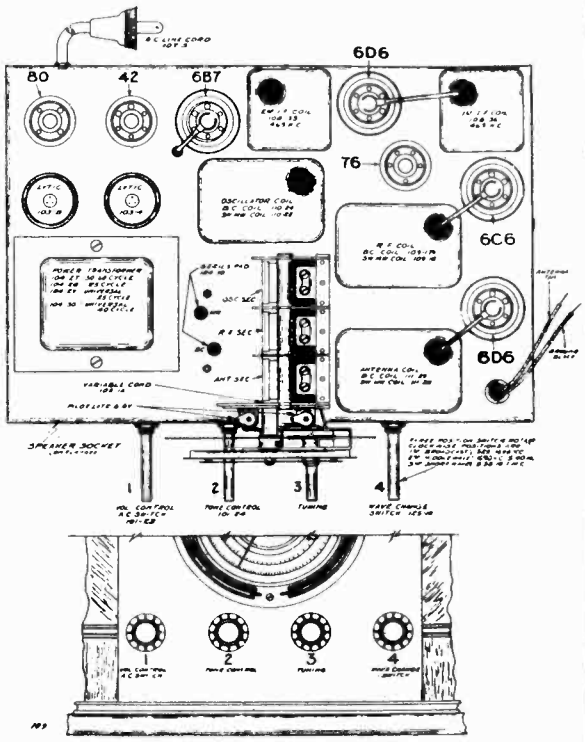
MODEL 777
Series A & B
Trimmers, Socket
Parts, Layouts

GOODYEAR SERVICE

TOP VIEW - SERIES A



TOP VIEW - SERIES B

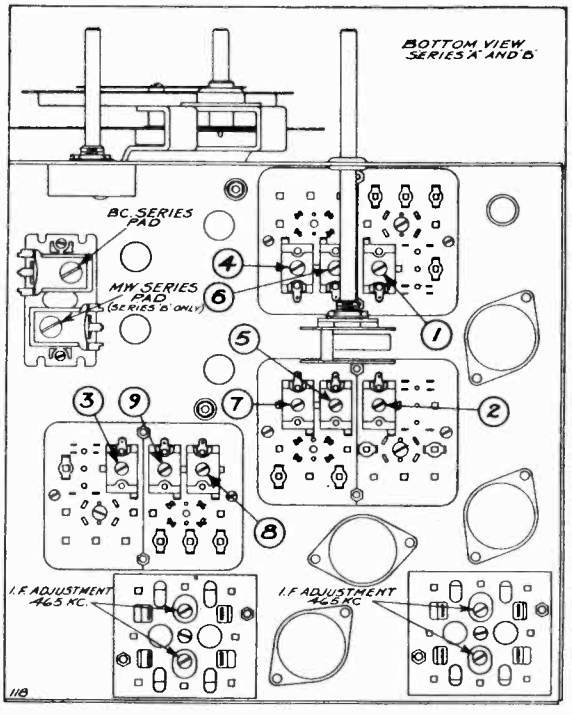


REPAIR PARTS LIST - MODEL 777

SERIES "A" & "B"

Parts Used In Ser. A Only	Parts Used In Ser. B Only	DESCRIPTION	List Price Each
		CONDENSERS	
		Unless Otherwise Listed—All Molded Mica	$0.25
		Unless Otherwise Listed—All Single Section Tubular Paper By-Pass	.25
		Unless Otherwise Listed—All Dual Section Tubular Paper By-Pass	.50
103-3	Not Used.	18 Mfd. x 300 V. Electrolytic	1.35
103-4	103-4	16 Mfd. x 350 V. Electrolytic	1.35
Not Used.	103-8	14 Mfd. x 400 V. Electrolytic	1.35
129-20	Not Used.	.0047 Mica—Type MH + or — 5%	.50
Not Used.	129-29	.0038 Mica—Type MW + or — 2½%	.50
		RESISTORS	
		Unless Otherwise Listed—All Resistors	.20
Not Used.	130-61	15M Ohm—2 Watt + or — 20%—180 V.	.40
		COILS	
108-35	108-35	Output I.F. Coil Assembly Complete—Less Can	1.50
108-36	108-36	Input I.F. Coil Assembly Complete—Less Can	1.50
109-14	Not Used.	Broadcast R.F. Coil Assembly Complete—Less Can	1.00
109-15	Not Used.	Mid-Wave & Short Wave R.F. Coil Assembly Complete—Less Can	1.50
Not Used.	109-17	Broadcast R.F. Coil Assembly Complete—Less Can	.70
Not Used.	109-18	Mid-Wave & Short Wave R.F. Coil Assembly Complete—Less Can	1.50
110-18	Not Used.	Broadcast Oscillator Coil Assembly Complete—Less Can	.50
110-19	Not Used.	Mid-Wave & Short Wave Oscillator Coil Assembly Complete—Less Can	1.25
Not Used.	110-24	Broadcast Oscillator Coil Assembly Com.—Less Can	.75
Not Used.	110-25	Mid-Wave & Short Wave Oscillator Coil Assembly Complete—Less Can	1.50
111-23	Not Used.	Broadcast Antenna Coil Assembly Com.—Less Can.	1.00
111-24	Not Used.	Mid-Wave & Short Wave Antenna Coil Assembly Complete—Less Can	1.50
Not Used.	111-29	Broadcast Antenna Coil Assembly Com.—Less Can	1.00
Not Used.	111-30	Mid-Wave & Short Wave Antenna Coil Assembly Complete—Less Can	1.50
		TRANSFORMERS	
104-23	Not Used.	50/60 Cycle Power Transformer	3.50
104-24	Not Used.	25 Cycle Power Transformer	5.00
104-25	Not Used.	Universal—25 Cycle Primary	7.50
104-26	Not Used.	Universal—40 Cycle Primary	6.00
Not Used.	104-27	50/60 Cycle Power Transformer	4.50
Not Used.	104-28	25 Cycle Power Transformer	7.00
Not Used.	104-29	Universal—25 Cycle Primary	7.50
Not Used.	104-30	Universal—40 Cycle Primary	7.00
		SPEAKERS	
114-13	114-13	Six Inch Speaker	6.00
114-17	114-17	Eight Inch Speaker	6.50
114-18	114-18	Ten Inch Speaker	8.00

		MISCELLANEOUS	
101-23	101-23	Volume Control and Switch	
101-24	101-24	Tone Control	
102-16	102-16	Three Gang Variable Condenser	
107-5	107-5	Line Cord and Plug	



MODEL 777
Series A & B
Alignment

GOODYEAR SERVICE

NOTE: IN SERIES B THE TYPE 75 WAS REPLACED BY TYPE 6B7, DUPLEX DIODE PENTODE AS A SECOND DETECTOR, A.V.C. AND AUDIO.

Series A and B chassis are serially numbered on the back flange of the chassis, series A beginning with number "5B104021A" and up, series B chassis beginning with number "5D114175B" and up. Series A and B may be identified by the letter "A" and "B" at the end of the serial numbers.

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 and B.

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.

ALIGNING INSTRUCTIONS

Dummy Antennas

The following dummy antennas are used in aligning both series A and B 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 screen terminals of the type 42 output tube. Maximum deflection of the meter indicates resonance. Use only enough signal to get a readily readable output. A low range output meter or the low scale of a multi-range meter should be used.

ALIGNMENT PROCEDURE SERIES A ONLY

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 550 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 1500 K.C., move dial pointer to 1500 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 position center of its rotation, and with external oscillator set at 5 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 5 megacycles and adjust intermediate wave oscillator (adjustment number 9), intermediate wave R.F. (adjustment number 5) and intermediate antenna (adjustment number 4) to resonance.
   (b) Re-set external oscillator to 1800 K.C. and pick up signal by rotating variable condenser and check for sensitivity.
   (c) Re-check broadcast sensitivity as outlined under "Broadcast Band Alignment".

Series "A" chassis have no intermediate band series oscillator pad adjustment.

ALIGNMENT PROCEDURE SERIES B ONLY

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.

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

Series A and B.

Series A—Part No. 108-35 Output I.F. Transformer
Series A—Part No. 108-36 Input I.F. Transformer
Series B—Part No. 108-35 Output I.F. Transformer
Series B—Part No. 108-36 Input I.F. Transformer

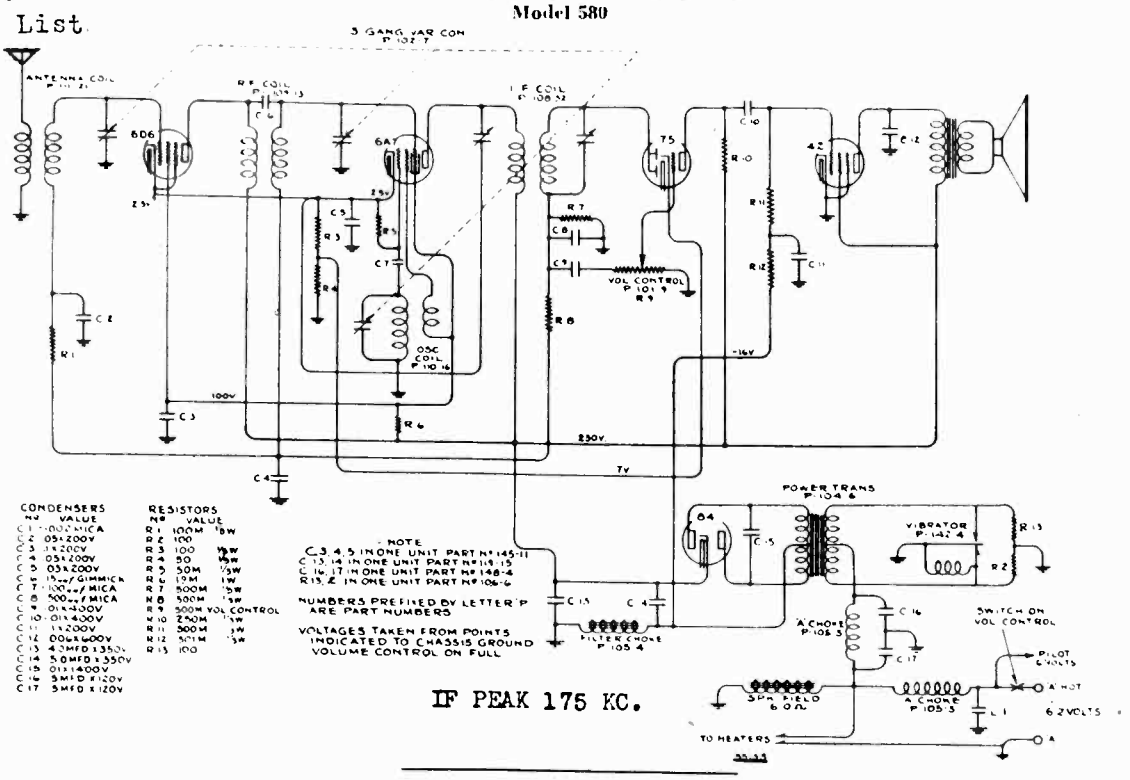
These I.F. transformers have two adjustments, both of which are accessible from the underside of chassis (see bottom view).

1. With volume control full on, the extreme right of its rotation, and with wave changing switch in the broadcast position, extreme left of its rotation, and with 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 6D6 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 6D6 to grid cap to 6C6 and adjust input I.F. transformer to resonance.
   (c) With oscillator still connected to 6C6, re-adjust output I.F. transformer.

MODEL 580
Schematic
Parts List

GOODYEAR SERVICE

Model 580



IF PEAK 175 KC.

REPAIR PARTS—MODEL 580

Serial No. 11501 and up

When ordering parts, always specify part and model number as well as serial number of chassis.

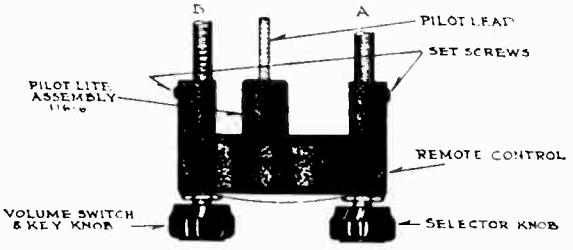
Part No.	Description	List Price Each
101-9	Volume Control with Switch	$1.35
102-7	Three Gang Geared Variable Condenser	4.00
104-6	Vibrator Transformer	3.00
105-3	"A" Choke—40T—No. 16E—½" Dia.	.10
105-4	380 Ohm Filter Choke	.85
106-6	200 Ohm Center Tapped Resistor	.25
108-32	Output I. F. Transformer Complete, less can and resistor and Condenser Assembly (175 K. C.)	1.75
109-13	R. F. Coil	1.00
110-16	Osc. Coil & bracket	.75
111-21	Antenna Coil	1.00
115-18	Special partition shield	.20
116-5	6-8 Volt T-50 pilot lamp, screw base	.10
116-14	6-8 volt T-51 frosted glass bayonet base lamp	.13
116-6	Pilot light assembly, complete, less bulb	.40
119-15	5-4 Mfd. 300 Volt Electrolytic Filter Condenser	2.50
135-5	⅜x3" carriage bolt	.05
140-4	Container complete with top and bottom	2.50
142-4	Plug-In Vibrator	4.50
145-11	By-Pass Block	.75
146-1	Special bracket including battery, antenna, pilot light cable fittings, but less antenna coil volume control	.40
146-2	Bushing and bracket complete	.20
147-1	Selector Control Coupling	.10
147-11	Volume control coupling	.10
148-1	.5 Mfd. Generator Condenser	.50
148-3	.5 Mfd. Ammeter Condenser	.40
148-4	Dual .5 Mfd. x 120 Volt Condenser	.75
148-6	Special Ford ignition condenser	.60
152-1	Antenna cable	.40
152-2	Battery cable	.35
152-3	Fuse Insulating Sleeve	.05
167-1	Dynamic Speaker	5.00
168-1	Spark-plug type suppressor Universal)	.30
168-2	Distributor plug-type suppressor	.40
168-3	Cable type suppressor	.40
169-1	15 Ampere Fuse (3AG-15)	.05
	Unless otherwise listed, all Carbon Resistors	.20
	Unless otherwise listed, all Single Section Tubular Paper By-Pass Condensers	.25
	Unless otherwise listed, all Dual Section Tubular Paper By-Pass Condensers	.50
	Unless otherwise listed, all Molded Mica Condensers	.25
	All Sockets	10
	Plate antenna	3.50

REMOTE CONTROL PARTS

Part No.	Description	List Price Ea
112-39	Selector Control Shaft	.20
112-41	Idler Gear	.15
112-42	Pointer Shaft	.05
112-43	Volume Control Shaft, Key type less knob	.10
112-85	Volume control shaft less knob	.05
112-44	Pointer (Specify White or Black)	.05
112-45	Bezel (Crystal Retainer)	.15
112-46	Celluloid Dial Crystal	.15
112-48	Pointer Shaft Gear	.05
112-89	Dial	.25
131-5	Black bakelite remote control knobs	.15
146-8	Die Cast Remote Control Mounting Bracket	.30
146-12	Steering Column Strap	.15
146-25	Dash Mounting Bracket	15
147-3	Selector Control Bushing for 112-39 shaft	.10
147-4	Volume Control Bushing for 112-43-112-85 shaft	.10
149-18	Flexible Volume Control Cable—18"	1.25
149-24	Flexible Volume Control Cable—24"	1.50
150-18	Flexible Selector Cable—18"	1.25
150-24	Flexible Selector Cable—24"	1.50
151-7	Remote Control Head, less flexible shafts, with pilot assemblies and with knobs and mounting hardware	4.90

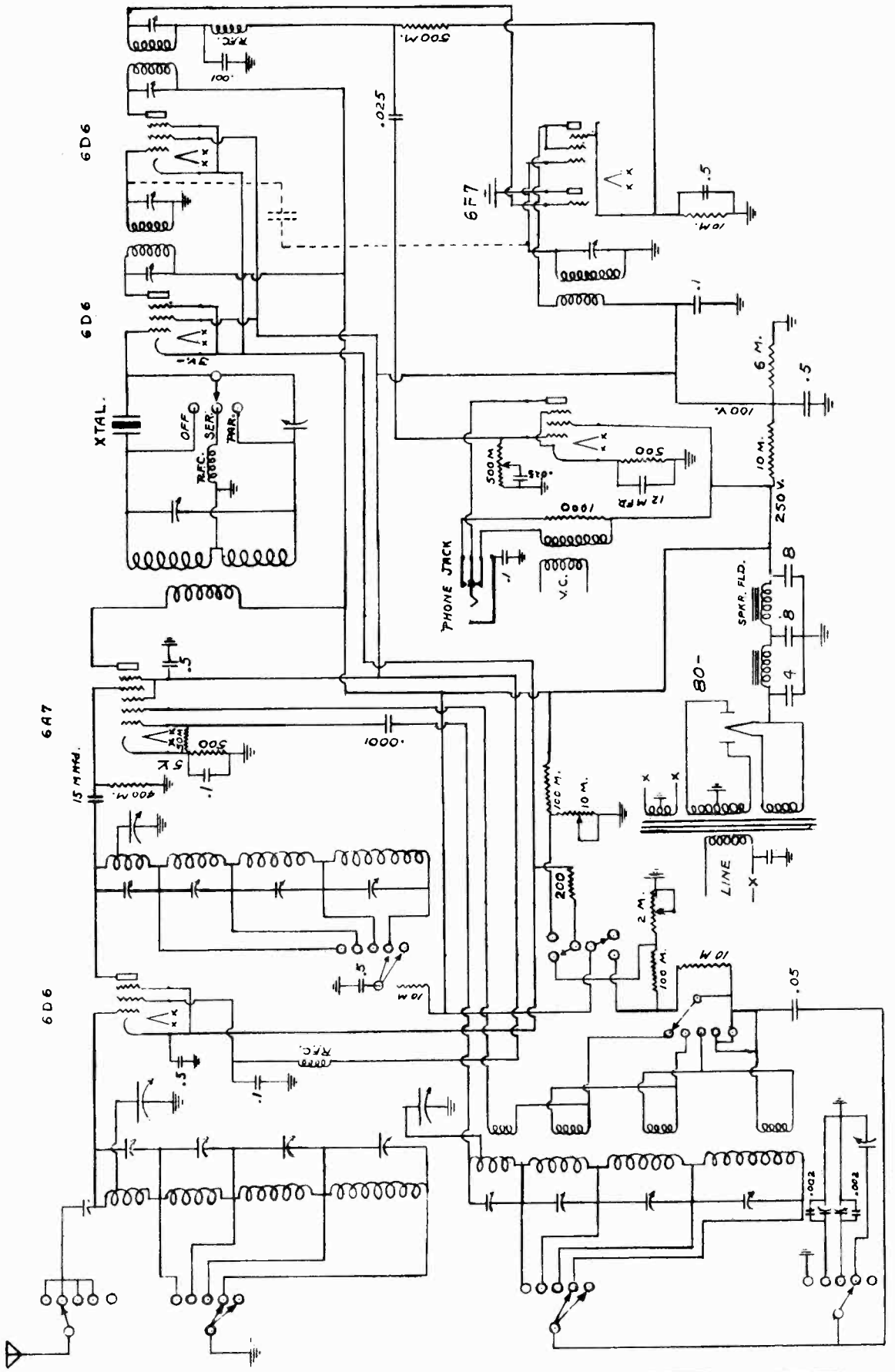
PILOT LIGHT:

Pilot light assembly, part number 116-9, plugs into the set and to the rear of the remote control unit (see illustrations).



HALLICRAFTERS, INC.

MODEL Super Skyrider
Schematic



ALIGNMENT OF THE SUPER SKYRIDER

Alignment instructions on the Super SKYRIDER are as follows:-

Peak the intermediate frequency transformer at 465 k.c. If a crystal filter is to be used with the receiver, that will have to be aligned with the crystal used to insure maximum results from the filter unit, for although our crystals are held to a very close tolerance, 2 k.c. variation will make considerable difference in the efficiency of the receiver. THEREFORE, THE INTERMEDIATES MUST BE ALIGNED WITH THE CRYSTAL TO BE USED.

This will necessitate a crystal oscillator on the indicating device in the diode circuit of the second detector, preferably a 200 micro ampre meter, so the input I.F. signal can be held as low as possible, to insure the I.F.'s being peaked exactly at resonance. If a 200 micro ampre is not available, a 0 to 1 mil meter can be used with a somewhat higher input signal.

After the I.F.'s have been aligned and rechecked, connect the antenna and ground to the output of the good test oscillator. Set the oscillator for 18 megacycles, then turn the wave band switch to the No. 1 position. Align the oscillator and RF circuit to this point to maximum output. Reset test oscillator and tuning condenser to 12 megacycles and if the receiver does not peak at 12, increase or decrease the length of lead from the low end to the high frequency oscillator coil. This lead is on the last switch head toward the rear of the chassis.

Follow the above instructions for the other three bands, with this exception. Adjust the oscillator pad to the low frequency end of each range to maximum response, rather than to the length of lead. The frequency used in these bands are:

No. 2 range 1100 k.c. to 6000 k.c.
No. 3 range 6000 k.c. to 15,000 k.c.
No. 4 range 2750 k.c. to 1400 k.c.

The alignment procedure will have to follow in this sequence to insure maximum results, that is range No. 1 first, No. 2 second and so forth, since due to the shortening action of the switch, the small trimmer condensers across each coil are cut into the circuit in the rotation.

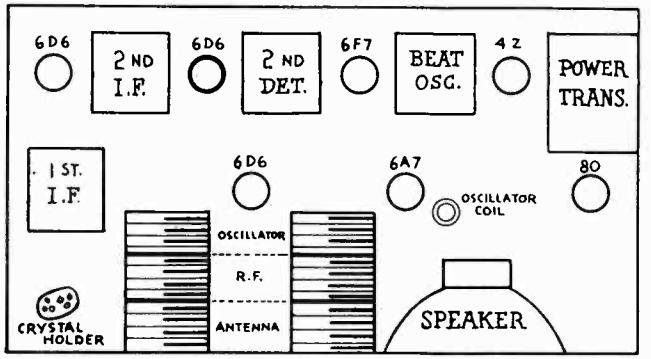
After the receiver has been aligned for maximum results on all ranges, the next step is to adjust the crystal filter circuit, still using a test oscillator to tune in the signal around 3600 k.c. with the crystal filter switch still in the "off" position.

If the test oscillator is modulated, switch the modulation off or place near the carrier signal being received. Turn on the C.W. beat oscillator switch, which is located on the front panel, just below the main tuning condenser. Adjust the trimmer in the rear of the receiver, mounted on the beat oscillator can to the zero beat. Then signal the beat signal to about a 1000 cycle pitch, by tuning the beat oscillator control to the right.

Now, set the crystal filter switch to the center position, which is the series circuit, that is the one used for maximum selectivity and single signal reception. Retune the receiver, preferably using the band spread control through both peaks. One should be strong and the other somewhat lower in volume. On the weaker side, which should be the one to the left of the dial, adjust the crystal phasing condenser, which is mounted above the switch, until the signal disappears, or if a very strong signal is being used, adjust to minimum. Retuning to the opposite side, you will find this hasn't been effected at all. By now you can only receive the one side of the signal. Then tune to the maximum point, which should be very sharp and probably a little hard to set, until one has become accustomed to tuning to the crystal notch, which can only come with some practice. Then switch to the series to "off" position. If the crystal has been properly aligned there will be no decrease in sensitivity between these two positions. If there is, recheck your alignment procedure, to make certain that all adjustments have been made properly.

CONNECT TO 110 V 60 CYCLE - UNLESS OTHERWISE SPECIFIED

TUBE AND PARTS PLACEMENT



If by any chance there is a difference in sensitivity between the "off" and series position, adjust the beat oscillator, tuning control slightly until you can find one side which seems to be considerably better in volume than any other. This is the ideal place to set this control.

After all these adjustments have been made, the Super SKYRIDER should be completely aligned and ready to put into operation.

THIS RECEIVER IS SOLD WITH OR LESS CRYSTAL. Since all receivers are sold with the Crystal filter circuit complete with the exception of the crystal, it is a comparatively simple process for any one to incorporate a crystal in the receiver anytime he so desires.

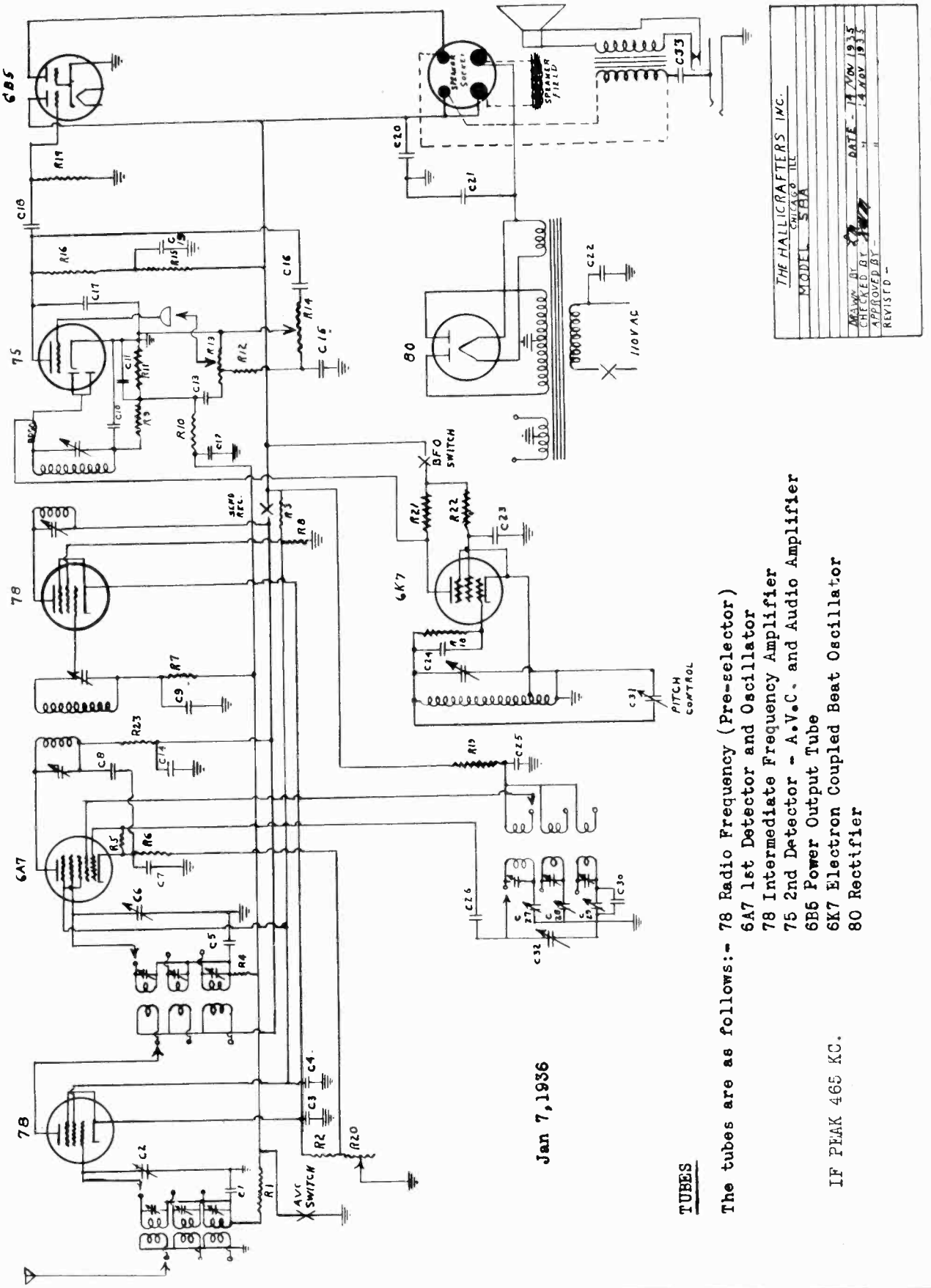
Of course if the crystal is added later the intermediate frequency transformers of the receiver must be aligned to the frequency of the crystal used. This is quite important for maximum results on the series crystal position. The intermediate frequency used is 465 K.C. The receiver may be returned to the factory and we will make the proper adjustments at a nominal cost.

Tubes used are:-

6D6 - PRE SELECTOR
6A7 - 1st DETECTOR - O SC
6D6 - IF
6D6 - IF
6F7 - 2nd DETECTOR - BEAT OSC.
42 - OUTPUT
80 - RECTIFIER

HALLICRAFTERS, INC.

MODEL S8A
Schematic



Jan 7, 1936

TUBES

The tubes are as follows:- 78 Radio Frequency (Pre-selector)
6A7 1st Detector and Oscillator
78 Intermediate Frequency Amplifier
75 2nd Detector - A.V.C. and Audio Amplifier
6B5 Power Output Tube
6K7 Electron Coupled Beat Oscillator
80 Rectifier

IF PEAK 465 KC.

To properly align this receiver proceed as follows:- With the input signal from the beat oscillator connected to the grid of the 6A7 tube and set at 465 kc, adjust the I.F. trimmers mounted in the top of the two I.F. transformer cans, to a maximum output reading. Then, with the 465 signal still connected with the modulator off, switch on the beat oscillator and adjust the oscillator pitch control, mounted on the top of the I.F. can and controlled by a black knob to zero beat.

Connect the output of the generator into the antenna and grid terminal with a 400 ohm resistor in series with the antenna lead. Turn the wave change switch to Band No. 1 and set the dial to 15 megacycles. Set the oscillator frequency at 15 megacycles also and adjust the oscillator trimmer mounted in the coil shield under the place - choose the one with the trimmer at the least capacity position, then shift the dial off the frequency and align the RF and antenna trimmers to maximum noise level. This completes the alignment for this point.

Next - tune the receiver to 6000 kc and adjust the low frequency pad, which is located next to the wave change switch to maximum noise level - this trimmer is the one nearest the end switch head.

Follow this procedure for the other ranges, except that in range 3 use a .0001 condenser in place of the resistor, choosing as the alignment frequencies for No. 2 range, 4000 and 1800 kc and for No. 3 Range 1400 and 600 kc. After this is finished the receiver is completely aligned. Never align the No. 3 and No. 2 band first, for when the No. 1 band is aligned the other two will be out.

TUBE VOLTAGES

Sensitivity control at maximum - voltages check to ground.

		PLATE	SCREEN	CATHODE
78	1st R.F.	275	110	3
6A7	Det. Osc.	276 Osc. Plate 200	110	3
78	I.F.	275	110	3
75	Diode Det. A.V.C. AF Amplifier	150		1½
6A7	Beat Osc.	10	50	0
6B5	Output Tube	270	275	20
80		375		

Weak all bands - check antenna loadin - tubes - voltages I.F. alignment

One Band - Check Switch Points - Leads to Coils - Coils for Continuity.

Hum - Check for Filament Grounded
Filter Condensers
Defective Tubes
Proper Polarization of AC Plug

Set Dead - Check Tubes - Coils - I. F. transformers for voltages and grounds on all circuits.

Weak Audio - Check A.V.C. circuit -6B5 tube - speaker, output trans. and Phone Jack.

Overload - Check A.V.C. tube and circuits - Grids return circuits for grids - alignment.

When service of a highly technical nature is required, get in touch with a competent service man.

To put this receiver into operation on the broadcast range, turn your wave change switch, located under the main tuning control, until the pointer is at Band No. 3 - this is at the extreme left. Next turn your sensitivity to a maximum - your volume up approximately half way and your A.V.C. switch to the "on" position and from any log on broadcast station list, select some frequency which you know is received in your location. Turn the control knob until the black hand corresponds with the number on the dial scale, which is shown on the log.

The dial scale is marked plainly in kc and most station logs are also marked in kc, so this is comparatively simple. Then, with this station being received vary your different controls and familiarize yourself with their action, such as by switching the A.V.C. control on and off and you will notice with extreme volume that the set will overload considerably. However, this can be controlled by reducing the sensitivity control, but on the other hand it cannot be controlled by reducing the volume control, since the volume control is in the audio circuit only and the R.F. circuits in this condition will still overload.

This receiver is equipped with mechanical band spread, which is a dual ratio planetary drive mounted on the main tuning control. This gives a tuning ratio of approximately 65 to 1, which makes it possible by the use of this very high ratio control and the red point to locate and also to separate stations or signals very close together, which you will find is the case in all of the amateur bands and some of the broadcast bands. This type of band spread has an advantage, in that it allows a very good ratio between the main tuning control and the band spread control near the minimum portion of the tuning condenser.

The tuning range of this receiver is as follows:

Band No.1 - Domestic & Foreign S.W. Broadcast
Amateur 40 & 20 Meter Bands
17 to 5.5 megacycles
17000 to 55000 kilocycles

Band No.2 - Amateur 160 & 80 Meter Band -
Police - Aviation
5.4 to 1.68 megacycles
5400 to 1650 kilocycles
55 to 180 meters.

Band No.3 Standard Broadcast Band
1.7 to .54 megacycles
1700 to 540 kilocycles
176 to 555 meters

Each of the above bands are in megacycles, kilocycles and meters. The two shortwave bands are calibrated in megacycles - the broadcast band is calibrated in kilocycles.

OPERATION OF THE RECEIVER

The receiver comes to you in a completely tested condition, with all tubes in their respective sockets, so all that is necessary to plug the A.C. cord into a receptacle and the receiver is ready for operation.

All controls are mounted conveniently on the front panel and identified by their individual markers. The controls mounted on the front panel from right to left are as follows:

STAND-BY-SWITCH

This switch is used to make the receiver inoperative when transmitting and cuts out the plate voltage on the plates of the RF and IF amplifier tubes.

POWER SWITCH AND TONE CONTROL

The power switch is combined with the tone control and operates in a clockwise rotation - that is maximum bass is at extreme right. This control also can be used conveniently to reduce atmospheric interference by reducing the audio frequency range of the receiver. It consisted of a tapered variable resistor, connected from the grid of the power tube to ground with a fixed condenser connected from the variable arm to ground.

BAND CHANGE SWITCH

This switch mounted directly under the tuning control allows any one of the three ranges to be covered by the variable condenser and are marked to correspond with the band marking on the main tuning dial, which are shown at the left center of the dial - for instance if the 40 meter or 7000 kc range is desired, the number on the dial shows this to be band No.1 - then turn the band switch until the pointer is on No. 1.

VOLUME CONTROL

The volume control on this receiver differs somewhat from that on the ordinary broadcast receiver in that it does not affect the sensitivity of the set, but it does control the audio output of the set.

SENSITIVITY CONTROL

The sensitivity control is a special adjustment which controls the sensitivity of

You will find in receiving a straight CW or carrier frequency, which is transmitting code signals, that with the A.V.C. on these signals will have a tendency to run together. This can be eliminated by switching the A.V.C. to the "off" position, which cuts the A.V.C. out of the receiver. By properly adjusting the manual volume control and the sensitivity control, various combinations can be found, which gives the ideal signal to noise ratio for this particular signal being received, where if one alone were used, this would not be possible. This often proves true when listening to foreign broadcast reception. You will find by increasing your manual control to maximum and controlling the output by the sensitivity control only, that it will be possible to reduce the noise to such an extent that the signal will come through very good, where with the A.V.C. on and controlling the output by the volume control only, with the sensitivity in the maximum position, there still will be considerable noise coming through the receiver. This condition of course can only come about by constant use of the receiver and varying controls until one can learn just which position is best for this condition.

The purpose of the "transmit" and "receive" switch is to make the set inoperative when using radio transmitters and need only be used by those operating transmitting stations. The switch does not turn off the radio set entirely. The tubes remain lighted, thereby eliminating the necessity of waiting for the tubes to become hot again when the receiver is to be used. At all other times this switch should always be left in the "on" position.

Resistors

No.	Value Ohms	Rating Watts	Part No
R1	100,000	1/3	2093
R2	300	1/3	2021
R3	25,000	1	2073
R4	100,000	1/3	2093
R5	50,000	1/3	2084
R6	300	1/3	2021
R7	100,000	1/3	2093
R8	30,000	1	2076
R9	20,000	1/3	2072
R10	1 Meg	1/3	2108
R11	250,000	1/3	2099
R12	60,000	1/3	2084
R13	1/2 Meg	Vol.Control	2504
R14	1 Meg	Tone Control	2505
R15	100,000	1/3	2093
R16	250,000	1/3	2099
R17	500,000	1/3	2102
R18	100,000	1/3	2093
R19	10,000	1	2061
R20	10,000	Sen.Control	2508
R21	100,000	1/2	2092
R22	60,000	1/2	2086
R23	1,500	1/3	2039

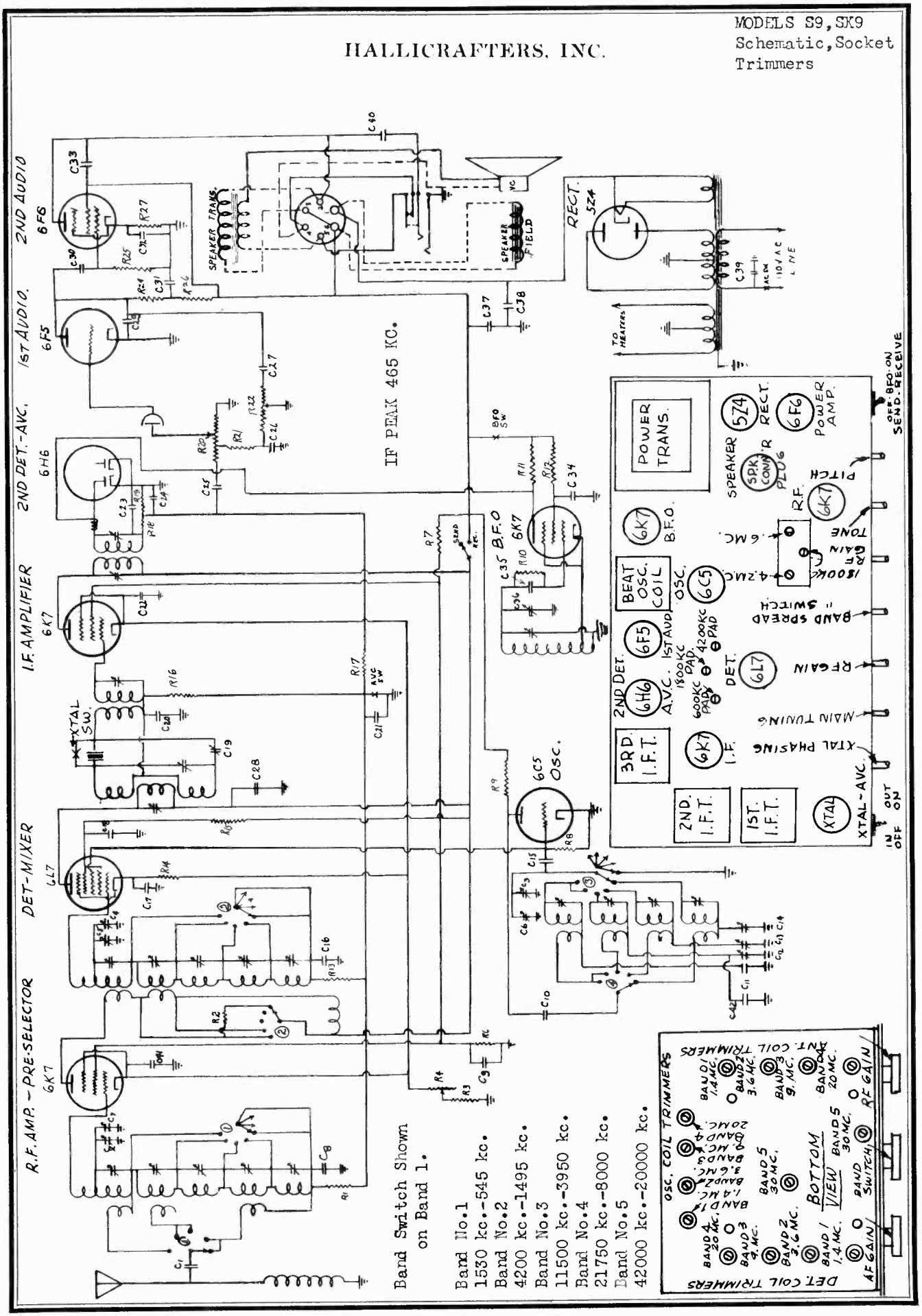
Condensers

No.	Value Mfd.	Type	Rating Volts	Part No
C1	.02	Paper	200	4102
C2	.00045	Var.Cond.		4807
C3	.05	Paper	200	4104
C4	.05	Paper	400	4105
C5	.02	Paper	200	4102
C6	.00045	Var.Cond.		4807
C7	.05	Paper	200	4104
C8	.02	Paper	400	4103
C9	.02	Paper	200	4102
C10	.0001	Mica	600	4003
C11	.0001	Mica	600	4003
C12	.02	Paper	200	4102
C13	.05	Paper	200	4104
C14	.1	Paper	400	4107
C15	.01	Paper	200	4100
C16	.002	Mica	600	4013
C17	.00025	Mica	600	4007
C18	.05	Paper	400	4105
C19	.1	Paper	400	4107
C20	8.	Elect.	450	4208
C21	8.	Elect.	450	4208
C22	.01	Paper	400	4101
C23	.01	Paper	400	4101
C24	.00025	Mica	600	4007
C25	.25	Paper	400	4109
C26	.0001	Mica	600	4003
C27	.00039	Var.		
C28	.0012	Pads	(One Unit)	4401
C29	.001			
C30	.002	Mica	600	4312
C31	.00005	Var.Cond.		4806
C32	.00045	Var.Cond.		4807
C33	.005	Mica	1000	4501

Jan 7, 1936

HALLICRAFTERS, INC.

MODELS S9, SX9
Schematic, Socket
Trimmers



CIRCUIT

The plate circuit of 6K7 R.F. amplifier has a high inductance plate load which gives maximum transfer by use of capacity coupling at low frequency end of the bands. By use of coupling in C16 this is further increased. The normal characteristics of a coil and condenser are such that the gain varies about 3 to 1 from one end to the other, being maximum at high frequency end. The capacity coupling combines with this to level out the gain in this circuit to get uniformity throughout.

The 6L7 used here as detector-mixer has no parallel in glass tubes. The modulation from the oscillator circuit is supplied to this tube by use of an extra grid. Due to not having oscillator plate current flowing in the first detector, the ratio of translation to noise is considerably better than in composite tubes or in circuits where the cathodes of 2 tubes are connected together.

The 6C5 OSCILLATOR - covers only four bands. The harmonic of No. 4 band is used to supply the oscillator voltage for the conversion of signals to I.F. frequency, when using Band 5. The oscillator circuit is a combination of the Hartley and the Colpitts, having the inherent features of both - the Hartley with the good oscillation at the high frequency ends of bands and the Colpitts where oscillation is better at low frequency ends of bands.

By this method the oscillator generates a fairly constant voltage for impression on grid 5 of 6L7 over the full tuning ranges of the set.

1ST I.F. - this transformer is made up of 3 coils phased in such a relation that maximum signal is impressed upon the low inductance primary of 2nd I.F. transformer. The crystal and crystal phasing circuit is inserted between these transformers in such a manner that when the crystal switch is at "in" position, the crystal and crystal phasing condenser cause single signal action to take place - this action varies by the setting of crystal condenser - when switch is at "out" position the signal is impressed directly on the second transformer.

The 2ND I.F. TRANSFORMER has a step up ratio so that the voltage impressed on grid of 6K7, I.F. amplifier, is increased over the normal I.F. transformer connections. By the use of a transformer the grid circuit of this tube is tuned to the I.F. frequency, so that greater selectivity is achieved. Then, if a choke coil is used to supply this tube.

Transformers used at Intermediate Frequencies are of iron core construction - greater selectivity and gain, due to better Q of the coils is achievable than by the use of air core coils.

The signal to noise ratio if iron core coils, due to a better Q, shows a marked improvement over other types of transformers.

The 6K7 (I.F. Amplifier) is coupled through an iron core transformer to single diode plate of 6H6. The single plate being used in order to lessen the load on the secondary of this transformer, making for greater selectivity in this circuit.

The ratios of AC & DC diods load are proportionate so that 100% modulation can be handled without distortion.

As will be noted from the circuit diagram (Fig. 2), the AVC voltage and the audio voltage are taken off slightly below maximum point. This was done to reduce stray R.F. in the circuit and to give better AVC action on the R.F. 1st detector and I.F. stages.

6K7 BEAT FREQUENCY OSCILLATOR - this is electron coupled oscillator - coupled to 6H6 diods plate by two turns of wire. Changes in line voltage and in tubes will not effect the frequency of beat oscillator. The frequency can be controlled by the use of the pitch control in order that a receiving operator can beat on either side of signal getting further selectivity on code reception by choice of audio frequencies.

AUDIO - FIRST STAGE AUDIO 6F5 - is a high MU triode. It is coupled to the diode circuit through its volume control (R20) and condenser (C26). As will be noted from the circuit no DC flows through this control, making for quiet operation.

TONE CONTROL - it will be noted that tone control (R22) is connected on plate of 6F5 and also on its grid circuit, when the control is full counter clockwise (treble position). The tone is normal. As the control is moved to the right up to one-half rotation the bass response is increased without cutting of high notes. Moved through the other half of the rotation the high notes are removed by use of condenser (C27) without further increasing low note response.

In order to avoid frequency discrimination found in cathode - resistor - condenser bias circuits, the Mallory bias cell is used on the grid of 6F5. This proves a boon for phone operators in that it insures greater intelligibility in all voice, short wave broadcasts, etc.

OUTPUT STAGE - a 6F6 pentode, giving 3.5 watts output is connected to the speaker and headphone jack. This jack is arranged in circuit in such way that when phones are inserted the voice coil of speaker is opened. A seperate magnetic or permanent magnetic dynamic speaker can be plugged into phone jack if external speaker is desired. Where an electro dynamic speaker has its own field supply, this too may be plugged in. Speaker impedance in these cases should be 7000 ohm, although other types can be used at a sacrifice in tone quality. No DC current flows through headphone circuit.

ALIGNMENT INSTRUCTIONS OF NEW SUPER SKYRIDER

Correct alignment of any receiver is extremely important. The receiver when it leaves the factory is properly aligned with precision instruments and realignment should not be attempted until all other possible causes of faulty operation have been investigated and even then not unless the service technician has the proper equipment. A signal generator that will provide an accurately calibrated signal at .465 m.c. - .6 m.c. - 1.4 m.c. - 1.8 m.c. - 3.6 m.c. - 4.2 m.c. - 9. m.c. - 20. m.c. and 30. m.c. and an output indicating meter are required.

It is practically impossible to align the S.F. unless a satisfactory oscillator and output meter are used. Use a non-magnetic screw driver for adjustments. The complete procedure is as follows:

I.F. Adjustment - in a receiver which has a crystal filter, a crystal controlled oscillator must be used in which the crystal from the radio is used to control the frequency. Connect the output of this through a .1 mfd condenser to the grid of the 6L7. Connect the ground lead of the radio to the ground side of oscillator. (On a receiver without crystal filter, set the signal generator at 465). Turn the band selector switch to band No. 1. Turn the AVC crystal to the "off" position, the audio gain and R.F. gain controls to maximum position (full right). Beat frequency oscillator switch off, set the crystal phasing condenser to one-half capacity that is, plates intermeshed about one-half. Attenuate the signal from the signal generator to prevent overloading the set. Use this procedure in all subsequent adjustments. Then adjust the five trimmers on top of the I.F. cans until maximum output, as indicated by the output meter is observed. The adjustment screws for these trimmers are located in the top of the I.F. transformer cans and may be reached from the top of the chassis. The location of these cans is shown in Fig. 3.

ADJUSTMENT BEAT FREQUENCY OSCILLATOR

Leave signal generator or crystal oscillator on as in alignment I.F.'s, except turn off the modulation. Set the pitch control condenser at one-half capacity. Turn Beat Frequency Oscillator crystal to "on" position and adjust the trimmer in the top of the Beat Frequency Oscillator coil can to "zero" beat.

ALIGNMENT OF R.F. STAGES - ADJUSTMENT OF BAND 5

Turn the band spread dial to 2009, minimum position in this and all subsequent adjustments. Connect the antenna lead of the receiver through a 400 ohm resistor to the output of the signal generator. Use this 400 ohm dummy antenna on all bands except band 1, whereas 200 mmfd condenser is used, turn the signal generator to 20. m.c. Set the main tuning dial at 20 m.c., the band switch at No. 4 position, adjust oscillator trimmer marked bands 4 and 5 - 20 m.c. until maximum output is obtained. The location of this trimmer is shown in Fig. 4. Reset the signal generator to 30 m.c., switch to band No. 5 and tune in the signal with the main tuning condenser. Adjust the antenna and detector coil, trimmers marked band 5 for maximum output.

ADJUSTMENT OF BAND 4

Set the signal generator at 18 m.c., tune in this signal, adjust the antenna and detector coil trimmer until maximum output is obtained. The location of this trimmer is shown in Fig. 4. Leave oscillator trimmer set as in Band 5.

ADJUSTMENT OF BAND 3

Set the signal generator at 9 m.c., set the main tuning dial at 9 m.c., switch on Band 3, adjust oscillator trimmer marked Band 3, 9 m.c. to maximum output, adjust trimmers on the antenna and detector coils until maximum output is obtained. Reset signal generator at 4.2 m.c., tune this signal in with the main tuning condenser and adjust 4.2 m.c. padder for maximum output while gradually rotating the main tuning condenser back and forth. Location of this padder is shown in Fig. 3 and Fig. 4.

ADJUSTMENT OF BAND 2

Set the signal generator to 3.6 m.c. with the band crystal on band No. 2 - turn the main tuning condenser to 3.6 m.c., adjust the band 2 oscillator trimmers until maximum output is obtained, then adjust Band No. 2 trimmer on the antenna and detector coils to maximum output. Reset the signal generator 1.8 m.c., tune this signal in with the main tuning condenser and adjust 1.8 m.c. padder for maximum output, while gradually rotating the main tuning condenser back and forth. Location of this padder is shown in Fig. 3 and Fig. 4.

ADJUSTMENT OF BAND 1

Change the dummy antenna from 400 ohm to 200 mmf condenser. Set the signal generator at 1.4 m.c. with the band switch on band No. 1 - turn the main tuning condenser to 1.4 m.c. Adjust the band 1 oscillator trimmer until maximum output is obtained. Then adjust Band #1 trimmers on the antenna and detector coils to maximum output. Reset the signal generator to .6 m.c. - tune this signal in with the main tuning condenser and adjust .6 m.c. padder for maximum output while gradually rotating the main tuning condenser back and forth. Location of this padder is shown in Fig. 3 and Fig. 4.

The location of the tubes and I. F. transformers and the purpose of each are shown in Fig. 3. The location of all trimmers and padders is shown in Fig. 4. The adjustment of trimmers and padders in another rotation will not give correct alignment of the receiver. These adjustments are accessible from the bottom of the chassis. The location and purpose of all controls are shown in Fig. 1. Schematic diagram of receiver is given in Fig. 2.

Resistors

No.	Value Ohms	Watts Rating	Tol.	Part No.
R1	100,000	1/2	20%	2098
R2	2,500	1/2	20%	2048
R3	75	1/2	10%	2206
R4	10,000	Receiving Gain		2500
R5				
R6	25,000	1	20%	2073
R7	25,000	1	20%	2073
R8	50,000	1/2	20%	2084
R9	25,000	1	20%	2073
R10	100,000	1/2	20%	2098
R11	100,000	1/2	20%	2098
R12	50,000	1/2	20%	2084
R13	100,000	1/2	20%	2098
R14	200	1/2	10%	2214
R15	50,000	1		2273
R16	100,000	1/2	20%	2098
R17	1 Meg	1/2	20%	2108
R18	20,000	1/2	20%	2072
R19	500,000	1/2	20%	2102
R20	1/2 Meg	AF Volume Control		2502
R21	50,000	1/2	20%	2084
R22	1 Meg	Tone Control		2503
R23				
R24	250,000	1/2	20%	2099
R25	250,000	1/2	20%	2099
R26	100,000	1/2	20%	2098
R27	500	1	10%	2419

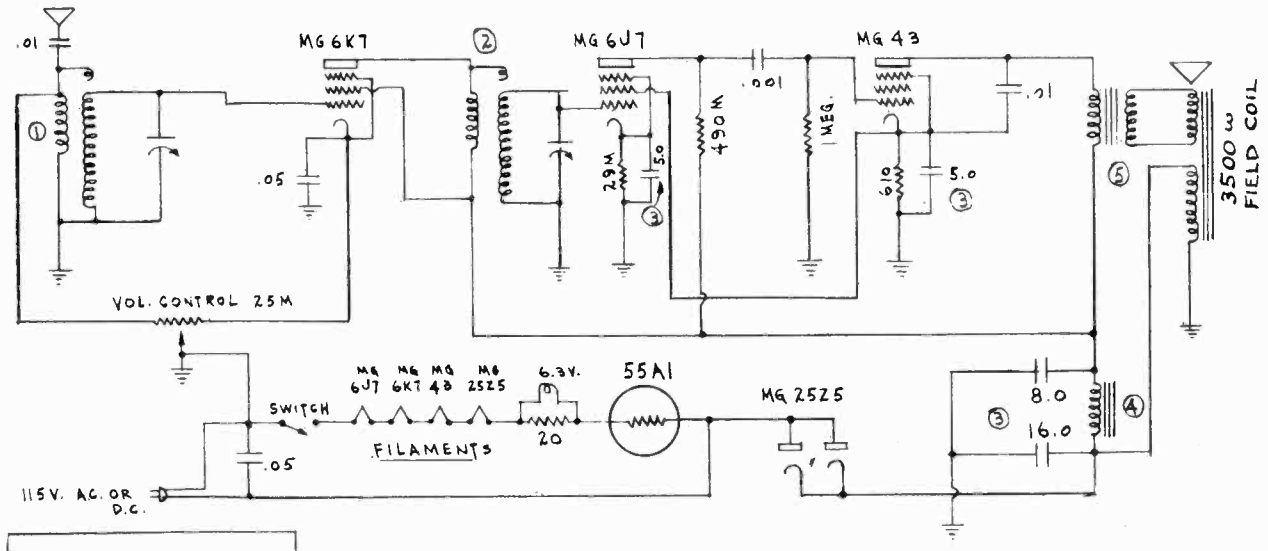
Condensers

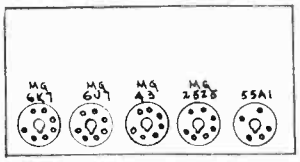
No.	Value Cap.	Volts Rating	Tol.	Type	Part No.
C1	.00025	600V	20%	Mica	4007
C2	.000028			Band Spread Con.	4802
C3	.000028			" " "	
C4	.000028			" " "	
C5	.000452			Main Tuning "	4801
C6	.000452			" " "	
C7	.000452			" " "	
C8	.006	600V	5%	Mica	4317
C9	.1	400V	20%	Paper	4107
C10	.002	600V	20%	Mica	4013
C11	.003	600V	5%	Mica	4315
C12	.0017-Appr.			Padders	
C13	.001 "			" One Strip	4400
C14	.0004 "			"	
C15	.00005	600V	20%	Mica	4001
C16	.006	600V	5%	Mica	4317
C17	.05	200V	20%	Paper	4104
C18	.25	400V	20%	Paper	4109
C19	.000025			Crystal Phas. "	4804
C20	.02	200V	20%	Paper	4102
C21	.05	200V	20%	Paper	4104
C22	.1	200V	20%	Paper	4106
C23	.00025	600V	20%	Mica	4007
C24	.00025	600V	20%	Mica	4007
C25	.05	200V	20%	Paper	4104
C26	.002	600V	20%	Mica	4013
C27	.004	600V	20%	Mica	4107
C28	.25	400V	20%	Paper	4109
C29	.0006	600V	20%	Mica	4009
C30	.05	400V	20%	Paper	4106
C31	.1	400V	20%	Paper	4107
C32	5 mfd	25V	20%	Elec.	4200
C33	.004	1000V	20%	Mica	4500
C34	.05	400V	20%	Paper	4105
C35	.00025	600V	20%	Mica	4108
C36	.000025			Var. Cond.	4804
C37	8 mfd	450V		Elec.	4210
C38	8 mfd	450V		Elec.	4210
C39	.05	400V	20%	Paper	4105
C40	.006	1000V	20%	Mica	4801
C41	.05	200V	20%	Paper	4104
C42	.0005	600V	5%	Mica	4308

Jan. 27, 1936.

HALSON RADIO MFG. CORP.

MODEL MG-5
MODEL 5LE
Schematics
Socket

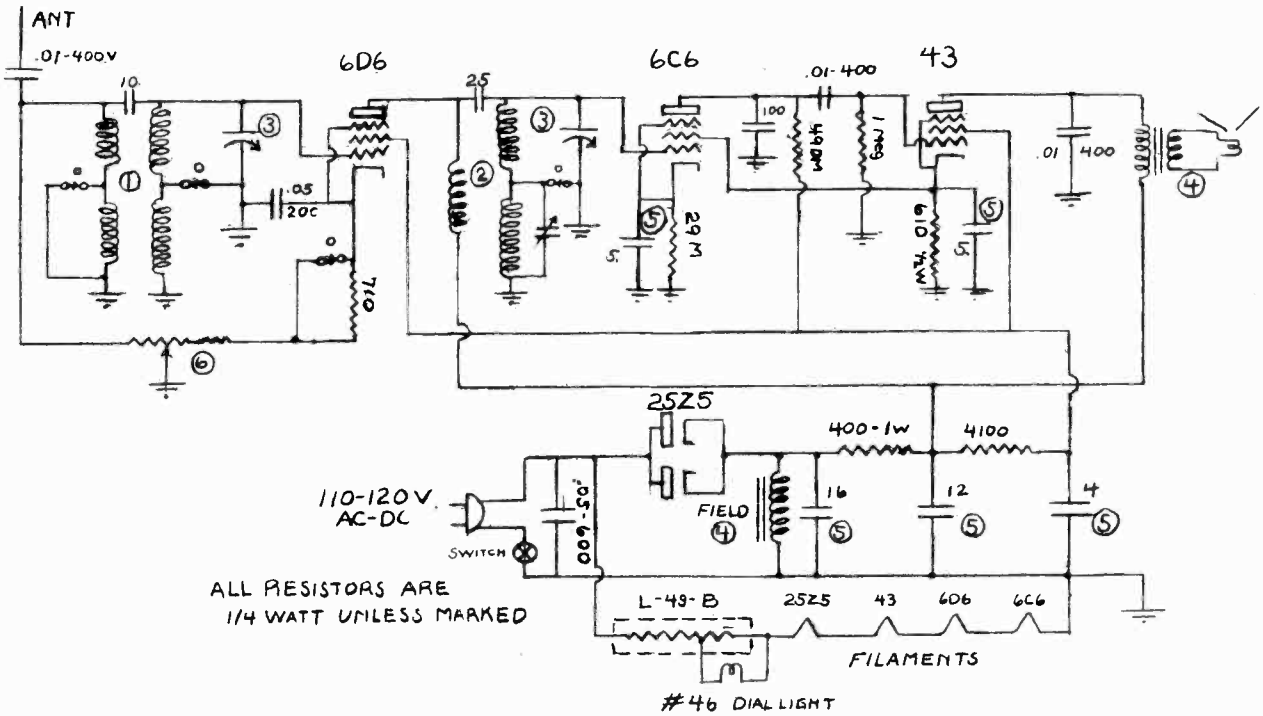




REAR OF CHASSIS

1 = 1406 ANTENNA COIL
2 = 1407 R. F. COIL
3 = MG5 ELECTROLYTIC COND. 16-8-5-5 MFD.
4 = 1281 FILTER CHOKE 400Ω
5 = 1418 SPEAKER ASS'Y

HALSON NUMBER
MG 5

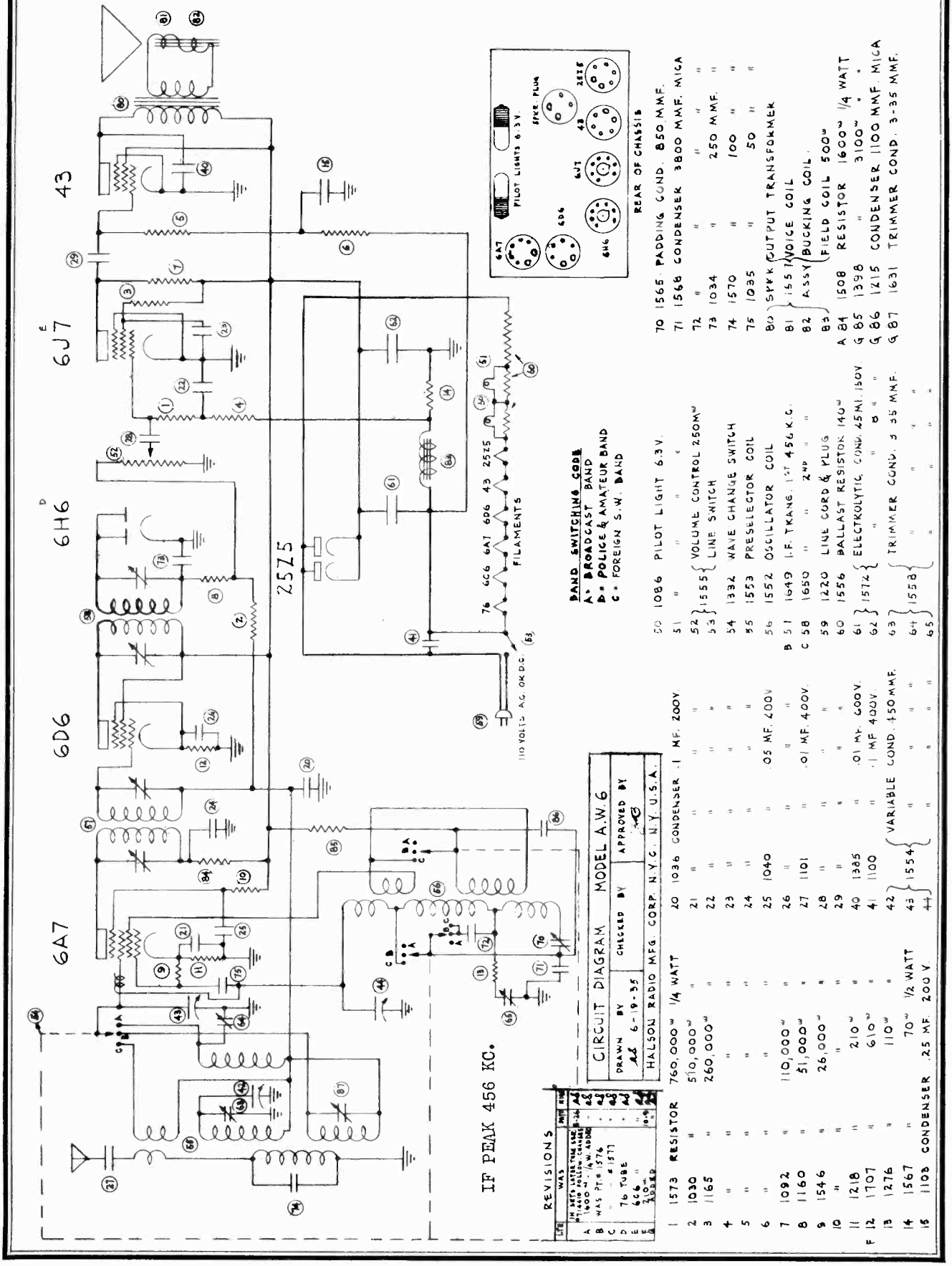


1- 1800 ANT. COIL
2- 1801 R.F. COIL
3- 1745 VARIABLE COND.
4- 1768 SPEAKER ASSEMBLY
5- 1751-1 ELECTROLYTIC COND.
6- 1748 VOL. CONTROL

MODEL 5L-E

MODEL AW6
Schematic
Socket

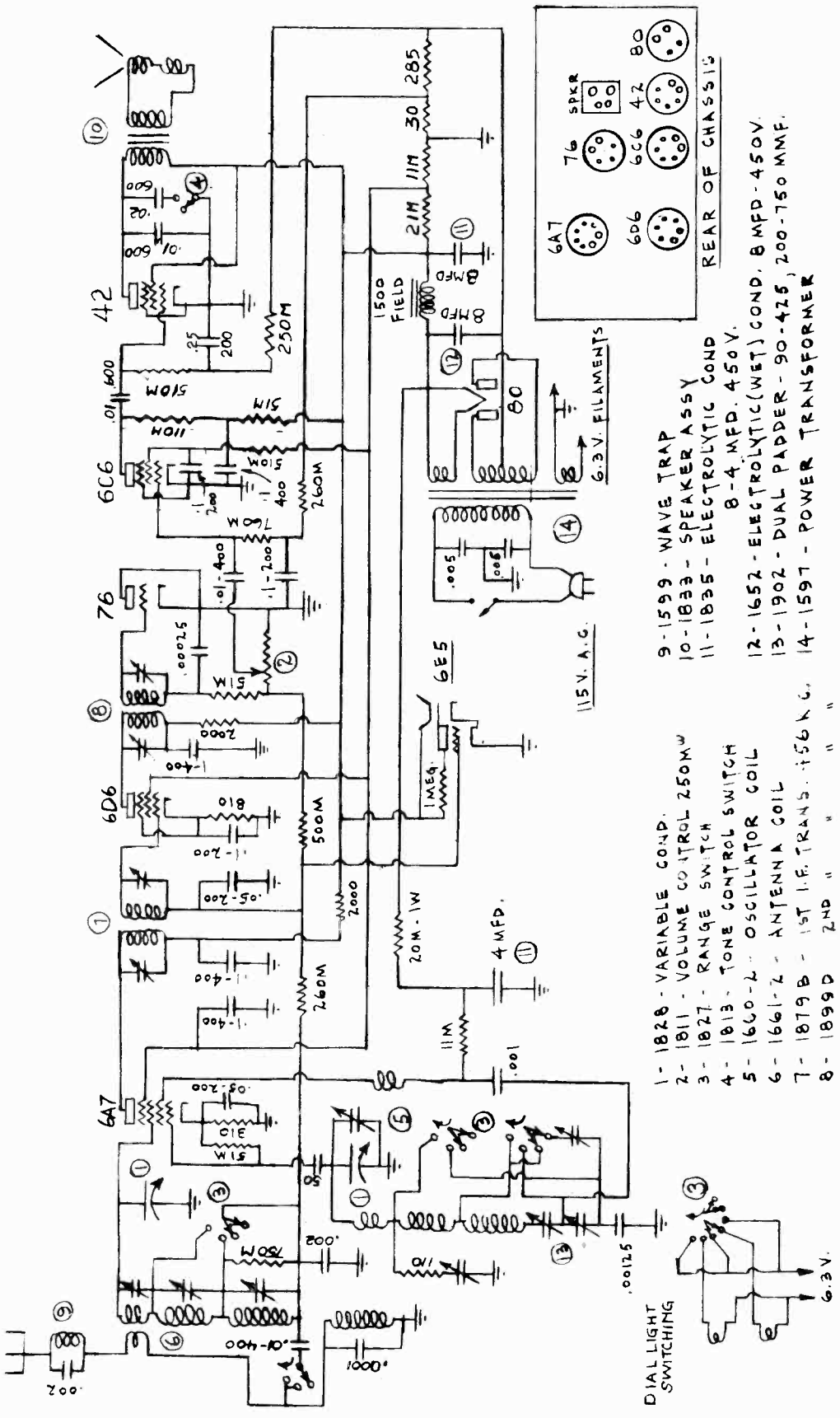
HALSON RADIO MFG. CORP.



1	1573	RESISTOR	760,000Ω	1/4 WATT	20	1036	CONDENSER .1 MF. 200V
2	1030	"	510,000Ω	"	21	"	" " " "
3	1165	"	260,000Ω	"	22	"	" " " "
4	"	"	"	"	23	"	" " " "
5	"	"	"	"	24	"	" " " "
6	"	"	"	"	25	1040	.05 MF. 400V
7	1092	"	110,000Ω	"	26	"	" " "
8	1160	"	51,000Ω	"	27	1101	.01 MF. 400V.
9	1546	"	26,000Ω	"	28	"	" " "
10	"	"	"	"	29	"	" " "
11	1218	"	210Ω	"	40	1385	.01 Mf. 600V.
F 12	1707	"	610Ω	"	41	1100	.1 MF 400V.
13	1276	"	110Ω	"	42		VARIABLE COND. 450 MMF.
14	1567	"	70Ω	1/2 WATT	43	1554	" " " "
15	1103	CONDENSER	.25 MF.	200 V	44	"	" " " "
	1086	PILOT LIGHT	6.3 V.		50		
	"	"	"		51		
	1555	VOLUME CONTROL	250MΩ		52		
	"	LINE SWITCH			53		
	1332	WAVE CHANGE SWITCH			54		
	1553	PRESELECTOR COIL			55		
	1552	OSCILLATOR COIL			56		
B	1649	I.F. TRANS 1ST	456 K.C.		57		
C	1650	" "	2ND	"	58		
	1220	LINE CORD & PLUG			59		
	1556	BALLAST RESISTOR	140Ω		60		
	1574	ELECTROLYTIC COND.	45 MI.	150V	61		
	"	" "	"	"	62		
	1558	TRIMMER COND.	3-35 MMF.		63		
	"	" "	"	"	64		
	"	" "	"	"	65		
	1565	PADDING COND.	850 MMF.		70		
	1566	CONDENSER	3800 MMF.	MICA	71		
	"	"	"	"	72		
	1034	"	250 MMF.	"	73		
	1570	"	100 "	"	74		
	1035	"	50 "	"	75		
		SPKR. OUTPUT TRANSFORMER			80		
	1551	VOICE COIL			81		
		ASSY BUCKING COIL			82		
		FIELD COIL 500Ω			83		
A	1508	RESISTOR	1600Ω	1/4 WATT	84		
G	1398	"	3100Ω	" "	85		
G	1215	CONDENSER	1100 MMF.	MICA	86		
G	1631	TRIMMER COND.	3-35 MMF.		87		

HALSON RADIO MFG. CORP.

MODEL 6L6
Schematic
Socket

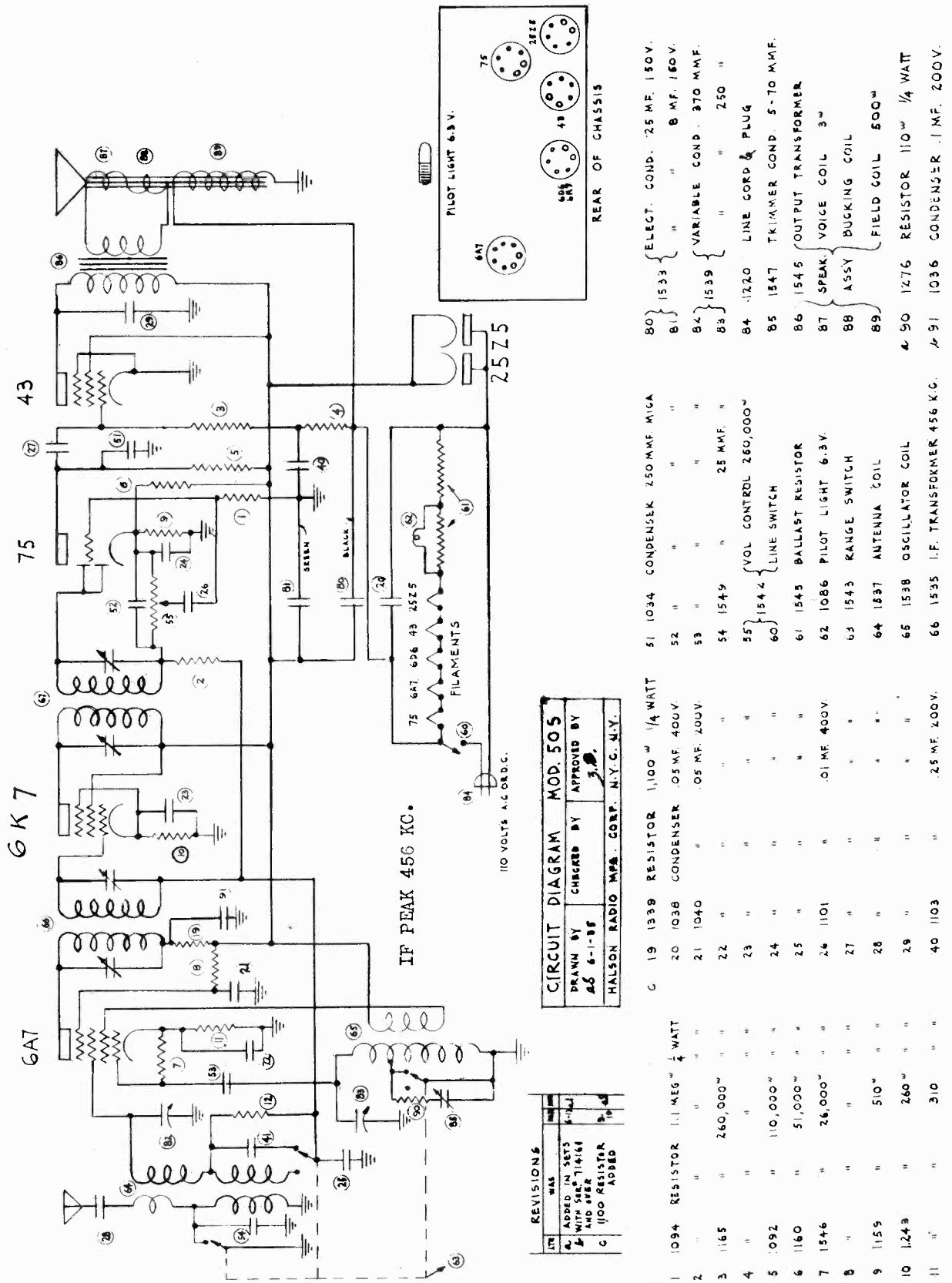


PURCHASE OR ISSUE	NAME	CIRCUIT DIAGRAM - MODEL 6L6		HALSON
	NUMBER	DATE ISSUED 3-20-36		NUMBER 6L6
MATERIAL	DRAWN BY CL	CHECKED BY	APPROVED BY	

HALSON RADIO MANUFACTURING CORPORATION, NEW YORK, U.S.A.

MODEL 50S
Schematic
Socket

HALSON RADIO MFG. CORP.



1	1094	RESISTOR	1.1 MEG	1/4 WATT	20	1038	CONDENSER	.05 MF. 400V	51	1034	CONDENSER 250 MMF. MICA
2	"	"	"	"	21	1040	"	.05 MF. 200V	52	"	"
3	1165	"	260,000	"	22	"	"	"	53	"	"
4	"	"	"	"	23	"	"	"	54	1549	" 25 MMF. "
5	1092	"	110,000	"	24	"	"	"	55	1542	VOL CONTROL 250,000
6	1160	"	51,000	"	25	"	"	"	60		LINE SWITCH
7	1546	"	26,000	"	26	1101	"	.01 MF. 400V.	61	1545	BALLAST RESISTOR
8	"	"	"	"	27	"	"	"	62	1086	PILOT LIGHT 6.3 V.
9	1159	"	510	"	28	"	"	"	63	1543	RANGE SWITCH
10	1243	"	260	"	29	"	"	"	64	1537	ANTENNA COIL
11	"	"	310	"	40	1103	"	.25 MF. 400V.	65	1538	OSCILLATOR COIL
12	1030	"	510,000	"	41	1548	"	900 MMF. MICA	66	1535	I.F. TRANSFORMER 456 K.C.
									67	1536	" "

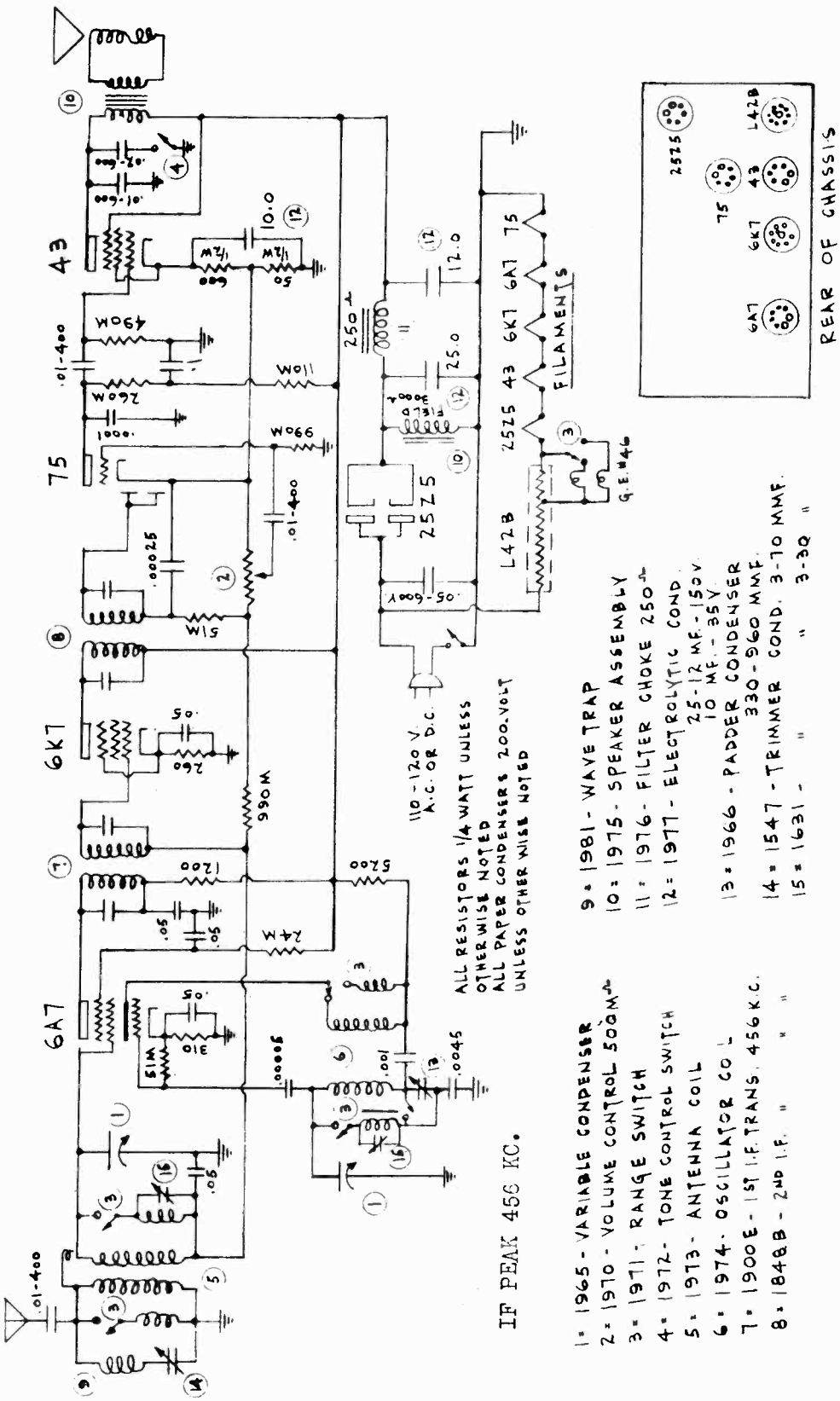
80	1533	ELECT. COND.	.25 MF. 150 V.
81		" "	8 MF. 160 V.
82	1539	VARIABLE COND.	370 MMF.
83		" "	250 "
84	1220	LINE CORD & PLUG	
85	1547	TRIMMER COND	5-70 MMF.
86	1545	OUTPUT TRANSFORMER	
87	SPEAK	VOICE COIL	3"
88	ASSY	BUCKING COIL	
89		FIELD COIL	500"
90	1276	RESISTOR	110" 1/4 WATT
91	1036	CONDENSER	.1 MF. 200 V.

CIRCUIT DIAGRAM MOD. 505		
DRAWN BY AS 6-1-35	CHECKED BY	APPROVED BY J.H.
HALSON RADIO MFG. CORP. N.Y.C. U.S.A.		

REVISIONS		
LTR	WAS	
A, B	ADDED IN SETS WITH SER. #1461 AND OVER	
C	1100 RESISTOR ADDED	

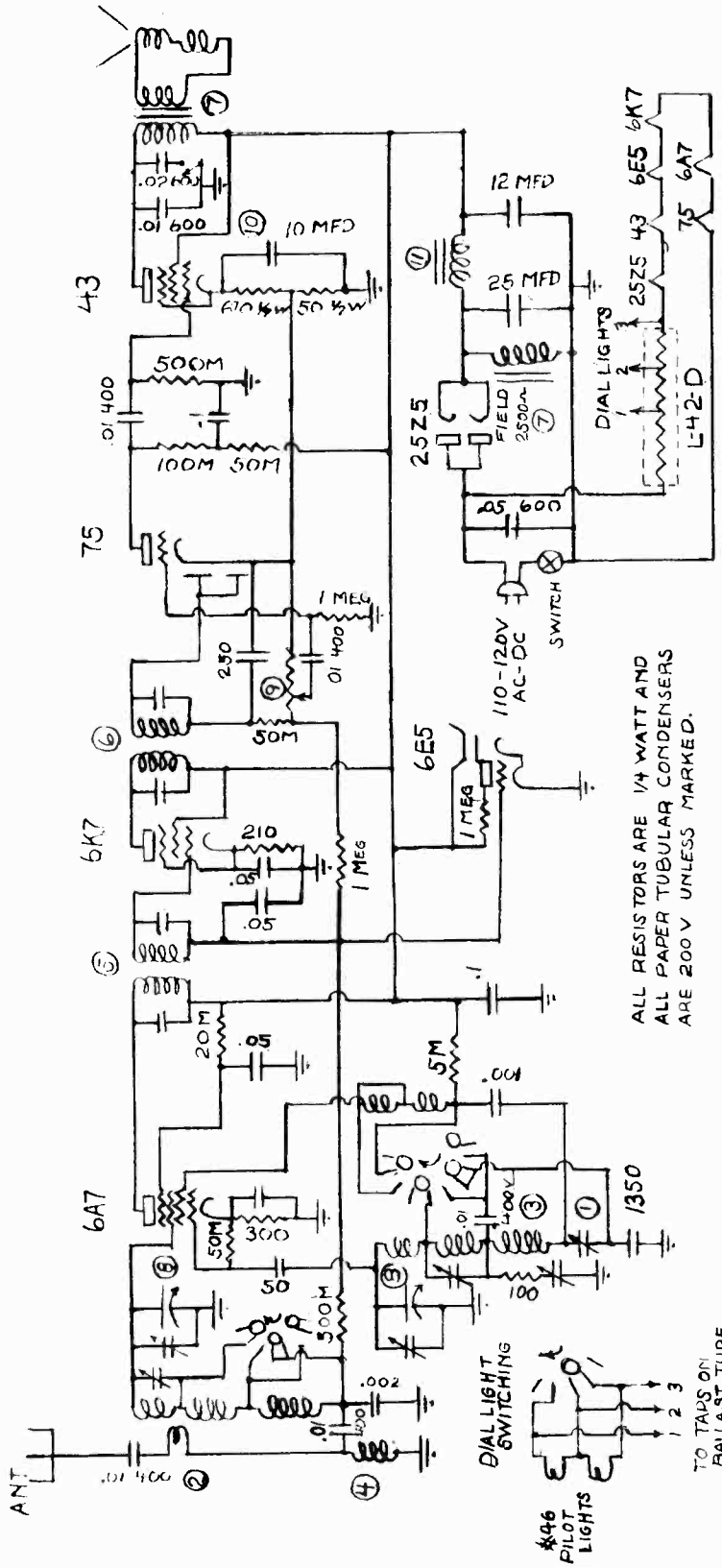
HALSON RADIO MFG. CORP.

MODEL 50X
Schematic
Socket



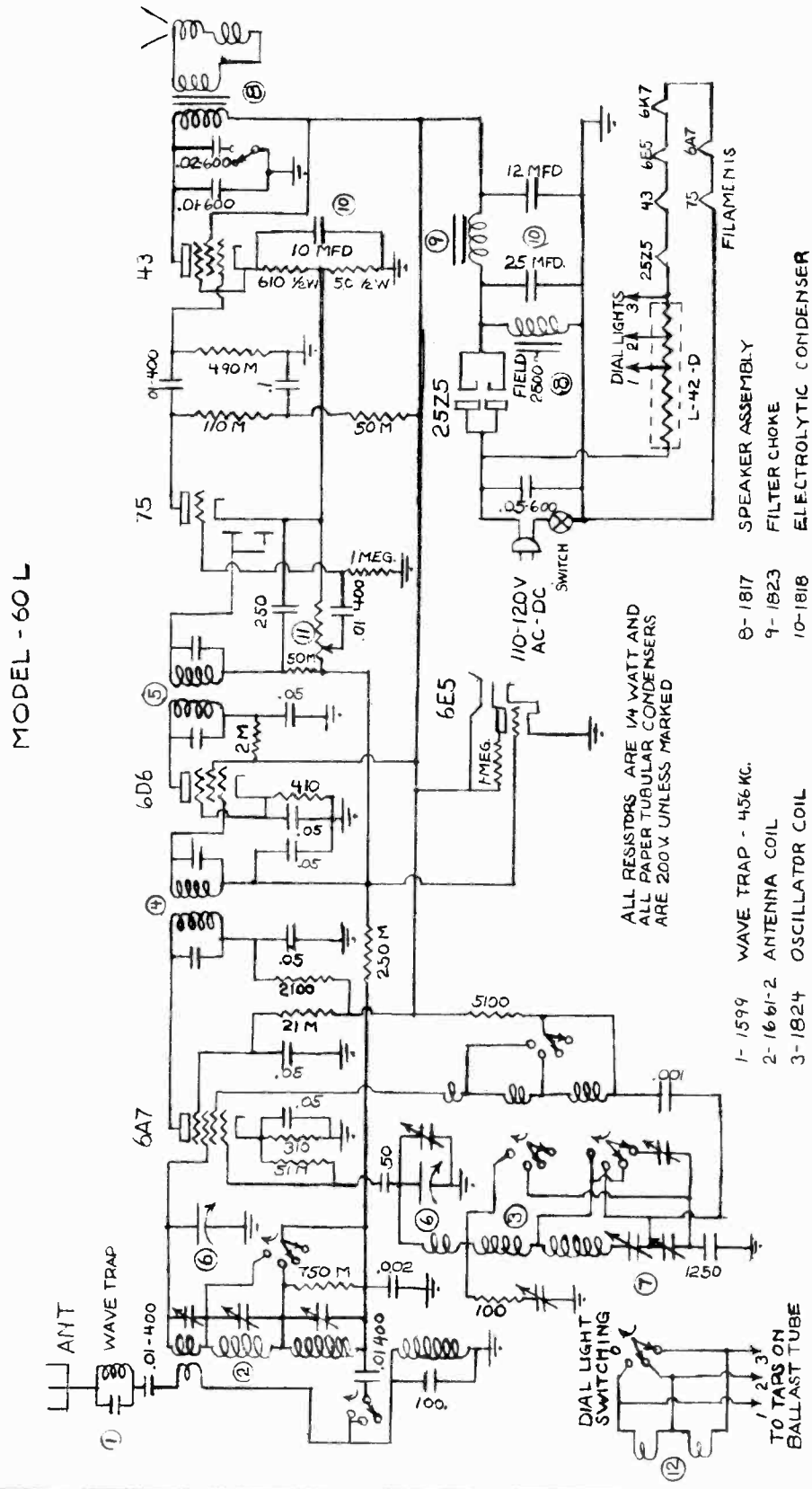
MODEL 60M
Schematic

HALSON RADIO MFG. CORP.



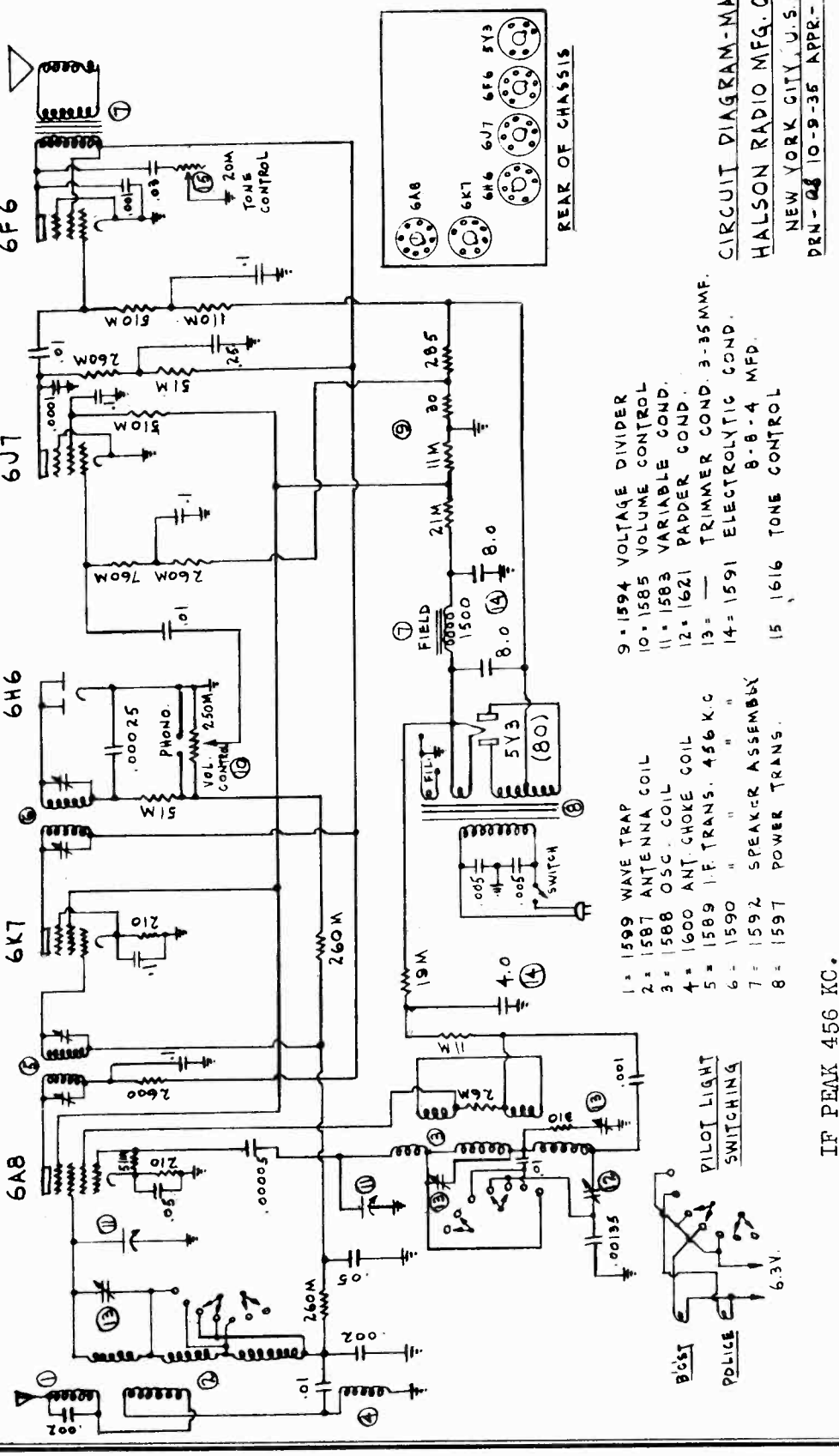
MODEL 60L
Schematic

HALSON RADIO MFG. CORP.



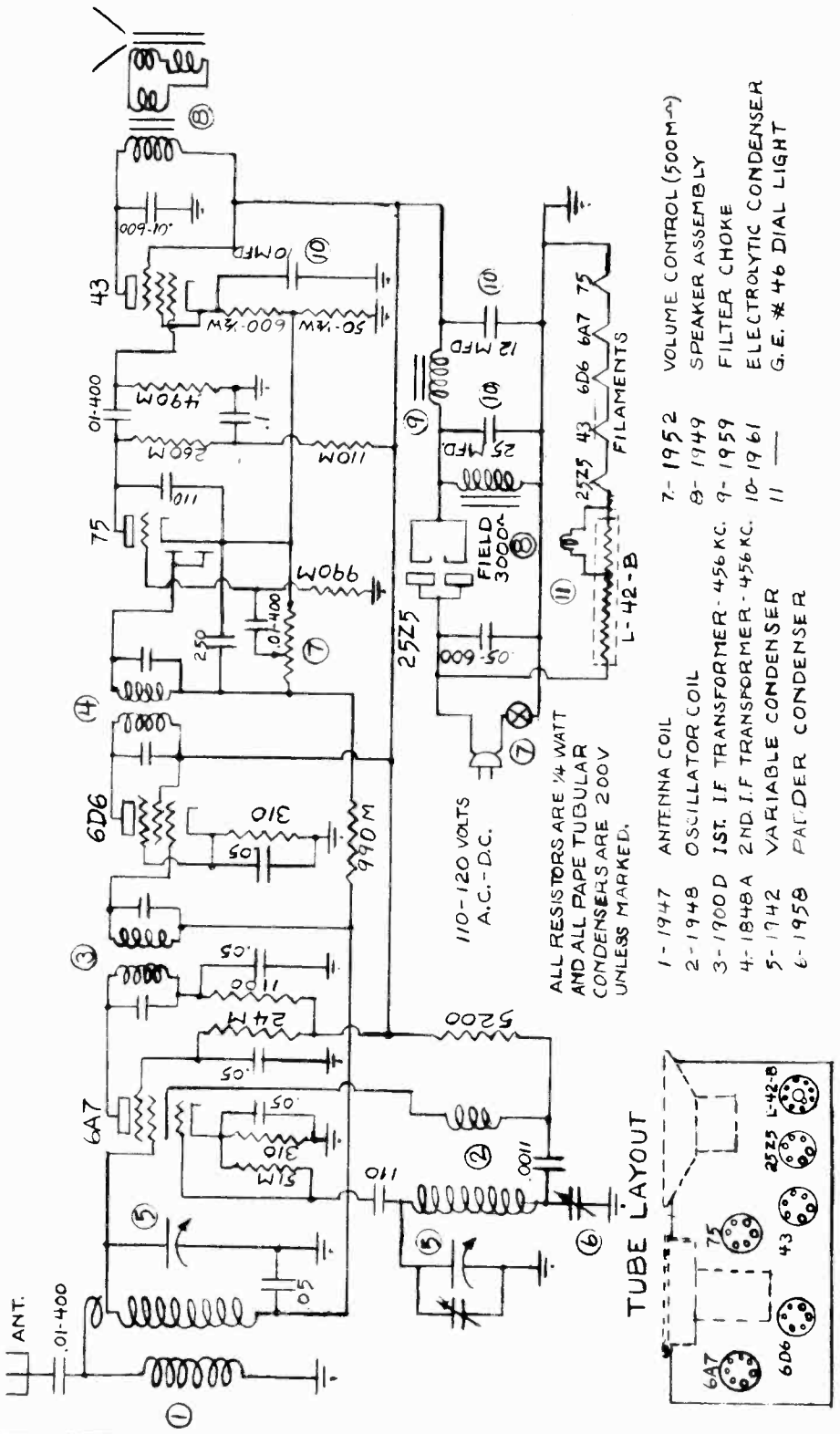
MODEL MA63
Schematic
Socket

HALSON RADIO MFG. CORP.



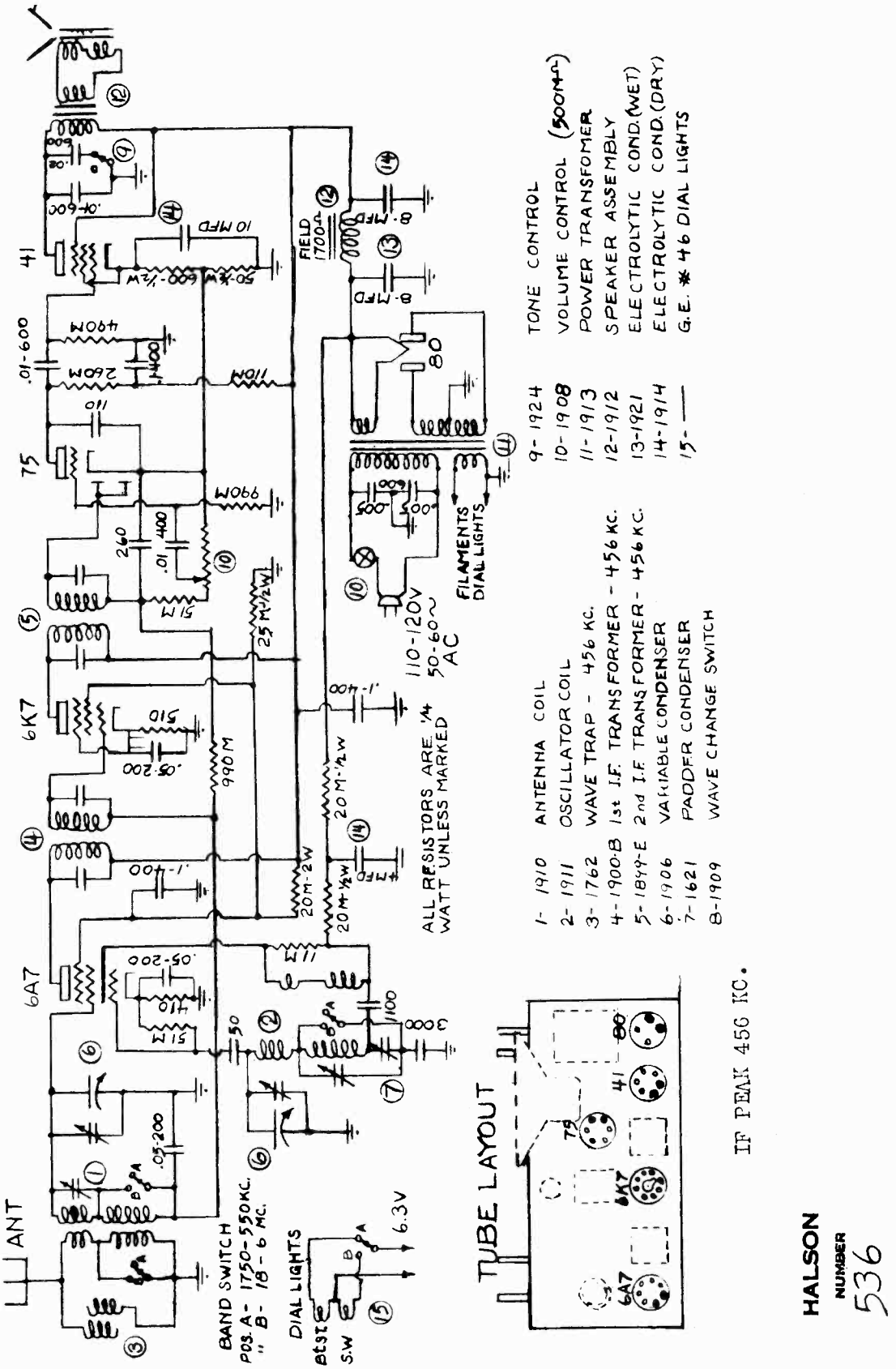
HALSON RADIO MFG. CORP.

MODELS 100, 100M
Schematic
Socket



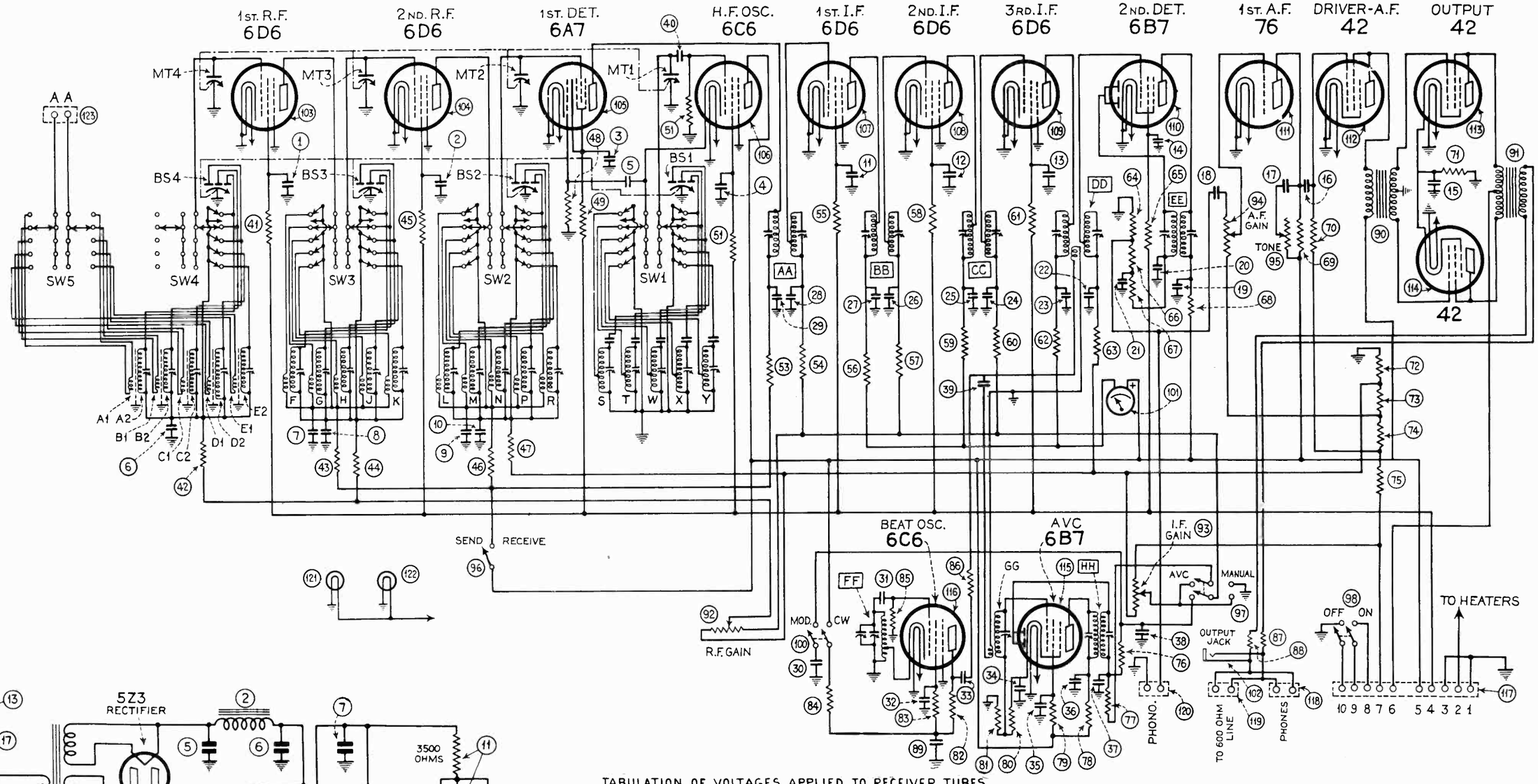
MODEL 536
Schematic
Socket

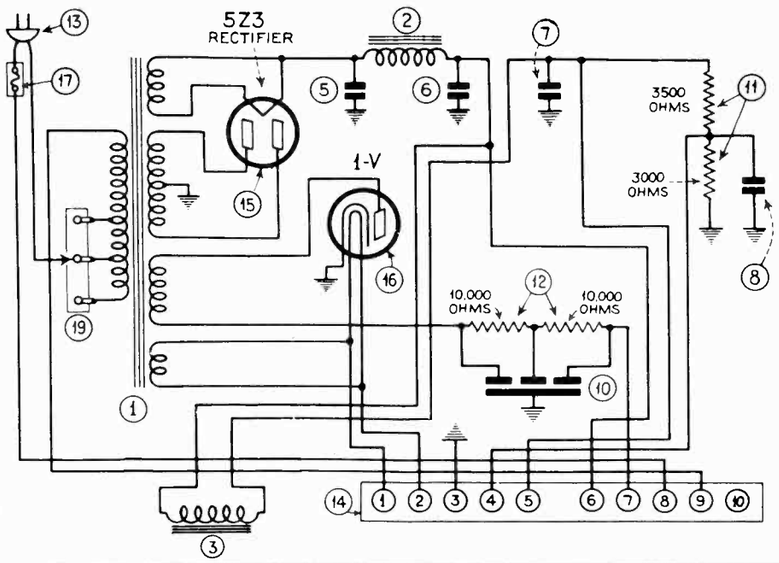
HALSON RADIO MFG. CORP.



HAMMARLUND MFG. CO., INC.

MODEL Super Pro
Schematic, Voltage
Trimmers

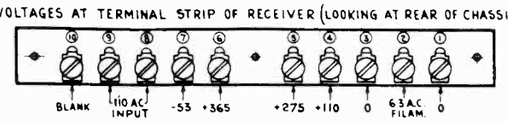




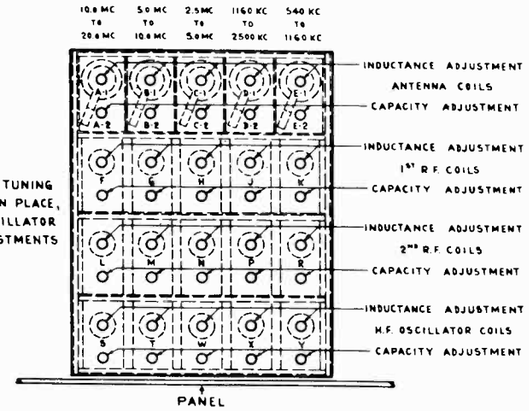
TABULATION OF VOLTAGES APPLIED TO RECEIVER TUBES

TUBE	FUNCTION IN RECEIVER	PLATE VOLTAGE	SCREEN VOLTAGE	CATHODE VOLTAGE	PLATE CURRENT MILLIAMPS
6A-7	1ST DETECTOR	260	80	0	3.
6C6	HIGH FREQ OSCILLATOR	275	110	0	2.5
6B6	1ST RADIO FREQ	275	110	0	1.5
6D6	2ND " "	275	110	0	1.5
6D6	1ST INTERMEDIATE FREQ	275	110	0	2.
6D6	2ND " "	275	110	0	2.
6D6	3RD " "	275	110	0	2.
6B7	2ND DETECTOR	260	100	0	3.
6B7	AUTOMATIC VOLUME CONTROL	230	145	45	7
6C6	BEAT OSCILLATOR	150	30	0	.4
76	1ST AUDIO	175	0	0	2.5
42	DRIVER	260	260	0	23.
42	CLASS A B AUDIO	360	360	35	21.
42	" " " "	360	360	35	21.

VOLTAGES AT TERMINAL STRIP OF RECEIVER (LOOKING AT REAR OF CHASSIS)



BOTTOM VIEW, MAIN TUNING UNIT, COVER PLATE IN PLACE, INDICATING H.F. OSCILLATOR AND R.F. COIL ADJUSTMENTS



SCHEMATIC DESIGNATION	DESCRIPTION - RECEIVER PARTS		PART NUMBER
A1	Antenna Input Coil Assembly	2.5 to 5.0 M.C.	SA 46
A2	Antenna Output Coil Assembly	2.5 to 5.0 M.C.	SA 46 A1
B1	Antenna Input Coil Assembly	5.0 to 10.0 M.C.	SA 47
B2	Antenna Output Coil Assembly	5.0 to 10.0 M.C.	SA 47 B1
C1	Antenna Input Coil Assembly	10.0 to 20.0 M.C.	SA 48
C2	Antenna Output Coil Assembly	10.0 to 20.0 M.C.	SA 48 C1
D1	Antenna Input Coil Assembly	1160 to 2500 K.C.	SA 49
D2	Antenna Output Coil Assembly	1160 to 2500 K.C.	SA 49 D1
E1	Antenna Input Coil Assembly	540 to 1160 K.C.	SA 50
E2	Antenna Output Coil Assembly	540 to 1160 K.C.	SA 50 E1
F	1st. R.F. Coil Assembly	2.5 to 5.0 M.C.	SA 46 A2
G	1st. R.F. Coil Assembly	5.0 to 10.0 M.C.	SA 47 B2
H	1st. R.F. Coil Assembly	10.0 to 20.0 M.C.	SA 48 C2
J	1st. R.F. Coil Assembly	1160 to 2500 K.C.	SA 49 D2
K	1st. R.F. Coil Assembly	540 to 1160 K.C.	SA 50 E2
L	2nd. R.F. Coil Assembly	2.5 to 5.0 M.C.	SA 46 A3
M	2nd. R.F. Coil Assembly	5.0 to 10.0 M.C.	SA 47 B3
N	2nd. R.F. Coil Assembly	10.0 to 20.0 M.C.	SA 48 C3
P	2nd. R.F. Coil Assembly	1160 to 2500 K.C.	SA 49 D3
R	2nd. R.F. Coil Assembly	540 to 1160 K.C.	SA 50 E3
S	High Frequency Osc. Coil Assembly	2.5 to 5.0 M.C.	SA 46 A4
T	High Frequency Osc. Coil Assembly	5.0 to 10.0 M.C.	SA 47 B4
W	High Frequency Osc. Coil Assembly	10.0 to 20.0 M.C.	SA 48 C4
X	High Frequency Osc. Coil Assembly	1160 to 2500 K.C.	SA 49 D4
Y	High Frequency Osc. Coil Assembly	540 to 1160 K.C.	SA 50 E4
AA	1st. I.F. Transformer Coil Assembly		SA 38
BB	2nd. I.F. Transformer Coil Assembly		SA 39
CC	3rd. I.F. Transformer Coil Assembly		SA 39
DD	2nd. Detector Input Coil Assembly		SA 40
EE	2nd. Detector Output Coil Assembly		SA 41
FF	Beat Osc. Coil Assembly		SA 44
GG	A.V.C. Input Coil Assembly		SA 42
HH	A.V.C. Output Coil Assembly		SA 41
1-2-3-4-34 11-12-13- 14-22-32-35 6-8-10-18 38-39	Capacitor Fixed Tubular Type	.05 MFD 200 Volts	3816
7-9-16-33 17-19-23-25 27-36-89-29	Capacitor Fixed Tubular Type	.02 MFD 200 Volts	3814
24-26-28	Capacitor Fixed Tubular Type	.02 MFD 400 Volts	3815
30-124	Capacitor Fixed Tubular Type	.05 MFD 400 Volts	3817
5-20-21	Capacitor Fixed Tubular Type	.01 MFD 200 Volts	3813
31	Capacitor Fixed Mica Type	.25 MFD 200 Volts	3819
40	Capacitor Fixed Mica Type	60 MMFD	3903
37	Capacitor Fixed Mica Type	.0001 MFD	3913
15	Capacitor Fixed Tubular	.0001 MFD	3929
52	Capacitor Fixed Tubular	.003 MFD	3902
41-45-55-58- 61-65	Resistor 10,000 Ohms, ~~Carbon~~ Metallized Type 1 Watt	50 MFD 50 Volts	3835
42-44-47-48 54-57-60- 63-64	Resistor 100,000 Ohms, ~~Carbon~~ " Type 1/3 Watt	.25 MFD 400 Volts	3820
69-84	Resistor 50,000 Ohms, ~~Carbon~~ " Type 1 Watt		3802
51	Resistor 50,000 Ohms, ~~Carbon~~ Metallized Type 1/3 Watt		3811
43-46-49-50 53-56-59-62 68-78-82	Resistor 5,000 Ohms, Carbon Type 1 Watt		3803
66-67-70	Resistor 200,000 Ohms, ~~Carbon~~ " Type 1/3 Watt		3917
71-80	Resistor 750 Ohms, Wire Wound, 10 Watt		3801
72	Resistor 300 Ohms, ~~Carbon~~ Metallized Type 1 Watt		3812
73	Resistor 600 Ohms, ~~Carbon~~ " Type 1 Watt		3836
74	Resistor 1100 Ohms, ~~Carbon~~ " Type 1 Watt		3806
75	Resistor 3,000 Ohms, ~~Carbon~~ " Type 1 Watt		3807
76-77-83	Resistor 500,000 Ohms, ~~Carbon~~ " Type 1 Watt		3808
79	Resistor 60,000 Ohms, ~~Carbon~~ " Type 1 Watt		3809
81	Resistor 4,000 Ohms, ~~Carbon~~ " Type 1 Watt		3805
*87-88	Resistor 300 Ohms, Carbon Type 3 Watt		3804
90	Audio Input Transformer		3810
91	Audio Output Transformer		3914
92	Radio Frequency Gain Control 1 megohm		2985
93	Int. Frequency Gain Control 50,000 Ohms		2986
94	Audio Frequency Gain Control 250,000 Ohms		3890
95	Tone Control 50,000 Ohms		3891
96	Send-Receive Switch		3889
97	A.V.C. Manual Switch		3888
98	Off-On Switch		2988
99	Speaker - Phone Switch		2990
100	C W - Mod Switch		2983
101	Tuning Meter		2983
*102	Output Jack		3894
103-104-107 108-109	Tube Socket 6D6		3892
105	Tube Socket 6A7		3821
106-116	Tube Socket 6C6		3822
110-115	Tube Socket 6B7		3823
111	Tube Socket 76		3824
112-113-114	Tube Socket 42		3825
117	Connecting Terminal Strip		3826
118	Phones Terminal Strip		3838
119	Speaker or Output Terminal Strip		3850
120	Phonograph Terminal Strip		3843
121-122	Pilot Light Mazda #40 6.3. Volts		3849
123	Antenna Terminal Strip		3920
MT4 MT1 MT2 MT3	Main Tuning Condensers		3842
BS 1-2-3-4	Band Spread Condensers		SA 6
SW 1-2-3-4-5	Band Change Switch		SA 7
* -----	Signal Corps Name Plate		SA 2
			3893

SCHEMATIC DESIGNATION	DESCRIPTION - MISCELLANEOUS PARTS	PART NUMBER
-----	Speaker Voice Coil Connecting Cable	SA 65
-----	Speaker Field Coil Connecting Cable	SA 66
-----	Metal Dust Cover Standard Model	2975
-----	Operating Knobs Large	3856
-----	Operating Knobs Small	3857
-----	Panel Cap Nuts	2951
-----	Dust Cover Thumb Screws	2952
-----	Meter Clamp	3926
-----	Main Tuning Dial Assembly	SA 25
-----	Band Spread Dial Assembly	SA 27
-----	Selectivity Control Shaft Assembly	SA 68
-----	Selectivity Control Cam Lever Assembly	SA 30
-----	Audio Gain Control Shaft	SA 70
-----	Beat Oscillator Control Shaft	SA 71
-----	Beat Oscillator Control Shaft Coupling	SA 69
-----	Band Switch Knob and Dial Assembly	SA 74
-----	Connecting Cable	SA 35
* -----	Emergency Battery Connecting Cable	SA 67

SCHEMATIC DESIGNATION	DESCRIPTION - POWER SUPPLY PARTS	PART NUMBER
1	Power Transformer 110 Volts - 60 Cycle A.C.	2980
2	1st. Filter Choke	2981
* 3	2nd. Filter Choke	2982
4	Fuse Block	3859
5	Filter Condenser 4 MFD Electrolytic - 500 Volt	3833
6-7-8	Filter Condenser 16 MFD Electrolytic - 450 Volt	3832
10	Filter Condenser 8-8-7-MFD Electrolytic - 450 Volt	3834
11	Resistor Voltage Divider-6500 Ohm Wire Wound 30 Watts	3854
12	Resistor Grid Bias 20,000 Ohms Wire Wound 15 Watts	3855
13	A.C. Input Cord and Plug	P.S.Cord
14	Connecting Terminal Strip	3838
15	Tube Socket 5Z3	3828
16	Tube Socket 1-V	3827
17	Fuse 2 AMP	3921
19	Line Voltage Adjusting Strip	3840
20	Speaker Field Terminal Strip	SA 35
-----	Dust Cover Standard Model	2975
-----	Dust Cover Rack and Panel Model	2976

* Army Models Only

HAMMARLUND MFG. CO., INC.

MODEL Super Pro
Alignment, Part 1

VOLTAGES:-

ALL MEASUREMENTS WERE MADE ON A 120 VOLT A.C. POWER SUPPLY LINE WITH LINE VOLTAGE ADJUSTMENT SET AT THE 125 VOLT TAP. R.F.-I.F. AND AUDIO GAIN CONTROLS SHOULD BE SET AT MINIMUM. THE A.V.C. MANUAL SWITCH SHOULD BE IN THE MANUAL POSITION, THE CW-MOD SWITCH IN THE C.W. POSITION, AND THE "SEND-RECEIVE" SWITCH IN THE RECEIVE POSITION. D.C. VOLTAGE READINGS WERE OBTAINED WITH A VOLTMETER HAVING A RESISTANCE OF 1000 OHMS PER VOLT USING THE CHASSIS AS A COMMON TERMINAL. VOLTAGES WITHIN ±10% OF THE VALUES GIVEN SHOULD BE CONSIDERED SATISFACTORY. THE 6.3 VOLT A.C. FILAMENT READING IS OBTAINED BETWEEN CHASSIS AND TERMINAL № 2 ON STRIP. TERMINAL № 10 ON STRIP IS BLANK EXCEPT WHEN USED FOR BATTERY OPERATION IN WHICH CASE IT PROVIDES A SHORT TO CHASSIS WITH POWER SWITCH IN "ON" POSITION AND OPEN WHEN POWER SWITCH IS IN THE "OFF" POSITION.

1 - TEST OSCILLATOR - An accurately calibrated instrument producing modulated signals covering a range of 465 K.C. to 20 M.C. This test oscillator should have an output of the order of 100 micro-volts and an output impedance of 100 Ohms for best results when aligning the R.F. and H.F. Oscillator circuits. For I.F. alignment these values are not critical. The frequency calibration of the test oscillator is extremely important, if the receiver alignment is to be correct.

2 - OUTPUT METER - This meter should respond to the modulation frequency of the test oscillator and should provide at least half-scale deflection for one volt.

3 - INSULATED SCREW DRIVER (9/64" wide - .025" thick at bit)

PRELIMINARY PROCEDURE

Place the "ON-OFF" switch in the "ON" position and allow the receiver to warm up approximately one hour before beginning adjustments. Turn the knurled thumb nuts located on the tops of coil assemblies D.D.-E.E. and H.H. until the tops of the thumb nuts are flush with the tops of the threaded rods. Connect the output meter to the "PHONES" terminals located at the rear of the receiver chassis.

I.F. - A.V.C. - BEAT OSC. ALIGNMENT

Adjust the test oscillator to 465 K.C. and connect the output to the control grid of the 1st Detector tube (6A7) through a fixed condenser. Front panel controls should be set as follows:

R.F. Gain Control MINIMUM (turn full left)
I.F. Gain Control MINIMUM (turn full left)
A.V.C. - MANUAL switch on "MANUAL"
C.W. - M.O.D. - switch on "MOD"
PHONES - SPEAKER Switch on "PHONES"
SEND-RECEIVE Switch on "RECEIVE"
BAND SWITCH on 540-1160 K.C.
AUDIO GAIN CONTROL MAXIMUM (turn full right)
TONE CONTROL (turn full left)
SELECTIVITY (turn full left)
BAND SPREAD DIAL set on 100

MAIN TUNING DIAL set near low frequency end of scale, being careful not to confliot with a powerful local signal. Adjust the I.F. gain control so that a reading of approximately one volt is obtained on the output meter. As the various circuits are adjusted for resonance reduce the I.F. gain control to prevent overloading. Adjust the two trimmer capacitors in each of the following coil assemblies for peak voltage readings on the output meter - A.A. - B.B. - C.C. - D.D. - E.E. Then adjust the trimmer capacitor on coil assembly G.G. to minimum (dip) reading on the output meter. Now reduce the A.F. gain to nearly zero and throw the A.V.C. switch to A.V.C. Then adjust the I.F. gain Control until the panel meter reads between 2 and 3. Then adjust the capacitors on H.H. for minimum panel meter reading. There should be a pronounced dip of the panel meter as each of these adjustments is made. It is advisable to switch over to "SPEAKER" at frequent intervals during alignment to make sure there is no overloading. If everything is operating properly the output meter reading will also dip to minimum as the capacitors on coil assembly H.H. are adjusted.

Set the A.V.C.-MANUAL Switch on MANUAL, the C.W.-MOD-switch on C.W. and adjust the trimmer capacitors on coil assembly F.F. for zero beat. For this adjustment the Beat oscillator control knob, on the front panel should be adjusted half-way, or with the stop pin on shaft vertical or pointing upwards. This completes the alignment of the I.F. - A.V.C. and Beat Oscillator circuits all of which are accessible on top of the receiver chassis. After these adjustments have been made, the entire procedure should be repeated to insure accuracy. The knurled thumb nuts on coil assemblies D.D. - E.E. and H.H. should now be returned to their original settings by turning them to the right until the tops of the thumb nuts are 7/16" below the tops of the threaded rods.

CRYSTAL FILTER I.F. ALIGNMENT

The above procedure for aligning the I.F. circuit also applies to receivers with crystal filters, except that the test oscillator must be accurately set to the frequency of the crystal. This can be accomplished by setting the frequency of the test oscillator (when connected to the grid of the first detector) for maximum response with the orystal in circuit and the crystal selectivity control set at maximum. When the frequency of the test oscillator has been correctly adjusted to that of the crystal the I.F. circuits can be tuned as described above with the crystal out out of circuit. Unless this procedure is carefully carried out, maximum crystal effioiency will not be obtained, since the peak of the I.F. selectivity curve must coincide exactly with the resonant peak of the orystal.

H.F. OSCILLATOR AND R.F. ALIGNMENT

Connect the output of the test oscillator to the "A.A." terminal strip. Keep the output meter in the same position as previous test. The controls on the front panel should be set as follows:

Band Change Switch on 540 - 1160 K.C.
Main Tuning Dial on 1100 K.C.
Band spread Dial on 100
R.F. Gain Control "Full On"
I.F. Gain Control "To Produce appropriate output meter reading"
Audio Gain Control "Full On"
Tone Control "Turn Full left"
C.W. - MOD switch on "MOD"
A.V.C.-MANUAL Switoh on "MANUAL"
SEND - RECEIVE Switch on "RECEIVE"
PHONES-SPEAKER Switch on "PHONES"

Turn the receiver over, bottom side up, placing a small block of wood under the rear of the switch section to protect the shield cans and tubes. The main tuning unit bottom plate should remain in place while H.F. oscillator and R.F. adjustments are being made. In order to facilitate the alignment of these stages, we have indicated in dotted lines, the coil positions beneath the bottom cover plate, to-gether with all capacity and inductance adjusters. Capacity adjusting condensers are located on the coil bases and inductance adjusters extend through the top of each coil. The coil markings correspond to the designations on the schematic wiring diagram. Set the test oscillator to produce a 1100 K.C. signal. Adjust the trimmer capacitor "Y" until a peak reading is obtained in the output meter. Now set the main tuning oondenser dial to 600 K.C. and adjust the test oscillator for a 600 K.C. signal. Turn the inductance adjustment on coil "Y" for a peak reading on the output meter. As these two adjustments react on each other it will be necessary to repeat them until no further change in either capacity or inductanoe is necessary. This realignment should only be done after making sure that the calibration of main dial is incorrect.

Turn the main tuning dial to 1100 K.C. and set the test oscillator for 1100 K.C. signal. Adjust each capacitor on coil "R" - "K" - "E2" in

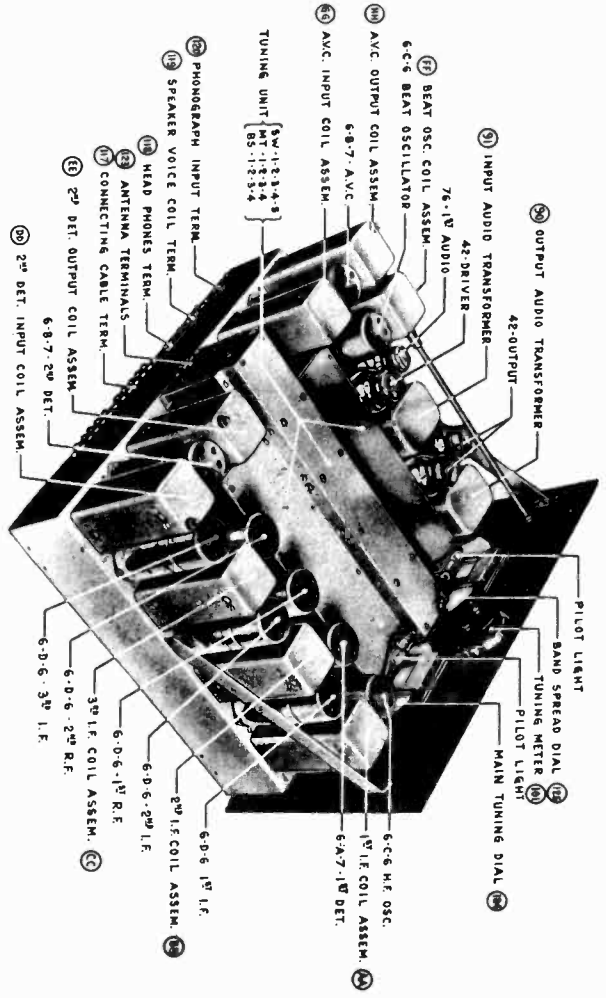
the order named, for peak reading on the output meter. The I.F. gain control should be adjusted so that no overloading occurs and an appropriate reading on the output meter is maintained. Now set the main tuning dial at 600 K.C. and the test oscillator on the same frequency and turn the "inductance adjustments" on coil "R" - "K" - "E1" for peak reading on the output meter. These adjustments are also interlocking and should be repeated until no further improvement can be noticed. This completes the H.F. Oscillator and R.F. coil alignment for the frequency range of 540 to 1160 K.C.

The alignment procedure of the H.F. Oscillator and R.F. coils in the remaining frequency ranges is exactly the same as outlined for the 540-1160 K.C. band, test oscillator frequencies and main tuning dial settings vary as follows:

RANGE	CAPACITY ADJUSTING FREQUENCY	COILS	INDUCTANCE ADJUSTING FREQUENCY	COILS
1160 to 2500 K.C.	2500 K.C.	X-P-J-D2	1200 K.C.	X-P-J-D1
2.5 to 5.0 MC	5.0 MC	W-N-H-C2	2.5 MC	W-N-H-C1
5.0 to 10.0 MC	10.0 MC	T-M-G-B2	5.0 MC	T-M-G-B1
10.0 to 20.0 MC	20.0 MC	S-L-F-A2	10.0 MC	S-L-F-A1

The capacity and inductance adjustments in each band should be rechecked until no further peak changes are noted. The receiver will then be completely aligned. On the three highest frequency bands, care should be exercised to avoid adjusting the H.F. oscillator coils to an image frequency.

The check on the alignment of the receiver on all bands is now complete and if instructions have been carefully carried out optimum performance should be obtained.



HAMMARLUND MFG. CO., INC.

MODEL Super Pro
Circuit Data
Operating Notes

OPERATING THE RECEIVER

The receiver may now be operated by tuning the OFF-ON SWITCH.

The receiver is equipped with every conceivable control to permit the operator to obtain maximum performance under a wide variety of receiving conditions. The numerous control knobs and switches appearing on the panel, may, at first glance, seem confusing, but in reality their actual manipulation is quite simple and after the receiver has been used for a very short time, no difficulty will be experienced in obtaining the most efficient results.

An AVC-MANUAL switch is provided to enable the operator to use either AVC or MANUAL volume control. For stations transmitting a continuous carrier such as a telephone station, the AVC position is generally the best. In this case, the manual I.F. gain control serves to limit the maximum sensitivity and prevents the high noise level present when the receiver is adjusted to maximum gain with no incoming signal. When the switch is set on MANUAL, the I.F. GAIN control adjusts the gain of the receiver to a given point, which remains fixed regardless of the intensity of the signal being received. When AVC is used a minimum reading on the TUNING METER indicates the signal has been tuned in properly.

The BEAT OSCILLATOR adjustment is brought out on the panel and may be adjusted to give any beat note frequency desired. For C.W. reception, be sure that the signal is tuned to its maximum strength, and then adjust the beat oscillator to the desired frequency.

DO NOT CHANGE THE TUNING TO PRODUCE THE DESIRED BEAT FREQUENCY. The only time the tuning is adjusted to change the beat frequency is after the station is properly tuned in, and has drifted in frequency so as to change the tuning as well as the beat note.

The BEAT OSCILLATOR may also be used for locating the carrier of distant broadcast or phone signals by tuning to the lowest pitch beat note (Zero Beat) with the CW-MOD switch in the CW position. For this purpose the BEAT OSCILLATOR control should be adjusted in the centre.

A SEND RECEIVE switch is placed on the panel and is used when transmitting on approximately the same frequency as that to which the receiver is tuned. This switch disconnects the plate supply to the R.F. amplifiers and first detector. With this switch in the send position, it is usually possible to use the receiver to monitor the transmissions, although in low powered transmitters it may be necessary to keep this switch in the receive position and reduce the R.F. GAIN, as the shielding and filtering in the receiver is sufficient to keep out any except extremely strong signals from a transmitter located a few feet away.

The frequency band desired for operation may be selected by means of the BAND CHANGE SWITCH located directly beneath the tuning meter. The main tuning dial shutter will at the same time automatically indicate the frequency band, in use. The calibration of the MAIN DIAL is correct only when the BAND SPREAD DIAL is set at 100, except in the two low-frequency ranges from 540 to 2500 K.C. In these two ranges the BAND SPREAD CONDENSER is automatically disconnected by the BAND CHANGE SWITCH. Therefore, with the BAND SPREAD DIAL set at 100, the receiver is a fully calibrated SINGLE DIAL instrument.

In the three high frequency bands tuning is sufficiently smooth on the main dial to permit its use almost entirely for selecting the desired signal and perhaps it would be more simple to disregard the band spread dial until the desired signal is picked up, and then use the band spread dial for the purpose of obtaining a very fine vernier adjustment.

If band spread operation is desired in any of the three high frequency bands, the MAIN TUNING DIAL should be adjusted to the HIGH FREQUENCY limit of the band desired. It will then be possible to tune down over the band by means of the band spread dial only, thereby permitting extremely fine tuning. Lower BAND SPREAD DIAL settings indicate lower frequencies.

THE BAND SPREAD DIAL is not used on the two lowest frequency bands, as the tuning is sufficiently fine on the main tuning dial.

GAIN ADJUSTMENTS:

The R.F. GAIN CONTROL will generally be at maximum, unless the signal being received is very strong, and causes overloading of the first detector. This overloading will be made apparent by a considerable amount of distortion. In this case, reduce the R.F. GAIN. This overloading will rarely be present on the high frequency bands, where the maximum R.F. gain is generally desired.

The AUDIO GAIN should be operated at or near its maximum setting, except when using A.V.C. The AUDIO GAIN should be full on at all times when the receiver is being used for C.W. reception except when using A.V.C. and the proper signal level obtained by the manipulation of the I.F. gain.

In C.W. reception, it will sometimes be found advantageous to reduce the R.F. GAIN when there is interference from a strong station operating very close to the desired signal.

The SELECTIVITY adjustment may be set at any desired point, depending upon conditions. For C.W. reception, it is usually desirable to adjust for maximum selectivity. It should be borne in mind at all times that the atmospheric disturbances and other noises of that character will vary in direct proportion to the width of the response curve of the receiver.

If the receiver becomes completely inoperative, it may be due to a shorted filter or by-pass condenser or an open resistor. By measuring voltages and comparing them with the tabulations in the chart, the defective parts can be easily determined. We do not believe that detailed continuity tests should be described since most operators are familiar with the ordinary procedure for determining defective component parts. In both receiver and power supply units, the bottom cover plates may be removed so that all parts are accessible. Values of any resistor or capacitor may be obtained by locating the number on the schematic wiring diagram, and referring to the parts list.

GENERAL DESCRIPTION

The receiver consists of two major units — the receiver proper and the power supply unit. Both units are supplied with dust covers and suitable for rack or table mounting.

The main tuning unit houses the MAIN TUNING and BAND SPREAD condensers and their respective dial assemblies — the BAND CHANGE SWITCH — and all ANTENNA COUPLING -- R.F. and H.F. OSCILLATOR coil assemblies. The BAND CHANGE switch, an exclusive Hammarlund development, embodies the well known knife switch principle and is located in the center of the unit. In the development of this switch, which presents a radical departure from switches commonly used for band changing, considerable thought was given to efficient operation over long periods of active use, and the elimination of faulty switch contacts, which would affect the sensitivity and selectivity of the receiver. All contacts are silver plated phosphor bronze so constructed that a six point contact is provided at each connection. This switch covers the range of 20 mc. to 540 kc. in 5 bands, and also connects the proper band spread condensers into each of the 3 high frequency circuits, and short circuits all coils not actually in use. When the switch is turned the next contact is made before the previous one is broken, thereby eliminating sparking. The switch dial may be turned in either direction, a very convenient feature.

The MAIN TUNING and BAND SPREAD condenser assemblies are located on the left and right hand side respectively of the BAND CHANGE SWITCH when facing the panel. Each tuning gang is controlled by a single control and dial located on the front panel. They are rigidly constructed and so designed that they will not get out of alignment during normal operation.

The MAIN TUNING and BAND SPREAD DIALS are plainly readable through well illuminated escutcheons. Both dials have an easy vernier tuning action without backlash. The main tuning dial is directly calibrated in megacycles in ranges of 2.5 to 5.0; 5.0 to 10.0; 10.0 to 20.0; and in kilocycles from 1160 to 2500 and 540 to 1160. The MAIN TUNING DIAL is equipped with an ingenious mechanical shutter which operates in synchrony with the BAND CHANGE SWITCH, so that only the frequency band in actual use is visible to the operator.

The POWER SUPPLY unit contains a properly filtered rectifier for furnishing D.C. plate voltages and A.C. filament voltage for operating the receiver. A separate rectifier is incorporated for supplying grid bias. All component parts are designed to have a high safety factor. A three terminal strip is located beneath the chassis to permit operation on power supply lines of 105 - 115 - 125 volts, 50-60 cycle alternating current. A cord and plug is provided for connecting the power unit to a wall outlet or receptacle. A connecting cable is furnished for connecting the receiver and power supply units. A special cable for emergency battery operation is also provided.

CONNECTING RECEIVER

The receiver is so designed that it may be located in any convenient position, as a table model or in a standard 19" telephone relay rack. Dust covers may be removed for the insertion of tubes by removing the thumb nuts on both receiver and power supply units.

Tubes:- The receiver has been designed and tested for the following R.C.A. tubes or their equivalent:-

5 - 6D6		
2 - 6C6		
1 - 6A7		Receiver
2 - 6B7		
1 - 76		
3 - 42		
1 - 5Z3		
1 - 1-V		Power supply

Care should be taken that the proper tube is inserted in each socket. The type numbers on the tubes should correspond with the markings on the sockets. After the tubes have been correctly inserted the dust covers may be replaced.

The receiver may now be placed in the location previously decided upon and the antenna connections made. The antenna input has been designed to couple either to a balanced transmission line having an impedence of approximately 300 ohms, or to a conventional single wire antenna and ground. In the former case both feeders should be connected to the two antenna terminals located at the rear of the receiver marked "A-A". If a single wire type of antenna is used the lead-in should be connected to one of the terminals marked "A" and the other "A" terminal connected to a good ground. It is not essential to ground the receiver chassis, but it may readily be accomplished by inserting a ground lead under one of the thumb screws holding the dust cover in place at the rear of the receiver.

The RECEIVER and POWER SUPPLY units are connected by a cable The spade lugs on the terminal strips at each end of the cable should be inserted in the corresponding terminals of the receiver and power supply, with the spade lugs pointing downward.

The output connections to the receiver may be made to the terminals marked "SPEAKER" on the rear of the receiver chassis, or to the pin jacks marked "PHONES". The output of the receiver has been designed to match a load impedence of approximately 600 ohms. A PHONE JACK is provided on the front panel of the receiver connected in parallel to the 600 ohm output terminals.

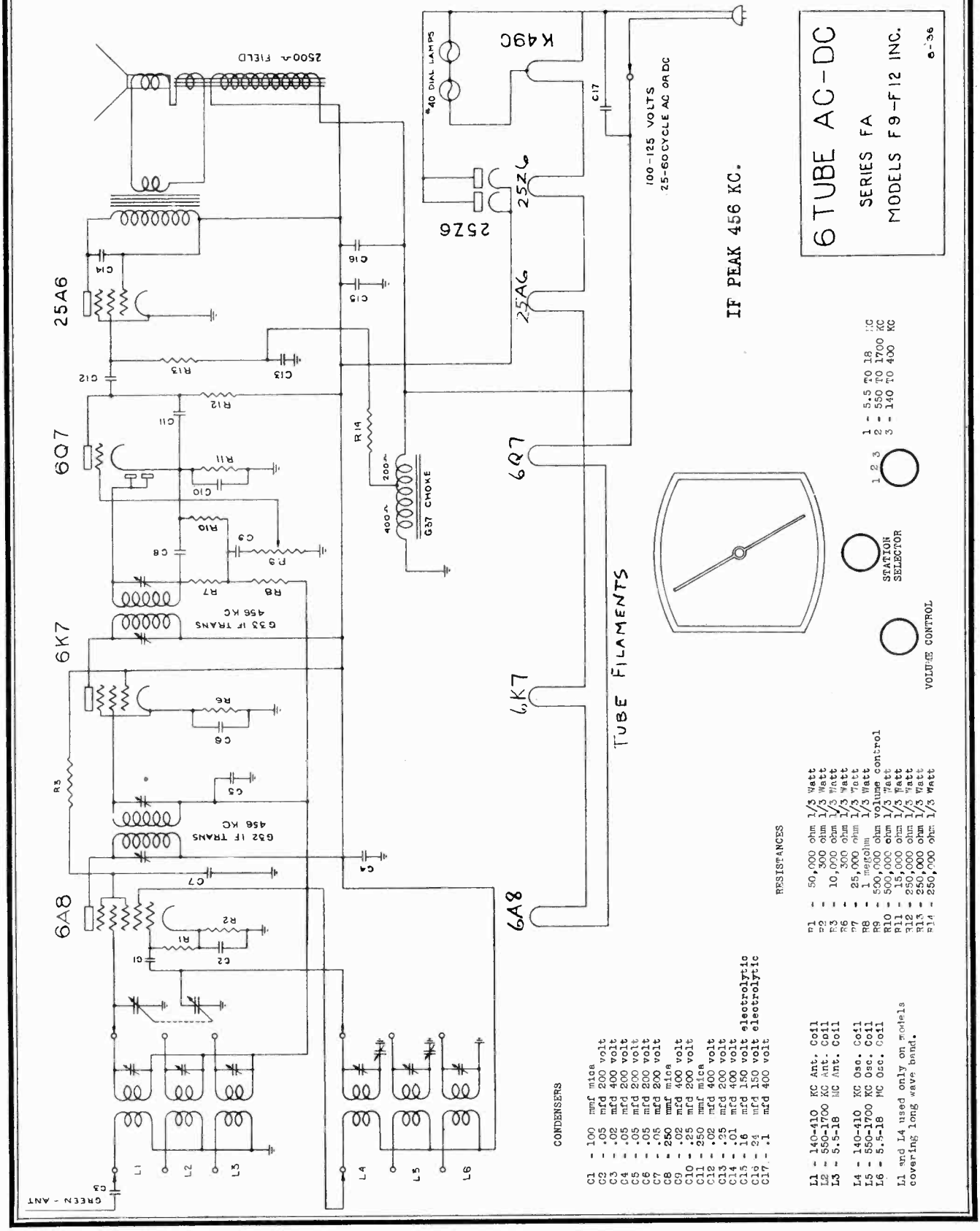
With the OFF-ON SWITCH in the OFF position, plug the power supply cord in the 60 cycle alternating current supply line. DO NOT ATTEMPT TO OPERATE ON DIRECT CURRENT -- OR ALTERNATING CURRENT OTHER THAN 50-60 CYCLES OF THE PROPER VOLTAGE, unless the power supply unit is marked for 25-40 cycle A.C. operation.

An extra connecting cord is supplied with each receiver for emergency battery operation. One end of this cord has a terminal strip that connects to the receiver and the other end has color coded wires for battery connections. The following batteries are required for emergency operation:-

5 - 45 volt "B" batteries
1 - 45 volt "C" battery
1 - 6 volt "A" storage battery.

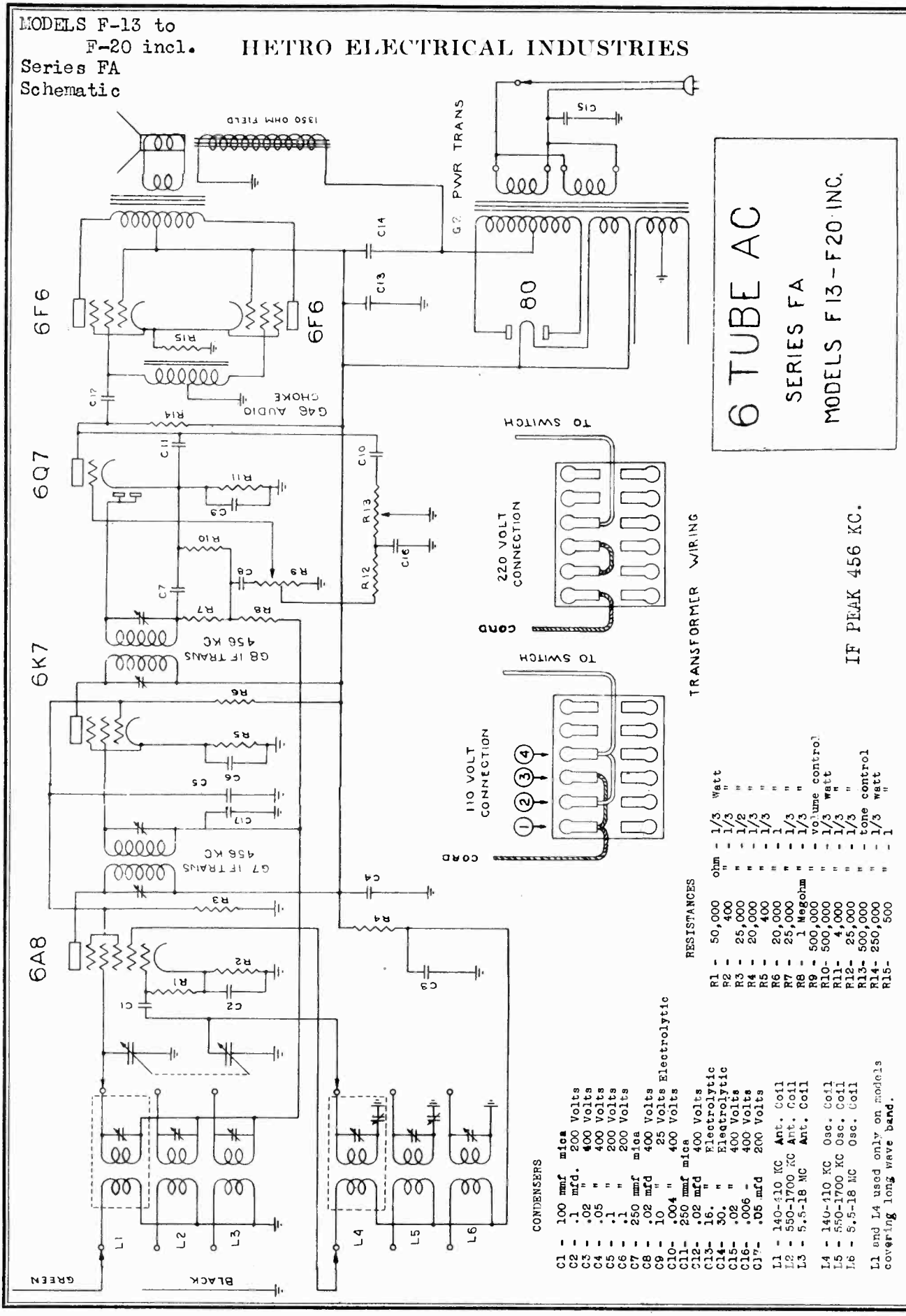
HETRO ELECTRICAL INDUSTRIES

MODELS F-9 to F-21 incl.
Series FA
Schematic



MODELS F-13 to F-20 incl.
Series FA
Schematic

HETRO ELECTRICAL INDUSTRIES



CONDENSERS

C1 - 100 mmf mica
C2 - .1 mfd. 200 Volts
C3 - .02 " 400 Volts
C4 - .05 " 400 Volts
C5 - .1 " 200 Volts
C6 - .1 " 200 Volts
C7 - 250 mmf mica
C8 - .02 mfd 400 Volts
C9 - 10 " 25 Volts Electrolytic
C10- .004 " 400 Volts
C11- 250 mmf mica
C12- .02 mfd 400 Volts
C13- 16. " Electrolytic
C14- 30. " Electrolytic
C15- .02 " 400 Volts
C16- .006 " 400 Volts
C17- .05 mfd 200 Volts

L1 - 140-410 KC Ant. Coil
L2 - 550-1700 KC Ant. Coil
L3 - 5.5-18 MC Ant. Coil

L4 - 140-410 KC Osc. Coil
L5 - 550-1700 KC Osc. Coil
L6 - 5.5-18 MC Osc. Coil

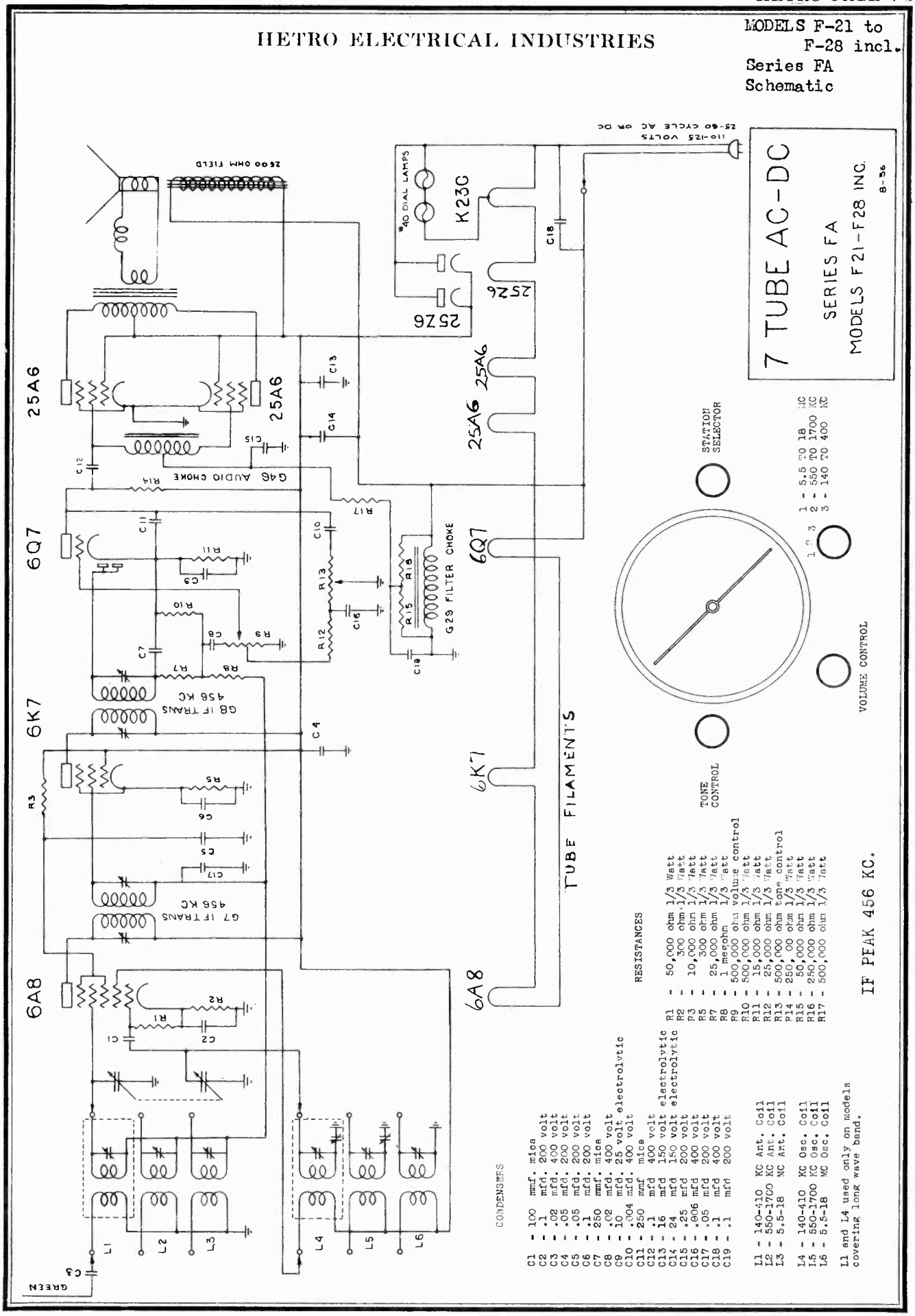
L1 and L4 used only on models covering long wave band.

RESISTANCES

R1 - 50,000 ohm - 1/3 Watt
R2 - 400 " - 1/3 "
R3 - 25,000 " - 1/2 "
R4 - 20,000 " - 1/3 "
R5 - 400 " - 1/3 "
R6 - 20,000 " - 1 "
R7 - 25,000 " - 1/3 "
R8 - 1 Megohm " - 1/3 "
R9 - 500,000 " - volume control
R10- 500,000 " - 1/3 watt
R11- 4,000 " - 1/3 "
R12- 25,000 " - 1/3 " - tone control
R13- 500,000 " - 1/3 watt
R14- 250,000 " - 1 "
R15- 500 "

HETRO ELECTRICAL INDUSTRIES

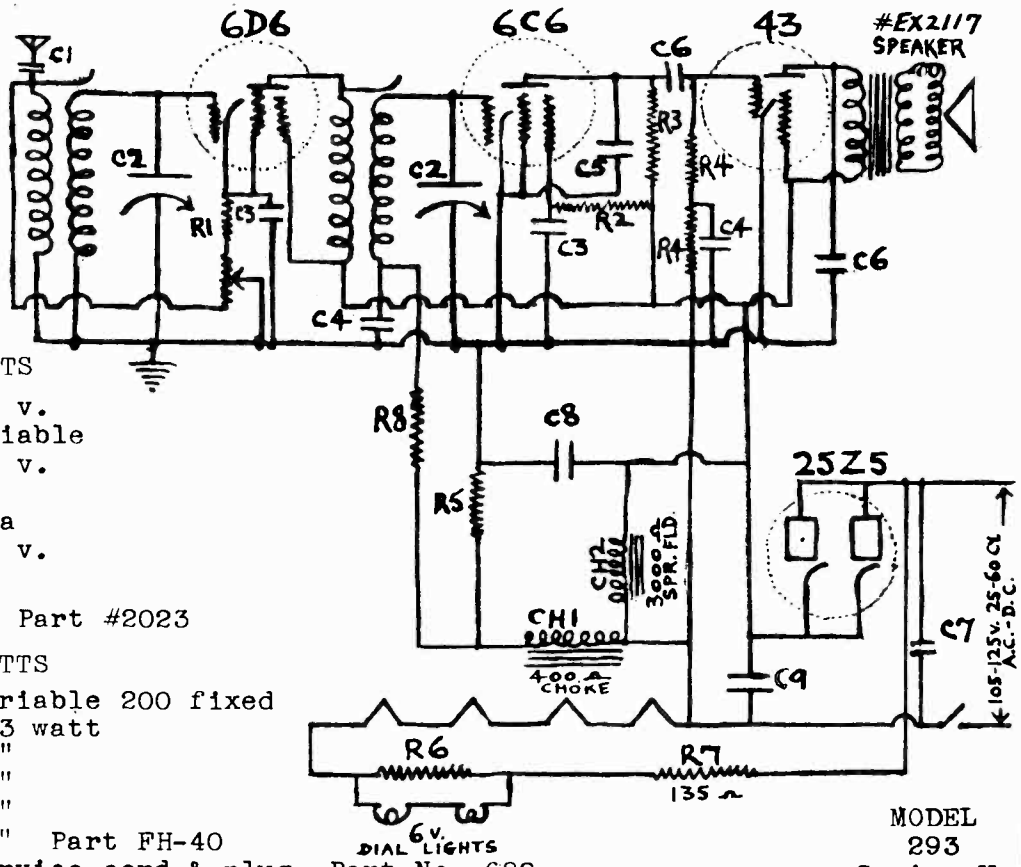
MODELS F-21 to F-28 incl.
Series FA
Schematic



MODEL 293
Series V
Schematic
MODEL Air-Ace
Series M
Changes

HETRO ELECTRICAL INDUSTRIES

4 TUBE T.R.F.
Compact
A. C. - D. C.
200 to 550 Meters



MODEL
293
Series V

CONDENSERS		VOLTS
C1	.01	400 v.
C2	.00037	Variable
C3	.05	200 v.
C4	.25	"
C5	.00025	mica
C6	.01	400 v.
C7	.05	"
C8	12.0	200
C9	16.0	" Part #2023

RESISTANCES		WATTS
R1	25000 ohm	variable 200 fixed
R2	2.000,000	1/3 watt
R3	500.000	"
R4	250.000	"
R5	100	"
R6	40	" Part FH-40
R7	135	Service cord & plug, Part No. 682
R8	1.000,000	1/3 watt

REPLACEMENT PARTS

Speaker Part #EX2117 Filter Choke Part #T341 Dial bulb Part #13
Antena Coil Part A1015 R.F. Coil Part #B1049 Vol cont & switch #329
Tubes; 2575, 6D6, 6C6, 43. Adaptor for 220-240 volts operation #319.

Several changes have been made in the 9-tube receiver, whose schematic is shown on *Hetro page 6-15 of Rider's Volume VI*. The tube complement has been changed and is now as follows:

New Tube	Old Tube	Position
6K7	6D6	R.F.
6A8	6A7	Mixer-Osc.
6K7	6D6	1st-2nd I.F.
6R7	85	2nd Det.
6C5	76	A.F.
6B5	42	O.P.
5Z3	80	Rect.

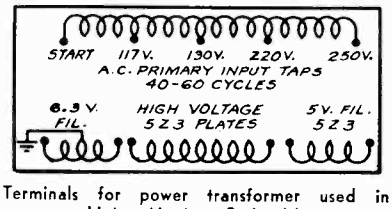
Note. On models using glass tubes only, the 6A7 is used instead of the 6A8.

A new power transformer is used, Part No. P-836, instead of No. T-789. The connections for this are shown in the accompanying sketch.

The resistor, R-7, in the cathode circuit of the output tubes, has been changed from 600 ohms to 250 ohms and is now known as R-17. The resistor, R-8, 700 ohms, in the cathode circuits of the i-f. tubes, has been changed to 250 ohms and is the same

Hetro Air-Ace, Series M

as R-1. Also the second i-f. tube cathode is no longer connected to the condenser C-2 and R-1, which was connected to the cathode of the first i-f. tube, but a condenser and resistor similar to C-2 and R-1, connects it to



Terminals for power transformer used in Hetro Air Ace, Series M.

ground. The condenser, C-2, in the secondary circuit of the second i-f. transformer, has been eliminated and the secondary is now directly connected to ground, instead of R-2.

The input transformer to the output stage has been removed and a tapped a-f. choke substituted for it. The center tap is grounded, as was the secondary of the transformer formerly used, and each end goes to the grid of the 6B5 tubes. A 0.05-mf. condenser, C-4, replaces C-14, 0.1 mf., in the plate circuit of the 6C5.

The two condensers, C-15, 0.004 mf., have been removed from across the primary of the output transformer and one of them has been connected from the plate of the 6R7 to ground. The tone control, C-4 and R-15, has been moved from across the plates of the output tubes to the plate circuit of the 6R7. One side of C-4 is connected to the plate and the other side to one end of R-15. The arm of this resistor is connected to the junction of C-11 and R-11, which is grounded. R-15 has been changed to 500,000 ohms instead of 40,000 ohms and R-11 has been changed to 1500 ohms from 5000 ohms. R-14 in the cathode circuit of the 6C5 has been changed to 3000 ohms from 6000.

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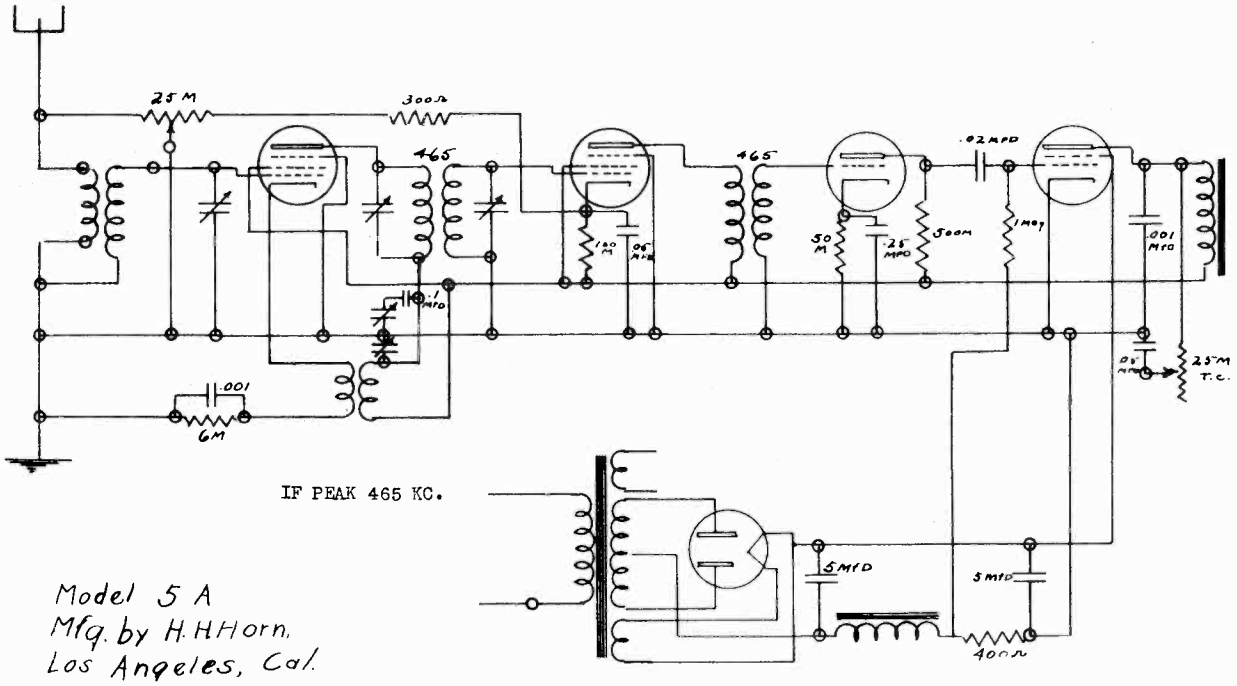
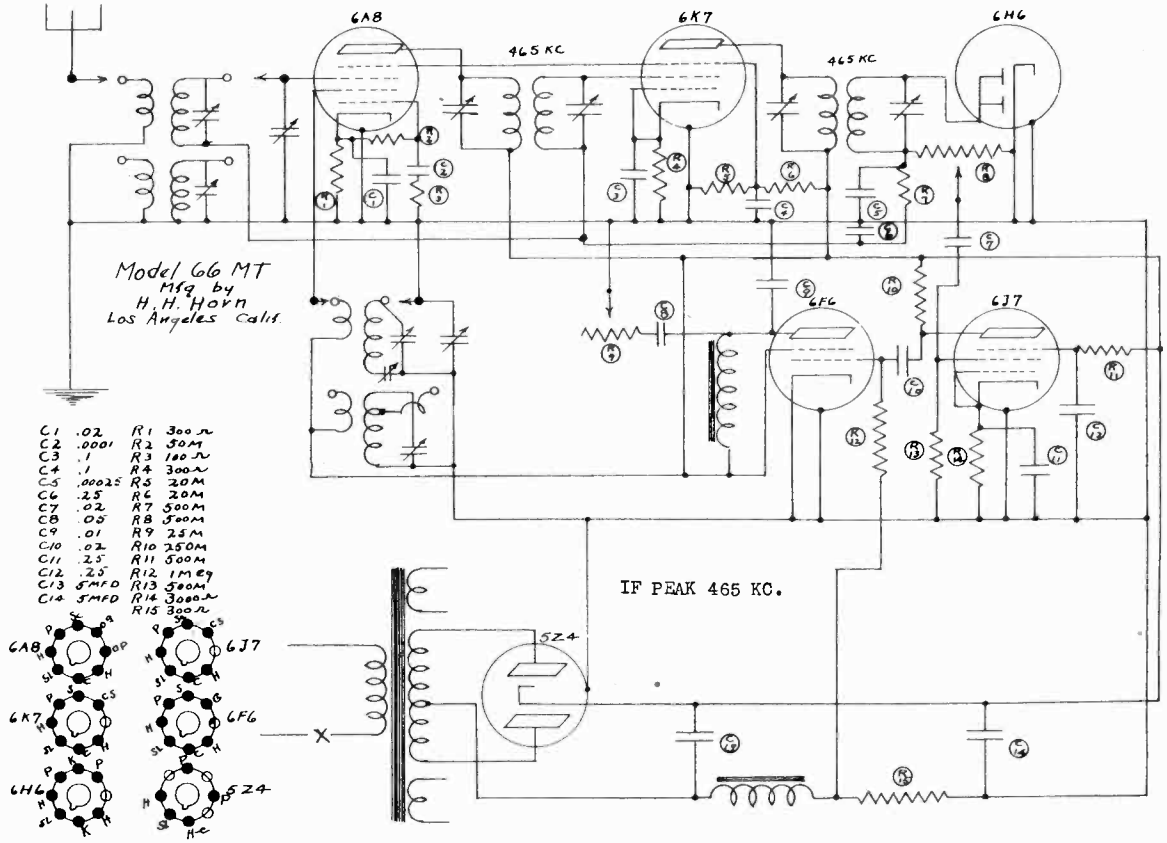
MODEL 5A
MODEL 66MT
Schematics



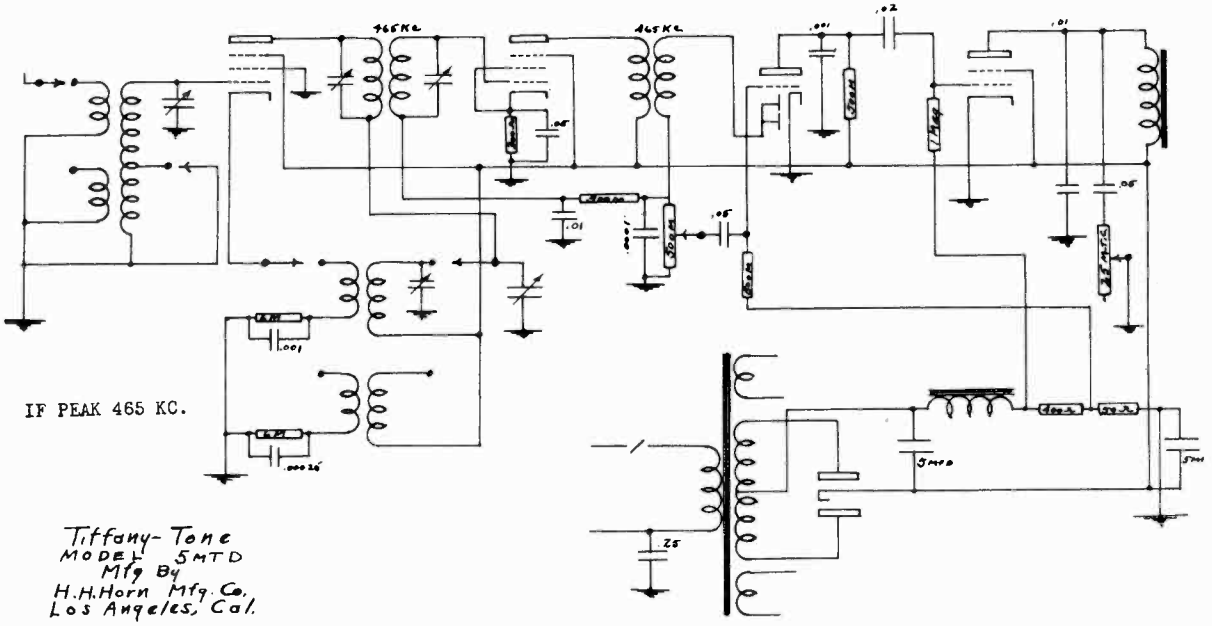
Model 5 A
Mfg. by H.H.Horn,
Los Angeles, Cal.

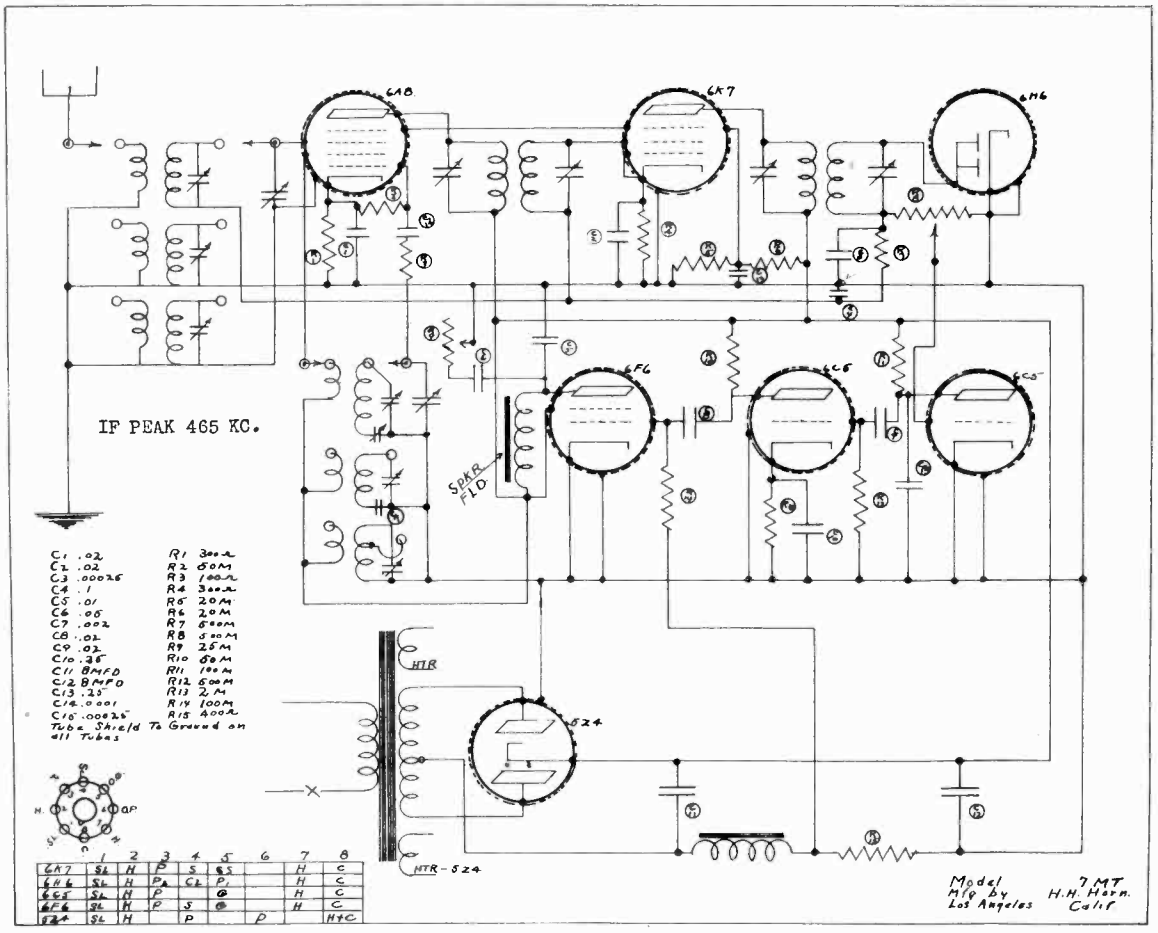


C1	.02	R1	300Ω
C2	.0001	R2	50M
C3	.1	R3	150Ω
C4	.1	R4	300Ω
C5	.00025	R5	20M
C6	.25	R6	20M
C7	.02	R7	500M
C8	.05	R8	500M
C9	.01	R9	25M
C10	.02	R10	250M
C11	.25	R11	500M
C12	.25	R12	1MEG
C13	5MFD	R13	500M
C14	5MFD	R14	3000Ω
		R15	300Ω

MODEL 5MTD
MODEL 7MT
Schematics

HERBERT H. HORN





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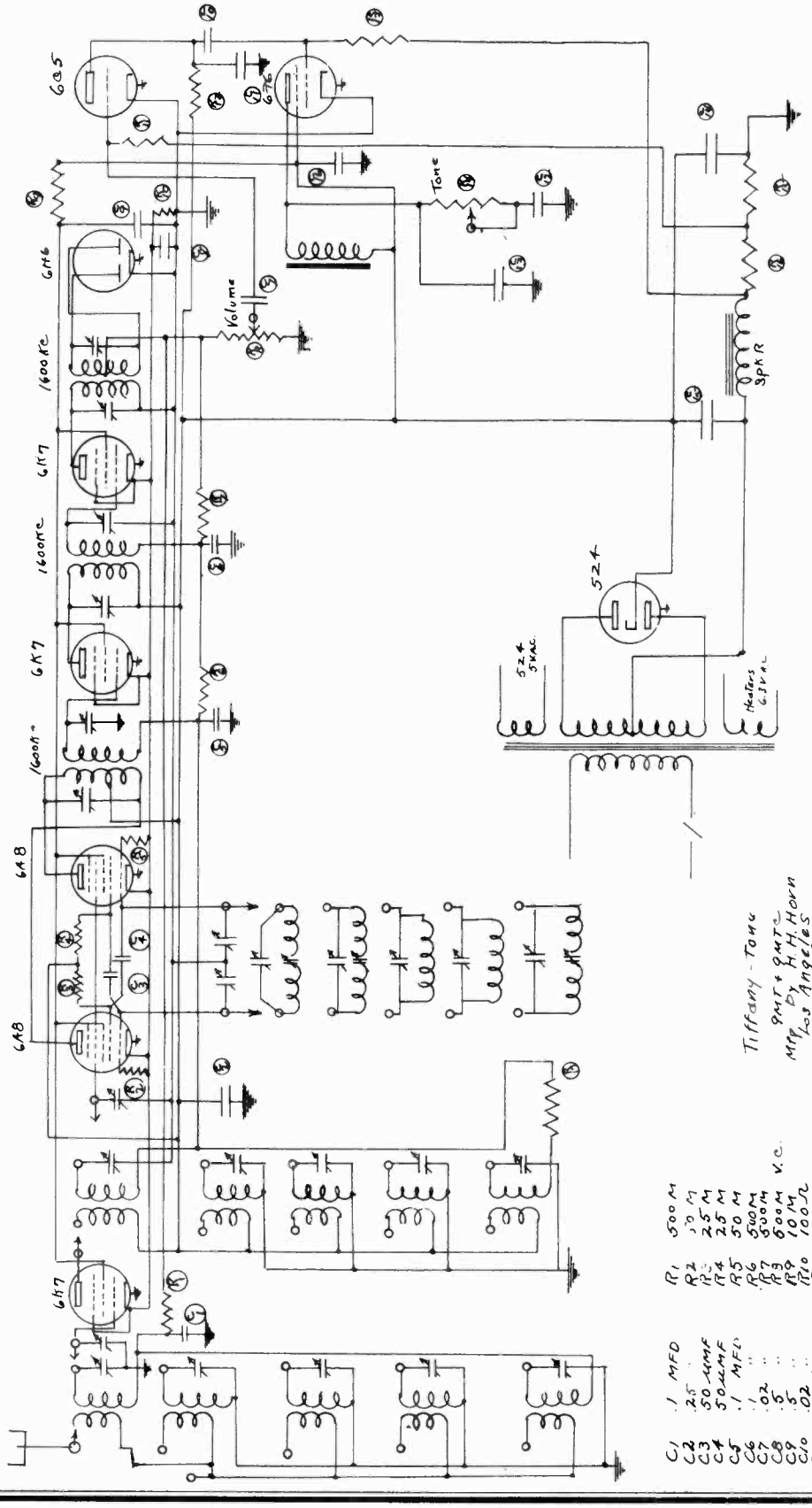
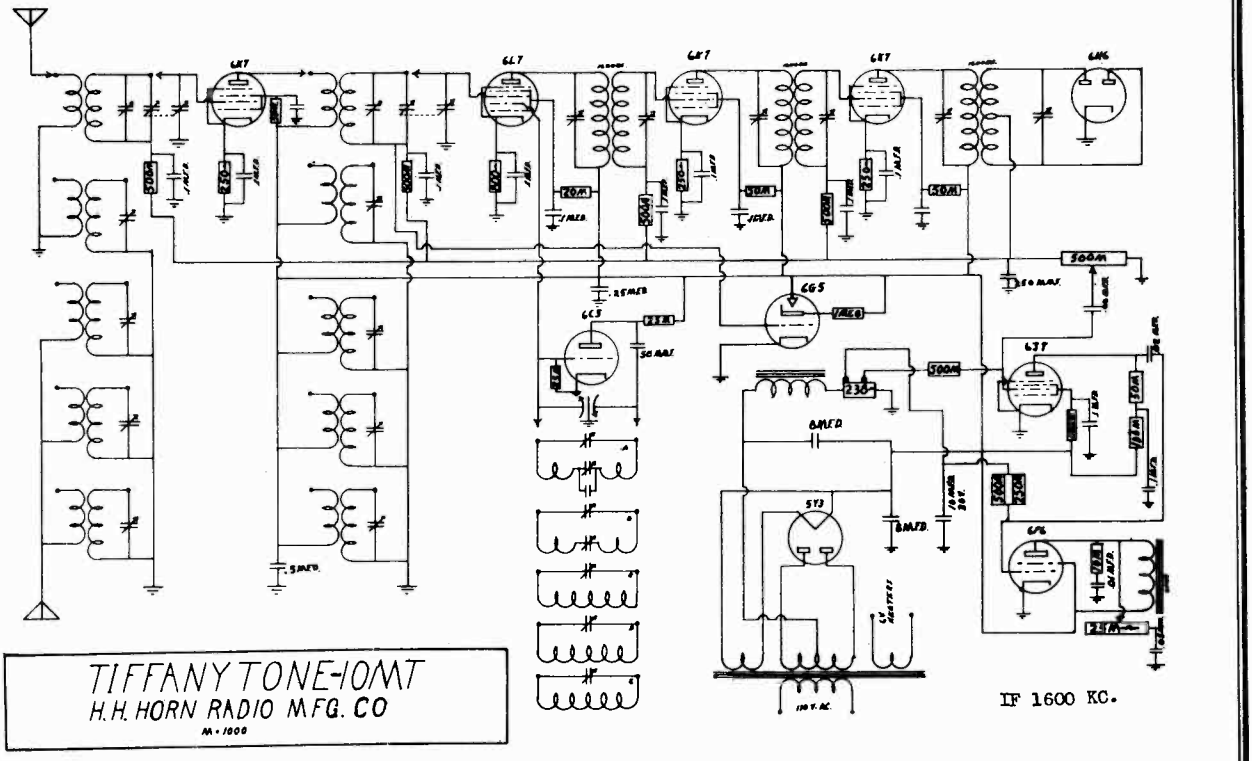
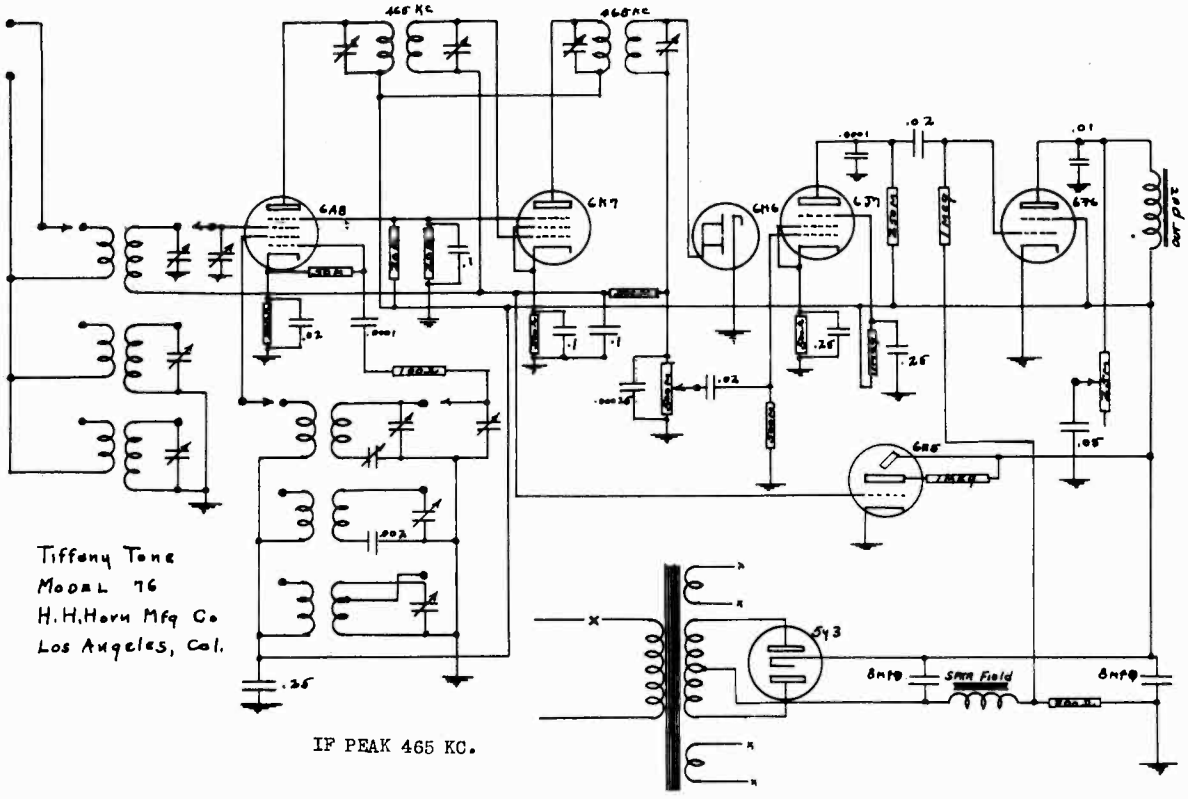
MODELS 9MT, 9MTC
Schematic



MODEL 10MT
MODEL 76
Schematics

HERBERT H. HORN





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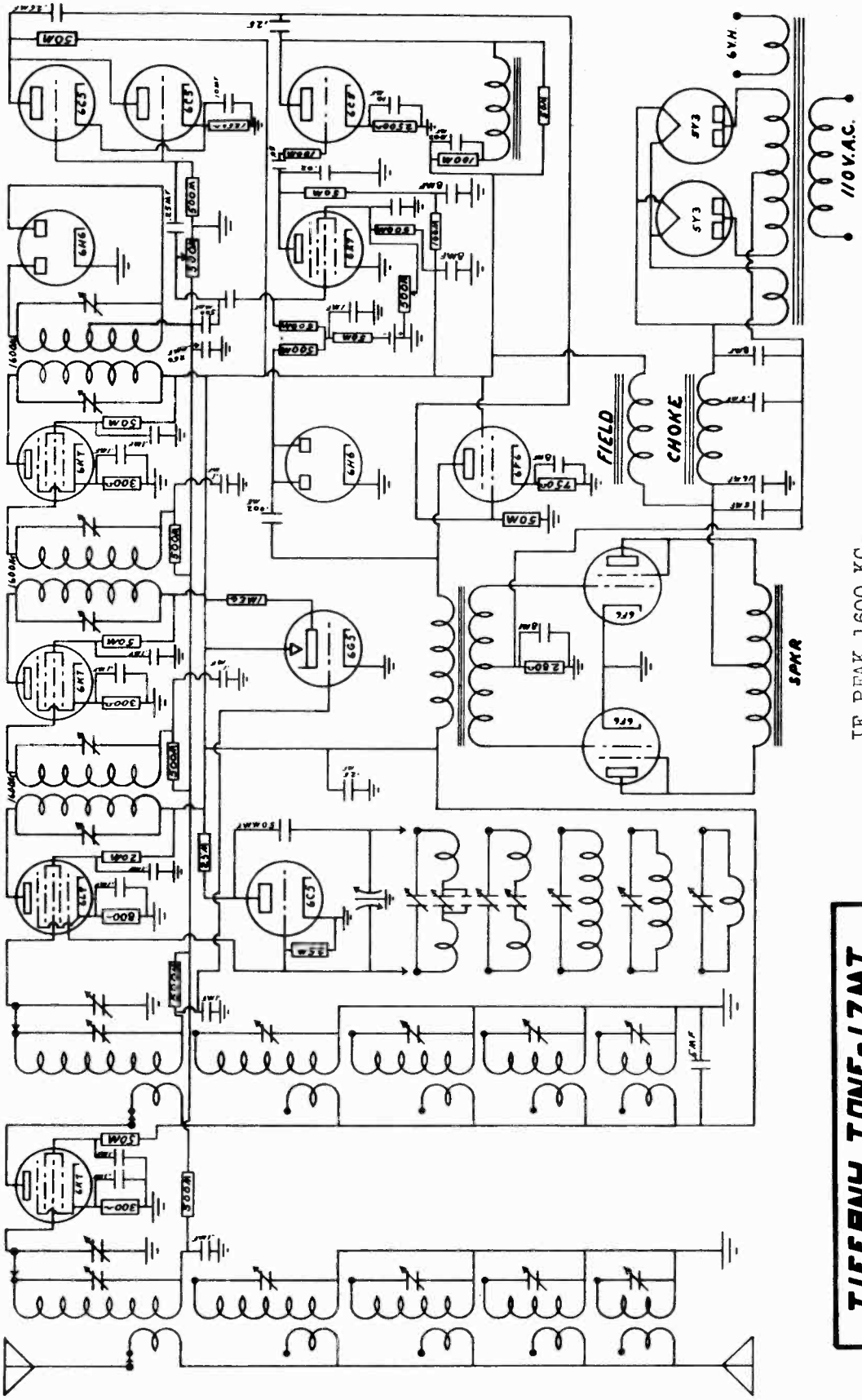
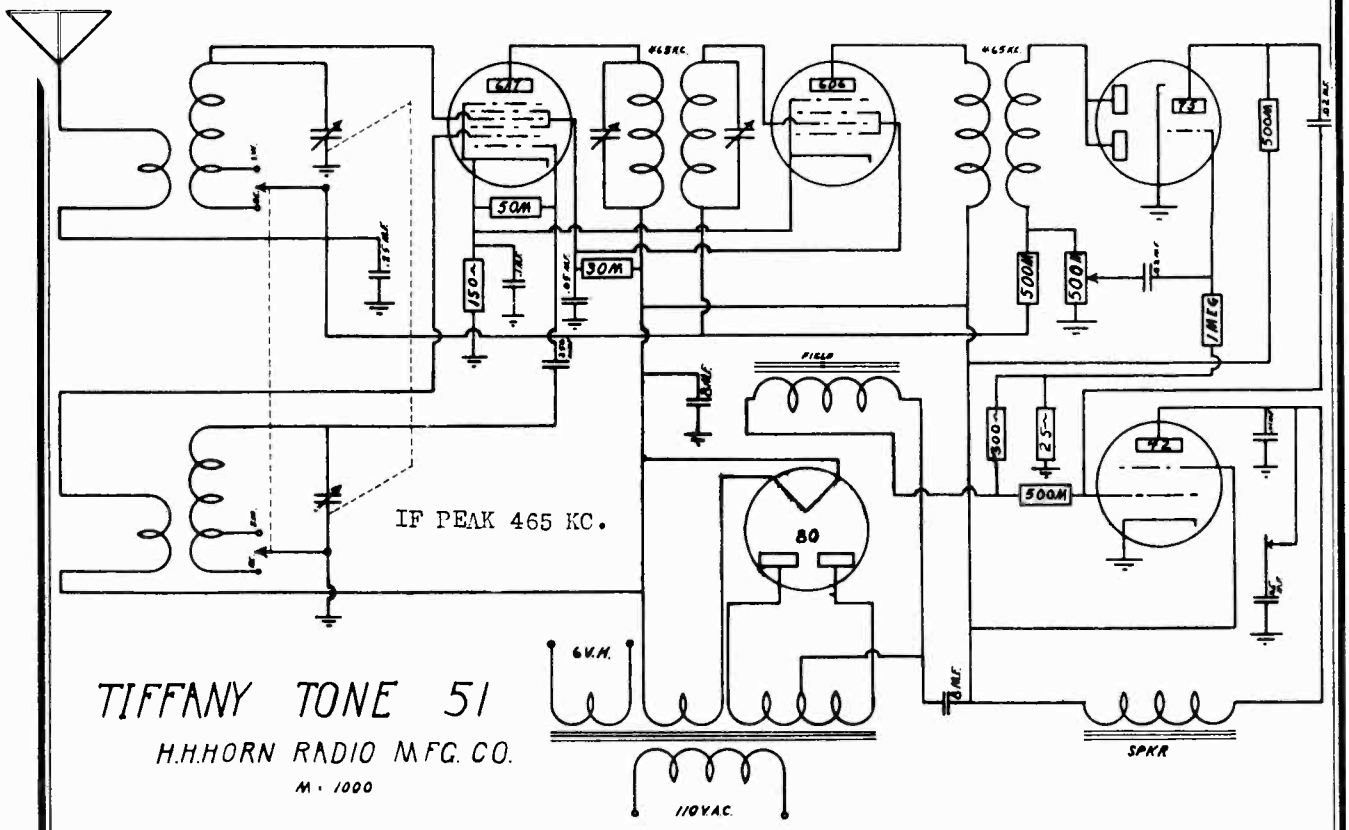
MODEL 17 MT
Schematic



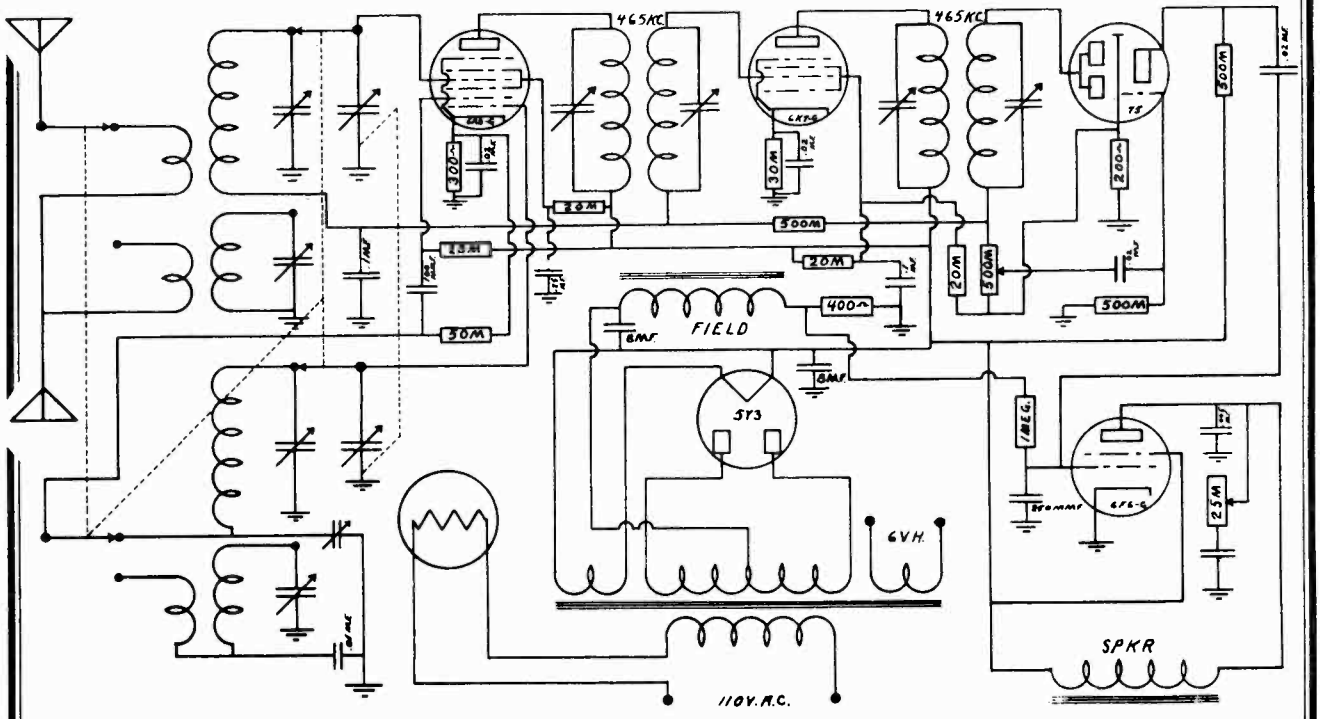
MODEL 51
MODEL 62
Schematics

HERBERT H. HORN



TIFFANY TONE 51

H.H.HORN RADIO MFG. CO.
M-1000



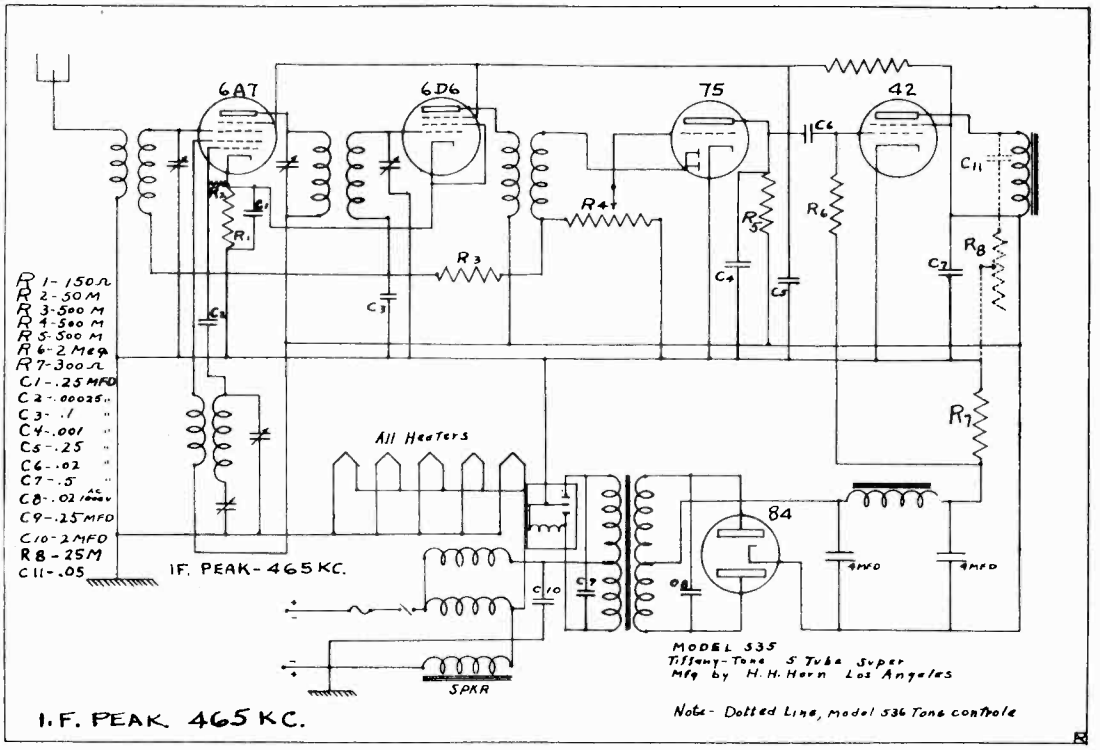
IF PEAK 465 KC.

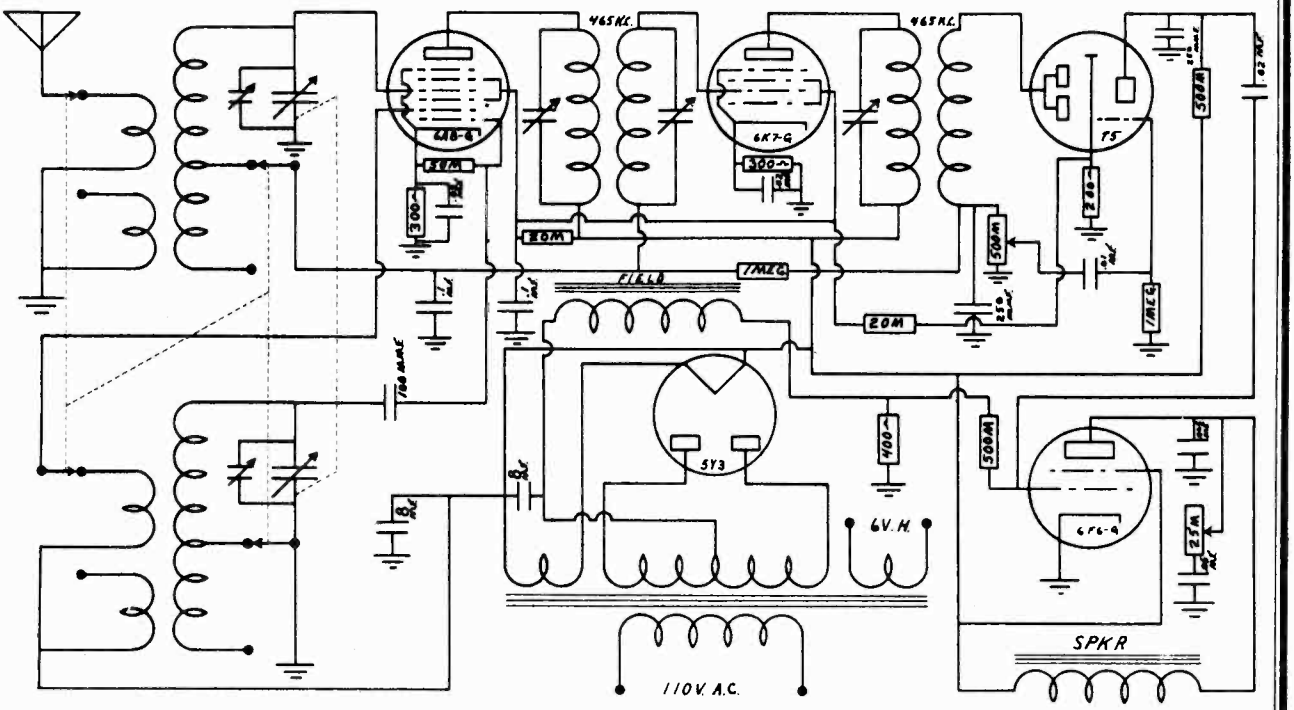
TIFFANY TONE 62

H.H. HORN RADIO MFG. CO.
M=1000

HERBERT H. HORN

MODEL 535
MODEL 52
Schematics

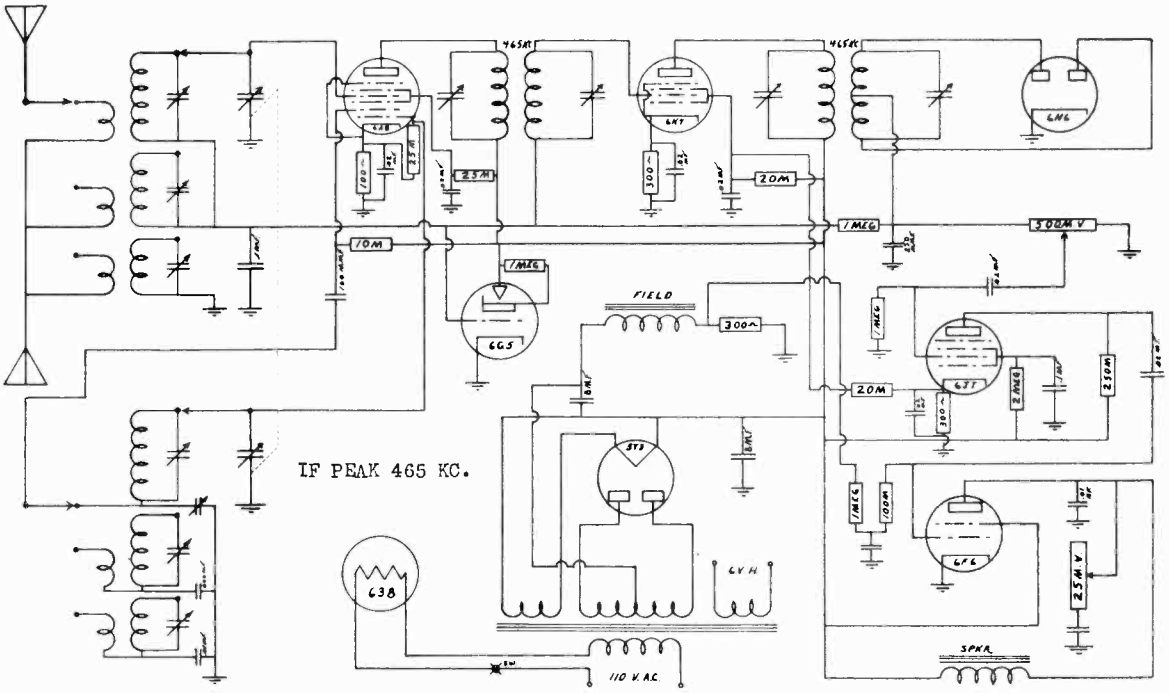


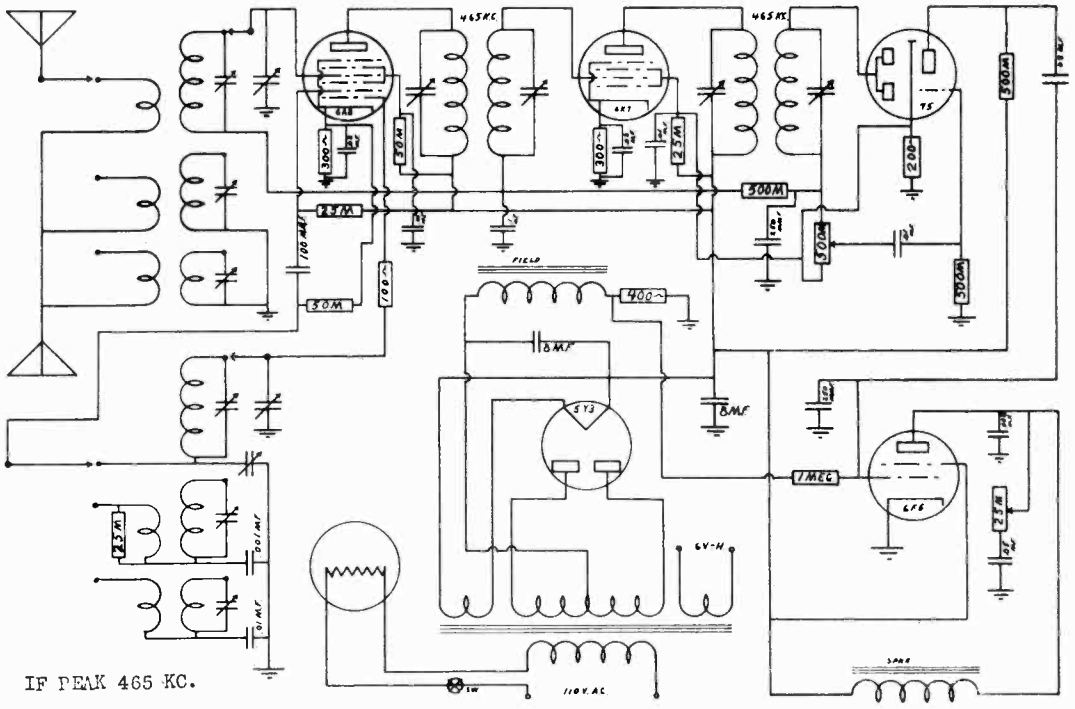


TIFFANY TONE 52
H.H. HORN RADIO MFG. CO.
M-1000

MODEL 63
MODEL 83
Schematics

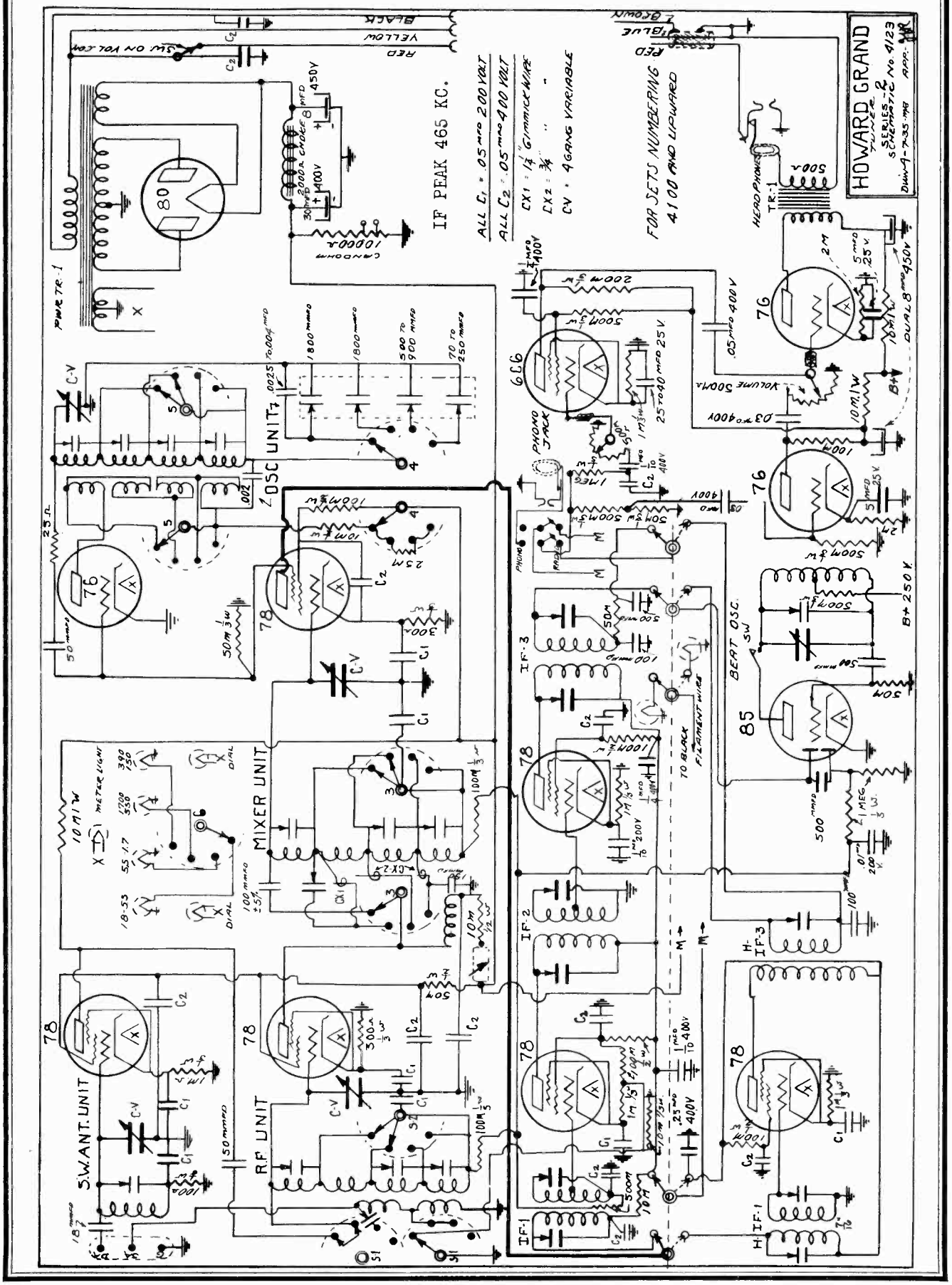
HERBERT H. HORN





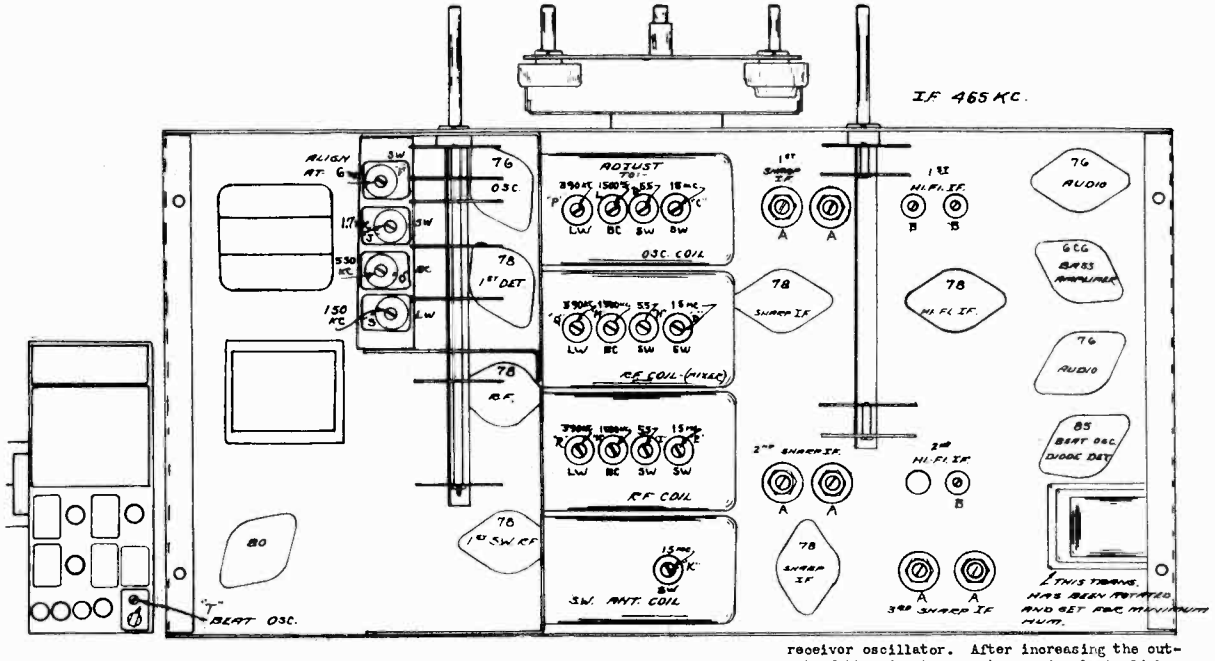
HOWARD RADIO CO.

MODEL Grand
Series 2
Schematic



MODEL Grand
Series 2
Socket, Trimmers
Alignment

HOWARD RADIO CO.



ALIGNMENT OF THE OSCILLATOR AND R.F. CIRCUITS

SERVICING EQUIPMENT NECESSARY

The following alignment instructions are given with the assumption that the service station has a signal generator capable of accurately covering the range of the receiver.

A vacuum tube volt meter is preferred to indicate resonance, though an 0 to 3 AC voltmeter can be connected across the voice coil for this purpose.

The two High Fidelity Broad I.F. Stages can not be correctly aligned by the usual methods as a Cathode-Ray oscillograph is required to visually show the resonance curve. Since these stages are broad, they are not liable to get out of adjustment easily after they have once been set, so they should not require any attention unless a replacement has been made of one of the coil units.

Refer to diagram for location of various trimmers.

ALIGNING THE I.F. STAGES

The alignment of the Broad I.F. Channel has been mentioned above. On some sets the trimmers extend through top of can. Also the last stage has a tuned primary.

The regular selective I.F. stages are coded "A" on the diagram and are aligned in the usual manner of feeding the 465 K.C. signal into the grid of the 78 Mixer Tube.

The trimmers should be very carefully tuned to resonance as they are very critical and will greatly affect the performance of the receiver.

The sensitivity of the I.F. stages should be between 25 and 50 Microvolts.

NOTE BEFORE ALIGNING OSCILLATOR AND RF CIRCUITS

(a) Align the I.F. Stages first.
(b) Always adjust oscillator stage before the R.F. in any particular band.
(c) Before aligning be sure dial pointer is set exactly on the 180 degree line which is the line straight across the middle of the dial with tuning condenser in full maximum position.
(d) Bend the plates on the oscillator section only and only on the broadcast band if necessary.
(e) Seal trimmers with wax.
(f) After the high frequency adjustments have been made on short wave bands, a check may be made by advancing the signal generator to 930 K.C. higher in frequency, which is the image of the receivor oscillator. After increasing the output of the signal generator a signal should be heard which will be an indication that the original adjustment has been made on the correct frequency.

1. Set band switch to 2nd (or highest frequency) band.

Set dial hand to 15 M.C. and adjust trimmer "C" to 15 M.C. fed into antenna.

Align R.F. Circuit trimmers "D", "E" and "K" same frequency.

Now set dial hand to 6 M.C. on same band and adjust padding condenser "F" to resonance.

2. Set band switch to next short wave band -- 5.5 to 1.7 M.C.

Rotate dial hand to 5.5 M.C. and adjust trimmer "G" to 5.5 M.C. signal.

Align R.F. circuit trimmers "H" and "I" to same frequency.

Rotate dial to 1.7 M.C. on same band and adjust padding condenser "J" to resonance.

3. Set band switch to Broadcast position.

With dial hand at 1500 K.C. peak trimmer "L" to resonance.

Peak R.F. Trimmers "M" and "N" to 1500 K.C.

Rotate dial hand to 550 and adjust padding condenser "O" to 550 K.C.

Check dial at 950 to K.C. and bend oscillator plates if necessary at any point to align with calibration of dial.

4. The long wave band is aligned with the band switch set on that band and trimmer "P" adjusted to 390 K.C. will dial hand at 390 K.C.

Adjust R.F. circuits with trimmers "Q" and "R".

Rotate dial to 150 K.C. and align padding condenser "S" to resonance.

5. Beat Oscillator Adjustment

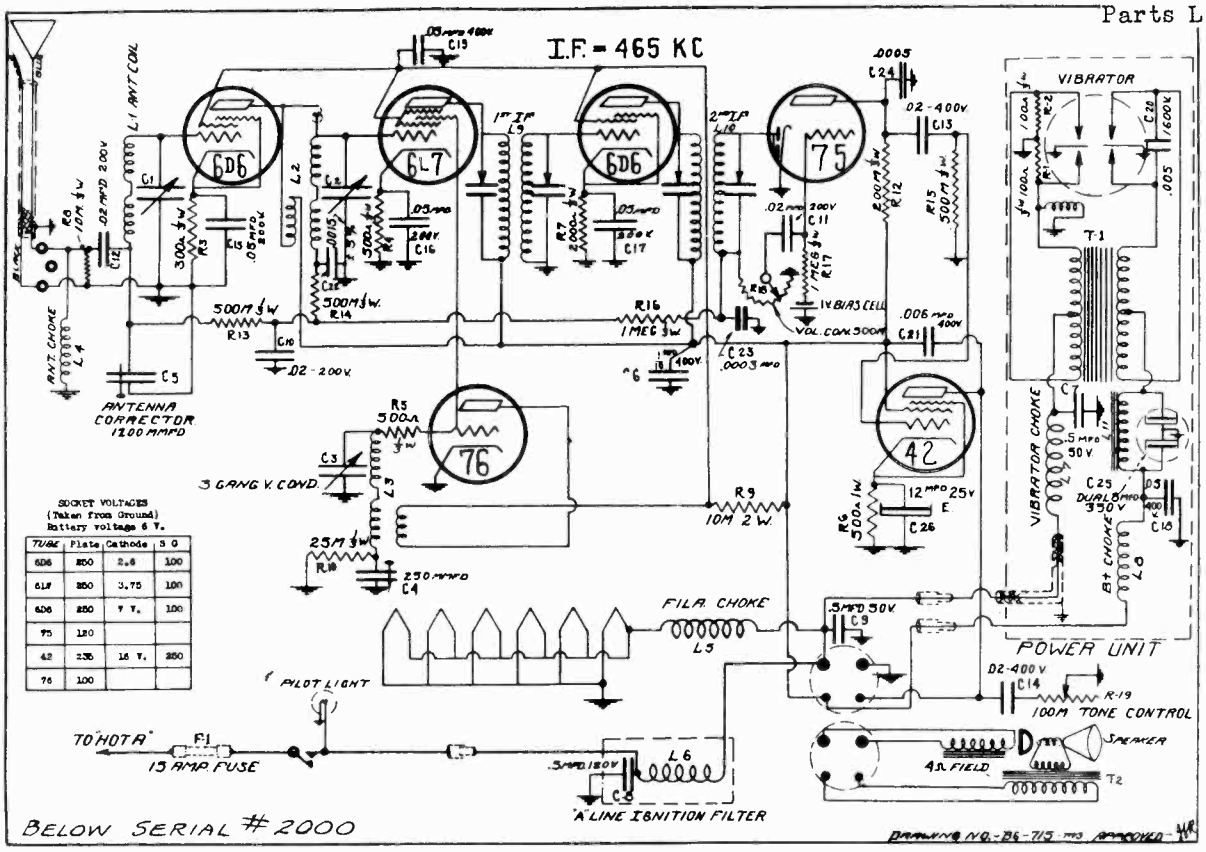
Set dial to some frequency, for example --- 7 M.C. and adjust trimmer "T" until note is heard.

6. The Whistle Trap

Located in the amplifier is the high frequency choke with its trimmer, which has been peaked to 10,000 K.C. at factory.

HOWARD RADIO CO.

MODEL HA-6
Early
Schematic
Parts List



TUBE	Plate	Cathode	S G
6D6	250	2.6	100
6L7	250	3.75	100
6D6	250	7 V.	100
75	120		
42	235	16 V.	250
76	100		

REPLACEMENT PARTS LIST

WHEN ORDERING, USE PART NO. AND DESCRIPTION SHOWN ON THIS LIST REGARDLESS OF NUMBER PRINTED ON PART ITSELF. FOR ALL ORDERS OR COMMUNICATIONS REGARDING THIS RECEIVER ALSO MENTION CHASSIS HA6. PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Part No.	Schematic Location	Description	List Price
7601		Bias Cell - 1 Volt	.20
5600		Cable - Flexible drive with fittings	.85
5532		Cable - Antenna	.50
5530A		Cable - "A" Battery with fuse holder	.50
5533		Cable - Battery and B + lead (inside set)	.32
5531		Short "A" lead (extending from set)	.25
5534		Long "A" lead (extending from drive head)	.60
4302	L11	Choke - filter (power unit)	.92
8523	L1	Coil - Antenna, complete assembly	.85
8524	L2	Coil - Mixer, complete assembly	.85
8525	L3	Coil - Oscillator, complete assembly	.85
8526	L4	Coil - Antenna input choke	.85
8527	L5	Coil - Filament choke	.85
8528	L6	Coil - Ignition choke	.85
8529	L7	Coil - Vibrator primary choke	.85
8530	L8	Coil - B + Choke	.85
8531	L9	Coil - 1st. I.F. Assembly	1.30
8532	L10	Coil - 2nd. I.F. Assembly	1.30
8121	C1 C2 C3	Condenser - variable tuning	3.50
8223	C4	Condenser - Padding 2 stud mounting	.28
8224	C5	Condenser - Padding, single mounting	.28
	C6	Condenser - .1 Mfd - 400 volt	.20
	C7	Condenser - .5 Mfd - 50 volt (power unit)	.40
	C8	Condenser - .5 Mfd - 120 volt	.40
	C9	Condenser - .5 Mfd - 50 volt	.36
	C10 C11 C12	Condenser - .02 Mfd - 200 volt	.16
	C13 C14	Condenser - .02 Mfd - 400 volt	.20
	C15 C16 C17	Condenser - .05 Mfd - 200 volt	.16
	C18 C19	Condenser - .05 Mfd - 400 volt	.20
	C20	Condenser - .005 Mfd - 1600 volt	.36
	C21	Condenser - .006 Mfd - 400 volt	.20
	C22	Condenser - .0015 Mica	.16
	C23	Condenser - .0003 Mica	.16
	C24	Condenser - .0005 Mica	.12
8825	C25	Condenser - Dual 8 Mfd. - 350 volt	1.80
8823	C26	Condenser - 12 Mfd. - 25 volt	.60
		Condenser - .5 Mfd. - 200 volt (can Type for Jenerator)	.40
6226	R18	Control - volume	.90
6225	R19	Control - tone	.75
4568		Coupling - insacup on vari. cond.	.12
6103		Coupling - male for wire leads	.20
6102		Coupling - female for wire leads	.20
		Dial Card - calibrated	.28
5717		Dial Plate	1.15
3415	F1	Fuse - 15 ampere	.30

Part No.	Schematic Location	Description	List Price
7904		Fuse - insulating tube	.04
460		Grid cap - large	.04
6012		Grid cap - metal tube	.04
7809		Grommet - Large rubber - 1/2" ID	.04
7109		Knob - volume control & switch	.60
7110		Knob - large control	.80
4106		Lamp - 6 volt pilor - bayonet type	.12
6420		Mounting Studs for Mtg. plate	.12
9006		Nuts for above	.12
756		Nut - thumb, round, knurled (power unit)	.04
8521		#8 P.K. Screw - hex head 1/4" long	.04
742		#8 P.K. Screw - hex head 3/8" long	.04
882		#6 P.K. Screw - hex head 1/4" long	.04
855		8-32 Headless set screw 1/8" long (couplings)	.04
6418		Cover Screw (Power Unit)	.12
4666		Cable anchor bushing (var. condenser)	.08
4669		Cable anchor bushing (volume control)	.08
820		#8 Washer 1/2" OD	.04
6421		Wing screw - 5/16 - 18 x 3/8" long	.08
7054		Wing screw Washer	.05
	R1 R2	Resistor - 100 ohm 1/3 Watt - Moulded bakelite	.12
	R3	Resistor - 300 ohm 1/3 Watt - Moulded bakelite	.12
	R4 R5	Resistor - 500 ohm 1/3 Watt - Moulded bakelite	.12
3365	R6	Resistor - 500 ohm 1/2 Watt - Wirewound	.15
	R7	Resistor - 2000 ohm 1/3 Watt - Moulded bakelite	.12
	R8	Resistor - 10M ohm 1/3 Watt - Moulded bakelite	.12
	R9	Resistor - 10M ohm 1 Watt - Moulded bakelite	.16
	R10	Resistor - 25M ohm 1/3 Watt - Moulded bakelite	.12
	R12	Resistor - 200M ohm 1/3 Watt - Moulded bakelite	.12
	R13 R14 R15	Resistor - 500M ohm 1/3 Watt - Moulded bakelite	.12
	R16 R17	Resistor - 1 megohm 1/3 Watt - Moulded bakelite	.12
		Resistor - 15M ohm (Distributor suppressor)	.25
4182		Remote control head (for under-dash mounting)	6.50
4018		Worm drive - replacement unit (var. cond.)	1.40
2746		Socket - 6 prong	.14
6008		Socket - 8 prong	.18
2745		Socket - 5 prong	.14
2744A		Socket - 4 prong - phenolic	.25
6003		Socket - 3 prong - antenna	.08
6014		Socket - vibrator	.12
8917		Speaker - 6 inch.	4.50
4321	T2	Speaker transformer - Specify if Jensen or Rola	1.80
4202	T1	Transformer - power	2.50
6331		Tube Shield assembly	.25
6832		Tube Shield ground clip	.18
9600		Vibrator - (synchronous)	3.30
3980		Main Mounting Plate	2.50

MODEL HA-6
Early
Alignment, Notes
Socket, Trimmers

HOWARD RADIO CO.

ALIGNMENT PROCEDURE

PRELIMINARY

Output Meter Connections (Copper Oxide Type Meter) . . Across voice coil
Output Meter reading to indicate 1 Watt output . . . . . 1.73 Volts
Average sensitivity in microvolts for 1 Watt output . . See chart below

Generator ground lead connection . . . . . Receiver Chassis
Dummy antenna value in series with generator output lead See chart below
Connection of generator output lead . . . . . See chart below

Position of volume control . . . . . Full on
Position of tone control . . . . . OFF (or treble position)
Position of dial card at Maximum Capacity . . . . . Max. Setting line

BAND RANGE	POSITION OF DIAL POINTER	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMERS ADJUSTED (in order shown)	MICRO-VOLTS
I.F.Stages	540 KC	465 KC	.1 Mfd.	Trans Grid	C31 C32 C33 C34	1000
Regular	1400 KC	1400 KC	.0002	Ant. Lead	C35 C36 C37	2
Regular	600 KC	600 KC	.0002	Ant. Lead	C4 C5	2

IMPORTANT ALIGNMENT NOTES

1. After adjusting the C4 oscillator padding condenser at 600 KC rotate dial back to 1400 KC and recheck the settings made on C35, C36, C37.

2. It will not be necessary to bend the plates of the variable condenser for alignment on other points on the dial.

3. It should be noted that after the receiver is installed in a car that it is not necessary, when preparing to align the set, to remove the control head and cables from the dash. There is a dial card on the variable condenser that will indicate the alignment frequencies and settings.

GENERAL INFORMATION

To examine this receiver for any reason first remove the two screws holding the cover. The speaker which is mounted on this cover will be removed at the same time allowing further inspection of the tubes and radio. The radio, being designed in two parts, having a pair of wire connectors from the chassis itself to the self contained power unit, can be removed from the case by first taking out the power unit.

The power unit has been very carefully designed to avoid any vibrator "Hash" from being picked up. Due to the exceptional sensitivity of the radio this interference must be kept at a minimum and it is advisable that the cover on the power unit be making good contact to the box. Tighten the cover by bending the flanges inward slightly. Also be sure that the .005 Mfd. 1600 Volt condenser across the vibrator is not open.

It is important that the chassis and power unit make contact to the inside of the receiver case. In addition it is advisable that the paint be removed from under the various bolt heads on the outside of the case that are holding power unit.

Harmonics of the I.F. may be noticed when the chassis is being serviced outside its case. This is a normal condition and will not be present when the set is in actual use.

NOTES ON THE ELIMINATION OF UNUSUAL NOISE CONDITIONS OCCURRING IN THE INSTALLATION IN CERTAIN CARS ARE GIVEN IN SECTION IX OF THE INSTRUCTIONS THAT WERE SENT WITH THE RECEIVER.

Car interference can be fed into the receiver through the flexible control cables, and it is suggested that these cables be bonded. Also see page 6 to this instruction book regarding the use of a shield bracket mounted over the tuning shaft coupling on the set.

In some types of installations (Usually inverted mountings) some receivers may experience extreme loss of sensitivity. If the 2nd I.F. transformer (#8532 as shown on can) does not respond to alignment, it should be replaced with a new type. This condition in the I.F. transformer is caused by the position of the iron core being affected by heat generated within the chassis, and is usually indicated by the softening of the wax within the transformer. The new type I.F. transformer (Part #8542) eliminates this difficulty.

WHEN REPLACING THE 2ND.I.F. UNIT FOR THE REASON AS DESCRIBED ABOVE, IT IS OF COURSE NECESSARY TO READJUST THE TRIMMERS TO 465 KC. WHEN MAKING THE ADJUSTMENT ON THIS UNIT AND LIKEWISE WHEN RE-TRIMMING THE 1ST. I.F. STAGE BE SURE NOT TO PULL THE PLATES TOGETHER TOO TIGHT AS THIS MAY BEND THE PLATES PERMANENTLY OUT OF SHAPE AND THEY WILL NOT SPRING BACK WHEN THE SCREW IS TURNED IN THE OTHER DIRECTION. IN THIS EVENT PEAKING OF THE TRIMMERS WOULD NOT BE OBTAINED, AND THE UNIT WOULD HAVE TO BE REPLACED.

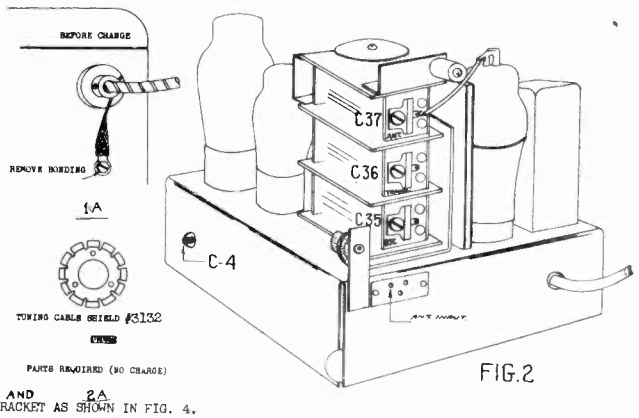
ADDITION OF NEW SPECIAL TUNING CABLE SHIELD (3132) TO ELIMINATE EXCESSIVE IGNITION INTERFERENCE. IN MODEL HA6 SERIES 1.

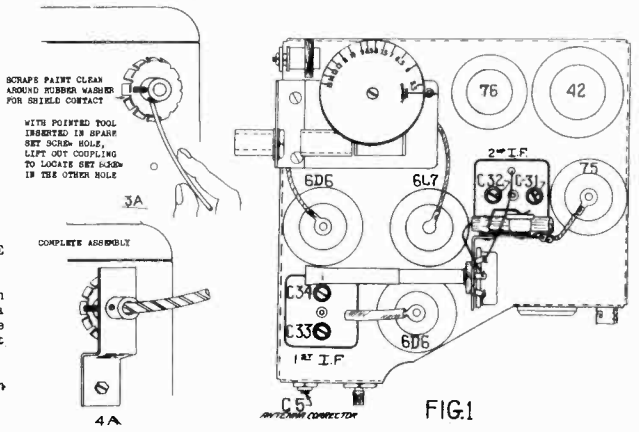
In Ford 1936 V-8 and other automobiles where an excessive amount of ignition noise is present, the bracket described should be used in conjunction with a new type of shield (No. 3132). Both the bracket described and the new type shield described here are necessary for best noise elimination. The bracket and shield need not be ordered for models number above 5000 (series 2).

The new tuning cable shield (3132) will be supplied "No Charge" together with a screw used to fasten it over the tuning cable opening.

SERVICE FIRST AID
EVERY GOOD SERVICEMAN CHECKS TUBES AND THE ANTENNA SYSTEM FIRST.

DEFECT	GENERALLY CAUSED BY	REMEDY
QUALITY POOR	After Checking Voltage, Tubes and Vibrator; Check .02 Condenser in the plate circuit of the 75 tube which may be open	Change if necessary
	Speaker Cone off center	Adjust or change speaker
DEAD RECEIVER	Blown Fuse, Defective Off-On Switch, Open Voice Coil or Speaker Transformer	Check
	Defective Vibrator, Blown Condenser, Open Coil Winding	Check "B" Voltage
LOW VOLUME INSENSITIVE	Poor Antenna System, Receiver not aligned, Speaker Field Coil shorted	Check
	2nd. I.F. Transformer having lost its gain due to the softening of the wax and the shifting of the iron core coupling	Change to new type I.F. (# 8542 on can)
AUDIO OSCILLATION OR HOWL	Possible open .006 in place circuit of 42	Change if necessary
	Variable Condenser not floating freely in its rubber mountings	Free Condenser
RADIO FREQUENCY OSCILLATION	Open C6 bypass condenser .1 Mfd. 400 volt in B - Circuit	Change
	The grid lead between the mixer tube 6L7 and the variable condenser may be too close to the Antenna Stage of the variable condenser (Top Section)	Push lead away
OFF CALIBRATION	Set not properly aligned	Check
	Dial hand not set to maximum line when condenser is at full capacity	Reset screw on back of drive head
SET NOT SELECTIVE	Check Alignment, especially the I.F. stages.	
SLIPPING OF THE VOLUME CONTROL SHAFT	Cable may not be meshed with slot in control shaft due to cable not being far enough in the coupling, or volume control bracket may be bending back at an angle which does not allow the control to meet the shaft slot.	Correct as described





MODEL HA-6
Early
Installation Data
Noise Notes

HOWARD RADIO CO.

I — LOCATING AND INSTALLING THE ANTENNA SYSTEM

On most cars, except those having an all metal top, an antenna already installed may be found. Look under the dash at either corner post where the lead-in from this roof antenna is located (if the car has one). If the lead-in cannot be reached with the fingers, use a stiff piece of wire with a hook bent on the end to bring it into view. See illustration
In the event the car does not have any antenna or if the car is of the all metal roof type (in which a roof antenna will not work), we suggest the use of one of the standard underslung types for mounting under the car. For best results the antenna such as the rod type should be covered with moulded rubber which will eliminate the possibilities of short circuits. Two point suspension and adjustable brackets simplify installation.

NOTE: WHEN INSTALLING THE UNDERSLUNG TYPES OF ANTENNAE ON SOME CARS IT MAY BE FOUND NECESSARY TO REDUCE IGNITION NOISE BY SHIELDING THE LEAD-IN ALL THE WAY FROM THE ANTENNA TO THE RADIO. THIS IS DONE BY USE OF A SPECIAL SHIELDED SLEEVING OBTAINABLE AT ANY RADIO SUPPLY STORE. THIS SHIELDED SLEEVING MUST BE OF THE LOW CAPACITY TYPE AT LEAST OF 3/8" DIAMETER.

The performance of any radio depends on the careful installation of the antenna. Never attempt to tack an aerial to the inside roof of a car having an all metal top or a car that has screen wire between the inside lining and the roof.

Instructions for connecting the antenna lead-in to the radio are given under the "ELECTRICAL CONNECTIONS" in Section V.

II — HOW TO CHECK POLARITY

When the receiver leaves the factory it has been adjusted for use on cars that have the Positive (+) terminal of the storage battery connected to the frame of the car as shown in Figure 3. below. Observe your battery connections. If they are connected as shown in Figure 3. no polarity change is necessary.

SHOULD THE STORAGE BATTERY BE CONNECTED IN THE CAR AS SHOWN IN FIGURE 3A, THE POLARITY OF THE RADIO MUST BE CHANGED AS FOLLOWS:

1. Remove the four screws around the cover of the radio housing. These screws are on the four sides of the speaker opening.

2. Carefully remove cover.

3. Looking into the radio interior, a copper plated box will be seen on the right. This box has a thumb screw in the center, which should be removed. Remove the cover of this box.

4. At the top of the box a round unit will be seen marked (+-) Pull this unit out of its socket.

5. Rotate this unit until the markings are reversed opposite to their position when found. The correct position of the positive and negative markings are shown in Figure 3A.

6. After complete reassembling the receiver is ready to be installed.

III — HOW TO MOUNT THE RECEIVER

Select a position on the partition (between the motor and driver's compartment) that will not interfere with any of the car's controls. The position where the control head is to be mounted on the dash board must also be considered (read Section IV on mounting control head) due to the need of having the control head cables run to and reach the radio with as few bends as possible. The receiver may be mounted right side up or inverted in order to secure the best position. (See receiver and control cables in figure 1).

IV — HOW TO MOUNT THE CONTROL HEAD

1. Insert the flexible cable shown as "B" in Fig. 5 into the coupling of the receiver having a rubber collar around it. To do this, turn either one of the tuning controls on the control head until the flat metal section at the end of cable "B" revolves and seats itself firmly into the coupling. Tighten the set screws on the collar securely.

When the position for the receiver mounting is selected, proceed as follows

1. Hold the mounting plate (shown in Figure 4) in the exact position desired and mark any two of the nine holes shown that will be convenient to drill and accessible on the motor side of the partition. Drill these two holes with a 3/8" drill (a small drill should be used first to start the drilling). IF YOU HAVE A LATE MODEL GENERAL MOTORS OR CHRYSLER CORP.AUTOMOBILE READ THE SPECIAL NOTES ON MOUNTING THE RECEIVER BEFORE DRILLING.

2. On the motor side of the partition scrape clean all rust, dirt, and paint around these holes until bright metal shows.

3. The bolt heads (shown in Figure 4) used to mount the plate in the driver's compartment are of a key type that fit into the slots of the mounting plate. Insert these bolts in their proper mounting plate holes, fit them into their slots, and then tap them lightly with a hammer. Push the bolts through the partition holes. The nuts may then be attached on the motor side and drawn up tightly.

4. To fasten the receiver to the mounting plate, locate the two holes that are indented on the back of the receiver and fit them into the pointed ears on the mounting plate. Secure the receiver into this position by tightening the wing screw on the opposite end of the mounting plate. The complete mounting details are shown in Figure 4A.

SPECIAL NOTES ON MOUNTING RECEIVER

Late model General Motors and Chrysler Corp.automobiles may not require drilling of the partition. These cars usually have knock-out slugs provided in the partition to correspond with certain holes in the mounting plate. It is only necessary to locate these slugs and punch them out from the motor side.

To mount the receiver right side up in General Motor cars, use holes numbered 2 and 3 as shown in Figure 4, or holes numbered 6 and 7 for inverted mounting.

To mount the receiver right side up in Chrysler Corp.automobiles, use holes numbered 1 and 4 as shown in Figure 4. or holes numbered 5 and 8 for inverted mounting.

2. BEFORE ATTACHING CABLE "C", FIRST:- REACH THROUGH COUPLING (THE ONE WITHOUT THE RUBBER COLLAR AROUND IT) WITH A NARROW SCREW DRIVER AND ROTATE THE VOLUME CONTROL SHAFT AS FAR TO THE LEFT AS IT WILL ROTATE. SECOND:- TURN THE KNOB ON THE CONTROL HEAD AS FAR TO THE RIGHT AS IT WILL ROTATE.

   THIRD:- INSERT THE FLEXIBLE SHAFT INTO THE COUPLING, TURNING IT VERY SLIGHTLY IF NECESSARY TO LOCATE THE FLAT PORTION INTO ITS SLOT.

   FOURTH:- AFTER TIGHTENING THE SET SCREW IN THE COUPLING, ROTATE THE CONTROL KNOB ON THE HEAD TO THE LEFT UNTIL THE SWITCH SNAPS. THIS SHAFT ASSEMBLY IS THEN COMPLETE.

3. Raise the control head to a position on the edge of the dashboard. Holding the control head, shift its location slightly to the left or right until you find a position where the cables will not interfere with other car controls.

4. When this position is determined, mark the locations for the two mounting holes as shown by "D" in Fig.5. Drill these two holes with a 3/16" drill and bolt the control head into its permanent position.

SPECIAL NOTE ON MOUNTING CONTROL HEAD

The beauty of the installation may be increased and drilling avoided by using a special plate to mount the Control Head on the dashboard of late model cars. These cars have space provided in the dashboard (such as the space used for an ash tray) into which a special plate, if available for your car, will fit. Information regarding special plates is available in the retail stores. Complete instructions are included.

V — ELECTRICAL CONNECTIONS

Refer to figure #5. Wire lead #1 is a two section wire with the fuse located between the two sections. Connect this wire to a terminal on the ammeter having only one lead already attached. Make this connection short, direct, clean, and tight, using only the required amount of wire and cutting off any not required.

Connect lead #2 as shown by inserting the plug attached to the black wire from the receiver into the socket of the wire from the control head. Press the two sections together firmly and twist to the right.

Cable #3 has a metal braid covering with a three prong plug at one end, to be inserted in the receiver at E in Figure 5. The other end has a blue and black wire together with an extension of the shield (Pigtail). Connect these wires to the car's antenna system as follows:

1. If an antenna was located coming from the corner post of the car, it will probably have an inner wire covered with metal braid. (If it has a plug at its end, cut the plug off). Scrape clean and solder the blue wire of the receiver's antenna lead to the inner wire of the antenna lead in from the car. Be certain these inner wires do not at any time touch the outer shield. See figure 6

2. After the connection has been scraped clean and connected, cover the joint carefully with tape. See figure 7 below.

3. Connect the pigtail of the receiver's antenna wire to the braid of the antenna lead-in from the car. Wrap the pigtail as shown in figure 8 below and solder it with rosin core solder. Do not hold the hot soldering iron too long on the wire when making the connection. Connect the black wire to the most convenient spot on the car's frame or dash board by use of solder or a bolt. This connection must be clean and tight.

VI — HOW TO ELIMINATE CAR NOISE

IMPORTANT:- IT MUST BE UNDERSTOOD THAT IT IS NOT NECESSARY TO ATTACH A FILTER CONDENSER FROM ONE SIDE OF THE AMMETER TO GROUND, AS IS NECESSARY IN MOST RECEIVER INSTALLATIONS, THIS FILTER IS A PART OF THIS SET ITSELF.

THE GENERATOR

Clamp and connect the generator by-pass condenser to the generator frame and the cut-out as shown in Figure 11. below. Be sure that all paint and dirt are scraped away from the spot where the condenser is mounted so that it makes perfect connection to the metal. Use any of the available screws on the generator to mount the condenser.

In some cases, interference will be reduced by connecting the condenser lead to the opposite side of the cut-out. The most suitable position for this lead must be determined by trial.

THE DISTRIBUTOR

Connect the distributor suppressor resistor in the center wire of the distributor by cutting the lead and screwing each free end into the ends of the suppressor. See Figure 12. below.

—— ATTENTION FORD OWNERS ——

No distributor suppressor can be used on the Ford V8. These Models require a special type of distributor condenser which can be secured from your local Ford Dealer. This special distributor condenser bolts to the frame of the distributor and the wire lead connect to the red wire from the distributor.

VII — HOW TO OPERATE THE RADIO CONTROLS

(REFER TO FIGURES 9 AND 10)

1. ON-OFF SWITCH & VOLUME CONTROL

Turning the small control knob to the right will cause a faint click and the dial will become illuminated. Wait about a minute for tubes to become heated before tuning in stations. When absent from car, operation may be prevented by pulling this knob out. Further rotation to the right increases the volume and to the left decreases it. Before making the final desired adjustment, the station should be tuned in as outlined in the following paragraph.

2. STATION SELECTOR DIAL & CONTROL

This receiver will tune in stations operating on frequencies from 540 to 1500 kilocycles. The dial figures with the ZERO omitted, indicate these frequencies. As the station selector control is rotated to the left or right, the red pointer on the dial will indicate the frequency of the station tuned in. (Refer to Figure 9) The correct "tuned in" spot for any station on the dial is the point of clearest reception where no swish is heard on either side.

3. TONE CONTROL

This knurled thumb screw is in position to give the most brilliant reproduction when turned completely to the right. When turned toward the left the reproduction is less brilliant and more mellow. This should be adjusted to the taste of the person using the radio. Less interference will be experienced when in the mellow position.

VIII — FINAL ADJUSTMENTS

(REFER TO FIGURES 9 AND 9A)

DIAL POINTER ADJUSTMENT

1. Rotate the station selector knob completely to the right. When this is done, the red pointer may or may not be completely around. This is normal. Do not force the selector knob.
2. Locate the red pointer adjustment screw as shown in Fig. 9A and turn it with a small screw driver until the red pointer is opposite the black line shown in Fig. 9. When this is done, the red pointer will indicate station frequency accurately.

ANTENNA BALANCER

First, tune in a weak station at or very near to 600 KC on the dial. Second, without changing any other control, insert a small screw driver into the antenna balancer screw shown in Figure 10 and turn it either to the left or right until the volume of the station is at its maximum point.

If a signal generator is used do not attempt to connect to the antenna of car but instead allow some means for signal to radiate (wild) by attaching a small piece of wire to signal generator output terminals. Attention is again called to the fact that a very weak signal must be used for this adjustment.

IX — CAUSES AND REMEDIES FOR UNUSUAL NOISE CONDITIONS

Any ignition noise that might remain will always be more noticeable when no station is tuned in. This is due to the fact that the automatic volume control feature of this receiver is exceptionally good. Sensitivity automatically becomes greater when no station is heard.

IF THE INSTALLATION OF THE STANDARD SUPPRESSOR EQUIPMENT AS GIVEN IN SECTION 6 DOES NOT REMOVE OBJECTIONABLE NOISE THE FOLLOWING ITEMS MAY BE OF ASSISTANCE:

1. Spark plug suppressors as illustrated in Figure 1. may be necessary. These suppressors are rated at 15,000 ohms and are available from the retail stores, or may be ordered from the factory..

CONTINUED ON NEXT PAGE

2. More motor noise will be noticed when the "A" lead is connected in such a way that the receiver current flows through the ammeter.

In many stubborn cases of motor noise trouble it may be advantageous to connect wire #1 shown in Figure 5. to the hot terminal of the starter switch rather than the ammeter terminal. In this case it will be necessary to splice a piece of wire to the end of one furnished. Use a wire no smaller than #12 with good insulation and solder well at splice, also make as short as possible. Should it be necessary to run wire through bulk-head or metal floor boards use a heavy piece of loom insulation to prevent cutting through insulating battery wire.

3. If the low tension wire between the ignition coil and the distributor runs parallel and near to the high tension leads, it must be changed. Run a new wire in its place keeping it as far removed from the high tension leads as possible. It is desirable to run it along the car chassis channels.

4. Check the high tension leads in the distributor and be sure there is no sparking between the ends of the wires and their contacts in the cap. This means that the wires must be pushed all the way down in the cap and leave no gap. Sparking from any of the high voltage leads to ground at any point means noise in the radio.

5. It is sometimes helpful to shield the center high tension lead from the distributor to the bulk-head but if this is done a piece of sleeving or tubing at least 1/2" in diameter must be placed over the wire below the shield is put on as the high voltage otherwise will spark through if the shielding is too close to the wire.

6. In certain cases, interference will be reduced still further by connecting an additional filter condenser ±.Mfd. 200V between the battery side of the ignition coils and the car frame.

7. Excessive gap between the distributor and high tension contacts, also fouled plugs with improperly adjusted gaps are sources of trouble. In other words the whole ignition system should be kept in good condition.

8. Any metal tubes or rods, such as windshield tubing, gas and oil lines, throttle and spark control cables, free wheeling cables, etc., that pass through the dash or bulk-head, should have a piece of heavy copper braid soldered to them and the other end of this braid fastened to the motor side of the bulk-head by means of self threading screws. These pieces of copper braid should be made as short as possible.

9. In some cars the ignition coil or leads come very close to the motor side of the toe board. As a result, interference is picked up by the occupants' body and transferred to the antenna in the roof of the car. Trouble of this sort can often be detected through the fact that the noise increases if the person sitting along side of the driver reaches his hand up to the roof of the car. It can be remedied by tacking a metal plate or screen to the motor side of the toe board or by placing the screen between the floor matting and the toe board. Then connect a piece of wire from this screen to an adjacent metal part of the car or else pass one of the screws that hold the toe board down, through the screen so that it makes an electrical connection to the car frame or body.

10. Very often interference may be fed into the antenna through the dome light wiring. This can be determined by disconnecting the dome light lead from the ammeter or lighting switch. If improvement results connect a condenser, of the same type as was used on the generator, to the dome light lead as near as possible to the point where the lead enters the corner post. Cut the insulation from the lead at this point and solder the wire from the condenser, tape the joint and ground the lug of the condenser can to the nearest point where a good connection to the car frame can be obtained. A small R.F. Choke connected in series with the dome light lead is preferred along with the use of the above mentioned condenser.

11. Make certain that the instrument panel has a good ground connection to the frame of the car. Also the motor block itself, especially in cars with floating power, should have 1/2" wide copper braid bonded from the engine block to the bulk-head, also bond engine to frame. Do not use ordinary wire. Make the leads as short as possible. In extreme cases the steering column has had to be bonded. Clamp down hood when testing for noise.

12. In stubborn cases a good grade mica .002 to .006 condenser connected across the breaker points will reduce interference. Whether or not the noise is being picked up by the antenna or through the chassis can be determined by grounding the antenna lead. If the noise continues it would be due to the interference being fed back through the frame of the car or through the storage battery to the receiver.

13. Wheel or brake noise is probably the most peculiar type of interference and is due to the accumulated static charge. This type of interference is very noticeable while the car is in motion and could very easily be confused with ignition interference. Check for this with the car running at a good speed, turn the ignition switch off and if the noise continues it is due to either this wheel static or a loose electrical connection. To overcome the wheel static condition use graphite grease in the wheel bearings or insert grounding springs in the hub caps. In the case of external brakes, it is necessary to ground the brake bands to the frame of the car.

14. Loose connections are a frequent cause of interference. Make certain that light bulb contacts are clean and that they fit tight in their sockets, and that all battery cable connections are tight and well grounded.

15. In cases, such as the V-8 Fords, it is necessary to pull battery and primary leads out of the special tube which houses high tension leads, shield and ground the shielding of these leads.

16. Accessories such as lighters, electric motor heaters, etc., are often sources of interference. Try a condenser from ground to these various accessories until the interference is located and eliminated.

17. Ignition noise should, if possible, be checked in a location that is free from electrical disturbances such as power lines, electrical equipment, neon signs, street car and elevated lines. This receiver is a very sensitive instrument and will pick up over its antenna system electrical disturbances in its immediate vicinity.

X — HOW TO KEEP RADIO IN GOOD OPERATING CONDITION

1. GENERATOR CHARGING RATE

If the receiver is used very much, and the car has other electrical accessories, such as cigar lighter, spot light, electric windshield wiper, heater, etc., it may be advisable to compensate for the additional drain of the battery by advancing the generator charging rate. This is especially advisable, if the car is driven more at night, when the lights are used, than during the day. If you are not familiar with the method of adjusting the charging rate of the generator, have it done by a competent service station. It is important that the charging rate never be advanced beyond the value specified by the car manufacturer as safe. Failure to observe this precaution may result in a burnt out generator.

2. TO CHANGE THE DIAL LIGHT pull straight out on the dial bulb holder from the back side of the control unit, Replace with a bulb of the same type, 6 volt bayonet socket type.

3. TO CHANGE THE FUSE grasp both ends of the metal container, pushing inward and twisting at the same time. The short end may then be pulled out to remove the 15 ampere fuse. When replacing be sure that the fibre lining is in place around the fuse itself.

4. Inspect all installation connections at frequent intervals to assure yourself that they are tight and clean. This is important.

XI — SERVICE NOTES

THE WIRING DIAGRAM AND REPLACEMENT PARTS LIST will be found inside the set on the side of the power unit case, likewise on the back page of these instruction sheets.

TUBE REPLACEMENT. Remove the front cover to get to the tubes. Also when the cover is removed, a layout diagram will be visable on top of the chassis showing the position of the tubes. (Pull out the speaker plug to avoid damaging the speaker).

For convenience in removing tubes it is suggested that a screw driver be used to pry up on the edge of the tube bases and also that the tubes be removed in the order hereby given:

1st. remove - 6D6 - I.F.
2nd. " - 6L7 - Mixer
3rd. " - 6D6 - Antenna
4th. " - 75 - 1st. Audio
5th. " - 42 - Output
6th. " - 76 - Oscillator

THE TUBES THEREFORE SHOULD BE REPLACED IN THE OPPOSITE ORDER IN WHICH THEY WERE REMOVED.

TO REMOVE THE CHASSIS for any reason, after removing the cover, the power unit (the rectangle box) must be removed first by taking out the three screws holding the unit to the end of the case. Next unfasten the two bayonet connections leading to the chassis. Next remove the two screws from the bottom of the case holding the chassis. Disconnect the two flexible cables, pull out the antenna plug, unhook the "A" wire connector (running between the set and the control head) then the set can be removed.

XII — REPLACEMENT PARTS LIST

THESE AUTHORIZED REPLACEMENT PARTS MAY BE ORDERED THROUGH THE RETAIL STORES. LIST PRICES SHOWN ARE SUBJECT TO CHANGE WITHOUT NOTICE.

WHEN ORDERING, USE PART NO. AND DESCRIPTION SHOWN ON THIS LIST REGARDLESS OF NUMBER PRINTED ON PART ITSELF. FOR ALL ORDERS OR COMMUNICATIONS REGARDING THIS RECEIVER ALSO MENTION CHASSIS HA6.

WHEN NO PART NUMBER IS ASSIGNED ORDER BY DESCRIPTION AND RATING

Part No.	Schematic Location	Description	List Price
7801		Bias Cell - 1 Volt	.20
5800		Cable - Flexible drive with fittings	.85
5532		Cable - Antenna	.50
5530A		Cable - "A" Battery with fuse holder	.50
5533		Cable - Battery and B + lead (inside set)	.32
5531		Short "A" lead (extending from set)	.25
5534		Long "A" lead (extending from drive head)	.60
4302	L11	Choke - filter (power unit)	.92
8623	L1	Coil - Antenna, complete assembly	.85
8624	L2	Coi - Mixer, complete assembly	.85
8626	L3	Coil - Oscillator, complete assembly	.85
8626	L4	Coil - Antenna input choke	.85
8627	L5	Coil - Filament choke	.85
8628	L6	Coil - Ignition choke	.85
8629	L7	Coil - Vibrator primary choke	.85
8630	L8	Coil - B + Choke	.85
8631	L9	Coil - 1st. I.F. Assembly	1.30
8632	L10	Coil - 2nd. I.F. Assembly	1.30
8121	C1 C2 C3	Condenser - variable tuning	3.50
8223	C4	Condenser - Padding 2 stud mounting	.28
8224	C5	Condenser - Padding, single mounting	.28
	C6	Condenser - .1 Mfd - 400 volt	.20
	C7	Condenser - .8 Mfd - 50 volt (power unit)	.40
	C8	Condenser - .5 Mfd - 120 volt	.40
	C9	Condenser - .5 Mfd - 50 volt	.36
	C10 C11 C12	Condenser - .02 Mfd - 200 volt	.16
	C13 C14	Condenser - .02 Mfd - 400 volt	.20
	C15 C16 C17	Condenser - .05 Mfd - 200 volt	.16
	C18 C19	Condenser - .05 Mfd - 400 volt	.20
	C20	Condenser - .005 Mfd - 1600 volt	.36
	C21	Condenser - .006 Mfd - 400 volt	.20
	C22	Condenser - .0015 Mica	.16
	C23	Condenser - .0003 Mica	.16
	C24	Condenser - .0005 Mica	.12
8825	C25	Condenser - Dual 8 Mfd. - 350 volt	1.80
8823	C26	Condenser - 12 Mfd. - 25 volt	.80
		Condenser - .5 Mfd. - 200 volt (can Type for Generator)	.40
6228	R18	Control - volume	.90
6225	R19	Control - tone	.75
4868		Coupling - insacup on vari. cond.	.12
6103		Coupling - male for wire leads	.20
6102		Coupling - female for wire leads	.20
		Dial Card - calibrated	.28
5717		Dial Plate	1.15
3415	F1	Fuse - 15 ampere	.30
7904		Fuse - insulating tube	.04
460		Grid cap - large	.04
9012		Grid cap - metal tube	.04
7809		Grommet - Large rubber - 1/2" ID	.04
7109		Knob - volume control & switch	.80
7110		Knob - large control	.80
4106		Lamp - 6 volt pilot - bayonet type	.12
6420		Mounting Studs for Mtg. plate	.12
9006		Nuts for above	.12
758		Nut - thumb, round, knurled (power unit)	.04
6521		#8 P.K. Screw - hex head 1/4" long	.04
742		#8 P.K. Screw - hex head 3/8" long	.04
882		#6 P.K. Screw - hex head 1/4" long	.04
855		8-32 Headless set screw 1/8" long (couplings)	.04
8418		Cover Screw (Power Unit)	.12
4866		Cable anchor bushing (var. condenser)	.08
4869		Cable anchor bushing (Volume control)	.08
820		#8 Washer 1/2" OD	.04
8421		Wing screw - 5/16 - 18 x 3/8" long	.08
7054		Wing screw Washer	.05
	R1 R2	Resistor - 100 ohm 1/3 Watt - Moulded bakelite	.12
	R3	Resistor - 300 ohm 1/3 Watt - Moulded bakelite	.12
	R4 R5	Resistor - 500 ohm 1/3 Watt - Moulded bakelite	.12
3366	R6	Resistor - 500 ohm 1/2 Watt - Wirewound	.15
	R7	Resistor - 2000 ohm 1/3 Watt - Moulded bakelite	.12
	R8	Resistor - 10M ohm 1/3 Watt - Moulded bakelite	.12
	R9	Resistor - 10M ohm 1 Watt - Moulded bakelite	.18
	R10	Resistor - 25M ohm 1/3 Watt - Moulded bakelite	.12
	R12	Resistor - 300M ohm 1/3 Watt - Moulded bakelite	.12
	R13 R14 R15 R16 R17	Resistor - 500M ohm 1/3 Watt - Moulded bakelite	.12
		Resistor - 1 megohm 1/3 Watt - Moulded bakelite	.12
		Resistor - 15M ohm (Distributor suppressor)	.25
4182		Remote control head (for under-dash mounting)	8.60
4018		Worm drive - replacement unit (var. cond.)	1.40
2748		Socket - 6 prong	.14
6008		Socket - 8 prong	.16
2745		Socket - 5 prong	.14
2744A		Socket - 4 prong - phenolic	.25
6003		Socket - 3 prong - antenna	.08
6014		Socket - vibrator	.12
8917		Speaker - 6 inch.	4.50
4321	T2	Speaker transformer - Specify if Jensen or Rola	1.80
4202	T1	Transformer - power	2.50
8331		Tube Shield assembly	.25
6832		Tube Shield ground clip	.16
9600		Vibrator - (synchronous)	3.30
3960		Main Mounting Plate	8.50

HOWARD RADIO CO.

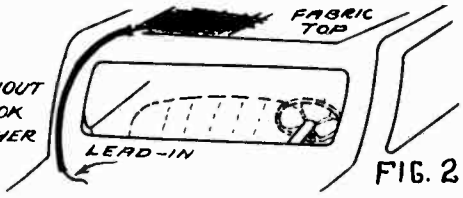
MODEL HA-6
Early
Installation
Data

FIG 1-A

FIG. 1

MODEL HA-6
Early
Installation Data

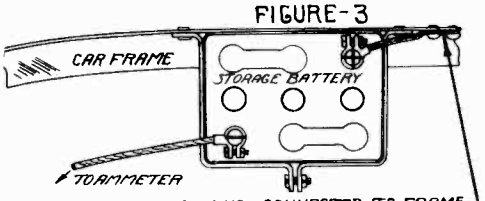
HOWARD RADIO CO.



WITH CARS WITHOUT ALL METAL TOP, LOOK FOR LEAD-IN AT EITHER CORNER POST.

FIG. 2

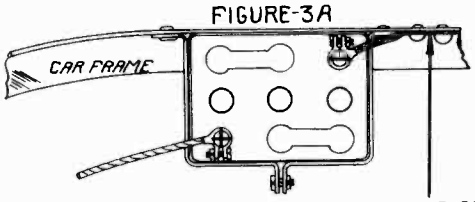
FIGURE-3



POSITIVE TERMINAL CONNECTED TO FRAME

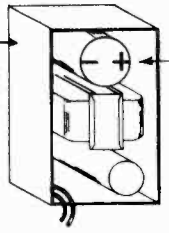
NO POLARITY ADJUSTMENT NECESSARY WHEN STORAGE BATTERY CONNECTIONS ARE MADE TO CAR AS SHOWN HERE.

FIGURE-3A



CAR WITH GROUNDED NEGATIVE AS SHOWN REQUIRES POLARITY CHANGE IN RADIO:-

COPPER PLATED BOX INSIDE RADIO CASE



PULL OUT AND ROTATE + TO THIS SIDE WHEN STORAGE BATTERY IS CONNECTED IN CAR AS SHOWN ABOVE

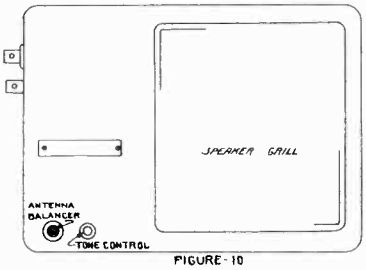


FIGURE-10

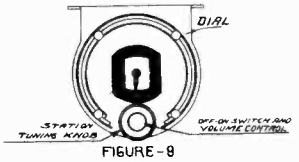


FIGURE-9

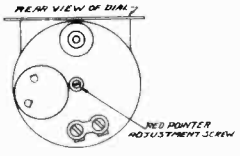


FIGURE-9A

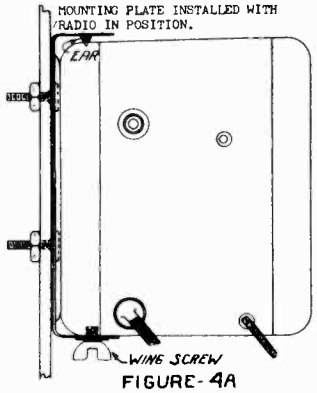


FIGURE-4A

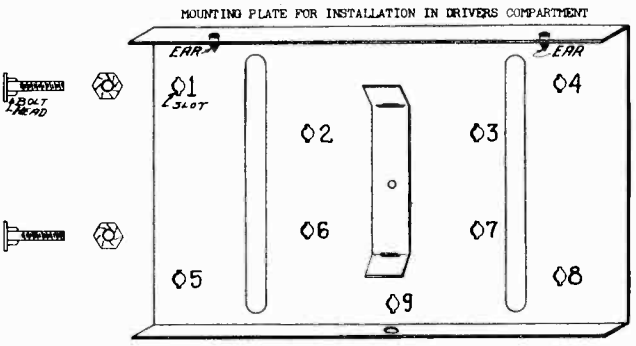


FIGURE-4

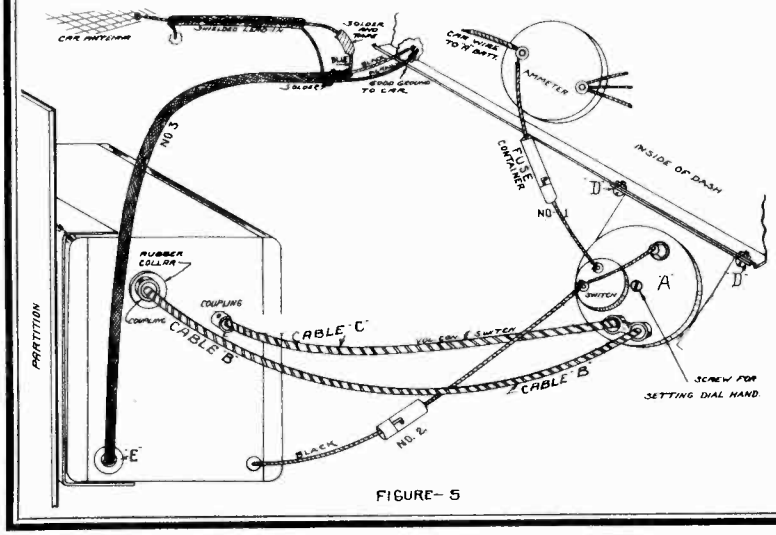
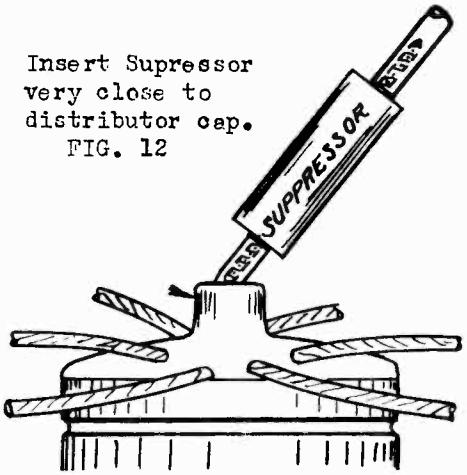


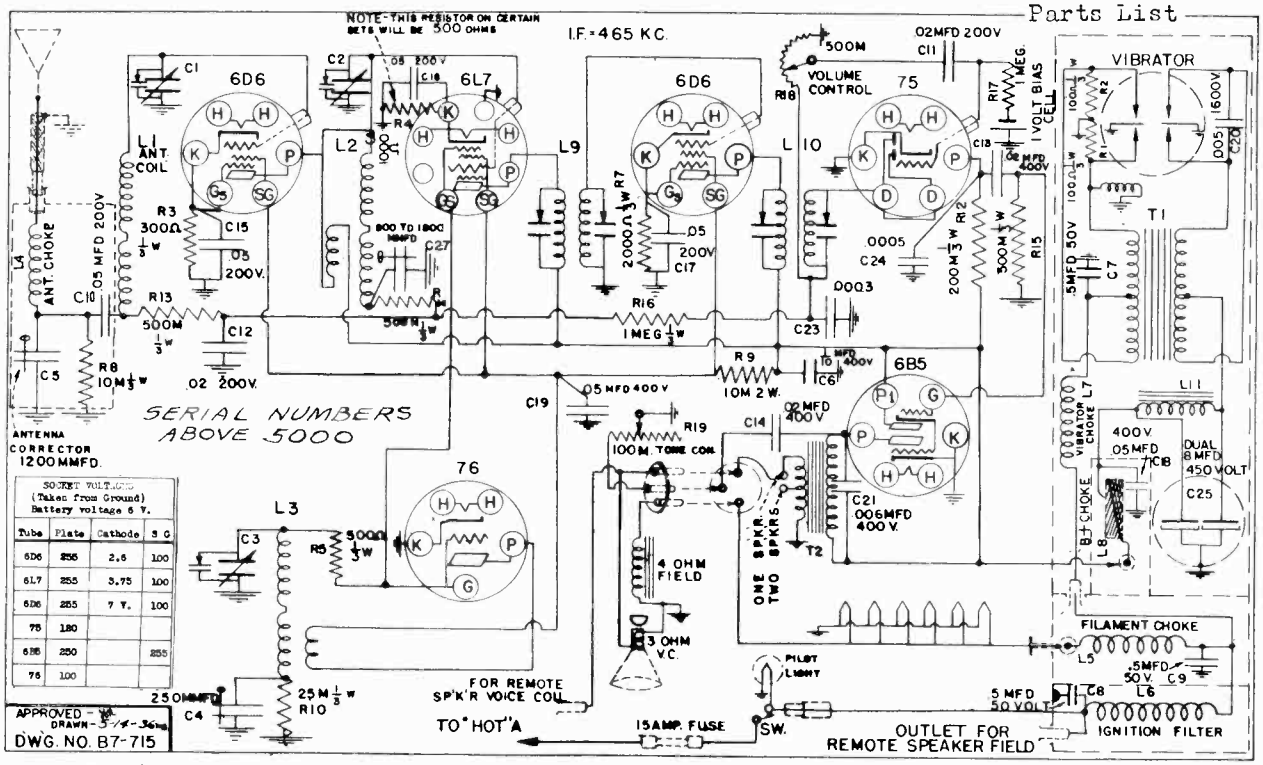
FIGURE-5

Insert Supressor very close to distributor cap.
FIG. 12



HOWARD RADIO CO.

MODEL HA-6
Late
Schematic, Voltage
Parts List



PRICES SUBJECT TO CHANGE WITHOUT NOTICE

REPLACEMENT PARTS LIST

WHEN ORDERING, USE PART NO. AND DESCRIPTION SHOWN ON THIS LIST REGARDLESS OF NUMBER PRINTED ON PART ITSELF. FOR ALL ORDERS OR COMMUNICATIONS REGARDING THIS RECEIVER ALSO MENTION CHASSIS NO. HA62.

Part No.	Schematic Location	Description	List Price
4302	L11	Choke - filter (power unit)	.92
8533	L1	Coil - Antenna, complete assembly	.85
8534	L2	Coil - Mixer, complete assembly	.85
8535	L3	Coil - Oscillator, complete assembly	.85
8536	L4	Coil - Antenna filter choke	.85
8527	L5	Coil - Filament choke	.85
8528	L6	Coil - Ignition choke	.85
8529	L7	Coil - Vibrator primary choke	.85
8537	L8	Coil - B + Choke	.85
8541	L9	Coil - 1st. I.F. Assembly	1.30
8542	L10	Coil - 2nd. I.F. Assembly	1.30
8122	C1 C2 C3	Condenser - variable tuning	3.50
8223	C4	Condenser - Padding 2 stud mounting	.28
8224	C5	Condenser - Padding, single mounting	.28
8225	C27	Condenser - Padding, single mounting	.28
	C6	Condenser - .1 Mfd.-400 volt	.20
	C7	Condenser - .5 Mfd.- 50 volt (power unit)	.40
	C8	Condenser - .5 Mfd.-120 volt	.40
	C9	Condenser - .5 Mfd.- 50 volt	.36
	C11 C12	Condenser - .02 Mfd.-200 volt	.16
	C13 C14	Condenser - .02 Mfd.-400 volt	.20
	C10 C15 C16 C17	Condenser - .05 Mfd.-200 volt	.16
	C18 C19	Condenser - .05 Mfd.-400 volt	.20
	C20	Condenser - .005 Mfd.-1600volt	.36
	C21	Condenser - .006 Mfd.-400 volt	.20
	C23	Condenser - .0003 Mica	.16
	C24	Condenser - .0005 Mica	.12
8826	C25	Condenser - Dual 8 Mfd. 450 volt	1.80
		Condenser - .5 Mfd. - 200 volt (can type for Generator)	.40
6227	R18	Control - volume (with coupling)	.90
6225	R19	Control - tone	.75
4668		Coupling - insacup on variable condenser	.12
6103		Coupling - male for wire leads	.20
6102		Coupling - female for wire leads	.20
1		Dial Card - calibrated	.28
5717		Dial Plate	1.15
3415	F1	Fuse - 15 ampere	.30
7904		Fuse - insulating tube	.04
460		Grid cap - large	.04
6012		Grid cap - metal tube	.04
7609		Grommet - Large rubber - 1/2" ID	.04
7109		Knob - volume control	.60
7110		Knob - tuning	.80
4106		Lamp - 6 volt pilot - bayonet type	.12
6420		Mounting Studs for Mtg. plate	.12

Part No.	Schematic Location	Description	List Price
9006		Nuts for above	.12
6521		#8 P.K. Screw - hex head 1/4" long	.04
742		#8 P.K. Screw - hex head 3/8" long	.04
882		#6 P.K. Screw - hex head 1/4" long	.04
	R1 R2	Resistor - 100 ohm 1/3 Watt - Moulded bakelite	.12
	R3	Resistor - 300 ohm 1/3 watt - Moulded bakelite	.12
	R5	Resistor - 500 ohm 1/3 watt - Moulded bakelite	.12
	R4	Resistor - 1000 ohm1/3 Watt - Moulded bakelite	.12
	R7	Resistor - 2000 ohm 1/3 watt - Moulded bakelite	.12
	R8	Resistor - 10M ohm 1/3 Watt - Moulded bakelite	.12
	R9	Resistor - 10M ohm 2 Watt - Moulded bakelite	.16
	R10	Resistor - 25M ohm 1/3 Watt - Moulded bakelite	.12
	R12	Resistor - 200M ohm 1/3 Watt - Moulded bakelite	.12
	R13 R14 R15	Resistor - 500M ohm 1/3 Watt - Moulded bakelite	.12
	R16 R17	Resistor - 1 megohm 1/3 Watt - Moulded bakelite	.12
		Resistor - 15M ohm (Distributor suppressor)	.25
6017		Plug and clutch assembly (used on connectors)	.25
6018		Plug - 3 prong male - (used on speaker wires)	.25
6016		Plug - (Tipjack with fibre head)	.25
4180		Remote control head (for under-dash mounting)	6.50
4018		Worm drive - replacement unit (var. cond.)	1.40
6015		Socket - Female, single prong	.12
6020		Socket - 2 prong	.12
6019		Socket - 3 prong (speaker)	.12
2745		Socket - 5 prong	.14
2746		Socket - 6 prong	.14
6008		Socket - 8 prong	.16
6014		Socket - vibrator	.12
8918		Speaker - 6 inch.	4.50
4322	T2	Speaker transformer	1.80
4203	T1	Transformer - power	2.50
6331		Tube Shield assembly	.25
6632		Tube Shield ground clip	.16
9600		Vibrator - (synchronous)	3.30
3980		Main Mounting Plate	2.50

MODEL HA-6
Late
Alignment, Socket
Trimmers, Speaker

HOWARD RADIO CO.

FOR INSTALLATION AND OPERATING NOTES SEE MODEL HA-6(Early)

ALIGNMENT PROCEDURE

PRELIMINARY

Output Meter Connections (Copper Oxide Type Meter) . . Across voice coil
Output Meter reading to indicate 1 Watt output . . . . . 1.73 Volts
Average sensitivity in microvolts for 1 Watt output . . See chart below

Generator ground lead connection . . . . . Receiver Chassis
Dummy antenna value in series with generator output lead See chart below
Connection of generator output lead . . . . . See chart below

Position of volume control . . . . . Full on
Position of tone control . . . . . OFF (or treble position)
Position of dial card at Maximum Capacity . . . . . Max. Setting line

BAND RANGE	POSITION OF DIAL POINTER	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMERS ADJUSTED (In order shown)	MICRO-VOLTS
I.F.Stages	540 KC	465 KC	.1 Mfd.	Trans Grid	C31 C32 C33 C34	1000
Regular	1400 KC	1400 KC	.0002	Ant. Lead	C35 C36 C37	2
Regular	600 KC	600 KC	.0002	Ant. Lead	C4 C5 C27	2

IMPORTANT ALIGNMENT NOTES

1. After adjusting the C4 oscillator padding condenser at 600 KC rotate dial back to 1400 KC and recheck the settings made on C35, C36, C37.

2. It will not be necessary to bend the plates of the variable condenser for alignment on other points on the dial.

3. The output meter mentioned above is connected across the voice coil and the voice coil is not opened.

4. It should be noted that after the receiver is installed in a car that it is not necessary, when preparing to align the set, to remove the control head and cables from the dash. There is a dial card on the variable condenser that will indicate the alignment frequencies and settings. Also it is possible to align the set without removing the chassis from the case. There are small holes in the case to reach all trimmers in the R.F. circuits. Likewise there is a spring button on the front cover that can be pulled out to allow examination and setting of the dial position.

5. INABILITY TO PEAK I.F. TRANSFORMER MAY BE DUE TO ABSENCE OF TRIMMER CAPACITY VARIATION, EVEN THOUGH TRIMMER SCREW TURNS. THIS OCCURS WHEN THE I.F. TRIMMER IS TURNED TOO TIGHT, CAUSING THE PLATE TO BECOME PERMANENTLY SPRUNG.

The performance of any radio depends on the careful installation of the antenna. Never attempt to tack an aerial to the inside roof of a car having an all metal top or a car that has screen wire between the inside lining and the roof.

In the event the car does not have any antenna or if the car is of the all metal roof type (in which a roof antenna will not work), we suggest the use of one of the standard underslung types for mounting under the car. For best results the antenna such as the rod type should be covered with moulded rubber which will eliminate the possibilities of short circuits. Two point suspension and adjustable bracket: simplify installation.

NOTE: WHEN INSTALLING THE UNDERSLUNG TYPES OF ANTENNAE ON SOME CARS IT MAY BE FOUND NECESSARY TO REDUCE IGNITION NOISE BY SHIELDING THE LEAD-IN ALL THE WAY FROM THE ANTENNA TO THE RADIO. THIS IS DONE BY USE OF A SPECIAL SHIELDED SLEEVING OBTAINABLE AT ANY RADIO SUPPLY STORE. THIS SHIELDED SLEEVING MUST BE OF THE LOW CAPACITY TYPE AT LEAST 5/8 DIAMETER. See Fig. 1A.

ANTENNA BALANCER

First, tune in a weak station at or very near to 600 KC on the dial. Second, without changing any other control, insert a small screw driver into the antenna balancer screw shown in Figure 10 and turn it either to the left or right until the volume of the station is at its maximum point.

INSTRUCTIONS FOR USING ADDITIONAL REMOTE SPEAKER

If desired, this auto receiver may be also used with an additional remote loud-speaker. This speaker may be mounted in the area directly over the windshield or in any other locality convenient for mounting. Speaker Jack Holes used for connecting an additional speaker are shown in Fig. 10A. THESE JACK HOLES ARE USED ONLY WHEN AN ADDITIONAL SPEAKER IS INSTALLED.

For overhead mounting order Speaker #8922 with cable #5622.

For remote mounting elsewhere order Speaker #8923 with cable #5623.

When an additional remote speaker is used, observe the following instructions:

1. Remove the front cover and observe the position of the plug A as shown in Fig. 13. To use an additional speaker this plug must be removed from the socket it is in, and reinserted into the adjacent socket as indicated by the arrow in Fig. 13A.

2. Replace the cover. Insert the Red coated tip of the speaker cable into the Red coated Jack Hole as shown in Fig. 10A. Insert the other Plain tip of the speaker cable into the Jack Hole on the front of the receiver.

3. The entire length of speaker cable should be well anchored as it runs from speaker to receiver.

TO USE THE REMOTE SPEAKER ONLY

If it is preferred to have only the additional remote speaker operating it will be necessary to disconnect wires on the speaker within the set. This is done after removing the cover by unsoldering the copper braid lead running from the voice coil to ground and likewise the field wire which is at the same point. Tape these wires so they will not touch any metal part and become grounded. With this arrangement the Plug "A" (See Fig. 13-A) will remain as is in position for using one speaker.

FIG. 10

FIG. 10-A

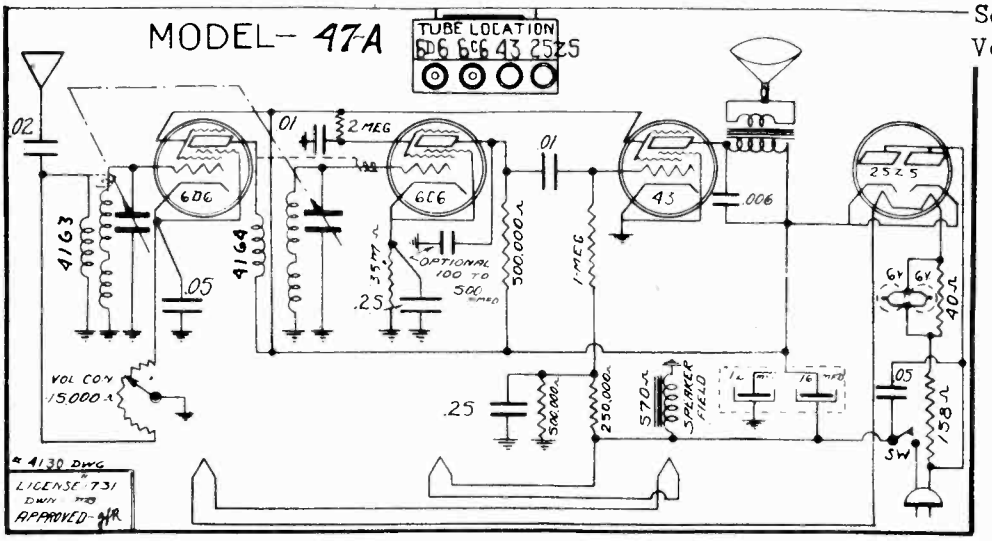
FIG 13-A

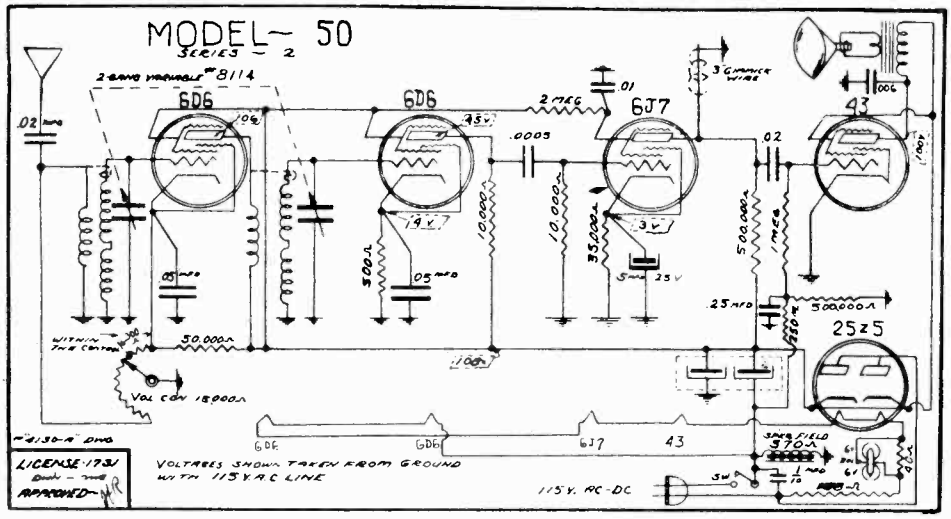
FIG. 3

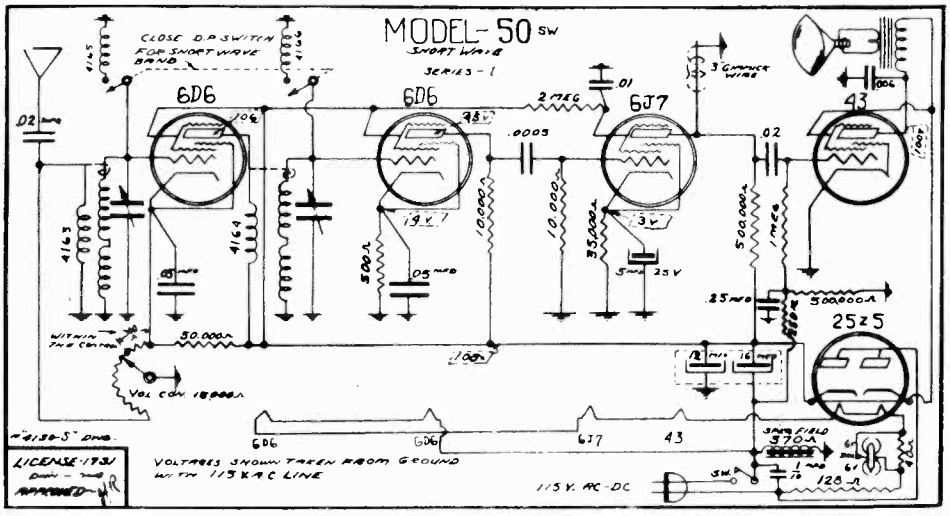
FIG. 4

MODEL 47-A
MODEL 50
MODEL 50-SW
Schematics
Voltage

HOWARD RADIO CO.







SERVICE NOTES

1. The various voltages at the sockets are shown on the schematics. These are taken from ground with a high resistance voltmeter with line voltage at 115 volts. For Model 47-A the voltages will average as follows.

	Plate	S.G.	Cathode	
6-D-6	110V	112V	15V with Volume at Minimum	Cont.
			3V with Volume at Maximum	Cont.
6-C-6	30V		3V	
43	105	112V		

2. The two trimmers on the variable condenser are aligned at 1400 KC on Models 47A, 50 and 50SW.

3. When the variable is at full maximum capacity (all the way to the right) the dial hand should be set above the horizontal dividing line about 1/8" or so that the opposite end of the pointer is on 1700 KC. The hand is adjusted by the set screw and collar on the variable condenser shaft.

4. Should the chassis be serviced at any time it is important to check the position of the pilot light socket brackets and be sure they do not touch the speaker cone on the edges or at any point. They should be in such a position so as to not be forced against the cone by the cabinet panel when installed back in cabinet.

5. The pilot light leads running from the sockets to the resistor should be kept high and away from all nearby wires to avoid pick-up hum.

6. On Model 50SW the short wave range is attained by use of shunt coils with the regular R.F. secondaries.

REPLACEMENT LIST -- Models 47A-50-50SW

Part No.	Description PRICES SUBJECT TO CHANGE WITHOUT NOTICE	Price
4163	Coil - Antenna	1.18
4164	Coil - R.F.	1.18
8106	Condenser - Two Gang for Model 47A only	2.00
8114	Condenser - Two Gang for Models 50 & 50SW only	2.00
8812	Condenser - 16-12 Mfd. Electrolytic	1.00
3003	Condenser - 5 Mfd. 25 Volt Electrolytic	.40
2756	Condenser - .1 Mfd. 400 Volt	.20
3512	Condenser - .01 Mfd. 400 Volt	.20
3517	Condenser - .02 Mfd. 400 Volt	.16
2183	Condenser - .05 Mfd. 200 Volt	.18
2475	Condenser - .25 Mfd. 200 Volt	.18
3515	Condenser - .006 Mfd. 400 Volt	.24
2280	Condenser - .0005 Mfd.	.12
3410	Condenser - .00005 Mfd.	.11
3335	Resistor - 1 Megohm 1/4 Watt	.11
3359	Resistor - 2 Megohm 1/4 Watt	.11
2763	Resistor - 500M ohms, 1/4 Watt	.11
1824	Resistor - 250M ohms, 1/2 Watt	.12
1843	Resistor - 50M ohms, 1/4 Watt	.11
3349	Resistor - 10M ohms, 1/4 Watt	.11
3356	Resistor - 35M ohms, 1/4 Watt	.11
1890	Resistor - 500 ohms, 1/2 Watt	.12
3361	Resistor - 42 ohms, Candohm	.20

REPLACEMENT PARTS LIST -- MODELS 57A-60-Short Wave Models

Part No.	Description	Price
8107	Two Gang Condensers Cut Plate 456	2.00
4150	Antenna Coil for Models 57-A & 60 only	1.18
4151	Oscillator Coil for Models 57-A & 60 only	1.18
4152	Antenna Coil for SW Models only	1.18
4153	Oscillator Coil for SW Models only	1.18
3361	Candohm - 40 Ohm	.20
8213	Three Section Trimmer	.75
3681	Antenna Coil Complete	3.50
3682	Mixer Coil Complete	3.50
8210	Adjustable Condenser	.40
2366	Condenser .0001 Mica	.12
2280	" .0005 "	.12
8815	" Dual Electrolytic 16-8 Mfd. 200 Volt	1.00
8816	" 8 Mfd. Electrolytic 200 Volt	.50
3513	" .02 Tubular 200 Volt	.20
2183	" .05 " 200 Volt	.20
2319	" .1 Tubular 200 Volt	.20
2756	" .1 Tubular 400 Volt	.20
3512	" .01 Tubular 400 Volt	.20
3512	" .006 Tubular 400 Volt	.20
2475	" .25 Tubular 200 Volt	.20
1843	Resistors 50,000 ohm 1/5 Watt	.12
3349	" 10,000 " 1/3 "	.12
2761	" 300 " 1/5 "	.12
2763	" 500,000 " 1/5 "	.12
3352	" 1 meg " 1/5 "	.12
1844-A	" 100,000 " 1/5 "	.12
1747	" 50,000 " 1/3 "	.12

PARTS FOR E57 LONG WAVE MODEL ONLY

8106	Variable Condenser	2.00
3644	Long Wave Oscillator Coil Complete	1.00
3645	Long Wave R.F. Coil Complete	1.00
3646	Broadcast Oscillator Coil Complete	1.00
3647	Broadcast R.F. Coil Complete	1.00
4038	Dial Complete	.82
5807	Band Switch	.38
8215	Trimmer Condenser 50-150 MMFD	.20
8216	Trimmer Condenser 250-550 MMFD	.20
3127	Trimmer 0-30 MMFD.	.18

NOTES ON E-57 LONG WAVE

1. The service notes given on previous page on standard 57 models apply to the E-57 long wave model generally.

2. The proceedure in aligning the set is the same except that the regular Broadcast band 540 to 1500 KC must be aligned before the long wave band.

   The Broadcast band oscillator padding condenser on this model is located near the center of the chassis and mounted through the back side of chassis.

3. To align the 150 to 350 KC band, set dial hand to 300 KC and peak oscillator trimmer (this trimmer is the one behind the variable condenser and under the 6-A-7 tube) to 300 KC.

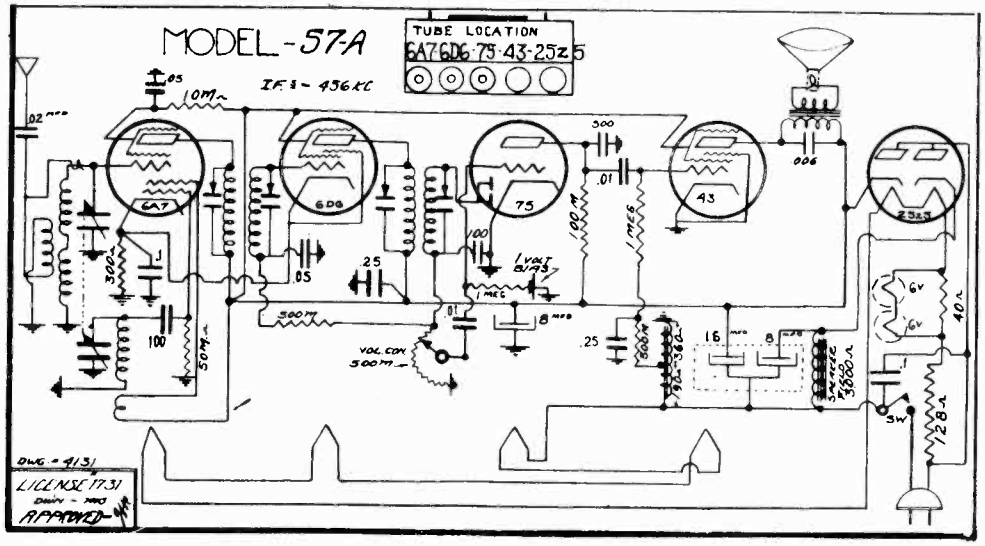
   Peak the R.F. trimmer (the one near the top of the chassis directly over the variable condenser) to 300 KC after the oscillator trimmer has been set.

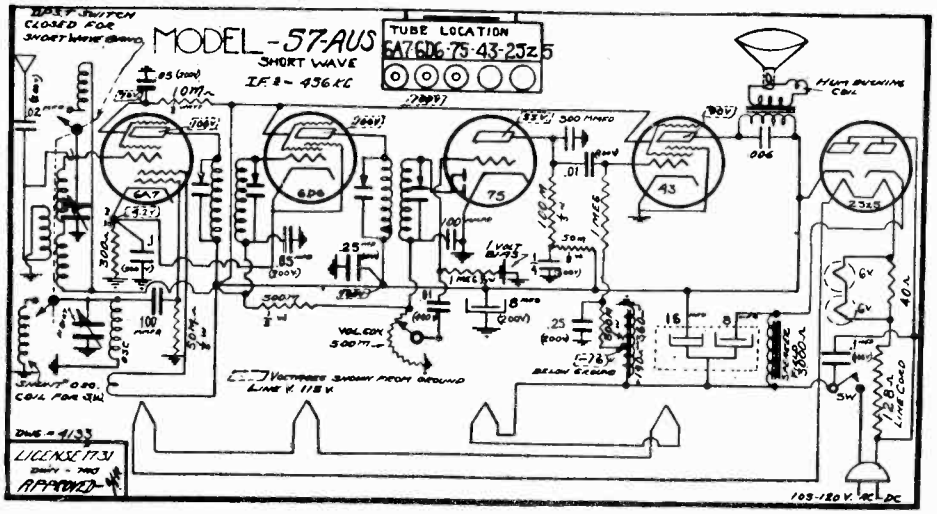
4. Rotate dial to 150 KC and peak oscillator padding condenser to 150 KC this is the condenser mounted through the front of the chassis below the dial.

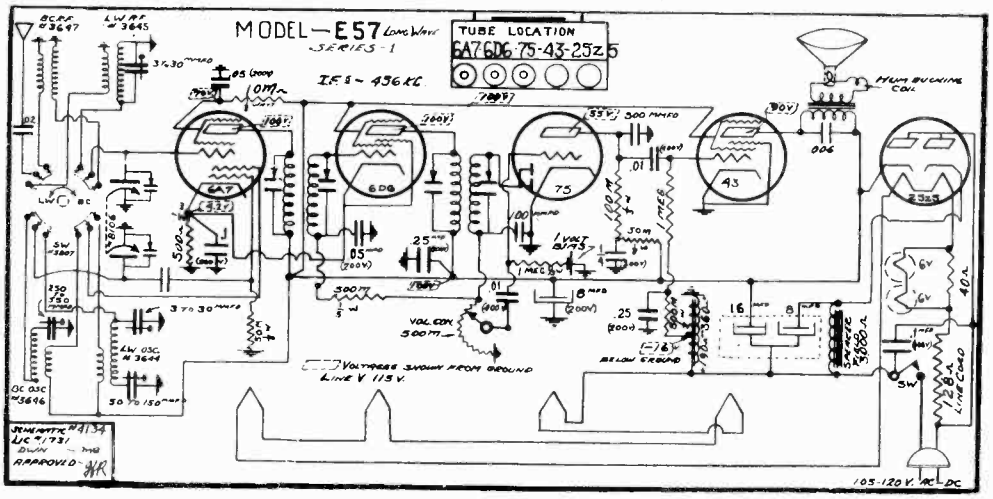
MODEL E-57
Schematics
Voltage

HOWARD RADIO CO.

MODEL 57-A
MODEL 57-AUS

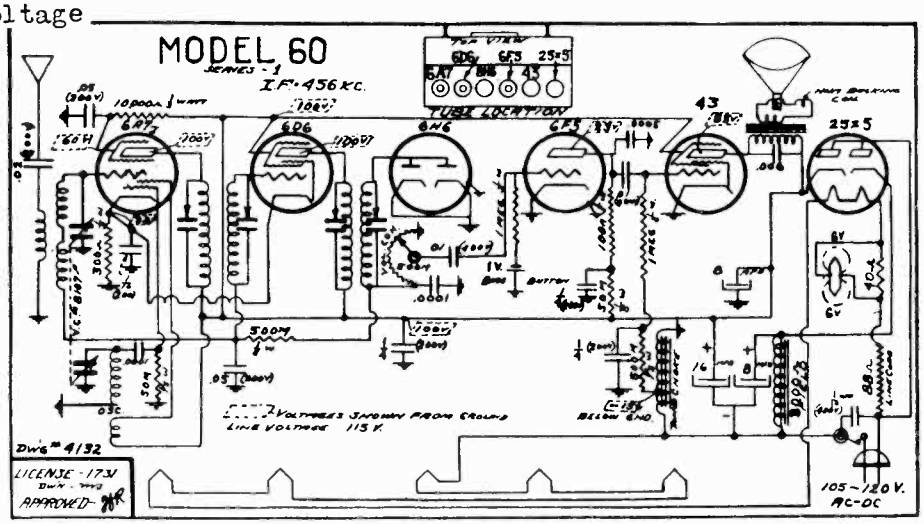


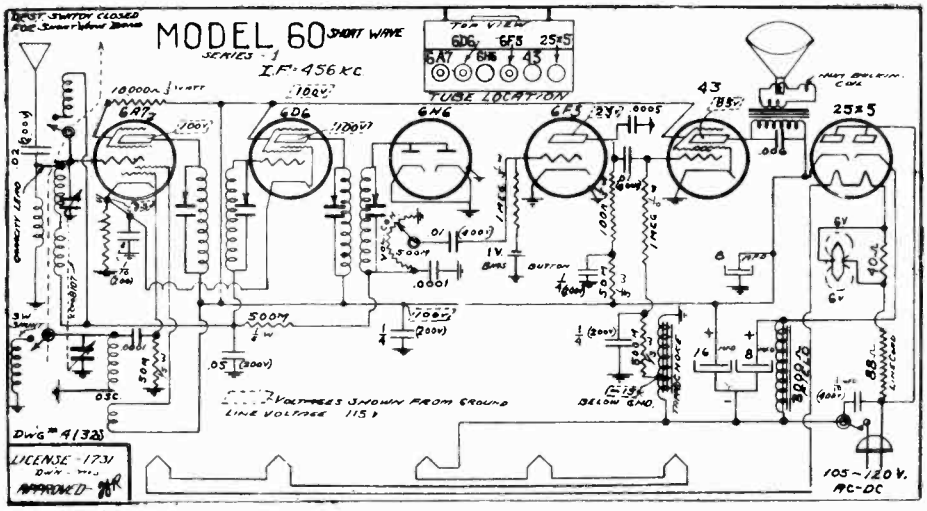




MODEL 60
MODEL 60-SW
Schematics, Voltage
Socket, Notes
MODEL 57-A
Notes

HOWARD RADIO CO.





FOR PARTS LIST SEE INDEX

SERVICE NOTES ON MODELS 57-A, 60 AND SHORT WAVE MODELS

1. See the schematics for the various voltages at the sockets.

2. Should the chassis be serviced at any time it is important to check the position of the pilot light socket brackets and be sure they do not touch the speaker cone on the edges or at any point. They should be in such a position so as to not be forced against the cone by the cabinet panel when installed back in cabinet.

3. The pilot light leads running from the sockets to the resistor should be kept high and away from all nearby wires to avoid pick-up hum.

4. The Short Wave Models attain the range by use of shunt coils across the R.F. and oscillator secondaries.

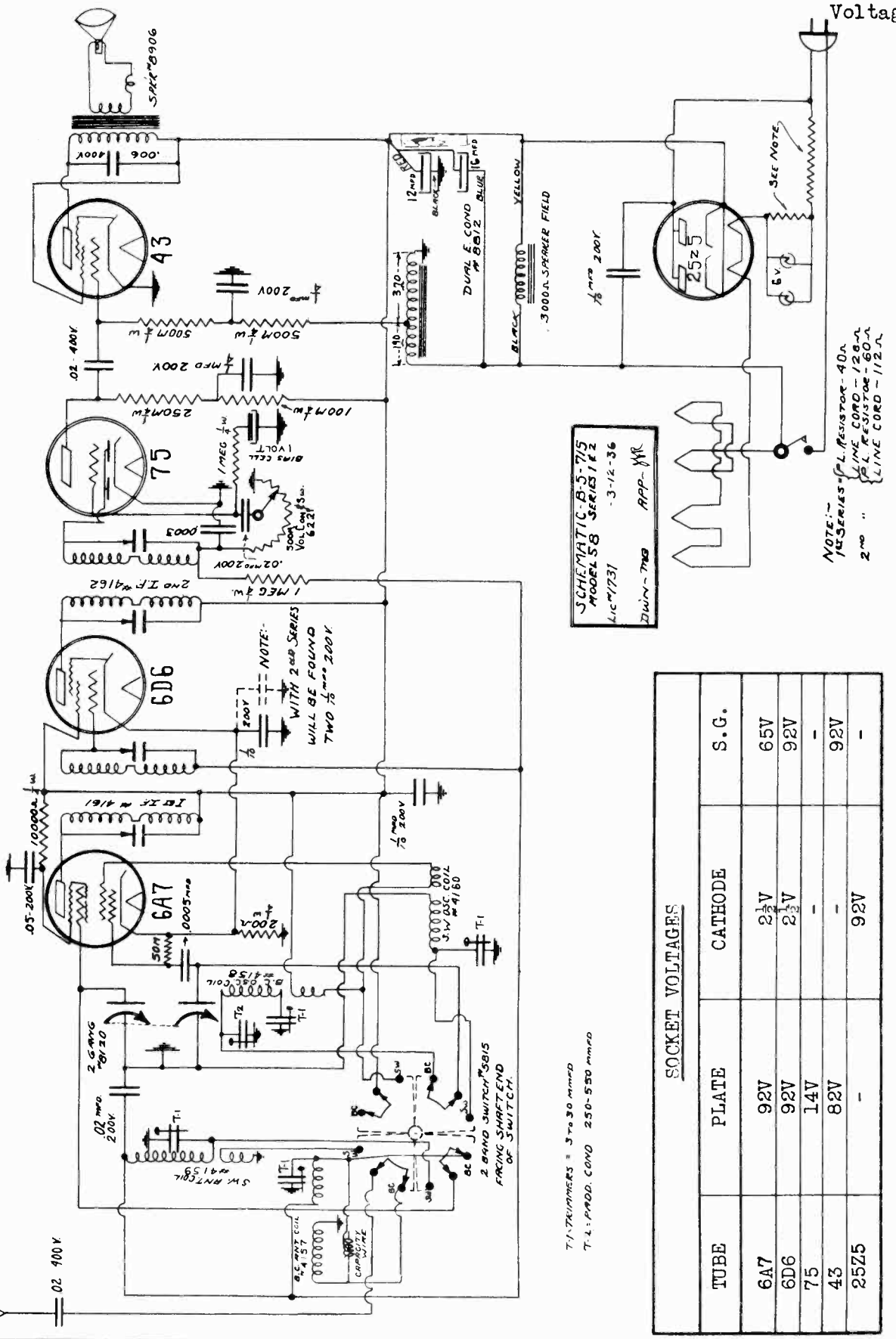
5. The Intermediate Frequency transformers should be aligned to 456 KC.

6. When the variable condenser is a full capacity (all the way to the right) the dial hand should be set on the horizontal dividing line.

7. The back section of the two gang condenser is the oscillator section and the trimmer should be peaked at 1400 KC and then peak the R.F. trimmer (Front section) to 1400.

HOWARD RADIO CO.

MODEL 58
Schematic
Voltage



SOCKET VOLTAGES

TUBE	PLATE	CATHODE	S.G.
6A7	92V	2½V	65V
6D6	92V	2½V	92V
75	14V	-	-
43	82V	-	92V
25Z5	-	92V	-

Taken from ground with line voltage at 115 V.

MODEL 58
Alignment
Socket, Trimmers
Parts List

HOWARD RADIO CO.

Part No.	PRICES SUBJECT TO CHANGE WITHOUT NOTICE Description	Price
7601	Bias Cell - 1 Volt	.20
4157	Coil - Antenna B.C.	.56
4158	Coil - Oscillator B.C.	.35
4159	Coil - Antenna S.W.	.40
4160	Coil - Oscillator S.W.	.40
4161	Coil - 1st. I.F. Complete with can and grid cap	.90
4162	Coil - 2nd. I.F. Complete with can and grid cap	.90
4320	Choke - 560 ohm, tapped at 190 ohms	1.00
5525	Cord - line, 128 ohms	.64
5527	Cord - line, 112 ohms	.64
8120	Condenser - variable, 2 gang	2.25
8812	Condenser - 16-12 Mfd. Electrolytic - 200 volt	1.00
8216	Condenser - Padding 250-550 Mmfd.	.20
3127	Condenser - Trimmer 3-30 Mfd.	.18
2319	Condenser - .1 Mfd. 200 Volt	.16
3513	Condenser - .02 Mfd. 200 Volt	.16
3517	Condenser - .02 Mfd. 400 Volt	.20
2183	Condenser - .05 Mfd. 200 Volt	.16
2475	Condenser - .25 Mfd. 200 Volt	.16
3515	Condenser - .006 Mfd. 400 Volt	.24
8304	Condenser - .0003 Moulded Mica	.12
3410	Condenser - .00005 Moulded Mica	.12
6221	Control - Volume and switch - 500M ohms	.92
4063	Dial card - calibrated	.35

REPLACEMENT PARTS LIST

4014	Dial hand and screw	.10
4057	Drive disc - 1/4" hub (pyralin)	.30
4056	Dial glass	.15
7112	Knob - plain	.15
7113	Knob - coded (specify colors)	.17
1919-A	Lamp - dial - 6 volt (brown bead)	.12
3340	Resistor - 200 ohms - 1/4 Watt	.12
2765	Resistor - 10M ohms - 1/4 Watt	.12
1843	Resistor - 50M ohms - 1/4 Watt	.12
3327	Resistor - 100M ohms - 1/4 Watt	.12
3355	Resistor - 250M ohms - 1/4 Watt	.12
3328	Resistor - 500M ohms - 1/4 Watt	.12
3335	Resistor - 1 Megohm - 1/4 Watt	.12
3361	Resistor - 40 ohm candohm	.20
3362	Resistor - 60 ohm candohm	.20
2746	Socket - 6 prong	.14
2747	Socket - 7 prong	.14
4030	Socket - pilot light (slotted)	.14
8906	Speaker - 5" - 3,000 ohms	3.75
5815	Switch - 2 band	.60
6600	Tube shield - base	.04
6601	Tube shield - shell	.08
6602	Tube shield - top	.04
2463	Wire - 20 Ft. antenna roll	.20

THE ALIGNMENT PROCEDURE

The following alignment instructions are given with the assumption that the service station has a signal generator capable of accurately covering the range of the receiver.

The only other apparatus necessary is a meter connected in the output stage to indicate resonance. This can be a 0 to 3 volt AC meter connected across the voice coil of the speaker or preferably an output meter connected in the plate circuit of the 42 power tube in series with an 8 MFD paper condenser.

The schematic circuit of the set will be found on the back side of the chassis.

1. THE I.F. STAGES

The I.F.'s are aligned by the usual system of feeding the intermediate frequency of 465KC into the grid of the 6A7 tube.

The two trimmers in each of the I.F. cans should be very carefully peaked to resonance as they are very critical and will greatly affect the performance of the set. These are trimmers number C1, C2, C3, C4. (See pictorial diagram).

The sensitivityof the I.F. stages will be 25 microvolts for a 50 milliwatt output.

Always use as low an output as possible from the signal generator in making the various adjustments.

2. ALIGNMENT OF SHORTWAVE BAND 5.5 TO 18 M.C.

First check the position of the dial hand by rotating the tuning knob to the left to full capacity. At this point the dial hand should be straight across in line with the lines dividing the scale in half. If the hand is off position it can easily be lined up by removing the dial glass to get at the screw holding the dial hand.

1. Turn wave band switch all the way to the right for the Short Wave Band.
2. Tune dial hand to 17 megacycles.
3. NOTE: FOR ADJUSTMENT AT 17 MEGACYCLES THE OUTPUT FROM THE SIGNAL GENERATOR MUST NOT BE COUPLED DIRECT TO THE ANTENNA LEAD OF THE SET. FOR TRUE ALIGNMENT STRETCH OUT THE RADIO ANTENNA LEAD IN SUCH A MANNER THAT IT WILL PICK UP THE SO CALLED "WILD" SIGNAL OF 17 MEGACYCLES EXITTING FROM THE GENERATOR. IT IS ALSO IMPORTANT THAT THIS SIGNAL ONLY BE STRONG ENOUGH TO JUST BE HEARD.
4. When the above set-up is arranged peak oscillator condenser C5 to the 17 megacycle weak signal.
5. After adjusting the oscillator trimmer, peak the S.W. antenna condenser C6 to 17 megacycles.

NOTE: After adjusting the short wave band at 17 megacycles, the signal generator output to antenna should be increased and receiver dial advanced to .9 megacycle lower and note if test oscillator signal is heard.

In case there is no response the oscillator trimmers have been pulled down too tightly. The trimmers should be released until this condition exists then go back to original point of alignment - reduce antenna input voltage and correct the trimmer adjustment.

EXAMPLE: The receiver has been adjusted to 17 megacycles. Tune receiver to approximately 16.9 MC.

Increase oscillator signal by "opening up" the attenuator. Move the dial back and forth at 16.9 MC.

If no signal is heard, let oscillator trimmer off until it is heard at 16.9 MC.

Reduce signal voltage from generator, go back to 17 MC and slightly correct this last trimmer adjustment.

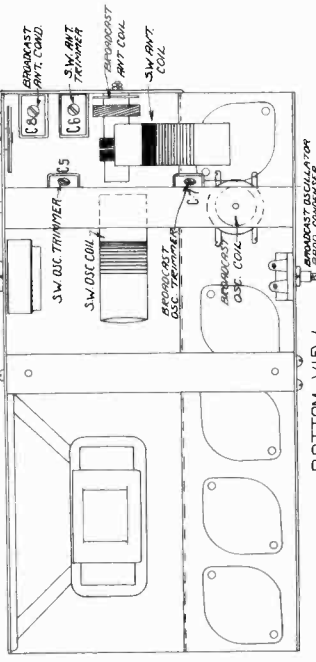
3. THE BROADCAST BAND

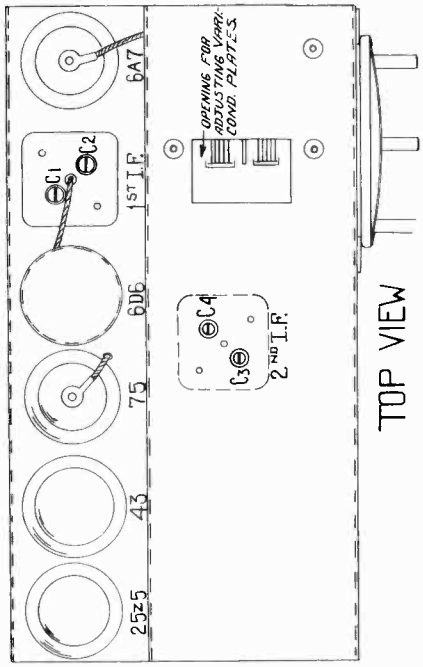
1. Turn wave band switch all the way to left and dial hand set to 1400 KC (the top scale). The signal generator may be coupled direct to the antenna lead on this band, through a standard 200 MMFD Condenser.
2. Peak oscillator trimmer C7 to 1400 KC from the signal generator.
3. Peak antenna trimmer C8 to 1400 KC after adjusting oscillator.

4. Set dial hand to 550 KC and adjust oscillator padding condenser C9 to 550 KC.
5. Recheck dial at 1400 KC as in Section 1.
6. Points in the middle of the dial may be checked and if necessary the plates of the back section (oscillator) of the variable condenser may be bent for alignment.

4. NOTES

1. Seal all trimmers after their final adjustment.
2. Be sure that the settings are being made to the true fundamental signal from the oscillator and not on a harmonic or image frequency.
3. Refer to the chart included for the voltages at the tube sockets.



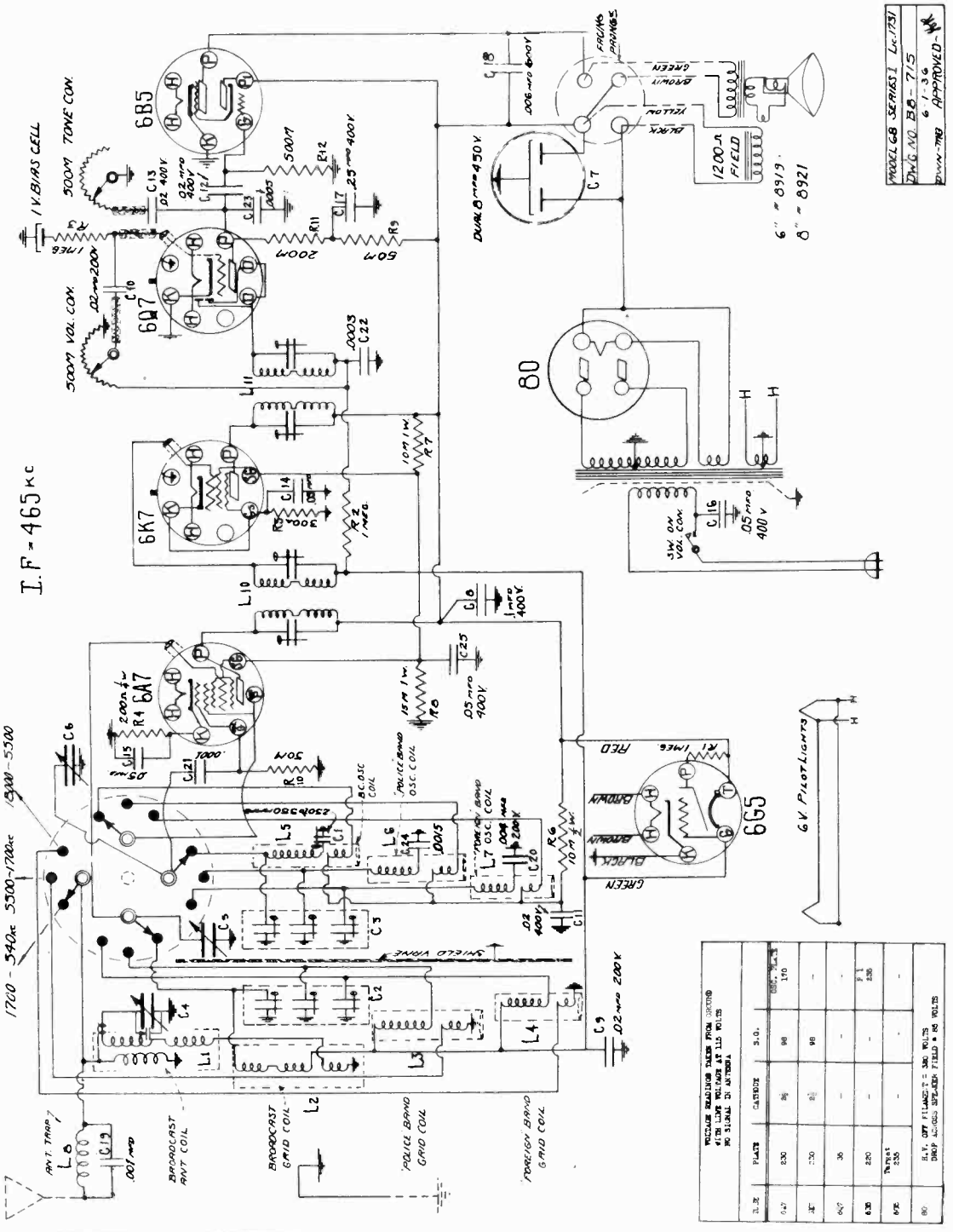


HOWARD RADIO CO.

MODEL 68
Schematic
Voltage

THE TUNING EYE

The movement of the tuning eye or resonance indicator is easily understood, as the station is tuned in, the green sections of the eye will draw together or tend to draw together depending upon the strength of the station. Rotate the tuning knob back and forth until the exact resonance point is found.

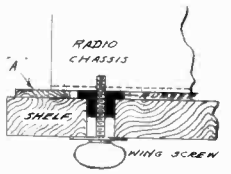


INSTRUCTIONS No. 68
FOR
ALL WAVE SUPERHETERODYNE
TABLE AND CONSOLE MODELS

INSTALLATION

Preparing The Receiver:

The chassis is floated on cushion rubber within the cabinet. However, for shipping purposes this mounting is made rigid by means of wooden strips (A) inserted at the two sides of the chassis, between the chassis and the shelf of the cabinet.



Before operating the receiver, it is necessary to remove these wooden strips. Loosen the four wing screws, one at each corner of the chassis.

USE ONLY WITH ALTERNATING CURRENT

Unless otherwise specified on back of chassis, this receiver is for use only with 105 to 120 Volts Alternating Current.

Antenna and Ground:

The ANTENNA should be about 75 feet in length, including lead-in, and as high as convenient. The BROWN lead extending from the right side of the chassis is the Antenna Lead.

The GROUND is the BLACK lead, and should have a good connection to a water pipe.

OPERATION

Important:

Read the following OPERATING INSTRUCTIONS very carefully and take time to thoroughly understand them. You will be well repaid by the finer performance that you can secure from the receiver, particularly on short waves.

The receiver has four operating controls (refer to diagram on next page). The knob of each control is clearly marked as to its function.

The knob with the three individual colors correspond to the three different colored band ranges covering all frequencies from 540 to 18,000 KC. (On the two short wave ranges the numerals are abbreviated to megacycles). Try the set first on the regular Broadcast band, with the white marker on the knob in the straight up position.

First turn the set on by rotating the combination OFF-ON switch and VOLUME control knob slightly to the right. Further rotation regulates the volume after the station has been tuned in with the TUNING knob.

NEVER REGULATE THE VOLUME BY DETUNING THE STATION, USE THE VOLUME CONTROL.

THE TONE CONTROL when turned to the left softens the tone. This can be set to any position that suits the individual.

TUNING ON THE POLICE AND AMATEUR BAND
(1.7 to 5.5 Megacycles)

Set the band switch to the middle position which is for the blue colored scale.

Rotate the tuning knob slowly until a station is tuned in. This scale is calibrated in megacycles. (One megacycle equals 1000 kc.) If the frequency of a desired station is known, it can be tuned in at the corresponding frequency marking on the dial. In addition to this frequency calibration, there are lettered blocks on this scale. The Station Selector knob must be turned more slowly and carefully for stations on this band than is necessary for the conventional Broadcast Stations.

TUNING ON THE U.S.A. AND FOREIGN SHORT WAVE BAND
(5.5 to 18 Megacycles)

Set the band switch all the way to the right bringing the yellow colored marker in position for the yellow scale.

Rotate the tuning knob very slowly until the desired station is heard. This scale is calibrated in megacycles. Many code stations of all kinds also will be heard. The tuning knob must be turned more slowly and carefully for reception on this band than for reception on the other two bands. The use of a Short Wave "Log" will be of great assistance in picking up Short Wave Stations. Such "logs" list the location, frequency and operating schedule of Short Wave stations.

NOTES ON SHORT WAVE RECEPTION

Short wave reception with ANY short wave receiver differs markedly, in many respects, from the usual broadcast reception. Fading is very much more pronounced. Quite often it is very rapid, making the voice or music seem to flutter. Electrical disturbances are more bothersome. Even the ignition systems of passing automobiles may cause interference on the very short waves.

The difference in time between the United States and foreign countries must constantly be borne in mind when trying for foreign broadcast reception. For instance, when it is 11 P.M. in New York City, it is 4 A.M. of the NEXT day in London and Paris, but early afternoon of the SAME day in Japan and Australia. This difference in time must be remembered constantly for two reasons. First, in order to determine whether or not it is a likely time of day for the foreign station to be broadcasting. Second, because the TIME OF DAY largely determines the portion of the dial that will prove most productive of results for foreign broadcast reception.

Usually, the part of the dial toward the highest frequency end is useful mainly when the path between the broadcast station and the receiver is totally in daylight. Therefore, attempts to obtain good reception on these frequencies at night usually are unsuccessful. The portion of the dial toward the low frequency end will be best when the path between the broadcast station and the receiver is in total darkness. The middle portion of the dial will bring in stations whose path lies partly in daylight and partly in darkness. Keeping the difference in time in mind, the path between a broadcaster in some particular part of the world and your own receiver can be visualized and the proper part of the dial used.

To illustrate, at 4 o'clock in the afternoon in Buffalo, N.Y., the London (Daventry) England, station GSD - 11.75 megacycles - comes in very well. Since it is 9 P.M. in London when it is 4 P.M. in Buffalo, the path of the radio waves lies partly in daylight and partly in darkness and the 11.75 megacycle frequency is very effective. As darkness approaches in Buffalo, GSD fades out, but GSA, the 6.05 megacycle transmitter of the same station will come in strongly since the transmission path then lies in darkness. Very often, the station makes the announcement that it is signing off of the higher frequency and resuming transmission at the lower one.

Allowance must be made for the season of the year since the days are longer in Summer.

Reception on the short waves is much less regular and less consistent than it is on the usual broadcast band. Stations at extreme distances may be picked up while equally powerful nearer ones cannot be heard. Conditions vary from day to day. It may be that for a period of several days foreign broadcasts are heard excellently, only to be followed by a like period during which distant reception becomes practically impossible. Many of the radio magazines report monthly on the sort of reception to be expected on the various frequencies.

IMPORTANT: Tuning for short wave stations must be done very much more SLOWLY and CAREFULLY than is necessary for the regular broadcast stations. The higher the frequency (shorter the wave length) the more this is true. An almost imperceptible movement of the knob may mean the difference between hearing a foreign station and not hearing it. The Station Selector knob MUST be turned VERY slowly, or the station will be completely missed. But, the thrill that one can experience in making direct contact with foreign countries or the eavesdropping on ship and amateur telephony, fully compensates for the extra care needed to tune them in.

SERVICE SUGGESTIONS

1. Be sure that the antenna and ground connections are made according to instructions.

2. Be sure that all of the tubes are in good operating condition, that they are firmly seated in their proper sockets, that the clips are attached to the small caps on the tops of those tubes requiring them and that the speaker plug is pushed all the way into its socket at the rear of the receiver.

3. Be sure that the Wave Band switch is at the proper position for the frequency band desired.

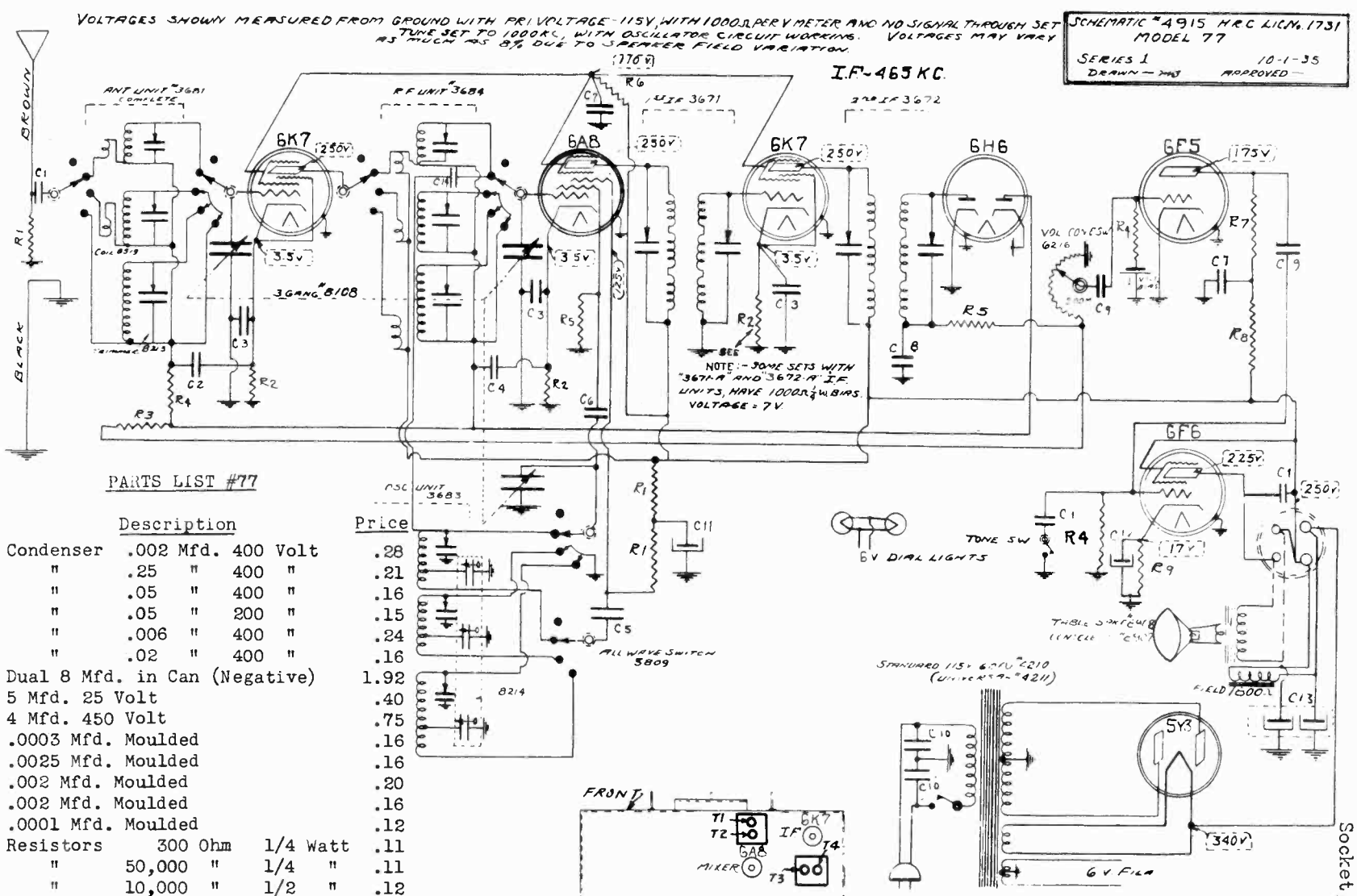
4. See that the power cord plug is making proper contact in its receptacle.

REPLACEMENT PARTS AND PRICE LIST
PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Part No.	Schematic Location	Description	List Price
7601		Bias Cell - 1 Volt	$ .20
8550	L8	Antenna Trap Assembly	.80
8545	L5	Coil - B. C. Oscillator	.80
8544	L2	Coil - B. C. Grid	.80
8547	L6	Coil - Police Band, Oscillator	.80
8546	L3	Coil - Police Band, Grid	.80
8549	L7	Coil - Foreign Band, Oscillator	.80
8548	L4	Coil - Foreign Band, Grid	.80
8543	L1	Coil - Broadcast, Antenna	.80
4191	L10	Coil - 1st I.F. Assembly	.84
4192	L11	Coil - 2nd I.F. Assembly	.84
8216	C1	Condenser - Padding	.40
8226	C2, C3	Condenser - Trimmer, 3 Section	1.20
8117-2	C4, C5, C6	Condenser - Variable, 3 Gang	3.90
8826	C7	Condenser - Dual 8 Mfd. 450 Volt Electrolytic	1.95
2756	C8	Condenser - .1 Mfd. 400 Volt	.20
3513	C9, C10	Condenser - .02 Mfd. 200 Volt	.16
3517	C11, C12, C13	Condenser - .02 Mfd. 400 Volt	.20
2188	C14, C15	Condenser - .05 Mfd. 200 Volt	.16
2757	C16, C25	Condenser - .05 Mfd. 400 Volt	.30
2758	C17	Condenser - .25 Mfd. 400 Volt	.30
3515	C18	Condenser - .006 Mfd. 600 Volt	.20
3518	C20	Condenser - .004 Mfd. 200 Volt	.20
1801	C19	Condenser - .001 Mfd. Mica	.20
2366	C21	Condenser - .0001 Mfd. Mica	.16
8304	C22	Condenser - .0003 Mfd. Mica	.16
2280	C23	Condenser - .0005 Mfd. Mica	.16
3005	C24	Condenser - .0015 Mfd. Mica - Minus 0% Plus .000	.30
6222		Control - Volume and Switch	1.00
6223		Control - Tone	.95
1552		Cord - A.C. Line and Plug	.32
4089		Dial Card - Calibrated	.64
4059		Dial Hand	.12
4048		Dial Glass	.35
5715		Escutcheon	.98
8642		Tuning Tube Fixture	.35
8022		Tuning Tube Cable and Socket	.75
3188		Drive Disc - 3-3/8 O.D.	.25
4073		Drive Disc and Hub - 3" O.D.	.45
460		Grid Cap	.06
7114		Knob - 3 Color band, coded	.25
7115		Knob - "Station Selector" coded	.25
7116		Knob - "Volume" - "Off", coded	.25
7117		Knob - "Tone", coded	.25
1919		Lamp - Dial - 6 Volt	.12
3335	R1, R2, R3	Resistor - 1 Megohm 1/4 Watt	.11
1828	R4	Resistor - 200 Ohm 1/4 Watt	.11
1836	R5	Resistor - 300 Ohm 1/4 Watt	.11
3349	R6	Resistor - 10M Ohm 1/2 Watt	.12
2777	R7	Resistor - 10M Ohm 1 Watt	.16
2362	R8	Resistor - 15M Ohm 1 Watt	.16
1843	R9, R10	Resistor - 50M Ohm 1/2 Watt	.12
3325	R11	Resistor - 200M Ohm 1/4 Watt	.11
3328	R12	Resistor - 500M Ohm 1/4 Watt	.11
3245		Socket - Pilot Light	.15
2744		Socket - 4 Prong	.12
2746		Socket - 6 Prong	.14
2747		Socket - 7 Prong	.14
6008		Socket - 8 Prong, Metal Tube	.16
8919		Speaker - 6 inch	5.40
5819		Switch - Wave Band, 3 Position	1.05
4204		Transformer - Power	3.60
6631		Tube Shield Assembly and Ground Ring	.16
80		Tube - Glass	.65
6B5		Tube - Glass	2.25
6Q7		Tube - Metal	2.00
6A7		Tube - Glass	1.35
6B5		Tube - Glass	1.80
6K7		Tube - Metal	1.50
6515-A		Wing Screw	.04
8921		8" Speaker	6.40

AUTOMATIC VOLUME CONTROL

When the control has been adjusted for the desired volume from any particular station, the Automatic Volume Control feature of the receiver will tend to maintain the volume at this same value for other stations. It does this by automatically changing the sensitivity of the receiver to compensate for changes in the strength of the signal received from different Broadcasting Stations. In some locations noise may be encountered as the receiver is tuned between stations. This noise is normal and is due to the automatic increase in the sensitivity of the receiver. When listening to weak and distant stations the tone may become distorted at times. This is normal and is due to fading of the station beyond the limits which can be compensated for by the Automatic Volume Control.



PARTS LIST #77

Part No.		Description				Price
3516 (C2)	Condenser	.002 Mfd.	400	Volt		.28
2758 (C7)	"	.25 "	400	"		.21
2757 (C10)	"	.05 "	400	"		.16
2183 (C3)	"	.05 "	200	"		.15
3515 (C1)	"	.006 "	400	"		.24
3517 (C9)	"	.02 "	400	"		.16
3004 (C13)	Dual 8 Mfd. in Can (Negative)					1.92
3003 (C12)	5 Mfd. 25 Volt					.40
8814 (C11)	4 Mfd. 450 Volt					.75
8304 (C8)	.0003 Mfd. Moulded					.16
8305X (C4)	.0025 Mfd. Moulded					.16
2287X (C5)	.002 Mfd. Moulded					.20
~~887~~	.002 Mfd. Moulded					.16
2366 (C6)	.0001 Mfd. Moulded					.12
1836 (R2)	Resistors	300 Ohm		1/4	Watt	.11
1843 (R5)	"	50,000 "		1/4	"	.11
3349 (R1)	"	10,000 "		1/2	"	.12
1890 (R9)	"	500 "		1/2	"	.12
3328 (R4)	"	500,000 "		1/4	"	.11
3335 (R3)	"	1 meg "		1/4	"	.11
3344 (R8)	"	25,000 "		1/2	"	.12
2650 (R6)	"	25,000 "		1	"	.14
1824 (R7)	"	250,000 "		1/2	"	.12

HOWARD RADIO CO.

MODELS 77-T, 77-
Schematic, Voltage
Socket, Trimmers

THE I.F. STAGES

The I.F.'s are aligned by the usual system of feeding the intermediate frequency of 465KC into the grid of the 6A7 tube.

The two trimmers in each of the I.F. cans should be very carefully peaked to resonance as they are very critical and will greatly affect the performance of the set. These are trimmers number T1, T2, T3, T4. (See pictorial diagram).

The sensitivity of the I.F. stages will be 30 microvolts or better.

Always use as low an output as possible from the test oscillator in making the various adjustments.

II ALIGNMENT OF SHORTWAVE BAND 5.5 TO 18 M.C.

First check the position of the dial hand by rotating the condenser shaft to the left to full capacity. At this point the dial hand should be straight across in line with the lines dividing the scale in half. If the hand is off position it can be lined up by removing dial glass and setting hand with screw in center of dial.

1. Set the test oscillator to 17 megacycles.

2. Turn wave band switch all the way to right for highest S.W. band, and set dial hand to 17 M.C.

3. Peak trimmer condenser T5 of the oscillator coil (See pictorial) to resonance with 17 M.C. fed into antenna.

4. Adjust antenna and RF coil trimmers T6 and T7 to same frequency after the above mentioned oscillator trimmer has been set.

5. Turn dial hand to 6 M.C. on the same band and peak padding condenser P-1 to 6 M.C.

III SHORTWAVE BAND 1.7 TO 5.5 M.C.

1. Set band switch to this band and dial hand to 5 M.C.
2. Peak trimmer T8 to 5 M.C.
3. Peak antenna and RF trimmer to T9 and T10 to 5 M.C.
4. Rotate dial to 1.7 M.C. and adjust padding condenser P-2 1.7 M.C.

NOTE: After adjusting the two high bands at 17 megacycles and 5 megacycles the test oscillator input to antenna should be increased and receiver dial advanced to .9 megacycle lower and note if test oscillator signal is heard.

In case there is no response the oscillator trimmers have been pulled down too tightly. The trimmers should be released until this condition exists then go back to original point of alignment - reduce antenna input voltage and correct the trimmer adjustment.

EXAMPLE: The receiver has been adjusted to 17 megacycles. Tune receiver to approximately 16.9 M.C.

Increase oscillator signal by "opening up" the attenuator. Move the dial back and forth at 16.9 M.C.

If no signal is heard, let oscillator trimmer off until it is heard at 16.9 M.C.

Reduce signal voltage from generator, go back to 17 M.C. and slightly correct this last trimmer adjustment.

The same applies to the 5 M.C. adjustment.

IV THE BROADCAST BAND

1. Turn wave band switch all the way to left and dial hand set to 1400 KC (the top scale).

2. Peak oscillator trimmer T11 to 1400 KC and RF circuit trimmers T12 and T13 to same frequency.

3. Set dial hand to 550 KC and adjust oscillator padding condenser P-3 to 550 KC.

4. Recheck dial at 1400 KC as in number (1) and (2).

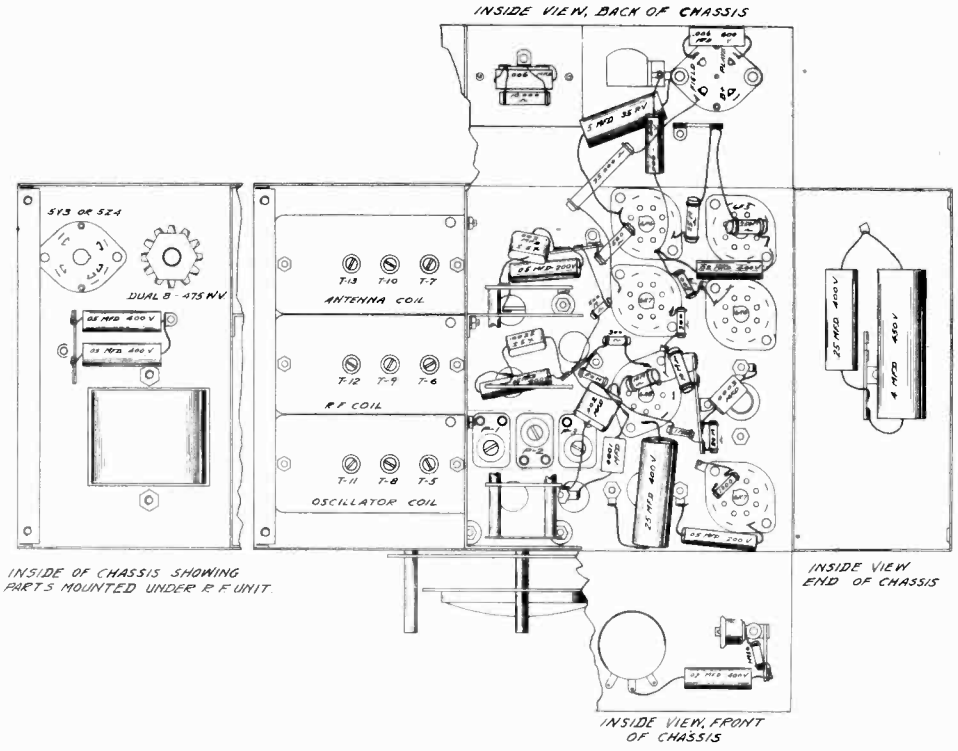
5. Points in the middle of the dial may be checked and if necessary the plates of the front section of variable condenser may be bent for alignment.

V NOTES.

1. Seal all trimmers after their final adjustment.

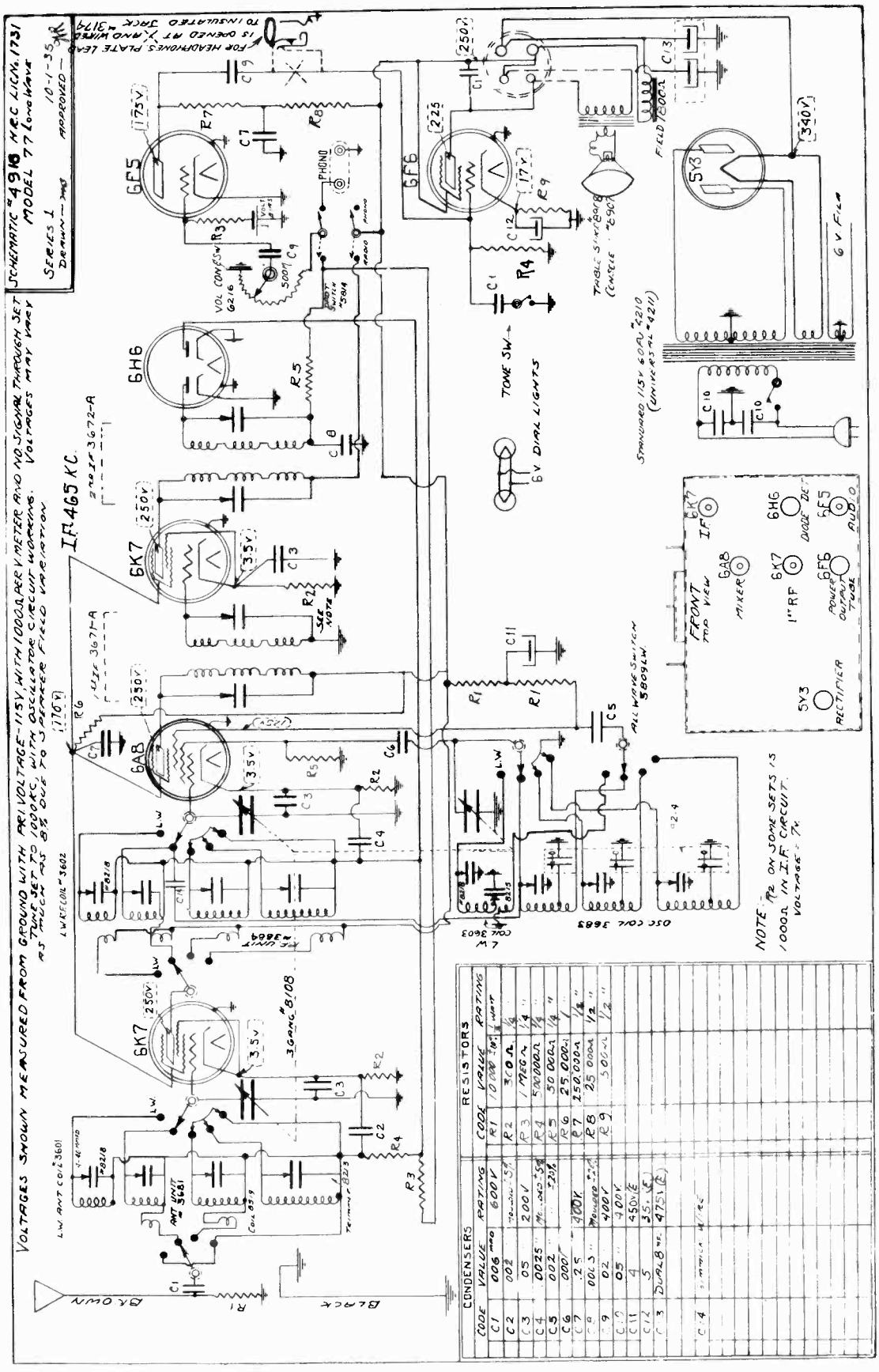
2. Be sure that the settings are being made to the true fundamental signal from the oscillator and not on a harmonic or image frequency.

3. Refer to the schematic for the voltages at the tube sockets.



HOWARD RADIO CO.

MODEL 77 Long Wave
Schematic, Voltage
Socket, Notes

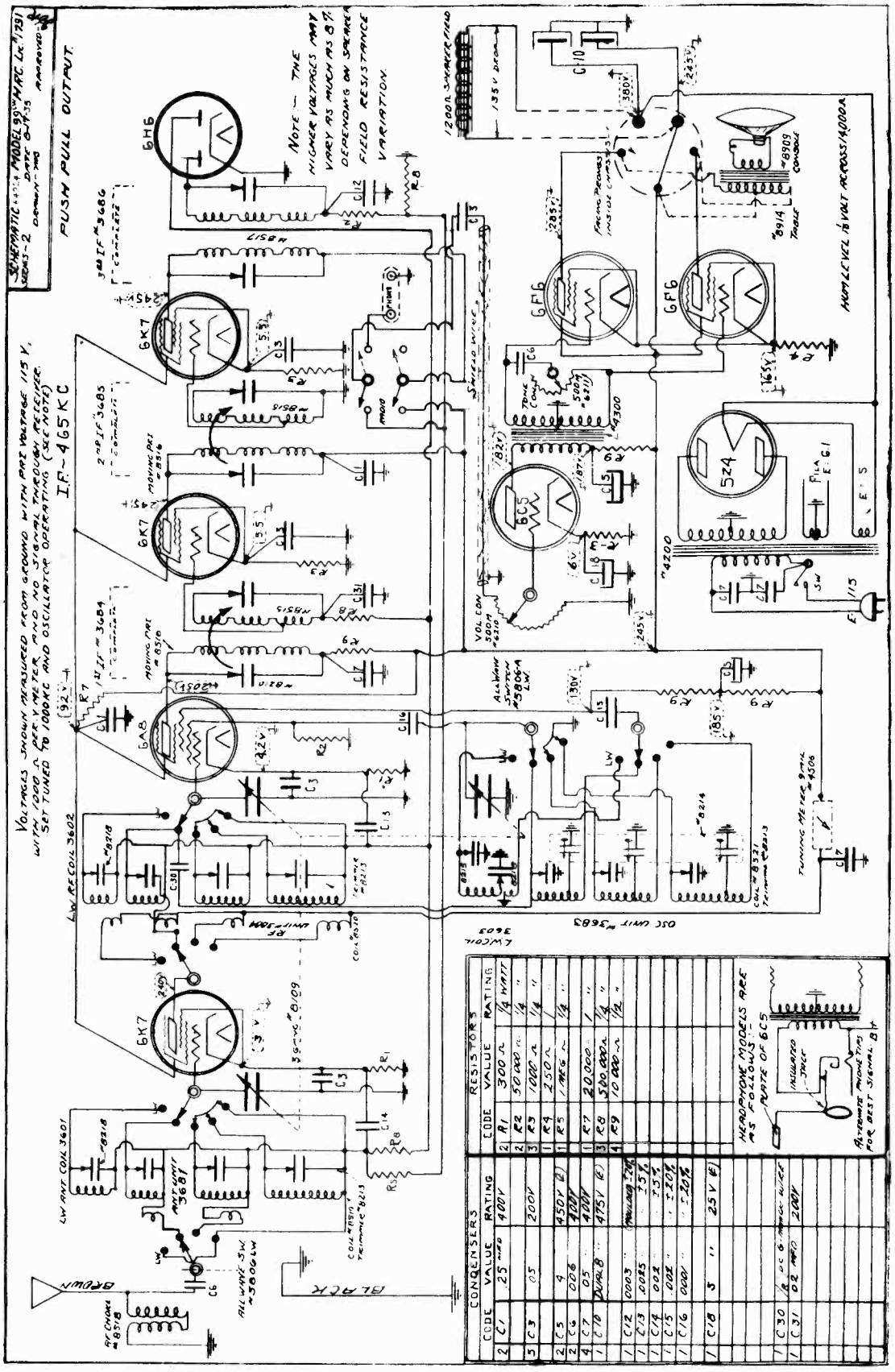


Adjust the oscillator trimmer (the one toward the front) to 300 KC and the antenna stage and R.F. stage trimmers to same frequency.

Adjust padding condenser to 150 KC with dial set to 150 KC.

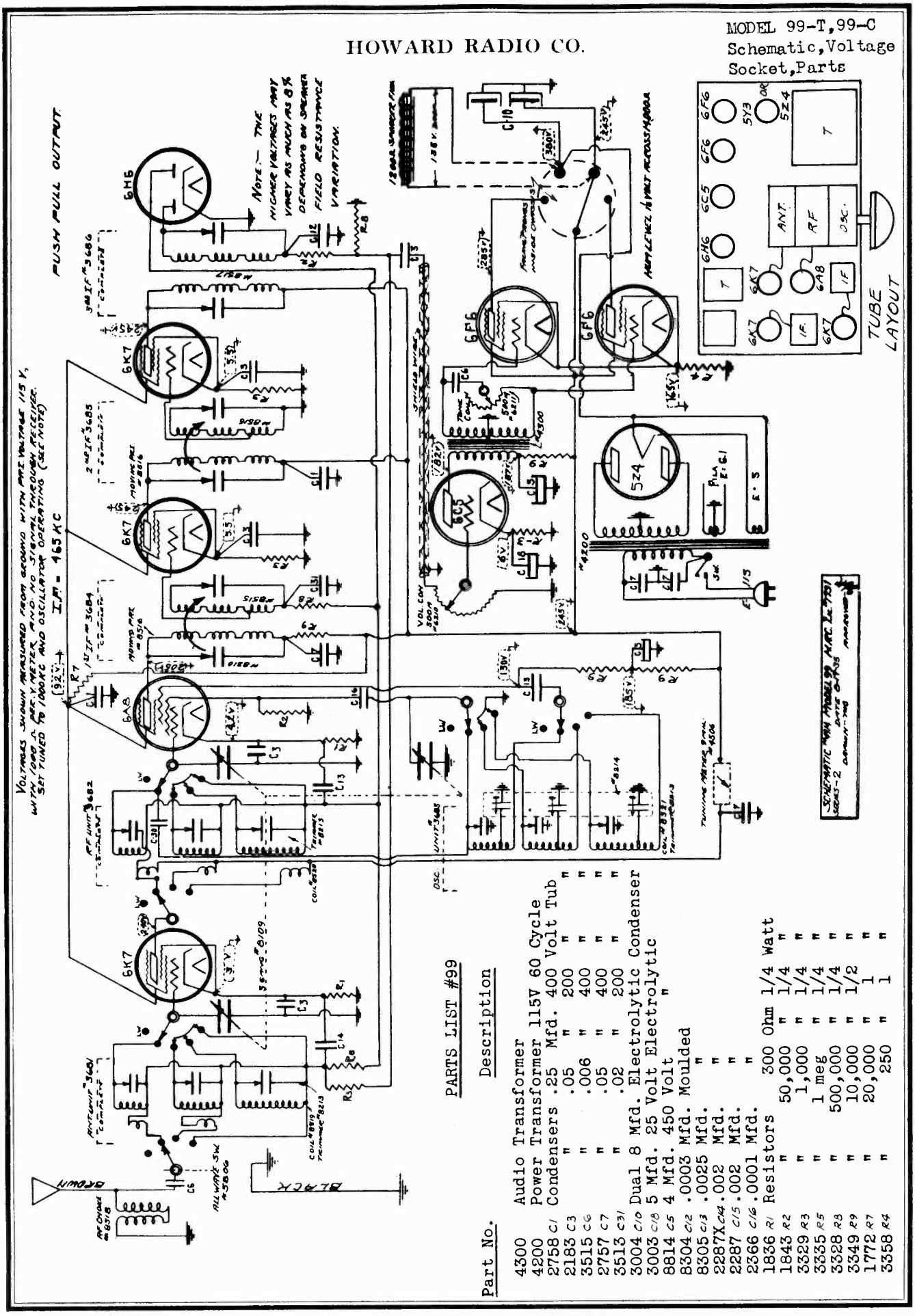
MODEL 99 Long Wave
Schematic, Voltage
Notes, Alignment

HOWARD RADIO CO.



HOWARD RADIO CO.

MODEL 99-T, 99-C
Schematic, Voltage
Socket, Parts



PARTS LIST #99

Part No.		Description
4300		Audio Transformer
4200		Power Transformer 115V 60 Cycle
2758	C1	Condensers .25 Mfd. 400 Volt Tub
2183	C3	" .05 " 200 " "
3515	C6	" .006 " 400 " "
2757	C7	" .05 " 400 " "
3513	C31	" .02 " 200 " "
3004	C10	Dual 8 Mfd. Electrolytic Condenser
3003	C18	5 Mfd. 25 Volt Electrolytic
8814	C5	4 Mfd. 450 Volt "
8304	C12	.0003 Mfd. Moulded "
8305	C13	.0025 Mfd. " "
2287X	C44	.002 Mfd. " "
2287	C15	.002 Mfd. " "
2366	C16	.0001 Mfd. " "
1836	R1	Resistors 300 Ohm 1/4 Watt
1843	R2	" 50,000 " 1/4 "
3329	R3	" 1,000 " 1/4 "
3335	R5	" 1 meg " 1/4 "
3328	R8	" 500,000 " 1/4 "
3349	R9	" 10,000 " 1/2 "
1772	R7	" 20,000 " 1 "
3358	R4	" 250 " 1 "

I THE I.F. STAGES

The I.F.'s are aligned by the usual system of feeding the intermediate frequency of 465KC into the grid of the 6A7 tube.

The two trimmers in each of the I.F. cans should be very carefully peaked to resonance as they are very critical and will greatly affect the performance of the set. These are the trimmers in the three I.F. cans. (See pictorial).

THE I.F. STAGES MUST BE ALIGNED WITH THE FIDELITY CONTROL IN THE SHARP POSITION, THAT IS WITH THE SHAFT TURNED ALL THE WAY TO THE LEFT.

The sensitivity of the I.F. system in the sharp position is about 200 microvolts. In the high fidelity position the sensitivity is about 20 microvolts.

Always use as low an output as possible from the signal generator when making the various adjustments.

II ALIGNMENT OF SHORTWAVE BAND 5.5 TO 18 M.C.

First check the position of the dial hand by rotating the condenser shaft to the left to full capacity. At this point the dial hand should be straight across in line with the lines dividing the scale in half. If the hand is off position it can be lined up by removing dial glass and setting hand with screw in center of dial.

1. Set the test oscillator to 17 megacycles.

2. Turn wave band switch all the way to right for highest S.W. band, and set dial hand to 17 M.C.

3. Peak trimmer condenser T-5 of the oscillator coil (See pictorial) to resonance with 17 M.C. fed into antenna.

4. Adjust antenna and R.F. coil trimmers T-6 and T-7 to same frequency after the above mentioned oscillator trimmer has been set.

5. Turn dial hand to 6 M.C. on same band and peaks padding condenser P-1 to 6 M.C.

III SHORTWAVE BAND 1.7 TO 5.5 M.C.

1. Set band switch to this band and dial hand to 5 M.C.

2. Peak trimmer T-8 to 5 M.C.

3. Peak antenna and R.F. trimmers T-9 and T-10 to 5 M.C.

4. Rotate dial to 1.7 M.C. and adjust Padding Condenser P-2 to 1.7 M.C.

NOTE: After adjusting the two high bands at 17 megacycles and 5 megacycles the test oscillator input to antenna should be increased and receiver dial advanced to .9 megacycle lower and note if test oscillator signal is heard.

In case there is no response the oscillator trimmers have been pulled down too tightly. The trimmers should be released until this condition exists then go back to original point of alignment - reduce antenna input voltage and correct the trimmer adjustment.

EXAMPLE: The receiver has been adjusted to 17 megacycles. Tune receiver to approximatly 16.9 M.C.

Increase oscillator signal by "opening up" the attenuator. Move the dial back and forth at 16.9 M.C.

If no signal is heard, let oscillator trimmer off until it is heard at 16.9 M.C.

Reduce signal voltage from generator, go back to 17 M.C. and slightly correct this last trimmer adjustment.

The same thing applies to the 5 M.C. adjustment.

IV THE BROADCAST BAND

1. Turn wave band switch all the way to left and dial hand set to 1400KC (the top scale).

2. Peak oscillator trimmer T-11 to 1400 KC and R.F. circuit trimmers T-12 and T-13 to same frequency.

3. Set dial hand to 550 KC and adjust oscillator padding condenser C-8 to 550 KC.

4. Recheck dial at 1400 KC as in number (1) and (2).

5. Points in the middle of the dial may be checked and if necessary the plates of the front section of variable condenser may be bent for alignment.

V NOTES

1. Seal all trimmers after their final adjustment.

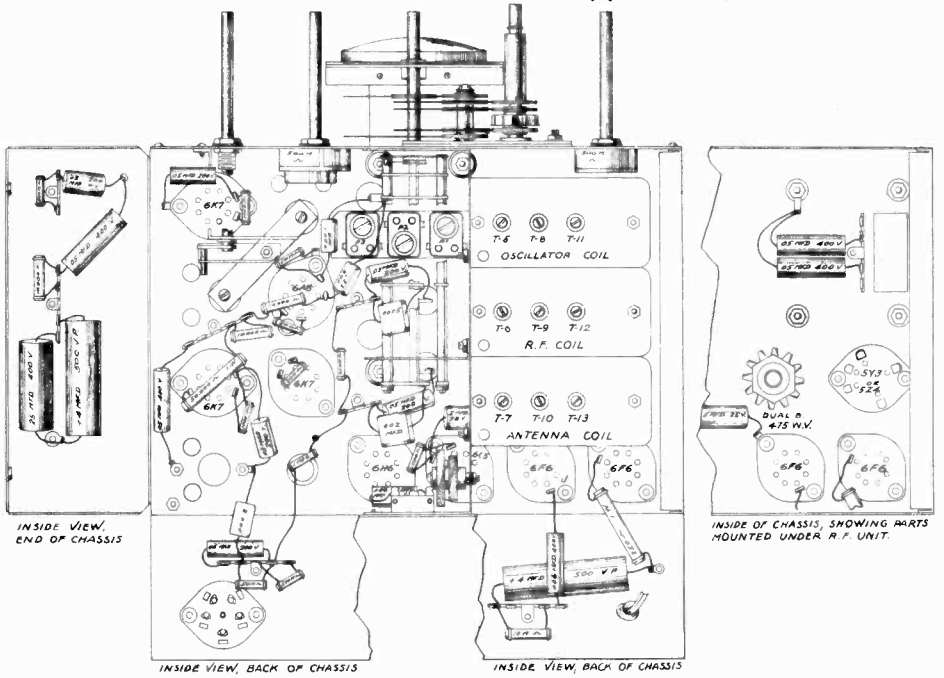
2. Be sure that the settings are being made to the true fundamental signal from the oscillator and not on a harmonic or image frequency.

3. Refer to the schematic for the voltages at the tube sockets.

4. It will be noted that the audio transformer is mounted so that it can be pivoted by loosening screw in slot. This is made adjustable to be able to set transformer at point of minimum hum.

5. The alignment instructions are given with the assumption that the service station has an oscillator capable of accurately covering the range of the receiver.

The only other apparatus necessary is a meter connected in the output stage to indicate resonance. This can be 0 to 3 volt AC meter connected across the voice coil of the speaker or preferably an output meter connected in the plate circuit of the 42 power tube in series with an 8 MFD paper condenser.



INTERNATIONAL RADIO CORP.

MODELS 40,41,43, 44,Jewel
Schematic,Parts
MODELS 66X,86,96
Socket,Voltage
Alignment

This chassis is designed to operate from 115 volt power lines, either alternating or direct current. It is a two band receiver covering the American broadcast and police and airport bands.

The following tubes are employed:

6D6 - 1st Detector-Oscillator	43 - Pentode Output
6D6 - I. F. Amplifier	25Z5 - Rectifier
6C6 - 2nd Detector	165R4 - Regulator

ALIGNMENT

ESSENTIAL DATA: The intermediate frequency employed is 448 Kc.

The standard type of output meter should be used to indicate signal strength. It should be connected from the plate of the 43 tube to ground.

Poor sensitivity may be an indication of incorrectly adjusted I. F. trimmers.

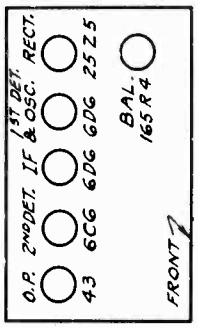
Aligning of Broadcast band should be done on 1400, 1000 and 600 kilocycles.

INTERMEDIATES: 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. Finally, adjust the trimmer in the tuned wave trap for minimum meter reading.

BROADCAST BAND: Place the band change switch on the Broadcast position. Turn the dial to 1400 Kc. and feed a very weak 1400 Kc. modulated signal from your signal generator to the antenna. Adjust the broadcast oscillator trimmer and detector trimmer (on condenser gang) for maximum reading.

There is no adjustable padder condenser in this model so resonance on lower frequencies is accomplished by bending plates on tuning condensers.

SHORT WAVE BAND: No alignment necessary.

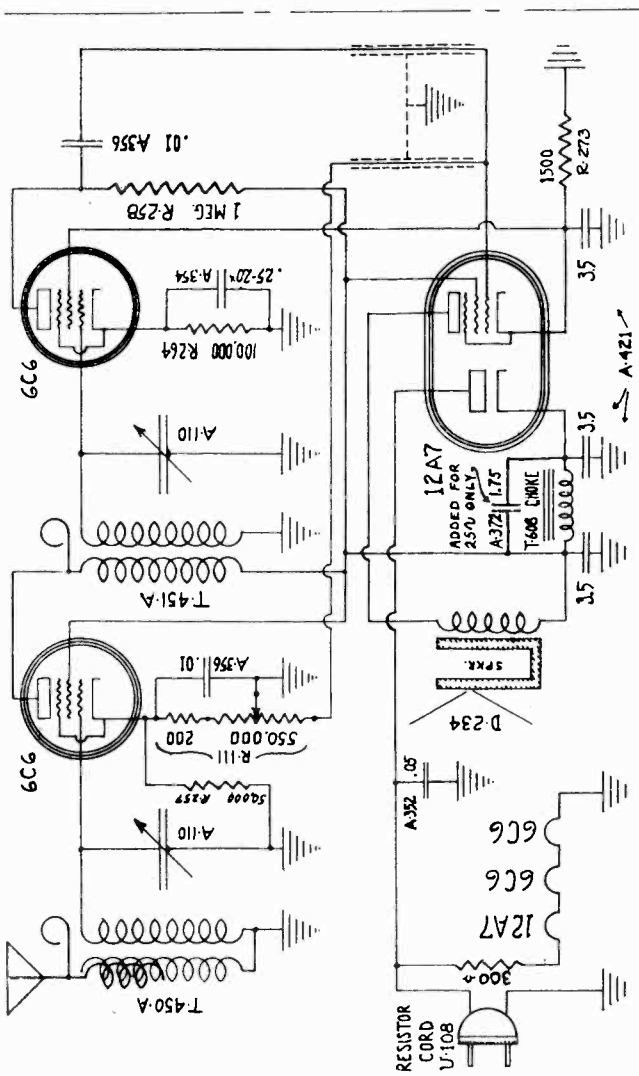


AVERAGE SOCKET VOLTAGES

Tube	Position	E_K	E_{G3}	E_{G2}	E_P
6D6	Det.-Osc.	14	0	100	100
6D6	I.F.	1	1	100	100
6C6	2nd Det.	2.5	-	14	25
43	Output	0	-	100	87
25Z5	Rect.	100	-	-	35

LINE 118 VOLTS. VOLUME CONTROL FULL ON. 10% VARIATION ALLOWABLE.

Measurements made from tube prongs to circuit ground.

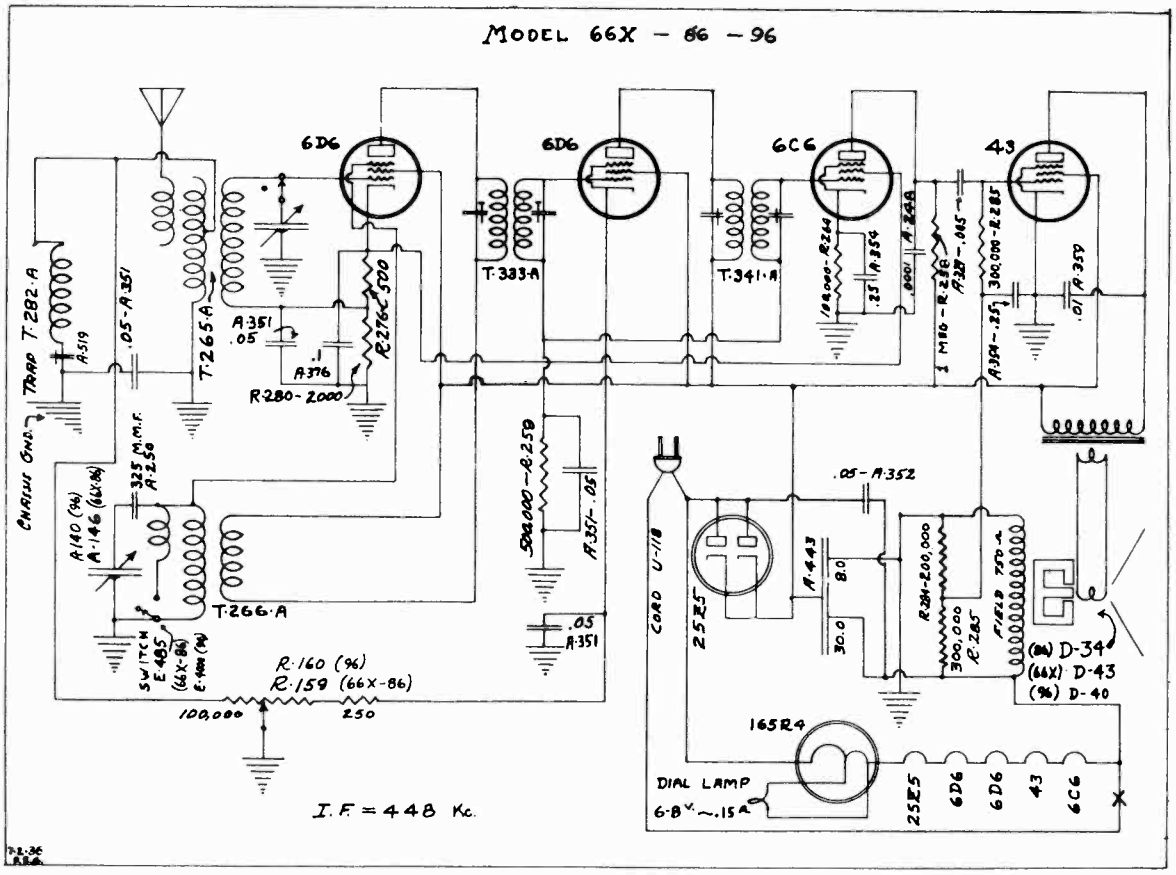


PRICES SUBJECT TO CHANGE WITHOUT NOTICE — May, 1936

Part No.	Description	List Price
A-110	2 Gang tuning condenser	$1.65
A-352	.05 mfd. tubular condenser	.15
A-354	.25 mfd. tubular condenser	.15
A-356	.01 mfd. tubular condenser	.15
A-372	1.75 mfd. (with brackets to solder to top of speaker frame) for 25 cycle operation only	.60
A-421	Filter condenser	1.00
D-234	5-inch Magnetic speaker	2.25
E-111	Knobs (order by color as well as number)	.15
H-41	6C6 Socket	.10
H-42	12A7 Socket	.10
R-111	Volume control with switch	.75
R-257	50M ohm resistor	.20
R-258	1 meg. resistor	.20
R-264	100M ohm resistor	.20
R-273	1500 ohm resistor	.20
S-102	Goat tube shield	.15
T-450A	Antenna coil assembly	.60
T-451A	RF coil assembly	.75
T-608	Filter choke	.65
U-108	Power cord with plug	.55
WL-20	Antenna wire	.10
*	Model 40 cabinet complete (no back)	2.50
*	Model 41 cabinet complete (no back)	2.75
*	Models 42 to 48 incl. cabinet complete (no back)	4.00
*	Grille only with silk for Model 40 cabinet	.3
*	Grille only with silk for Models 41 to 48 cabinets (incl.)	.5

MODELS 66X,86,96
Schematic,Parts

INTERNATIONAL RADIO CORP.



August 1936

PARTS PRICE LIST

MODELS 66X, 86, 96

Part No.	Description	List Price
A-140	2 gang tuning condenser (Model 96)	$1.90
A-146	2 gang tuning condenser (Models 66X & 86)	1.85
A-248	100 mmf. type O condenser	.20
A-250	325 mmf. mica padder condenser	.20
A-329	.005 mfd. 600 v. paper condenser	.15
A-351	.05 mfd. 200 v. tubular condenser	.15
A-352	.05 mfd. 300 v. tubular condenser	.15
A-354	.25 mfd. 25 v. tubular condenser	.20
A-359	.01 mfd. 400 v. tubular condenser	.15
A-376	.1 mfd. 25 v. tubular condenser	.15
A-443	Electrolytic filter condenser	1.15
D-34	Dynamic speaker (Model 86)	3.25
D-40	Dynamic speaker (Model 96)	3.25
D-43	Dynamic speaker (Model 66X)	3.00
E-111P	Knob (Model 66X)	.10
E-161	Large knob (Model 86 & 96)	.10
E-162	Small knob (Model 86 & 96)	.10
E-282	Dial pointer (Model 96)	.10
E-283	Dial pointer (Model 66X & 86)	.05
E-294	Transparent dial window (Model 96)	.25
E-298	Transparent dial window (Model 66X & 86)	.20
E-299	Dial scale (Model 66X)	.15
E-2002	Dial scale (Model 86)	.15
E-481	Special pilot lamp 6-8 v.,.15 amp.	.15
E-483	Pilot lamp socket & bracket (Model 66X & 86)	.10
E-485	Wave band switch (Model 66X & 86)	.35
E-492	Pilot lamp socket and bracket (Model 96)	.10
E-2004	Dial acale (Model 96)	$ .30
E-4000	Wave band switch (Model 96)	.35
G-112	Dial drive spring (Model 96)	.05
H-18	25Z5 tube socket	.10
H-19	6D6 tube socket	.10
H-21	43 tube socket	.10
H-41	6C6 tube socket	.10
H-58	165R4 tube socket	.10
R-159	Volume control & power switch (Model 66X & 86)	.70
R-160	Volume control & power switch (Model 96)	.75
R-258	1 megohm carbon resistor	.20
R-259	500 M ohm carbon resistor	.20
R-264	100 M ohm carbon resistor	.20
R-276	500 ohm carbon resistor	.20
R-280	2000 ohm carbon resistor	.20
R-284	200 M ohm carbon resistor	.20
R-285	300 M ohm carbon resistor	.20
T-265A	Detector coil	1.00
T-266A	Oscillator coil	1.00
T-282A	Tuned wave trap	.50
T-333A	1st I. F. transformer	1.25
T-341A	2nd I. F. transformer	1.25
U-118	Power cord and plug	.30
X-368	Cabinet (Model 66X)	5.30
X-366	Cabinet (Model 86)	6.30
X-371	Cabinet (Model 96)	7.00

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

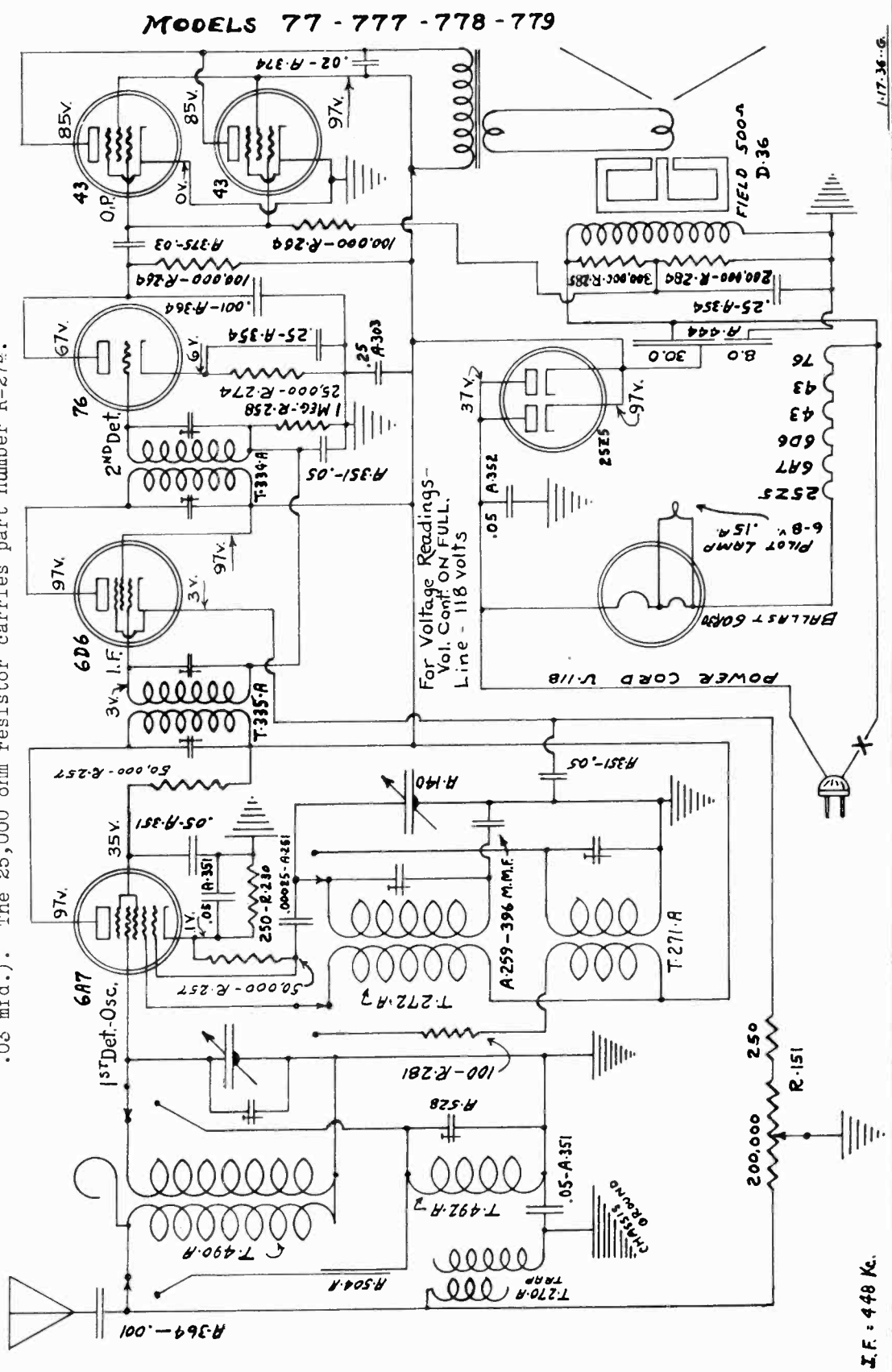
INTERNATIONAL RADIO CORP.

MODELS 77, 777, 778
779
Schematic, Voltage
Changes

PRODUCTION CHANGES

Referring to the circuit diagram, part R-281, 100 ohm resistor in S. W. oscillator coil circuit has been found unnecessary and will be omitted in future production.

In some chassis a 25,000 ohm resistor has been inserted between the 76 tube plate resistor (part R-264, 100,000 ohm) and the coupling condenser (part A-375, .03 mfd.). The 25,000 ohm resistor carries part number R-274.



MODELS 77,777,778
779
Alignment,Parts

INTERNATIONAL RADIO CORP.

MODEL 77 SERIES

February, 1936

ALIGNMENT

ESSENTIAL DATA: The intermediate frequency employed is 448 Kc.

The standard type of output meter should be used to indicate signal strength. It should be connected from the plates of the 43 tubes to ground.

Poor sensitivity may be an indication of incorrectly adjusted I. F. trimmers.

Aligning of Broadcast band should be done on 1400, 1000 and 600 kilocycles.

The three trimmers on the bottom of the chassis are, reading from the end of the chassis toward the center, B. C. oscillator, S. W. detector and S. W. oscillator. No trimmer is used across the B. C. detector coil.

BROADCAST BAND: Place the band change switch on the Broadcast position. Turn the dial to 1400 Kc. and feed a very weak 1400 Kc. modulated signal from your signal generator to the antenna. Adjust the broadcast oscillator trimmer for maximum reading.

There is no adjustable padder condenser in this model so resonance on lower frequencies is accomplished by bending plates on tuning condensers.

INTERMEDIATES: 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.

SHORT WAVE BAND: Place the band change switch on the Short Wave position. Turn the dial to 15.5 megacycles and feed a very weak 15.5 megacycle modulated signal from your signal generator to the antenna. Adjust the S. W. oscillator trimmer for maximum reading on the output meter. This trimmer should not be touched again when checking alignment on other frequencies.

Next go to 12 megacycles and adjust the S. W. detector trimmer.

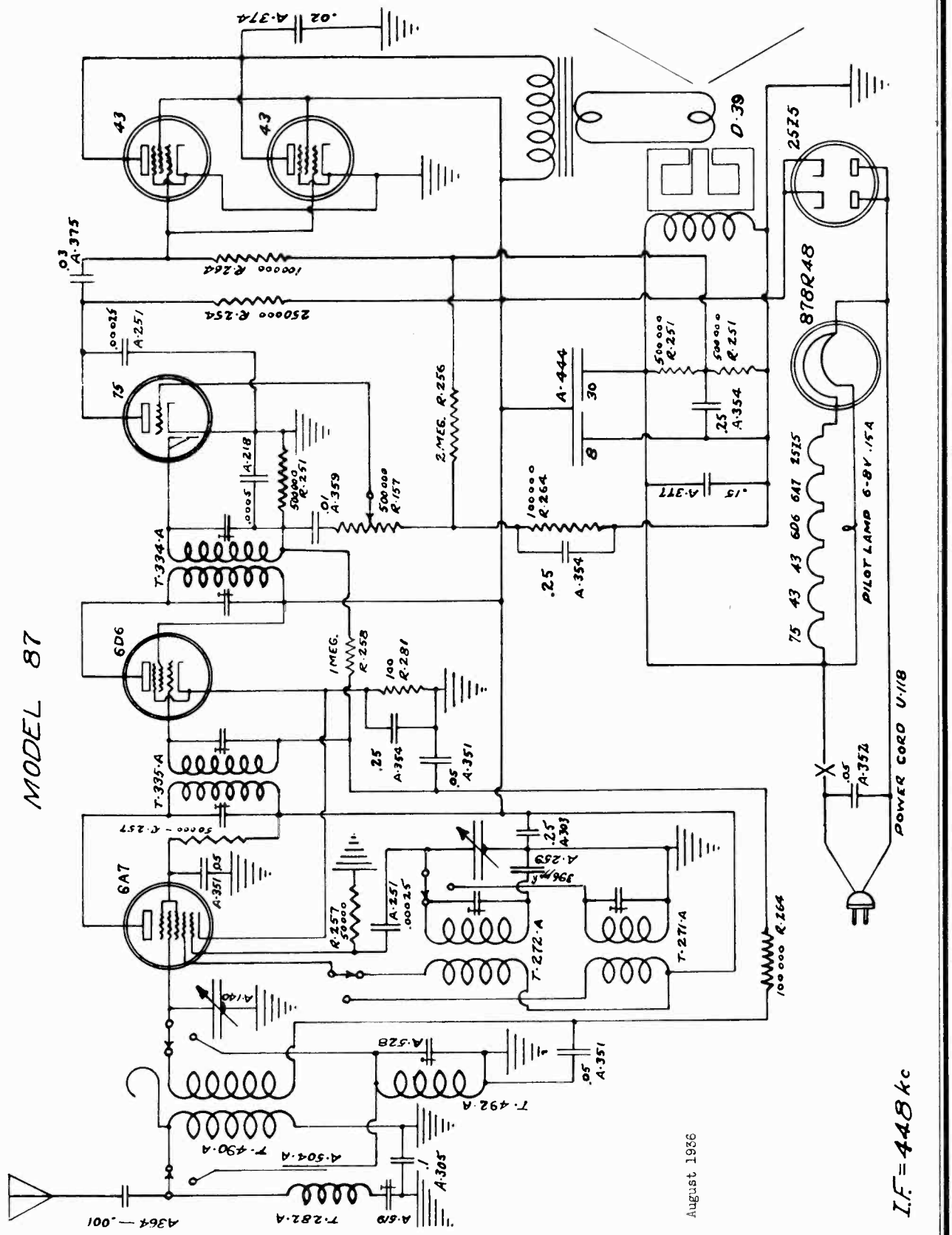
Instead of bending condenser plates at 6 megacycles alignment is accomplished by spreading or crowding turns on the S. W. detector coil. If much crowding or spreading is necessary it is advisable to go back and recheck at 12 megacycles.

Part Number	Description	List Price
A-140	2 gang tuning condenser	$1.90
A-251	250 mmf. mica condenser	.20
A-259	396 mmf. mica padder condenser	.20
A-303	.25 mf., 200 v. paper condenser	.15
A-351	.05 mf., 200 v. paper condenser	.15
A-352	.05 mf., 300 v. paper condenser	.20
A-354	.25 mf., 25 v. paper condenser	.15
A-364	.001 mf., 400 v. paper condenser	.15
A-374	.02 mf., 600 v. paper condenser	.15
A-375	.03 mf., 400 v. paper condenser	1.25
A-444	Electrolytic filter condenser	.30
A-528	Three section trimmer condenser	.20
B-170X	Dial mounting bracket	3.25
D-36	Dynamic speaker	.10
E-111S	Knobs	.20
E-280	Transparent dial window	.25
E-281	Calibrated dial scale	.10
E-282	Dial pointer	.15
E-481	Special pilot lamp, 6-8 v., .15 amp.	.45
E-491	Wave band switch	.10
E-492	Pilot lamp socket and bracket	.05
G-112	Dial drive spring	.10
H-17	6A7 tube socket	.10
H-18	25Z5 tube socket	.10
H-19	6D6 tube socket	.10
H-21	43 tube socket	.10
H-26	76 tube socket	.10
H-58	60R30 tube socket	.10
I-238	Pointer shaft bushing (pulley)	.10
I-240	Condenser shaft bushing (pulley)	.05
I-241	Pointer shaft	.02
MSS-44	Set screws for I-238 and I-240	.75
R-151	Volume control and switch	.20
R-230	250 ohm carbon resistor	.20
R-257	50M ohm carbon resistor	.20
R-258	1 megohm carbon resistor	.20
R-264	100M ohm carbon resistor	.20
R-274	25M ohm carbon resistor	.20
R-281	100 ohm carbon resistor	.20
R-284	200M ohm carbon resistor	.20
R-285	300M ohm carbon resistor	.10
S-119	Goat tube shield	.35
T-270A	Trap	1.00
T-271A	S. W. oscillator coil	1.25
T-272A	B. C. oscillator coil	1.25
T-334A	2nd I. F. transformer	1.00
T-335A	1st I. F. transformer	.35
T-490A	B. C. detector coil	5.50
T-492A	S. W. detector coil	5.50
U-118	Power cord and plug	4.75
X-357	Model 777 cabinet	5.75
X-358	Model 778 cabinet	
X-359	Model 779 cabinet	
X-360	Model 77 cabinet	

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 87
Schematic

INTERNATIONAL RADIO CORP.



ALIGNMENT

ESSENTIAL DATA: The intermediate frequency employed is 448 Kc.

The standard type of output meter should be used to indicate signal strength. It should be connected from the plates of the 43 tubes to ground.

Poor sensitivity may be an indication of incorrectly adjusted I. F. trimmers.

Aligning of Broadcast band should be done on 1400, 1000 and 600 kilocycles.

The three trimmers on the bottom of the chassis are, reading from the end of the chassis toward the center, B. C. oscillator, S. W. detector and S. W. oscillator. No trimmer is used across the B. C. detector coil.

INTERMEDIATES: 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. Finally, adjust the trimmer on the tuned wave trap for minimum meter reading.

BROADCAST BAND: Place the band change switch on the Broadcast position. Turn the dial to 1400 Kc. and feed a very weak 1400 Kc. modulated signal from your signal generator to the antenna. Adjust the broadcast oscillator trimmer for maximum reading.

There is no adjustable padder condenser in this model so resonance on lower frequencies is accomplished by bending plates on tuning condensers.

SHORT WAVE BAND: Place the band change switch on the Short Wave position. Turn the dial to 15.5 megacycles and feed a very weak 15.5 megacycle modulated signal from your signal generator to the antenna. Adjust the S. W. oscillator trimmer for maximum reading on the output meter. This trimmer should not be touched again when checking alignment on other frequencies.

Next go to 12 megacycles and adjust the S. W. detector trimmer.

Instead of bending condenser plates at 6 megacycles alignment is accomplished by spreading or crowding turns on the S. W. detector coil. If much crowding or spreading is necessary it is advisable to go back and recheck at 12 megacycles.

AVERAGE SOCKET VOLTAGES

Tube	Position	E_k	E_{g^3}	E_{g^2}	E_p
6A7	Det-Osc.	1	5	35	97
6D6	I. F.	3	3	97	97
75	2nd Det.-A.V.C.-A.F.	0	-	-	35
43 43	Output	0	-	97	85
25Z5	Rect.	97	-	-	37

LINE 118 VOLTS. VOLUME CONTROL FULL ON. 15% VARIATION ALLOWABLE. Measurements made from tube prongs to circuit ground and made with 1000 ohms per volt instrument on 250 volt scale.

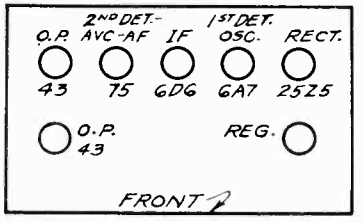
PARTS PRICE LIST

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 87

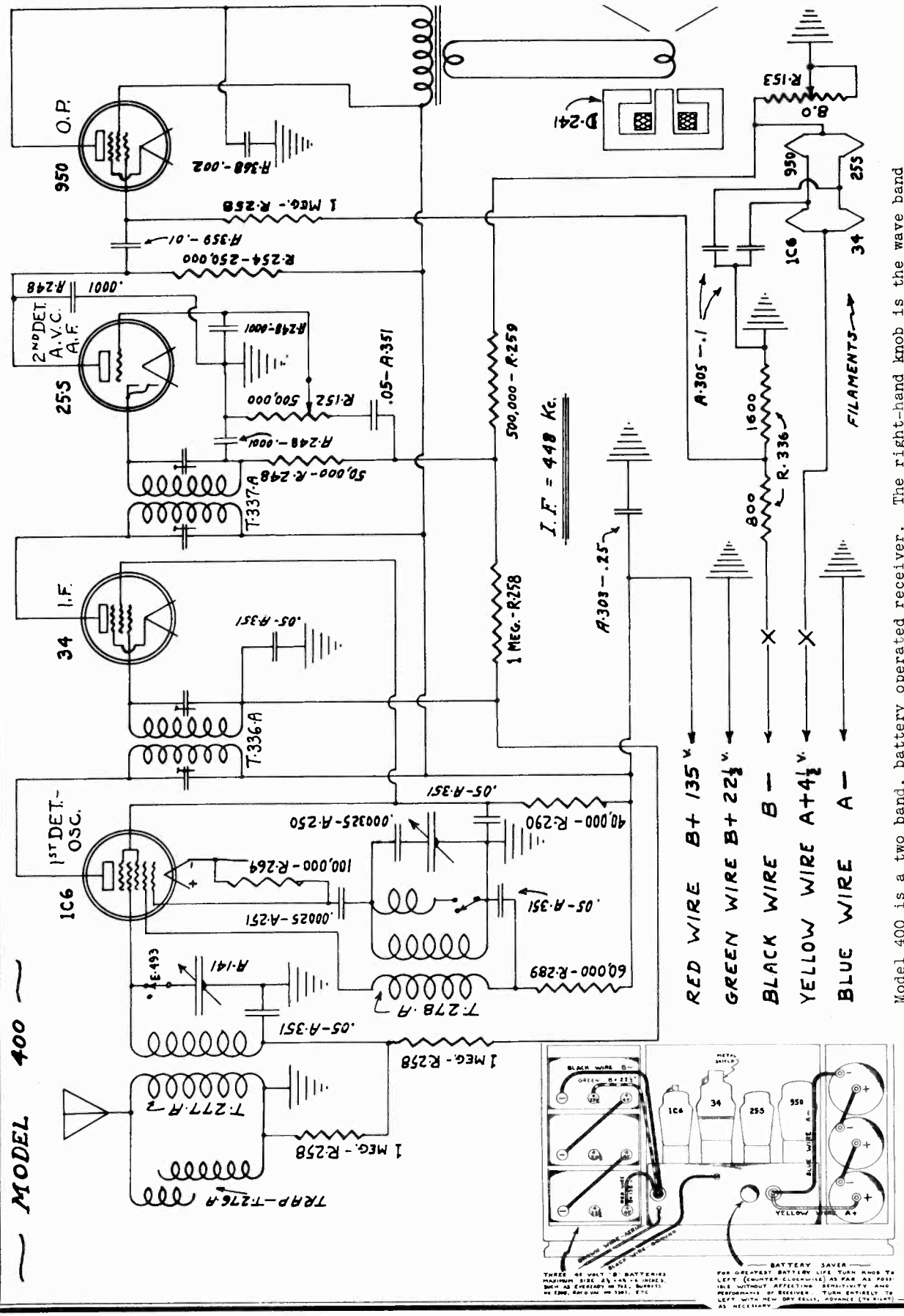
Part Number	Description	List Price
A-140	2 gang tuning condenser	$1.90
A-218	.0005 mfd. mica condenser	.20
A-251	.00025 mfd. mica condenser	.20
A-259	396 mmf. mica condenser	.20
A-303	.25 mfd., 200 v. paper condenser	.20
A-305	.1 mfd., 200 v. paper condenser	.15
A-351	.05 mfd., 200 v. paper condenser	.15
A-352	.05 mfd., 300 v. paper condenser	.15
A-354	.25 mfd., 25 v. paper condenser	.20
A-359	.01 mfd., 400 v. paper condenser	.15
A-364	.001 mfd., 400 v. paper condenser	.15
A-374	.02 mfd., 600 v. paper condenser	.15
A-375	.03 mfd., 400 v. paper condenser	.15
A-377	.15 mfd., 200 v. paper condenser	.15
A-444	Electrolytic filter condenser	1.25
A-528	Three section trimmer condenser	.30
B-170X	Dial bracket	.20
D-39	Dynamic speaker	3.25
E-163	Large knob	.10
E-164	Small knob	.10
E-282	Dial pointer	.10
E-294	Transparent dial window	.25
E-295	Dial scale	.30
E-481	Special pilot lamp, 6-8 v., .15 amp.	.15
E-491	Wave band switch	.45
E-492	Pilot lamp socket and bracket	.10
G-112	Dial drive spring	.05
H-17	6A7 tube socket	.10
H-18	25Z5 tube socket	.10
H-19	6D6 tube socket	.10
H-21	43 tube socket	.10
H-25	75 tube socket	.10
H-58	878R48 tube socket	.10
I-238	Pointer shaft bushing (pulley)	.10
I-240	Condenser shaft bushing (pulley)	.10
I-241A	Pointer shaft	.05
MSS-44	Set screws for I-238 and I-240	.02
R-157	Volume control and switch	.65
R-251	500M ohm carbon resistor	.20
R-254	250M ohm carbon resistor	.20
R-256	2 megohm carbon resistor	.20
R-257	50M ohm carbon resistor	.20
R-258	1 megohm carbon resistor	.20
R-264	100M ohm carbon resistor	.20
R-281	100 ohm carbon resistor	.20
S-119	Goat tube shield	.10
T-271A	S.W. oscillator coil	.35
T-272A	B.C. oscillator coil	1.00
T-282A	Tuned wave trap	.50
T-334A	2nd I.F. transformer	1.25
T-335A	1st I.F. transformer	1.25
T-430A	B.C. Detector coil	1.00
T-492A	S.W. Detector coil	.35
U-118	Power cord and plug	.30
X-367	Cabinet	6.75

This chassis is designed to operate from 115 volt power lines, either alternating or direct current. It is a two band receiver tuning the American broadcast and foreign short wave bands



INTERNATIONAL RADIO CORP.

MODEL 400
Schematic
Socket



Model 400 is a two band, battery operated receiver. The right-hand knob is the wave band switch. It should be turned to the left for broadcast band reception. When turned to the right the receiver tunes the police, airplane and amateur band for 70 to 200 meters.

April, 1936

MODEL 400
Alignment
Parts

INTERNATIONAL RADIO CORP.

MODEL 400 SERIES

Model 400 is a two band, battery operated receiver. The right-hand knob is the wave band switch. It should be turned to the left for broadcast band reception. When turned to the right the receiver tunes the police, airplane and amateur band for 70 to 200 meters.

This receiver requires 4-1/2 volts of "A" battery and 135 volts of "B" battery. For "B" supply, three 45 volt "B" batteries are required. Each should have a 22-1/2 volt connection, or "tap", and the size of each battery should not exceed 2-1/2 x 4-1/4 x 6 inches though the largest battery available within this size should be used. Batteries such as the Eveready No. 762, Burgess No. 5308, Ray-O-Vac No. 5303, etc., are suitable.

For "A" battery supply, three standard "No. 6" dry cells--as used for telephone, ignition and radio--are required. These are 1-1/2 volt batteries--three connected in series providing the necessary 4-1/2 volts. These batteries are approximately 6 inches long and 2-1/2 inches in diameter (or square). Dry cells such as the Eveready No. 7111, Burgess "Little Six", Ray-O-Vac No. 66, etc., are suitable.

ALIGNMENT

The standard type of output meter should be used to indicate signal strength. It may be connected from plate of the 950 tube to ground.

ESSENTIAL DATA: The intermediate frequency employed is 448 Kc.

The rear section of the two gang condenser is the oscillator section; the front section, first detector.

INTERMEDIATES: To align the I.F. circuits, set the signal generator to 448 Kc. and feed its modulated signal direct to the antenna. Short out the oscillator section of the two gang condenser. 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. Due to the I.F. trap in the antenna circuit a strong signal is necessary.

BROADCAST BAND: Place the band change switch on Broadcast position. Turn the dial to 1400 Kc. and feed a very weak 1400 Kc. modulated signal from your signal generator to the antenna. Adjust the broadcast oscillator trimmer for maximum reading. On most sets the detector trimmer has its adjusting screw purposely removed.

There is no adjustable padder condenser in this model so resonance on the low frequency end is accomplished by bending plates on the tuning condensers. Check the alignment at 1000 Kc. Insert a thin bakelite, celluloid or mica feeler strip between the plates of the variable condensers to determine whether the circuits are properly matched. The action is this--the dielectric constant of the celluloid feeler strip being higher than that of the air it displaces, results in an increase of capacity. Open the variable condenser just enough to indicate two or three points below maximum signal. As the feeler is inserted the meter reading should indicate increasing signal and then decreasing as the feeler is inserted farther. This procedure should be followed on both sections. Should the meter fail to show an increase in signal as the strip is inserted in one section this indicates too great a capacity for that section. This may be corrected by bending the outside rotor plates out at the point where they begin to mesh with the stator.

After checking the alignment at 1000 Kc. repeat the process at 600 Kc.

SHORTWAVE BAND: No alignment necessary due to untuned detector circuit.

PRICES SUBJECT TO CHANGE
WITHOUT NOTICE

PARTS PRICE LIST

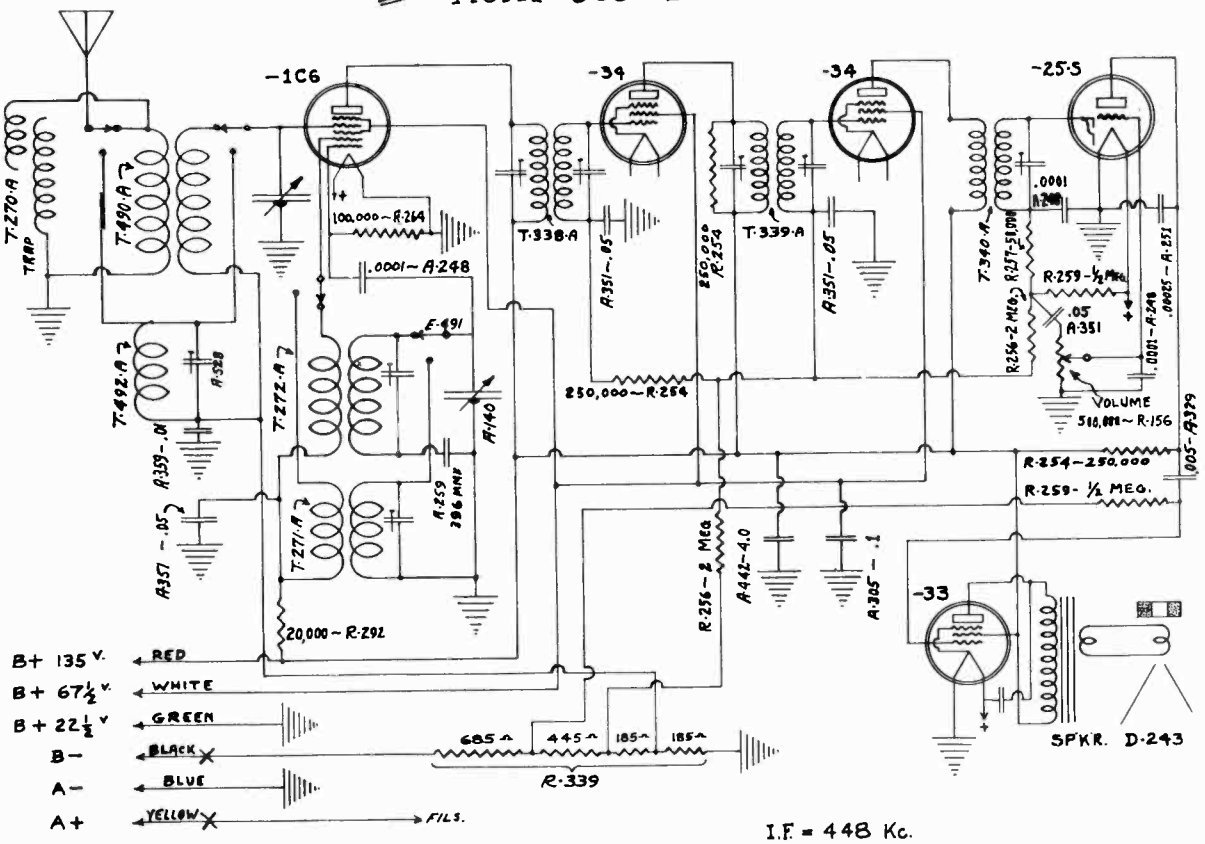
Part Number	Description	List Price
A-141	2 gang tuning condenser	$1.75
A-24£	.0001 mf. mica condenser	.20
A-250	.000325 mf. mica condenser	.20
A-251	.00025 mf. mica condenser	.20
A-303	.25 mf., 200 v. paper condenser	.20
A-305	.1 mf., 200 v. paper condenser .	.15
A-351	.05 mf., 200 v. paper condenser	.15
A-359	.01 mf., 400 v. paper condenser	.15
A-368	.002 mf., 300 v. paper condenser	.15
D-241	Per-O-Flux speaker	4.75
E-111W	Battery saver knob	.10
E-116	Large knobs	.15
E-283	Single dial pointer	.05
E-285	Dial scale	.15
E-493	Wave band switch	.35
H-45	25-S tube socket	.10
H-46	34 tube socket	.10
H-59	1C6 tube socket	.10
H-62	950 tube socket	.10
R-152	Volume control with switch	.80
R-153	Battery saver control	.50
R-248	50M ohm carbon resistor	.20
R-254	250M ohm carbon resistor	.20
R-258	1 megohm carbon resistor	.20
R-259	500M ohm carbon resistor	.20
R-264	100M ohm carbon resistor	.20
R-289	60M ohm carbon resistor	.20
R-290	40M ohm carbon resistor	.20
R-336	800-1600 ohm candohm resistor ..	.25
S-120	Goat tube shield	.10
T-276A	Trap	.35
T-277A	Detector coil	1.00
T-278A	Oscillator coil	1.00
T-336A	1st I.F. transformer	1.25
T-337A	2nd I.F. transformer	1.25
X-362	Cabinet	6.00

April, 1936

INTERNATIONAL RADIO CORP.

MODEL 500
Schematic
Parts

MODEL 500 — BATTERY



I.F. = 448 Kc.

JULY, 1936

6/23/36

Part Number	Description	List Price
A-140	2 gang tuning condenser	$1.90
A-248	100 mmf. mica condenser	.20
A-251	250 mmf. mica condenser	.20
A-259	396 mmf. mica condenser	.20
A-305	.1 mf., 200 v. paper condenser	.15
A-329	.005 mf., 600 v. paper condenser	.15
A-351	.05 mf., 200 v. paper condenser	.15
A-359	.01 mf., 400 v. paper condenser	.15
A-367	.05 mf., 400 v. paper condenser	.15
A-442	4 mf., 150 v. electrolytic condenser	.45
A-528	Three gang trimmers	.30
B-170	Dial mounting bracket	.20
D-243	Perm-O-Flux speaker	5.00
E-114	Large knob	.15
E-115	Small knob	.15
E-282	Dial pointer	.10
E-293	Dial scale	.30
E-294	Dial window	.30
E-491	Wave band switch	.45
G-111	Dial string	.01
G-112	Dial spring	.05
H-34	34 tube socket	.10
H-45	25S tube socket	.10
H-46	34 tube socket	.10
H-59	1C6 tube socket	.10
I-238	Pointer shaft bushing (pulley)	.10
I-240	Condenser shaft bushing (pulley)	.10
I-241A	Pointer shaft	.05
MSS-44	Set screws for I-238 and I-240	.02
R-156	Volume control and switch	.80
R-254	250M ohm carbon resistor	.20
R-256	2 megohm carbon resistor	.20
R-257	50M ohm carbon resistor	.20
R-259	500M ohm carbon resistor	.20
R-264	100M ohm carbon resistor	.20
R-292	20M ohm carbon resistor	.20
R-339	Candohm resistor	.30
S-120	Goat tube shield	.10
T-270A	Trap	.35
T-271A	S.W. oscillator coil	.35
T-272A	B.C. oscillator coil	1.00
T-338A	1st I.F. transformer	1.25
T-339A	2nd I.F. transformer	1.25
T-340A	3rd I.F. transformer	1.25
T-490A	B.C. detector coil	1.00
T-492A	S.W. detector coil	.35
X-364	Cabinet	10.00

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MODEL 500
Alignment
Socket
Battery Connections

INTERNATIONAL RADIO CORP.

MODEL 500

Model 500 is a two band, battery operated receiver. The right-hand knob is the wave band switch. It should be turned to the left for broadcast band reception. When turned to the right the receiver tunes the American-Foreign Short Wave band of 18 to 55 meters.

The following tubes are employed:

1C6 - 1st Detector-Oscillator
34 - I.F. Amplifier
34 - I.F. Amplifier
25S - 2nd Detector-A.V.C.-A.F. Amplifier
33 - Power Amplifier

ALIGNMENT

The standard type of output meter should be used to indicate signal strength. It may be connected from plate of the 33 tube to ground.

ESSENTIAL DATA: The intermediate frequency employed is 448 Kc.

The rear section of the two gang condenser is the oscillator section; the front section, first detector.

INTERMEDIATES: To align the I.F. circuits, set the signal generator to 448 Kc. and feed its modulated signal direct to the antenna. Short out the oscillator section of the two gang condenser. 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. The third I.F. transformer has only one trimmer. If adjustments are not made accurately, selectivity will be poor and I.F. oscillation may result. Due to the I.F. trap in the antenna circuit a strong signal is necessary.

BROADCAST BAND: Place the band change switch on Broadcast position. Turn the dial to 1400 Kc. and feed a very weak 1400 Kc. modulated signal from your signal generator to the antenna. Adjust the broadcast oscillator trimmer for maximum reading. A three gang trimmer will be found on the bottom of the chassis. The oscillator trimmer mentioned is the section nearest the end of the chassis.

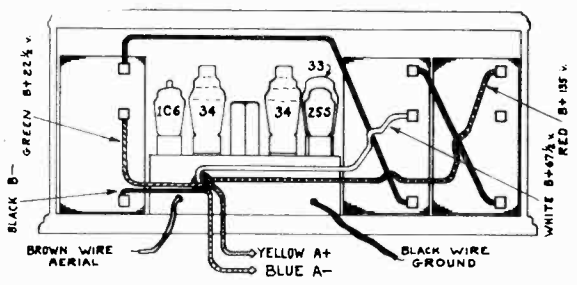
There is no adjustable padder condenser in this model so resonance on the low frequency end is accomplished by bending plates on the tuning condensers. Check the alignment at 1000 Kc. Insert a thin bakelite, celluloid or mica feeler strip between the plates of the variable condensers to determine whether the circuits are properly matched. The action is this--the dielectric constant of the celluloid feeler strip being higher than that of the air it displaces, results in an increase of capacity. Open the variable condenser just enough to indicate two or three points below maximum signal. As the feeler is inserted the meter reading should indicate increasing signal and then decreasing as the feeler is inserted farther. This procedure should be followed on both sections. Should the meter fail to show an increase in signal as the strip is inserted in one section this indicates too great a capacity for that section. This may be corrected by bending the outside rotor plates out at the point where they begin to mesh with the stator.

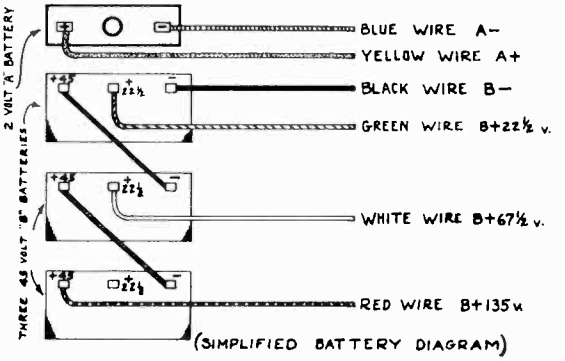
After checking the alignment at 1000 Kc. repeat the process at 600 Kc.

SHORT WAVE BAND: Place the band change switch on the Short Wave position. Turn the dial to 15.5 megacycles and feed a very weak 15.5 megacycle modulated signal from your signal generator to the antenna. Adjust the S. W. oscillator trimmer (at opposite end of three gang trimmer) for maximum reading on the output meter. This trimmer should not be touched again when checking alignment on other frequencies.

Next go to 12 megacycles and adjust the S. W. detector trimmer.

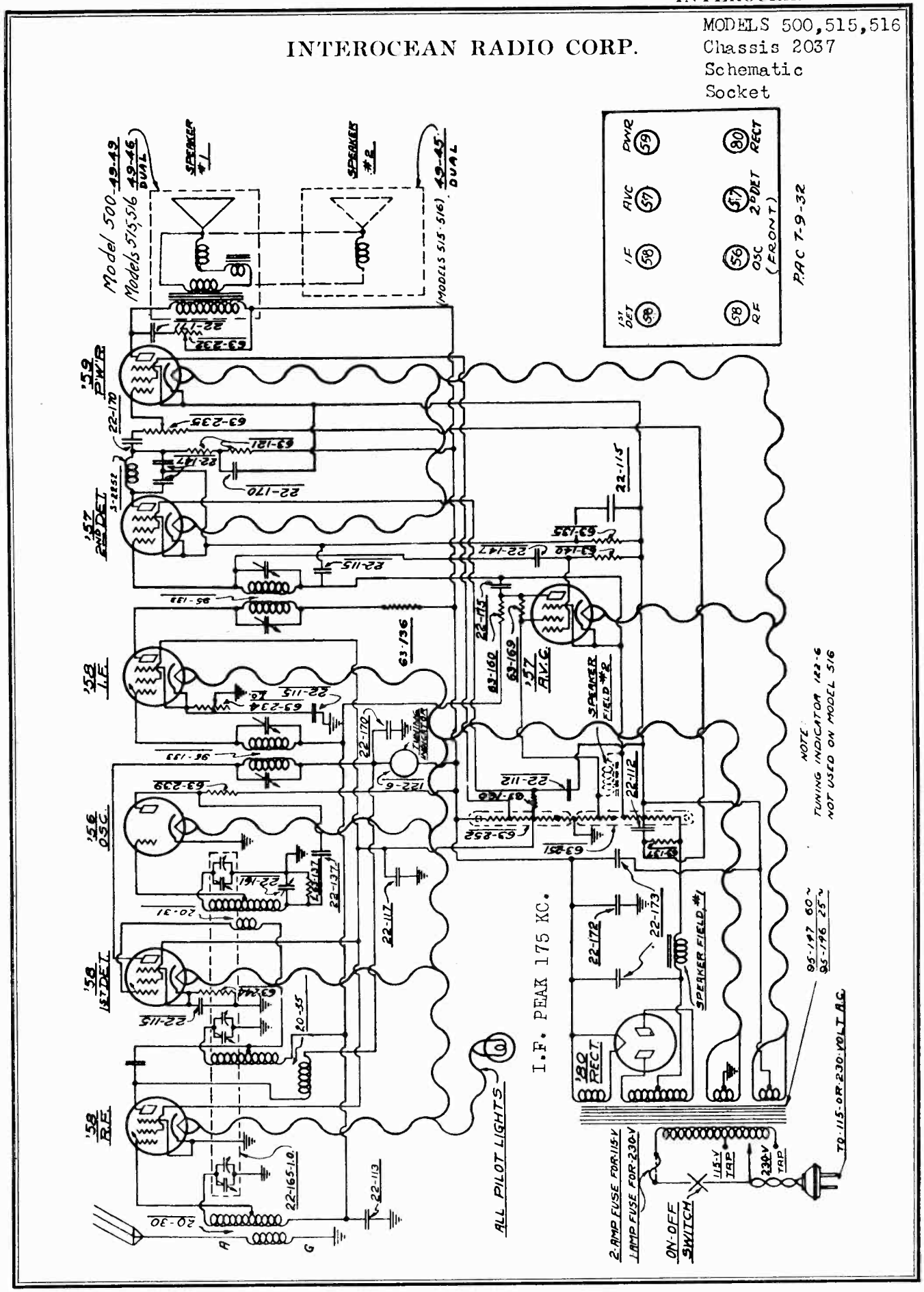
Instead of bending condenser plates at 6 megacycles alignment is accomplished by spreading or crowding turns on the S. W. detector coil. If much crowding or spreading is necessary it is advisable to go back and recheck at 12 megacycles.





INTEROCEAN RADIO CORP.

MODELS 500,515,516
Chassis 2037
Schematic
Socket



MODELS 500,515,516
Voltage,Alignment
Parts List

INTEROCEAN RADIO CORP.

Resistors

63-121 100M ohm,1 Watt (2nd Detector Plate).....
63-135 25M " ½ " (2nd Detector Cathode).....
63-137 250M " ½ " (Oscillator & Power Grid)..
63-140 1 meg" ½ " (A.V.C. Screen).....
63-160 100M " ½ " (A.V.C.Plate).....
63-169 400M " ½ " (A.V.C. Grid).....
63-239 24M ohm 1 Watt (Oscillator Plate).....
63-244 500 " ¼ " (1st Detector Cathode).
63-251 Voltage Divider (six tap).....
63-252 Voltage Divider (five tap).....

Coils and Chokes

20-30 Antenna Coil.....
20-31 Oscillator Coil.....
20-35 Detector Coil.....
95-133 1st & 2nd I. F. Transformer.....

Condensers

22-112 .1 mfd 300 volt(2nd Detector Screen & Power Grid).....
22-113 .5 " .....(R.F.1st Detector & I.F.Grid Return).....
*22-115 .1 " 200 volt(Four used, see below).....
22-117 .5 " .....(R.F.1st Detector, & I.F. Screen).....
22-137 .05 " 400 volt(Oscillator Plate).....
22-147 .0005 600 volt(2nd Detector Plate & A.V.C.Screen).....
22-170 .1 mfd 400 volt(R.F.& 1st Detector Plate,2nd Detector Plate)..
22-171 .05 " 600 volt(Tone Control).....
22-172 2. " 450 volt(Filter).....
22-173 8. " 500 volt(Filter).....

Socket Voltages

Tube Type	Position	Fil. Volt.	Plate Volt.	Cath. Volt.	Screen Volt.	Supp. Volt.	Plate Current
Z-58	R.F.	2.4	190	0	95	0	7.
Z-58	1st Det.	2.4	190	2.3	95	2.3	4.
Z-56	Osc.	2.4	100	0	-	-	4.
Z-58	I.F.	2.4	190	0	90	0	2.
Z-57	2nd Det.	2.4	90	-60	70	-60	.2
Z-57	A.V.C.	2.4	-10	-65	-2	-65	0
Z-59	Power	2.4	175	-70	165	-70	25
Z-80	Rect.	5.	*350	-	-	-	*36

Line 115 Volts

All Controls Maximum

All readings, with exception of heaters, taken from socket connections to ground Use 1,000 ohm per volt D. C. meter.)

BALANCE I.F. frequency at 175 K.C. Condenser gang at 1500 K.C. and oscillator padder at 600 K.C.